Appendix 6A

Bat Report

Bat Survey Report

Ballycar Wind Farm

January 2024

Prepared for:

BALLYCAR Green Energy

CIEEM REGISTERED PRACTICE 2023-2024

O'DONNELL ENVIRONMENTAL

Summary

Project: Bat survey in relation to the proposed wind energy development at Ballycar, Co. Clare.

Report by: Tom O'Donnell BSc (Hons) MSc CEnv MCIEEM.

Company Profile: O'Donnell Environmental Ltd. is an independent environmental consultancy established by Tom O'Donnell in 2019. O'Donnell Environmental is a Chartered Institute of Ecology and Environmental Management (CIEEM) 'Registered Practice' which demonstrates our commitment to high professional standards, accountability and the delivery of the best outcomes for biodiversity and our clients.

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1 Introduction

O'Donnell Environmental Ltd. were commissioned by Ballycar Green Energy Ltd. to undertake a bat survey assessment and report in relation to a proposed wind energy development. The proposed project involves the development of a twelve-turbine wind farm and associated grid connection route and Turbine Delivery Route (TDR) at Ballycar in south-east Co. Clare. A site location map is presented in **Figure 1.1**.

The aim of the current study was to determine and evaluate the likely importance of the study area and its immediate environs to bats.

1.1 PROPOSED WORKS

The proposed project consists of the following:

- 12 wind turbines (blade tip height up to 158m). 11 of the turbines will have a hub height of 90m and a blade length of 68m and one turbine (T10) will have a hub height of 82m and a blade length of 68m.
- 12 wind turbine foundations and hardstand areas.
- One permanent meteorological mast (90m height) and foundation and associated hardstand areas.
- One substation (110kV) including associated ancillary buildings security fencing and all associated works.
- Two developed site entrances, one temporary entrance to facilitate construction traffic delivering material from the local quarry and one to facilitate turbine deliveries, materials originating from other sources and operations and maintenance vehicles.
- New and upgraded internal site access tracks.
- Provision of an on-site visitor cabin and parking.

Associated development components include:

- All associated underground electrical and communications cabling connecting the proposed turbines to the proposed onsite substation.
- Laying of approximately 1.5km of underground electricity cabling to facilitate the connection to the national grid from the proposed onsite substation to connect to an existing 110kV overhead line.
- Temporary works on sections of the public road network along the turbine delivery route (including hedge or tree cutting, relocation of powerlines/poles, lampposts, signage, and local road widening).
- One temporary construction site compound and additional mobile welfare unit.
- One borrow pit to be used as a source of stone material during construction.
- Three spoil deposition areas (one at borrow pit location).
- Associated surface water management systems.
- Tree felling for wind farm infrastructure.

Planning permission is sought for a period of 10 years and an operational life of 35 years from the date of commissioning of the entire wind farm.

This report assesses the impacts of the temporary and permanent construction works, as well as the potential impacts of the operational phase of the proposed wind farm and their effects on the local bat population.

The potential effects on bats due to elements of the proposed works include the following:

- Vulnerability of bats to collision with turbines resulting in injury or mortality.
- Loss of features with potential for bat roosting.
- Loss of potential foraging or commuting habitat for bats.
- Displacement of individuals or populations from industrial disturbance.

1.2 LEGAL STATUS OF BATS

All bat species and their roosting sites are protected under both national and international law. The purpose of this legislation is to maintain and restore bat populations within their natural range. Where human activities have the potential to compromise bat populations, measures are required to be put in place to avoid effects or compensate and mitigate for those effects. A grant of planning permission does not constitute a licence or permit to disturb bats or interfere with their breeding or resting places.

The key legislation which provides protection to bats is as follows:

- Wildlife Act (1976) and subsequent amendments which makes it unlawful to intentionally disturb, injure or kill a bat or disturb its resting place without a licence to derogate from Regulation 23 of the Habitats Regulations 1997, issued by National Parks & Wildlife Service (NPWS).
- The EU Habitats Directive (which has been transposed into Irish law with the European Communities (Birds and Natural Habitats) Regulations 2011) which seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All Irish bat species are listed in Annex IV, while Annex II provides additional protection for the Lesser Horseshoe Bat.

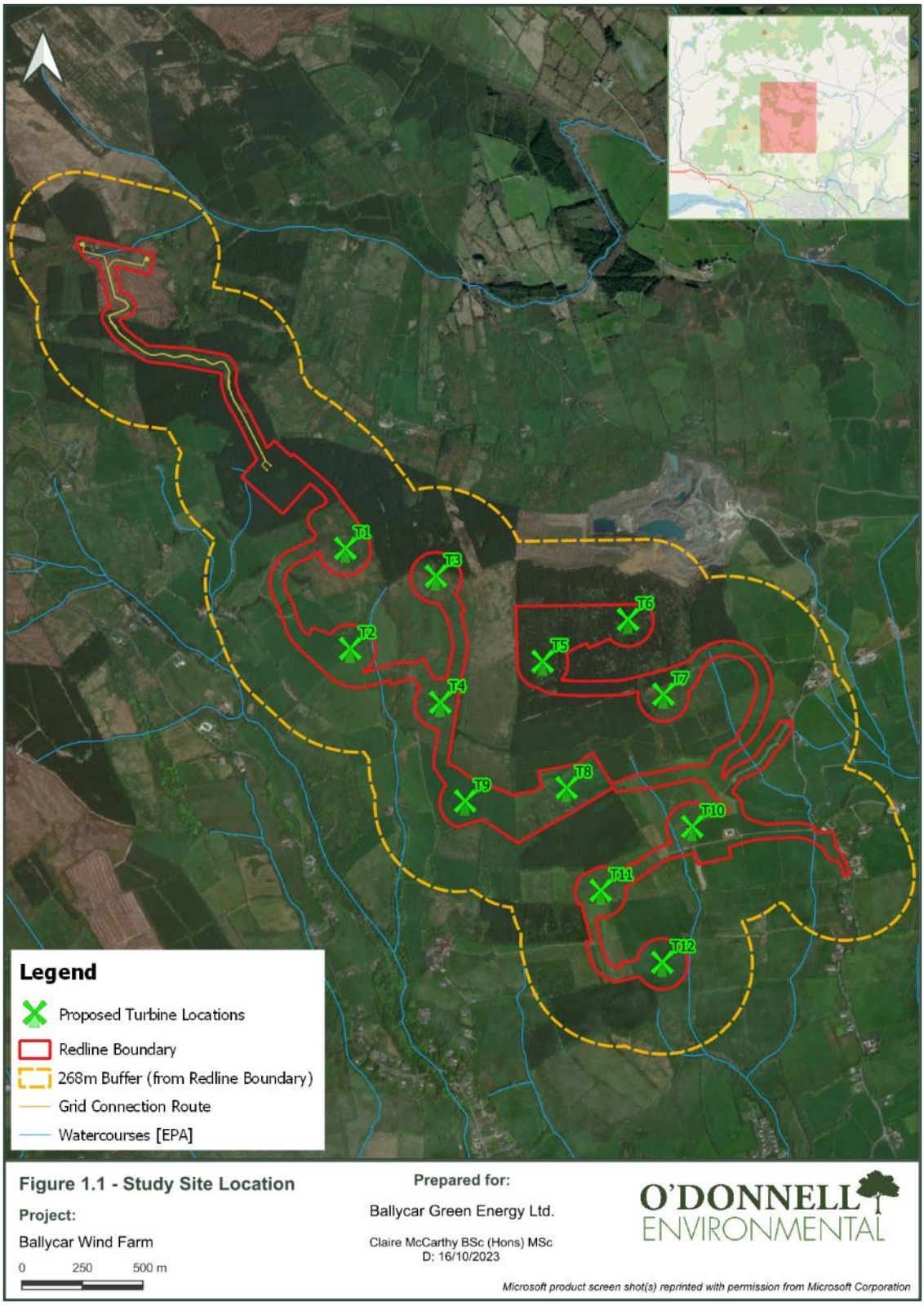
1.3 STATEMENT OF COMPETENCE

O'Donnell Environmental Ltd. is an independent environmental consultancy established by Tom O'Donnell in 2019. O'Donnell Environmental is a Chartered Institute of Ecology and Environmental Management (CIEEM) 'Registered Practice' which demonstrates our commitment to high professional standards, accountability and the delivery of the best outcomes for biodiversity and our Clients.

Tom O'Donnell is a Chartered Environmentalist and a full member of the Chartered Institute of Ecology and Environmental Management. He was awarded a BSc in Environmental and Earth System Science [Applied Ecology] in 2007 and an MSc in Ecological Assessment in 2009, both from UCC. Tom has over 15 years professional experience in the environmental industry, including working on projects such as windfarms, overhead power lines, roads, cycleways and residential developments. Tom is licensed by NPWS for roost disturbance (Ref: DER/BAT 2023-16) and to capture bats (C25/2023).

Claire McCarthy BSc (Hons) MSc is a Qualifying member of the Chartered Institute of Ecology and Environmental Management. She was awarded a BSc in Biological, Earth and Environmental Sciences [Zoology] in 2018 and an MSc in Marine Biology in 2022, both from UCC. Claire has contributed to the preparation of EIAR and EcIA reports for renewable energy developments and has experience in preliminary roost assessments and bat activity surveys.

Colm Breslin BSc (Hons) is a Qualifying member of the Chartered Institute of Ecology and Environmental Management. He was awarded a BSc in Biological, Earth and Environmental Sciences [Ecology and Environmental Biology] in 2023 from UCC. Colm has experience in habitat mapping, bat activity surveys and preliminary roost assessments for a variety of windfarm and residential developments. Colm is licenced by NPWS for roost disturbance (Ref: DER/BAT 2024-09) and to capture bats (C03/2024).


T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
Legend
Proposed Turbine Locations
Redline Boundary
268m Buffer (from Redline Boundary)
Grid Connection Route
Watercourses [EPA]
Figure 1.1 - Study Site Location
Project:
Ballycar Wind Farm
0 250 500 m
Prepared for:
Ballycar Green Energy Ltd.
Claire McCarthy BSc (Hons) MSc
D: 16/10/2023
O'DONNELL ENVIRONMENTAL
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2 Methodology

This assessment was carried out for a study area which comprises the wind farm site, the grid connection route and the TDR. The assessment was carried out through desk study, daytime visual inspection of potential bat roosting features, passive detector surveys and active transect surveys. Each of these elements are described in detail below.

2.1 DESKTOP REVIEW

A desktop review of publicly available relevant data was undertaken on the National Biodiversity Data Centre (NBDC)[1] and National Parks & Wildlife Service (NPWS)[2] websites. The National Biodiversity Data Centre was reviewed for relevant data, specifically i) existing species records for the 10km square in which the study site is located (wind farm site and grid connection route) (R56) and ii) an indication of the relative importance of the wider landscape in which the study site is located, based on Model of Bat Landscapes for Ireland (Lundy et al., 2011). In the latter, the index ranges from 0 to 100, with 0 being least favourable and 100 most favourable for bats. A protected species data request was submitted to NPWS for information not otherwise publicly available regarding protected species such as the Annex II (EU Habitats Directive) listed Lesser Horseshoe Bat.

Bat Conservation Ireland (BCI) conducted a search of their records database at the request of O'Donnell Environmental on 5th May 2023. The relevant search area included a 30km radius from a central point within the proposed site. Known roost locations in the target area as well as results from BCI Volunteer based surveys and records submitted by Ecological Consultants were provided. Where roost locations occur in private dwellings the location provided refers to the relevant 1km grid square.

2.2 POTENTIAL ROOST ASSESSMENT

Targeted surveys were carried out to determine the presence of bats or Potential Roosting Features (PRFs) where proposed works may impact a PRF directly or indirectly. Targeted day time surveys were carried out by Tom O'Donnell, Claire McCarthy and Colm Breslin on various dates between June and October 2023 to assess the potential of relevant features to support roosting by bats.

Potential roost assessment surveys were non-destructive, and relevant PRFs were visually inspected from ground level to identify any evidence of bat roosting. Further inspections of potential roosting features were carried out using a torch and endoscope and those at height were accessed using a 5 meter ladder where safely possible. Signs of bat use include bat droppings, feeding remains, potential bat access points identified by characteristic staining and scratches, noise made by bats etc.

The potential suitability of structures for roosting bats present at the proposed development site was classified according to the guidelines in Collins (2023), see **Table 2.1** below. Selected photographs of features surveyed are shown in **Appendix A**.

[1] https://maps.biodiversityireland.ie/Map. Accessed 15/08/2023.
[2] https://www.npws.ie/protected-sites. Accessed 15/08/2023.

Table 2.1. Scheme for describing the potential suitability of structures for bats.

Suitability	Description
None	No habitat features likely to be used by any roosting bats at any time of the year (i.e. a complete absence of crevices/suitable shelter at all ground/underground levels.)
Negligible	No obvious habitat features likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable and not a classic cool/stable hibernation site, but could be used by individual hibernating bats.
Moderate	A structure with one or more potential roost sites that could be used by bats due their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost type only, such as maternity and hibernation – the categorisation described in this table is made irrespective of species conservation status, which is established after presence is confirmed.
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat. These structures have the potential to support high conservation status roosts, e.g. maternity or classic cool/stable hibernation site.

After 'Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Edition)', Collins (2023).

In relation to trees, Collins (2023) has moved away from the subjective approach used in Collins (2016) for categorising individual PRFs in trees. Collins (2023) acknowledges the subjectivity of the previous approach and the many constraints associated with surveying trees for bats. The preliminary ecological appraisal (now termed the Daytime Bat Walkover (DBW)) of trees present on site follows the categorisations scheme outlined in **Table 2.2**.

In line with Marnell et al. (2022), a risk-based approach was adopted in relation to survey of individual trees for the presence of PRFs. Marnell et al. (2022) recommends that trees with a high probability of use by bats should be subject to survey. Factors listed as increasing the probability of trees being used by roosting bats include ancient woodland, large trees with complex growth form, visible damage etc. Factors listed as decreasing the probability of trees being used by roosting bats include "coniferous plantation with no specimen trees" and "young trees with simple growth form and little damage".

Table 2.2. Scheme for describing the potential suitability of PRFs in trees on a proposed development site for bats.

Suitability	Description
None	Either no PRFs in the tree or highly unlikely to be any.
FAR	Further Assessment Required to establish if PRFs are present in the tree.
PRF	A tree with at least one PRF present.

Following the confirmation of the possible presence of PRFs in trees, the assessment of suitability is further refined during the Ground Level Tree Assessment (GLTA), whereby the potential suitability of such PRFs is now categorised according to the system detailed in **Table 2.3** below.

Table 2.3. Scheme for describing the potential suitability of PRFs in trees for bats.

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

2.2.1 Potential Significant Roosts

NatureScot (2021) recommends that key roosting features which could support maternity roosts and significant hibernation and / or swarming sites on the wind farm site be identified in a search area extending to 200m plus one rotor radius from the "site boundary". The potential for significant roosts was investigated within an area extending to a minimum of 268m from the 'redline' boundary (as it relates to turbines) (see **Figure 1.1**).

In an Irish context, significant roosts are typically associated with man-made structures and underground features such as caves and mines. Features with potential to accommodate a significant bat roost were identified through examination of OSi historic 6" black & white mapping, aerial imagery and site walkovers. Information on known mines and caves was identified through the examination of publicly available information produced by Geological Survey Ireland. Trees were also considered during walkover surveys.

Targeted day time surveys were carried out by Tom O'Donnell, Claire McCarthy and Colm Breslin on various dates between June and October 2023 to assess the potential of relevant features to support roosting by bats.

2.3 BAT ACTIVITY SURVEYS

Bat activity at the proposed wind farm site was investigated using a combination of passive and active bat detector surveys. These surveys are described in further detail below.

2.3.1 Passive Bat Survey

In order to inform an assessment of the likely effects of the proposed wind energy development on bats, surveys were carried out to characterise the importance of the habitats and features within the relevant survey area to bats. An ultrasonic detector survey was carried out at the site to record bat activity in the area from which information on species composition, relative abundance and landscape usage could be derived. This multi-season passive detector survey was carried out from spring 2023 until autumn 2023 following NatureScot (2021) guidelines (with modifications for an Irish context) and NIEA (2022).

Passive bat detectors were deployed at 12 monitoring stations within the wind farm site for three seasonal periods to record general bat activity in locations corresponding to the proposed turbine layout (see **Figure 2.1**). An additional detector was deployed along the proposed grid connection route from 24th October to 26th November 2023, to characterise bat activity in this area.

Proxy locations were used for the proposed Turbine 5 and Turbine 6 locations across all survey periods as the exact locations proposed were located within commercial forestry and were not safely accessible at the time of surveys. Bat monitoring within commercial forestry is likely to record a low level of bat activity which would not well represent post construction conditions when forest edge habitat provides greater access and more suitable habitat for foraging bats.

The likelihood of design changes is acknowledged in NatureScot (2021), and while in this instance no changes in proposed turbine locations occurred, in two instances alternative monitoring locations were utilised as the intended locations were not safely accessible at the time of deployment. Alternative locations were used for the proposed Turbine 8 (52.71823136, -8.661662624) and Turbine 12 (52.71219455, -8.651104564) monitoring locations during the summer monitoring season only (see **Table 2.4** and **Figure 2.1**).

The locations of detectors deployed are provided in **Table 2.4** below and shown in **Figure 2.1.** Details of the survey periods are shown in **Table 2.5.**

Table 2.4 Passive Bat Monitoring Survey Locations

Ref.	Latitude	Longitude
Bat_01	52.72730463	-8.672278834
Bat_02	52.72359201	-8.671737978
Bat_03	52.72620704	-8.666759754
Bat_04	52.72160787	-8.666453554
Bat_05p	52.72203499	-8.661494957
Bat_06p	52.72382925	-8.650805984
Bat_07	52.72196583	-8.652751114
Bat_08	52.71855932	-8.658638894
Bat_08 (summer)	52.71823136	-8.661662624
Bat_09	52.71789779	-8.664817624
Bat_10	52.71708359	-8.650924594
Bat_11	52.71467803	-8.656458019
Bat_12	52.71202801	-8.652682978
Bat_12 (summer)	52.71219455	-8.651104564
Bat_13	52.73369397	-8.679353403

Note: Where 'p' stands for proxy location.

Wildlife Acoustic's SM4 full-spectrum bat detectors and Song Meter Mini Bat Ultrasonic full-spectrum detectors were deployed at suitable locations as proximal to the proposed turbine locations as safely feasible. Detectors were set to record from 30 minutes before sunset until 30 minutes after sunrise and the GPS locations were set on each detector. The detectors automatically adjust their start and finish times based on sunrise and sunset.

Individual bats of the same species cannot be distinguished by their echolocation alone and therefore 'bat registrations' are used as a measure of activity. A bat registration is defined as the presence of an individual species echolocation signal within a recording of maximum 15 seconds duration. All bat registrations recorded during this study follow these criteria, allowing comparison between monitoring stations. It is important to note that bat registrations do not equate to number of individuals (Collins, 2023).

A Davis 'EnviroMonitor' weather monitoring station was erected at the proposed Turbine 10 location (see **Figure 2.1**), which is considered to be a suitable and representative area from which to record weather conditions for the overall site. Relevant parameters were recorded on an hourly basis to demonstrate that weather conditions on each survey night were suitable, as set out in the NIEA (2022).

Monitoring periods follow guidance in NatureScot (2021) and NIEA (2022) while an additional 5 nights of monitoring was carried out in autumn in anticipation of revised Bat Conservation Ireland guidance. The minimum number of good-weather survey nights for each of the three seasonal surveys was:

- Spring - 10 nights
- Summer - 20 nights
- Autumn - 15 nights

Appropriate weather conditions for bat activity in upland sites (>200m) are described as temperatures of 8°C and above for most of the survey period, maximum ground level wind speed of 27km/hr and no heavy

rainfall (NIEA, 2022). It is considered that appropriate coverage was achieved in the passive bat detection surveys. The details of the weather monitoring for all survey periods are presented in **Appendix D**.

Although commonly applied in Ireland, the NatureScot (2021) guidelines 'Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation' were written for a Scottish context. While survey effort and design are carried out according to the guidelines in this study, the guidelines were adapted to an Irish context in the following ways:

- NatureScot (2021) recommends the use of an online tool, 'Ecobat' to provide a measure of relative bat activity. The tool compares site specific inputted data to a comparator database to provide an interpretation of the level of bat activity compared to other sites in Britain. The tool is not considered to be appropriate for use as yet in an Irish context (data is heavily weighted by data collected in the UK where there are a different range of bat species and differing ecology). In relation to Ecobat, NIEA (2022) states that "caution should be exercised when using the tool as it has a significant bias towards results from Great Britain and there is a paucity of data from Northern Ireland or Ireland where we have a significantly different species assemblage. Therefore, it is currently unlikely to produce results which accurately reflect the species composition and bat activity levels normally encountered on wind turbine sites in Northern Ireland". At the time of writing, the EcoBat tool is offline and has been since June 2022. Interpretation of relative activity level at the proposed site versus other similar sites in Ireland relies on the expertise and experience of the authors.
- Assessment of vulnerability of bats to wind farms, including assessment of collision risk, generally follows the procedure outlined in NatureScot (2021) but with amendments in line with NIEA (2022) to reflect the Irish species assemblage and the different relative abundance of individual species (e.g. Leisler's Bat) in an Irish context.

Table 2.5 Details of passive monitoring periods.

