FEHILY TIMONEY

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

# APPENDIX 9

BIODIVERSITY

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# APPENDIX 9.1

# Bat Assessment Report

# Derrynadarragh Wind Farm

# Bat Assessment Report

Doherty Environmental Consultants Ltd

September 2025

| Document Stage | Document Version | Prepared by |
|---|---|---|
| Final | 1 | Pat Doherty MSc, MCIEEM |

This report has been prepared by Doherty Environmental Consultants Ltd with all reasonable skill, care and diligence. Information report herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is prepared for Dara Energy Ltd. and we accept no responsibility to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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# 1.0 INTRODUCTION

This Bat Report has been prepared on behalf of the applicant in respect of the proposed Derrynadarragh Wind Farm. This report and associated surveys have also been completed in accordance with the NatureScot 2021 guidance document *Bats and onshore wind turbines – survey, assessment and mitigation* (NatureScot, 2021). Consideration has also been given to the Northern Ireland Environmental Agency (NIEA) Natural Environment Division (NED) *Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Development in Northern Ireland.*

Bats are a European protected species and are listed under the *European Communities (Birds and Natural Habitats) Regulations 2011*. Lesser horseshoe (*Rhinolophus hipposideros*) bats are afforded special protection as an *Annex II* listed species. At the national level all species are protected under the *Wildlife Acts, as amended (1976 and 2000)*.

This report details the results of field surveys that aimed to identify the potential for roosting, foraging and commuting activity of bats within and immediately adjacent to the proposed Derrynadarragh Wind Farm with recommendations for mitigating any potential negative impacts. The surveys referred to in this report were undertaken throughout the bat activity season of 2021 (Summer, Autumn); 2022 (Spring), 2023 (Spring, Summer, Autumn) and 2024 (Spring, Summer, Autumn).

## 1.1 STATEMENT OF AUTHORITY

This Natura Impact Statement has been prepared by Mr. Pat Doherty BSc., MSc, MCIEEM, of DEC Ltd. Mr. Doherty is a consultant ecologist with over 20 years' experience in completing ecological impact assessments and environmental impact assessments. Pat has been involved in the completion of assessment reports for proposed developments and land use activities under the EIA Directive and Article 6 of the Habitats Directive since 2003 and 2006 respectively. He has extensive experience completing such reporting for projects located in a variety of environments and has a thorough understanding to the biodiversity issues that may arise from proposed land use activities. Pat was responsible for completing one of the first Appropriate Assessment reports for large scale infrastructure developments in Ireland when he prepared the Appropriate Assessment for the N25 New Ross Bypass in 2006/07. Since then, Pat has completed multiple examinations of both plans and projects in Ireland. He has completed Natura Impact Statements for national scale plans such as Ireland's CAP Strategic Plan and National Seafood Development Plan and regional and county scale plans including County Development Plans, Local Area Plans, Tourism Strategies and Climate Action Plans. Pat has completed multiple Natura Impact Statements for a range of development types that include large scale infrastructure developments in sectors such as transport and energy as well as industrial, commercial and residential developments.

Pat has completed focused certified professional development training in Appropriate Assessment as well as in a range of ecological survey techniques and assessment processes.

Training has been completed for National Vegetation Classification (NVC) and Irish Vegetation Classification (IVC) surveying, bryophyte survey for habitat assessment and identification, professional bat survey and assessment training, mammal surveying and specific training for bird and bat survey techniques. Ongoing training has been completed by approved training providers such as CIEEM, British Trust for Ornithology, the Botanic Gardens and the Field Studies Council.

## 1.2 AIMS & OBJECTIVES

The overall aim of the study was to appraise whether the proposed Derrynadarragh Wind Farm site and wider area of the proposed development is an important resource for roosting, foraging and commuting bats.

The results of these surveys were used to assess the potential impact of the proposed Derrynadarragh Wind Farm on the local bat population occurring within the proposed development site and wider area.

In order to establish the potential impacts of the proposed Derrynadarragh Wind Farm to bats the study sought to establish:

- the likely presence of bat roosts based on daytime surveys of field evidence associated with bat species and dusk and dawn activity surveys;
- the presence or otherwise of bat activity within the site;
- the presence of suitable foraging habitat; and
- the species type and population size occurring within or adjacent to the site.

## 1.3 SITE DESCRIPTION

The Site comprises approximately 208 hectares of land, and is contained within the townlands of Cushina, Clonsast Lower, and Chevychase or Derrynadarragh in County Offaly, and Aughrin and Derrylea in County Kildare. It is located within both the jurisdictions of Kildare County Council and Offaly County Council, approximately 1.7km south of the village of Bracknagh, 5km northwest of Monasterevin, and approximately 6.5km northeast of Portarlington.

The Proposed Wind Farm comprises a total of 9 no. turbines, with the positioning of 4 no. turbines to be located in the jurisdiction of County Kildare, and 5 no. turbines are to be located in the jurisdiction of County Offaly. The turbine array is located approximately 1.7km south of Bracknagh, 5.24km north-west of Monastervin and 6.5km north-east of Portarlington. Land use within the site is mainly dominated by agriculture, with areas of turbary activities located outside of, but adjacent to, the site boundary to the centre and south (Derrylea Bog). Furthermore, there is 89500 $m^2$ of forestry land within the northern portion of the site.

The Site is located within the lowland topography with predominantly flatlands. Red Hill (194m), Dunmurry Hill (234m) and Grange Hill (223m) are located within 10km to the east of the site. The site is located on the Derrylea Bog which is connected to Clonsast Bog to the north and Derryounce Bog to the west.

The Corrine Land Cover database for Ireland (based on interpretation of satellite imagery and national vector mapping data) identifies Quaternary deposits present at the site mostly comprise cut over raised peat. There are sections in the north and west of the site that are underlain by till derived from limestones, while the eastern section of the site is underlain by lake marl. The site is predominantly underlain by the Lucan Formation (dark limestone and shale) with a section in the north of the site underlain by the Ballyadams Formation (crinoidal wackestones/ packstone limestone).

The proposed wind farm site contains a number of habitats that are of ecological importance including treelines to the west of the site, woodland to the south-west and lowland rivers within the Cushina River.

# 2.0 METHODOLOGY

## 2.1 DESKTOP STUDY

### *2.1.1 Historical Records for Bats*

The National Biodiversity Data Centre reporting polygon tool was used to generate a report for all records of bat species occurring within a 6km buffer zone of the wind farm site. A 3km buffer zone was selected as this represents the greatest area over which the core sustenance zone of any bat species in Ireland extends. Leisler's bat have the widest core sustenance zone in Ireland, extending up to 3km from roost sites. (BCT, 2024). All records for bat species held within the 3km buffer zone were identified as part of the desktop study.

### *2.1.2 Bat Landscapes & Site Suitability for Bats*

A landscape conservation guide for Irish bat species was published in 2011 (Lundy et al., 2011). This study identified core areas of favourable habitat for bat species in Ireland. Landscapes are assigned a habitat suitability index score with the index ranging from 0 to 100, with 0 being least favourable and 100 being most favourable. The habitat suitability index is presented as GIS layers hosted by the National Biodiversity Data Centre. Habitat suitability index scores are provided for species areas of each species of bat individually as well as for all species combined.

The publication was reviewed to identify whether the project site occurs within the core area for any bat species.

The suitability of the Site to support bats was evaluated by reviewing the bat landscape favourability model (Lundy et al. 2011) and appraising the habitats occurring within the site or their potential to support foraging bats. This latter appraisal was completed with reference to the foraging habitat preferences of bats, as detailed by Collins et al. (2023) and the SNH (2019) guidance for appraising the habitat risk for bats.

### *2.1.3 Designated Conservation Areas*

Current mapping data for European Sites, NHAs and pNHAs boundaries were downloaded from the NPWS Maps & Data website. All such conservations sites occurring within a 6km buffer zone of the proposed wind farm site were identified and reviewed to identify whether or not any of these sites are listed as conservation areas for their role in supporting bat species.

## 2.2 BAT ACTIVITY SURVEYS

Bat activity surveys were undertaken during the 2021, 2022, 2023 and 2024 bat activity season. The surveys have been completed in accordance with the Scottish Natural Heritage (2021) guidance document Bats and Onshore Wind turbines – survey, assessment and mitigation; and Bat Conservation Trust (BCT) Guidelines (Hundt, 2012 & Collins, 2016).

A minimum of 10 no. nights of monitoring per meteorological season of the bat activity season was completed at or in the vicinity of each turbine position. Wildlife Acoustics Bat detectors were used for all surveys. The Wildlife Acoustics bat detectors deployed during monitoring comprise SM4 Full Spectrum (FS), SM4 Zero-crossing (ZC), SM-Mini Bat and SM-Mini Bat 2. For SM4 Full Spectrum (FS), SM4 Zero-crossing (ZC) detectors SMX U2 microphones were used. Fresh branded batteries (e.g. Duracell; Panasonic) were used at the start of each monitoring session.

All automatic bat detectors were mounted at least 2m above ground level (see subsections below for further details of heights at which detectors were deployed). Each detector was set to record continuously on a nightly basis during the monitoring session, commencing at 30 minutes before sunset and 30 minutes after sunrise.

A Davis Vantage Vue remote weather station was erected on site for the duration of the bat activity season surveys.

Field surveys commenced during the summer season of 2021 and continued during the 2022, 2023 and 2024 bat activity seasons, terminating in autumn 2024. Extended automatic monitoring for bat activity has been undertaken during the following meteorological seasons for the above listed bat activity seasons:

2021 Bat Activity Season: Summer & Autumn

2022 Bat Activity Season: Spring

2023 Bat Activity Season: Spring, Summer & Autumn

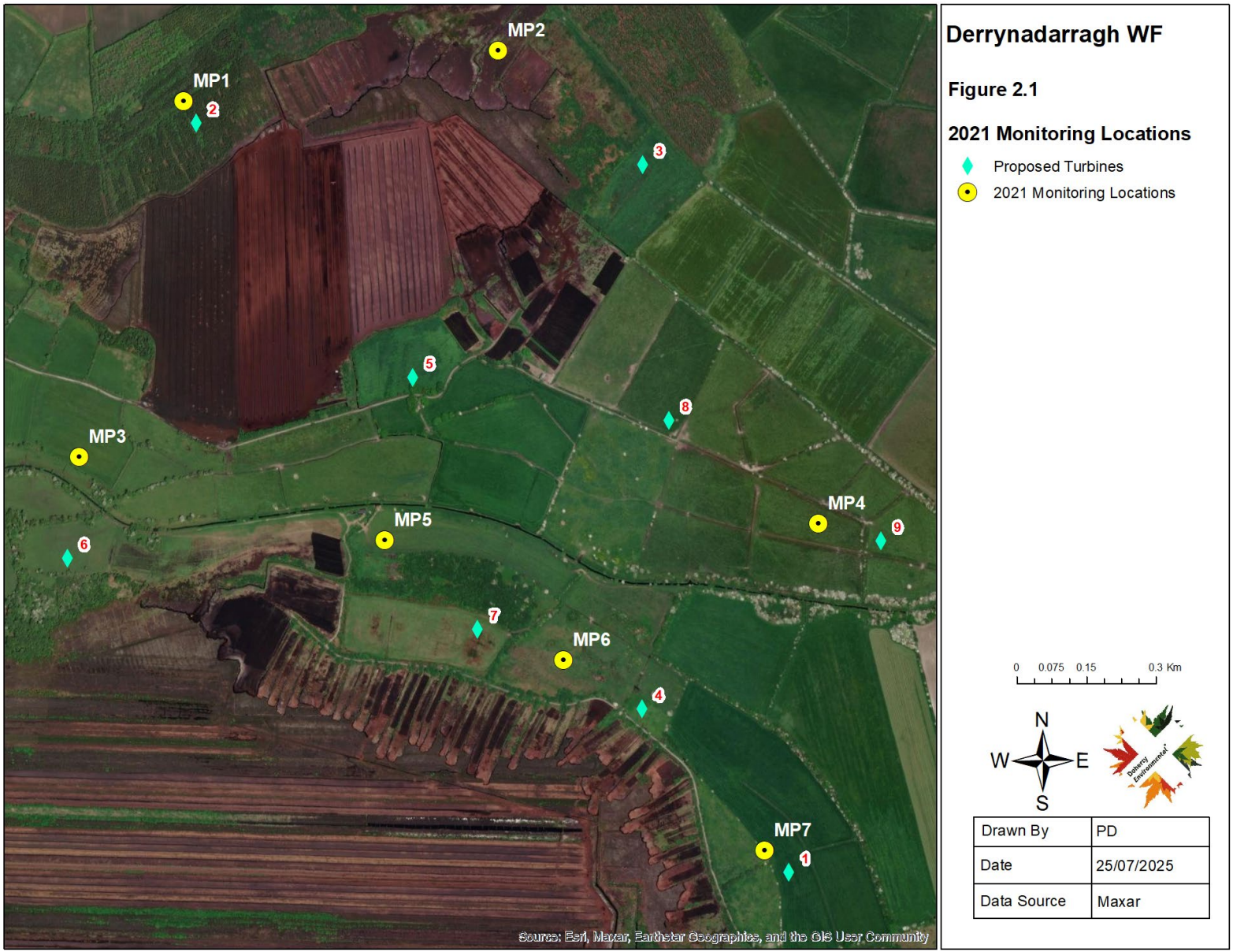
2024 Bat Activity Season: Spring, Summer & Autumn

Details of the bat activity surveys completed during each season are set out in the following sub-sections.

### *2.2.1 2021 & 2022 Bat Activity Season*

During the 2021 (summer and autumn) and 2022 (spring) bat activity monitoring bat detectors were placed in the vicinity of the proposed turbine layout at the time of the proposed surveys. This was based on a 7-turbine layout. The details of the detectors used and the position of each detector with respect to the 2021 layout are described in Table 2.1 below. The spatial relevance of the 2021 bat activity monitoring with respect to the final proposed 9-turbine layout is described in **Table 2.1**. **Figure 2.1** shows the position of the 2021 & 2022 bat monitoring point (MP1 – MP7), along with the 2021/2022 turbine positions (T1 – T7) and the position of the 9 turbines associated with the proposed wind farm development.

**Table 2.2** below lists the dates for the summer and autumn 2021 and spring 2022 monitoring sessions, along with the number of nights of monitoring completed per session. A total of 575 nights of monitoring was completed during the summer and autumn 2021 and spring 2022 monitoring session.




**Derrynadarragh WF**

**Figure 2.1**

**2021 Monitoring Locations**

Proposed Turbines

2021 Monitoring Locations

0 0.075 0.15 0.3 Km

N W E S

| | |
|---|---|
| Drawn By | PD |
| Date | 25/07/2025 |
| Data Source | Maxar |

**Table 2.1: Details of 2021 & 2022 Bat Activity Monitoring**

| Monitoring Point | Turbine No. | Detector Type | Habitat Type | Habitat Category | Description |
|---|---|---|---|---|---|
| 1 | 1 | SM4 | U2 | Edge | The detector was place at an elevated position attached to a pole securely positioned in a spoil heap situated at the edge of the conifer plantation in which the T01 turbine was situated as per the 2021/2022 turbine layout. The detector microphone was positioned c. 3.5m above ground level.<br><br>***Spatial Relevance to Final Turbine Layout***<br><br>MP1 was positioned approximately 150m to the east of the position of the proposed turbine T02, which is situated within the same block of conifer plantation as the 2021/2022 T01 position. |
| 2 | 2 | SM4 | U2 | Open | The detector was attached to a pole whic75h was in turn attached to the trunk of an immature birch tree along a drain separating to fields of cutover raised bog. The detector microphone was positioned at a height of c. 2.5m above ground level. MP2 was positioned approximately 30m from T02 of the 2021/2022 turbine layout.<br><br>**Spatial Relevance to Final Turbine Layout**<br><br>MP2 was positioned approximately 400m to the northwest of the position of the proposed turbine T03, which is nearest turbine of the final proposed layout to MP2. |

| Monitoring Point | Turbine No. | Detector Type | Habitat Type | Habitat Category | Description |
|---|---|---|---|---|---|
| 3 | 3 | SMZC | U2 | Linear | The detector microphone was attached to a pole that was in turn attached to the trunk of a hawthorn tree along a field boundary hedgerow. The microphone was positioned at a height of c. 3.5m above ground level. MP3 was positioned approximately 25m from T03 of the 2021/2022 turbine layout.<br><br>**Spatial Relevance to Final Turbine Layout**<br><br>MP3 was positioned approximately 220m to the north of the position of the proposed turbine T08, which is nearest turbine of the final proposed layout to MP3. |
| 4 | 4 | SM Mini Bat | SM Mini Bat | | The detector microphone was attached to a pole that was in turn attached to the fenceline bounding the field in which T04 of the 2021/2022 layout was positioned. The detector was positioned at a height of 2.5m above ground level. The detector was positioned c. 40m to the north of the 2021/2022 T04 position.<br><br>**Spatial Relevance to Final Turbine Layout**<br><br>MP4 was positioned approximately 150m to the northwest of the position of the proposed turbine T09, which is nearest turbine of the final proposed layout to MP4. |
| 5 | 5 | SMZC | U2 | | The detector microphone was attached to a pole that was in turn attached to a branch of a mature hawthorn tree. The microphone extended out from the mature tree in a southerly direction at c. 3.5m above ground level. The detector was positioned c. 30m to the north of the 2021/2022 T05 position.<br><br>**Spatial Relevance to Final Turbine Layout**<br><br>The location of MP5 is positioned approximately 275m to the northwest of the position of the proposed turbine T07, which is nearest turbine of the final proposed layout to MP5. |

| Monitoring Point | Turbine No. | Detector Type | Habitat Type | Habitat Category | Description |
|---|---|---|---|---|---|
| 6 | 6 | SM Mini Bat | SM Mini Bat | | The detector microphone was attached to a pole that was in turn positioned on top of a wall of a ruined structure. The detector and microphone was placed c. 5m above ground level, orientated to the southeast in the direction of the 2021/2022 T06 position. The detector was positioned c. 30m to the northwest of T06 of the 2021/2022 turbine layout.<br><br>**Spatial Relevance to Final Turbine Layout**<br><br>The location of MP6 is positioned c. 160m to the east of the position of the proposed turbine T07, which is nearest turbine of the final proposed layout to MP6. |
| 7 | 7 | SM Mini Bat | SM Mini Bat | | The detector was attached to a pole that was in turn attached to a branch of an ash tree, with the detector and microphone extending out from the tree. The detector and microphone was placed c. 4m above ground level, orientated to the northwest along the alignment of the field boundary. The detector was positioned immediately adjacent to the position of T07 of the 2021/2022 turbine layout.<br><br>**Spatial Relevance to Final Turbine Layout**<br><br>The location of MP7 is positioned c. 70m to the northwest of the position of the proposed turbine T01, which is nearest turbine of the final proposed layout to MP7. |

**Table 2.2: Monitoring Date Ranges and No. Nights Monitoring during Summer & Autumn 2021 & Spring 2022**

| MP No. | Dates | No Monitoring Nights | No. Nights of Suitable Weather | Season |
|---|---|---|---|---|
| T1 | 03/07/2021 – 11/08/2021 | 40 | 35 | Summer |

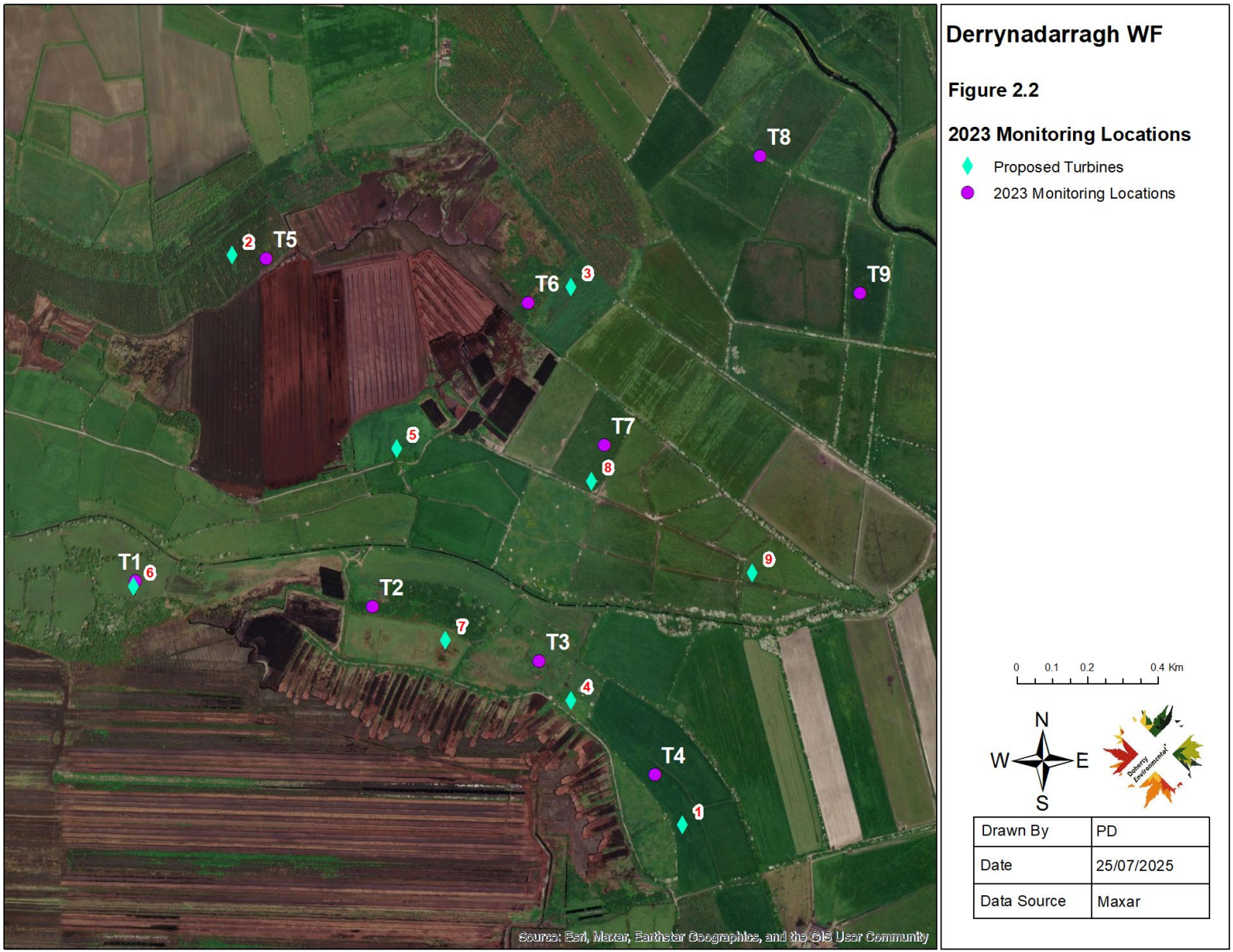
| MP No. | Dates | No Monitoring Nights | No. Nights of Suitable Weather | Season |
|---|---|---|---|---|
| | 12/10/2021 – 23/10/2021 | 12 | 12 | Autumn |
| | 26/04/2022 – 31/05/2022 | 35 | 31 | Spring |
| T2 | 03/07/2021 – 11/08/2021 | 40 | 35 | Summer |
| | 27/09/2021 – 16/10/2021 | 19 | 17 | Autumn |
| | 26/04/2022 – 31/05/2022 | 35 | 31 | Spring |
| T3 | 10/06/2021 – 06/08/2021 | 58 | 53 | Summer |
| | 27/09/2021 – 03/11/2021 | 35 | 26 | Autumn |
| | 26/04/2022 – 21/05/2022 | 35 | | Spring |
| T4 | Deployed 10/06/2021 – detector failed to record. | NA | NA | Summer |
| | 12/10/2021 – 08/11/2021 | 27 | 20 | Autumn |
| | 26/04/2022 – 16/05/2022 | 20 | 19 | Spring |
| T5 | 10/06/2021 – 08/07/2021 | 29 | 24 | Summer |
| | 27/09/2021 – 16/10/2021 | 19 | 17 | Autumn |
| | 26/04/2022 – 31/05/2022 | 35 | 31 | Spring |
| T6 | 03/07/2021 – 11/08/2021 | 40 | 38 | Summer |
| | 12/10/2021 – 07/11/2021 | 26 | 16 | Autumn |
| | 26/04/2022 – 27/04/2022 | 1 – Detector failed to record after first night – detector failure | NA | Spring |
| T7 | 03/07/2021 – 04/08/2021 | 33 | 28 | Summer |

| MP No. | Dates | No Monitoring Nights | No. Nights of Suitable Weather | Season |
|---|---|---|---|---|
| | 12/10/2021 – 31/10/2021 | 20 | 17 | Autumn |
| | 26/04/2022 – 12/05/2022 | 17 | 16 | Spring |

### *2.2.2 2023 Bat Activity Season*

During the 2023 bat activity monitoring bat detectors were placed in the vicinity of the proposed turbine layout at the time of the proposed surveys. This was based on a 9-turbine layout. The details of the detectors used and the position of each detector with respect to the 2023 layout are described in **Table 2.2** below. The spatial relevance of the 2023 bat activity monitoring with respect to the final proposed 9-turbine layout is described in **Table 2.3. Figure 2.2** shows the position of the 2023 bat monitoring point (MP1 – MP9), along with the 2023 turbine positions (T1 – T9) and the position of the 9 turbines associated with the proposed wind farm development.

**Table 2.4** below lists the dates for the spring, summer and autumn 2023 monitoring sessions, along with the number of nights of monitoring completed per session. A total of 390 nights of monitoring was completed during the 2023 bat activity season.