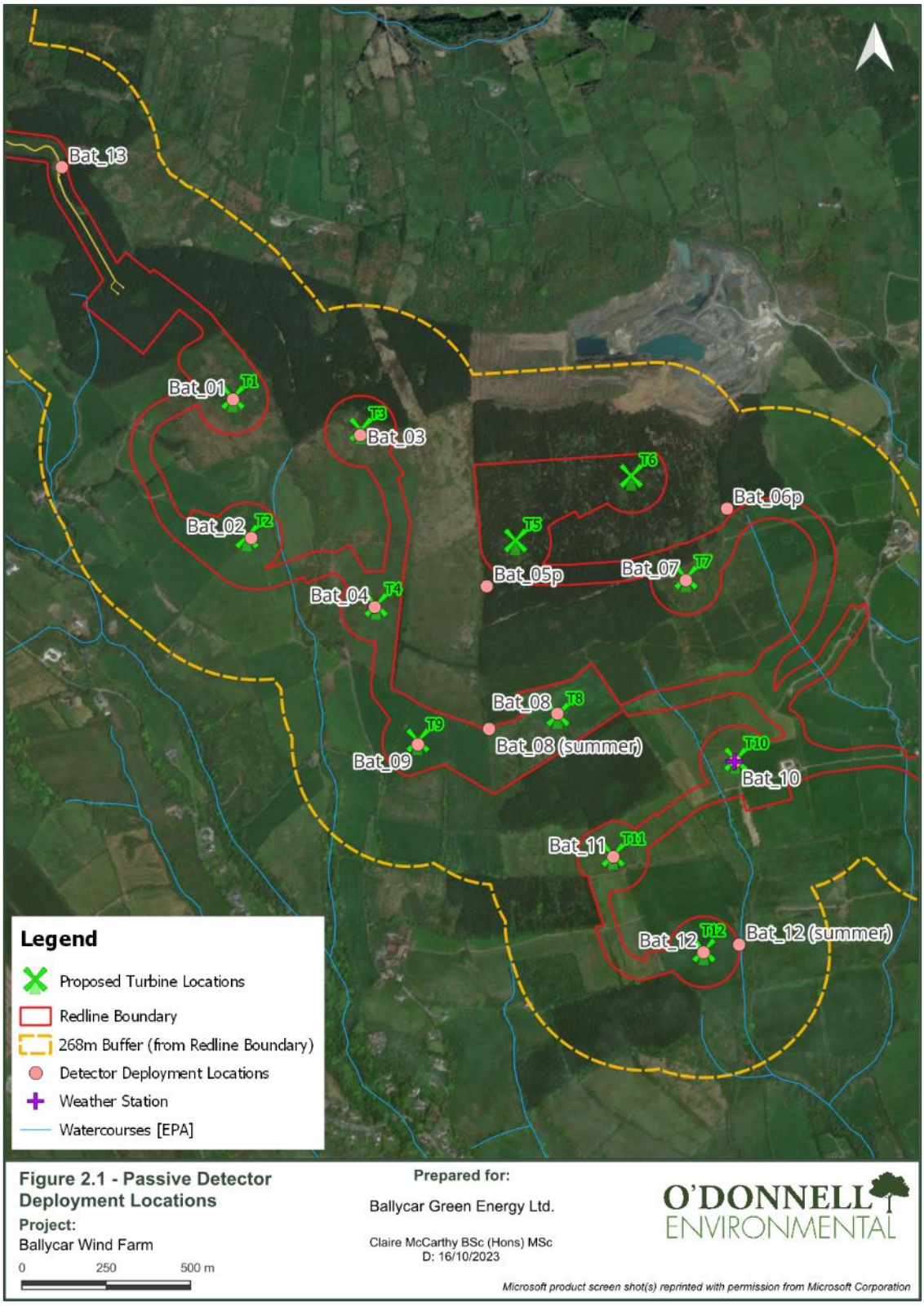
	Date [Night Of]	Sunset	Sunrise	Suitable Weather[1]	T1	T2	T3	T4	T5p	T6p	T7	T8	T9	T10	T11	T12
Spring 2023	05/04/2023	20:15	06:57		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	06/04/2023	20:17	06:55		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	07/04/2023	20:19	06:53		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	08/05/2023	20:21	06:50	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	09/05/2023	20:22	06:48		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	10/05/2023	20:24	06:46		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	11/04/2023	20:26	06:44		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	12/04/2023	20:28	06:41		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	13/04/2023	20:29	06:39		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	14/04/2023	20:31	06:37		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	15/04/2023	20:33	06:35	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	16/04/2023	20:35	06:32	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	17/04/2023	20:36	06:30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	18/04/2023	20:38	06:28	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	19/04/2023	20:40	06:26	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	20/04/2023	20:42	06:24	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	21/04/2023	20:43	06:21	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	22/04/2023	20:45	06:19		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	23/05/2023	20:47	06:17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	24/05/2023	20:49	06:15		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	25/05/2023	20:50	06:13		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	26/05/2023	20:52	06:11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Summer 2023	06/06/2023	05:12	21:53	✓[3]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	07/06/2023	05:12	21:54	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	08/06/2023	05:11	21:55	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	09/06/2023	05:11	21:56	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	10/06/2023	05:10	21:57	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	11/06/2023	05:10	21:58	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	12/06/2023	05:10	21:58	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	13/06/2023	05:10	21:59	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	14/06/2023	05:10	21:59	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	15/06/2023	05:09	22:00	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	16/06/2023	05:09	22:01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	17/06/2023	05:09	22:01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	18/06/2023	05:09	22:01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	19/06/2023	05:10	22:02	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	20/06/2023	05:10	22:02	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	21/06/2023	05:10	22:02	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	22/06/2023	05:10	22:02	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	23/06/2023	05:11	22:03	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	24/06/2023	05:11	22:03	✓[3]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	25/06/2023	05:11	22:03	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	26/06/2023	05:12	22:03	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	27/06/2023	05:12	22:02	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Autumn 2023	21/08/2023	06:27	20:48	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	22/08/2023	06:29	20:46	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	23/08/2023	06:31	20:44	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	24/08/2023	06:32	20:41	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	25/08/2023	06:34	20:39	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	26/08/2023	06:36	20:37	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	27/08/2023	06:37	20:35	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	28/08/2023	06:39	20:32	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	29/08/2023	06:41	20:30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	30/08/2023	06:42	20:28	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	31/08/2023	06:44	20:25	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	01/09/2023	06:46	20:23	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	02/09/2023	06:47	20:21	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	03/09/2023	06:49	20:18	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	04/09/2023	06:51	20:16	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	05/09/2023	06:52	20:14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note 1: Appropriate weather conditions achieved for upland sites according to parameters outlined in NIEA, 2022.

Note 2: Bat detector successfully recorded on this night.

Note 3: Weather Station Offline 06/06/2023 - 09/06/2023 and 24/06/2023 - 27/06/2023 due to technical issue. Weather conditions were checked for these nights and confirmed suitable.


Bat_13
Bat_01
T1
T3
Bat_03
T6
Bat_06p
Bat_02
T2
T5
Bat_05p
Bat_07
T7
Bat_04
T4
Bat_08
T8
T9
Bat_08 (summer)
Bat_09
T10
Bat_10
Bat_11
T11
Bat_12
T12
Bat_12 (summer)
Legend
Proposed Turbine Locations
Redline Boundary
268m Buffer (from Redline Boundary)
Detector Deployment Locations
Weather Station
Watercourses [EPA]
Figure 2.1 - Passive Detector Deployment Locations
Project:
Ballycar Wind Farm
0
250
500 m
Prepared for:
Ballycar Green Energy Ltd.
Claire McCarthy BSc (Hons) MSc
D: 16/10/2023
O'DONNELL ENVIRONMENTAL
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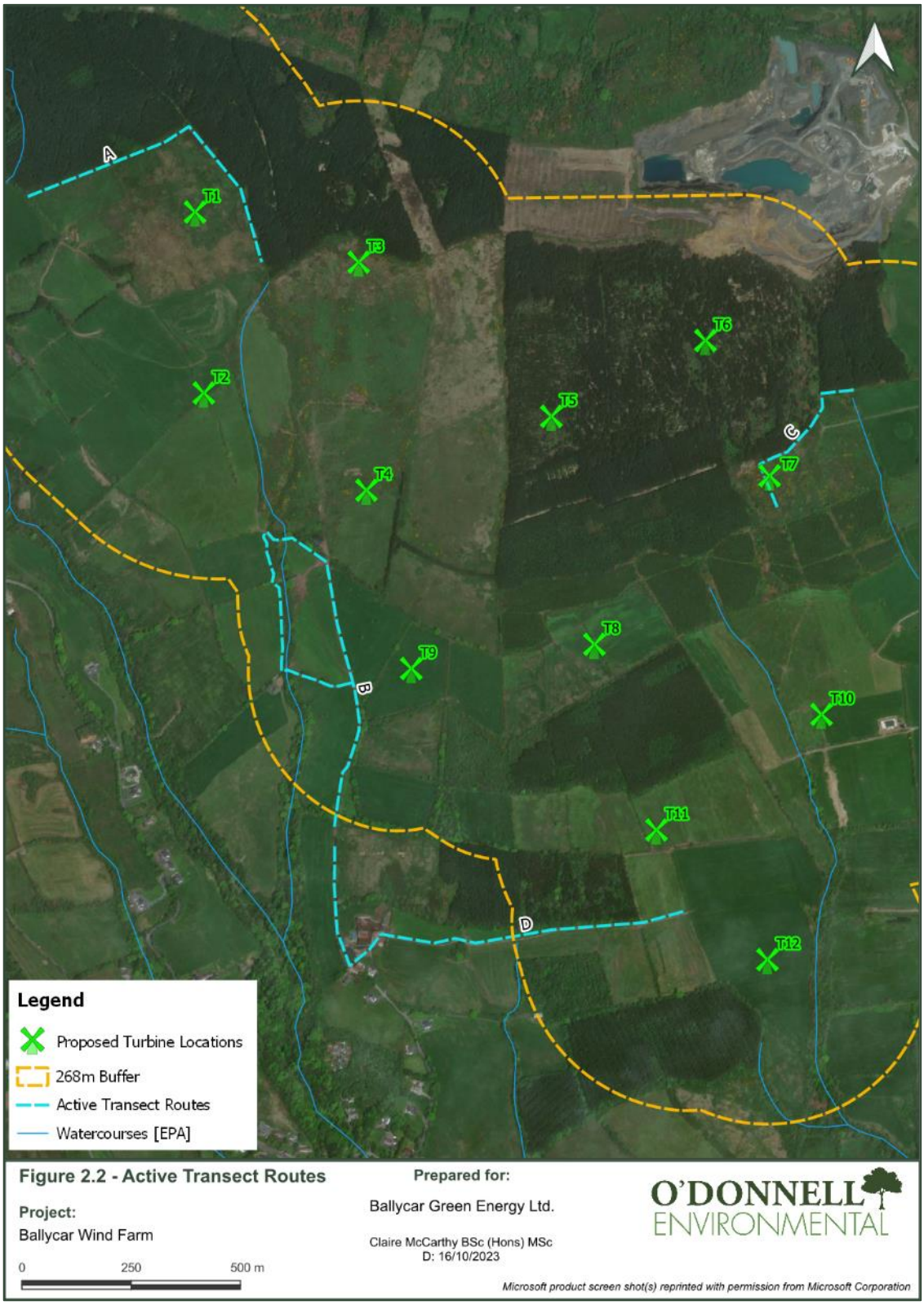
2.3.2 Active Transect Surveys

Active bat surveys were used to complement the information gained from passive bat monitoring. The aim of the surveys was to identify any flight-lines which may be apparent, and to identify any behaviour which would indicate the presence of a roost. Three active bat surveys were carried out at the proposed site for approximately 1.5 hours from dusk on 6th June 2023, 21st August 2023 and 5th September 2023. Active transects surveys were carried out on foot where safe to do so and driven transect surveys were carried out on public roads following Roche et al. (2008). Wildlife Acoustics full-spectrum Echo Meter Touch handheld detectors were used to perform the active surveys. The locations of the proposed active survey routes within the wind farm site are shown in **Figure 2.2**.

The details of the active surveys carried out at the wind farm site are shown in **Table 2.6** below.

Table 2.6 Timings of transect routes for active bat surveys within the wind farm site.

Date	Transect	Start	Finish	Temp/Wind/Rain	Notes
06/06/2023	A	21:50	22:30	18°C / F2 / Dry	Walked transect.
06/06/2023	B	22:45	23:25	18°C / F2 / Dry	Walked transect.
21/08/2023	A	21:00	21:30	16°C / F2 / Dry	Walked transect. Cut short due to cattle in field.
21/08/2023	B	21:40	21:55	16°C / F2 / Dry	Driven transect. Route slightly changed for accessibility reasons.
21/08/2023	C	22:15	22:30	16°C / F2 / Dry	Walked transect.
05/09/2023	A	20:20	20:40	21°C / F2 / Dry	Walked transect.
05/09/2023	B	20:50	21:05	21°C / F2 / Dry	Driven transect. Route slightly changed for accessibility reasons.
05/09/2023	D	21:05	21:15	21°C / F2 / Dry	Driven transect.
05/09/2023	C	21:25	21:50	21°C / F2 / Dry	Walked transect.


A
B
D
G
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
Legend
Proposed Turbine Locations
268m Buffer
Active Transect Routes
Watercourses [EPA]
Figure 2.2 - Active Transect Routes
Project:
Ballycar Wind Farm
0
250
500 m
Prepared for:
Ballycar Green Energy Ltd.
Claire McCarthy BSc (Hons) MSc
D: 16/10/2023
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2.4 DATA ANALYSIS

Species identification was aided by post hoc sonogram analysis using Wildlife Acoustics' Kaleidoscope Professional software (v. 5.4.8) and British Trust for Ornithology (BTO) 'Acoustic Pipeline' sound analysis tool. Automatic identifications were manually verified following the parameters set out in Russ (2012; 2021) and Middleton et al. (2014).

2.5 EVALUATION & IMPACT ASSESSMENT

Evaluation of ecological features follows the NRA (now TII) publication 'Guidelines for Assessment of Ecological Impacts of National Roads Schemes' (2009). Impact assessment follows 'Guidelines on The Information to be Contained in Environmental Impact Assessment Reports' published by the EPA (2022). Reporting generally follows Chartered Institute of Ecology and Environmental Management (2018) 'Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater, Coastal and Marine'.

2.6 SURVEY LIMITATIONS

Weather conditions were optimal during surveys, and the proposed wind farm site and environs were generally fully accessible with the exception of the dense conifer forestry plantations.

Alternative static monitor locations were used for the proposed Turbine 8 and Turbine 12 monitoring locations during the summer monitoring season only as the intended locations were not safely accessible at the time of detector deployment. Nonetheless it is considered that sufficient coverage of the relevant habitats within the area was obtained, and access restrictions were not a significant limitation.

No weather data was available for the first two nights of the summer monitoring period (due to technical issues) and also the final four nights (due to damage of the weather station). The weather conditions for these nights were assessed from publicly available information and considered to be suitable conditions for the survey.

During the autumn survey season the detector deployed at the proposed Turbine 7 monitoring location ceased to record the night of the 30th August 2023 due to a technical difficulty, but resumed recording the night of 31st August.

Overall, it is considered that the study was not limited in any significant way.

3 Results

The results of the surveys previously outlined are presented below.

3.1 DESKTOP REVIEW

The wind farm site itself is not located within any internationally or nationally designated sites. Following NatureScot (2021), a search was undertaken for nationally or internationally designated bat roosting sites. Three Special Areas of Conservation (SAC) and three proposed National Heritage Areas (pNHA) which include bats in their conservation interests are present within 10km of the proposed windfarm site (see **Table 3.1** below).

Table 3.1 - Designated sites within 10km of the proposed wind farm site which list bats as a qualifying interest.

Site Name	Species	Site Code	Distance (km)
Cloonlara House pNHA	Leisler's Bat	000028	4.9
Danes Hole, Poulnalecka SAC	Lesser Horseshoe Bat	000030	6.8
Danes Hole, Poulnalecka pNHA	Lesser Horseshoe Bat	000030	7
Ratty River Cave SAC	Lesser Horseshoe Bat	002316	7.4
Castleconnell (Domestic Dwelling, Occupied) pNHA	Daubenton's Bat	000433	7.7
Kilkishen House SAC	Lesser Horseshoe Bat	002319	9.8

National Biodiversity Data Centre (NBDC) holds previous records of bat presence from within the 10km square (R56) in which the proposed site is located. These records are for Brown Long-eared Bat (*Plecotus auritus*), Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Leisler's Bat (*Nyctalus leisleri*), Daubenton's Bat (*Myotis daubentonii*) and the Annex II (EU Habitats Directive) listed Lesser Horseshoe Bat (*Rhinolophus hipposideros*). It is important to note that an absence of other bat species records may be reflective of a lack of surveys undertaken to date rather than absence of bat species.

The overall bat suitability index value (32.78) according to 'Model of Bat Landscapes for Ireland' (Lundy et al., 2011) suggests the landscape in which the proposed site is located is of moderate suitability for bats in general. Species specific scores are provided in **Table 3.2** below.

Table 3.2 - Suitability of the study area for the bat species according to 'Model of Bat Landscapes for Ireland' (Lundy et al., 2011).

Common name	Scientific name	Suitability index
All bats	-	*32.78*
Soprano pipistrelle	*Pipistrellus pygmaeus*	45
Brown long-eared bat	*Plecotus auritus*	51
Common pipistrelle	*Pipistrellus pipistrellus*	46
Lesser horseshoe bat	*Rhinolophus hipposideros*	15
Leisler's bat	*Nyctalus leisleri*	45
Whiskered bat	*Myotis mystacinus*	1
Daubenton's bat	*Myotis daubentonii*	36
Nathusius pipistrelle	*Pipistrellus nathusii*	4
Natterer's bat	*Myotis nattereri*	37

Available bat records were provided by Bat Conservation Ireland (BCI) from their database of roost locations and other bat records. Details of known roost locations in the target area as well as results from BCI Volunteer based surveys and records submitted by Ecological Consultants were provided and reviewed. The relevant search area consisted of a 30km radius from a central point within the proposed wind farm site. Where roost locations occur in private dwellings the location shown refers to the relevant 1km grid square in which the roost is located. Roost records are summarised in **Appendix B** and shown in **Figure 3.1**.

Consideration was given to the location of the proposed site relative to the 'Core Sustenance Zones' (CSZ) of all known bat roosts proximal to the site. When considering development, Collins (2023) states that the CSZ could be used to indicate:

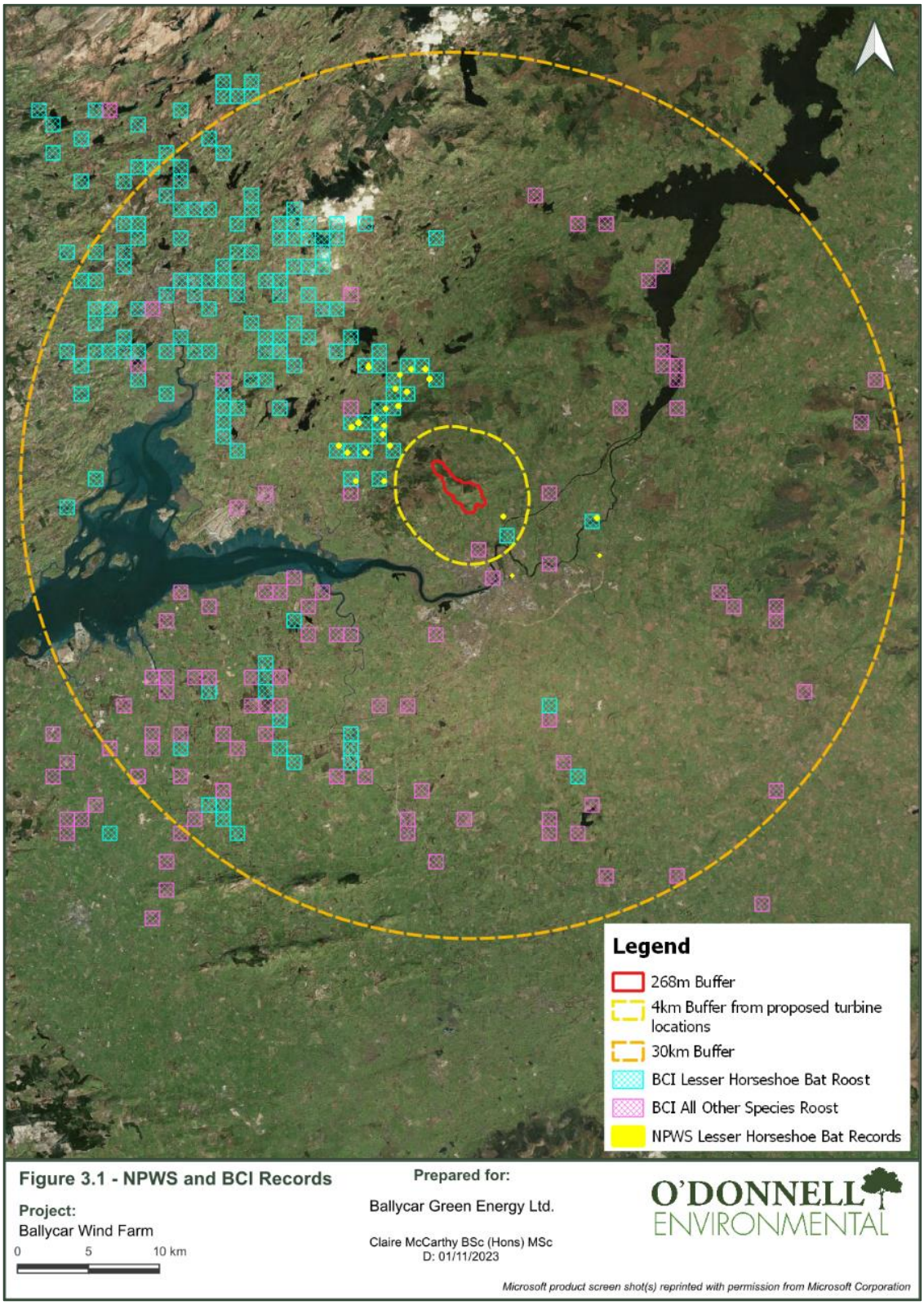
- The area surrounding a communal roost within which development work may impact the flight-paths and foraging habitat of bats using that roost.
- The area within which it may be necessary to ensure no net reduction in the quality and availability of foraging habitat for the colony.