**Derrynadarragh WF**

**Figure 2.2**

**2023 Monitoring Locations**

- Proposed Turbines
- 2023 Monitoring Locations

0 0.1 0.2 0.4 Km

N W E S

| | |
|---|---|
| Drawn By | PD |
| Date | 25/07/2025 |
| Data Source | Maxar |

**Table 2.3: Details of 2023 Bat Activity Monitoring**

| Monitoring Point | Turbine No. | Detector Type | Habitat Type | Habitat Category | Description |
|---|---|---|---|---|---|
| MP1 | 1 | SM4 | U2 | Linear | The detector was place at an elevated position attached to a pole securely positioned into the ground along a gap in a hedgerow located c. 100m to the west of the T01 turbine of the 2023 turbine layout. The detector microphone was positioned c. 2.5m above ground level.<br><br>***Spatial Relevance to Final Turbine Layout***<br><br>MP1 was positioned approximately 100m to the west of the position of the proposed turbine T06 of the final proposed wind farm layout. |
| MP2 | 2 | SM Mini Bat | U2 | Linear | The detector was attached to a pole which was in turn attached to the branch of tree along the boundary of the field to the west of the 2023 T2 position. The detector was extended out from the tree on the pole and was orientated in a easterly direction towards the turbine position. The detector microphone was positioned at a height of c. 3.5m above ground level. MP2 was positioned approximately 50m from T02 of the 2021 turbine layout.<br><br>***Spatial Relevance to Final Turbine Layout***<br><br>MP2 was positioned c. 230m to the west of the position of the proposed turbine T07, which is nearest turbine of the final proposed layout to MP2. |

| Monitoring Point | Turbine No. | Detector Type | Habitat Type | Habitat Category | Description |
|---|---|---|---|---|---|
| MP3 | 3 | SMZC | U2 | Linear | The detector microphone was attached to a pole that was in turn fixed in place on top of a spoil heap at a height of c. 4.5m above ground level. MP3 was positioned approximately 20m from T03 of the 2023 turbine layout.<br><br>***Spatial Relevance to Final Turbine Layout***<br><br>The location of MP3 is positioned c. 140m to the northwest of the position of the proposed turbine T04, which is nearest turbine of the final proposed layout to MP3. |
| MP4 | 4 | SM Mini Bat | U2 | Linear/Open | The detector was attached to a pole that was in turn attached to a branch of an ash tree, with the detector and microphone extending out from the tree. The detector and microphone was placed c. 4m above ground level, orientated to the northwest along the alignment of the field boundary. The detector was deployed c. 100m to the south of the position of T04 of the 2023 turbine layout.<br><br>***Spatial Relevance to Final Turbine Layout***<br><br>The location of MP4 is positioned c. 70m to the northwest of the position of the proposed turbine T01, which is nearest turbine of the final proposed layout to MP4. |
| MP5 | 5 | SM Mini Bat | U2 | Edge | The detector was place at an elevated position attached to a pole securely positioned in a spoil heap situated at the edge of the conifer plantation in which the T05 turbine was situated as per the 2023 turbine layout. The detector microphone was positioned c. 3.5m above ground level.<br><br>***Spatial Relevance to Final Turbine Layout***<br><br>MP5 was positioned c. 50m to the east of the position of the proposed turbine T02 of the final 9-turbine layout, which is situated within the same block of conifer plantation as the 2023 T05 position. |

| Monitoring Point | Turbine No. | Detector Type | Habitat Type | Habitat Category | Description |
|---|---|---|---|---|---|
| MP6 | 6 | SM Mini Bat | U2 | Open | The detector microphone was attached to a pole that was in turn attached to the trunk of an immature Sitka spruce tree at the T06 position of the 2023 layout. The detector and microphone was placed c. 3m above ground level, orientated to the south.<br><br>***Spatial Relevance to Final Turbine Layout***<br><br>The location of MP6 is positioned c. 130m to the southwest of the position of the proposed turbine T03, which is nearest turbine of the final proposed layout to MP6. |
| MP7 | 7 | SM Mini Bat | U2 | Open | The detector was attached to a pole that was in turn attached to the trunk of an immature willow trees growing along a drainage ditch field boundary. The detector and microphone was placed c. 3.5m above ground level, orientated to the northwest in the direction of the proposed 2023 T07. The detector was positioned c. 30m to the east of T07 of hte 2023 layout.<br><br>***Spatial Relevance to Final Turbine Layout***<br><br>The location of MP7 is positioned c. 100m to the northeast of the position of the proposed turbine T08, which is nearest turbine of the final proposed layout to MP7. |
| MP8 | 8 | SM FS | U2 | Open | The detector microphone was attached to a disused telephone pole at a height of placed c. 5m above ground level, orientated to the southeast in the direction of the 2023 T08 position. The detector was positioned c. 100m to the northwest of T08 of the 2023 turbine layout.<br><br>***Spatial Relevance to Final Turbine Layout***<br><br>The location of MP8 is positioned c. 650m to the northeast of the position of the proposed turbine T03, which is nearest turbine of the final proposed layout to MP8. |

| Monitoring Point | Turbine No. | Detector Type | Habitat Type | Habitat Category | Description |
|---|---|---|---|---|---|
| MP9 | 9 | SM Mini Bat | SM Mini Bat | | The detector was attached to a pole that was in turn attached to a branch of a hawthorn tree, with the detector and microphone extending out from the tree. The detector and microphone was placed c. 4m above ground level, orientated to the east in the direction of the 2023 T09 turbine position. The detector was positioned c. 30m to the west of the position of T07 of the 2023 turbine layout.<br><br>***Spatial Relevance to Final Turbine Layout***<br><br>The location of MP9 is positioned c. 820m to the east of the position of the proposed turbine T03, which is nearest turbine of the final proposed layout to MP9. |

**Table 2.4: Monitoring Date Ranges and No. Nights Monitoring during Spring, Summer & Autumn 2023**

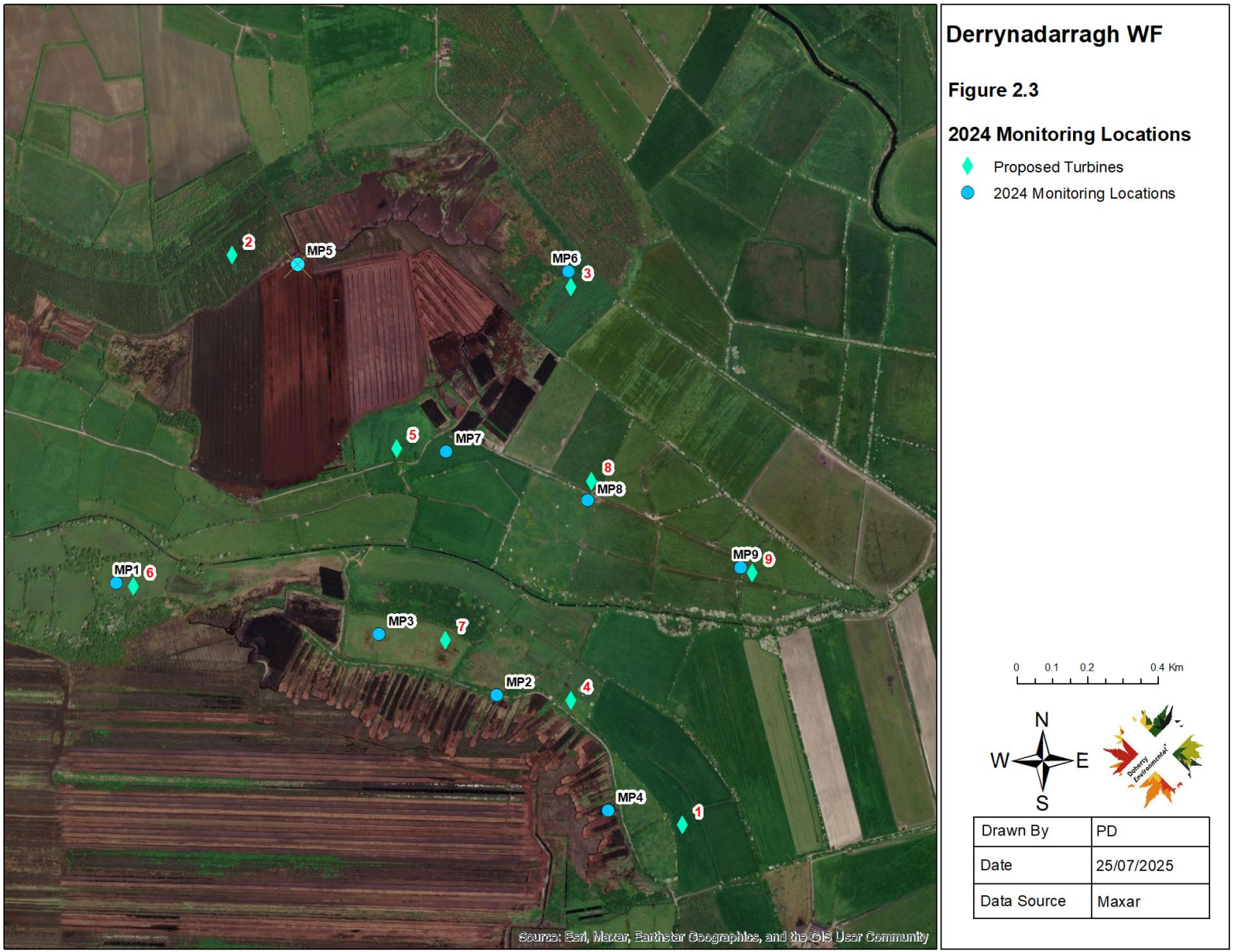
| MP No. | Dates | No Monitoring Nights | No. Nights of Suitable Weather | Season |
|---|---|---|---|---|
| T1 | 19/04/2023 – 30/04/2023 | 11 | 11 | Spring |
| | 20/08/2023 – 31/08/2023 | 11 | 11 | Summer |
| | 01/09/2023 – 19/09/2023 | 19 | 19 | Autumn |
| T2 | 01/05/2023 – 18/05/2023 | 18 | 17 | Spring |
| | 29/06/2023 – 08/07/2023 | 10 | 10 | Summer |
| | 10/10/2023 – 21/10/2023 | 11 | 10 | Autumn |
| T3 | 19/04/2023 – 30/04/2023 | 11 | 11 | Spring |
| | 20/08/2023 – 31/08/2023 | 11 | 11 | Summer |

| MP No. | Dates | No Monitoring Nights | No. Nights of Suitable Weather | Season |
|---|---|---|---|---|
| | 01/09/2023 – 11/09/2023 | 11 | 11 | Autumn |
| T4 | 19/04/2023 – 30/04/2023 | 11 | 11 | Spring |
| | 20/08/2023 – 31/08/2023 | 11 | 11 | Summer |
| | 01/09/2023 – 11/09/2023 | 11 | 11 | Autumn |
| T5 | 01/05/2023 – 10/05/2023 | 10 | 10 | Spring |
| | 09/07/2023 – 20/07/2023 | 11 | 11 | Summer |
| | 01/09/2023 – 17/09/2023 | 17 | 17 | Autumn |
| T6 | 19/04/2023 – 13/05/2023 | 24 | 24 | Spring |
| | 08/08/2023 – 20/08/2023 | 12 | 12 | Summer |
| | 10/10/2023 – 21/10/2023 | 11 | 10 | Autumn |
| T7 | 19/04/2023 – 08/05/2023 | 20 | 20 | Spring |
| | 20/08/2023 – 31/08/2023 | 11 | 11 | Summer |
| | 01/09/2023 – 11/09/2023 | 11 | 11 | Autumn |
| T8 | 13/05/2023 – 31/05/2023 | 19 | 18 | Spring |
| | 10/06/2023 – 30/06/2023 | 20 | 20 | Summer |
| | 01/09/2023 – 21/11/2023 | 21 | 20 | Autumn |
| T9 | 10/05/2023 – 31/05/2023 | 21 | 20 | Spring |
| | 20/08/2023 – 31/08/2023 | 11 | 11 | Summer |
| | 01/09/2023 – 24/09/2023 | 25 | 24 | Autumn |

### *2.2.3 2024 Bat Activity Season*

During the 2024 bat activity monitoring bat detectors were placed in the vicinity of the final 9-turbine layout of the proposed wind farm development. The details of the detectors used and the position of each detector with respect to the final proposed layout are described in **Table 2.5** below. **Figure 2.3** shows the position of the 2024 bat monitoring point (MP1 – MP9), along with the position of the 9 turbines associated with the proposed wind farm development.

**Table 2.6** below lists the dates for the spring, summer and autumn 2024 monitoring sessions, along with the number of nights of monitoring completed per session. A total of 337 nights of monitoring was completed during the 2024 bat activity season.




**Derrynadarragh WF**

**Figure 2.3**

**2024 Monitoring Locations**

- Proposed Turbines
- 2024 Monitoring Locations

0 0.1 0.2 0.4 Km

N W E S

| | |
|---|---|
| Drawn By | PD |
| Date | 25/07/2025 |
| Data Source | Maxar |

**Table 2.5: Details of 2024 Bat Activity Monitoring**

| Monitoring Point | Turbine No. | Detector Type | Habitat Type | Habitat Category | Description |
|---|---|---|---|---|---|
| MP1 | 6 | SM4 | U2 | Linear | The detector at MP1 was place at an elevated position attached to a pole securely positioned into the ground along a gap in a hedgerow located c. 100m to the west of the T06 turbine of the 2024 turbine layout. The detector microphone was positioned c. 2.5m above ground level. |
| MP2 | 4 | SM Mini Bat | U2 | Linear | The detector was attached to a pole which was in turn attached to the branch of tree along the boundary of an area of cutover bog. The detector was extended out from the tree on the pole and was orientated in a southeasterly direction. The detector microphone was positioned at a height of c. 3.5m above ground level. MP2 was positioned approximately 200m from T04 of the proposed turbine layout. |
| MP3 | 7 | SMZC | U2 | Linear | The detector at MP3 was attached to a pole that was in turn attached to the trunk of an immature willow trees growing along a drainage ditch within a central area of a field. The detector and microphone was placed c. 3.5m above ground level, orientated to the east in the direction of the T07. The detector was positioned c. 180m to the west of T07 of proposed turbine layout. |
| MP4 | 1 | SM Mini Bat | U2 | Open | The detector at MP4 was attached to a birch tree within an area of cutover bog. The detector was extended out from the top of the tree and an elevation of c. 5m.<br><br>The detector was positioned c. 200 to the west of the proposed turbine T01. |

| Monitoring Point | Turbine No. | Detector Type | Habitat Type | Habitat Category | Description |
|---|---|---|---|---|---|
| MP5 | 2 | SM Mini Bat | U2 | Edge | The detector was place at an elevated position attached to a pole securely positioned in a spoil heap situated at the edge of the conifer plantation. The detector microphone was positioned c. 3.5m above ground level.<br><br>MP5 was positioned c. 125m to the southeast of the position of the proposed turbine T02 of the final 9-turbine layout, which is situated within the same block of conifer plantation as the 2023 T05 position. |
| MP6 | 3 | SM Mini Bat | U2 | Linear | The detector at MP6 was attached to a pole which was in turn attached to the branch of tree along a hedgerow field boundary. The detector was extended out from the tree on the pole and was orientated in a southerly direction in the direction of T03. The detector microphone was positioned at a height of c. 3.5m above ground level.<br><br>MP6 was positioned approximately 35m from T03 of the proposed turbine layout. |
| MP7 | 5 | SM Mini Bat | U2 | Linear/Open | The detector was attached to a pole that was in turn attached to a branch of an willow tree, with the detector and microphone extending out from the tree. The detector and microphone was placed c. 4m above ground level, orientated to the northwest.<br><br>The location of MP7 was positioned c. 80m to the south of the position of the T05 of the proposed turbine layout. |
| MP8 | 8 | SM Mini Bat | U2 | Open | The detector was attached to a pole that was in turn attached to the trunk of an immature willow trees growing along a drainage ditch field boundary. The detector and microphone was placed c. 3.5m above ground level, orientated to the south in the direction of the T08.<br><br>The detector was positioned c. 25m to the north of T08 of the proposed turbine layout. |

| Monitoring Point | Turbine No. | Detector Type | Habitat Type | Habitat Category | Description |
|---|---|---|---|---|---|
| MP9 | 9 | SM Mini Bat | U2 | Open | The detector was attached to a pole that was in turn attached to the trunk of an immature willow trees growing along a drainage ditch field boundary. The detector and microphone was placed c. 3.5m above ground level, orientated to the east in the direction of the T09.<br><br>The detector was positioned c. 20m to the west of T079 of the proposed turbine layout. |

**Table 2.6: Monitoring Date Ranges and No. Nights Monitoring during Spring, Summer & Autumn 2024**

| MP No. | Dates | No Monitoring Nights | No. Nights of Suitable Weather | Season |
|---|---|---|---|---|
| T1 | 01/05/2024 – 10/05/2024 | 11 | 11 | Spring |
| | 21/08/2024 – 31/08/2024 | 11 | 11 | Summer |
| | 01/09/2024 – 12/09/2024 | 13 | 13 | Autumn |
| T2 | 01/05/2024 – 12/05/2024 | 12 | 12 | Spring |
| | 21/08/2024 – 31/08/2024 | 11 | 11 | Summer |
| | 01/09/2024 – 12/11/2024 | 13 | 13 | Autumn |
| T3 | 17/04/2024 – 01/05/2024 | 13 | 11 | Spring |
| | 21/08/2024 – 31/08/2024 | 11 | 11 | Summer |
| | 01/09/2024 – 13/11/2024 | 14 | 14 | Autumn |
| T4 | 17/04/2024 – 01/05/2024 | 15 | 13 | Spring |
| | 21/08/2024 – 31/08/2024 | 11 | 11 | Summer |

| MP No. | Dates | No Monitoring Nights | No. Nights of Suitable Weather | Season |
|---|---|---|---|---|
| | 13/09/2024 – 30/11/2024 | 18 | 18 | Autumn |
| T5 | 01/05/2024 – 12/05/2024 | 12 | 12 | Spring |
| | 17/08/2024 – 31/08/2024 | 15 | 15 | Summer |
| | 13/09/2024 – 24/11/2024 | 12 | 12 | Autumn |
| T6 | 01/05/2024 – 15/05/2024 | 16 | 16 | Spring |
| | 21/08/2024 – 31/08/2024 | 11 | 11 | Summer |
| | 01/09/2024 – 12/11/2024 | 13 | 13 | Autumn |
| T7 | 01/05/2024 – 15/05/2024 | 16 | 16 | Spring |
| | 21/08/2024 – 31/08/2024 | 11 | 11 | Summer |
| | 01/09/2024 – 12/11/2024 | 13 | 13 | Autumn |
| T8 | 01/05/2024 – 13/05/2024 | 13 | 13 | Spring |
| | Deployed 21/08/2024 – detector failed to record. | NA | | Summer |
| | 13/09/2024 – 24/09/2024 | 12 | 12 | Autumn |
| T9 | 01/05/2024 – 14/05/2024 | 14 | 14 | Spring |
| | 21/08/2024 – 31/08/2024 | 11 | 11 | Summer |
| | 01/09/2024 – 14/09/2024 | 15 | 15 | Autumn |

## 2.3 BAT ROOST SURVEYS

### *2.3.1 Structures*

In addition to the automatic surveys, roost surveys were completed at any structures occurring within a 200m buffer distance of the proposed turbine locations. No structures occur within a

200m buffer distances of any of the proposed turbines. Two corrugated agricultural sheds are located approximately 225m to the east of the proposed turbine T5. These sheds are situated within a farm yard to the east of T5 as shown on **Figure 2.4**, (labelled as S1a and S1b). An additional structure within the wind farm site boundary, in the form of a corrugated farm shed occurs approximately 340m to the northwest of the proposed turbine T07. This shed is shown on **Figure 2.4** as S2**.** The structures S1 and S2 were subject to daytime inspection survey that comprised a search for:

- obvious exit/egress points for bats such as roof spaces, wall crevices, open windows & doors etc.; and
- field signs associated with bat activity such as faecal droppings, scratch marks, staining on walls etc.

Other structural features such as roof material, aspect and shape were recorded along with the overall condition of the structure.

Binoculars, high powered torches and inspection cameras were used during the daytime assessment. Photographs were taken of structures occurring within the proposed site.

Where the possibility that bats were present in the structures inspected could not be eliminated during the internal inspection survey or where evidence of bats was found during the roost inspection survey then further presence/absence roost surveys were completed.

### *2.3.2 Trees*

Any mature trees occurring within a 200m radius of turbine locations were assessed for their potential to function as roosts for bats and, where required surveyed for the presence of roosting bats.

The tree roost assessment method follows that outlined by Collins et al. (2023) for a ground level tree assessment (GLTA). All mature trees occurring within a 200m radius of the final layout were inspected for their potential to function as roost sites during on the 17th April and 1st May 2024. The inspections were based on a ground level tree assessment. Each tree was inspected for the presence of preferred roost features (PRFs). Examples of PRF types are set out in **Table 2.7** below.

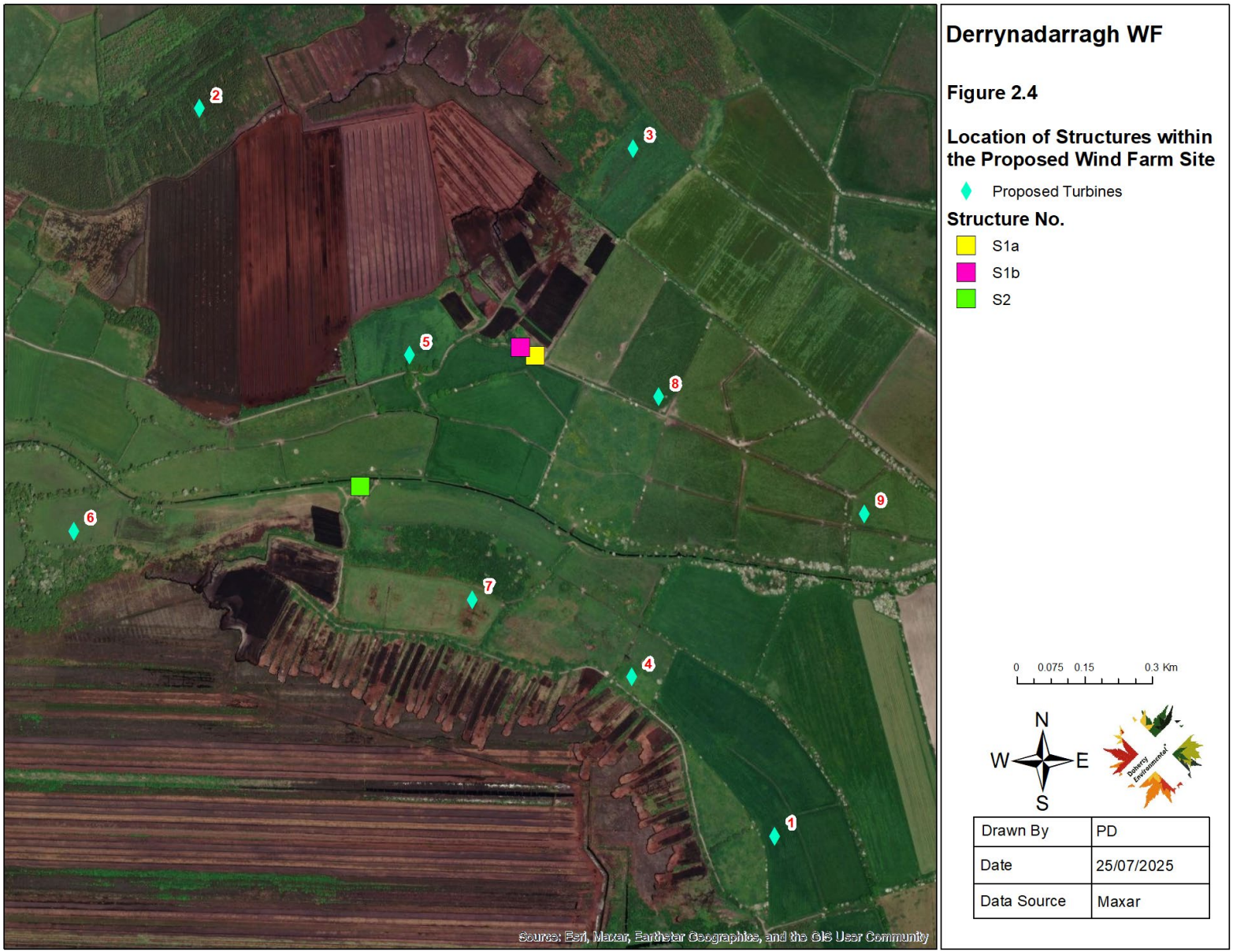

2
3
5
8
6
9
7
4
1
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Derrynadarragh WF
Figure 2.4
Location of Structures within the Proposed Wind Farm Site
Proposed Turbines
Structure No.
S1a
S1b
S2
0 0.075 0.15 0.3 Km
N
W
E
S
Drawn By PD
Date 25/07/2025
Data Source Maxar

**Table 2.7: PRF Types that can be exploited by bats and how they form**

| PRFs formed by disease and decay | PRFs formed by damage | PRFs formed by association |
|---|---|---|
| Holes | Lightning Strikes | Fluting |
| Pruning Cuts | Hazard Beams | Ivy |
| Tear Outs | Subsidence | |
| Wounds | Cracks | |
| Cankers | Shearing Cracks | |
| Compression | Welds | |
| Forks | Lifting Bark | |
| Butt Rots | Desiccation | |
| | Fissures | |
| | Frost Cracks | |

Any mature trees occurring within a 200m radius of the proposed turbine locations were inspected during the daytime. The inspections of the trees were undertaken using an LED head torch and Swarovski binoculars.

All trees inspected were classified as PRF-I and PRF-M trees as per Collins et al. (2023). PRF-I trees are described by Collins et al. as trees with PRFs only suitable for individual bats or very small numbers of bats either due to size or lack of suitable surrounding habitat. PRF-M trees are described as trees with PRFs suitable for multiple bats and may therefore be used by a maternity colony.

For PRF-I trees Collins *et al*. recommend that no further surveys are required. For PRF-M trees Collins *et al*. recommend that at least two no. presence/absence surveys for bats are completed between May to September with at least two of the surveys being completed between May and August.

Locations where mature trees occur within a 200m buffer distance of turbines comprise the 200m buffer area surrounding the proposed turbine T1, T5 and T6. The mature trees occurring within the buffer areas of these turbines were inspected for their potential to function as roost sites for bats.

## 2.4 ANALYSIS OF BAT CALLS

Bat calls recorded by the SM4 bat detectors during the automatic bat monitoring sessions were analysed using Kaleidoscope Pro (v. 5.7.0) software. Kaleidoscope automatic bat identification software was used to assign bat calls to species level. Bat calls assigned to Myotis species were grouped together under the Myotis genus.

The online Ecobat tool as recommended by NatureScot (2021), hosted and developed by the Mammal Society (Lintott et al., 2017) was offline during the preparation of this report and has been offline since the early summer of 2022. As such this analytical tool was not available for use. In lieu of Eco Bat the methods outlined by Kepel (2011) were used to measure bat activity recorded during the automatic monitoring surveys. The Kepel approach is based on assigning the number of bat passes recorded per hour of each monitoring session to an activity category. Kepel has assigned the number of passes per hour to three activity categories. These activity categories are as follows:

- Pipistrelle species and Leisler's bat: Low = <3.5 passes per hour; Moderate = 3.6 – 6.5 passes per hour; High = >6.5 passes per hour
- All Other Bat species: Low = <4.0 passes per hour; Moderate 4.1 to 10 passes per hour; high = >10 passes per hour.

The median bat pass per hour is used for the classification of bat activity as per the above categories. The median bat pass per hour per night has been recommended by Lintott & Matthews (2018) as the most accurate representation of bat activity as bat activity levels between nights can be highly variable. The results of the Kaleidoscope analysis outputs were sorted so that the median bat pass for each species recorded per monitoring session at each turbine was calculated. Once calculated the median pass per hour was then categorised as low, moderate and high activity as per the above categories.

## 2.5 METHOD FOR ASSESSING POTENTIAL RISK

The risk posed by wind turbines to bat species varies between species depending on factors such as foraging behaviour and the abundance of the population at a national level. The NatureScot (2021) guidelines provides tables of the level of potential vulnerability of population of British bat species to turbines. No such table is provided for the Irish context. **Table 2.8** provides such a table for the Irish context, based on the approach set out in the NatureScot (2021) guidelines. The relative abundance assigned for species are based on the number of 10km square records and Article 17 reporting (NPWS, 2019) for bat species.

**Table 2.8: Level of Population Vulnerability of Bat Species in Ireland**

| Relative Abundance | Low Collision Risk | Medium Collision Risk | High Collision Risk |
|---|---|---|---|
| Common Species | Daubenton's bat | | Common pipistrelle<br>Soprano pipistrelle<br>Leisler's bat |
| Rarer Species | Brown long-eared bat<br>Natterer's bat<br>Lesser horseshoe bats | | |
| Rarest Species | Whiskered bat | | Nathusius pipistrelle |
| Colour Key | **Low Population Vulnerability** | **Medium Population Vulnerability** | **Medium Population Vulnerability** |

The NatureScot (2021) guidelines provide a method for assessing the overall risk of a wind farm development to bats. This overall risk is based on assessing the site level risk alongside the activity levels recorded for each species during site surveys.

The site level risk is based upon an evaluation of the project's size and the habitats occurring within the project site. Wind farm projects are ranked from small to medium to large in size. Habitat risk increases with an increase in the presence of habitats known to be relied upon by bats. **Table 2.9** details the approach to calculating site level risk using the size of the project and the habitat risk present at the project site.

**Table 2.9: 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 |
| Green (1-2) = lowest/low site risk<br>Amber (3) = medium site risk<br>Red (4 – 5) = high/highest site risk | | | | |
| Habitat Risk | Description | | | |
| Low | Small number of potential roost features, of low quality. Low quality foraging habitat that could be used by small numbers of foraging bats. Isolated site not connected to the wider landscape by prominent linear features. | | | |
| Moderate | Buildings, trees or other structures with moderate-high potential as 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. |

**Table 2.10** illustrates the approach to identifying the overall risk level to each bat species/genus recorded at the proposed wind farm site.

**Table 2.10: Overall Risk Assessment**

| **Site Risk** | **Ecobat Activity Category** | | | | | |
|---|---|---|---|---|---|---|
| | 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 |
| Green (0 -4) = Low Risk<br>Amber (5 – 12) = medium risk<br>Red (15 - 25) = high risk | | | | | | |

## 2.6 LIMITATIONS

A multi-year bat survey has been completed at the proposed wind farm spanning the years 2021 to 2024. The survey completed are in accordance with the recommended level of survey effort to be completed at wind farm sites as per the NatureScot Guidance. The bat surveys began

during the summer of 2021 on the basis of a 7-turbine layout. Surveys were repeated during each meteorological season of the 2023 and 2024 bat activity seasons. Monitoring points locations where bat detectors were deployed during each round of monitoring are predominantly within close proximity to the final proposed turbine layout for the proposed wind farm site. As such data from all monitoring rounds is considered to provide representative data for bat activity at and in the vicinity of the proposed turbine locations.

Two no. bat detector failures occurred during the multi-year surveys. However given the survey effort completed at the wind farm site and the availability of survey data spanning multiple bat activity years during spring, summer and autumn the failure of these detectors is not considered to represent a limitation to the understanding of baseline bat activity at the wind farm site. As such a comprehensive baseline dataset has been gather to facilitate a robust assessment of the potential impacts of the proposed wind farm on local the bat populations.

# 3.0 RESULTS

## 3.1 DESKTOP STUDY: HISTORICAL RECORDS FOR BAT SPECIES

Historical records for the presence of 3 no. bat species within a 3km radius of the proposed wind farm site have been identified. Records are held by the National Biodiversity Data Centre for Soprano pipistrelle, Common pipistrelle Leisler's bat, brown long-eared bat, Daubenton's bat and Natterer's bat. A total of 5 no. records are held for Soprano pipistrelle and Leisler's bat respectively; 2 records are held for Daubenton's bat; whilst 1 record is held for Common pipistrelle, Natterer's bat and brown long-eared bat.

The latest record reported for each of the 6 no. species for which records are held are as follows:

Soprano pipistrelle: September, 2018

Common pipistrelle: May, 2009

Leisler's bat: September, 2018

Daubenton's bat: September, 2018

Natterer's bat: May, 2009

Brown long-eared bat: May, 2009

## 3.2 DESKTOP STUDY: BAT LANDSCAPES

A review of the bat landscapes published by Lundy et al. (2011) shows that the proposed wind farm site falls into an area that scores. The habitat suitability for all bats in the area surrounding the proposed development site has been ranked at 30, indicating a low to moderate habitat suitability for all bat species combined. **Table 3.1** provides the scores for individual bat species for the landscape occurring at and in the wider area surrounding the proposed wind farm site.