In the absence of information specific to Ireland, CSZ distances provided in Collins (2023) are considered to be the best available information. CSZ distances for species known to occur in Ireland range from 1km to 4km although these distances are based on limited information in some instances (Collins, 2023). Roost records were considered within a search area extending to 4km from proposed turbine locations, and two roost records were identified. These are located within 1km grid squares which are approx. 2km south-east of the wind farm site at the closest point (see **Figure 3.1**). Species recorded at the roost located further east (R5860) are: Brown Long-eared Bat, *Myotis spp*., and the Annex II listed Lesser Horseshoe Bat. The western-most roost (R5659) is a tree roost of an unidentified bat species and is located 2.7km from Turbine 12.

BCI Volunteer based surveys and records submitted by Ecological Consultants (Ad-hoc records) were provided and analysed for the presence of the Annex II (EU Habitats Directive) listed Lesser Horseshoe Bat.

A protected species data request was submitted to NPWS and species records for the relevant area were received on 1st November 2023. All but three of the NPWS Lesser Horseshoe Bat records coincide with the BCI identified roost locations. NPWS data shows that Lesser Horseshoe Bat has been recorded at Ardnacrusha, Co. Clare, approximately 2.4km south-east of the closest proposed turbine (Turbine 12). Two additional records of the species are located further south-east of the site (see **Figure 3.1**), for which the CSZ for any Irish species, including Lesser Horseshoe, does not overlap.

Cloonlara House pNHA is located 4.6km from the proposed development boundary. The foraging range of Leisler's Bat has been recorded as being up to 13.4km (Shiel et al., 1998) and Marnell et al., (2022) notes that this species will frequently travel >5km from their roosts to forage. However, the best available information for this species in relation to CSZ indicates a CSZ of up to 3km (Collins, 2023) and the proposed project is outside the CSZ of the roost. No recent data exists for Cloonlara House pNHA and evidence exists that the roost was in possible decline when it was last visited over ten years ago (pers comm. David Lyons (NPWS)). As a result, it is considered that there is no likelihood for the proposal to have any significant effects on the conservation objectives of the designated site.


Legend
268m Buffer
4km Buffer from proposed turbine locations
30km Buffer
BCI Lesser Horseshoe Bat Roost
BCI All Other Species Roost
NPWS Lesser Horseshoe Bat Records
Figure 3.1 - NPWS and BCI Records
Project:
Ballycar Wind Farm
0 5 10 km
Prepared for:
Ballycar Green Energy Ltd.
Claire McCarthy BSc (Hons) MSc
D: 01/11/2023
O'DONNELL ENVIRONMENTAL
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3.2 POTENTIAL ROOST ASSESSMENT

Surveys were carried out to identify and investigate potential bat roosting features at the following locations:

- Proposed wind farm site (see **Figure 3.2** & **3.3**).
- Proposed grid connection route.
- Points of interest along the proposed TDR ('nodes', see **Figure 3.4**).

During these surveys, all trees which might be impacted by the proposed design and structures which may potentially host significant bat roosts were inspected visually. A total of 94 trees and 3 structures and their associated potential roosting features, where present, were identified and described according to Collins (2023).

3.2.1 Potential Significant Roosts at Proposed Windfarm

NatureScot (2021) recommends that key roosting features which could support maternity roosts and significant hibernation and / or swarming sites on the wind farm site be identified in a search area extending to 200m plus one rotor radius from the "site boundary".

Manmade structures with potential to accommodate significant bat roosts were identified through examination of OSi historic 6" mapping, aerial imagery as well as ground truthing. EPA data regarding known locations of caves and historic mining operations was examined in order to identify the presence of any known underground features which could support a significant bat roost. No known underground sites are present within the relevant search area. Some of the historic features identified by historic mapping no longer exist. Remaining features were surveyed for the presence of bats and their suitability to roosting bats was assessed according to the scheme outlined in Collins (2023).

Three man-made structures considered of relevance to this assessment (i.e. within or proximal to the 'redline' boundary) were surveyed for potential bat roosting. These structures consist of an incomplete blockwork structure (**Plate 3.1**), a modern steel agricultural shed, and a derelict stonework cottage (see **Plate 3.2**; **Appendix A5**). The locations of these structures are shown in **Figure 3.2** and **Figure 3.3**. None of the structures were considered suitable for use as a significant bat roost. These structures are not proposed to be removed as part of the current project and following NatureScot (2021) and NIEA (2022) no further surveys are warranted.

Ground level tree assessments (GLTA) were carried out at the proposed windfarm site on 25th to 27th October 2023, by Tom O'Donnell and Colm Breslin. All potential significant roosting features in an area extending to at least 268m from the 'redline' boundary were taken into consideration.

Plate 3.1 Stone structure (S_01 in Figure 3.2) present within the proposed wind farm site displaying 'negligible' suitability for roosting bats.

Plate 3.2 Derelict structure (S_03 in Figure 3.3) present east of the proposed Turbine 7 displaying 'low' suitability for roosting bats.

A total of 94 trees were identified and assessed within the proposed wind farm site and TDR (see **Table 3.3**). Trees assessed within the wind farm site consisted primarily of semi-mature and mature Ash and Beech trees located within the mature hedgerow field boundaries of agricultural grassland. Of the trees assessed, 3 displayed PRF-M suitability for roosting bats, and 31 displayed PRF-I suitability. The remaining 60 trees did not display any suitability for roosting bats, comprised mostly of juvenile individuals or stunted trees showing evidence of disease.

During the GLTA a single tree considered of moderate suitability (PRF-M) was recorded at the proposed wind farm (**Tr_67** in **Figure 3.2**; **Plate 3.3**). This tree is not proposed for removal. 14 trees considered to be PRF-I are proposed for removal to facilitate the site layout. Such trees have low suitability for bats and could only be used by individual or small number of bats. Such features would often be used sporadically. Following Collins (2023), no further survey of low suitability (PRF-I) trees is warranted and following recommendation in Collins (2023) bat boxes are included in the scheme and these are considered as suitable mitigation in this instance (see Biodiversity Management Plan which accompanies the current planning application).

Plate 3.3 View of veteran beech (Tr_67) displaying 'PRF-M' suitability for roosting bats with fluting at the base and water collecting in welded stems.

3.2.2 Potential Roosts Along Grid Connection Route

Visual survey and inspection of Potential Roost Features (PRFs) which may be directly or indirectly impacted by the proposed grid and access works was carried out following guidance set out in Collins (2023). The existing habitat within which the grid connection route will be installed is entirely commercial forestry, with no broadleaved trees (see **Plate 3.7**). Following Marnell et al. (2022) coniferous plantation with no specimen trees have decreased probability of being used by roosting bats and such trees do not require individual assessment for roosting potential. The proposed grid route and location for the associated substation were assessed as were the proposed 'loop-in loop-out' locations (see **Appendix A9** and **A10**). General observations were made regarding bat roost potential on the proposed grid route and substation footprint, and no likelihood of suitability for roosting was noted.

Plate 3.4 View along the proposed grid connection route and substation location, showing commercial forestry of limited suitability for roosting bats.

3.2.4 Potential Roosts Along Turbine Delivery Route

Although not included in the 'redline' boundary, the turbine delivery route is an essential component of the overall wind farm project, and the potential impact of associated facilitation works is therefore considered. Visual survey and inspection of PRFs was carried out where a direct or indirect effect may result from the proposed works. Works along the TDR include widening of an existing gateway, temporary widening of public roads and works to existing treelines and hedgerows to facilitate 'over-sail' of turbine blades during transport to site.

The TDR was surveyed from the R646 junction with Sweeps Road at Node 1 to the site entrance at Node 13. The relevant Nodes where facilitation works might directly impact upon PRFs for bats were surveyed in detail. Along a section of the Sweeps Road, referred to as 'Node 11' (see **Figure 3.4**), a regularly maintained treeline of Hawthorn, Oak, and Willow exists below the overhead powerlines, which is considered to be of negligible suitability for potential roosting bats. Two mature Beech trees are present within the proposed area of works to facilitate 'over-sail', with PRFs visible from ground level. These trees were surveyed from ground level and are assessed as PRF-M, with potential to support multiple bats (see **Plate 3.5** – **3.7**).

Facilitation works at Node 13 involve removal of trees from a treeline including semi-mature to mature Ash trees. These trees showed evidence of dieback with some dead trees evident (see **Plate 3.8**). These trees are classified as PRF-I (low) in terms of suitability for roosting bats, and are likely to increase in value to roosting bats in the short term. Approximately 30m of hedgerow will be temporarily removed to facilitate the delivery of turbine components at Node 1. The hedgerow will be replanted following the delivery of the components.

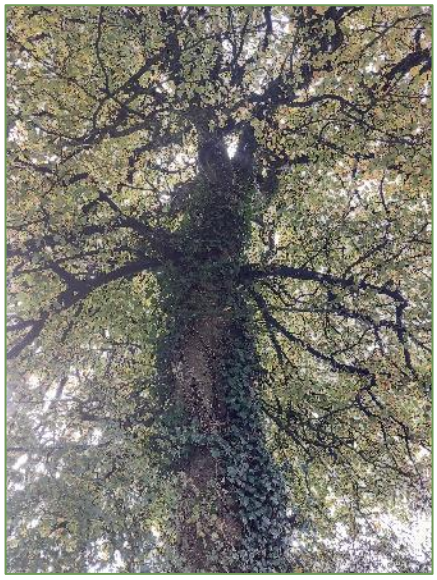


Plate 3.5 View of mature beech (Tr_01) within Node 11 displaying 'PRF-M' suitability for roosting bats.

Plate 3.6 View of mature beech (Tr_04) within Node 11 displaying 'PRF-M' suitability for roosting bats.

Plate 3.7. Overview looking east of Node 11 and the two mature beech trees (Tr_01; Tr_04).

Plate 3.8 View looking north of Node 13 and the Ash treeline.

Table 3.3 – Results of potential roost assessment of trees potentially impacted by the proposed wind farm design.

Ref.	Suitability	Species	Age	Description	Latitude	Longitude
Tr_01	PRF_M	Beech	Mature	Moderate ivy cover, PRFs obscured at height, recommend tree climbing prior to removal or alteration to TDR layout to avoid.	52.71254	-8.64099
Tr_02	None	Ash	Semi-Mature	Evidence of dieback.	52.72119	-8.64710
Tr_03	None	Birch	Juvenile	No identifiable PRFs.	52.72179	-8.65319
Tr_04	PRF_M	Beech	Mature	Moderate ivy cover, PRFs obscured at height. Use of blade lifter has avoided need for removal.	52.71257	-8.64081
Tr_05	PRF_I	Ash	Semi-Mature	Multi-stem, moderate ivy cover, evidence of dieback	52.71614	-8.64189
Tr_06	PRF_I	Ash	Semi-Mature	Dense ivy cover, dead from Ash dieback.	52.71597	-8.64171
Tr_07	PRF_I	Ash	Semi-Mature	Dense ivy cover, in poor condition evidently as a result of Ash dieback, PRFs may increase in value over time.	52.71594	-8.64165
Tr_08	PRF_I	Ash	Mature	Multi-stem, view of PRFs at height restricted, Minor dieback evidence, limbs overhanging road.	52.71591	-8.64158
Tr_09	PRF_I	Ash	Semi-Mature	Multi-stem, moderate ivy cover, minor PRFs visible e.g. rot holes, evidence of dieback.	52.71587	-8.64160
Tr_10	PRF_I	Ash	Mature	Multi-stem, low ivy cover, minor PRFs visible e.g. rot holes, Minor PRFs visible which may increase in value from dieback.	52.71576	-8.64152
Tr_11	PRF_I	Ash	Semi-Mature	Multi-stem, moderate ivy cover.	52.71565	-8.64148
Tr_12	PRF_I	Ash	Semi-Mature	Multi-stem, low ivy cover, view of PRFs at height restricted, some dieback.	52.71545	-8.64142
Tr_13	None	Ash	Semi-Mature	No suitability for roosting bats. Birds nest, likely pigeon.	52.71604	-8.64177
Tr_14	None	Hawthorn	Mature	No identifiable PRFs.	52.71781	-8.64820
Tr_15	None	Beech	Juvenile	No identifiable PRFs.	52.71877	-8.64947
Tr_16	None	Ash	Semi-Mature	Moderate ivy cover, Dieback.	52.71888	-8.64958
Tr_17	None	Willow	Semi-Mature	Multi-stem, low ivy cover.	52.71910	-8.64973
Tr_18	PRF_I	Birch	Mature	Low ivy cover, thick intertwined ivy stems.	52.71948	-8.64716
Tr_19	None	Ash	Semi-Mature	Moderate ivy cover.	52.72046	-8.64806
Tr_20	None	Sycamore	Semi-Mature	Low ivy cover.	52.72031	-8.64593
Tr_21	None	Holly	Semi-Mature	Multi-stem.	52.71662	-8.64966
Tr_22	None	Ash	Semi-Mature	Moderate ivy cover, 2 individual Ash trees with evidence of dieback.	52.71650	-8.65032

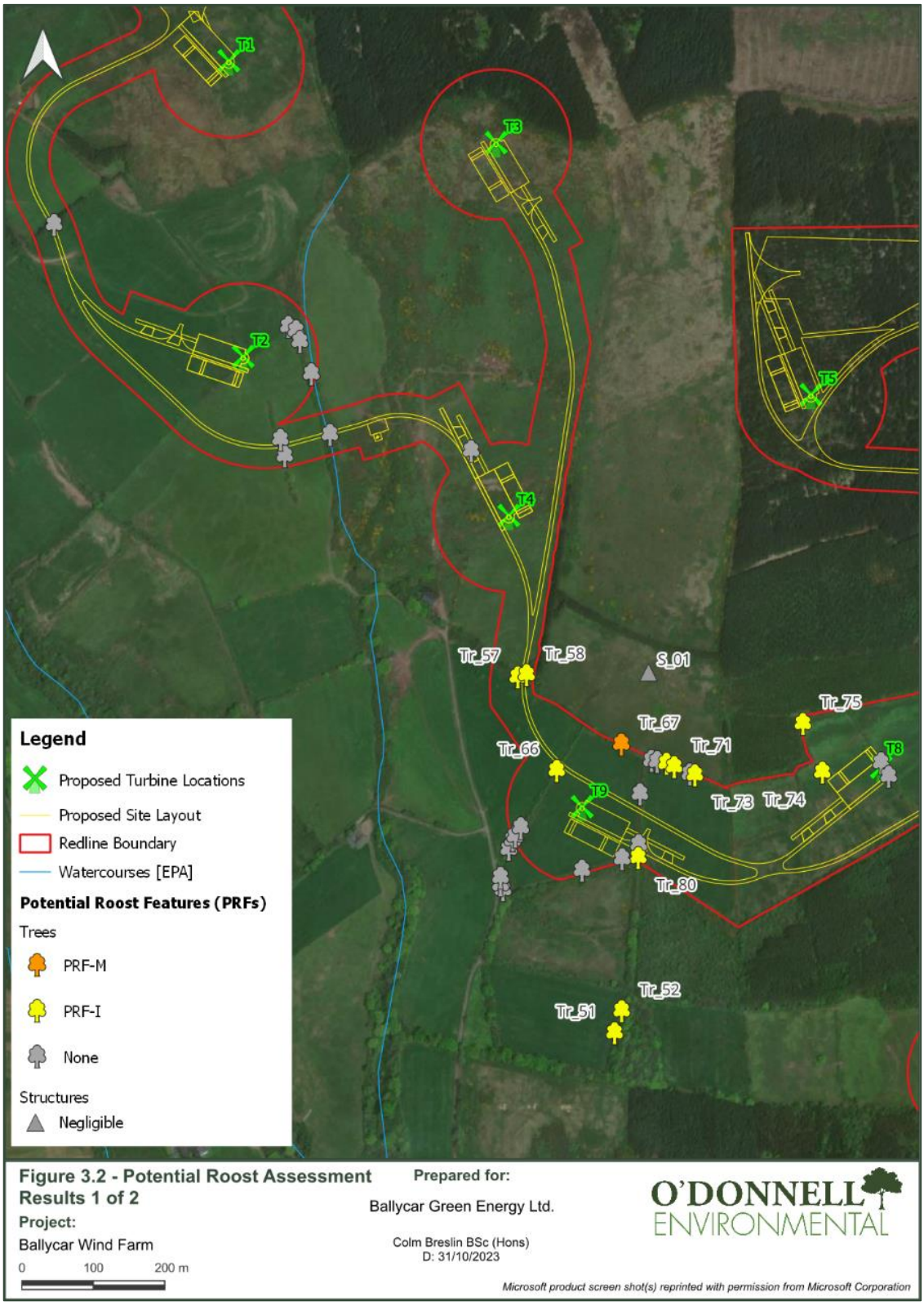
Tr_23	None	Ash	Semi-Mature	Low ivy cover, Evidence of dieback.	52.71639	-8.65125
Tr_24	None	Ash	Semi-Mature	Multi-stem, Row of 7 semi-mature Ash and Birch trees.	52.71642	-8.65101
Tr_25	None	Sycamore	Mature	Minor tear offs of axillary stems..	52.71644	-8.65088
Tr_26	None	Ash	Semi-Mature	Row of 3 dead Ash trees, no identifiable PRFs.	52.71636	-8.65154
Tr_27	None	Ash	Semi-Mature	Low ivy cover.	52.71644	-8.65174
Tr_28	None	Ash	Semi-Mature	Low ivy cover.	52.71651	-8.65180
Tr_29	PRF_I	Ash	Semi-Mature	Minor PRFs visible e.g. rot holes, Minor rot holes stemming from fallen axillary stems.	52.71661	-8.65189
Tr_30	None	Ash	Semi-Mature	Within proposed exclusion area, proposed for retention.	52.71628	-8.65160
Tr_31	None	Ash	Semi-Mature	Low ivy cover, Within proposed exclusion area, proposed for retention.	52.71621	-8.65159
Tr_32	None	other	Semi-Mature	Row of semi-mature Conifers to be removed.	52.72525	-8.67588
Tr_33	None	Willow	Mature	Multi-stem, low ivy cover.	52.72399	-8.67100
Tr_34	None	Ash	Semi-Mature	Multi-stem, low ivy cover, dieback.	52.72394	-8.67084
Tr_35	None	Sycamore	Semi-Mature	Multi-stem.	52.72381	-8.67076
Tr_36	None	Sycamore	Semi-Mature	Moderate ivy cover.	52.72340	-8.67051
Tr_37	PRF_I	Ash	Semi-Mature	Dense ivy cover, dieback.	52.71438	-8.65589
Tr_38	PRF_I	Ash	Semi-Mature	Multi-stem, dense ivy cover, dieback.	52.71442	-8.65538
Tr_39	None	Ash	Semi-Mature	Set of 3 semi-mature Ash trees, evidence of dieback, moderate ivy cover.	52.71446	-8.65675
Tr_40	None	Ash	Semi-Mature	Low ivy cover, dieback.	52.71458	-8.65681
Tr_41	None	Ash	Semi-Mature	Moderate ivy cover, dieback.	52.71477	-8.65695
Tr_42	PRF_I	Ash	Semi-Mature	Dense ivy cover.	52.71251	-8.65687
Tr_43	PRF_I	Ash	Semi-Mature	Dense ivy cover.	52.71242	-8.65683
Tr_44	None	Ash	Semi-Mature	Multi-stem, low ivy cover.	52.71231	-8.65635
Tr_45	None	Ash	Semi-Mature	Multi-stem, moderate ivy cover, dieback.	52.71223	-8.65673
Tr_46	None	Ash	Semi-Mature	Multi-stem, dense ivy cover, dieback.	52.71212	-8.65670
Tr_47	None	Ash	Semi-Mature	Multi-stem, dense ivy cover, Minor dieback.	52.71212	-8.65627
Tr_48	PRF_I	Ash	Mature	Multi-stem, moderate ivy cover, thick intertwined ivy stems, Minor dieback.	52.71193	-8.65659
Tr_49	None	Ash	Juvenile	Multi-stem.	52.71199	-8.65627
Tr_50	None	Ash	Semi-Mature	Moderate ivy cover, advanced dieback.	52.71175	-8.65653
Tr_51	PRF_I	Ash	Mature	Moderate ivy cover, minor PRFs visible e.g. rot holes, Dieback.	52.71514	-8.66410