**Table 3.1: Bat Suitability for Individual Bat Species**

| Species | Suitability Score |
|---|---|
| Soprano pipistrelle | 41 |
| Common pipistrelle | 49 |
| Nathusius pipistrelle | 2 |
| Brown long-eared | 40 |
| Leisler's bat | 44 |
| Daubenton's bat | 32 |
| Natterer's bat | 42 |
| Whiskered bat | 20 |
| Lesser horseshoe bats | 0 |

## 3.3 AUTOMATIC BAT SURVEY RESULTS

### *3.3.1 2021 & 2022 Automatic Bat Survey Results*

Static detector surveys were completed during the 2021 summer and autumn and 2022 spring bat activity season. As detailed in Section 2 above Wildlife Acoustics static bat detectors were installed at seven locations during the summer and autumn seasons of 2021 of the spring season of the 2022 bat activity season.

Nightly monitoring was completed at all seven static detectors. Monitoring during the summer, autumn 2021 seasons and during the spring 2022 season significantly exceeds the recommended monitoring effort for a proposed 7-turbine wind farm at a moderate value site. The requirement for such a site is 30 nights of monitoring during the season with 10 nights being completed during spring, summer and autumn. For a 7-turbine wind farm this amounts to a total monitoring requirement of 210 monitoring nights. A total of 575 monitoring nights was completed at the wind farm site during the 2021 summer and autumn and 2022 spring activity season.

The following bat species were recorded during the automatic static bat detector surveys during the 2021 summer and autumn and 2022 spring session:

- Myotis species;
- Leisler's bat;
- Soprano pipistrelle;
- Common pipistrelle;
- Brown long-eared bat

The total number of bat passes recorded during monitoring are presented in **Table 3.3** below while **Table 3.4** presents the number of bat passes recorded at each monitoring point during each of the seasonal monitoring sessions. As can be seen in **Table 3.3** and **Table 3.4** activity was dominated by Leisler's bat, which accounted for over half (i.e. 32.85%) of all activity recorded. Common pipistrelle and Soprano pipistrelle were the next most frequent recorded species, accounted for 31.18% and 26.59% of all activity, while Myotis species accounted for c. 9% of the activity recorded. Brown long-eared bat accounted for less than 1% of activity.

Across the three meteorological seasons of monitoring bat was highest during the summer season with approximately 60% of activity recorded during this season. Activity during the spring 2022 season accounted for 40% of the bat activity recorded. Activity levels were much lower during autumn, which accounted for c. 2.7% of the activity recorded. The trend of seasonal activity levels of Myotis species differed when compared to all other species recorded

with c, 95% of all activity for these species recorded during the spring monitoring sessions, whilst very low levels were recorded during the summer and autumn seasons.

**Table 3.2: Total No. Bat Passes Recorded**

| Species | Passes (No.) | Percentage of Total (%) |
|---|---|---|
| Leisler's bat | 14,614 | 32.85 |
| Soprano pipistrelle | 13,869 | 31.18 |
| Common pipistrelle | 11,828 | 26.59 |
| Myotis species | 3,888 | 8.74 |
| Brown long-eared bat | 286 | 0.64 |
| **Total** | **44,485** | **100** |

**Table 3.3: Total No. Bat Passes Recorded at Each Monitoring Point**

| Season | MP No. | MYOSPP | NYCLEI | PIPPIP | PIPPYG | PLEAUR |
|---|---|---|---|---|---|---|
| Summer 2021 | T1 | 57 | 1704 | 2612 | 1360 | 28 |
| | T2 | 17 | 977 | 569 | 423 | 11 |
| | T3 | 31 | 3836 | 1012 | 1368 | 32 |
| | T5 | 4 | 1326 | 305 | 532 | 20 |
| | T6 | 8 | 715 | 345 | 752 | 19 |
| | T7 | 27 | 376 | 1621 | 5197 | 48 |
| Summer Sub-Totals | | **144** | **8934** | **6464** | **9632** | **158** |
| Autumn 2021 | T1 | 4 | 20 | 45 | 56 | 3 |
| | T2 | 2 | 16 | 25 | 28 | 1 |
| | T3 | 0 | 0 | 0 | 0 | 0 |
| | T4 | 6 | 54 | 98 | 90 | 2 |
| | T5 | 8 | 6 | 36 | 104 | 21 |
| | T6 | 4 | 21 | 14 | 27 | 6 |
| | T7 | 9 | 19 | 50 | 423 | 7 |
| Autumn Sub-Totals | | **33** | **136** | **268** | **728** | **40** |
| Spring 2022 | T1 | 2532 | 704 | 1743 | 1073 | 6 |
| | T2 | 63 | 1540 | 1513 | 667 | 39 |
| | T3 | 1080 | 1953 | 986 | 13 | 0 |
| | T4 | 7 | 217 | 35 | 71 | 5 |
| | T5 | 19 | 1125 | 376 | 422 | 16 |
| | T7 | 13 | 194 | 611 | 1477 | 27 |
| Spring Sub-Totals | | **3711** | **5544** | **5096** | **3509** | **88** |
| Total No Calls | | **3888** | **14614** | **11828** | **13869** | **286** |

As described in Section 2 above the number of bat passes recorded per hour provides a metric against which activity levels can be assigned. Kepel (2011) has assigned the number of passes per hour to three activity categories. These activity categories are as follows:

- Pipistrelle species and Leisler's bat: Low = <3.5 passes per hour; Moderate = 3.6 – 6.5 passes per hour; High = >6.5 passes per hour;
- All Other Bat species: Low = <4.0 passes per hour; Moderate = 4.1 to 10 passes per hour; High = >10 passes per hour.

The median bat species pass per hour per night for each of the monitoring sessions at each monitoring point/turbine has been used to assign bat activity levels in line with the Kepel approach. As per Lintott & Matthews (2018) median bat pass per hour per night is used during this analysis as it is recognised as providing a more accurate representation of activity, as bat activity levels between nights can be highly variable and thus the median provides a more reliable value than the mean or maximum. In addition, given the high variability of bat activity between nights the data set is unlikely to be normally distributed, therefore the median is the most appropriate metric to use when quantifying bat activity. The median bat species pass per hour per night for each species for all nights (including nights when bats were absent) for each recording session was calculated. **Table 3.5** lists the median bat pass per hour per night for each species and assigns each median value to a bat activity category following the Kepel approach described above.

As can be seen on **Table 3.5** below, the median bat activity levels recorded were predominantly low during monitoring. Spikes in activity where high levels of activity were recorded occurred as follows:

- During the summer monitoring season for:
    - Leisler's bat at T3;
    - Common pipistrelle at T1
    - Soprano pipistrelle at T7
- During the spring monitoring season for:
    - Leisler's bat at T3

**Table 3.4: Activity Categorisation of Median Bat Passes per Hour as per Kepel (2011)**

| Species | Season | MP Location/Turbine | Median Pass Rate (passes/hour/night) | Kepel Activity Category |
|---|---|---|---|---|
| Leisler's | Summer | T1 | 4.21 | Moderate |
| | | T2 | 3.36 | Low |
| | | T3 | 9.21 | High |
| | | T5 | 5.86 | Moderate |
| | | T6 | 2.57 | Low |
| | | T7 | 1.43 | Low |
| | Autumn | T1 | 0.06 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T6 | 0.00 | Low |
| | | T7 | 0.00 | Low |
| | Spring | T1 | 4.27 | Moderate |
| | | T2 | 3.33 | Low |
| | | T3 | 7.07 | High |
| | | T4 | 1.20 | Low |
| | | T5 | 2.33 | Low |
| | | T7 | 1.20 | Low |
| Common pipistrelle | Summer | T1 | 8.64 | High |
| | | T2 | 1.57 | Low |
| | | T3 | 1.93 | Low |
| | | T5 | 1.00 | Low |
| | | T6 | 0.86 | Low |
| | | T7 | 5.86 | Moderate |
| | Autumn | T1 | 0.22 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T6 | 0.00 | Low |
| | | T7 | 0.17 | Low |
| | Spring | T1 | 1.07 | Low |
| | | T2 | 3.60 | Moderate |

| | | | | |
|---|---|---|---|---|
| | | T3 | 2.53 | Low |
| | | T4 | 0.13 | Low |
| | | T5 | 0.67 | Low |
| | | T7 | 0.80 | Low |
| Soprano pipistrelle | Summer | T1 | 4.50 | Moderate |
| | | T2 | 1.29 | Low |
| | | T3 | 1.64 | Low |
| | | T5 | 1.71 | Low |
| | | T6 | 1.86 | Low |
| | | T7 | 14.43 | High |
| | Autumn | T1 | 0.50 | Low |
| | | T2 | 0.06 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.06 | Low |
| | | T5 | 0.22 | Low |
| | | T6 | 0.06 | Low |
| | | T7 | 1.83 | Low |
| | Spring | T1 | 0.80 | Low |
| | | T2 | 1.67 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.40 | Low |
| | | T5 | 0.67 | Low |
| | | T7 | 1.33 | Low |
| Myotis | Summer | T1 | 0.14 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T6 | 0.00 | Low |
| | | T7 | 0.14 | Low |
| | Autumn | T1 | 0.00 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T6 | 0.00 | Low |
| | | T7 | 0.00 | Low |
| | Spring | T1 | 0.00 | Low |
| | | T2 | 0.13 | Low |
| | | T3 | 3.60 | Low |

| | | | | |
|---|---|---|---|---|
| | | T4 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T7 | 0.00 | Low |
| Brown long-eared | Summer | T1 | 0.00 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T6 | 0.00 | Low |
| | | T7 | 0.14 | Low |
| | Autumn | T1 | 0.00 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T6 | 0.00 | Low |
| | | T7 | 0.00 | Low |
| | Spring | T1 | 0.00 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T7 | 0.13 | Low |

**Table 3.5: Summary of Seasonal Bat Activity Levels per Species and Overall Activity Levels during the 2021/2022 bat activity season**

| Species | Season | Overall Activity Level |
|---|---|---|
| Leisler's bat | Summer | Moderate |
| | Autumn | Low |
| | Spring | Moderate |
| | **Overall** | **Low** |
| Common pipistrelle | Summer | Moderate |
| | Autumn | Low |
| | Spring | Low |
| | **Overall** | **Low** |
| Soprano pipistrelle | Summer | Moderate |
| | Autumn | Low |
| | Spring | Low |

| | | |
|---|---|---|
| | **Overall** | **Low** |
| Myotis Species | Summer | Low |
| | Autumn | Low |
| | Spring | Low |
| | **Overall** | **Low** |
| Brown long-eared | Summer | Low |
| | Autumn | Low |
| | Spring | Low |
| | **Overall** | **Low** |

### *3.3.2 2023 Automatic Bat Survey Results*

Static detector surveys were completed during the spring, summer and autumn 2023 bat activity season. As detailed in Section 2 above Wildlife Acoustics static bat detectors were installed at nine locations during the spring, summer and autumn seasons of 2023.

Nightly monitoring was completed at all nine static detectors. Monitoring during the spring, summer and autumn 2023 bat activity season significantly exceeds the recommended monitoring effort for a proposed 9-turbine wind farm at a moderate value site. The requirement for such a site is 30 nights of monitoring during the season with 10 nights being completed during spring, summer and autumn. For a 9-turbine wind farm this amounts to a total monitoring requirement of 270 monitoring nights. A total of 390 monitoring nights was completed at the wind farm site during the 2023 spring, summer and autumn activity seasons.

The following bat species were recorded during the automatic static bat detector surveys during the 2023 spring, summer and autumn session:

- Myotis species;
- Leisler's bat;
- Soprano pipistrelle;
- Common pipistrelle;
- Brown long-eared bat

The total number of bat passes recorded during the 2023 monitoring are presented in **Table 3.6** below while **Table 3.7** presents the number of bat passes recorded at each monitoring point during each of the seasonal monitoring sessions. As can be seen in **Table 3.6** and **Table 3.7** activity was dominated by Leisler's bat, which accounted for over half (i.e. 49%) of all activity recorded. Common pipistrelle and Soprano pipistrelle accounted for 22% and 26% of all

activity recorded. Myotis species and brown long-eared bat accounted for 1% and 2% respectively of the remaining activity recorded.

Across the three meteorological seasons of monitoring bat was significantly highest during the spring season with approximately 65% of activity recorded during this season. Activity during the summer season accounted for 22% of the bat activity recorded. Activity levels were lower still during autumn, which accounted for c. 12% of the activity recorded. This trend in the seasonal distribution of activity followed all species with the exception of Soprano pipistrelle, for which activity was higher during autumn when compared to summers.

**Table 3.6: Total No. Bat Passes Recorded**

| Species | Passes (No.) | Percentage of Total (%) |
|---|---|---|
| Leisler's bat | 9,753 | 49 |
| Soprano pipistrelle | 5,117 | 26 |
| Common pipistrelle | 4,484 | 22 |
| Myotis species | 201 | 1 |
| Brown long-eared bat | 387 | 2 |
| **Total** | **19,942** | **100** |

**Table 3.7: Total No. Bat Passes Recorded at Each Monitoring Point**

| Season | Turbine | MYSPP | NYCLEI | PIPPIP | PIPPYG | PLEAUR |
|---|---|---|---|---|---|---|
| Spring | T1 | 12 | 468 | 260 | 949 | 12 |
| | T2 | 33 | 1,727 | 174 | 236 | 99 |
| | T3 | 10 | 345 | 23 | 131 | 8 |
| | T4 | 12 | 464 | 20 | 28 | 5 |
| | T5 | 1 | 224 | 18 | 80 | 1 |
| | T6 | 29 | 1,282 | 2,836 | 1,682 | 81 |
| | T7 | 10 | 161 | 52 | 111 | 6 |
| | T8 | 20 | 547 | 47 | 115 | 15 |
| | T9 | 22 | 545 | 56 | 98 | 41 |
| Spring Sub-Totals | | **149** | **5,763** | **3,486** | **3,430** | **268** |
| Summer | T1 | 1 | 2 | 0 | 13 | 0 |
| | T2 | 1 | 296 | 34 | 45 | 0 |
| | T3 | 0 | 469 | 135 | 79 | 13 |
| | T4 | 2 | 2 | 7 | 19 | 3 |
| | T5 | 0 | 168 | 50 | 162 | 9 |
| | T6 | 16 | 555 | 92 | 106 | 32 |
| | T7 | 6 | 962 | 83 | 150 | 5 |
| | T8 | 7 | 653 | 125 | 69 | 13 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | T9 | 1 | 0 | 0 | 2 | 0 |
| Summer Sub-Totals | | **34** | **3,107** | **526** | **645** | **75** |
| Autumn | T1 | 2 | 2 | 7 | 353 | 0 |
| | T2 | 2 | 7 | 0 | 0 | 0 |
| | T3 | 2 | 1 | 0 | 0 | 1 |
| | T4 | 4 | 11 | 11 | 23 | 0 |
| | T5 | 3 | 492 | 387 | 595 | 43 |
| | T6 | 0 | 1 | 1 | 1 | 0 |
| | T7 | 2 | 336 | 63 | 67 | 0 |
| | T8 | 3 | 25 | 0 | 2 | 0 |
| | T9 | 0 | 8 | 3 | 1 | 0 |
| Autumn Sub-Totals | | **18** | **883** | **472** | **1,042** | **44** |

The median bat species pass per hour per night for each species for all nights (including nights when bats were absent) for each recording session was calculated. **Table 3.8** lists the median bat pass per hour per night for each species and assigns each median value to a bat activity category following the Kepel approach described above.

As can be seen on **Table 3.8**, the median bat activity levels recorded was consistently low during monitoring. Only one spikes in activity levels, where high activity was recorded for Leisler's bat in the vicinity of MP2 during spring monitoring was recorded.

Moderate levels for Leisler's bat were recorded:

- during spring at MP6;
- during summer at MP7 and MP8;
- during Autumn at MP6.

Moderate levels of activity for Soprano pipistrelle were recorded:

- during spring at MP6.

**Table 3.8: Activity Categorisation of Median Bat Passes per Hour as per Kepel (2011)**

| Species | Season | MP Location/Turbine | Median Pass Rate (passes/hour/night) | Kepel Activity Category |
|---|---|---|---|---|
| Leisler's bat | Spring | T1 | 1.60 | Low |
| | | T2 | 9.56 | High |
| | | T3 | 1.85 | Low |
| | | T4 | 3.45 | Low |

| | | | | |
|---|---|---|---|---|
| | | T5 | 2.30 | Low |
| | | T6 | 4.50 | Moderate |
| | | T7 | 0.79 | Low |
| | | T8 | 3.00 | Low |
| | | T9 | 2.78 | Low |
| | Summer | T1 | 0.00 | Low |
| | | T2 | 1.55 | Low |
| | | T3 | 1.90 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 1.43 | Low |
| | | T6 | 2.50 | Low |
| | | T7 | 3.64 | Moderate |
| | | T8 | 3.65 | Moderate |
| | | T9 | 0.00 | Low |
| | Autumn | T1 | 0.00 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 4.00 | Moderate |
| | | T6 | 0.00 | Low |
| | | T7 | 3.18 | Low |
| | | T8 | 0.00 | Low |
| | | T9 | 0.00 | Low |
| Common pipistrelle | Spring | T1 | 1.90 | Low |
| | | T2 | 0.65 | Low |
| | | T3 | 0.10 | Low |
| | | T4 | 0.15 | Low |
| | | T5 | 0.20 | Low |
| | | T6 | 8.45 | Low |
| | | T7 | 0.20 | Low |
| | | T8 | 0.22 | Low |
| | | T9 | 0.20 | Low |
| | Summer | T1 | 0.00 | Low |
| | | T2 | 0.05 | Low |
| | | T3 | 0.65 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.43 | Low |
| | | T6 | 0.70 | Low |
| | | T7 | 0.29 | Low |
| | | T8 | 0.47 | Low |
| | | T9 | 0.00 | Low |

| | | | | |
|---|---|---|---|---|
| | Autumn | T1 | 0.00 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 1.29 | Low |
| | | T6 | 0.00 | Low |
| | | T7 | 0.59 | Low |
| | | T8 | 0.00 | Low |
| | | T9 | 0.00 | Low |
| Soprano pipistrelle | Spring | T1 | 2.10 | Low |
| | | T2 | 0.99 | Low |
| | | T3 | 0.70 | Low |
| | | T4 | 0.20 | Low |
| | | T5 | 0.20 | Low |
| | | T6 | 5.38 | Moderate |
| | | T7 | 0.40 | Low |
| | | T8 | 0.20 | Low |
| | | T9 | 0.30 | Low |
| | Summer | T1 | 0.00 | Low |
| | | T2 | 0.20 | Low |
| | | T3 | 0.16 | Low |
| | | T4 | 0.14 | Low |
| | | T5 | 1.21 | Low |
| | | T6 | 0.90 | Low |
| | | T7 | 0.86 | Low |
| | | T8 | 0.35 | Low |
| | | T9 | 0.00 | Low |
| | Autumn | T1 | 0.12 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 2.00 | Low |
| | | T6 | 0.00 | Low |
| | | T7 | 0.24 | Low |
| | | T8 | 0.00 | Low |
| | | T9 | 0.00 | Low |
| Myotis species | Spring | T1 | 0.10 | Low |
| | | T2 | 0.16 | Low |
| | | T3 | 0.10 | Low |
| | | T4 | 0.10 | Low |
| | | T5 | 0.00 | Low |

| | | | | |
|---|---|---|---|---|
| | | T6 | 0.10 | Low |
| | | T7 | 0.00 | Low |
| | | T8 | 0.00 | Low |
| | | T9 | 0.10 | Low |
| | Summer | T1 | 0.00 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T6 | 0.10 | Low |
| | | T7 | 0.00 | Low |
| | | T8 | 0.00 | Low |
| | | T9 | 0.00 | Low |
| | Autumn | T1 | 0.00 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T6 | 0.00 | Low |
| | | T7 | 0.00 | Low |
| | | T8 | 0.00 | Low |
| | | T9 | 0.00 | Low |
| Brown long-eared bat | Spring | T1 | 0.10 | Low |
| | | T2 | 0.26 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.00 | Low |
| | | T6 | 0.21 | Low |
| | | T7 | 0.00 | Low |
| | | T8 | 0.10 | Low |
| | | T9 | 0.10 | Low |
| | Summer | T1 | 0.00 | Low |
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.07 | Low |
| | | T6 | 0.20 | Low |
| | | T7 | 0.00 | Low |
| | | T8 | 0.00 | Low |
| | | T9 | 0.00 | Low |
| | Autumn | T1 | 0.00 | Low |

| | | | | |
|---|---|---|---|---|
| | | T2 | 0.00 | Low |
| | | T3 | 0.00 | Low |
| | | T4 | 0.00 | Low |
| | | T5 | 0.24 | Low |
| | | T6 | 0.00 | Low |
| | | T7 | 0.00 | Low |
| | | T8 | 0.00 | Low |
| | | T9 | 0.00 | Low |

**Table 3.9: Summary of Seasonal Bat Activity Levels per Species and Overall Activity Levels during the 2021/2022 bat activity season**

| Species | Season | Overall Activity Level |
|---|---|---|
| Leisler's bat | Spring | Low |
| | Summer | Low |
| | Autumn | Low |
| | **Overall** | **Low** |
| Common pipistrelle | Spring | Low |
| | Summer | Low |
| | Autumn | Low |
| | **Overall** | **Low** |
| Soprano pipistrelle | Spring | Low |
| | Summer | Low |
| | Autumn | Low |
| | **Overall** | **Low** |
| Myotis Species | Spring | Low |
| | Summer | Low |
| | Autumn | Low |
| | **Overall** | **Low** |
| Brown long-eared | Spring | Low |
| | Summer | Low |
| | Autumn | Low |
| | **Overall** | **Low** |

### *3.3.3 2024 Automatic Bat Survey Results*

Static detector surveys were completed during the spring, summer and autumn 2024 bat activity season. As detailed in Section 2 above Wildlife Acoustics static bat detectors were installed at each of the nine turbine locations during the spring, summer and autumn seasons of 2024.

Nightly monitoring was completed at all nine static detectors. Monitoring during the spring, summer and autumn 2024 bat activity season significantly exceeds the recommended monitoring effort for a proposed 9-turbine wind farm at a moderate value site. The requirement for such a site is 30 nights of monitoring during the season with 10 nights being completed during spring, summer and autumn. For a 9-turbine wind farm this amounts to a total monitoring requirement of 270 monitoring nights. A total of 337 monitoring nights was completed at the wind farm site during the 2024 spring, summer and autumn activity seasons.

The following bat species were recorded during the automatic static bat detector surveys during the 2024 spring, summer and autumn session:

- Myotis species;
- Leisler's bat;
- Soprano pipistrelle;
- Common pipistrelle;
- Brown long-eared bat

The total number of bat passes recorded during the 2024 monitoring are presented in **Table 3.10** below while **Table 3.11** presents the number of bat passes recorded at each monitoring point during each of the seasonal monitoring sessions. As can be seen in **Table 3.10** and **Table 3.11** activity was dominated by Leisler's bat, which accounted for over half (i.e. 49%) of all activity recorded. Common pipistrelle and Soprano pipistrelle accounted for 24% and 20% of all activity recorded. Myotis species accounted for 6% whilst brown long-eared bat accounted for the remaining circa 1% of activity.

Across the three meteorological seasons of monitoring bat activity was significantly highest during the spring season with approximately 54% of activity recorded during this season. Activity during the summer season accounted for 21% of the bat activity recorded. Autumn activity levels were slightly higher than summer levels with c. 25% of all the activity recorded during this season. The following deviations to the seasonal distribution of activity is shown in the data:

Myotis species bat activity was highest during summer and lowest during spring;

Soprano pipistrelle activity was highest during spring, whilst summer levels of activity were higher that autumn.

It is noted that the failure of the detector to record at the T8 location during the summer session is likely to have contributed to the lower summer totals.

**Table 3.10: Total No. Bat Passes Recorded**

| Species | Passes (No.) | Percentage of Total (%) |
|---|---|---|
| Leisler's bat | 16.276 | 49 |
| Soprano pipistrelle | 6,787 | 20 |
| Common pipistrelle | 8,048 | 24 |
| Myotis species | 1,886 | 6 |
| Brown long-eared bat | 322 | 1 |
| **Total** | **33,319** | **100** |

**Table 3.11: Total No. Bat Passes Recorded at Each Monitoring Point**

| Season | Turbine | MYSPP | NYCLEI | PIPPIP | PIPPYG | PLEAUR |
|---|---|---|---|---|---|---|
| Spring | T1 | 12 | 1,618 | 239 | 167 | 1 |
| | T2 | 5 | 1,739 | 509 | 346 | 1 |
| | T3 | 2 | 839 | 180 | 176 | 1 |
| | T4 | 22 | 512 | 109 | 101 | 6 |
| | T5 | 50 | 4,088 | 1,830 | 1,964 | 5 |
| | T6 | 13 | 413 | 214 | 222 | 6 |
| | T7 | 16 | 290 | 380 | 294 | 5 |
| | T8 | 6 | 772 | 58 | 71 | 15 |
| | T9 | 1 | 315 | 145 | 91 | 1 |
| Spring Sub-Totals | | **127** | **10,586** | **3,664** | **3,432** | **41** |
| Summer | T1 | 823 | 1458 | 873 | 234 | 16 |
| | T2 | 109 | 346 | 77 | 46 | 5 |
| | T3 | 0 | 26 | 28 | 112 | 2 |
| | T4 | 2 | 133 | 90 | 101 | 4 |
| | T5 | 4 | 247 | 216 | 90 | 6 |
| | T6 | 0 | 14 | 41 | 42 | 1 |
| | T7 | 3 | 230 | 117 | 731 | 41 |
| | T8 | | | | | |
| | T9 | 2 | 216 | 64 | 479 | 11 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Summer Sub-Totals | | **943** | **2,670** | **1,506** | **1,835** | **86** |
| Autumn | T1 | 721 | 2,563 | 2,176 | 296 | 3 |
| | T2 | 56 | 336 | 150 | 55 | 6 |
| | T3 | 15 | 28 | 71 | 131 | 3 |
| | T4 | 13 | 5 | 191 | 157 | 7 |
| | T5 | 0 | 0 | 9 | 31 | 0 |
| | T6 | 0 | 1 | 98 | 71 | 0 |
| | T7 | 5 | 55 | 24 | 106 | 141 |
| | T8 | 0 | 3 | 11 | 347 | 26 |
| | T9 | 6 | 29 | 148 | 326 | 9 |
| Autumn Sub-Totals | | **816** | **3,020** | **2,878** | **1,520** | **195** |

The median bat species pass per hour per night for each species for all nights (including nights when bats were absent) for each recording session was calculated. **Table 3.13** lists the median bat pass per hour per night for each species and assigns each median value to a bat activity category following the Kepel approach described above.

As can be seen on **Table 3.12** below, the median bat activity levels recorded was predominantly low during monitoring.