Tr_52	PRF_I	Ash	Mature	Multi-stem, dense ivy cover.	52.71541	-8.66396
Tr_53	None	Ash	Semi-Mature	Multi-stem, moderate ivy cover.	52.72264	-8.67012
Tr_54	None	Beech	Semi-Mature	Relict hedgerow, multi-stem.	52.72236	-8.67105
Tr_55	None	Hawthorn	Mature	Relict hedgerow, multi-stem.	52.72257	-8.67114
Tr_56	None	Hawthorn	Mature	Multi-stem.	52.72245	-8.66719
Tr_57	PRF_I	Ash	Mature	Multi-stem, dense ivy cover, thick intertwined ivy stems, minor PRFs visible e.g. rot holes, Tear off of lower limbs, peeling bark.	52.71960	-8.66618
Tr_58	PRF_I	Conifer	Mature	Moderate ivy cover, thick intertwined ivy stems.	52.71963	-8.66599
Tr_59	None	Beech	Semi-Mature	Multi-stem.	52.71693	-8.66644
Tr_60	None	Beech	Semi-Mature	No identifiable PRFs.	52.71699	-8.66649
Tr_61	None	Beech	Semi-Mature	Multi-stem.	52.71708	-8.66650
Tr_62	None	Beech	Juvenile	No identifiable PRFs.	52.71744	-8.66633
Tr_63	None	Beech	Semi-Mature	No identifiable PRFs.	52.71755	-8.66625
Tr_64	None	Beech	Semi-Mature	Moderate ivy cover, Leaning to east.	52.71760	-8.66620
Tr_65	None	Beech	Juvenile	No identifiable PRFs.	52.71771	-8.66609
Tr_66	PRF_I	Beech	Mature	Multi-stem, low ivy cover, minor PRFs visible e.g. rot holes.	52.71843	-8.66535
Tr_67	PRF_M	Beech	Veteran	Multi-stem, view of PRFs at height restricted, minor PRFs visible e.g. rot holes., Fluting at base. Welds of stems. Vigorous specimen atop relict hedgerow earthen bank stone wall. Water collecting in welds with likelihood to rot and increase in value for bats in short-medium term. Located on the periphery of the redline boundary this tree will not require removal. No potential identified for 'significant' roosting.	52.71877	-8.66402
Tr_68	None	Beech	Juvenile	Multi-stem, low ivy cover.	52.71857	-8.66339
Tr_69	None	Beech	Juvenile	No identifiable PRFs.	52.71856	-8.66327
Tr_70	PRF_I	Beech	Mature	Multi-stem, Old tear offs, rot holes and peeling bark facing south approx. 3m high.	52.71854	-8.66308
Tr_71	PRF_I	Beech	Mature	Multi-stem, minor PRFs visible e.g. rot holes, Old tear offs and rot holes facing south approx. 3m high.	52.71849	-8.66292
Tr_72	None	Beech	Semi-Mature	Multi-stem, low ivy cover.	52.71840	-8.66259
Tr_73	PRF_I	Beech	Mature	Multi-stem, Rot associated with welded stems approx. 5m high facing south.	52.71839	-8.66249

Tr_74	PRF_I	Ash	Mature	Multi-stem, dense ivy cover, view of PRFs at height restricted, Dense ivy cover obscures main stems. Single tear off approx. 6m high facing southeast.	52.71844	-8.65984
Tr_75	PRF_I	Ash	Mature	Multi-stem, dense ivy cover, Some dieback.	52.71905	-8.66026
Tr_76	None	Ash	Juvenile	Multi-stem.	52.71857	-8.65863
Tr_77	None	Ash	Semi-Mature	Dense ivy cover.	52.71840	-8.65847
Tr_78	None	Ash	Juvenile	Row of 8 Ash all with significant dieback and stunted growth.	52.71815	-8.66362
Tr_79	None	Beech	Juvenile	Multi-stem.	52.71751	-8.66364
Tr_80	PRF_I	Beech	Semi-Mature	Multi-stem, moderate ivy cover, view of PRFs at height restricted, Dieback.	52.71735	-8.66364
Tr_81	None	Beech	Semi-Mature	Multi-stem.	52.71733	-8.66398
Tr_82	None	Willow	Semi-Mature	Multi-stem, low ivy cover.	52.71718	-8.66481
Tr_83	PRF_I	Sycamore	Veteran	Multi-stem, low ivy cover, Specimen individual. Minor broken branches. No discernible PRFs.	52.72258	-8.64627
Tr_84	None	Sycamore	Mature	Multi-stem.	52.72245	-8.64616
Tr_85	None	Sycamore	Semi-Mature	Multi-stem.	52.72228	-8.64617
Tr_86	PRF_I	Sycamore	Semi-Mature	Moderate ivy cover, thick intertwined ivy stems, Peeling bark.	52.72220	-8.64624
Tr_87	None	Ash	Juvenile	No identifiable PRFs.	52.72214	-8.64626
Tr_88	PRF_I	Sycamore	Mature	Multi-stem, moderate ivy cover, view of PRFs at height restricted., minor PRFs visible e.g. rot holes, Rot holes facing northwest at 2m. May increase in value.	52.72195	-8.64631
Tr_89	PRF_I	Sycamore	Mature	Multi-stem, Major tear off of large stem facing northeast at 2m.	52.72177	-8.64647
Tr_90	PRF_I	Hawthorn	Mature	Multi-stem, low ivy cover, thick intertwined ivy stems, Tear offs, welds.	52.72189	-8.64645
Tr_91	None	Hawthorn	Semi-Mature	Multi-stem, low ivy cover.	52.72326	-8.65051
Tr_92	None	Scots Pine	Mature	Group of approximately 15 individuals comprising buffer zone of existing forestry, all within proposed felling zone.	52.72303	-8.65152
Tr_93	None	Birch	Juvenile	Multi-stem.	52.72221	-8.65293
Tr_94	None	Birch	Juvenile	No identifiable PRFs.	52.72201	-8.65296

Table 3.4 – Results of preliminary roost assessment of suitability of structures for bats within the proposed windfarm site boundary.

Ref.	Suitability	Description	Latitude	Longitude
S_01	Negligible	Isolated and exposed 3-walled structure without roof, some cracks present within blockwork.	52.71969	-8.66347
S_02	Negligible	Modern, corrugated steel cattle shed with no identifiable PRFs, subject to frequent disturbance from cattle and machinery.	52.71694	-8.64862
S_03	Low	Derelict stone cottage. Collapsed east portion of roof. Light and water and wind ingress. Natural slate directly atop timber frame. No roofing felt. Underlying stonework revealed in places which provide suitable crevices for individual bats, but no potential for 'significant' roosting. Likely to collapse completely in the short term.	52.72201	-8.64620


T1
T2
T3
T4
T5
T8
T9
Tr_57
Tr_58
S_01
Tr_67
Tr_66
Tr_71
Tr_75
Tr_73
Tr_74
Tr_80
Tr_52
Tr_51
Legend
Proposed Turbine Locations
Proposed Site Layout
Redline Boundary
Watercourses [EPA]
Potential Roost Features (PRFs)
Trees
PRF-M
PRF-I
None
Structures
Negligible
Figure 3.2 - Potential Roost Assessment Results 1 of 2
Project:
Ballycar Wind Farm
0
100
200 m
Prepared for:
Ballycar Green Energy Ltd.
Colm Breslin BSc (Hons)
D: 31/10/2023
O'DONNELL ENVIRONMENTAL
Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

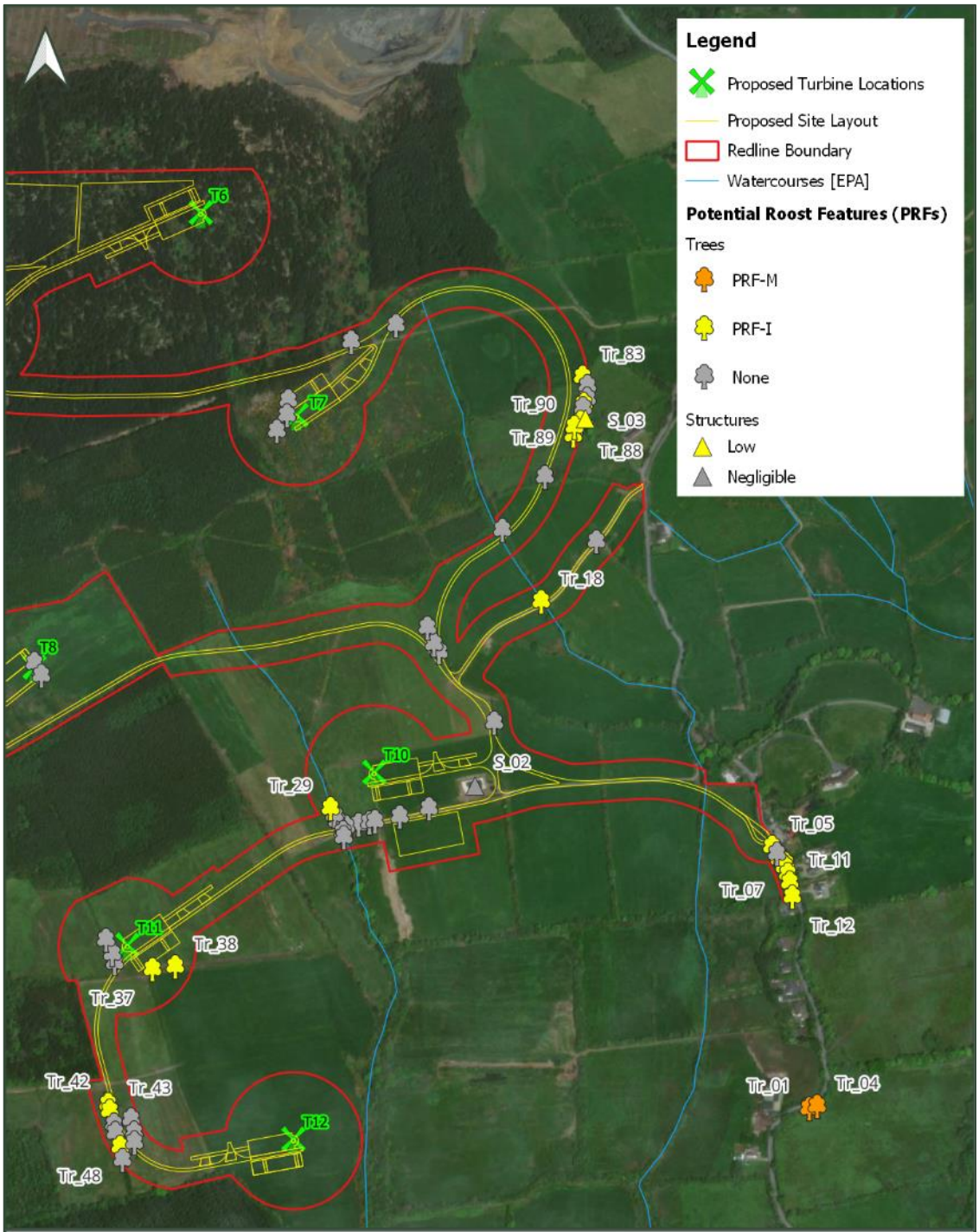


Figure 3.3 - Potential Roost Assessment Results 2 of 2

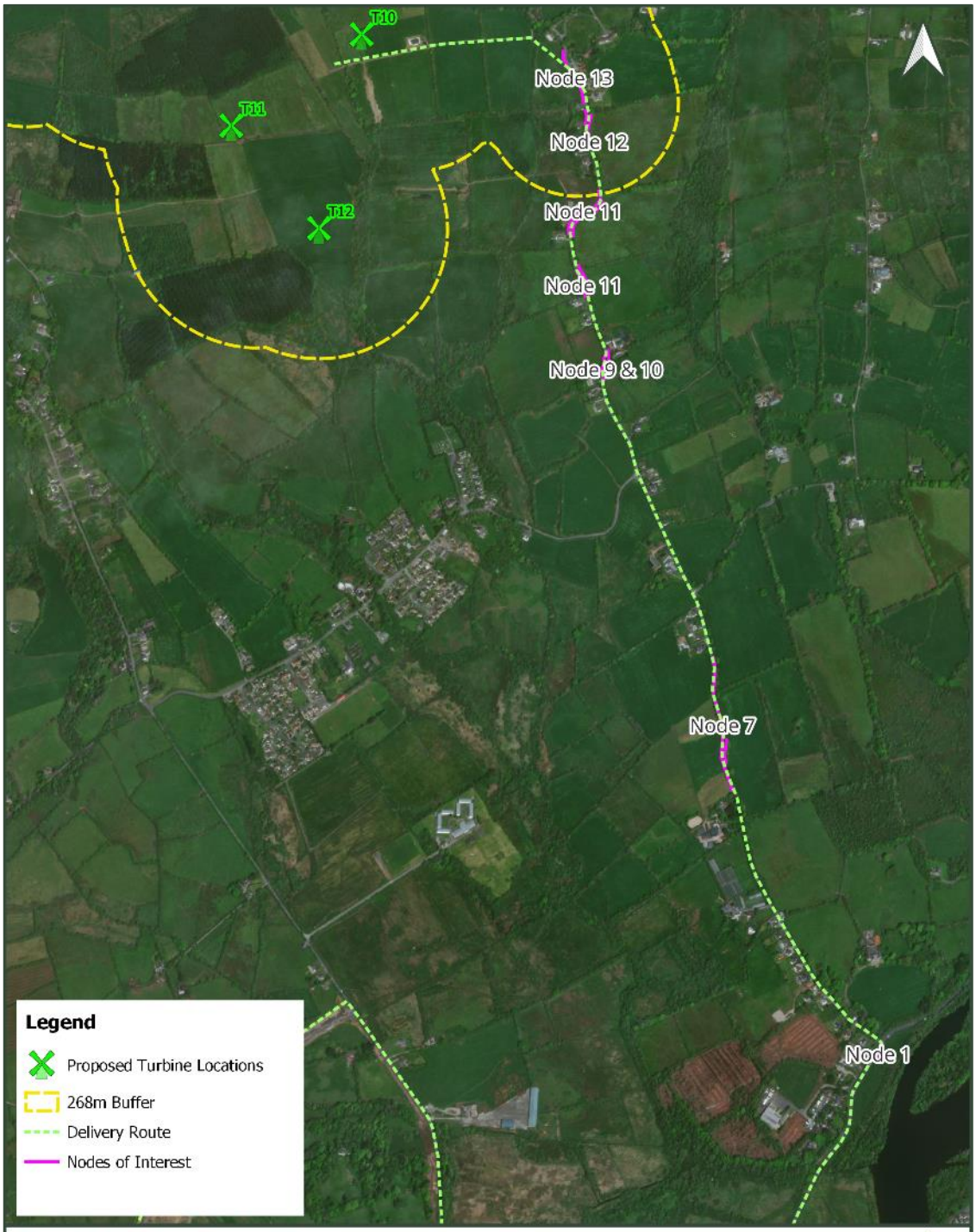
Project:
Ballycar Wind Farm

0 100 200 m

Prepared for:
Ballycar Green Energy Ltd.

Colm Breslin BSc (Hons)
D: 31/10/2023

O'DONNELL ENVIRONMENTAL


T10
T11
T12
Node 13
Node 12
Node 11
Node 11
Node 9 & 10
Node 7
Node 1
Legend
Proposed Turbine Locations
268m Buffer
Delivery Route
Nodes of Interest
Figure 3.4 - Turbine Delivery Route
Nodes of Interest
Project:
Ballycar Wind Farm
0
250
500 m
Prepared for:
Ballycar Green Energy Ltd.
Claire McCarthy BSc (Hons) MSc
D: 17/11/2023
O'DONNELL ENVIRONMENTAL
Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

3.3 BAT ACTIVITY SURVEYS

Bat activity at the wind farm site was assessed through passive detection surveys and active transect surveys. These surveys are described in detail below.

3.3.1 Passive Bat Survey

Ultrasonic detector surveys were carried out at the wind farm site across three seasons to record bat activity in the area from which information on species composition, relative abundance and landscape usage could be derived. The surveys were carried out from 12 monitoring locations based on the turbine layout available at the time of each deployment. Detectors could generally be deployed within 15m of the proposed turbine location (following NIEA, 2022) but in the case of Turbines 5 and 6 the proposed locations are within dense commercial forestry and were not accessible. Proxy locations (T_05p and T_06p; see **Figure 2.1**) were utilized instead and these forest-edge locations are considered to better represent post-construction habitat than within dense commercial forestry (which typically is associated with relatively low levels of bat activity).

Overall, a moderate to high level of activity was recorded at the site, and a high level of species diversity. A total of nine bat species were recorded (possibly ten as Whiskered Bats and Brandt's Bats are indistinguishable through ultrasonic detection). The wind farm site generally lacks bat roosting opportunities and primarily represents a foraging and commuting habitat.

Common Pipistrelle was the most commonly recorded species and accounted for 82.1% of all registrations recorded during passive bat monitoring, while Leisler's Bat accounted for 7.2% of all registrations, followed by Soprano Pipistrelle at 4.4%.

The level of activity recorded at the wind farm site varied according to season, location and species. The results of passive bat monitoring are presented in **Table 3.5**. The highest level of bat activity was recorded at 'Bat_6p' which accounted for 24.1% of all registrations recorded across the three survey seasons, followed by the Turbine 8 monitoring station, accounting for 16.24% of all registrations recorded.

3.3.1.1 Spring 2023 Passive Monitoring Survey

A high level of species diversity was recorded during the spring monitoring period, with a total of nine bat species confirmed, including the Annex II listed Lesser Horseshoe Bat. A moderate level of activity was recorded with a total of 17,748 bat registrations across the 22-night survey period and 12 detector locations.

Common Pipistrelle was the most abundantly recorded species this passive survey season, accounting for 77.9% of all recorded registrations. This species was the most commonly recorded at eight of the twelve monitoring stations. Common Pipistrelle are common and widespread in Ireland and are present in a wide variety of habitat types.

Leisler's Bat was the next most commonly recorded species accounting for 12.3% of all registrations recorded during this passive bat monitoring season. This species accounted for the highest number of registrations at four of the 12 monitoring stations (**Table 3.5**). Leisler's Bats are a relatively large and fast-flying species and have been recorded to have relatively large territories and to travel significant distances to reach preferred foraging habitats (Shiel et al., 2006). While strong habitat associations for the species have been difficult to identify in an Irish context, there is evidence to suggest a positive association with pasture and freshwater habitats (Roche et al., 2014).

Soprano Pipistrelle, Natterer's Bat and Brown Long-eared Bat registrations were recorded in similar numbers during this passive monitoring season, accounting for 3.1%, 3% and 2.9% of the total registrations recorded respectively. 30.7% of all Soprano Pipistrelle registrations were recorded at 'Bat_11', 36.7% of Brown Long-eared Bats registrations were recorded at monitoring station 'Bat_12' and more than half (52.5%) of all Natterer's registrations recorded at 'Bat_11'.

The Annex II listed Lesser Horseshoe Bat was recorded, with a total of 21 registrations across the spring survey season, accounting for 0.1% of the total registrations recorded. This species was recorded at five of the 12 monitoring locations. The highest number of registrations for this species was recorded at monitoring station 'Bat_08'.

3.3.1.2 Summer 2023 Passive Monitoring Survey

A high level of species diversity was recorded during the summer monitoring period, with a total of eight bat species (possibly nine as Whiskered Bats and Brandt's Bats are indistinguishable through ultrasonic detection) recorded, including the Annex II listed Lesser Horseshoe Bat. A moderate to high level of activity was recorded with a total of 47,281 bat registrations across the 22-night survey period and twelve detector locations.

Common Pipistrelle was the most commonly recorded species and accounted for 86% of all registrations during the summer passive bat monitoring season. More than 90% of the registrations recorded at 'Bat_01', 'Bat_05p', 'Bat_08' and 'Bat_12' were Common Pipistrelle and 23.3% of all Common Pipistrelle registrations were recorded at monitoring station 'Bat_05p'.

Leisler's Bat was the next most commonly recorded species accounting for 8% of all registrations. 19.8% of all Leisler's Bat registrations were recorded at the 'Bat_06p' monitoring station, followed by 16.6% at 'Bat_07'.

Natterer's Bat was the third most common species recorded across the site with a total of 1,241 registrations, accounting for 2.6% of all registrations recorded during this monitoring season. Natterer's Bat was recorded at all monitoring stations, with the highest proportion of registrations recorded at 'Bat_06p' at 30.5%.

Soprano Pipistrelle were recorded across all monitoring stations and accounted for 1.5% of the registrations recorded during the monitoring season. The highest percentage of Soprano Pipistrelle registrations was recorded at 'Bat_12' at 26.6%, followed closely by 21.6% at 'Bat_02' and 16.2% at 'Bat_06p'.

The Annex II listed Lesser Horseshoe Bat was recorded this survey season, with a total of 83 registrations, accounting for 0.2% of the total registrations recorded. This species was recorded at seven of the 12 monitoring locations. More than half of the total Lesser Horseshoe registrations (56.6%) were recorded at the Turbine 8 monitoring station 'Bat_08' which was located at an alternative location for the summer survey period (see **Figure 2.1**) as safe access to the turbine location was not available at the time of deployment.

In total Brown Long-eared Bat registrations accounted for only 0.6% of the total registrations recorded during this monitoring season. However, it is important to note that this species, similar to Lesser Horseshoe Bat, can be under-recorded in ultrasonic detection surveys due to their quiet calls. Daubenton's Bat and Whiskered Bat registrations were recorded in small numbers and accounted for 0.6% and 0.3% of the total registrations respectively.

3.3.1.3 Autumn 2023 Passive Monitoring Survey

A high level of species diversity was recorded during the autumn monitoring period, with a total of nine bat species (possibly ten as Whiskered Bats and Brandt's Bats are indistinguishable through ultrasonic detection) recorded, including the Annex II listed Lesser Horseshoe Bat. The highest level of activity across the three survey periods was recorded in autumn with a total of 64,467 bat registrations across the 16-night survey period and twelve detector locations.

Common Pipistrelle was the most commonly recorded species with a total of 51,805 registrations and accounted for 80.4% of all registrations during the autumn passive bat monitoring season. 34.9% of all Common Pipistrelle registrations were recorded at monitoring station 'Bat_06p', followed by 19.9% at 'Bat_08'.

Soprano Pipistrelle was the second most abundant species recorded this autumn monitoring season and accounted for 7% of the registrations recorded. The highest percentage of Soprano Pipistrelle registrations was recorded at 'Bat_06p' at 28.5%. Leisler's Bat was the next most commonly recorded species with a total of 3,369 registrations, accounting for 5.2% of all registrations recorded during this passive bat monitoring season. Brown Long-eared Bat accounted for 3.9% of all registrations recorded during this passive monitoring season. 55% of all Lesser Horseshoe Bat were recorded at 'Bat_06p and 'Bat_08' monitoring stations during the autumn monitoring season.

The data recorded during the passive survey is presented as "average [peak]" where average is the average number of registrations per night on the first 10 suitable weather nights in the spring season, the first 20 suitable weather nights in the summer season and the first 15 suitable weather nights in the autumn. The peak represents the maximum number of nightly registrations from any night in the relevant recording period (see **Table 3.5**).