Spikes in activity levels, where high to moderate activity was recorded are as follows:

**High** activity for **Leisler's bat** during spring at **MP1; MP2; MP3;** and **MP4**

**Moderate** activity for **Leisler's bat** during spring at **MP4; MP6** and **MP8**

**Moderate** activity for **Leisler's bat** during summer at **MP7**

**Moderate** activity for **Leisler's bat** during autumn at **MP5**

**High** activity for **Common pipistrelle** during spring at **MP5**

**High** activity for **Common pipistrelle** during autumn at **MP1**

**Moderate** activity for **Common pipistrelle** during spring at **MP2**

**High** activity for **Soprano pipistrelle** during spring at **MP5**

**Moderate** activity for **Soprano pipistrelle** during spring at **MP6**

**Table 3.12: Activity Categorisation of Median Bat Passes per Hour as per Kepel (2011)**

| Species | Season | MP Location/Turbine | Median Pass Rate (passes/hour/night) | Kepel Activity Category |
|---|---|---|---|---|
| Leisler's bat | Spring | T1 | **17.38** | High |
| | | T2 | **20.88** | High |
| | | T3 | **7.63** | High |
| | | T4 | **4.88** | Moderate |
| | | T5 | **32.13** | High |
| | | T6 | **4.13** | Moderate |
| | | T7 | **2.75** | Low |
| | | T8 | **5.13** | Moderate |
| | | T9 | **0.00** | Low |
| | Summer | T1 | **5.20** | Moderate |
| | | T2 | **3.33** | Low |
| | | T3 | **0.00** | Low |
| | | T4 | **0.93** | Low |
| | | T5 | **2.00** | Low |
| | | T6 | **0.00** | Low |
| | | T7 | **0.13** | Moderate |
| | | T8 | | n/a |
| | | T9 | **0.53** | Low |
| | Autumn | T1 | **6.93** | High |
| | | T2 | **3.00** | Low |
| | | T3 | **0.00** | Low |
| | | T4 | **0.00** | Low |
| | | T5 | **0.00** | Moderate |
| | | T6 | **0.00** | Low |
| | | T7 | **0.19** | Low |
| | | T8 | **0.00** | Low |
| | | T9 | **0.06** | Low |
| Common pipistrelle | Spring | T1 | **2.13** | Low |
| | | T2 | **4.38** | Moderate |
| | | T3 | **1.50** | Low |
| | | T4 | **0.63** | Low |
| | | T5 | **11.88** | High |
| | | T6 | **2.25** | Low |
| | | T7 | **3.13** | Low |
| | | T8 | **0.38** | Low |
| | | T9 | **0.00** | Low |
| | Summer | T1 | **3.47** | Low |
| | | T2 | **0.53** | Low |

| | | | | |
|---|---|---|---|---|
| | | T3 | **0.13** | Low |
| | | T4 | **1.33** | Low |
| | | T5 | **1.60** | Low |
| | | T6 | **0.13** | Low |
| | | T7 | **0.27** | Low |
| | | T8 | | n/a |
| | | T9 | **0.53** | Low |
| | Autumn | T1 | **16.80** | High |
| | | T2 | **1.25** | Low |
| | | T3 | **0.25** | Low |
| | | T4 | **0.00** | Low |
| | | T5 | **0.00** | Low |
| | | T6 | **0.25** | Low |
| | | T7 | **0.06** | Low |
| | | T8 | **0.00** | Low |
| | | T9 | **0.19** | Low |
| Soprano pipistrelle | Spring | T1 | **1.44** | Low |
| | | T2 | **2.00** | Low |
| | | T3 | **1.75** | Low |
| | | T4 | **0.75** | Low |
| | | T5 | **19.63** | High |
| | | T6 | **1.38** | Moderate |
| | | T7 | **2.63** | Low |
| | | T8 | **0.50** | Low |
| | | T9 | **0.00** | Low |
| | Summer | T1 | **1.07** | Low |
| | | T2 | **0.27** | Low |
| | | T3 | **0.67** | Low |
| | | T4 | **0.40** | Low |
| | | T5 | **0.53** | Low |
| | | T6 | **0.27** | Low |
| | | T7 | **3.07** | Low |
| | | T8 | | n/a |
| | | T9 | **2.67** | Low |
| | Autumn | T1 | **3.13** | Low |
| | | T2 | **0.50** | Low |
| | | T3 | **0.50** | Low |
| | | T4 | **0.19** | Low |
| | | T5 | **0.13** | Low |
| | | T6 | **0.38** | Low |
| | | T7 | **0.94** | Low |
| | | T8 | **2.63** | Low |

| | | | | |
|---|---|---|---|---|
| | | T9 | **1.06** | Low |
| Myotis species | Spring | T1 | **0.13** | Low |
| | | T2 | **0.00** | Low |
| | | T3 | **0.00** | Low |
| | | T4 | **0.25** | Low |
| | | T5 | **0.13** | Low |
| | | T6 | **0.13** | Low |
| | | T7 | **0.13** | Low |
| | | T8 | **0.00** | Low |
| | | T9 | **0.00** | Low |
| | Summer | T1 | **0.27** | Low |
| | | T2 | **0.67** | Low |
| | | T3 | **0.00** | Low |
| | | T4 | **0.00** | Low |
| | | T5 | **0.00** | Low |
| | | T6 | **0.00** | Low |
| | | T7 | **0.00** | Low |
| | | T8 | | n/a |
| | | T9 | **0.00** | Low |
| | Autumn | T1 | **0.40** | Low |
| | | T2 | **0.44** | Low |
| | | T3 | **0.13** | Low |
| | | T4 | **0.00** | Low |
| | | T5 | **0.00** | Low |
| | | T6 | **0.00** | Low |
| | | T7 | **0.00** | Low |
| | | T8 | **0.00** | Low |
| | | T9 | **0.00** | Low |
| Brown long-eared bat | Spring | T1 | **0.00** | Low |
| | | T2 | **0.00** | Low |
| | | T3 | **0.00** | Low |
| | | T4 | **0.00** | Low |
| | | T5 | **0.00** | Low |
| | | T6 | **0.00** | Low |
| | | T7 | **0.00** | Low |
| | | T8 | **0.00** | Low |
| | | T9 | **0.00** | Low |
| | Summer | T1 | **0.13** | Low |
| | | T2 | **0.00** | Low |
| | | T3 | **0.00** | Low |
| | | T4 | **0.00** | Low |
| | | T5 | **0.00** | Low |

| | | | | |
|---|---|---|---|---|
| | Autumn | T6 | **0.00** | Low |
| | | T7 | **0.13** | Low |
| | | T8 | | n/a |
| | | T9 | **0.00** | Low |
| | | T1 | **0.00** | Low |
| | | T2 | **0.00** | Low |
| | | T3 | **0.00** | Low |
| | | T4 | **0.00** | Low |
| | | T5 | **0.00** | Low |
| | | T6 | **0.00** | Low |
| | | T7 | **1.00** | Low |
| | | T8 | **0.06** | Low |
| | | T9 | **0.06** | Low |

**Table 3.13: Summary of Seasonal Bat Activity Levels per Species and Overall Activity Levels during the 2021/2022 bat activity season**

| Species | Season | Overall Activity Level |
|---|---|---|
| Leisler's bat | Spring | Moderate to High |
| | Summer | Low to Moderate |
| | Autumn | Low |
| | **Overall** | **Moderate** |
| Common pipistrelle | Spring | Low |
| | Summer | Low |
| | Autumn | Low |
| | **Overall** | **Low** |
| Soprano pipistrelle | Spring | Low |
| | Summer | Low |
| | Autumn | Low |
| | **Overall** | **Low** |
| Myotis Species | Spring | Low |
| | Summer | Low |
| | Autumn | Low |
| | **Overall** | **Low** |
| Brown long-eared | Spring | Low |
| | Summer | Low |
| | Autumn | Low |
| | **Overall** | **Low** |

## 3.4 BAT ROOST SURVEYS

### *3.4.1 Structures*

Roost inspection surveys were completed at S1 and S2 shown on **Figure 2.4**. Inspections were completed on the 3rd July 2021 and again on the 21st August 2024 No evidence of use of these structures as a roost site by bats was recorded during the inspection surveys. Both structures are representative of structures that are of decreased probability, as per Marnell & Kelleher (2022), for their potential to function as roost sites for bats. Given the pre-fabricated corrugated sheet material, high internal light levels and internal draughty conditions, both S1 and S2 are considered to be of negligible potential to function as a roost. Furthermore no evidence was recorded indicating that these two structures support roosting bats.

### *3.4.2 Tree Roost Surveys*

The mature trees occurring within a 200m radius of T1, T5 and T6 were inspected for the presence of preferred roost features on the 17th April and 1st May 2024.

The trees occurring in the 200m buffer zone of T1 and T6 are representative of thin stemmed trees that do not provide preferential roosting opportunities for bats. These trees are considered to be representative of PRF-I trees and are of low bat roost potential.

A line of mature beech trees occurs to the southeast of the proposed turbine T05, within the 200m buffer zone. These are mature trees with thick trunks and spreading crowns with mature limbs. The presence of preferred roost features was limited during the inspection survey with the trees considered to best fall into the category of PRF-I trees. However given the mature condition of these trees, they were targeted for roost emergence surveys during the 2024 bat activity season.

The emergence survey was completed on the 16th May 2024 and again on the 21st August 2024. Weather conditions were favourable for bat activity during the emergence survey. The emergence survey commenced 30 minutes before sunset and terminated 90 minutes after sunset. The survey commenced at 20:50 of the 16th May and 20:15 on the 21st August. An echometer pro bat detector and LED head torch were used during the survey. A position was taken up to the north of the mature treeline providing a view of the trees. No bats were recorded emerging from these trees during the emergence surveys.

Based on the findings of the tree roost inspection and emergence surveys, the trees occurring within a 200m radius of the proposed turbine T05 do not function as roosts for bats.

# 4.0 EVAULATION OF BAT POPULATION & SITE RISK

## 4.1 SCALE OF THE PROJECT

The project size has been identified by examining the proposed wind farm against the project size criteria detailed in **Table 2.9** above. **Table 3.2** provides the details for evaluating the project size in the line with the criteria referenced in NatureScot Guidelines.

**Table 4.1: Evaluation of the Project Size**

| Evaluation Criteria | Individual Criteria Project Size Representativeness | Overall Project Size |
|---|---|---|
| Small-scale development (less than 10 no. turbines) | Small | Medium |
| Other wind farm developments occur within 5km of the project | Medium | |
| The project comprises turbines >100m in height | Large | |

## 4.2 HABITAT RISK

Factors used to aid the description of habitat risk at wind farm site are set out in **Table 2.9** above. The factors fall under 3 specific headings, namely roost availability, quality of foraging habitat, and connectivity to the wider landscape.

In terms of roost availability, the proposed wind farm site is considered to fall into the category of low habitat risk. There are no structures occurring within a 200m radius of the proposed turbines, whilst a total of 2 no. structures occur within the wind farm site. These are representative of corrugated agricultural sheds that are of negligible bat roost potential.

The quality of foraging habitat is variable within and surrounding the proposed wind farm site. The large and open expanses of cutover raised bog, predominantly denuded of vegetation limits the potential foraging in areas to the south of turbine T1, T4, T7 and T8. Similarly the expanses of denuded cutover raised bog between the proposed turbine T2 and T5 limits foraging in this area.

The field boundaries in the vicinity of T3, T4, T5, T7 and T6 are well developed and are representative of high potential foraging habitat for bats. In contrast the field boundaries in the vicinity of T8 and T9 are characterised by ephemeral drainage ditches where hedgerow boundaries are either absent or gappy in nature. The proposed turbine T2 is situated within a stand of dense conifer plantation that does not provide foraging habitat for bats. The edge of conifer plantation is considered to be representative of moderate foraging habitat for bats. The Cushina River flowing through the proposed wind farm site is representative of a slow flowing

depositing river of high foraging potential for bats. Overall the foraging habitat within the site is considered to be moderate to high.

Connectivity to the proposed wind farm site from the wider surrounding landscape is limited to the east and west as well as the southeast and northeast. The large expanses of denuded and cutover raised bog to the north and south of the proposed wind farm site limit connectivity to the south from these directions. The Cushina River represents the principal landscape corridor providing connectivity to the wider surrounding area. The hedgerow networks to the north of the river in the vicinity of T5, T8 and T9 are considered to be of low to moderate value with respect to connectivity due to the discontinuous and gappy nature of hedgerows in this area of the site. These is better connectivity via hedgerows and lagg woodland to T6 to the west of the site and along established and mature hedgerow to T1 towards the southeast of the site. Overall the connectivity to the wider landscape is considered to be of moderate potential.

Given the low potential for roosting opportunities, the moderate to high quality foraging habitat within the wind farm site and the moderate potential for connectivity to the wider landscape the overall habitat risk for the wind farm site is considered to be Moderate.

## 4.3 SITE RISK ASSESSMENT

Table 3a of the NatureScot (2021) guidelines provides a guide for establishing the site risk assessment score for a wind farm site. The Medium Scale of the project and the overall Moderate Habitat Risk at the wind farm site, together combine to result in a Site Risk Assessment Score of 3 which is representative of a medium risk site.

## 4.4 EVAULATION OF RISK FOR BAT SPECIES BASED ON ACTIVITY LEVELS

The wind farm turbine layouts evolved between 2021 and 2024 whilst bat activity surveys were completed. However the majority of all monitoring points used between 2021 and 2024 are within 250m of a proposed turbine of the final wind farm layout.

The following monitoring points are used to inform risk for bat species at each of the proposed turbines based on activity:

T1: 2021/2022 MP7; 2023 MP4; 2024 MP4

T2: 2021/2022 MP1; 2023 MP5; 2024 MP5

T3: 2023 MP6; 2024 MP6

T4: 2021/2022 MP6; 2023 MP3; 2024 MP2

T5: 2024 MP5

T6: 2021/2022 MP3; 2023 MP1; 2024 MP1

T7: 2023 MP2; 2024 MP3

T8: 2024 MP8

T9: 2024 MP9

### *4.4.1 Leisler's bat*

Table 4.2 below provide an evaluation of risk posed by each proposed turbine to Leisler's bats based on the activity levels recorded during baseline bat activity monitoring.

**Table 4.2: Evaluation of Risk for Leisler's bat at Each Turbine based on baseline activity monitoring**

| Turbine No. | Year | Risk | | |
|---|---|---|---|---|
| | | Spring | Summer | Autumn |
| T1 | 2021/2022 | Low | Low | Low |
| | 2023 | Low | | Low |
| | 2024 | Moderate | Low | Low |
| **Overall Risk at T1** | | **Low** | **Low** | **Low** |
| T2 | 2021/2022 | Moderate | Moderate | Low |
| | 2023 | Low | Low | Moderate |
| | 2024 | High | Low | Moderate |
| **Overall Risk at T2** | | **Moderate** | **Low** | **Moderate** |
| T3 | 2023 | Moderate | Low | Low |
| | 2024 | Moderate | Low | Low |
| **Overall Risk at T3** | | **Moderate** | **Low** | **Low** |
| T4 | 2021/2022 | | Low | Low |
| | 2023 | Low | Low | Low |
| | 2024 | High | Low | Low |
| **Overall Risk at T4** | | **Moderate** | **Low** | **Low** |
| T5 | 2024 | High | Low | Moderate |
| **Overall Risk at T5** | | **High** | **Low** | **Moderate** |
| T6 | 2021/2022 | High | Low | High |
| | 2023 | Low | Low | Low |
| | 2024 | High | Moderate | High |
| **Overall Risk at T6** | | **High** | **Low** | **High** |

| | | | | |
|---|---|---|---|---|
| T7 | 2023 | High | Low | Low |
| | 2024 | High | Low | Low |
| **Overall Risk at T7** | | **High** | **Low** | **Low** |
| T8 | 2024 | Moderate | | Low |
| **Overall Risk at T8** | | **Moderate** | **Moderate** | **Low** |
| T9 | 2024 | Low | Low | Low |
| **Overall Risk at T9** | | **Low** | **Low** | **Low** |

### *4.4.2 Common Pipistrelle*

Table 4.3 below provide an evaluation of risk posed by each proposed turbine to Common Pipistrelle based on the activity levels recorded during baseline bat activity monitoring.

**Table 4.3: Evaluation of Risk for Common Pipistrelle at Each Turbine based on baseline activity monitoring**

| **Turbine No.** | **Year** | **Risk** | | |
|---|---|---|---|---|
| | | **Spring** | **Summer** | **Autumn** |
| T1 | 2021/2022 | Low | Low | Moderate |
| | 2023 | Low | Low | Low |
| | 2024 | Low | Low | Low |
| **Overall Risk at T1** | | **Low** | **Low** | **Low** |
| T2 | 2021/2022 | Low | High | Low |
| | 2023 | Low | Low | Low |
| | 2024 | High | Low | Low |
| **Overall Risk at T2** | | **Moderate** | **Moderate** | **Low** |
| T3 | 2023 | Low | Low | Low |
| | 2024 | Low | Low | Low |
| **Overall Risk at T3** | | **Low** | **Low** | **Low** |
| T4 | 2021/2022 | | Low | Low |
| | 2023 | Low | Low | Low |
| | 2024 | Moderate | Low | Low |
| **Overall Risk at T4** | | **Moderate** | **Low** | **Low** |
| T5 | 2024 | High | Low | Low |
| **Overall Risk at T5** | | **High** | **Low** | **Low** |
| T6 | 2021/2022 | Low | Low | Low |
| | 2023 | Low | Low | Low |

| | | | | |
|---|---|---|---|---|
| | 2024 | Low | Low | High |
| **Overall Risk at T6** | | **Low** | **Low** | **Moderate** |
| T7 | 2023 | Low | Low | Low |
| | 2024 | Moderate | Low | Low |
| **Overall Risk at T7** | | **Moderate** | **Low** | **Low** |
| T8 | 2024 | Low | | Low |
| **Overall Risk at T8** | | **Low** | **Low** | **Low** |
| T9 | 2024 | Low | Low | Low |
| **Overall Risk at T9** | | **Low** | **Low** | **Low** |

### *4.4.3 Soprano pipistrelle*

Table 4.4 below provide an evaluation of risk posed by each proposed turbine to Soprano Pipistrelle based on the activity levels recorded during baseline bat activity monitoring.

**Table 4.4: Evaluation of Risk for Soprano Pipistrelle at Each Turbine based on baseline activity monitoring**

| **Turbine No.** | **Year** | **Risk** | | |
|---|---|---|---|---|
| | | **Spring** | **Summer** | **Autumn** |
| T1 | 2021/2022 | Low | High | Low |
| | 2023 | Low | Low | Low |
| | 2024 | Low | Low | Low |
| **Overall Risk at T1** | | **Low** | **Moderate** | **Low** |
| T2 | 2021/2022 | Low | Moderate | Low |
| | 2023 | Low | Low | Low |
| | 2024 | High | Low | Low |
| **Overall Risk at T2** | | **Moderate** | **Low** | **Low** |
| T3 | 2023 | Moderate | Low | Low |
| | 2024 | Moderate | Low | Low |
| **Overall Risk at T3** | | **Moderate** | **Low** | **Low** |
| T4 | 2021/2022 | | Low | Low |
| | 2023 | Low | Low | Low |
| | 2024 | Low | Low | Low |
| **Overall Risk at T4** | | **Low** | **Low** | **Low** |
| T5 | 2024 | High | Low | Low |
| **Overall Risk at T5** | | High | **Low** | **Low** |
| T6 | 2021/2022 | Low | Low | Low |
| | 2023 | Low | Low | Low |
| | 2024 | Low | Low | Low |
| **Overall Risk at T6** | | **High** | **Low** | **High** |

| | | | | |
|---|---|---|---|---|
| T7 | 2023 | Low | Low | Low |
| | 2024 | Low | Low | Low |
| **Overall Risk at T7** | | **Low** | **Low** | **Low** |
| T8 | 2024 | Low | | Low |
| **Overall Risk at T8** | | **Low** | **Low** | **Low** |
| T9 | 2024 | Low | Low | Low |
| **Overall Risk at T9** | | **Low** | **Low** | **Low** |

### *4.4.4 Myotis species*

The risk levels for Myotis species at each turbine, based on the activity levels recorded, will be low.

### *4.4.5 Brown Long-eared Bat*

The risk levels for brown long-eared bat at each turbine, based on the activity levels recorded, will be low.

### *4.4.6 Summary of Risk at Turbine Locations*

Based upon the risk evaluation set out in Section 4.3.1 to 4.3.5 above the following summary points can be made:

- T1 will present a moderate risk to Soprano pipistrelle during the summer season.
- T2 will present a moderate risk to:
    - Leisler's bat during the spring and autumn;
    - Common pipistrelle during the spring and summer;
    - Soprano pipistrelle during the spring.
- T3 will present a moderate risk to Leisler's bat and Soprano pipistrelle during the spring.
- T4 will present a moderate risk to Leisler's bat and Common pipistrelle during the spring.
- T5 will present a:
    - high risk to Leisler's bat and Common pipistrelle during the spring

- moderate risk to Leisler's bat during the autumn.

- T6 will present a:
  - high risk to Leisler's bat and Soprano pipistrelle during the spring and autumn
  - moderate risk to Common pipistrelle during the autumn.
- T7 will present
  - high risk to Leisler's bat during the spring
  - moderate risk to Common pipistrelle during the spring.
- T8 will present a moderate risk to Leisler's bat during the spring and summer.
- T9 will not present a low risk to all bat species recorded during baseline monitoring.

## 5.0 IMPACT ASSESSMENT

The NatureScot (2021) guidelines identify the following potential impacts posed by wind farms to bats:

1. Collision mortality, barotrauma and other injuries (although it is important to consider these in the context of other forms of anthropogenic mortality)

2. Loss or damage to commuting and foraging habitat, (wind farms may form barriers to commuting or seasonal movements, and can result in severance of foraging habitat);

3. Loss of, or damage to, roosts;

4. Displacement of individuals or populations (due to wind farm construction or because bats avoid the wind farm area).

## 5.1 COLLISION RISK

The potential operation phase impacts to bats relates to the potential for collision with bats that use the proposed wind farm site. The proposed wind farm site has been identified as a site of

low risk to bats, based on the size of the proposed wind farm and the habitats occurring within and adjacent to it.

The results of the bat monitoring on site and subsequent analysis using Kepel (2011) indicate that activity by Leisler's bat, Common pipistrelle, Soprano pipistrelle, Myotis species and brown long-eared bat within and adjacent to the proposed wind farm site is overall Low throughout the site and throughout the bat activity season.

Myotis species and brown long-eared bats are considered to be at low risk of collision with operating turbines (NatureScot (2021)) and given the low levels of activity recorded for these species during monitoring the proposed wind farm is predicted to present a low risk of collision to these species.

### *5.1.1 Leisler's bat*

**Table 5.1** below provides an overall seasonal risk assessments, as per **Table 3b** of the NatureScot (2021) guidelines for Leisler's bat based on the site risk level and the seasonal activity category assigned to Leisler's bat. The collision risk assessment is presented for each turbine on a seasonal basis.

**Table 5.1: Seasonal Collision Risk Assessment to Leisler's bat (per Table 3b of the NatureScot (2021) Guidelines)**

| Site Risk Level | Turbine | Season | Seasonal Activity Category | Overall Seasonal Risk Assessment |
|---|---|---|---|---|
| Medium (3) | T1 | Spring | Low (1) | Low (3) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T2 | Spring | Moderate (3) | Moderate (9) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Moderate (3) | Moderate (9) |
| | T3 | Spring | Moderate (3) | Moderate (9) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T4 | Spring | Moderate (3) | Moderate (9) |
| | | Summer | Low (1) | Low (3) |

| Site Risk Level | Turbine | Season | Seasonal Activity Category | Overall Seasonal Risk Assessment |
|---|---|---|---|---|
| | | Autumn | Low (1) | Low (3) |
| | T5 | Spring | High (5) | High (15) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Moderate (3) | Moderate (9) |
| | T6 | Spring | High (5) | High (15) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | High (5) | High (15) |
| | T7 | Spring | High (5) | High (15) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T8 | Spring | Moderate (3) | Moderate (9) |
| | | Summer | Moderate (3) | Moderate (9) |
| | | Autumn | Low (1) | Low (3) |
| | T9 | Spring | Low (1) | Low (3) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |

### *5.1.2 Common pipistrelle*

**Table 5.2** below provides an overall seasonal risk assessments, as per **Table 3b** of the NatureScot (2021) guidelines for Leisler's bat based on the site risk level and the seasonal activity category assigned to Common pipistrelle. The collision risk assessment is presented for each turbine on a seasonal basis.

**Table 5.2: Seasonal Collision Risk Assessment to Common pipistrelle (per Table 3b of the NatureScot (2021) Guidelines)**

| Site Risk Level | Turbine | Season | Seasonal Activity Category | Overall Seasonal Risk Assessment |
|---|---|---|---|---|
| | T1 | Spring | Low (1) | Low (3) |

| | | | | |
|---|---|---|---|---|
| Medium (3) | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T2 | Spring | Moderate (3) | Moderate (9) |
| | | Summer | Low (1) | Moderate (9) |
| | | Autumn | Moderate (3) | Low (3) |
| | T3 | Spring | Moderate (3) | Low (3) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T4 | Spring | Moderate (3) | Moderate (9) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T5 | Spring | High (5) | High (15) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Moderate (3) | Moderate (9) |
| | T6 | Spring | High (5) | Low (3) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | High (5) | Moderate (9) |
| | T7 | Spring | High (5) | Moderate (9) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T8 | Spring | Moderate (3) | Low (3) |
| | | Summer | Moderate (3) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T9 | Spring | Low (1) | Low (3) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |

### *5.1.3 Soprano pipistrelle*

**Table 5.3** below provides an overall seasonal risk assessments, as per **Table 3b** of the NatureScot (2021) guidelines for Leisler's bat based on the site risk level and the seasonal activity category assigned to Leisler's bat. The collision risk assessment is presented for each turbine on a seasonal basis.

**Table 5.3: Seasonal Collision Risk Assessment to Soprano pipistrelle (per Table 3b of the NatureScot (2021) Guidelines)**

| Site Risk Level | Turbine | Season | Seasonal Activity Category | Overall Seasonal Risk Assessment |
|---|---|---|---|---|
| Medium (3) | T1 | Spring | Low (1) | Moderate (9) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T2 | Spring | Moderate (3) | Moderate (9) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Moderate (3) | Low (3) |
| | T3 | Spring | Moderate (3) | Moderate (9) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T4 | Spring | Moderate (3) | Low (3) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T5 | Spring | High (5) | Low (3) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Moderate (3) | Low (3) |
| | T6 | Spring | High (5) | High (15) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | High (5) | High (15) |
| | T7 | Spring | High (5) | Low (3) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T8 | Spring | Moderate (3) | Low (3) |
| | | Summer | Moderate (3) | Low (3) |
| | | Autumn | Low (1) | Low (3) |
| | T9 | Spring | Low (1) | Low (3) |
| | | Summer | Low (1) | Low (3) |
| | | Autumn | Low (1) | Low (3) |

### *5.1.4 Myotis species*

**Table 5.4** below provides an overall seasonal risk assessments, as per **Table 3b** of the NatureScot (2021) guidelines for Myotis species based on the site risk level and the seasonal activity category assigned to Myotis species. Based on the low risk assessment for each season

at all turbine locations the collision risk assessment for Myotis species will be consistently Low at all turbine locations.

**Table 5.4: Seasonal Collision Risk Assessment to Myotis Species (per Table 3b of the NatureScot (2021) Guidelines)**

| Site Risk Level | Turbines | Season | Seasonal Activity Category | Overall Seasonal Risk Assessment |
|---|---|---|---|---|
| Low (3) | All Turbines | Spring | Low (1) | Low (3) |
| | All Turbines | Summer | Low (1) | Low (3) |
| | All Turbines | Autumn | Low (1) | Low (3) |

### *5.1.5 Brown Long-eared Bat*

**Table 5.5** below provides an overall seasonal risk assessments, as per **Table 3b** of the NatureScot (2021) guidelines for Myotis species based on the site risk level and the seasonal activity category assigned to Myotis species. Based on the low risk assessment for each season at all turbine locations the collision risk assessment for Myotis species will be consistently Low at all turbine locations.

**Table 5.5: Seasonal Collision Risk Assessment to Brown long-eared bat (per Table 3b of the NatureScot (2021) Guidelines)**

| Site Risk Level | Turbines | Season | Seasonal Activity Category | Overall Seasonal Risk Assessment |
|---|---|---|---|---|
| Low (3) | All Turbines | Spring | Low (1) | Low (3) |
| | All Turbines | Summer | Low (1) | Low (3) |
| | All Turbines | Autumn | Low (1) | Low (3) |

## 5.2 LOSS OR DAMAGE TO COMMUTING AND FORAGING HABITAT

The Natural England guidance (2014) and NatureScot (2021) recommends that potential collision to bats from wind farm developments can be minimised by siting the proposed turbines so that all parts of the turbine are over 50m from the nearest vegetated corridor. In order to implement this measures hedgerow and conifer plantation will be required to be cleared from within a buffer area surrounding the proposed turbines. A buffer zone of 90.2m that will be maintained free of bat foraging habitat such as hedgerows, woodland edge, scrub and woodland habitat will be required around the proposed turbines T1 and T3 to T9 inclusive. A buffer zone of 95m will be required to be maintained between the rotor swept area of the proposed turbine T2 and the surrounding conifer plantation.

The implementation of these buffer zones will result in the loss of approximately 1.8km of hedgerow habitat; 0.5 Ha of scrub habitat to the south of the proposed turbine T6; and approximately 2.83 Ha of conifer plantation surrounding the proposed turbine T2. The areas of hedgerow and woodland habitat loss within the bat buffer zones of turbines are shown on Figure 5.1 below.

The above habitats will be removed to maintain this buffer and reduce the potential risk of collision between the operating turbine and bats. It is noted that mitigation in the form of hedgerow habitat replacement is provided as part of the Biodiversity Environmental Management Plan (BEMP) for the proposed development. This mitigation will provide for the new planting of hedgerows and tree lines that will amount to a length of 1120m of new native and species-rich hedgerow habitat.