3.3.1.4 Grid Route Passive Detection

A passive detector was placed along the proposed grid route on 24th October 2023 for a total of 14 survey nights in order to characterize bat activity in this area. The deployment location is shown as location 'Bat_13' in **Figure 2.1** and was in commercial forestry adjoining a forestry track. A low level of activity was observed with an average of 7.8 registrations being recorded per night. Of the six species recorded, Common Pipistrelle were recorded most frequently and accounted for 79% of all registrations. Leisler's Bat accounted for 11% of all registrations with Natterer's Bat, Brown long-eared Bat, Soprano Pipistrelle and Daubenton's Bat each accounting for less than 5% of registrations. No patterns of activity were recorded which suggested proximity to a significant roost location.

Table 3.5 Results of passive bat monitoring.

	Common Name	Bat_1	Bat_2	Bat_3	Bat_4	Bat_5p	Bat_6p	Bat_7	Bat_8	Bat_9	Bat_10	Bat_11	Bat_12
Spring 2023	Brown Long-eared Bat	0.6 [2]	0.2 [1]	1.2 [4]	0.8 [3]	9.7 [50]	2.6 [9]	0.9 [16]	0.4 [2]	1.3 [9]	1.2 [4]	2 [9]	13.3 [33]
	Common Pipistrelle	1.9 [10]	36 [187]	4.7 [10]	5.8 [13]	33.1 [76]	164.1 [415]	16.7 [80]	86.7 [208]	8.1 [24]	32.1 [110]	547.6 [1642]	193.5 [651]
	Daubenton's Bat	0.1 [1]	0.6 [2]	0 [0]	0.1 [1]	0.1 [2]	1 [3]	0.1 [1]	0.8 [3]	0.1 [1]	0.3 [2]	2.5 [13]	0.7 [3]
	Leisler's Bat	3.2 [9]	1.8 [3]	5.2 [21]	4.2 [10]	8.2 [20]	16 [50]	14.5 [42]	1.2 [6]	12.5 [79]	42.4 [159]	20.4 [55]	28.3 [52]
	Lesser Horseshoe Bat	0 [0]	0 [1]	0 [0]	0 [0]	0.3 [2]	0.4 [2]	0 [0]	0.6 [2]	0 [0]	0 [0]	0 [0]	0.2 [1]
	Myotis sp.	0 [0]	0.2 [1]	0 [0]	0 [0]	0 [0]	0.2 [2]	0.1 [1]	0 [0]	0 [0]	0 [2]	0.2 [1]	0 [1]
	Natterer's Bat	0.4 [3]	1.7 [6]	0.6 [3]	0.7 [3]	1.3 [5]	0.8 [3]	1 [3]	0.1 [1]	1.9 [7]	1.4 [8]	6.4 [113]	6.2 [13]
	Pip. 40kHz	0 [0]	0 [0]	0 [0]	0 [0]	0.1 [1]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
	Soprano Pipistrelle	0.6 [4]	0.5 [4]	0.5 [2]	0.9 [4]	2.8 [7]	5.2 [20]	0.4 [5]	6 [30]	1.6 [5]	3.6 [10]	13.3 [66]	9.9 [30]
	Whiskered Bat	0 [0]	0 [0]	0 [1]	0 [0]	0.2 [1]	0.4 [2]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0.1 [1]
Summer 2023	Brown Long-eared Bat	0 [0]	0 [0]	0 [1]	0 [0]	0.2 [1]	0.4 [2]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [1]
	Common Pipistrelle	23.6 [79]	234.45 [415]	11.05 [37]	34.35 [164]	454.2 [1121]	340.65 [1015]	153.95 [431]	370.45 [1112]	4.75 [16]	8.25 [67]	66.9 [711]	195.25 [1047]
	Daubenton's Bat	0.15 [2]	1.2 [4]	0.1 [1]	0.95 [7]	3.05 [23]	2.7 [11]	2.15 [18]	1.3 [5]	0.05 [1]	0.2 [2]	1.35 [6]	1.1 [5]
	Leisler's Bat	11.7 [44]	16.4 [46]	11.65 [78]	8.65 [38]	23.6 [169]	36.15 [200]	29.3 [88]	17.5 [55]	0.5 [5]	9.9 [25]	9.6 [28]	3.65 [16]
	Lesser Horseshoe Bat	0.05 [1]	0.4 [2]	0 [0]	0 [0]	0.35 [1]	0.3 [2]	0.3 [2]	2.2 [8]	0 [0]	0 [0]	0 [0]	0.4 [3]
	Natterer's Bat	1.3 [5]	0.1 [2]	5.35 [18]	7.05 [26]	2.85 [7]	18.25 [54]	3.25 [12]	7.1 [24]	0.15 [2]	0.85 [4]	13.7 [49]	0.1 [2]
	Soprano Pipistrelle	0.25 [2]	5.65 [37]	0.5 [3]	0.45 [2]	2.35 [6]	5.6 [28]	0.65 [3]	4.9 [16]	0.35 [3]	0.5 [3]	1.95 [6]	8.95 [26]
	Whiskered Bat	0 [0]	0.3 [2]	0 [0]	0.05 [1]	1.45 [11]	1.15 [5]	2.25 [33]	2.25 [23]	0 [0]	0 [0]	0 [0]	0.3 [1]
Autumn 2023	Brown Long-eared Bat	3.2 [9]	3.53 [10]	11.33 [38]	8.13 [17]	17.33 [36]	13.53 [29]	1.8 [6]	8.13 [27]	12 [31]	8.47 [21]	11.87 [27]	66.33 [167]
	Common Pipistrelle	18.2 [40]	292.87 [1071]	64 [308]	126.33 [392]	271.6 [727]	1205.4 [2155]	270.13 [1022]	687 [1946]	57.4 [196]	99.6 [372]	308.6 [999]	52.33 [357]
	Daubenton's Bat	0.2 [2]	4.33 [15]	1.07 [4]	0.73 [3]	2.47 [11]	9.27 [24]	1.27 [10]	1.87 [7]	1.47 [6]	0.6 [2]	2.53 [7]	0.33 [2]
	Leisler's Bat	13 [31]	36.67 [94]	24.33 [66]	18.07 [38]	26.33 [101]	29.6 [75]	2.47 [7]	7.07 [19]	27.53 [67]	11.73 [21]	13.47 [37]	14.33 [99]
	Lesser Horseshoe Bat	0 [0]	0.33 [2]	0 [0]	0 [0]	1.47 [6]	1.67 [6]	0.87 [3]	1.67 [11]	0 [0]	0 [0]	0.07 [1]	0 [0]

Myotis sp.	0.07 [1]	3.87 [17]	0.53 [3]	0.07 [1]	0.87 [3]	1.33 [4]	0.27 [1]	0.33 [1]	0.4 [2]	0.13 [1]	1.8 [6]	0.47 [2]
Nathusius' Pipistrelle	0 [0]	0.07 [1]	0.13 [1]	0 [0]	0 [0]	0.07 [1]	0 [0]	0.2 [1]	0.07 [1]	0.07 [1]	0 [0]	0.6 [8]
Natterer's Bat	3.8 [10]	13.93 [41]	14.8 [52]	8.67 [23]	5.07 [13]	10.53 [20]	2.6 [8]	2.67 [7]	12.47 [55]	3.13 [8]	24.47 [55]	4.4 [10]
Soprano Pipistrelle	4.27 [17]	25.47 [73]	9 [29]	10.33 [32]	33.47 [141]	85.4 [254]	9.13 [41]	33.8 [126]	10.73 [44]	36.4 [249]	26.07 [47]	15.27 [54]
Whiskered Bat	0 [0]	1 [3]	0 [0]	0.07 [1]	1.4 [7]	0.33 [2]	0.73 [4]	0.67 [4]	0.07 [1]	0.13 [1]	0.07 [1]	0 [0]

Note: Data is presented as "average [peak]" where average is the average number of registrations per night on the first 10 good-weather nights in the spring season, the first 20 good-weather nights in the summer season and the first 15 good-weather nights in the autumn. Peak data represents the maximum number of nightly registrations from any night in the relevant recording period.

Table 3.6 Results of passive bat monitoring on grid route (Bat_13).

Survey Night	Brown Long-eared Bat	Common Pipistrelle	Daubenton's Bat	Leisler's Bat	Natterer's Bat	Soprano Pipistrelle
24/10/2023	2	4	0	3	1	0
25/10/2023	0	12	0	0	0	2
26/10/2023	0	29	0	0	0	0
27/10/2023	0	1	0	0	0	0
28/10/2023	0	8	0	9	0	0
29/10/2023	0	0	0	0	0	0
30/10/2023	0	5	0	0	0	0
31/10/2023	0	2	0	0	0	0
01/11/2023	0	1	0	0	0	0
02/11/2023	0	1	1	0	0	0
03/11/2023	1	16	0	0	4	0
04/11/2023	0	3	0	0	0	0
05/11/2023	0	4	0	0	0	0
06/11/2023	0	0	0	0	0	0
Total	**3**	**86**	**1**	**12**	**5**	**2**

3.3.2 Active Transect Survey

Three active bat surveys were carried out at the proposed wind farm site for approximately 1.5 hours from dusk on 6th June, 21st August and 5th September 2023.

In general, across the three survey nights a moderate level of species diversity was recorded during the active surveys. The recorded species included Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, Brown Long-eared Bat and *Myotis sp*.

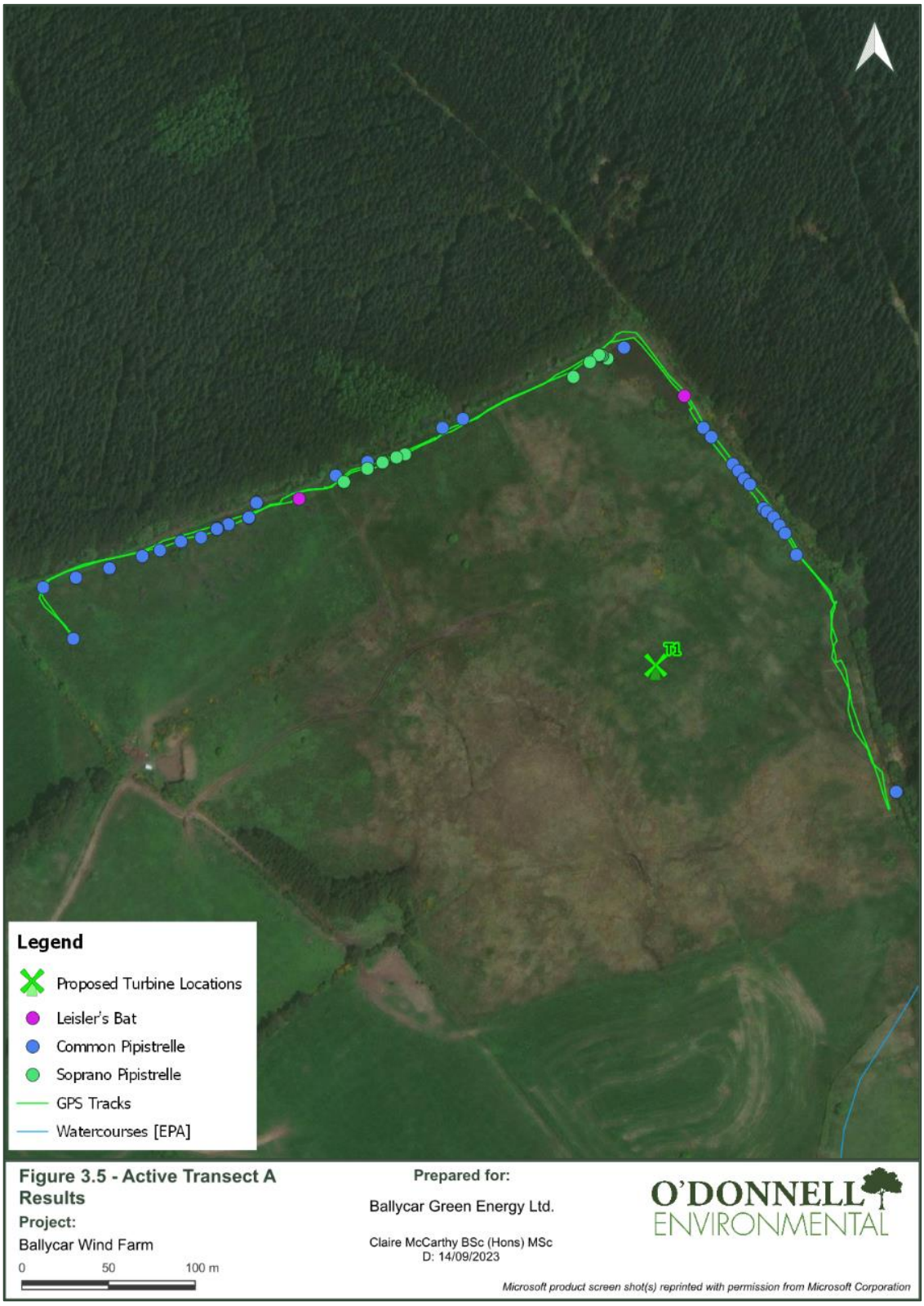
All of the above species were also recorded during the passive bat detection surveys. The locations of the registrations recorded during the active bat surveys at the proposed wind farm site are shown in **Figure 3.5** to **Figure 3.8**.

On the night of the 6th June 2023 activity was low to moderate with a total of 19 registrations all attributed to Common Pipistrelle. Transects A and B were surveyed that night.

On the night of the 21st August 2023 activity was moderate and a total of 103 bat registrations were recorded. Of these, Common Pipistrelle was most commonly recorded and accounted for 71 registrations, Soprano Pipistrelle accounted for 15 registrations, Leisler's accounted for 13 registrations and three Brown Long-eared Bat registrations were recorded. A single registration of *Myotis sp*. was recorded along Transect C which could not be conclusively identified to species level.

On the night of the 5th September 2023 activity was moderate and a total of 84 bat registrations were recorded. Of these, Common Pipistrelle was the most abundant accounted for 68 registrations, Soprano Pipistrelle accounted for 15 registrations and a single Leisler's Bat registration was recorded along Transect C. No activity was recorded along Transect A this survey night. Transect D was an additional transect route only surveyed on this survey night.

While each individual survey represents only a 'snapshot', overall, data derived from active surveys broadly reflected the data derived from passive bat surveys in terms of species diversity and relative abundance. No activity indicative of emergence from (or proximity to) an active roosting location was recorded. While individual observations were made of bats in flight, no patterns of behaviour were noted which would suggest the presence of important or significant commuting routes. Transect C, located at the north-east of the proposed site, recorded a relatively high level of activity. Habitat in this area was a boundary habitat occurring between forestry and wet grassland and high levels of activity were noted in relation to 'Bat_6p' also. Deforestation occurred in this area following the summer season surveys.


T1
Legend
Proposed Turbine Locations
Leisler's Bat
Common Pipistrelle
Soprano Pipistrelle
GPS Tracks
Watercourses [EPA]
Figure 3.5 - Active Transect A Results
Project:
Ballycar Wind Farm
0
50
100 m
Prepared for:
Ballycar Green Energy Ltd.
Claire McCarthy BSc (Hons) MSc
D: 14/09/2023
O'DONNELL ENVIRONMENTAL
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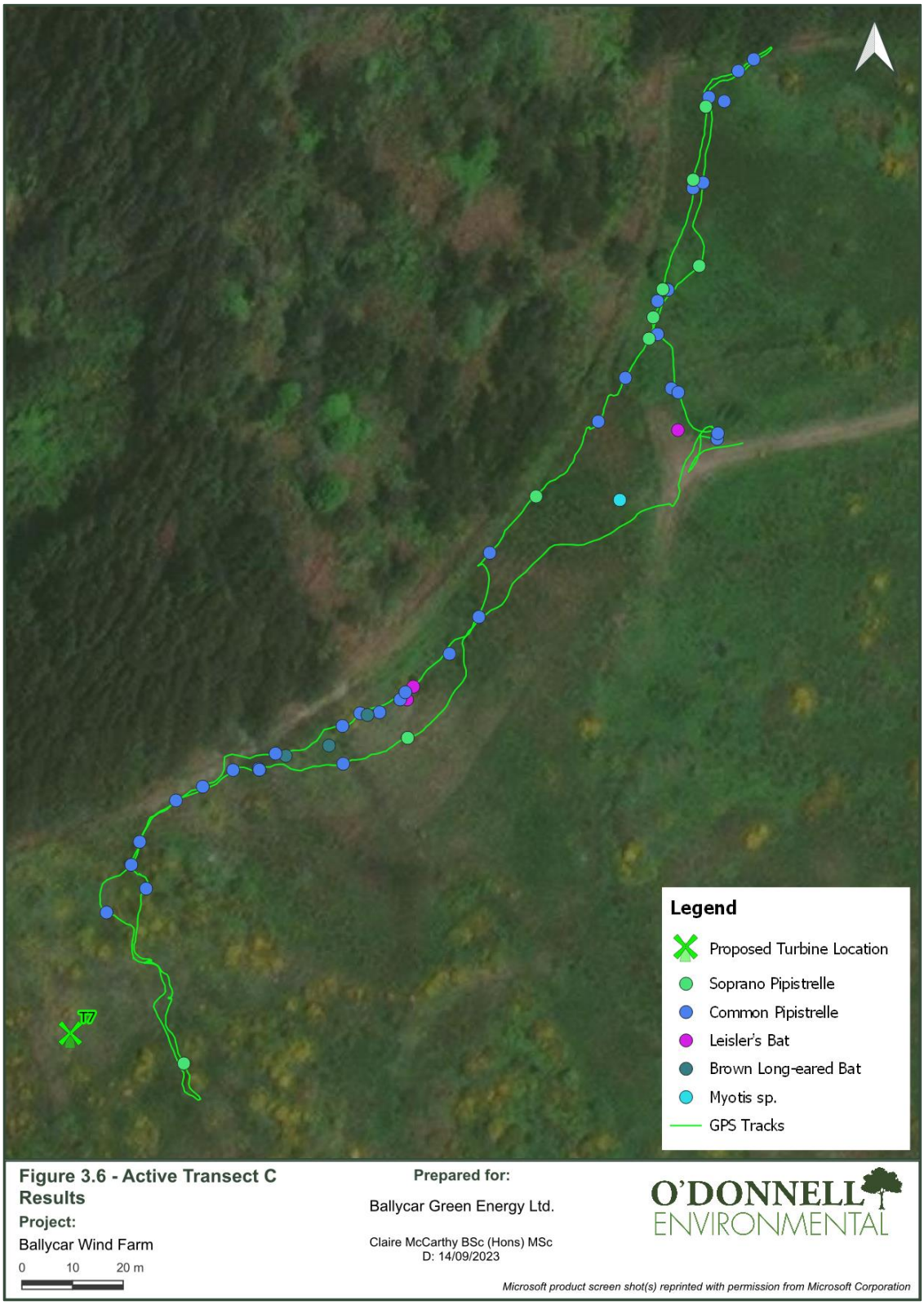
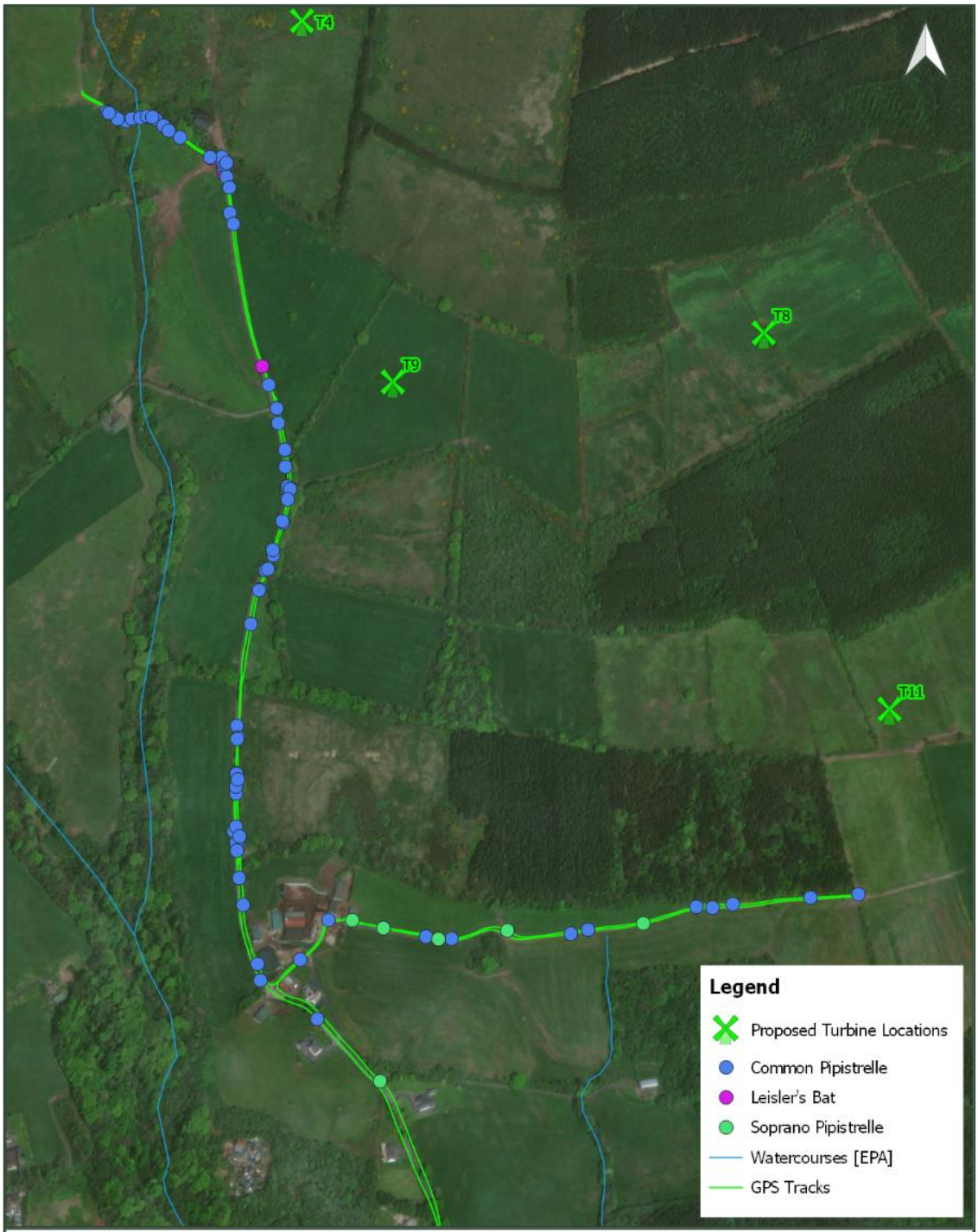