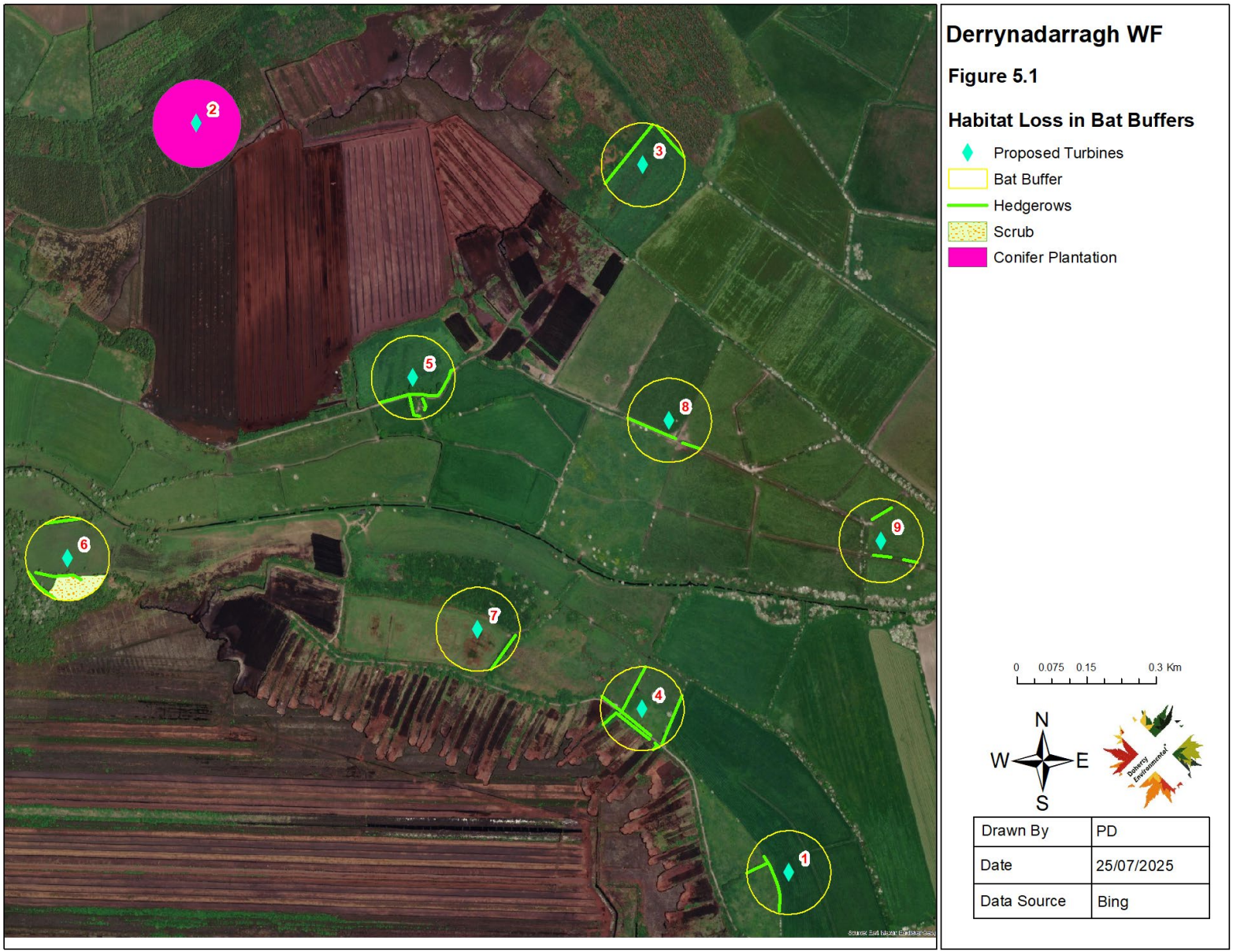
## 5.3 LOSS OF, OR DAMAGE TO, ROOSTS

No bat roosts occur within any of the structures within the vicinity of the proposed turbine locations. In addition, no mature trees occurring within a 200m buffer area surrounding the proposed turbine were found to function as roost sites for bats. As such the project will not result in any loss or damage to bat roosts.

## 5.4 DISPLACEMENT OF INDIVIDUALS OR POPULATIONS

The potential for displacement of bats from foraging habitats due to their avoidance of wind turbines is still poorly understood and is likely to result in species-specific behavioural responses. A number of studies have shown that bats avoid foraging in areas in the immediate vicinity of turbines (Bach 2002). Other studies have shown that pipistrelle species become habituated to the presence of turbines and are in general not displaced from foraging habitats located adjacent to wind turbines (Bach & Rahmael, 2004).

Given that all habitat features such as hedgerows, rivers, streams and woodland edges will be located outside a buffer distance of the rotor swept area of all turbines no significant displacement effects for individuals or populations are likely to arise. The removal of hedgerows and woodland edges within the buffer zone of the rotor swept area of turbines has been considered under Section 5.2 above.


2
3
5
8
6
9
7
4
1
Derrynadarragh WF
Figure 5.1
Habitat Loss in Bat Buffers
Proposed Turbines
Bat Buffer
Hedgerows
Scrub
Conifer Plantation
0 0.075 0.15 0.3 Km
N
W
E
S
Drawn By PD
Date 25/07/2025
Data Source Bing

## 5.5 CUMULATIVE IMPACT

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.

The Proposed Development was considered in combination with other projects and/or plans (existing approved and proposed), 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.

There is one wind farm Cushina wind farm which is at preapplication stage that is 4.3Km northwest of the site case ref 323296 of the Proposed Development;

Cushina wind farm when submitting for planning, which will be post submission of this Proposed Development, will be subject to the same requirements for environmental impact assessment and will be required to confirm that it will have no cumulative impact with other developments in the area, including the Proposed Development with which this current report is concerned.

### *5.5.1 Cushina Wind Farm*

Qualitative assessment based on limited information:

Cushina wind farm is in the townland of Cushina and Clonsast Upper. From a Desktop assessment predominantly Commercial Forestry and Cutaway bog and agricultural land. The proposed location for this development is within the same sub-catchment as the Proposed Development and upstream.

Cushina and this Proposed Development are separated by R419 and commercial forestry. The Cushina Wind Farm is located c. 4.3km from the Proposed Development, with the median point between both sites being c. 2.15km. The bat species most active at the Proposed development site were Common pipistrelle, Soprano pipistrelle and Leisler's bat, The core sustenance zone for Leisler's bats and Soprano pipistrelle is estimated to be 3km (BCT, 2020), whilst the core sustenance zone for Common pipistrelle is estimated to be 2km. Assuming a worst case scenario with roost sites for these species situated in the vicinity of the median distance between the 2 wind farms, there will be no overlap between the Proposed Development and the Cushina wind farm within the core sustenance zone for Common pipistrelle, whilst the majority of the core sustenance zone for Soprano pipistrelle and Leisler's bat will be outside the boundaries of both wind farm site, thereby reducing the potential for cumulative impacts to these species.

Cushina wind farm is at preapplication stage with limited information available with regards road layouts, detailed habitat and Bat surveys of the site and mitigation measures.

Given distance, the species surveyed and most active on the Proposed Development and their associated core sustenance zones it is likely that any foraging activity overlapping both wind farm site by a local bat population will be low.

It is further noted that as part of the Cushina wind farm development, mitigation measures, in line with best practice guidelines, and specific for the wind farm site and local bat population recorded at that site, will be implemented to minimise the potential impact of the Cushina wind farm to bats.

### *5.5.2 Findings of Cumulative Impact Assessment*

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

## 6.0 MITIGATION MEASURES

### 6.1 BAT HABITAT BUFFER

The Natural England guidance (2014) and NatureScot (2021) recommends that potential collision to bats from wind farm developments can be minimised by siting the proposed turbines so that all parts of the turbine are over 50m from the nearest vegetated corridor. The location of the proposed amended Derrynadarragh Wind Farm turbines will satisfy this recommendation with no vegetated corridors occurring within 50m of a turbine rotor diameter. To this end a "bat buffer" area will be implemented around all turbines such that the buffer area will remain free of suitable foraging habitat, consisting of hedgerows, treelines or scrub. This will require the clearance of hedgerows within the vicinity of the proposed turbines T5 and T6. The clearance of hedgerows to satisfy this requirement will amount to approximately 877m. Figure 6.1 shows the bat buffer areas surrounding turbines, the existing hedgerows that will be cleared and also the replacement hedgerows (amounting to approximately 1120m) that will be planted and managed as part of the BEMP to offset any hedgerow loss within the buffer area.

In order to avoid the potential for future interactions between the proposed Derrynadarragh Wind Farm and local bat populations all structures associated with the proposed Derrynadarragh Wind Farm such as the control building will be built in a manner to ensure no roosting opportunities are present to bats. Also no structured vegetation will be permitted to establish at these locations during the operational phase of the turbines.

### 6.2 VEGETATION CLEARANCE

An Ecological Clerk of Works (ECoW) with bat survey expertise will be appointed for the construction phase of the project. The ECoW will be required to inspect any vegetation with potential to support preferred bat roost features prior to removal. This is required to ensure that changes to vegetation (e.g. newly cracked limbs, crevices etc. formed on mature trees to be cleared) will be inspected and appraised for the presence of roosting bats prior to removal. In the event that bat roosts, established in the intervening period between the completion of baseline surveys and the completion of construction phase inspections, are identified all further vegetation clearance will be completed in accordance with legislative and best practice requirements pertaining to bat roosts.

## 6.3 OPERATION PHASE

Given the findings of moderate to high levels of activity for Leisler's bat, common pipistrelle and Soprano pipistrelle at turbines T1 to T8 during certain season mitigation measures in line with the requirements outlined in SNH guidelines will be implemented.

### *6.3.1 Blade Feathering*

There is evidence that bat casualties at wind farms is reduced by pitching the blades out of the wind ("feathering") to reduce rotation speeds below 2 rpm while idling. Arnett *et al.* have reported this reduction to be in the order of 50% when compared with normal idling. In view of this all turbine blades will be required to be feathered during idling. The implementation of this measure is in line with the current NIEA guidelines Guidance on "Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland".

### *6.3.2 Curtailment*

Curtailment involves raising the cut-in speed with associated loss of power generation in combination with reducing the blade rotation below the cut-in speed, as above. It should be considered where feathering below cut-in normal speed (above) will not provide sufficient reduction in risk to bats. The curtailment is achieved by feathering (not the actual braking of the turbine) so that the blades continue to rotate slowly (at ~2 rpm or less).

Whilst the overall activity levels of all bat species across the wind farm site were predominantly low, instances of high levels of activity for high collision risk species, namely Leisler's bat, Soprano pipistrelle and Common pipistrelle were recorded at T5 during spring; T6 during spring and autumn; and T7 during spring. These three species are considered to be of medium population vulnerability to collision with turbines.

Given the high levels of activity recorded at this time for these high collision risk species an adaptive mitigation and monitoring strategy will be implemented for the operation phase of the wind farm. Such a strategy aims to minimise and or avoid fatalities caused by operating turbines by adjusting turbine operations in response to real-time conditions. The conditions for which real-time adjustments to operation can be made comprise a combination of bat activity and weather particularly wind speed and temperature.

This will involve post-construction monitoring at turbine locations to establish bat activity levels during the post construction phase. Monitoring will be completed in accordance with Section 8 of the NatureScot 2021 guidelines "Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation". The activity monitoring will be completed at all turbine locations throughout the site with particular focus (i.e. extended periods of monitoring) given to areas of the site where high levels of bat activity have been recorded during baseline monitoring.

The monitoring will involve static detector monitoring at each of the turbine locations as well as overlapping weather monitoring for wind speed, rainfall and temperature. The monitoring will

commence during year 1 of the operation phase of the project. In addition to the monitoring carcass searches will be completed at each turbine location. These searches will be completed in line with SNH guidelines and will require searcher efficiency trials. Casualty rates will be estimated in accordance with the methods outlined by SNH (2019).

Following the completion of Year 1 monitoring the requirement for turbine curtailment to minimise/avoid impacts to bat species will be identified. In the event that curtailment is required the curtailment scheme will be informed by the results of the Year 1 monitoring. This will facilitate targeting of curtailment to the turbines and times of years where bat fatalities were identified during the monitoring.

Where the need for curtailment has been identified, a curtailment regime will be developed and presented as a part of the annual reporting. The proposed operating regime will specify, and be designed around the values for the key weather parameters and other factors that are known to influence collision risk which may include any or all of the following:

- Wind speed in m/s (measured at nacelle height),
- Time after sunset,
- Month of the year,
- Temperature (ºC), and
- Precipitation (mm/hr)

Where any curtailment strategy has been utilised it will be reviewed on an annual basis to review the level of success of same, and amended as appropriate for the following season in order to increase the efficiency with respect to both preventing bat casualties and minimising turbine downtime.

The monitoring will continue for at least the first 3 years of the operation phase so that a clear understanding of the patterns of bat activity and the turbines and times of years that pose a risk to bats are identified.

Detailed curtailment schemes can be designed based on the finding of the operation phase monitoring and the above listed parameters and can be programmed into wind turbine SCADA operating systems to only pause/feather the rotating blades in certain wind speeds, wind directions, in a certain temperature range all within specified time periods (e.g. dawn and dusk) (i.e. the SCADA can be used to temporarily curtail turbines in certain conditions when risks to bats are high). Thus, the periods of high bat activity can be identified in relation to key weather parameters and wind turbine SCADA can be programmed to appropriately curtail the operation of specific turbines in these periods.

The effectiveness of any curtailment scheme needs to be monitored in order to determine (a) whether it is working effectively (i.e. the level of bat mortality is considered to be 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 implementation of the monitoring regime and the measures to avoid significant risks to bats by regulating turbine operations where fatality risks are identified will ensure that the potential for the operation phase of the wind farm to impact local bat populations will be mitigated to an insignificant level.

### *6.3.3 Lighting*

The applicant commits to the use of lights during construction, operation, and decommissioning (such that they are necessary) in line with the following guidance in the Dark Sky Ireland Lighting Recommendations:

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

Where external lighting is required, lighting will be oriented away from mature trees and treelines located along the site perimeter. Lighting selected will use shields to ensure light is focused only on necessary areas and to eliminate upward light spill and to significantly reduce horizontal dispersion. Lighting shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/23 Bats and artificial lighting at night.

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.

## 7.0 RESIDUAL IMPACTS & CONCLUSION

Comprehensive, multi-year bat activity monitoring has been completed at the Derrynadarragh Wind Farm site to inform an assessment of the impact proposed wind farm on local bat populations. Overall, bat activity at the proposed Derrynadarragh Wind Farm was predominantly low with instances of elevated bat activity being restricted only three of the proposed turbines during spring and/or autumn seasons. No bat roosts were identified in the vicinity of turbines. The wind farm will result in the temporary loss of bat foraging habitat. Mitigation measures in the form of replacement habitat will be implemented to provide for a net increase in the availability of bat foraging habitat within the wind farm site. Such habitat will be located away from (i.e. outside bat buffer zone) operating turbines thus minimising the potential for collision with turbines and ensuring no residual long-term impact to bats as result of habitat loss. Adaptive mitigation will be implemented during

the operation phase to ensure that operating turbines present a low risk of collision to bat species. The implementation of this mitigation strategy will ensure that the wind farm will not result in any significant residual effects to the local bat populations. .

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# APPENDIX 9.2

# Aquatic Ecology Report

# DERRYNADARRAGH WIND FARM
# AQUATIC ECOLOGY


**Version: 11th of September 2025**

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# TABLE OF CONTENTS

# 1. INTRODUCTION

This report addresses the potential impact of the proposed Derrynadarragh Wind Farm (also referred to in this report as the 'Site') project on the receiving aquatic environment. The Site is located south of Edenderry, Co. Kildare and Northeast of Portarlington. Co. Laois. This document provides an assessment of the impact of the proposed development on aquatic habitats, aquatic ecological communities, and individual aquatic species. The aims of the aquatic ecology assessment are:

- To carry out a desktop study in order to determine the surface water features affected by the proposed development and surrounding area and
- To carry out a baseline fisheries and aquatic ecological survey of the identified aquatic areas.

Field survey work to inform the current assessment included kick/sweep sampling and visual assessments as well as electrical fishing surveying during September 2021 and September 2024.

The CIEEM (2019) advice note on the lifespan of ecological reports and surveys states that for reports more than three years only that "*the report is unlikely to still be valid and most, if not all, of the surveys are likely to need to be updated*". This advice is also in line with the NRA (2009) guidance for ecology surveys, which gives a three-year expiry date. The aquatic ecology surveys for this project were therefore all updated during September 2024 to a level of detail that will ensure that the assessment remains valid during the planning application period. The 2021 data is used as a reference point and for comparison purposes, rather than a basis for decision-making.

Figure 1 gives the location of the proposed Derrynadarragh Wind Farm. Figure 2 shows an aerial view of the Site. Figure 3 shows the Site with respect to the River Barrow and River Nore SAC and watercourses in the Barrow catchment. This report was prepared by Ecofact Environmental Consultants Ltd.

## 1.1 Statement of Authority

The report was prepared by Senior Ecologist Dr. Will O'Connor. Dr. O'Connor has over 30 years professional experience and holds an MSc in Applied Hydrobiology from the University of Wales, Cardiff and a PhD in Zoology from the National University of Ireland, Galway. He is a Fellow of the Royal Society of Biology and a full member of the Chartered Institute of Ecology and Environmental Management. The surveys were also completed by Dr. Will O'Connor with the assistance of junior staff.

# 2. METHODOLOGY

## 2.1 Desk study

A desktop study was undertaken to collate the existing available information on the aquatic ecology of the study area. The Study Area included the Site and all waterbodies/watercourses adjacent to the Site. The desktop study involved accessing the National Biodiversity Data Centre (NBDC) (www.biodiversityireland.ie) and the databases available for any records of sensitive aquatic ecology receptors. The National Parks and Wildlife Service (www.npws.ie) website and online maps were accessed in relation to designated areas, qualifying interests and site synopses on relevant Special Areas of Conservation with regard to aquatic ecology. Similarly, any relevant information on the website of Inland Fisheries Ireland (www.fisheriesireland.ie) was reviewed.

The Environmental Protection Agency (www.gis.epa.ie/EPAMaps/) websites including Catchments.ie (www.catchments.ie) and publications relating to the Water Framework Directive (WFD) were accessed to identify watercourses in the Study Area, in relation to water quality status and also water quality pressures in the study area. The Environmental Sensitivity Mapping (ESM) tool was also used to gather data on aquatic biodiversity, flora and fauna in the study area.

Aerial imagery was accessed online in order to gain a better understanding of the study area and its surrounding habitats. All documents reviewed are included in the bibliography section of the current report.

## 2.2 Field survey

### *2.2.1 Introduction*

All watercourses / water bodies which could be affected directly (i.e. within the site) or indirectly (i.e. drain areas close to the site) were considered as part of the current appraisal. Aquatic habitat surveys were completed on all watercourses draining the Proposed Wind Farm Site and a total of 6 sites were selected for detailed assessment. The purpose of these sites is to provide baseline information and can also be used for monitoring during the construction of the Proposed Wind Farm. The locations of the sites are given in Table 1 and shown in Figure 1.

**Table 1** Location of the aquatic ecology sites assessed for the Proposed Derrynadarragh Wind Farm Site.

| Site No. | Catchment | Sub-catchment | Watercourse Name | Watercourse Order | Segment Code | EPA Code |
|---|---|---|---|---|---|---|
| 1 | Barrow 14 | Barrow_SC_040 | River Barrow | 5th | 14_1611 | 14B01 |
| 2 | Barrow 14 | Barrow_SC_040 | River Figile | 4th | 14_1766 | 14F01 |
| 3 | Barrow 14 | Barrow_SC_040 | River Cushina | 3rd | 14_276 | 14C04 |
| 4 | Barrow 14 | Barrow_SC_040 | River Cushina | 3rd | 14_276 | 14C04 |
| 5 | Barrow 14 | Barrow_SC_040 | River Cushina | 3rd | 14_275 | 14C04 |
| 6 | Barrow 14 | Figile_SC_020 | River Figile | 4th | 14_10514 | 14F01 |

. The surveys completed at each site were at a level required to make an evaluation of biological water quality, fisheries value, aquatic habitat value, and presence of rare/protected/notable aquatic species at each site. The surveys were conducted in accordance with relevant best practice guidelines, as outlined in the following sections. All watercourses on the site were again viewed during the walkover

surveys. Of the sites chosen, two were within the Site, two were upstream and 2 were downstream of the Site. One of the upstream sites (Site 5) is also along the proposed Turbine Delivery Route (TDR).

### 2.2.2 Habitat Surveys

Habitat surveys were completed with reference to the Environment Agency's "*River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003*" (EA, 2003) and "*A Guide to Habitats in Ireland*" (Fossitt, 2000). Lamprey habitats in the study area were assessed with reference to the manuals 'Ecology of the River, Brook and Sea Lamprey *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus'* by Maitland (2003) and 'Monitoring the River, Brook and Sea Lamprey' by Harvey and Cowx (2003). Salmonid habitat was evaluated with reference the Department of Agriculture for Northern Ireland's Fisheries Division document, the '*Evaluation of habitat for Salmon and Trout'* (DANI, 1995), and the English Nature manuals 'Ecology of the Atlantic Salmon' by Hendry K & Cragg-Hine D (2003).

### 2.2.3 General Fish Surveys

Electrical fishing surveys were undertaken at the six sites during September 2021 and September 2024. The surveys were completed under authorisation from the Department of Environment, Climate and Communications under Section 14 of the Fisheries (Consolidation) Act (1959).

Sites were surveyed following the methodology outlined in the CFB (2008) guidance, and with reference to Matson *et al* (2018). A portable electrical fishing unit (Smith Root-LR 24backpack) was used to carry out the survey. The sites were fished continuously for 5 minutes each. Captured fish were collected into a container of river water using dip nets. The fish were released alive and spread evenly over the sampling area. No mortalities were recorded. Strict biosecurity measures were followed during all fieldwork (IFI, 2010).

### 2.2.4 Juvenile Lamprey Surveys

Juvenile Lamprey surveys followed the methodology for ammocoete surveys given in the manual *'Monitoring the River, Brook and Sea Lamprey, Lampetra fluviatilis, L. planeri* and *Petromyzon marinus'* by Harvey & Cowx (2003). Electrical fishing for juvenile lampreys was carried out at three 1m$^2$ habitat patches where available. A total of 3 x 1 m$^2$ enclosures were fished at each site where suitable habitat was present and where conditions allowed. Lamprey identification followed '*Identifying Lamprey. A Field Key for Sea, River and Brook Lamprey'* by Gardiner R (2003). Sites were surveyed during September 2021 and September 2024

### 2.2.5 Biological water quality

A biological water quality rating was assigned at each site with regard to the methodology given in Toner *et al*., (2005). This was a rapid assessment and estimated water quality ratings were assigned for each of the 6 aquatic survey sites.

The presence / absence of any rare or notable macroinvertebrate species was also assessed during the survey. This was based on the kick /sweep sampling results and visual observations at each site.

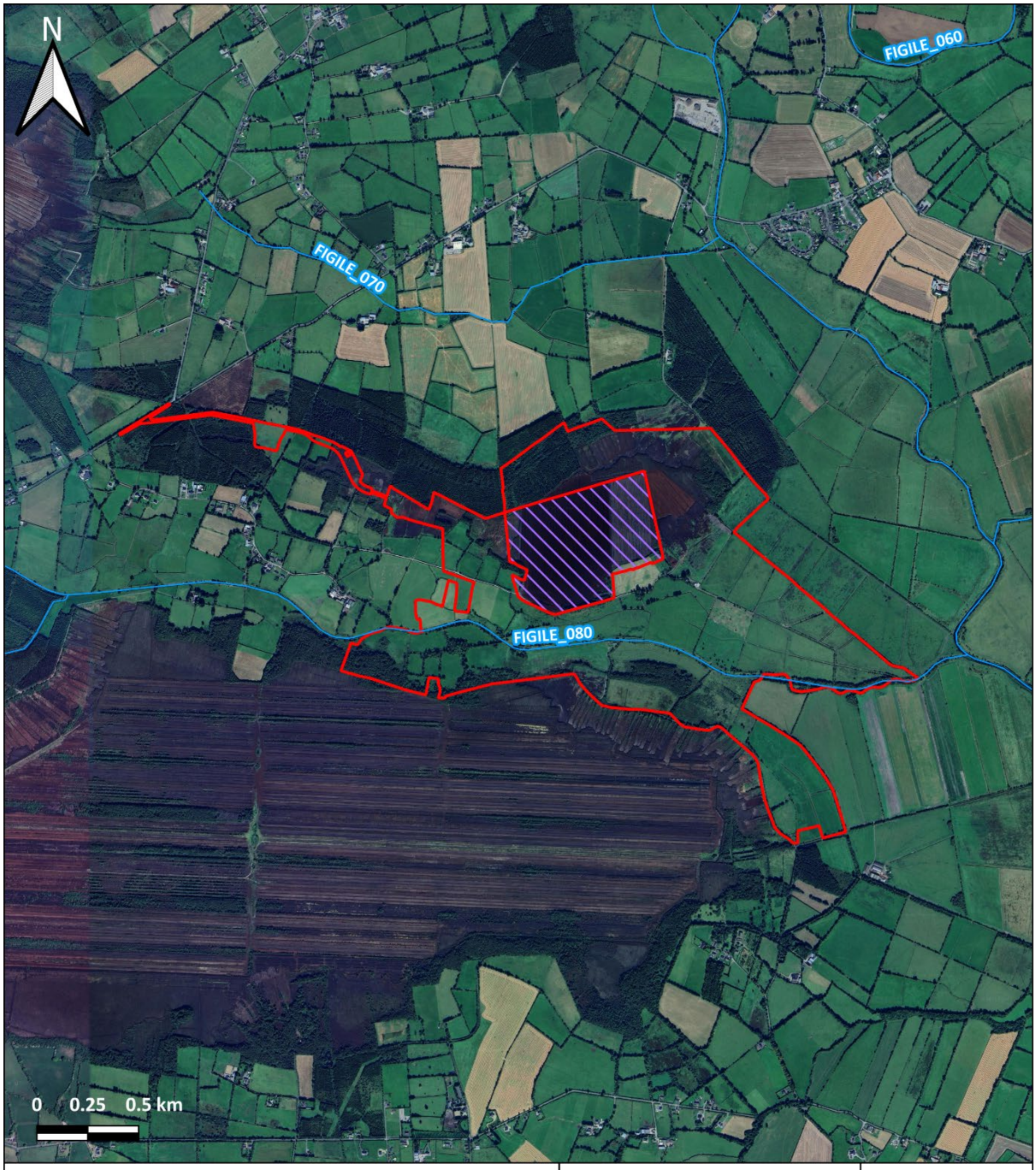


**Figure 1** Location of the proposed Derrynadarragh Wind Farm site.


**Figure 2** The location of the 6 aquatic ecology survey sites.

# 3. RECEIVING ENVIRONMENT

## 3.1 Desk study

### *3.1.1 Introduction*

The proposed Derrynadarragh wind farm is located within the River Figile sub catchment, which is part of the Barrow catchment. The River Barrow is the 2nd longest river in Ireland, the Barrow catchment drains a total area of 3,025km$^2$.

The River Figile (EPA code: 14F01) is the largest sub-catchment of the River Barrow. It is a lowland drained catchment where land use is predominantly pastures and peat bogs, with some forest tracts scattered throughout too. The main tributaries of the Figile are the Cushina, Slate and Daingean Rivers. There are three survey sites (Sites 1, 2 and 6) located on the River Figile.

The Figile confluence with the Barrow is located at the Laois – Kildare County border, just north of Monasterevin. The 4th order Figile River flows in a southerly direction into the main channel of the River Barrow from the north side and to the west of the Grand Canal Barrow Line. Upstream of the Barrow the Figile is joined by a 1st order tributary, the Ummera_Beg, from the east before the 3rd order Cushina River flows in from the west to the north of Derrylea Bog. Just over 600rm upstream of the Cushina confluence, the 3rd order Slate River joins the watercourse from the east side. The Proposed Wind Farm is located directly west of this confluence.

Further upstream at Bracknagh, two small tributaries flow into the channel from the west, the Bracknagh River and the Clonshannon 14 River. Just downstream of Clonbulloge the 3rd order Ballygarrett 14 flows in from the east. The Daingean River confluence is located at the upstream side of the village of Clonbulloge. A number of 1st order streams drain into the Figile River as the channel turns to a west-east orientation upstream of Edenderry Power Station. The 3rd order Ballyleakin also flows in from the north. Several more 1st and 2nd order tributaries connect to the Figile in its upper reaches; including the Lullymore_East, Abbeylough and Parsontown Rivers just downstream of the source of the Figile at Dunfierth Bog North County Kildare.

The Proposed Wind Farm Site is located on the River Cushina c. 280rm upstream from the River Figile. Sites 3, 4 and 5 are also located on the River Cushina. This river rises c. 17.6rkm upstream from the Proposed Wind Farm Site. From where the river rises it flows east until it meets the River Figile. The only major tributary is the 3rd order Enaghan Stream (EPA code: 14E02).

### *3.1.2 Designated sites*

Part of the River Barrow catchment is included in the River Barrow and River Nore Special Area of Conservation (SAC) (Site code: 002162). The boundary of the SAC is located approximately 6rkm downstream of the Proposed Derrynadarragh Wind Farm site. This is the only Natura 2000 river system potentially affected by the proposed development. The River Barrow and River Nore SAC comprise of the freshwater element of the River Barrow downstream of the Slieve Bloom Mountains to the tidal areas as far as Credaun Head in Waterford.

The River Barrow and River Nore SAC is selected for the Annex I aquatic habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]. The site is also listed for the following aquatic Annex II species; *Margaritifera margaritifera (*Freshwater Pearl Mussel) [1029], *Austropotamobius pallipes* (White-clawed Crayfish) [1092], Petromyzon marinus (Sea

Lamprey) [1095], *Lampetra planeri* (Brook Lamprey) [1096], Lampetra fluviatilis (River Lamprey) [1099], *Alosa fallax fallax* (Twaite Shad) [1103], and *Salmo salar* (Salmon) [1106].

### *3.1.3 Water Quality*

The Environmental Protection Agency (EPA) carry out biological monitoring on a number of sites on the watercourses within the study area.

There is an EPA monitoring station on the River Figile at survey Site 6. This monitoring station (EPA station code: 14F01 0500) was rated Q4 in 2020 equivalent to WFD status "Good". A further 6rkm upstream there is another EPA monitoring station (EPA station code: 14F01 0400). This station was rated Q3 in 2023 equivalent to WFD status "Poor". There is another monitoring station located at Clonbulloge village c. 3rkm upstream. This site was rated Q3 in 2024.

The closest EPA monitoring station downstream is located on the River Barrow at Monasterevin. This site (EPA station code: 14B01 1000) was rated Q3-4 in 2023 equivalent to WFD status "Moderate".