T7
Legend
Proposed Turbine Location
Soprano Pipistrelle
Common Pipistrelle
Leisler's Bat
Brown Long-eared Bat
Myotis sp.
GPS Tracks
Figure 3.6 - Active Transect C Results
Project:
Ballycar Wind Farm
0 10 20 m
Prepared for:
Ballycar Green Energy Ltd.
Claire McCarthy BSc (Hons) MSc
D: 14/09/2023
Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation


T4
T8
T9
T11
Legend
Proposed Turbine Locations
Common Pipistrelle
Leisler's Bat
Soprano Pipistrelle
Watercourses [EPA]
GPS Tracks
Figure 3.7 - Active Transect B & D Results
Project:
Ballycar Wind Farm
0
100
200 m
Prepared for:
Ballycar Green Energy Ltd.
Claire McCarthy BSc (Hons) MSc
D: 18/09/2023
O'DONNELL ENVIRONMENTAL
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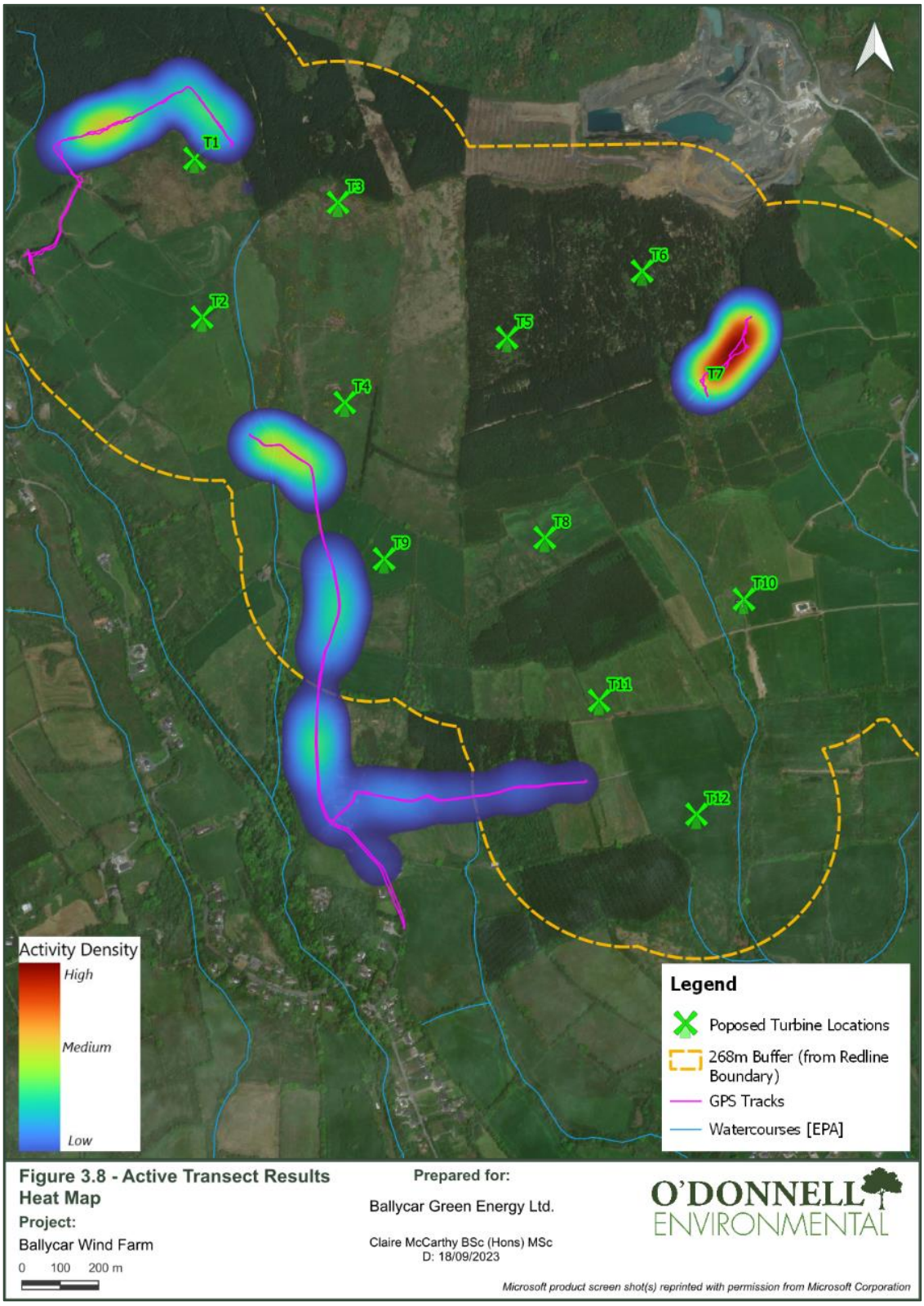
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
Activity Density
High
Medium
Low
Legend
Poposed Turbine Locations
268m Buffer (from Redline Boundary)
GPS Tracks
Watercourses [EPA]
Figure 3.8 - Active Transect Results Heat Map
Project:
Ballycar Wind Farm
0 100 200 m
Prepared for:
Ballycar Green Energy Ltd.
Claire McCarthy BSc (Hons) MSc
D: 18/09/2023
O'DONNELL ENVIRONMENTAL
Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

3.5 ECOLOGICAL SITE EVALUATION

The current report describes the proposed study area in terms of roosting and foraging suitability for bats. A comprehensive and appropriate survey effort was employed, and no evidence of bat roosting in either structures or trees present within and immediately adjoining the proposed site could be found. Suitable foraging and commuting habitat exists within the proposed wind farm site.

Taking into account the results of surveys described in this report, the intensive agricultural nature of the site, general lack of roosting opportunities, suitable foraging and commuting habitat with good habitat connectivity to its local environs, the overall study site is considered to be of **Local Importance (Higher Value)** for bats.

4 Potential Impacts

The potential impacts of the proposed wind energy development on the bat species recorded to be present at the Ballycar site are discussed in detail below.

4.1.1 Potential Cumulative Impacts

At the time of writing there are no permitted or operational wind energy developments within a 10km radius of the proposed Ballycar wind energy development.

A planning application was submitted in relation to the proposed Fahy Beg Wind Farm (Clare Co. Co. Planning Ref. 23/148) which relates to 8 turbines and associated infrastructure. The application was submitted by RWE in March 2023 and refused in May 2023; a first party appeal has been submitted to An Bord Pleanála. The proposed Fahy Beg Wind Farm is located approximately 8km north-east of the proposed development.

Two single-turbine developments are located within 10km of the proposed development:

- One turbine at Vistakon in Limerick approx. 8.5km south-east of the proposed site.
- One 800kw turbine at Limerick Blow Moulding approx. 3.6km south-east of the proposed site.

4.1.2 Construction Phase Impacts

Wind energy developments present four potential risks to bats (NatureScot, 2021):

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

For each of these four risks, the detailed knowledge of bat distribution and activity within the study area gained during the current assessment is used to predict the potential effects of the wind farm on bats. Several bat species were noted in the vicinity of the site and grid route all of which are legally protected under the Irish Wildlife Acts (1976 as amended) and listed on the EU Habitats Directive.

A total of 93.65ha of direct habitat loss will be required to facilitate construction of the wind farm and associated infrastructure, including the required ecological buffer areas (see ***Section 6.1.1.1***). 15.75 ha of commercial forestry will be removed to facilitate proposed turbines (T5 and T6) as well as the required grid infrastructure.

While the site is in nature mostly an intensive agricultural site with a general lack of roosting opportunities, the foraging and commuting habitat is suitable with good connectivity to surrounding habitats. The effect of this vegetation loss will be reduced or altered foraging and commuting habitat for bats. The loss of linear features will be approximately 864m. While hedgerows and treelines are common features in the wider landscape, the loss of commuting habits will potentially displace some bats in the immediate locality of works and marginally reduce habitat connectivity locally. It should be noted that in the context of wind farm development, it is preferrable to reduce habitat connectivity in the immediate locality of turbines to reduce the potential for collision and barotrauma to occur. Outside of the works footprint, existing land use (e.g. pasture-based agriculture) will continue.

No bat roosts were confirmed within the site and bat activity recorded was moderate overall. While it is considered that there is no potential for a "significant" bat roost to occur within the relevant distance (268m) of the proposed site boundary (NatureScot, 2021), it is possible that individual bats or small numbers of bats may roost in trees or existing structures at least occasionally and mitigation measures have been applied to minimise the potential effects on bats associated with construction related disturbance.

No significant tree roost locations suitable to support large numbers of roosting bats were noted in proximity to the grid route, and no trees of above negligible suitability for roosting bats were found or are likely to occur in the footprint of the proposed works. Trees proposed for removal within the wind farm site are considered to be mostly of low suitability (PRF-I).

Construction phase lighting has the potential to attract certain bat species and displace others and floodlighting can be a significant source of disturbance to bat species. However, this effect will be temporary in nature and localized to areas around the site compound. Night-time lighting will be limited in extent (both static lighting, and vehicle headlights) as standard construction works will be carried out mostly during daylight hours.

Construction related run-off or degradation of aquatic habitats through hydrological links could potentially lead to a deterioration of the feeding resource for bats associated with watercourses within the site boundary and in the wider area. Assessment of potential water quality impacts is addressed elsewhere in the EIAR (Chapter 8 Water, Appendix 6C Aquatic Report).

Considering the above, potential construction phase impacts of the proposed wind farm are considered to have a **'slight', permanent negative effect** on bats at a local level following EPA (2022).

4.1.3 Operational Phase Impacts

Habitat loss experienced during the construction phase (described above) will continue to persist through the operational phase. The operation of the wind farm at this site has the potential to result in disturbance to commuting and foraging bats. Bat activity at the site was variable with periods of moderate-to-high activity occurring for some species. Decreased connectivity resulting from removal of commuting features likely to be used by many bat species (e.g. hedgerows and treelines) will persist during the operational phase, but decreased connectivity to proposed turbine locations is desirable in terms of reducing risk of fatality or injury as a result of contact with rotating turbine blades. Collision risk is discussed further below.

4.1.3.1 Collision Risk

There is little or no published evidence available on prevalence of bat fatalities at wind farms in an Irish context. Where fatalities have been monitored at wind farms in the USA, most losses have been related to periods of migration (www.nationalwind.org).

Both direct collision with turbine blades and barotrauma resulting from close contact with blades have been reported as an issue for bats at wind farms (e.g. Cryan et al., 2009). The susceptibility of bat species likely to be at risk of effects from wind turbines is partly associated with the likelihood of different species flying at rotor blade height. In an Irish context, Leisler's Bat is considered to have a somewhat greater mortality risk at wind farms than the other species recorded on (or adjacent to) the site, as this species is a relatively large and high-flying species

and typically do not follow landscape features such as treelines or woodland edges when foraging.

4.1.3.2 Assessment of Collision Risk

A general assessment of vulnerability of bat populations to collision with wind turbines, based on best available scientific information, is provided below. This adapts for use in an Irish context a collision risk scheme provided in SNH (2019) and NatureScot (2021). NatureScot (2021) provides a generic assessment of bat collision risk for UK species, based on species behaviour and flight categorisation as well as evidence of casualty rates in the UK and Europe. This bat species collision risk assessment is considered to represent best available information for use in an Irish context.

This species collision risk categorisation is used in combination with relative abundance to indicate the potential vulnerability of bat populations. Relative abundance for Irish species was determined in accordance with a scheme for rarity of bat species provided in Wray et al. (2010) in combination with best available population data provided in recent Article 17 reports (NPWS, 2019). The limitations in terms of Irish bat population data are acknowledged in the latter report.

The collision risk estimation scheme for Irish bat species is presented in **Table 5.1** below.

Table 5.1 Scheme for estimation of Irish bat species' population vulnerability to wind energy development.

Relative Abundance	Collision-Risk		
	Low	Medium	High
Common (100,000 plus)			Common Pipistrelle Soprano Pipistrelle
Rarer (10,000 – 100,000)	Daubenton's Bat Brown Long-eared Bat Lesser Horse-shoe Bat		Leisler's Bat
Rarest (under 10,000)	Natterer's Bat Whiskered Bat		Nathusius Pipistrelle

Population vulnerability: yellow = low, orange = medium, red = high.

In determining the project specific potential risk to bats, NatureScot (2021) recommends a two-stage process as follows:

- Stage 1: Indicatively assess potential site risk based on consideration of habitat present and development related features (i.e. number of turbines, size of turbines and proximity to other wind farms).
- Stage 2: Overall assessment of risk for high collision-risk species, considering bat activity results and the relative vulnerability of species.

Initially an assessment of the general site risk based on habitats present was carried out following the scheme presented in SNH (2019) and NatureScot (2021). A total of three PRF-M suitability bat roosts are present local to the proposed wind farm site. The site represents foraging habitat which is well connected to suitable foraging habitats in the hinterland and therefore a habitat risk of 'Moderate' is applied. The proposed project is considered 'Medium' (12-turbine project, with no other wind farms (greater than 1 turbine) granted permission within 10km and one proposal which is in appeal at an 8km distance). According to the project size categories in NatureScot (2021), turbines of height >100m are included in the 'Large' project

category. This height refers to the 'tip height' of the turbine (P. Taylor (NatureScot), pers. Comm.). The maximum tip height of the turbines proposed for this development is 158m, however given the number of turbines (significantly less than the threshold for a large site >40 no. turbines) and the lack of other wind developments in close proximity to the proposed development, it is considered that 'Medium' remains the appropriate project size category. Based on the above initial site risk assessment, the proposed project is considered to be 'Medium Risk' to bats and a site risk score of 3 is applicable.

The next stage of the process is applicable to 'high collision-risk' species only and utilises information on the activity level recorded on site in each monitoring period. This assessment is intended to identify projects which are of greatest concern in terms of bat collision risk. The following high collision-risk species have been recorded at the current site:

- Leisler's Bat
- Common Pipistrelle
- Soprano Pipistrelle
- Nathusius' Pipistrelle

Leisler's bats are considered to be a high-collision risk species due to their foraging ecology and flight characteristics. While Leisler's Bat is rare in a European context, Ireland is a stronghold for the species. They are classified as 'Rarer' for the purposes of this assessment but the minimum population range for the species in Ireland is estimated at 63,000 to 113,000 (NPWS, 2019) and therefore the species may be 'Common'. Leisler's Bats were recorded during activity surveys across the site (see **Table 3.5**). Overall activity levels for Leisler's Bat in the context of the proposed wind farm are considered 'Low to Moderate' across all three survey seasons.

Common Pipistrelle are a common and widespread species in Ireland which are considered to be a high-collision risk species due to their foraging ecology and flight characteristics. Common Pipistrelles were the most commonly recorded species across the site. Overall activity levels for Common Pipistrelles in the context of the proposed wind farm are considered to vary between 'Moderate' in spring and summer and 'Moderate to High' in autumn. High peaks in activity were noted in relation to Common Pipistrelle on individual nights for example, at Turbine 8 a peak of 1,946 registrations was recorded in the autumn monitoring period. Although significant peaks in activity are noted for this species on occasions, an average of 'Moderate to High' activity overall is considered to be appropriate.

Soprano Pipistrelle are another common and widespread species in Ireland which are considered to be a high-collision risk species due to their foraging ecology and flight characteristics. Overall activity levels for Soprano Pipistrelles in the context of the proposed wind farm are considered to be 'Low' in spring and summer and 'Low to Moderate' in autumn.

Nathusius' Pipistrelle has a fast flight and is slightly less agile in flight than the other Pipistrelle species and is positively associated with broadleaf woodland and areas where pasture is less extensive (Rocher et al., 2014). This species is considered to be of high-collision risk due to their foraging ecology and flight characteristics. Nathusius' Pipistrelle was only recorded in the autumn monitoring period with low numbers of registrations, yielding a 'Low' activity category for this season.

It is noted that proxy locations were used for the proposed Turbine 5 and Turbine 6 across all survey periods as the exact locations proposed were within commercial forestry and were not safely accessible at the time of surveys. A conservative approach was taken in relation to the selection of proxy locations, and detectors were placed in optimal habitat locally. Both detectors were placed on the woodland edge which likely overestimates activity which would be recorded at the base of the proposed turbine locations post-construction. For example, high peaks in activity were noted in relation to Common Pipistrelle on individual nights at both Turbine 5 and 6 proxy locations with peaks of 1,121 and 1,015 respectively in the summer period and a peak of 2,155 at the Turbine 6 proxy location in autumn. Data from proxy locations was included in the overall assessment of collision risk.

Table 5.2 Overall collision risk assessment of relevant (high-risk) species.

	Species	Site Risk Level	Activity Category	Overall Assessment
Spring 2023	Leisler's Bat	3	Low to Moderate (2)	6
	Common Pipistrelle	3	Moderate (3)	9
	Soprano Pipistrelle	3	Low (1)	3
Summer 2023	Leisler's Bat	3	Low to Moderate (2)	6
	Common Pipistrelle	3	Moderate (3)	9
	Soprano Pipistrelle	3	Low (1)	3
Autumn 2023	Leisler's Bat	3	Low to Moderate (2)	6
	Common Pipistrelle	3	Moderate to High (4)	12
	Soprano Pipistrelle	3	Low to Moderate (2)	6
	Nathusius' Pipistrelle	3	Low (1)	3

Overall collision risk assessment: Low (green), medium (amber), high (red) (following SNH, 2019).

While activity levels of the above species varied between survey locations (corresponding to proposed turbine locations) it is not possible to determine with any accuracy the different levels of collision risk presented by individual turbines (NatureScot, 2021).

As per NatureScot (2021) there is no requirement to complete an Overall Risk Assessment for low-risk species. The low-risk species that were recorded were Brown Long-eared Bat, Natterer's Bat, Whiskered Bat, Daubenton's Bat and Lesser Horseshoe Bat. Overall activity levels were generally 'Low' or 'Low to Moderate' for the above species and by virtue of their low potential vulnerability to wind energy developments, no significant collision related risk is likely.

No additional loss of foraging and commuting habitat, relative to that discussed above in relation to the construction phase, will occur during the operational phase. No other significant effects are likely to occur on bats during the operations phase of the proposed wind farm.

Overall, the operation of the proposed wind farm is considered to have a **'slight', permanent negative effect** at a local level following EPA (2022).

4.1.4 Decommissioning Phase Impacts

No other potential effects other than those already discussed above for the construction and operational phases are likely to occur during decommissioning. Turbine design renders the decommissioning process as a straightforward process. Decommissioning activities are assumed to be similar to construction activities, having similar type risks and sensitive receptors associated with them. However, they are considerably less intrusive.

Overall, the decommissioning of the proposed wind farm is considered to have a **'neutral' effect** at a local level following EPA (2022).

5 Avoidance and Mitigation Measures

The proposed mitigation measures applicable to the construction and operational phases of the proposed wind energy development are discussed in detail below.

5.1.1 Construction Phase Mitigation

5.1.1.1 Tree & Hedgerow Clearance

Some sections of hedgerow (WL1) and mature treeline (WL2) habitat removal is required to accommodate the development of the new site access tracks and buffer areas for bats. Also, NatureScot (2021) recommends a minimum 50m buffer from the blade tip to the nearest key habitat features (e.g. woodland, hedgerow etc.) to be implemented to avoid encouraging bat activity within the 'blade-swept' area. These areas will be maintained vegetation-free during the operational life of the development. A methodology for determining the recommended clearance area at ground level is presented in NatureScot (2021). The clearance area surrounding each individual turbine was calculated using the formula presented in **Figure 6.1.**

Figure 6.1 Methodology for determining the clearance area at ground level (NatureScot, 2021).

Calculate the distance between the edge of the feature and the centre of the tower (b) using the formula:

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

where:
bl = blade length,
hh = hub height,
fh = feature height (all in metres).

For the example shown, b = 69.3m.

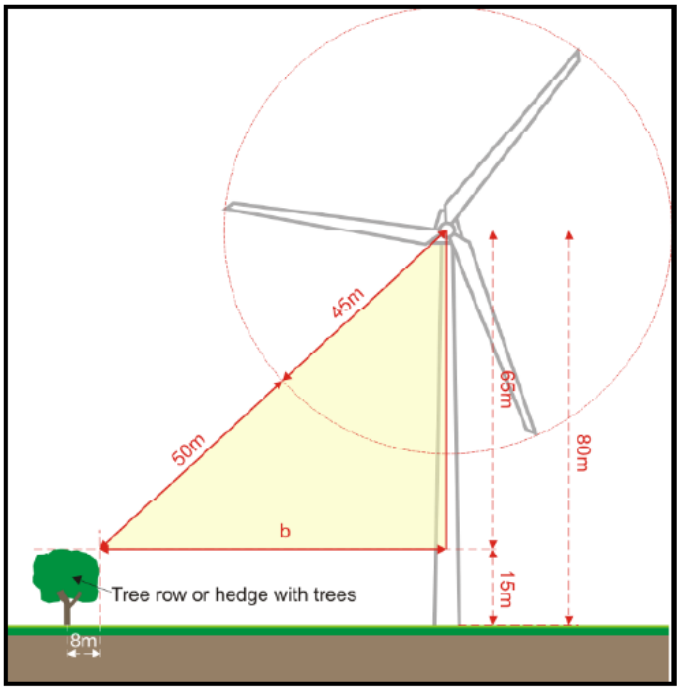

Illustration © Entec Ltd.

The approximate average height (*fh*) of the vegetation surrounding each proposed turbine was measured and in the case of commercial forestry an average feature height at harvest of 20m was assumed. These values were inputted to a formula alongside the associated measurements of each turbine to determine turbine specific minimum clearance buffers. The output summarized in **Table 6.1** below shows the minimum recommended vegetation clearance buffer surrounding each turbine.

Clearance of vegetation to a maximum of the clearance buffer distance will be carried out for all turbines up to the redline boundary, and these areas will be maintained free from woodland, hedgerows or treelines throughout the operational phase of the wind farm.

Table 6.1 – Results of formula to calculate the minimum recommended clearance radius of vegetation.

Turbine	Blade Length (m)	Hub Height (m)	Average Vegetation Height (m)	Clearance Buffer (m)
T01	68	90	0	76
T02	68	90	3	80
T03	68	90	2	79
T04	68	90	4	81
T05	68	90	20	94
T06	68	90	20	94
T07	68	90	5	82
T08	68	90	7	84
T09	68	90	10	87
T10	68	80	10	95
T11	68	90	4	81
T12	68	90	0	76

In order to confirm that the ecological context of the site remains as is outlined herein, prior to the commencement of site clearance surveys will be carried out on trees identified as having some (i.e. 'PRF-I' or 'PRF-M' in this instance) suitability for bat roosting. If roosts are found or are likely to be present, an appropriate mitigation strategy will be devised following Marnell (2022) and Collins (2023) or other relevant guidance, and an application to NPWS for a derogation license under section 55 of S.I. No. 477 of 2011 (Birds and Natural Habitats Regulations) will be made. Removal of trees with bat roost suitability will be carried out under the supervision of a bat licensed Ecologist and subject to receipt of derogation license (if required) and any additional conditions contained therein. Trees with ivy-cover or other features which may conceal roosting bats, once felled, will be left intact onsite for 24 hours prior to disposal to allow any bats present to depart.

A comprehensive survey effort was carried out in relation to potential roost features in structures following Collins (2023) and no evidence of roosting was found in relation to the three man-made structures within the wind farm site. These structures are considered to have negligible potential to host a maternity roost for any bat species but may be used by individual bats or small numbers of bats at least occasionally. The structures are not proposed for removal as part of the current design and therefore further surveys or other mitigation are not considered warranted.

Construction operations will take place during the hours of daylight in as far as possible to minimise disturbances to bats and other wildlife. It is recognised that key works such as turbine delivery and erection may require night-time working. All construction phase lighting systems will be designed to minimise nuisance through light spillage and follow ILP (2023) guidance. Shielded, downward directed lighting will be used wherever possible and all non-essential lighting will be switched off during the hours of darkness.

Lighting that meets the lowest light levels permitted under health and safety will be used. Low-pressure sodium lights will be used instead of high-pressure sodium lights or mercury lamps. If mercury lamps are to be used, they will be fitted with UV filters. LED luminaires will also be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability. All lighting used will lack UV/IR elements to reduce impact.

Directional lighting will be used to prevent overspill on to forestry/woodland edges, riparian zones or other habitat features of importance to bats. This will be achieved with the use of covers and shields (baffles, hoods or louvres) to reduce light spill and direct lighting to the intended area only. Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats. Only luminaires with an upward light ratio of 0% and with good optical control will be used. Luminaires will be mounted on the horizontal, i.e. no upward tilt.

5.1.2 Derogation License

A derogation license is required where disturbance to a bat roost is likely to occur (Marnell et al., 2022). Based on current information, a derogation license issued under Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 is not required to facilitate the proposed works.

5.1.3 Operational Phase Mitigation

A 'High' level of overall collision risk has not been identified for any bat species in any of the bat activity seasons. Based on best available information, a 'Low' to 'Moderate' overall collision risk level has been identified in relation to high-collision-risk bat species, in all three activity seasons, with the exception of a 'Moderate to High' risk for Common Pipistrelle in the autumn period. The limitations of the assessment procedure and knowledge gaps in relation to bats and windfarms are acknowledged herein, particularly in an Irish context.

In addition to the creation of buffers between the proposed turbines and surrounding vegetation (discussed above) reduced rotation speed will be implemented when turbines are idling. 'Feathering' of idling blades may reduce fatality rates by up to 50% and does not result in loss of output (NatureScot, 2021). No additional control measures to avoid/reduce collision related bat fatalities are considered warranted in this instance.

NatureScot (2021) recommends post construction monitoring is carried out in at least three years post construction, but not necessarily consecutive years. Post-construction monitoring aims to assess changes in bat activity patterns (e.g. in response to landscape changes such as land management and forestry rotation) and the efficacy of mitigation to inform any changes which may be required to inform a curtailment strategy. Post-construction fatality monitoring and activity surveys will be carried out in years 1, 2, 3, 5, 10 and 15 post construction. Post-construction monitoring will consist of:

- Passive bat monitoring at all turbine locations in order to monitor changes in activity levels relative to pre-construction baseline information (presented herein).
- Fatality monitoring following the methodology presented in Appendix 4 of NatureScot (2021) or subsequent updates.
- Monitoring of proposed bat boxes (see BMP) by a bat-licensed Ecologist, and relocation of any boxes with no evidence of use in the first year after construction.

Post-construction monitoring data will be analysed and presented in report format to the planning authority. Recommendations will be made in relation to a curtailment strategy if required.

All permanent lighting systems will be designed in accordance with ILP (2023)[3] in order to minimise disturbance through light spillage. All non-essential lighting will be switched off during the hours of darkness. No artificial lighting will illuminate any trees or structures with potential to be used by roosting bats to prevent disturbance to bats roosting within upon emergence and re-entry. To reduce the ecological disturbance from artificial lighting, the following will be implemented:

- Reduce non-essential external night lighting.
- Lower the angle of external night lighting.
- Use of LEDs, as these emit minimal ultra-violet light.
- White and blue wavelengths should be avoided; wavelength will be <2,700 kelvin.
- Lights should peak higher than 550nm.

5.1.4 Turbine Delivery Route Mitigation

Enabling works at the proposed site entrance (Node 13) will result in the removal of trees of low (PRF-I) suitability for bat roosting. Prior to the delivery of turbines, trees will be surveyed for roosting bats at height or by means of emergence survey in advance of works to determine if roosting occurs or is likely to occur. Surveys will be carried out according to Collins (2023). In the event that the removal of any trees with suitability for bat roosting is required, a derogation license will be secured in advance of any tree-felling works, and appropriate mitigation measures will be put in place to avoid or reduce impacts on bats.

The loss of two mature Beech trees at Node 11 with moderate (PRF-M) suitability has been 'designed-out' in consultation with O'Donnell Environmental Ecologists through the use of a 'blade adjuster', and these trees will be retained.

Approximately 30m of hedgerow will be temporarily removed to facilitate the delivery of turbine components at Node 1. The hedgerow will be replanted following the delivery of the components.

5.1.5 Grid Connection Route Mitigation

Clearance works along the proposed grid connection route will require the felling of existing forestry which will result in the loss of trees with negligible bat roosting potential. Prior to the commencement of works pre-clearance ecological surveys will be carried out to confirm that the current assessment remains valid and any changes in site context are acknowledged.

5.1.6 Decommissioning Phase Mitigation

The potential for effects during decommissioning are similar in nature, if not in scope, to those assessed for the Construction Phase. All decommissioning works will be governed by the same requirements to control run-off or potential pollution to watercourses (feeding resources for bats) as have been implemented during the construction phase. Any site compound will need to conform to the construction phase mitigation measures including those related to lighting design. Decommissioning phase works will include the reestablishment of woodland and linear features removed during the construction phase.

[3] https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/

6 Residual Impacts

The mitigation measures described for the proposed Ballycar wind energy development have been designed to minimise the effect of the development on the local bat populations, from the construction of the wind farm infrastructure including the grid connection route and turbine delivery, through the operational phase and onto decommissioning. This assessment has found that the proposed development in the absence of mitigation will have a **'slight' permanent negative effect** on bats at a local level (EPA, 2022). The proposed mitigation measures will avoid any significant effects occurring on bats at a local level as a result of the construction and operation of the proposed wind farm. Ongoing monitoring and implementation of the mitigation measures will ensure the preservation and future stability of the surrounding foraging and commuting habitats for bats.

With the implementation of the mitigation measures outlined in this assessment it is concluded that the development will have a **'not significant', permanent negative residual effect** on the bat population at a local level.

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Appendix A – Photographic Record

A1. SM4 Detector deployed at T07.

A2. SM4 Detector and weather station deployed at T10.

A3. Detector deployed at T05.

A4. SM4 Detector deployed at T12.

A5. Interior of the derelict structure **S_03**. Partial Slate roof remaining with significant light ingress

A6. Semi-mature Ash trees present along Node 13 of the TDR.

A7. Mature Beech trees present at Node 11 along the TDR (**Tr_01** and **Tr_04** in **Figure 3.3**)

A8. Pre-existing forest track along the proposed grid connection route.

A9. Photograph of the Loop-in/Loop-out location within recently clear-felled forestry.

A10. Photograph of the Loop-in/Loop-out location within recently clear-felled forestry.

Appendix B – Bat Conservation Ireland Roost Data

Table B1. Bat Conservation Ireland bat roost locations within a 30km radius of the proposed windfarm site.

Grid Reference	Record	Species
R2762	Private	Lesser Horseshoe Bat
R2773	Private	Lesser Horseshoe Bat
R2870	Private	Lesser Horseshoe Bat
R2872	Private	Lesser Horseshoe Bat
R2878	Private	Lesser Horseshoe Bat
R2964	Private	Lesser Horseshoe Bat
R2973	Private	Lesser Horseshoe Bat
R2975	Private	Lesser Horseshoe Bat
R2976	Private	Lesser Horseshoe Bat
R2978	Private	Lesser Horseshoe Bat
R2980	Private	Lesser Horseshoe Bat
R3045	Private	Pipistrellus spp. (45kHz/55kHz)
R3073	Private	Lesser Horseshoe Bat
R3076	Cave	Lesser Horseshoe Bat
R3148	Private	Pipistrellus spp. (45kHz/55kHz), Unidentified Bat
R3173	Private	Lesser Horseshoe Bat
R3174	Cave	Lesser Horseshoe Bat
R3179	Private	Lesser Horseshoe Bat
R3180	Private	Lesser Horseshoe Bat
R3182	Private	Lesser Horseshoe Bat
R3243	Private	Unidentified Bat
R3271	Private	Lesser Horseshoe Bat
R3272	Private	Brown Long-eared Bat
R3273	Cave	Lesser Horseshoe Bat
R3276	Private	Lesser Horseshoe Bat
R3281	Tree	Lesser Horseshoe Bat
R3282	Private	Lesser Horseshoe Bat
R3345	Private	Pipistrellus spp. (45kHz/55kHz)
R3346	Private	Pipistrellus spp. (45kHz/55kHz), Natterer's Bat
R3350	Private	Daubenton's Bat
R3376	Private	Brown Long-eared Bat, Pipistrellus spp. (45kHz/55kHz)
R3386	Private	Lesser Horseshoe Bat
R3449	Private	Pipistrellus spp. (45kHz/55kHz), Leisler's Bat
R3450	Private	Brown Long-eared Bat
R3454	Private	Pipistrellus spp. (45kHz/55kHz)
R3470	Private	Lesser Horseshoe Bat
R3473	Private	Lesser Horseshoe Bat
R3477	Private	Lesser Horseshoe Bat
R3484	Private	Lesser Horseshoe Bat
R3487	Private	Lesser Horseshoe Bat
R3539	Private	Pipistrellus spp. (45kHz/55kHz)
R3543	Private	Pipistrellus spp. (45kHz/55kHz), Brown Long-eared Bat
R3545	Private	Lesser Horseshoe Bat, Brown Long-eared Bat
R3546	Private	Brown Long-eared Bat
R3556	Private	Brown Long-eared Bat, Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat
R3574	Private	Lesser Horseshoe Bat
R3578	Private	Lesser Horseshoe Bat, Common Pipistrelle, Brown Long-eared Bat
R3581	Cave/Souterrain	Lesser Horseshoe Bat
R3583	Private	Lesser Horseshoe Bat
R3585	Private	Lesser Horseshoe Bat
R3586	Private	Lesser Horseshoe Bat
R3640	Private	Brown Long-eared Bat

R3650	Private	Pipistrellus spp. (45kHz/55kHz)
R3673	Private	Lesser Horseshoe Bat, Brown Long-eared Bat, Common Pipistrelle
R3677	Private	Lesser Horseshoe Bat, Soprano Pipistrelle
R3678	Private	Lesser Horseshoe Bat
R3683	Private	Lesser Horseshoe Bat
R3741	Private	Lesser Horseshoe Bat, Natterer's Bat, Pipistrellus spp. (45kHz/55kHz)
R3749	Private	Lesser Horseshoe Bat, Brown Long-eared Bat, Pipistrellus spp. (45kHz/55kHz)
R3750	Private	Pipistrellus spp. (45kHz/55kHz)
R3755	Private	Pipistrellus spp. (45kHz/55kHz)
R3773	Private	Lesser Horseshoe Bat
R3776	Private	Lesser Horseshoe Bat
R3778	Private	Lesser Horseshoe Bat
R3783	Private	Lesser Horseshoe Bat
R3788	Private	Lesser Horseshoe Bat
R3840	Private	Lesser Horseshoe Bat, Brown Long-eared Bat, Soprano Pipistrelle, Leisler's Bat
R3841	Private	Lesser Horseshoe Bat, Natterer's Bat
R3842	Private	Unidentified Bat
R3846	Private	Pipistrellus spp. (45kHz/55kHz)
R3867	Private	Lesser Horseshoe Bat
R3868	Private	Lesser Horseshoe Bat
R3869	Private	Lesser Horseshoe Bat
R3870	Private	Lesser Horseshoe Bat
R3871	Private	Unidentified Bat
R3878	Private	Lesser Horseshoe Bat
R3879	Private	Lesser Horseshoe Bat
R3887	Private	Lesser Horseshoe Bat
R3939	Private	Brown Long-eared Bat, Unidentified bat, Pipistrellus spp. (45kHz/55kHz),Myotis spp.,Lesser Horseshoe Bat, Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat
R3945	Private	Brown Long-eared Bat
R3962	Private	Common Pipistrelle, Soprano Pipistrelle
R3966	Private	Lesser Horseshoe Bat
R3969	Private	Lesser Horseshoe Bat
R3977	Private	Lesser Horseshoe Bat
R3978	Private	Lesser Horseshoe Bat
R3980	Private	Lesser Horseshoe Bat
R3982	Private	Lesser Horseshoe Bat
R4048	Private	Pipistrellus spp. (45kHz/55kHz), Brown Long-eared Bat
R4050	Private	Unidentified Bat, Brown Long-eared Bat
R4071	Private	Lesser Horseshoe Bat
R4075	Private	Lesser Horseshoe Bat, Leisler's Bat, Common Pipistrelle
R4080	Private	Lesser Horseshoe Bat
R4083	Private	Lesser Horseshoe Bat
R4084	Private	Lesser Horseshoe Bat
R4091	Private	Lesser Horseshoe Bat
R4146	Private	Unidentified Bat
R4148	Private	Unidentified Bat, Brown Long-eared Bat
R4149	Private	Lesser Horseshoe Bat
R4150	Private	Lesser Horseshoe Bat
R4151	Private	Lesser Horseshoe Bat
R4156	Private	Pipistrellus spp. (45kHz/55kHz), Brown Long-eared Bat, Natterer's Bat

R4163	Private	Pipistrellus spp. (45kHz/55kHz),Brown Long-eared Bat,Natterer's Bat
R4171	Private	Lesser Horseshoe Bat
R4173	Cave	Lesser Horseshoe Bat
R4174	Private	Lesser Horseshoe Bat
R4178	Private	Lesser Horseshoe Bat
R4245	Private	Lesser Horseshoe Bat, Brown Long-eared Bat
R4247	Private	Lesser Horseshoe Bat, Brown Long-eared Bat, Pipistrellus spp. (45kHz/55kHz)
R4248	Private	Brown Long-eared Bat
R4250	Private	Pipistrellus spp. (45kHz/55kHz)
R4256	Private	Unidentified Bat
R4269	Private	Lesser Horseshoe Bat
R4273	Cave	Lesser Horseshoe Bat
R4274	Cave	Lesser Horseshoe Bat
R4277	Private	Lesser Horseshoe Bat
R4278	Private	Lesser Horseshoe Bat
R4281	Private	Lesser Horseshoe Bat
R4282	Private	Lesser Horseshoe Bat
R4344	Private	Lesser Horseshoe Bat, Natterer's Bat
R4354	Private	Pipistrellus spp. (45kHz/55kHz), Lesser Horseshoe Bat
R4357	Private	Brown Long-eared Bat
R4372	Private	Lesser Horseshoe Bat
R4375	Souterrain	Lesser Horseshoe Bat
R4379	Private	Lesser Horseshoe Bat
R4381	Private	Lesser Horseshoe Bat
R4382	Private	Lesser Horseshoe Bat
R4383	Private	Lesser Horseshoe Bat
R4453	Private	Pipistrellus spp. (45kHz/55kHz), Brown Long-eared Bat
R4455	Private	Pipistrellus spp. (45kHz/55kHz)
R4474	Private	Lesser Horseshoe Bat
R4477	Private	Lesser Horseshoe Bat
R4479	Private	Lesser Horseshoe Bat
R4481	Cave	Lesser Horseshoe Bat
R4482	Private	Lesser Horseshoe Bat
R4556	Private	Pipistrellus spp. (45kHz/55kHz)
R4576	Private	Lesser Horseshoe Bat
R4579	Private	Lesser Horseshoe Bat
R4580	Private	Lesser Horseshoe Bat
R4581	Private	Lesser Horseshoe Bat
R4643	Private	Brown Long-eared Bat
R4653	Private	Pipistrellus spp. (45kHz/55kHz)
R4666	Private	Lesser Horseshoe Bat
R4673	Tunnel	Lesser Horseshoe Bat
R4676	Private	Lesser Horseshoe Bat
R4681	Cave	Common Pipistrelle, Lesser Horseshoe Bat, Brown Long-eared Bat, Natterer's Bat
R4682	Private	Lesser Horseshoe Bat
R4744	Private	Lesser Horseshoe Bat, Brown Long-eared Bat
R4745	Tree	Unidentified Bat, Lesser Horseshoe Bat, Brown Long-eared Bat
R4746	Private	Lesser Horseshoe Bat, Soprano Pipistrelle, Pipistrellus spp. (45kHz/55kHz), Brown Long-eared Bat
R4753	Private	Brown Long-eared Bat
R4763	Private	Brown Long-eared Bat
R4764	Private	Lesser Horseshoe Bat
R4766	Private	Lesser Horseshoe Bat
R4768	Private	Lesser Horseshoe Bat

R4769	Private	Pipistrellus spp. (45kHz/55kHz), Brown Long-eared Bat
R4774	Private	Lesser Horseshoe Bat
R4777	Private	Pipistrellus spp. (45kHz/55kHz)
R4843	Private	Pipistrellus spp. (45kHz/55kHz)
R4866	Private	Lesser Horseshoe Bat
R4868	Cave	Lesser Horseshoe Bat
R4872	Private	Lesser Horseshoe Bat, Unidentified Bat
R4882	Private	Lesser Horseshoe Bat
R4948	Private	Pipistrellus spp. (45kHz/55kHz), Unidentified Bat
R4964	Private	Lesser Horseshoe Bat
R4967	Private	Lesser Horseshoe Bat
R4968	Private	Lesser Horseshoe Bat
R4969	Private	Lesser Horseshoe Bat
R4972	Private	Soprano Pipistrelle, Natterer's Bat, Lesser Horseshoe Bat
R4973	Private	Lesser Horseshoe Bat
R5066	Private	Lesser Horseshoe Bat
R5069	Private	Lesser Horseshoe Bat
R5070	Private	Lesser Horseshoe Bat
R5071	Private	Lesser Horseshoe Bat
R5139	Private	Pipistrellus spp. (45kHz/55kHz), Brown Long-eared Bat
R5140	Private	Pipistrellus spp. (45kHz/55kHz), Leisler's Bat
R5148	Private	Natterer's Bat, Unidentified Bat
R5170	Private	Lesser Horseshoe Bat
R5172	Private	Lesser Horseshoe Bat
R5242	Private	Unidentified Bat
R5272	Private	Lesser Horseshoe Bat
R5337	Private	Pipistrellus spp. (45kHz/55kHz), Brown Long-eared Bat
R5353	Private	Brown Long-eared Bat, Soprano Pipistrelle
R5371	Cave	Lesser Horseshoe Bat
R5381	Private	Lesser Horseshoe Bat
R5540	Private	Brown Long-eared Bat
R5659	Tree	Unidentified Bat
R5757	Private	Common Pipistrelle
R5860	Private	Lesser Horseshoe Bat, Brown Long-eared Bat, Myotis spp.
R6084	Private	Soprano Pipistrelle
R6139	Private	Brown Long-eared Bat, Unidentified Bat
R6140	Private	Pipistrellus spp. (45kHz/55kHz), Brown Long-eared Bat
R6147	Private	Brown Long-eared Bat
R6148	Private	Lesser Horseshoe Bat
R6158	Private	Brown Long-eared Bat
R6163	Private	Leisler's Bat
R6244	Private	Brown Long-eared Bat, Natterer's Bat
R6339	Private	Brown Long-eared Bat, Soprano Pipistrelle, Leisler's Bat
R6343	Private	Pipistrellus spp. (45kHz/55kHz), Daubenton's Bat, Lesser Horseshoe Bat, Soprano Pipistrelle, Myotis spp.
R6382	Private	Pipistrellus spp. (45kHz/55kHz),Brown Long-eared Bat, Soprano Pipistrelle, Unidentified bat
R6441	Private	Pipistrellus spp. (45kHz/55kHz), Brown Long-eared Bat
R6461	Private	Lesser Horseshoe Bat
R6536	Private	Pipistrellus spp. (45kHz/55kHz)
R6582	Private	Brown Long-eared Bat
R6669	Private	Brown Long-eared Bat
R6878	Private	Unidentified Bat
R6972	Private	Pipistrellus spp. (45kHz/55kHz),Common Pipistrelle,Soprano Pipistrelle