There is an EPA monitoring station on the River Cushina (EPA station code: 14C04 0100). This site is located c. 1.8 rkm upstream of the Proposed Wind Farm Site. The site was rated Q3-4 in 2023. There is another EPA monitoring station (EPA station code: 14E02 0300) located c. 3.4rkm upstream. This site was rated Q4 in 2023 equivalent to WFD status "Good".

The Water Framework Directive sets out objectives to be met by river waterbodies in Ireland before 2027. Waterbodies are then assessed for their potential risk of not meeting these objectives set out by WFD and therefore are assigned a Risk rating. Waterbodies that are "At Risk" can then be prioritised for the implementation of measures. The River Figile directly downstream of the site is considered "Under Review". The River Cushina at the Wind Farm site is also "Under Review". These are located in the same sub-catchment. This sub-catchment (sub-catchment: Figile_080) is under pressure from channelisation and wastewater discharge. Directly upstream of Site 6 the River Figile is considered "Not at Risk". Upstream of the Figile_080 sub-catchment the Cushina_30 sub-catchment is "Not at Risk". Further upstream the River Cushina at "At Risk".

### *3.1.4 Previous Aquatic Ecology Records*

The River Barrow supports a range of fish species including Atlantic salmon (*Salmo salar*), Brown Trout (*Salmo trutta*), Twaite Shad (*Alosa fallax*), Dace (*Leuciscus leuciscus*), Bream (*Abramis brama*), Perch (*Perca fluviatilis*), Rudd (*Scardinius erythrophthalmus*), Roach (*Rutilus rutilus*), Tench (*Tinca tinca*), and Pike (*Esox lucius*). The Barrow is known to support the only sizeable spawning population of Twaite Shad (*Alosa fallax*) in Ireland – however, this species does not occur in the study area as migration of Shad (*Alosa fallax*) in the river is blocked by the weir at St. Mullins (King, 2006). In general, the tributaries of the River Barrow tend to have limited habitat for juvenile Lamprey (*Lampetra sp.*) (King, 2006). Compared to other catchments in Ireland, such as the Slaney and Munster Blackwater and the Moy, the Barrow has limited ammocoete (*Lampetra* spp.) populations (King, 2006).

The River Barrow has a relatively good run of salmon which spawn downstream of the weirs on the main channel and also run into the tributaries. Most of the tributaries have been subjected to arterial drainage schemes and water quality is a significant pressure in the catchment. According to Inland Fisheries Ireland (IFI), the River Barrow catchment contains 5.75% of the accessible juvenile salmon habitat in Ireland, comprising 6.49 million $m^2$ of suitable juvenile salmon habitat. As gradient has a strong influence on habitat suitability for salmonids, especially at the early life stages, the main channel

of the River Barrow is regarded as a marginal habitat with respect to salmon production. To accommodate navigation, as well as providing hydropower to a number of industrial units, the River Barrow was regulated by a number of major weirs, creating a series of zero to very low gradient reaches between each weir.

IFI carried out an electrofishing survey of the entire River Barrow Catchment as part of the National Research Survey Programme in 2015 and again in 2020. Both surveys included sites located on the River Figile and the River Cushina catchments. There were four sites located on the River Figile. Of these, three were located just in a 2km stretch downstream of Daingean. These were located on the Philipstown River. This is over 30km upstream from where the River Figile flows into the river Cushina. Cumulatively at these sites in 2015, Stone loach, Pike, Nine-spiked stickle back and Three-spined stickleback were recorded. The River Figile site was located at Ticknevin and is over 20 rkm upstream from where the River Cushina flows in the River Figile. This site was only surveyed in 2020. There was a total of three species recorded. These were Brown trout (0.0101 fish/$m^2$), Stone loach (0.018 fish/$m^2$) and Three-spined stickleback (0.083 fish/$m^2$). There were two age classes of brown trout recorded. The minimum density recorded for 0+ fish was 0.046 fish/$m^2$ and for 1+ and older it was 0.055 fish/$m^2$ (Gordon 2021).

The survey site on the River Cushina was located upstream of the Proposed Wind Farm Site at Survey Site 5. At this site there were three species recorded. These were 1+ and older Brown trout (0.009 fish/$m^2$), Gudgeon (0.009 fish/$m^2$) and Stone loach (0.03 fish/$m^2$). Overall, the fish ecological status for the River Cushina and the Phillipstown river sites was Poor. The status for the River Figile site was Moderate (Gordon 2021).

The Barrow also supports populations of the protected, White-clawed Crayfish (*Austropotamobius pallipes*). The River Barrow and River Nore SAC was a stronghold for White-clawed crayfish (Demers *et al.,* 2005). This species is threatened on a global scale and Ireland holds one of the world's largest populations of the species. Crayfish plague, caused by the alien fungus *Aphanomyces astaci* is present in the River Barrow.

In 2017 large Crayfish mortality events occurred in the catchment between Graignamanagh in Kilkenny and upstream as far as Carlow. DNA tests from 4 different locations along this stretch confirmed the presence of Crayfish plague. According to catchments.ie, the highly infectious disease had spread through the main Barrow channel and was now widespread in the river. It had been recorded as far upstream in the main channel as Monasterevin in 2018. In May 2019 Crayfish Plague was found to be present within the Figile sub-catchment, its presence was confirmed on the River Slate at Rathangan (NPWS, 2019). Previous Ecofact surveys have shown that the Figile River has previously been considered important for this species (Ecofact 2014). Significant numbers were recorded at Cushaling Bridge in 2014. It is likely that the Figile River population has since been impacted by Crayfish Plague.

There are records of Freshwater Pearl Mussel (*Margaritifera margaritifera*) populations in the Barrow catchment. Pieces of empty *Margaritifera* shells have been recorded previously in the River Barrow (McMillan and Zeissler, 1990), however, no living specimens of the critically endangered species have been found outside of the River Nore since 1993. The Barrow Freshwater Pearl Mussel populations occur in the Aughavaud, Ballymurphy and Mountain sub-catchments. The Figile River was surveyed by Moorkens in 1991 (Moorkens *et al.* 1992) and the species was not present.


**Figure 3** Natura 2000 Sites within 15km of proposed Derrynadarragh Wind Farm.

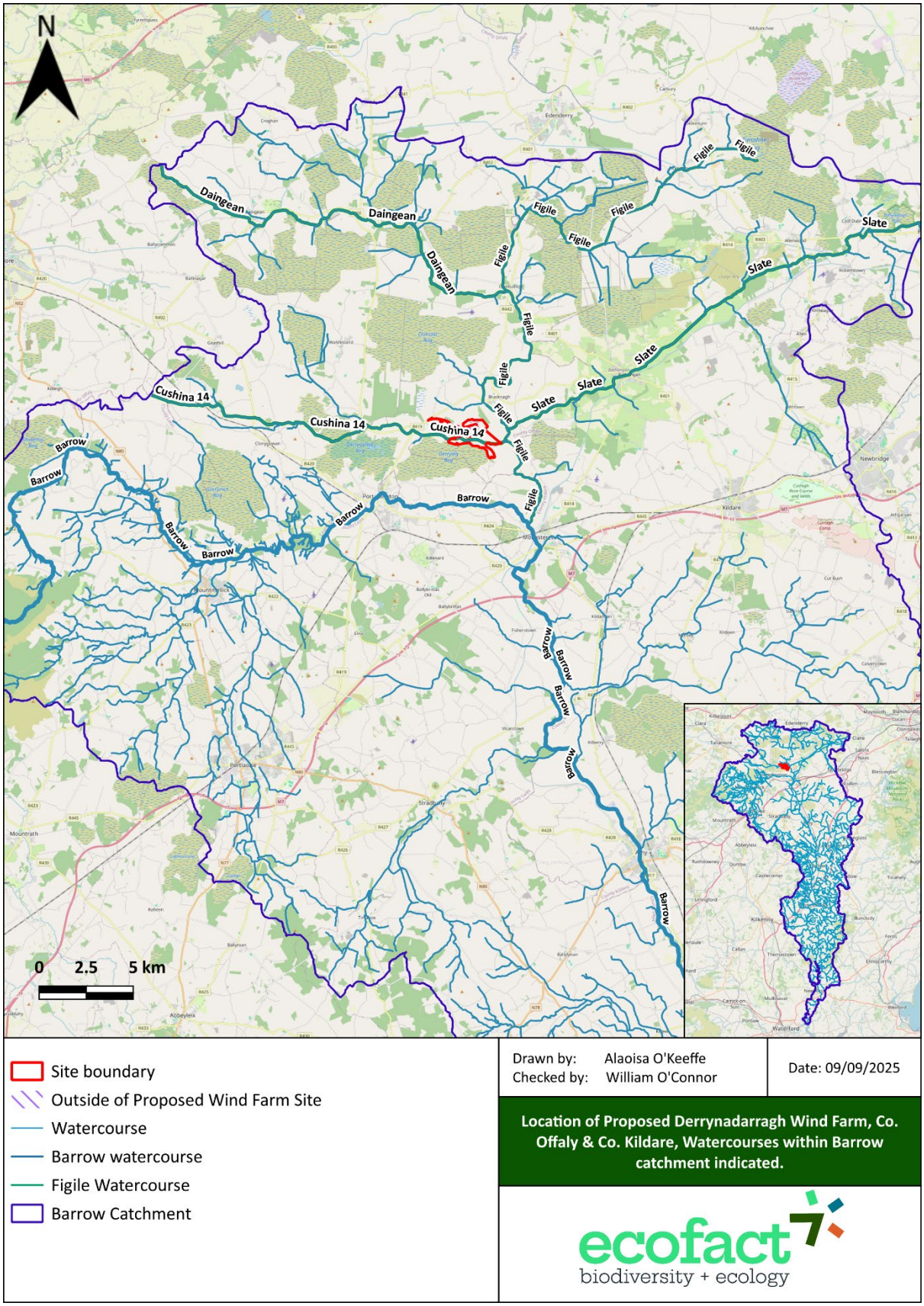


**Figure 4** Location of the proposed Derrynadarragh Wind Farm in relation to the River Barrow catchment.

**Table 3** Summary of the potential occurrence of aquatic qualifying interests of the River Barrow and River Nore SAC within the Figile sub-catchment.

| | Natura Code | Qualifying Interests | Occurrence |
|---|---|---|---|
| Habitats | 3260 | Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation | The main area of this habitat for which the SAC is designated is located in the Kings tributary of the River Nore. It is noted that the full distribution of this habitat in the SAC is not currently known (NPWS, 2011). However, this habitat occurs in areas of good water quality, the water quality in the Figile sub-catchment is not sufficient to support this habitat type and so it does not occur in these rivers. |
| Species | 1095 | Sea lamprey (*Petromyzon marinus*) | Range in the Barrow catchment is limited to the lower reaches due to barriers to migration – therefore is not present in these rivers of the Figile sub-catchment in the Upper Barrow catchment. |
| | 1096 | Brook lamprey (*Lampetra planeri*) | Widely distributed in the River Barrow and recorded in the River Figile at Cushaling in 2014 (Ecofact, 2015). |
| | 1099 | River lamprey (*Lampetra fluviatilis)* | The range of this species is mainly limited to downstream areas due to barriers to upstream migration and so is unlikely to be present in these rivers of the Figile sub-catchment in the Upper Barrow catchment. |
| | 1102 | Allis shad (*Alosa fallax*) | Impassable barrier at St. Mullins weir prevents this species from accessing these rivers of the Figile sub-catchment in the Upper Barrow catchment (NPWS, 2013). This species therefore would not occur in the Figile sub-catchment located in the Upper Barrow catchment. |
| | 1106 | Atlantic salmon (*Salmo salar)* | This species has not been recorded on the main River Figile in previous Ecofact surveys (Ecofact, 2015; Ecofact, 2020) but is likely to occur here as it is known to be present in the Figile sub-catchment. |
| | 1103 | Twaite shad (*Alosa alosa*) | Impassable barrier at St. Mullins weir prevents this species from accessing these rivers of the Figile sub-catchment in the Upper Barrow catchment (NPWS, 2013). This species therefore would not occur in the Figile sub-catchment located in the Upper Barrow catchment. |
| | 1092 * | White-clawed crayfish (*Austropotamobius pallipes*) | The Figile River has previously been considered important for this species (Ecofact 2014). Significant numbers were recorded at Cushaling Bridge in 2014. It is likely however that the Figile River population has since been impacted by Crayfish Plague as the invasive species was confirmed to be present in the River Slate in 2019. |
| | 1029 | Freshwater pearl mussel (*Margaritifera margaritifera*) | Freshwater pearl mussel populations recorded from the River Barrow sub-basin are restricted to three tributaries of the Barrow in Co. Carlow: the Aughavaud, Ballymurphy and Mountain Rivers.<br><br>The Figile River was surveyed by Moorkens in 1991 (Moorkens *et al.* 1992) and the species was not present. This species is not present in this watercourse. |

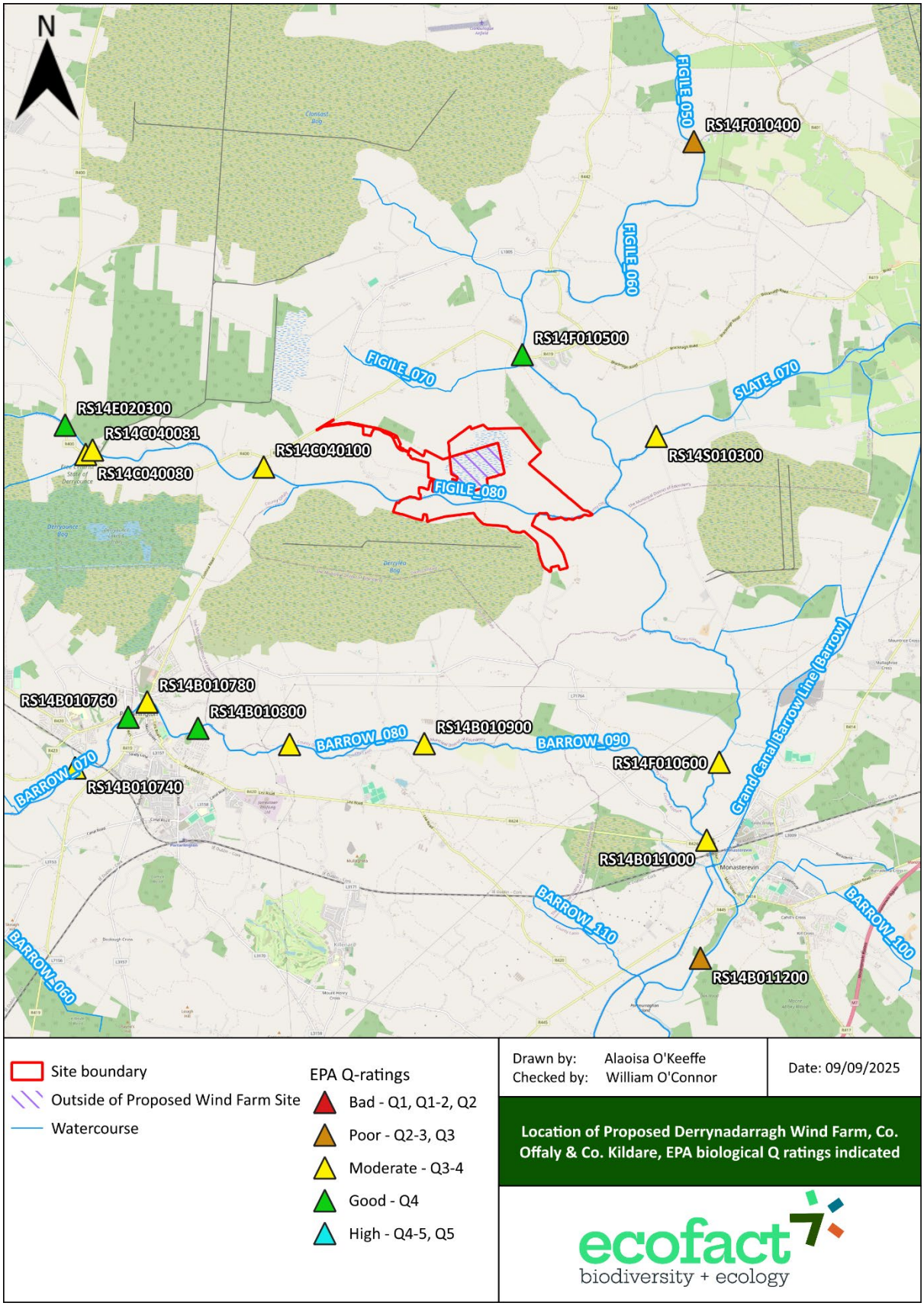


**Figure 5** EPA Monitoring Stations in Relation to proposed Derrynadarragh Wind Farm.

## 3.5 Baseline Aquatic Ecology Surveys 2021-2024

### *3.5.1 Site 1*

Site 1 is located on the 5th order River Barrow (EPA segment code: 14_1611). This site is located c. 390rm downstream of the River Figile confluence with the River Barrow and c. 5.5 km downstream from the Proposed Wind Farm Site boundary. This site is located within the River Barrow and River Nore SAC.

The river here was wide with a wetted width of c. 30m. The water depth at the site was also relatively high with a mean depth of 70cm and a maximum depth of over 1m. Habitat present was predominantly glide (80%), no riffle habitat and 10% pool habitat. The substrate at the site was dominated by fine material. Silt/mud increased towards the riverbanks. The gradient here was low and siltation was moderate. The channel has been drained and channelised. Filamentous algae were recorded here.

The fish community at this site was dominated by coarse fish. The most abundant species were Minnow, Dace, and Roach. Small numbers of Brown trout and lampreys were recorded at this site.

Salmon were not recorded in either the 2021 or 2024 survey. Salmon are present in this stretch but the nursery habitat here is suboptimal. Adult salmon pass through to spawn in areas upstream and only very low densities of parr would be expected, and these were not picked up in the surveys. White-clawed crayfish were present at the site until recently, but the population here has been impacted by crayfish plague. Crayfish were not recorded during the 2021 and 2024 surveys, but it is hoped the population will recover again in the future.

The site was assigned a Q-value of Q3-4 equivalent to WFD status “Moderate”. The EPA assigned the site a rating of Q3-4 also in 2023. The dominant fish are coarse fish species and moderate siltation along with filamentous algae were present.

### *3.5.2 Site 2*

Site 2 is located on the 4th order River Figile (EPA segment code: 14_10483). This site is located c. 600rm downstream of the Proposed Wind Farm Site.

The river here had a wetted width of 12m. The water depth at the site was on average 50cm. The riverbank here was 3m high. The level of instream vegetation at the site was c. 30%. Habitat present was predominantly glide (80%) with no riffle and 10% pool habitat. The substrate was predominantly sand/fine (50%) with lower levels of cobble (30%) and rock (20%). The gradient here was low and siltation was moderate. The channel has been drained and channelised.

The fish community recorded was again dominated by coarse fish species. The most abundant species was Minnow. Three-spined stickleback were recorded in small numbers. Small numbers of Brook lamprey were also present. Salmonids were recorded during the 2021 survey but not in the 2024 survey. This does not mean they were absent, but they are present in very low numbers in suboptimal habitat here and were not detected during the September 2024 survey. The river levels were slightly lower during the 2021 survey, and this may have affected sampling efficiency.

White-clawed crayfish were not recorded in either survey. White-clawed crayfish were present at the site until recently, but the population here has been impacted by crayfish plague (see Section 3.1.4 above).

The site was assigned a Q-value of Q3 equivalent to WFD status “Poor”. This rating is driven by the suboptimal habitat at the site. The dominant fish are coarse fish species and moderate siltation along with filamentous algae were present.

### *3.5.3 Site 3*

Site 3 is located on the 3rd order River Cushina (EPA segment code: 14_276) c. 50m downstream of the Proposed Wind Farm Site boundary. This site is located c. 250rm upstream of the river Cushina and River Figile confluence.

The river here is c. 8m wide. There is a mean depth of c. 30cm with a maximum of c. 50cm. The proportion of instream vegetation present was 35%. The dominant habitat here was glide. The substrate was predominantly cobble with lower levels of sand/fine and rock. The gradient here was low and siltation was moderate. Filamentous algae were present. The channel has been drained and channelised. The fish community here was again dominated by coarse fish. There were overall small numbers of salmonids and lampreys present. White-clawed crayfish were not recorded.

The site was assigned a Q-value of Q3 equivalent to WFD status “Poor”. This rating is driven by the suboptimal habitat at the site. The dominant fish are coarse fish species and moderate siltation along with filamentous algae were present.

### *3.5.4 Site 4*

Site 4 is located within the Proposed Wind Farm Site. This site is on the 3rd order River Cushina (EPA segment code: 14_276). This was located c. 1.7rkm upstream from survey Site 3.

The river at the site here is c.5m wide. The mean depth was c. 40 cm with a maximum depth of c. 70cm. The habitat here was 100% glide. The substrate was 100% sand/fine. The gradient here was low and siltation was moderate. Filamentous algae were present. The channel has been drained and channelised.

Minnow, Roach, Three-spined Stickleback, and Stone Loach were recorded at this site. This is very suboptimal habitat for salmonids and none were recorded in either survey. However, both salmon and trout are present in more suitable habitats on this waterbody. There were ongoing river works at this site when it was visited in September 2021. It is regularly dredged, and this further degrades the habitats present. Low densities of lampreys may be present, but they were not recorded. Juvenile lampreys are very vulnerable to river maintenance works.

The site was assigned a Q-value of Q3 equivalent to WFD status “Poor”. This rating is driven by the suboptimal habitat at the site. The dominant fish are coarse fish species and moderate siltation along with filamentous algae were present.

### *3.5.5 Site 5*

Site 5 is located on the 3rd order River Cushina (EPA segment code: 14_275). This site is located c. 1.8rkm upstream of the Proposed Wind Farm Site boundary. The site is located where the River Cushina crosses the R419 road.

The wetted width of the channel was c. 5m. The mean depth was c. 35cm with a maximum of c. 70cm. The coverage of instream vegetation present was c. 50%. The dominant habitat here was glide (70%)

followed by pool (20%) and riffle (10%). The substrate was predominantly sand/fine (40%), with equal proportions of rock (30%) and cobble (30%). The gradient here was low and siltation was moderate. Filamentous algae were present. The channel has been drained and channelised. There were ongoing river works at this site when it was visited in September 2021.

The fish community at this site is again dominated by coarse fish species. Gudgeon were recorded here in the 2024 survey but were not detected in the previous survey. Minnow and Dace were the most common species. Salmon, Brown Trout, Brook lamprey were recorded. However, the habitats here are very suboptimal for salmonids and lampreys.

The site was assigned a Q-value of Q3-4 equivalent to WFD status “Moderate”. The dominant fish are coarse fish species and moderate siltation along with filamentous algae were present.

### *3.5.6 Site 6*

Site 6 is located on the River Figile (EPA segment code: 14_10514). This site is located where the river crossed the regional R419 road. This site is located c. 3.5rkm upstream from Site 2.

The wetted width of this site was c.10m with a maximum depth of 80cm. The coverage of instream vegetation was 40%. The dominant habitat here was glide (90%) followed by riffle (10%). The substrate was predominantly sand/fine (40%), with equal proportions of rock (30%) and cobble (30%). The gradient here was low and siltation was moderate. Filamentous algae were present. The channel has been drained and channelised. River works were ongoing downstream of the site when it was surveyed in 2021.

The most abundant species were Minnow and Three-spined stickleback. Eel, Salmon, Brown Trout, Dace, Stone Loach and Pike were also recorded. Small numbers of salmonids and lampreys were present. The habitats here are very suboptimal for these species.

The site was assigned a Q-value of Q3-4 equivalent to WFD status “Moderate”. The dominant fish are coarse fish species and moderate siltation along with filamentous algae were present.

**Table 4** Summary of the results of the aquatic ecology surveys completed for the proposed Derrynadarragh Wind Farm development.

| Site No. | Watercourse name | Biological Water quality | Aquatic habitat | Fish population | Rare / notable species | Overall evaluation |
|---|---|---|---|---|---|---|
| 1 | River Barrow | Q3-4 | Drained and channelised. Gravel substrate with muddy sides. | Fish community dominated by coarse fish. Small numbers of salmonids and lampreys also present. | Brook Lamprey Brown Trout White-clawed crayfish were present until recently. Salmon likely to be present. | Moderate status channel dominated by coarse fish species. |
| 2 | River Figile | Q3 | Drained and channelised. Substrate dominated by silt/mud. | Fish community dominated by coarse fish. Small numbers of salmonids and lampreys also present. | Brook Lamprey, Brown Trout, Salmon. White-clawed crayfish were present until recently | Moderate status channel dominated by coarse fish species, but salmonids and lampreys present in low numbers. |
| 3 | River Cushina | Q3 | Drained and channelised. Substrate dominated by silt/mud. | Fish community dominated by coarse fish. Small numbers of salmonids and lampreys also present. | Brook Lamprey, Brown Trout, Salmon. | Moderate status channel dominated by coarse fish species, but salmonids and lampreys present in low numbers. |
| 4 | River Cushina | Q3 | Drained and channelised. Substrate dominated by silt/mud. Ongoing river works. | Minnows and Three spined sticklebacks recorded in the survey. However, some salmonids and lampreys likely to be present and occur upstream. | None | Moderate status channel. Modified and ongoing river works. |
| 5 | River Cushina | Q3-4 | Drained and channelised. Ongoing river works. | Fish community dominated by coarse fish. Small numbers of salmonids and lampreys also present. | Brook Lamprey, Brown Trout, Salmon. | Moderate status channel dominated by coarse fish species, but salmonids and lampreys present in low numbers. |
| 6 | River Figile | Q3-4 | Drained and channelised. Ongoing river works. | Fish community dominated by coarse fish. Small numbers of salmonids and lampreys also present. | Brook Lamprey, Brown Trout, Salmon. | Moderate status channel dominated by coarse fish species, but salmonids and lampreys present in low numbers. |

# 5. CONCLUSION

The overall assessment of the aquatic habitats within and adjacent to the site have been assessed to be of moderate quality, with Q-Values of 3 and 3-4 recorded. The fish community is generally dominated by coarse fish with small numbers of salmonids and lampreys also present in some of the survey sites. The river channels, at least at the points surveyed, have been, and continue to be, modified through dredging and channelisation.

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## PLATES

**Plate 1** The River Barrow downstream of the River Figile confluence (Site 1) during September 2024.

**Plate 2** The River Cushina at Site 3, September 2024.

**Plate 3** The River Cushina at Site 4, September 2024.

**Plate 4** The River Cushina at Site 5, September 2024.

**Plate 5** Eutrophication at Site 6 on the River Figile, September 2024.

**Plate 6** Drainage maintenance works on the River Cushina between Sites 4 and 5 (September 2021).

**Plate 7** Electrical fishing survey at Site 6 on the River Figile, September 2024.


**Plate 8** Brown trout (top), Dace (centre) and Roach from Site 1 The fish community at this site was dominated by coarse fish species. However, juvenile trout and salmon were also present.

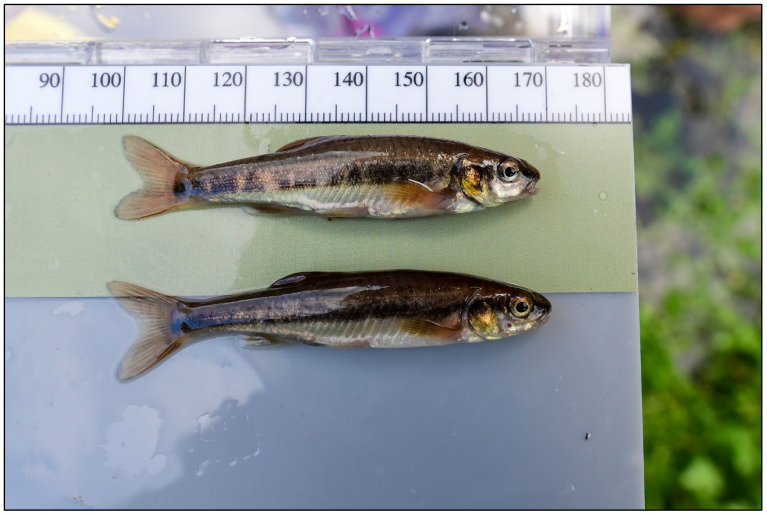



**Plate 9** Minnows from the River Cushina at Site 3.

**Plate 10** Juvenile Pike from the Site 6 on the River Figile, September 2024.

**Plate 11** Stone Loach from the River Cushina at Site 5, September 2024.


**Plate 12** Juvenile salmon (two age classes) from the River Cushina, at Site 5.


**Plate 13** Pike (top), Dace (centre), and Gudgeon from Site 6 on the River Figile.


**Plate 14** Juvenile Brook lampreys from at Site 6 on the River Figile.

**Plate 15** Juvenile Brook lampreys from at Site 6 on the River Figile, September 2024.

# APPENDIX 1 RESULTSI (2021-2024 SURVEYS)

**Table A.1.1** General characteristics of the 6 survey sites.

| Site | Watercourse Name | Wetted width (m) | Mean Depth (cm) | Max Depth (cm) | Instream vegetation (%) | Bank Height (m) |
|---|---|---|---|---|---|---|
| 1 | River Barrow | 30 | 80 | 100+ | 20 | 3 |
| 2 | River Figile | 12 | 50 | 100+ | 30 | 3 |
| 3 | River Cushina | 8 | 40 | 80 | 35 | 1 |
| 4 | River Cushina | 5 | 40 | 70 | 90 | 2 |
| 5 | River Cushina | 4 | 35 | 60 | 50 | 2 |
| 6 | River Figile | 8 | 35 | 80 | 40 | 2 |

**Table A.1.2** Flow and substrate characteristics of the 6 survey sites.

| Site | Watercourse Name | Habitat | Riffle (%) | Glide (%) | Pool (%) | Rock (%) | Cobble (%) | Sand/Fine (%) |
|---|---|---|---|---|---|---|---|---|
| 1 | River Barrow | FW2 | 0 | 80 | 20 | 10 | 20 | 70 |
| 2 | River Figile | FW2 | 0 | 80 | 20 | 20 | 30 | 50 |
| 3 | River Cushina | FW2 | 10 | 70 | 20 | 20 | 60 | 20 |
| 4 | River Cushina | FW2 | 0 | 100 | 0 | 0 | 0 | 100 |
| 5 | River Cushina | FW2 | 10 | 80 | 10 | 30 | 30 | 40 |
| 6 | River Figile | FW2 | 10 | 90 | 0 | 40 | 40 | 20 |

**Table A.1.3** Results of the River Corridor Survey (RHS) Assessments at the 6 survey sites.

| Site | EPA Code | Drained (Y/N) | Habitat | Gradient (Low/Med/High) | Siltation (Heavy/Moderate/Normal/Free) | Filamentous algae (Y/N) | Eroding Banks (Y/N) |
|---|---|---|---|---|---|---|---|
| 1 | 14B01 | Y | FW2 | L | M | Y | N |
| 2 | 14F01 | Y | FW2 | L | M | Y | N |
| 3 | 14C04 | Y | FW2 | L | M | Y | N |
| 4 | 14C04 | Y | FW2 | L | M | Y | N |
| 5 | 14C04 | Y | FW2 | L | M | Y | N |
| 6 | 14F01 | Y | FW2 | L | M | Y | N |

**Table A.1.4** Results of the aquatic ecology habitat assessments at the 6 survey sites.

| Site | Watercourse Name | Salmonid Nursery(Y/N) | Salmonid Fishery (Y/N) | Coarse Nursery (Y/N) | Coarse Fishery (Y/N) | Salmon (P/A) | Trout (P/A) | Coarse Fish (P/A) | Eel (P/A) | Lamprey Habitat (P/A) | Lamprey (Y/N) | Crayfish (P/A) | FWPM (P/A) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | River Barrow | N | N | Y | Y | A | P | P | A | P | Y | A* | A |
| 2 | River Figile | N | N | Y | N | P | P | P | A | P | Y | A* | A |
| 3 | River Cushina | N | N | Y | N | A | P | P | A | P | Y | A | A |
| 4 | River Cushina | N | N | Y | N | A | A | P | A | P | A | A | A |
| 5 | River Cushina | Y | N | Y | N | P | P | P | A | P | Y | A | A |
| 6 | River Figile | Y | N | Y | N | P | P | P | P | P | Y | A* | A |

Y = Yes, N= No, P = Present, A = Absent, L = not recorded but likely to occur in the waterbody

**A.1.5** Biological water quality and WFD status at the 6 aquatic survey sites (2024 results).

| Site | Watercourse Name | EPA Code | EPA Q Value | Ecofact Q Value | WFD Status | WFD Waterbody Status |
|---|---|---|---|---|---|---|
| 1 | River Barrow | 14B01 | Q4 | Q3-4 | Moderate | Good |
| 2 | River Figile | 14F01 | - | Q3 | Poor | - |
| 3 | River Cushina | 14C04 | - | Q3 | Poor | - |
| 4 | River Cushina | 14C04 | - | Q3 | Poor | - |
| 5 | River Cushina | 14C04 | Q4 | Q3-4 | Moderate | Good |
| 6 | River Figile | 14F01 | Q3-4 | Q3-4 | Moderate | Moderate |

**Table A.1.6** Native species abundance recorded at the 6 survey sites (summary of 2021-2024 results).

| Site | Watercourse Name | Salmon | Brown Trout | Eel | Brook Lamprey | Three-spined stickleback |
|---|---|---|---|---|---|---|
| 1 | River Barrow | | * | | * | |
| 2 | River Figile | * | * | | ** | |
| 3 | River Cushina | | * | | ** | |
| 4 | River Cushina | | | | | |
| 5 | River Cushina | * | * | | * | |
| 6 | River Figile | ** | * | ** | * | |

*Present, **Small Numbers, ***Common, ****Numerous

**Table A.1.7** Non-native species abundance recorded at the 6 survey sites (summary of 2021-2024 results).

| Site | Watercourse Name | Minnow | Stone Loach | Dace | Roach | Pike | Perch | Gudgeon |
|---|---|---|---|---|---|---|---|---|
| 1 | River Barrow | *** | * | *** | *** | * | * | |
| 2 | River Figile | **** | * | * | * | * | | |
| 3 | River Cushina | ** | | | | | | |
| 4 | River Cushina | * | | | | | | |
| 5 | River Cushina | ** | *** | ** | | * | | |
| 6 | River Figile | *** | * | ** | | * | | ** |

*Present, **Small Numbers, ***Common, ****Numerous

**Table A.1.8** Results of the 10-minute electrical fishing surveys at the 6 survey sites (CPUE fish/min). Results for native species the September 2024 survey.

| Site | Watercourse Name | Salmon | Brown Trout | Eel | Three-spined stickleback |
|---|---|---|---|---|---|
| 1 | River Barrow | 0.00 | 0.00 | 0.10 | 0.20 |
| 2 | River Figile | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | River Cushina | 0.00 | 0.00 | 0.00 | 0.60 |
| 4 | River Cushina | 0.00 | 0.00 | 0.00 | 0.50 |
| 5 | River Cushina | 0.60 | 0.40 | 0.00 | 0.50 |
| 6 | River Figile | 0.20 | 0.40 | 0.20 | 0.20 |

**Table A.1.9** Results of the 10-minute electrical fishing surveys at the 6 survey sites (CPUE fish/min). Results for non-native species the September 2024 survey.

| Site | Watercourse Name | Stone Loach | Dace | Roach | Pike | Perch | Gudgeon |
|---|---|---|---|---|---|---|---|
| 1 | River Barrow | 0.00 | 0.60 | 0.20 | 0.00 | 0.00 | 0.00 |
| 2 | River Figile | 0.00 | 1.00 | 0.20 | 0.10 | 0.00 | 0.00 |
| 3 | River Cushina | 0.00 | 0.00 | 1.30 | 0.00 | 0.00 | 0.00 |
| 4 | River Cushina | 0.00 | 0.00 | 1.20 | 0.00 | 0.00 | 0.00 |
| 5 | River Cushina | 0.20 | 0.60 | 0.00 | 0.10 | 0.00 | 0.00 |
| 6 | River Figile | 0.10 | 0.80 | 1.00 | 0.20 | 0.10 | 0.40 |

**Table A.1.10** Results of the 3-minute lamprey surveys at the 6 survey sites (CPUE fish/min). Results for the September 2024 survey.

| Site | Watercourse Name | Potential lamprey nursery habitat present (Y/N) | Potential lamprey Spawning habitat present (Y/N) | CPUE |
|---|---|---|---|---|
| 1 | River Barrow | Y | N | 1.67 |
| 2 | River Figile | Y | N | 0.00 |
| 3 | River Cushina | Y | N | 1.33 |
| 4 | River Cushina | Y | N | 0.00 |
| 5 | River Cushina | Y | Y | 3.00 |
| 6 | River Figile | Y | Y | 2.67 |

**Table A.1.11** Results of the 5-minute electrical fishing surveys at the 6 survey sites (CPUE fish/min). Results for the September 2021 survey.

| Site | Watercourse Name | Salmon | Brown Trout | Eel | Minnow | Three-spined stickleback | Stone Loach | Dace | Roach | Pike | Perch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | River Barrow | 0.00 | 0.20 | 0.00 | 0.00 | 3.00 | 1.00 | 0.20 | 1.20 | 2.00 | 0.20 |
| 2 | River Figile | 0.40 | 0.40 | 0.00 | 0.00 | 4.00 | 2.00 | 0.20 | 0.20 | 0.20 | 0.40 |
| 3 | River Cushina | 0.00 | 0.20 | 0.00 | 0.00 | 3.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | River Cushina | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | River Cushina | 0.60 | 1.00 | 0.00 | 0.00 | 4.00 | 0.80 | 0.40 | 0.80 | 0.00 | 0.20 |
| 6 | River Figile | 0.80 | 0.60 | 0.80 | 0.80 | 3.00 | 2.80 | 0.20 | 0.60 | 0.00 | 0.20 |

*Present, **Small Numbers, ***Common, ****Numerous

**Table A.1.12** Results of the 3-minute lamprey surveys at the 6 survey sites (CPUE fish/min). Results for the September 2021 survey.

| Site | Watercourse Name | Potential lamprey habitat present (Y/N) | Brook Lamprey | CPUE |
|---|---|---|---|---|
| 1 | River Barrow | Y | 3 | 1.00 |
| 2 | River Figile | Y | 5 | 1.67 |
| 3 | River Cushina | Y | 8 | 2.67 |
| 4 | River Cushina | Y | 0 | 0.00 |
| 5 | River Cushina | Y | 6 | 2.00 |
| 6 | River Figile | Y | 3 | 1.00 |

# APPENDIX 9.3

# Field Assessment Observations - Ecological Surveys

## Flora species recorded at the Proposed Development Site during ecological fieldwork between 2021-202

| English Name | Latin Name | English Name | Latin Name |
|---|---|---|---|
| **Alder** | *Alnus glutinosa* | **Lodgepole Pine** | *Pinus contorta* |
| **Alder Buckthorn** | *Frangula alnus* | **Lords-and-Ladies** | *Arum maculatum* |
| **Ash** | *Fraxinus excelsior* | **Many-headed Bog-Cotton** | *Eriophorum angustifolium* |
| **Birdsfoot Trefoil** | *Lotus corniculatus* | **Meadow Buttercup** | *Ranunculus acris* |
| **Blackthorn** | *Prunus Spinosa* | **Meadow-sweet** | *Filipendula ulmaria* |
| | | **Mint** | *Mentha* sp. |
| **Bog Asphodel** | *Narthecium ossifragum* | **New Zealand Flax** | *Phormium tenax* |
| **Bog Cotton** | *Eriophorum sp.* | **Norway Spruce** | *Picea abies* |
| **Bramble** | *Rubus fruticosus agg.,* | **Oxeye Daisy** | *Leucanthemum vulgare* |
| **Broad-leaved Pondweed** | *Potamogeton natans* | **Perennial Rye-grass** | *Lolium perenne* |
| **Bulrush** | *Typha latifolia* | **Plantain** | *Plantago* spp. |
| **Carnation Sedge** | *Carex panicea* | **Poplar** | *Populus* |
| **Clover** | *Trifolium* sp. | **Purple Moor-grass** | *Molinia caerulea* |
| **Common Daisy** | *Bellis perennis* | **Purple-loosestrife** | *Lythrum salicaria* |
| **Common Knapweed** | *Centaurea nigra* | **Rushes** | *Juncus* spp. |
| **Common Ragwort** | *Jacobaea vulgaris* | **Reed Canary Grass** | *Phalaris arundinaceae* |
| **Common Reed** | *Phragmites australis* | **Sally (Grey Willow)** | *Salix sp.* |
| **Copper Beech** | *Fagus sylvatica 'Atropurpurea'* | **Scots Pine** | *Pinus sylvestris* |
| **Cowslip** | *Primula veris* | **Sedges** | *Carex* spp. |
| **Creeping Buttercup** | *Ranunculus repens* | **Self-heal** | *Prunella vulgaris* |
| **Creeping Thistle** | *Cirsium arvense* | **Silverweed** | *Potentilla anserina* |
| **Cross-leaved Heath** | *Erica tetralix* | **Snowberry** | *Symphoricarpos albus* |
| **Cuckooflower** | *Cardamine pratensis* | **Soft Rush** | *Juncus effusus* |
| **Dandelion** | *Taraxacum officinale agg.* | **Sphagnum species** | *Sphagnum capillifolium* |
| **Devils-bit Scabious** | *Succisa pratensis* | **Sphagnum species** | *Sphagnum cuspidatum* |
| **Downy Birch** | *Betula pubescens* | **Spindle** | *Euonymus europaeus* |
| **Elder** | *Sambucus nigra* | **Sweet-vernal grass** | *Anthoxanthum odoratum* |
| **Field Madder** | *Sherardia arvensis* | **Sycamore** | *Acer pseudoplatanus* |
| **Fescue (grasses)** | *Festuca* sp. | **Thistles** | *Cirsium* spp. |
| **Giant Hogweed** | *Heracleum mantegazzianum* | **Tormentil** | *Potentilla erecta* |
| **Gorse** | *Ulex europaeus* | **Tufted Hair-grass** | *Deschampsia cespitosa* |
| **Hard Rush** | *Juncus inflexus* | **Tufted Vetch** | *Vicia cracca* |
| **Holly** | *Ilex aquifolium* | **White Beak-sedge** | *Rhynchospora alba* |
| **Honeysuckle** | *Lonicera periclymenum* | **Woodrush** | *Luzula p.* |
| **Horsetail** | *Equisetum* spp. | **Yarrow** | *Achillea millefolium* |
| **Ivy** | *Hedera helix* | **Yellow Flag-iris** | *Iris pseudocorus* |
| **Ling Heather** | *Calluna vulgaris* | **Yorkshire Fog** | *Holcus lanatus* |

## Fauna species (excluding birds) recorded at the Proposed Development Site between 2021 and 2025

| English Name | Latin Name |
|---|---|
| **Fish** | |
| **Minnow** | *Phoxinus phoxinus* |
| **Roach** (non-native) | *Rutilus rutilus* |
| **Stone Loach** | *Barbatula barbatula* |
| **Three-spined Stickleback** | *Gasterosteus aculeatus* |
| **Amphibians** | |
| **Common Frog** | *Rana temporaria* |
| **Non-Volant Mammals** | |
| **Eurasian Badger** | *Meles meles* |
| **European Otter** | *Lutra lutra* |
| **Irish Hare** | *Lepus timidus hibernicus* |
| **Red Fox** | *Vulpes vulpes* |
| **Bats** | |
| **Brown Long-eared** | *Plecotus auritus* |
| **Common Pipistrelle** | *Pipistrellus pipistrellus* |
| **Leisler's Bat** | *Nyctalus leisleri* |
| **Myotis species** | *Myotis* spp. |
| **Soprano Pipistrelle** | *Pipistrellus pygmaeus* |

# APPENDIX 9.4

# Arboricultural Report

# Arboricultural Report

BS5837:2012 Trees in Relation to Design, Demolition and Construction - Recommendations

**Proposed Site:** Derrylea Bog

Counties Kildare & Offaly

**Client:** Inis Onshore Wind

**Project:** Derrynadarragh Wind Turbines

Arbtech Ireland

# Contents



# Appendices

## 1.0 Project Brief and Objectives

**1.1** Arbtech Ireland was retained by Inis Onshore Wind to undertake a pre-development tree survey on lands to the north of Derrylea Bog, County Kildare in relation to the installation of wind turbines in accordance with British Standards 'Trees in relation to design, demolition & construction – Recommendations (BS 5837:2012). The surveyed trees are located within the boundaries of the proposed development.

**1.2** The objective of this survey was to gather information regarding the location of trees, tree groups and hedgerows and how these may be impacted by development of the site.

**1.3** The survey report will detail any constraints posed by existing trees to the proposed development.

**1.4** An arboricultural impact assessment addresses the likely impact of the proposed development on trees within the site. Recommendations for the protection of trees and hedgerows during construction work is based on BS 5837: 2012. Any recommendations for tree work are based on BS 3998: 2010.

## 2.0 Survey Methodology

**2.1** A tree survey and visual assessment was undertaken on 28th August 2025 by Rik Pannett and Therese Woodruff. The trees were surveyed during daylight hours in changeable weather conditions.

**2.2** Tree inspections were undertaken from ground level using Visual Tree Assessment (VTA) techniques.

**2.3** All trees, groups of trees, hedgerows, and areas of scrub surveyed have been allocated a number prefixed by the letter T, G, H or A. In accordance with BS 5837: 2012, only trees with a stem diameter of 75mm or greater were surveyed. As per section 4.4.2.3, some trees forming obvious groups were assessed as such.

**2.4** Tree species, estimated maximum height, stem diameter and crown spread were recorded for significant trees, groups, and hedgerows within the site.

**2.5** The findings of the survey are given in tabular form in the Tree Survey Data (appendix A). An explanation of the survey headings is provided (appendix B).

**2.6** All trees were assessed using the 'Cascade chart for tree quality assessment' as described in table 1 of BS 5837:2012 (appendix C).

**2.7** The locations of treeshedgerows and areas of scrub are illustrated in the Tree Constraints Plan (TCP: appendix D).

**2.8** Tree removals are illustrated in the Tree Impact Plan (TIP: appendix E).

**2.9** An arboricultural method statement (section 7) is included to provide guidance in relation to tree removal prior to the construction phase of the development.

**2.10** Drawings referenced in preparation of the report are shown below in table 1.

| | |
|---|---|
| ACAD-Derrynadarragh layout aug 2025 | Inis Onshore Wind |
| | |

***Table 1**: Referenced drawings.*

## 3.0 Limitations of Survey Report

**3.1** Trees and hedgerows have been inspected from ground level only. No climbing inspections have been undertaken. Should a more detailed inspection be deemed appropriate, this will be covered within recommendations in appendix A. Trees are dynamic living organisms, whose health and condition can be subject to rapid change, depending upon external and internal factors. This survey does not constitute a tree risk assessment, and the conclusions and recommendations herein are valid for one year.

**3.2** Where obvious features and defects were observed they have been noted in appendix A. Where fruiting bodies of tree decay fungi are present, they have been noted, however, annual fruiting bodies are not present year-round, and as such, the absence of them does not necessarily indicate the absence of active fungi within the tree crown, stem, or root system.

**3.3** No assessment of the soil has taken place as part of this report. BS 5837:2012 states that a soil assessment should be carried out by a competent person to establish the structure, clay content and potential volume for change of the soil. A survey of this nature is considered outside the scope of this arboricultural assessment. For guidance on soil structure in relation to construction, advice should be sought from a Structural Engineer.

## 4.0 Site Overview

**4.1** The survey focuses on the trees and hedgerows located within the red line locations as illustrated below (fig. 1).

***Figure 1:*** *Redline boundaries illustrating survey areas (Google aerial maps).*

**4.2** The proposed development consists of the installation of wind turbines (T4, T5, and T6) and associated infrastructure as illustrated below (fig. 2).

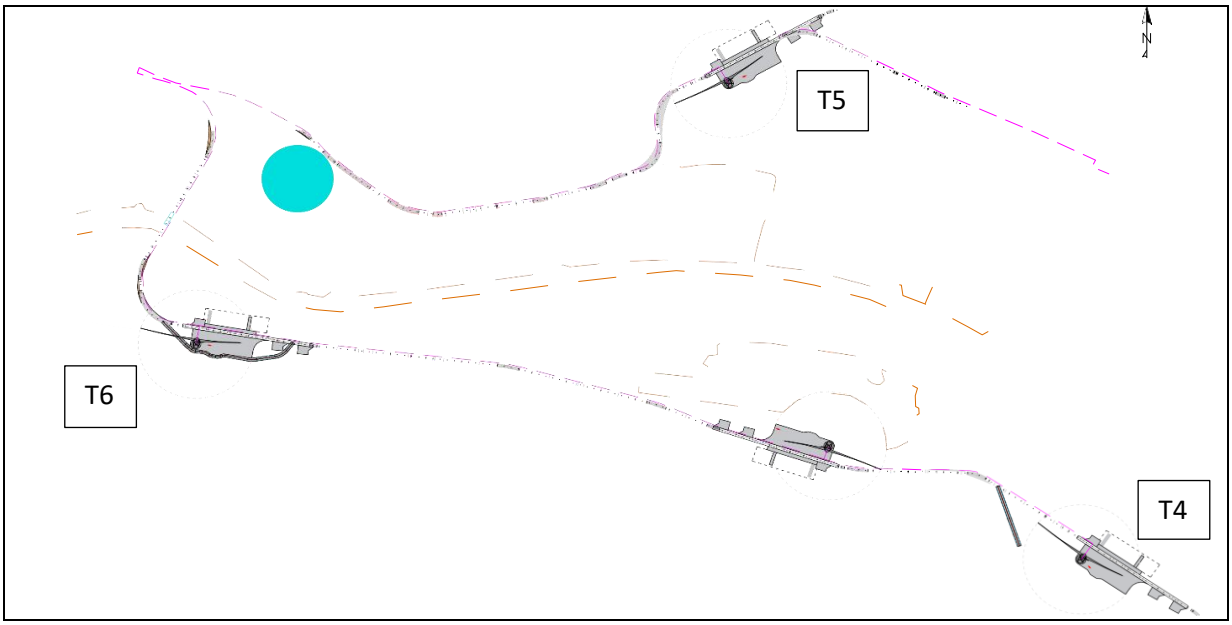



***Figure 2:*** *Site layout for proposed development.*

**4.3** The survey area focuses on three sites within lands to the north of Derrylea Bog straddling the border of Counties Kildare and Offaly. The sites are broadly level, with those in West Kildare comprising grassland with mixed species hedgerows and blackthorn scrub (fig. 3), and the site in East Offaly comprising mature trees adjacent a gravel road.

***Figure 3:*** *Area of blackthorn scrub.*

**4.4** Tree and shrub species present include ash (some with ash dieback disease – *Hymenoscy*phus *fraxineus)*, sycamore, holly, grey willow, blackthorn, guelder rose, dog rose, and ivy. The condition and amenity values of the surveyed trees are displayed in the tree survey data (appendix A).

**4.5 Ecological Value**

The majority of the surveyed hedgerows and scrub are relatively species poor, with most comprised of only two or three species. Biodiversity is relatively limited, which may be a consequence of changes in local peatland hydrology, and habitat fragmentation due to peat cutting and farming practices. The overall ecological value of the hedgerows and trees is moderate.

**4.6** A number of the mature ash have cavities and fissures which may provide temporary roosting sites for bats.

**4.7** Removal of the trees and hedgerows within the three sites has been identified as a means to mitigate the likelihood of bat collisions with the blades of the proposed turbines.

## 5.0 Summary of Findings

**5.1** 5 individual trees, a further 52 trees contained within 9 groups, 9 hedgerows, and 1 area of scrub have been surveyed. A breakdown of the numbers of trees, groups, and hedgerows in each retention category is shown in table 2 below as per BS 5837:2012:

| | Category A | Category B | Category C | Category U |
|---|---|---|---|---|
| Individual Trees | 0 | 2 | 3 | 0 |
| Trees in Groups | 0 | 24 | 16 | 12 |
| Hedgerows & areas of scrub | 0 | 0 | 10 | 0 |
| Total | 0 | 26 | 29 | 12 |

***Table 2**: Tree Categorisation.*

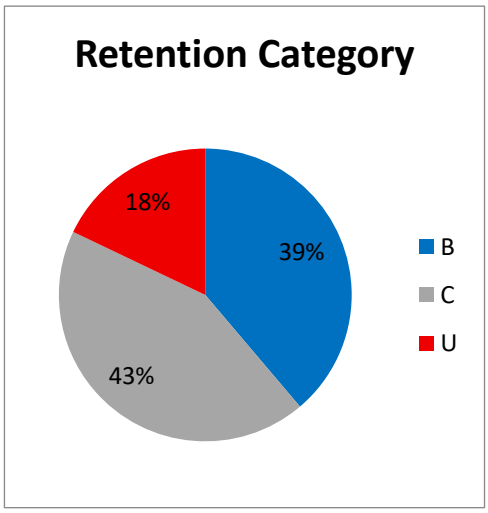
**5.2** Category A trees are of high quality and there should be a general presumption for retention of these trees.

**5.3** Category B trees are of moderate quality. It is likely that most Category B trees should be retained and regarded as a constraint to development. Some Category B trees, particularly smaller individuals are of insufficient value to impose significant design constraints and removal of such trees can be justified to promote good design (usually on the basis that mitigation is provided elsewhere on the site in the form of high-quality new planting).

**5.4** Category C trees are of low quality. They should not impose significant constraints to design layout and can defensibly be removed to facilitate good design. If Category C trees can be satisfactorily retained within the proposed layout, then consideration should be given for this.

**5.5** Category U trees are unsuitable for retention, usually in such a condition that they cannot realistically be retained as living trees and should be removed for reasons of sound arboricultural practice.

**5.6** Tree quality categorisation (chart 1) and life stage of trees (chart 2) are displayed below.



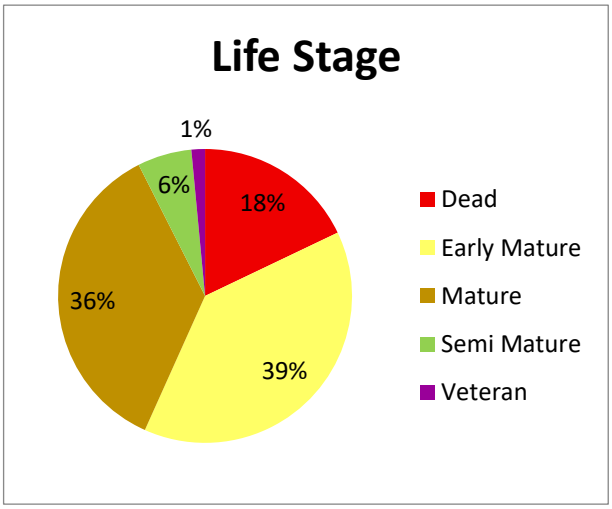




***Chart 1**: Retention category.*

***Chart 2**: Life stage.*

**5.7** Lists of the tree species surveyed with their common and botanical names (tables 3 and 4) are displayed below.

| Common Name | No. trees |
|---|---|
| Blackthorn | 21 |
| Common alder | 2 |
| Common ash | 45 |
| Common hawthorn | 24 |
| Common holly | 5 |
| Dogrose | 2 |
| Elder | 2 |
| Grey willow | 15 |
| Guelder rose | 1 |
| Hazel | 1 |
| Ivy | 1 |
| Silver birch | 4 |
| Sycamore | 2 |

| Botanical Name | No. trees |
|---|---|
| *Acer pseudoplatanus* | 2 |
| *Alnus glutinosa* | 2 |
| *Betula pendula* | 4 |
| *Corylus avellana* | 1 |
| *Crataegus monogyna* | 24 |
| *Fraxinus excelsior* | 45 |
| *Hedera sp.* | 1 |
| *Ilex aquifolium* | 5 |
| *Prunus spinosa* | 21 |
| *Rosa canina* | 2 |
| *Salix cinerea* | 15 |
| *Sambucus nigra* | 2 |
| *Viburnum opulus* | 1 |

***Tables 3 and 4**: Tree species surveyed.*

## 6.0 Arboricultural Impact Assessment

**6.1** Based on the proposed site layout drawings supplied, the arboricultural impact of the proposed development was assessed as follows.

**6.2** The hedgerows H003-7 at the T4 site predominantly comprise lapsed grey willow and hawthorn (figs. 4 & 5) with the occasional birch. Ivy, bramble and bindweed proliferate in the understory. These hedgerows require removal to mitigate the likelihood of bat collisions with the blades of the proposed turbines.

***Figure 4:*** *H003 Grey willow and hawthorn hedgerow.*

***Figure 5:*** *H004 Grey willow and hawthorn hedgerow.*

**6.3** The trees at the T5 site comprise of mainly mature ash (fig. 6), with sycamore, hawthorn, holly, and alder. Most of the trees are in good condition, however, there is ash dieback disease present, and one stem is completely dead. These trees and hedgerows (fig. 7) require removal to mitigate the likelihood of bat collisions with the blades of the proposed turbines.

***Figure 6:*** *G004 Mature ash and hawthorn group.*

***Figure 7:*** *H001 Hawthorn and grey willow hedgerow.*

**6.4** There is slightly more diversity among the trees and hedgerows at the T6 site. An area of blackthorn scrub A001 abuts a fragmented hedgerow to the south. Much of the adjacent ash G007 is dead and dying (fig. 8). The northern hedgerow H009 consists of hawthorn, holly, and hazel with mature ash (fig.9). These trees and hedgerows require removal to mitigate the likelihood of bat collisions with the blades of the proposed turbines.

***Figure 8:*** *G007/A001 Dead ash group/area of blackthorn scrub.*

***Figure 9:*** *H009 Mixed species boundary hedgerow.*

### 6.5 Tree Constraints Plan

The Tree Constraints Plan (TCP: appendix D) has been produced as a basis for the assessment of the constraints imposed by existing trees and hedgerows on the proposed design. Refer to TCP for location of trees, groups of trees and hedgerows surveyed.

### 6.6 Tree Impact Plan

The Tree Impact Plan (TIP: appendix E) illustrates the extent of tree and hedgerow removal which is denoted by a red hatch pattern.

### 6.7 Summary of Impact of Proposed Development on Tree Population

| Surveyed Trees | Category A | Category B | Category C | Category U | Total no. | % |
|---|---|---|---|---|---|---|
| Tees proposed for retention. | 0 | 0 | 0 | 0 | 0 | 0 |
| Trees proposed for removal. | 0 | 26 | 19 | 12 | 57 | 100 |
| | | | | | | |
| Hedgerows & scrub proposed for retention. | 0 | 0 | 0 | 0 | 0 | 0 |
| Hedgerows & scrub proposed for removal. | 0 | 0 | 10 | 0 | 10 | 100 |

***Table 5**: Summary of Impact on Tree Population.*

**6.8** In conclusion, the current development proposals impact significantly upon the surveyed trees and hedgerows, necessitating their removal. The trees and hedgerows which are to be removed are generally of low to moderate quality. Their loss is relatively minor within the broader context since similar habitats are in their immediate vicinity which will continue to provide ecosystem services.

**6.9** The loss of trees due to development can in part be mitigated by the high-quality planting of a mixture of small, medium, and large canopy native trees. Trees should be of local provenance, selected for species diversity, pest and disease resistance, and climate change resilience. Successful establishment of trees must be achieved by the careful selection, planting, and aftercare of high-quality trees.

## 7.0 Arboricultural Method Statement

### Method Statement Summary

**7.1** The arboricultural method statement provides information about tree removal during the pre-construction phase. The information described below must be used as reference by the main contractor to prepare a site-specific method statement for tree removal. The method statement is to be used in conjunction with the Tree Survey Data (appendix A) and the Tree Impact Plan (TIP: appendix E). The TIP must be made available to all contractors as a colour print only.

### Pre-construction

### 7.2 Tree work

The developer will appoint a qualified arborist to undertake felling works (subject to planning approval) as specified in the tree survey recommendations (appendix A). Works must conform to Section 40 of the Wildlife Act, 1976. All works carried out must also conform to BS3998: 2010 Tree Work. Recommendations. Any damage caused to retained trees in the surrounding area during the construction phase must be reported immediately to the site manager so that inspection and/or remedial works can be undertaken.

## 8.0 Statutory Obligations

I am currently unaware if any trees at the site are protected by a Tree Preservation Order (TPO) or by virtue of being located within a Special Area of Conservation. I have not been instructed to establish the TPO status of trees with the Local Planning Authority. If any trees are subject to TPOs then consent should be sought from the relevant Local Authority prior to commencement of any works.

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## 9.0 Bibliography

BS 5837 (2012). *Trees in Relation to Design, Demolition and Construction -Recommendations.* British Standards Institution. TSO, London.

BS 3998 (2010) *Tree Work - Recommendations*. British Standards Institution. TSO, London.

Irish Statute Book. Wildlife Act, 1976, Section 40.

# Tree Survey Schedule

## Derrynadarragh Wind Farm

## Wind Turbines

Appendix A

| Ref. | Species | Full Structure | Measurements | Survey Notes | Retention Category | RPA | Tree Value | Recommendations | Photo |
|---|---|---|---|---|---|---|---|---|---|
| A001 | Common hawthorn x5 *(Crataegus monogyna)* Common ash x3 *(Fraxinus excelsior)* Blackthorn x20 *(Prunus spinosa)* Grey willow x5 *(Salix cinerea)* | Area of scrub | Height (m): 3<br>Life Stage: Semi Mature<br>Rem. Contrib.: 10+ Years | Scrubby thicket, predominantly blackthorn. | C2 | Area: 1765 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: Access<br>Bat Habitat: None | Remove scrub. |  |
| G001 | Sycamore x2 *(Acer pseudoplatanus)* | Group 2 trees | Height (m): 21<br>2 stems, avg.(mm): 750#<br>Spread (m): 6N, 6E, 5S, 5W<br>Crown Clearance (m): 1<br>Lowest Branch (m): 2(N)<br>Life Stage: Mature<br>Rem. Contrib.: 20+ Years | Pair of ivy covered trees adjacent track. | B2 | Area: 240 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove trees. |  |
| G002 | Common ash x5 *(Fraxinus excelsior)* Common hawthorn *(Crataegus monogyna)* | Group 6 trees | Height (m): 22<br>6 stems, avg.(mm): 800<br>Spread (m): 4N, 6E, 7S, 7W<br>Crown Clearance (m): 3<br>Lowest Branch (m): 3(S)<br>Life Stage: Mature<br>Rem. Contrib.: 20+ Years | Field boundary trees. Ivy obscuring stems and main unions. Historic storm damage in crown of 1 ash tree with torn out stems and branches. Moderate crown density. Understory of elder.<br><br>Pests and Diseases:<br>Ash Health Class 1 - 100%-75% remaining canopy<br>Ash Health Class 2 - 75%-50% remaining canopy | B2 | Area: 668 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove trees. |  |
| G003 | Common holly *(Ilex aquifolium)* Grey willow x2 *(Salix cinerea)* | Group 3 trees | Height (m): 8<br>3 stems, avg.(mm): 280<br>Spread (m): 2N, 2E, 2S, 2W<br>Crown Clearance (m): 1<br>Lowest Branch (m): 1(S)<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Group growing adjacent track. Dead tops in holly with vigorous regrowth. | C2 | Area: 80 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove trees. |  |

| Ref. | Species | Full Structure | Measurements | Survey Notes | Retention Category | RPA | Tree Value | Recommendations | Photo |
|---|---|---|---|---|---|---|---|---|---|
| G004 | Common hawthorn x4 *(Crataegus monogyna)* Common ash x11 *(Fraxinus excelsior)* Common alder *(Alnus glutinosa)* | Group 16 trees | Height (m): 20<br>16 stems, avg.(mm): 550<br>Spread (m): 4N, 4E, 4S, 4W<br>Crown Clearance (m): 1<br>Lowest Branch (m): 1(E)<br>Life Stage: Mature<br>Rem. Contrib.: 30+ Years | 9 mature ash with understory of hawthorn, alder and ash saplings. 1 mature ash dead. 2 with canker. Well formed buttresses. Surface roots exposed due to cattle browsing. The majority of the trees are in fair condition. Many small cavities on stems. Major deadwood in canopy. 1 mature ash has major cavity in buttresses.<br><br>Pests and Diseases:<br>Ash Health Class 1 - 100%-75% remaining canopy | B2 | Area: 726 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: None<br>Bat Habitat: Medium | Remove trees. |  |
| G005 | Common hawthorn x5 *(Crataegus monogyna)* Common ash *(Fraxinus excelsior)* | Group 6 trees | Height (m): 8<br>6 stems, avg.(mm): 200<br>Spread (m): 2N, 2E, 2S, 2W<br>Crown Clearance (m): 1<br>Lowest Branch (m): 1(E)<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Group growing adjacent farm track. 1 hawthorn with extensive storm damage in upper crown. Good crown density. | C2 | Area: 149 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: None<br>Bat Habitat: Low | Remove trees. |  |
| G007 | Common ash x12 *(Fraxinus excelsior)* | Group 12 trees | Height (m): 14<br>12 stems, avg.(mm): 400#<br>Spread (m): 3N, 3E, 3S, 3W<br>Life Stage: Dead | Group of mostly dead ash trees. One live tree with symptoms of ash dieback disease amongst them.<br><br>Pests and Diseases:<br>Ash Health Class 1 - 100%-75% remaining canopy<br>Ash Health Class 4 - 25%-0% remaining canopy | U | Area: 761 sq m. | Physiological Condition: Diseased<br>Structural Condition: Collapsing<br>Public Amenity Value: Low<br>Inspection Limitations: Access<br>Bat Habitat: Medium | Remove trees. |  |
| G008 | Common ash x2 *(Fraxinus excelsior)* | Group 2 trees | Height (m): 14<br>2 stems, avg.(mm): 500#<br>Spread (m): 3N, 3E, 3S, 3W<br>Crown Clearance (m): 4<br>Lowest Branch (m): 5(E)<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Top of 1 tree collapsed and lodged in crown of the other. Ivy obscuring stems and main unions. Poor crown density.<br><br>Pests and Diseases:<br>Ash Health Class 2 - 75%-50% remaining canopy | C2 | Area: 200 sq m. | Physiological Condition: Poor<br>Structural Condition: Poor<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove trees. |  |
| G009 | Common ash x5 *(Fraxinus excelsior)* | Group 5 trees | Height (m): 15<br>5 stems, avg.(mm): 450#<br>Spread (m): 5N, 1E, 5S, 4W<br>Crown Clearance (m): 4<br>Lowest Branch (m): 4(NW)<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Group of hedgerow ash. Ivy obscuring stems and main unions. In varying stages of decline.<br><br>Pests and Diseases:<br>Ash Health Class 1 - 100%-75% remaining canopy<br>Ash Health Class 2 - 75%-50% remaining canopy<br>Ash Health Class 3 - 50%-25% remaining canopy | C2 | Area: 493 sq m. | Physiological Condition: Diseased<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove trees. |  |

| Ref. | Species | Full Structure | Measurements | Survey Notes | Retention Category | RPA | Tree Value | Recommendations | Photo |
|---|---|---|---|---|---|---|---|---|---|
| H001 | Grey willow *(Salix cinerea)* Common hawthorn *(Crataegus monogyna)* | Hedge | Height (m): 2<br>Stem Diam(mm): 100<br>Spread (m): 1N, 1E, 1S, 1W<br>Life Stage: Semi Mature<br>Rem. Contrib.: 10+ Years | Scrappy section of hedgerow adjacent track. | C2 | Radius: 1.2m.<br>Area: 65 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: None<br>Bat Habitat: Low | Remove hedgerow. |  |
| H002 | Common holly *(Ilex aquifolium)* Common hawthorn *(Crataegus monogyna)* Common ash *(Fraxinus excelsior)* | Hedge | Height (m): 3<br>Stem Diam(mm): 100<br>Spread (m): 1N, 1E, 1S, 1W<br>Life Stage: Semi Mature<br>Rem. Contrib.: 10+ Years | Gappy boundary hedgerow. | C2 | Radius: 1.2m.<br>Area: 66 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: None<br>Bat Habitat: Low | Remove hedgerow. |  |
| H003 | Silver birch *(Betula pendula)* Common hawthorn *(Crataegus monogyna)* Grey willow *(Salix cinerea)* | Hedge | Height (m): 10<br>Stem Diam(mm): 300#<br>Spread (m): 3N, 3E, 3S, 3W<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Sprawling lapsed boundary hedgerow. Bindweed proliferating through lower canopy. Ivy and bramble present. Birch protruding above hedgerow canopy. | C2 | Radius: 3.6m.<br>Area: 1183 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove hedgerow. |  |
| H004 | Silver birch *(Betula pendula)* Elder *(Sambucus nigra)* Grey willow *(Salix cinerea)* Common hawthorn *(Crataegus monogyna)* | Hedge | Height (m): 9<br>Stem Diam(mm): 300#<br>Spread (m): 3N, 3E, 3S, 3W<br>Crown Clearance (m): 2<br>Lowest Branch (m): 1(E)<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Sections of lapsed hedgerow. Ivy obscuring stems. Silver birch protrudes over hedgerow canopy. | C2 | Radius: 3.6m.<br>Area: 767 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove hedgerow. |  |
| H005 | Common hawthorn *(Crataegus monogyna)* Grey willow *(Salix cinerea)* | Hedge | Height (m): 9<br>Stem Diam(mm): 300#<br>Spread (m): 3N, 3E, 3S, 3W<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Sprawling lapsed hedgerow. Partially collapsed to north with deadwood. Scrubby and open beyond the northern extent. | C2 | Radius: 3.6m.<br>Area: 262 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: None<br>Bat Habitat: Low | Remove hedgerow. |  |
| H006 | Common hawthorn *(Crataegus monogyna)* Grey willow *(Salix cinerea)* | Hedge | Height (m): 7<br>Stem Diam(mm): 200#<br>Spread (m): 2N, 2E, 1S, 2W<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Sparse section of hedgerow adjacent track. | C2 | Radius: 2.4m.<br>Area: 246 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: None<br>Bat Habitat: Low | Remove hedgerow. |  |

| Ref. | Species | Full Structure | Measurements | Survey Notes | Retention Category | RPA | Tree Value | Recommendations | Photo |
|---|---|---|---|---|---|---|---|---|---|
| H007 | Silver birch<br>*(Betula pendula)*<br>Elder<br>*(Sambucus nigra)*<br>Common hawthorn<br>*(Crataegus monogyna)*<br>Dogrose<br>*(Rosa canina)*<br>Grey willow<br>*(Salix cinerea)*<br>Common holly<br>*(Ilex aquifolium)* | Hedge | Height (m): 9<br>Stem Diam(mm): 350#<br>Spread (m): 3N, 3E, 3S, 3W<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Lapsed boundary hedgerow adjacent track. Major deadwood present. Birch protruding through hedgerow canopy. | C2 | Radius: 4.2m.<br>Area: 470 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: None<br>Bat Habitat: Low | Remove hedgerow. |  |
| H008 | Blackthorn<br>*(Prunus spinosa)*<br>Common ash<br>*(Fraxinus excelsior)*<br>Common hawthorn<br>*(Crataegus monogyna)*<br>Common holly<br>*(Ilex aquifolium)*<br>Guelder rose<br>*(Viburnum opulus)*<br>Grey willow<br>*(Salix cinerea)*<br>Dogrose<br>*(Rosa canina)* | Hedge | Height (m): 11<br>Stem Diam(mm): 230#<br>Spread (m): 3N, 3E, 3S, 3W<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Lapsed mixed species hedgerow with gaps. Bramble and ivy proliferating in the understorey. | C2 | Radius: 2.8m.<br>Area: 789 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: None<br>Bat Habitat: Low | Remove hedgerow. |  |
| H009 | Common holly<br>*(Ilex aquifolium)*<br>Ivy<br>*(Hedera sp.)*<br>Common hawthorn<br>*(Crataegus monogyna)*<br>Hazel<br>*(Corylus avellana)*<br>Common ash<br>*(Fraxinus excelsior)*<br>Grey willow<br>*(Salix cinerea)* | Hedge | Height (m): 8<br>Stem Diam(mm): 200#<br>Spread (m): 2N, 2E, 2S, 2W<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Sprawling mixed species hedgerow. | C2 | Radius: 2.4m.<br>Area: 492 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove hedgerow. |  |
| T2010 | Common alder<br>*(Alnus glutinosa)* | Tree<br>2 stems | Height (m): 7<br>2 stems (mm): 130, 120<br>Spread (m): 2N, 3E, 3S, 3W<br>Crown Clearance (m): 1<br>Lowest Branch (m): 1(W)<br>Life Stage: Semi Mature<br>Rem. Contrib.: 10+ Years | Twin stemmed tree growing on bank. Good vigour | C2 | Radius: 2.1m.<br>Area: 14 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: None<br>Bat Habitat: Low | Remove tree. |  |

| Ref. | Species | Full Structure | Measurements | Survey Notes | Retention Category | RPA | Tree Value | Recommendations | Photo |
|---|---|---|---|---|---|---|---|---|---|
| T2011 | Silver birch<br>*(Betula pendula)* | Tree | Height (m): 12<br>Stem Diam(mm): 360<br>Spread (m): 4N, 3E, 3S, 3W<br>Crown Clearance (m): 1<br>Lowest Branch (m): 1(S)<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Ivy obscuring stem and main unions. Moderate crown density. | C2 | Radius: 4.3m.<br>Area: 58 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove tree. |  |
| T2012 | Common ash<br>*(Fraxinus excelsior)* | Tree | Height (m): 20<br>Stem Diam(mm): 1200<br>Spread (m): 6N, 7E, 6S, 5W<br>Crown Clearance (m): 2<br>Lowest Branch (m): 3(W)<br>Life Stage: Veteran<br>Rem. Contrib.: 30+ Years | Enormous buttresses. Forking at 3m. Major deadwood attached at fork. Partially occluded wounds on stems. Historic loss of stem to south with occlusion. Good unions and crown density.<br><br>Fungus:<br>Daldinia concentrica (King Alfreds Cakes) | B2 | Radius: 18.0m.<br>Area: 1018 sq m. | Physiological Condition: Fair<br>Structural Condition: Good<br>Public Amenity Value: Low<br>Inspection Limitations: None<br>Bat Habitat: Medium | Remove tree. |  |
| T2013 | Common ash<br>*(Fraxinus excelsior)* | Tree | Height (m): 13<br>Stem Diam(mm): 700#<br>Spread (m): 3N, 3E, 3S, 3W<br>Crown Clearance (m): 3<br>Lowest Branch (m): 4(S)<br>Life Stage: Early Mature<br>Rem. Contrib.: 10+ Years | Forking at 1m. Ivy obscuring stems and main unions. Moderate crown density.<br><br>Pests and Diseases:<br>Ash Health Class 1 - 100%-75% remaining canopy | C2 | Radius: 8.4m.<br>Area: 222 sq m. | Physiological Condition: Fair<br>Structural Condition: Fair<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove tree. |  |
| T2014 | Common ash<br>*(Fraxinus excelsior)* | Tree | Height (m): 13<br>Stem Diam(mm): 350#<br>Spread (m): 3N, 3E, 3S, 3W<br>Crown Clearance (m): 2<br>Lowest Branch (m): 3(W)<br>Life Stage: Early Mature<br>Rem. Contrib.: 20+ Years | Ivy obscuring stem and main unions. Good crown density. | B2 | Radius: 4.2m.<br>Area: 55 sq m. | Physiological Condition: Good<br>Structural Condition: Good<br>Public Amenity Value: Low<br>Inspection Limitations: Vines<br>Bat Habitat: Low | Remove tree. |  |

# Key to Tree Survey Data

| Ref. | Species | Full Structure | Measurements | Survey Notes | Retention Category | RPA | Tree Features | Recommendations | Photo |
|---|---|---|---|---|---|---|---|---|---|

**Ref.** Reference number identifies the tree, tree group or hedge & corresponds with the plans e.g. T0301, H2.

**Species** The common and botanical names are given for each tree.

**Full Structure** Structure recorded e.g., tree, tree group, hedge, coppice, pollard, woodland and quantity within a group.

**Measurements: Height** Estimated in metres.

**Stem Diameter** Measured at approximately 1.5 meters above ground level, recorded in millimetres.

**Number of Stems** Recorded from ground level or base of tree.

**Crown Spread** Estimated in metres and given at cardinal compass points.

**Life Stage** Refers to the age of the tree or tree structure & recorded as e.g.:

Y = Young; SM = Semi-mature; EM = Early Mature; M = Mature; V = Veteran; D = Dead.

**Estimated Remaining Contribution** <10 years; 10+; 20+; 30+; 40+

**Survey Notes** Observations regarding tree condition, location, history, structure & vigour.

**Retention Category** Each tree or tree structure is categorised as either **A**; **B**; **C**; **U** & sub-categories:

1 = Arboricultural qualities; 2 = Landscape qualities; 3 = Cultural values (see Appendix C for further information).

**RPA** Root protection radius (r) measured in metres from centre of tree (r= 12 x stem diameter at 1.5m).

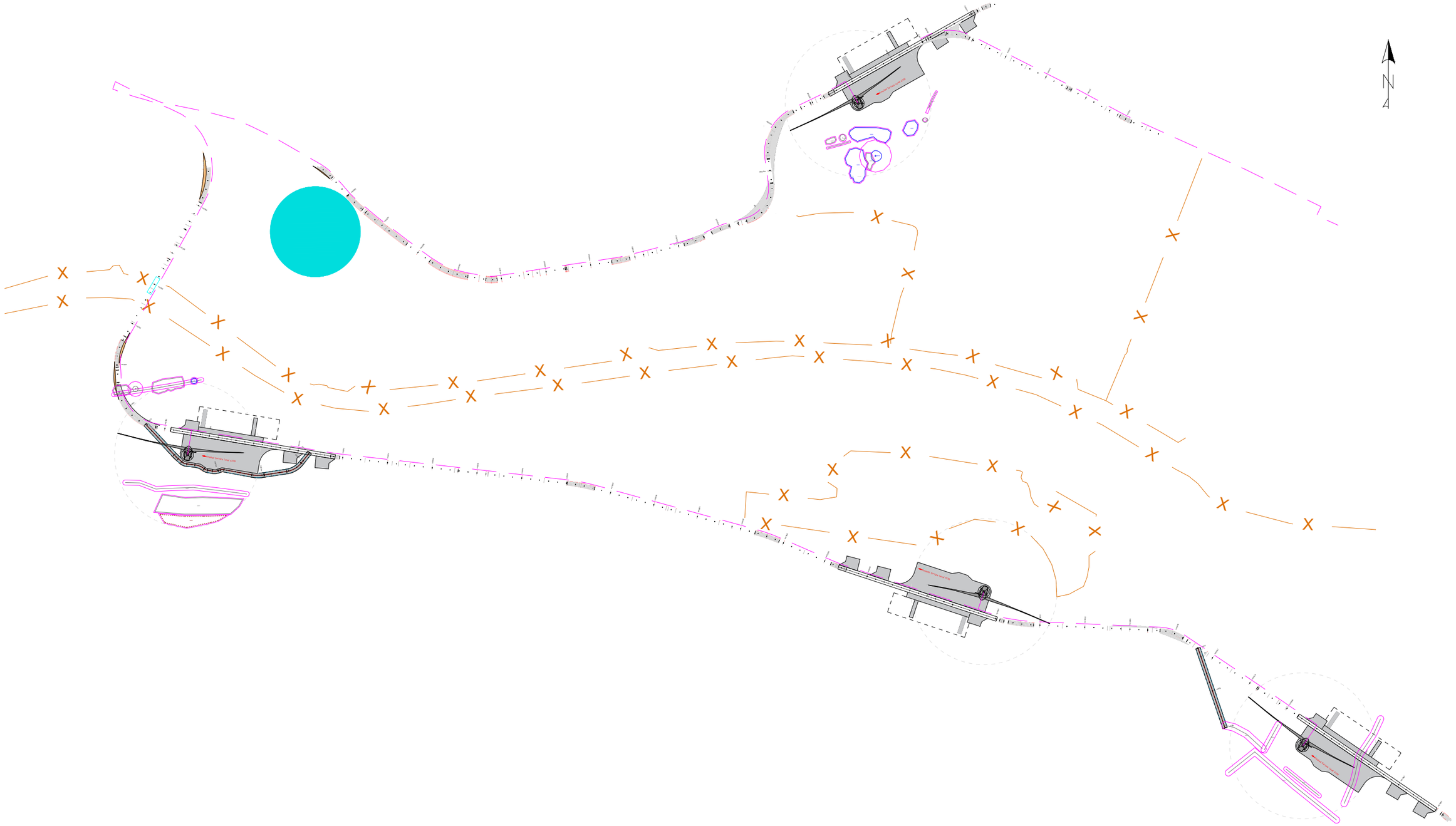
**Tree Features** Categorises physiological and structural condition; Amenity value; Bat habitat

**Photo** Image of each tree, group or hedgerow.

**Recommendations** Management recommendations for trees within the development.

| TREES UNSUITABLE FOR RETENTION | | |
|---|---|---|
| **Category and Definition** | **Criteria** | **Identification on Plan** |
| **Category U**<br>Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years. | • Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other Category U trees (eg, where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning).<br>• Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline.<br>• Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality.<br><br>*NOTE: Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.* | |

| TREES TO BE CONSIDERED FOR RETENTION | | | | |
|---|---|---|---|---|
| **Category and Definition** | **Criteria** | | | **Identification on Plan** |
| | 1. Mainly arboricultural qualities | 2. Mainly landscape qualities | 3. Mainly cultural values, including conservation | |
| **Category A**<br>Trees of high quality with an estimated remaining life expectancy of at least 40 years. | Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (eg, the dominant and/or principal trees within an avenue. | Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features. | Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e, veteran trees or wood-pasture). | |
| **Category B**<br>Trees of moderate quality with an estimated remaining life expectancy of at least 20 years. | Trees that might be included in category A, but are downgraded because of impaired condition (eg, presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation. | Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality. | Trees with material conservation or other cultural value. | |
| **Category C**<br>Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150mm. | Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories. | Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value, and/or trees offering low or only temporary/transient landscape benefits. | Trees with no material conservation or other cultural value. | |



CONTRACTOR:

Rik Pannett : Consultant Arborist
Retained by Inis Onshore Wind

LEGEND

Root Protection Area

Actual Crown Spread

T032 - C2

Tag Number - Category Grade

CATEGORY GRADE

CATEGORY U

CATEGORY A

CATEGORY B

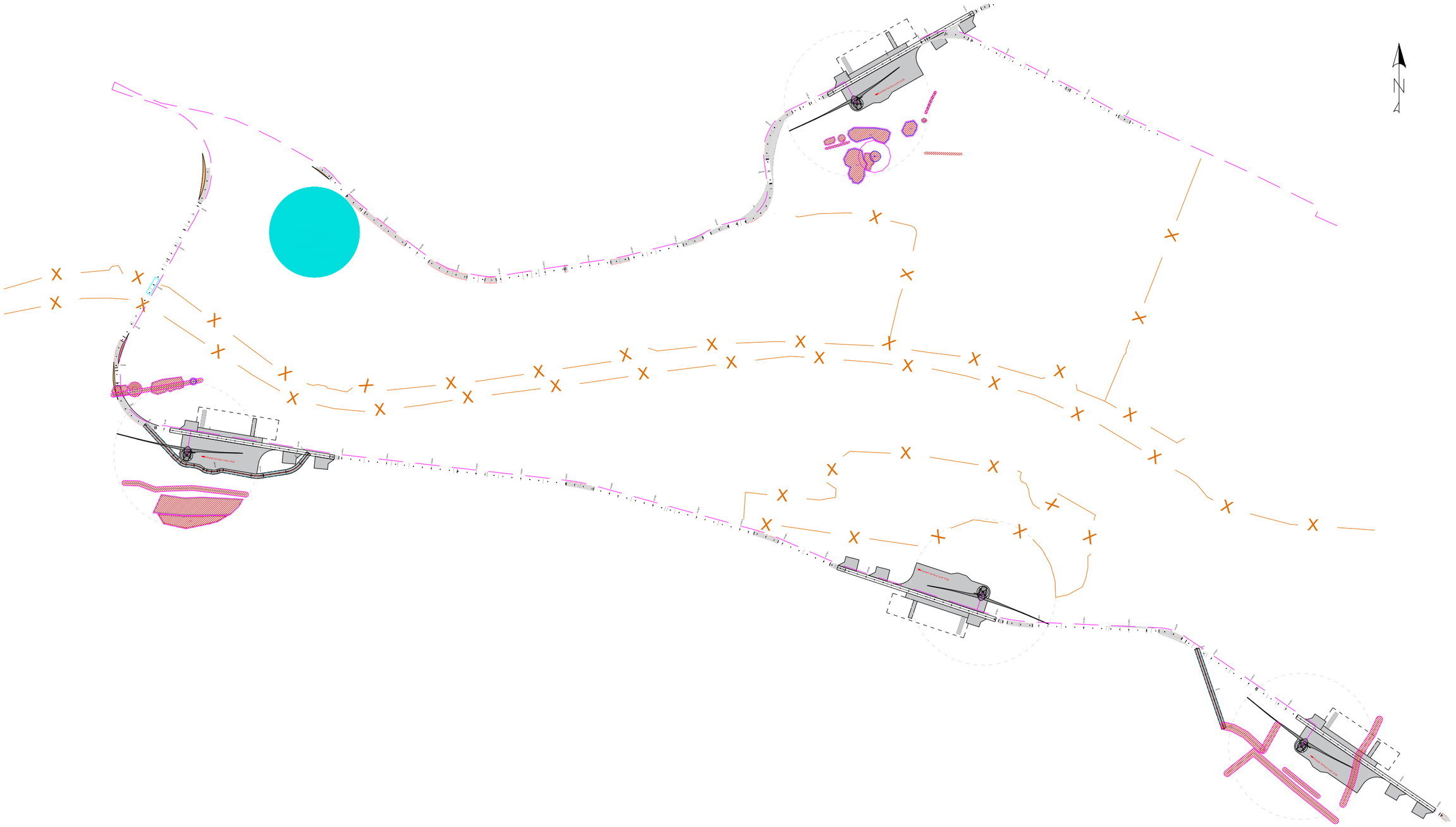
CATEGORY C

| DRAWING No | RP-2025-010-2-TCP | STATUS |
|---|---|---|

| REV SUFFIX | REVISION DETAILS | DATE |
|---|---|---|
| | | |
| | | |
| | | |

| DRAWN BY | DATE | SCALE | ENG CHECK | DATE |
|---|---|---|---|---|
| WD | 05/09/25 | NTS | RP | 05/09/25 |

| PROJECT | DERRYNADARRAGH | SHEET SIZE |
|---|---|---|
| DRAWING TITLE | TREE CONSTRAINTS PLAN | A3 |




CONTRACTOR:

Rik Pannett : Consultant Arborist
Retained by Inis Onshore Wind

REMOVAL AREA

LEGEND

Root Protection Area

Actual Crown Spread

T032 - C2

Tag Number - Category Grade

CATEGORY GRADE

CATEGORY U

CATEGORY A

CATEGORY B

CATEGORY C

TREE PROTECTION

| DRAWING No | RP-2025-010-2-TIP | STATUS |
|---|---|---|

| REV SUFFIX | REVISION DETAILS | DATE |
|---|---|---|
| | | |
| | | |
| | | |

| DRAWN BY | DATE | SCALE | ENG CHECK | DATE |
|---|---|---|---|---|
| WD | 05/09/25 | NTS | RP | 05/09/25 |

| PROJECT | DERRYNADARRAGH | SHEET SIZE |
|---|---|---|
| DRAWING TITLE | TREE IMPACT PLAN | A3 |

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