R6973	Private	Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, Brown Long-eared Bat, Pipistrellus spp. (45kHz/55kHz), Unidentified Bat
R6979	Private	Brown Long-eared Bat, Soprano Pipistrelle
R7036	Private	Leisler's Bat, Brown Long-eared Bat
R7069	Private	Pipistrellus spp. (45kHz/55kHz), Soprano Pipistrelle, Common Pipistrelle
R7071	Tree	Brown Long-eared Bat, Soprano Pipistrelle, Common Pipistrelle
R7072	Private	Pipistrellus spp. (45kHz/55kHz),Soprano Pipistrelle, Natterer's Bat, Myotis mystacinus/brandtii, Brown Long-eared Bat, Leisler's Bat, Daubenton's Bat
R7356	Private	Brown Long-eared Bat
R7455	Private	Pipistrellus spp. (45kHz/55kHz)
R7742	Private	Brown Long-eared Bat
R7754	Private	Unidentified Bat
R7755	Private	Unidentified Bat
R7949	Private	Soprano Pipistrelle
R8368	Private	Natterer's Bat
R8471	Private	Leisler's Bat

Appendix C - Weather Station Data

Date	Time	Barometer - hPa	Temp - °C	Wind Speed - km/h	Wind Direction	Rain - mm	No of Suitable Survey Nights (Upland)
Spring 2023							
06/04/2023	00:00:00	1003	--	--	--	--	
06/04/2023	01:00:00	1002.8	--	--	--	--	
06/04/2023	02:00:00	1002.3	--	--	--	--	
06/04/2023	03:00:00	1002.2	--	--	--	--	
06/04/2023	04:00:00	1002.5	--	--	--	--	
06/04/2023	05:00:00	1002.6	--	--	--	--	
06/04/2023	06:00:00	1003.1	--	--	--	--	
06/04/2023	20:00:00	1019.9	9	5	W	0	
06/04/2023	21:00:00	1020.3	6	6	NNW	0	
06/04/2023	22:00:00	1020.4	6	8	NNW	0	
06/04/2023	23:00:00	1020.4	6	5	NNW	0	
07/04/2023	00:00:00	1020.5	4	6	NNW	0	
07/04/2023	01:00:00	1020.5	4	5	N	0	
07/04/2023	02:00:00	1020.2	4	5	NNE	0	
07/04/2023	03:00:00	1020.1	4	5	NNE	0	
07/04/2023	04:00:00	1019.9	5	5	NNE	0	
07/04/2023	05:00:00	1019.5	4	5	NNE	0	
07/04/2023	06:00:00	1019.2	5	3	ENE	0	
07/04/2023	20:00:00	1018.7	9	16	SSE	0	
07/04/2023	21:00:00	1019.3	8	13	SSE	0	
07/04/2023	22:00:00	1019.3	8	13	SSE	0	
07/04/2023	23:00:00	1019.4	8	11	SSE	0	
08/04/2023	00:00:00	1019.2	8	10	SSE	0	
08/04/2023	01:00:00	1019.4	7	10	SSE	0	
08/04/2023	02:00:00	1019.3	7	8	SSE	0	
08/04/2023	03:00:00	1019	7	8	SSE	0	
08/04/2023	04:00:00	1019	8	10	SSE	0	
08/04/2023	05:00:00	1018.8	7	10	SSE	0	
08/04/2023	06:00:00	1019	7	10	SSE	0	
08/04/2023	20:00:00	1018.2	11	16	SSE	0	
08/04/2023	21:00:00	1018.3	10	18	SSE	0	
08/04/2023	22:00:00	1018.1	10	18	SSE	0	
08/04/2023	23:00:00	1017.5	10	18	SSE	0	
09/04/2023	00:00:00	1017.1	9	14	SSE	0	
09/04/2023	01:00:00	1016.4	9	18	SSE	0	1
09/04/2023	02:00:00	1015.8	9	19	SSE	0	
09/04/2023	03:00:00	1015.1	9	21	SSE	0	
09/04/2023	04:00:00	1014.2	9	19	SSE	0	
09/04/2023	05:00:00	1013.5	9	19	SSE	0	
09/04/2023	06:00:00	1012.7	9	19	SSE	0	
09/04/2023	20:00:00	1005.4	11	10	S	0.6	
09/04/2023	21:00:00	1005.8	10	10	S	2.6	
09/04/2023	22:00:00	1005.6	9	3	SW	0.2	
09/04/2023	23:00:00	1006	8	3	WSW	0.2	
10/04/2023	00:00:00	1006.2	8	6	WSW	0	
10/04/2023	01:00:00	1005.8	8	5	WSW	0	
10/04/2023	02:00:00	1005.3	8	5	WSW	0	
10/04/2023	03:00:00	1005	8	8	WSW	0	
10/04/2023	04:00:00	1004.7	7	5	W	0	
10/04/2023	05:00:00	1004.4	7	3	SW	1.6	
10/04/2023	06:00:00	1004.1	7	5	SW	1.8	
10/04/2023	20:00:00	1008.9	8	14	W	0	

10/04/2023	21:00:00	1010.1	7	13	W	0	
10/04/2023	22:00:00	1010.1	6	11	WSW	0	
10/04/2023	23:00:00	1010.6	6	8	WSW	0	
11/04/2023	00:00:00	1010.9	5	5	WSW	0	
11/04/2023	01:00:00	1010.8	4	5	W	0	
11/04/2023	02:00:00	1010.3	4	5	W	0	
11/04/2023	03:00:00	1009.9	4	5	W	0	
11/04/2023	04:00:00	1009.4	4	3	WNW	0	
11/04/2023	05:00:00	1008.6	4	5	WSW	0	
11/04/2023	06:00:00	1007.3	4	3	W	0	
11/04/2023	20:00:00	992.4	5	18	W	0.2	
11/04/2023	21:00:00	992.5	4	16	W	0.2	
11/04/2023	22:00:00	993	3	13	WSW	0.8	
11/04/2023	23:00:00	992.7	3	14	WSW	0.2	
12/04/2023	00:00:00	992.7	3	14	WSW	0	
12/04/2023	01:00:00	991.8	1	6	SW	0	
12/04/2023	02:00:00	990.7	2	14	SW	0.4	
12/04/2023	03:00:00	988.6	1	6	SSW	0.2	
12/04/2023	04:00:00	986.3	2	8	SSW	0	
12/04/2023	05:00:00	982.3	2	14	S	0.4	
12/04/2023	06:00:00	979.3	2	16	S	1.4	
12/04/2023	20:00:00	998.9	8	21	WNW	0	
12/04/2023	21:00:00	999.6	7	16	W	0	
12/04/2023	22:00:00	1000.4	6	13	W	0	
12/04/2023	23:00:00	1000.8	6	11	W	0	
13/04/2023	00:00:00	1001.1	6	14	W	0	
13/04/2023	01:00:00	1001.1	5	10	WSW	0	
13/04/2023	02:00:00	1001.3	5	6	WSW	0	
13/04/2023	03:00:00	1001.4	5	5	WSW	0	
13/04/2023	04:00:00	1001.8	4	5	WSW	0	
13/04/2023	05:00:00	1002	3	3	NW	0	
13/04/2023	06:00:00	1002	2	3	WNW	0	
13/04/2023	20:00:00	1001.9	8	5	W	0	
13/04/2023	21:00:00	1002	6	6	NW	0	
13/04/2023	22:00:00	1001.7	5	6	NNW	0	
13/04/2023	23:00:00	1001.1	4	6	NNW	0	
14/04/2023	00:00:00	1000.8	4	5	N	0	
14/04/2023	01:00:00	1000.4	4	5	N	0	
14/04/2023	02:00:00	1000	5	5	NE	0	
14/04/2023	03:00:00	999.8	5	5	NNE	0	
14/04/2023	04:00:00	999.6	6	6	NNE	0	
14/04/2023	05:00:00	999.7	5	8	N	0	
14/04/2023	06:00:00	1000	5	8	NNE	0	
14/04/2023	20:00:00	1011.6	10	13	WNW	0	
14/04/2023	21:00:00	1012.6	8	8	W	0	
14/04/2023	22:00:00	1013.5	7	5	WNW	0	
14/04/2023	23:00:00	1014.2	7	3	WNW	0	
15/04/2023	00:00:00	1014.9	6	5	WNW	0	
15/04/2023	01:00:00	1015.8	6	5	NW	0	
15/04/2023	02:00:00	1016	6	6	NW	0	
15/04/2023	03:00:00	1016.4	6	3	NW	0	
15/04/2023	04:00:00	1016.9	5	3	NW	0	
15/04/2023	05:00:00	1017.2	4	3	NW	0	
15/04/2023	06:00:00	1017.7	3	5	NNW	0	
15/04/2023	20:00:00	1019.4	10	11	SSW	0	
15/04/2023	21:00:00	1019.9	9	11	SSW	0	

15/04/2023	22:00:00	1020.3	9	11	SSW	0	
15/04/2023	23:00:00	1020.1	9	11	SSW	0	
16/04/2023	00:00:00	1020.3	9	10	SW	0	
16/04/2023	01:00:00	1020.3	9	3	SSW	0	**2**
16/04/2023	02:00:00	1020.3	9	2	S	0	
16/04/2023	03:00:00	1020	10	2	SSW	0	
16/04/2023	04:00:00	1019.9	10	2	SW	0	
16/04/2023	05:00:00	1020.1	10	3	SW	0	
16/04/2023	06:00:00	1020.3	11	3	SW	0	
16/04/2023	20:00:00	1022.6	15	8	S	0	
16/04/2023	21:00:00	1023	14	6	S	0	
16/04/2023	22:00:00	1023.4	13	5	SSE	0	
16/04/2023	23:00:00	1023.5	12	6	SSE	0	
17/04/2023	00:00:00	1023.7	12	6	SSE	0	
17/04/2023	01:00:00	1023.7	11	5	S	0	**3**
17/04/2023	02:00:00	1023.6	11	3	SSE	0	
17/04/2023	03:00:00	1023.6	11	5	SSE	0	
17/04/2023	04:00:00	1023.7	11	5	SSE	0	
17/04/2023	05:00:00	1024.1	11	6	SSE	0	
17/04/2023	06:00:00	1024.5	10	6	SSE	0	
17/04/2023	20:00:00	1027	13	10	SSE	0	
17/04/2023	21:00:00	1027.6	11	5	SSE	0	
17/04/2023	22:00:00	1027.9	10	2	SE	0	
17/04/2023	23:00:00	1027.9	8	3	ENE	0	
18/04/2023	00:00:00	1028.1	8	3	ENE	0	
18/04/2023	01:00:00	1028.2	8	2	ESE	0	**4**
18/04/2023	02:00:00	1028.2	7	2	ENE	0	
18/04/2023	03:00:00	1028.2	7	3	ESE	0	
18/04/2023	04:00:00	1027.9	8	6	ENE	0	
18/04/2023	05:00:00	1027.6	8	5	NE	0	
18/04/2023	06:00:00	1027.7	8	6	NE	0	
18/04/2023	20:00:00	1026.8	14	11	E	0	
18/04/2023	21:00:00	1027.4	12	14	E	0	
18/04/2023	22:00:00	1027.8	10	8	E	0	
18/04/2023	23:00:00	1027.6	9	10	NE	0	
19/04/2023	00:00:00	1027.6	9	13	NNE	0	
19/04/2023	01:00:00	1027.3	8	13	NNE	0	**5**
19/04/2023	02:00:00	1027.1	8	11	NNE	0	
19/04/2023	03:00:00	1026.6	8	11	NNE	0	
19/04/2023	04:00:00	1026.3	7	10	NNE	0	
19/04/2023	05:00:00	1026.3	7	10	NNE	0	
19/04/2023	06:00:00	1026.1	6	13	NE	0	
19/04/2023	20:00:00	1023.9	12	11	E	0	
19/04/2023	21:00:00	1024.2	11	11	ENE	0	
19/04/2023	22:00:00	1024.3	11	11	ENE	0	
19/04/2023	23:00:00	1023.8	10	14	NE	0	
20/04/2023	00:00:00	1023.7	10	14	NE	0	
20/04/2023	01:00:00	1023.9	9	13	ENE	0	**6**
20/04/2023	02:00:00	1023.6	9	10	ENE	0	
20/04/2023	03:00:00	1023.4	9	10	ENE	0	
20/04/2023	04:00:00	1023.1	9	11	ENE	0	
20/04/2023	05:00:00	1023	9	14	E	0	
20/04/2023	06:00:00	1022.6	7	13	ENE	0	
20/04/2023	20:00:00	1020.8	12	13	E	0	
20/04/2023	21:00:00	1020.7	10	10	E	0	
20/04/2023	22:00:00	1020.2	9	8	ENE	0	

20/04/2023	23:00:00	1020	8	11	NE	0	
21/04/2023	00:00:00	1020.2	8	13	NE	0	
21/04/2023	01:00:00	1019.5	7	11	NE	0	7
21/04/2023	02:00:00	1019.4	7	16	NE	0	
21/04/2023	03:00:00	1019.1	7	14	NE	0	
21/04/2023	04:00:00	1018.6	6	11	NE	0	
21/04/2023	05:00:00	1018.5	6	8	NE	0	
21/04/2023	06:00:00	1018	5	8	NE	0	
21/04/2023	20:00:00	1009.6	11	5	ENE	0	
21/04/2023	21:00:00	1009.5	11	5	NE	0	
21/04/2023	22:00:00	1009.6	10	8	NE	0	
21/04/2023	23:00:00	1009.7	9	11	NE	0	
22/04/2023	00:00:00	1009.4	8	10	NE	0	
22/04/2023	01:00:00	1009	8	11	NE	0	8
22/04/2023	02:00:00	1008.6	8	8	NNE	0	
22/04/2023	03:00:00	1007.9	8	8	NE	0	
22/04/2023	04:00:00	1007.5	7	6	NNE	0	
22/04/2023	05:00:00	1006.8	7	3	NNE	0	
22/04/2023	06:00:00	1005.9	7	5	NE	0	
22/04/2023	20:00:00	1001.9	7	8	N	0	
22/04/2023	21:00:00	1001.8	7	8	N	0	
22/04/2023	22:00:00	1001.8	7	10	N	0	
22/04/2023	23:00:00	1002.2	7	8	N	0	
23/04/2023	00:00:00	1002.1	7	6	NNW	0.4	
23/04/2023	01:00:00	1002.2	6	5	NNW	0	
23/04/2023	02:00:00	1002.2	6	2	WSW	0	
23/04/2023	03:00:00	1002	6	5	NW	0.4	
23/04/2023	04:00:00	1002	6	5	NW	0	
23/04/2023	05:00:00	1002.1	6	6	NW	0	
23/04/2023	06:00:00	1002.4	6	6	NNW	0	
23/04/2023	20:00:00	1008.2	9	5	NNW	0	
23/04/2023	21:00:00	1009	9	2	W	0	
23/04/2023	22:00:00	1009.3	8	5	NW	0	
23/04/2023	23:00:00	1009.5	8	5	NNW	0	
24/04/2023	00:00:00	1009.2	7	5	NNW	0	
24/04/2023	01:00:00	1009.4	8	8	NNW	0	9
24/04/2023	02:00:00	1009.2	7	11	NNW	0	
24/04/2023	03:00:00	1009.7	7	13	NNW	0	
24/04/2023	04:00:00	1009.9	7	13	NNW	0	
24/04/2023	05:00:00	1010	6	8	NNW	0	
24/04/2023	06:00:00	1010	6	10	NNW	0	
24/04/2023	20:00:00	1017.2	8	6	NNE	0	
24/04/2023	21:00:00	1017.8	7	6	N	0	
24/04/2023	22:00:00	1018.2	4	8	N	0	
24/04/2023	23:00:00	1018.1	5	10	N	0	
25/04/2023	00:00:00	1018.5	5	10	N	0	
25/04/2023	01:00:00	1018.4	4	6	NNE	0	
25/04/2023	02:00:00	1018.4	4	6	NNE	0	
25/04/2023	03:00:00	1018.4	4	6	NNE	0	
25/04/2023	04:00:00	1018.4	3	8	NNE	0	
25/04/2023	05:00:00	1018.9	3	5	NNE	0	
25/04/2023	06:00:00	1018.7	2	6	N	0	
25/04/2023	20:00:00	1015.6	9	10	SSE	0	
25/04/2023	21:00:00	1016.3	8	10	SSE	0	
25/04/2023	22:00:00	1016.5	7	5	SSE	0	
25/04/2023	23:00:00	1016.7	7	6	E	0	

26/04/2023	00:00:00	1016.5	7	8	E	0	
26/04/2023	01:00:00	1016.2	7	6	E	0	
26/04/2023	02:00:00	1015.9	7	6	E	0	
26/04/2023	03:00:00	1015.6	7	8	ESE	0	
26/04/2023	04:00:00	1015.1	7	11	ESE	0	
26/04/2023	05:00:00	1014.8	7	8	ESE	0	
26/04/2023	06:00:00	1014.4	7	6	SE	0	
26/04/2023	20:00:00	1014.1	10	8	SSE	0	
26/04/2023	21:00:00	1014.3	10	8	SSE	0	
26/04/2023	22:00:00	1014.1	9	6	SSE	0	
26/04/2023	23:00:00	1014.3	9	6	SE	0	
27/04/2023	00:00:00	1014.2	9	6	SE	0	
27/04/2023	01:00:00	1013.9	8	6	SE	0	**10**
27/04/2023	02:00:00	1013.3	8	8	SE	0	
27/04/2023	03:00:00	1012.4	8	8	SE	0	
27/04/2023	04:00:00	1011.8	8	5	SE	0.2	
27/04/2023	05:00:00	1011.2	8	6	SE	0	
27/04/2023	06:00:00	1010.4	8	6	SE	0.4	
Summer 2023							
06/06/2023							**1**
07/06/2023							**2**
08/06/2023							**3**
09/06/2023							**4**
10/06/2023	20:00:00	1001.1	18	8	WNW	0	
10/06/2023	21:00:00	1001.4	17	8	W	0	
10/06/2023	22:00:00	1001.8	17	5	WSW	0	
10/06/2023	23:00:00	1002.1	16	5	WSW	0	
11/06/2023	00:00:00	1002.2	16	3	W	0	
11/06/2023	01:00:00	1002.2	16	3	W	0	**5**
11/06/2023	02:00:00	1001.9	16	3	W	0	
11/06/2023	03:00:00	1001.9	16	3	WSW	0	
11/06/2023	04:00:00	1001.8	15	3	SW	0	
11/06/2023	05:00:00	1001.9	15	5	WSW	0	
11/06/2023	06:00:00	1001.9	15	5	SW	0	
11/06/2023	20:00:00	1004.4	19	8	ENE	0	
11/06/2023	21:00:00	1004.8	18	6	ENE	0	
11/06/2023	22:00:00	1005.5	17	5	E	0	
11/06/2023	23:00:00	1006	17	6	E	0	
12/06/2023	00:00:00	1006.4	16	3	ESE	0	
12/06/2023	01:00:00	1006.3	15	3	E	0	**6**
12/06/2023	02:00:00	1006	15	5	NE	0	
12/06/2023	03:00:00	1005.9	15	3	ESE	0	
12/06/2023	04:00:00	1005.7	15	3	E	0	
12/06/2023	05:00:00	1005.7	15	3	ENE	0	
12/06/2023	06:00:00	1005.9	15	6	E	0	
12/06/2023	20:00:00	1005.6	19	5	E	0	
12/06/2023	21:00:00	1005.4	17	10	E	0	
12/06/2023	22:00:00	1005.5	17	11	E	0	
12/06/2023	23:00:00	1005.6	17	11	E	0	
13/06/2023	00:00:00	1005.8	17	6	ESE	0	
13/06/2023	01:00:00	1005.5	17	3	ESE	0	**7**
13/06/2023	02:00:00	1005.5	17	2	ESE	0	
13/06/2023	03:00:00	1005.1	16	3	ESE	0	
13/06/2023	04:00:00	1004.8	16	2	ESE	0	
13/06/2023	05:00:00	1004.7	16	2	E	0	
13/06/2023	06:00:00	1004.5	16	0		0	

13/06/2023	20:00:00	1004.3	22	6	SSE	0	
13/06/2023	21:00:00	1004.6	20	6	SE	0	
13/06/2023	22:00:00	1005.1	19	8	SE	0	
13/06/2023	23:00:00	1005.4	18	6	SE	0	
14/06/2023	00:00:00	1005.4	18	5	SE	0	
14/06/2023	01:00:00	1005.4	17	5	SE	0	**8**
14/06/2023	02:00:00	1005.5	17	5	SE	0	
14/06/2023	03:00:00	1005	16	5	ESE	0	
14/06/2023	04:00:00	1004.8	14	5	ESE	0	
14/06/2023	05:00:00	1004.9	14	5	ESE	0	
14/06/2023	06:00:00	1005	14	3	ESE	0	
14/06/2023	20:00:00	1007	19	5	E	0	
14/06/2023	21:00:00	1007.1	18	3	E	0	
14/06/2023	22:00:00	1007.9	16	2	SSE	0	
14/06/2023	23:00:00	1008.1	16	2	E	0	
15/06/2023	00:00:00	1008.5	16	5	ENE	0	
15/06/2023	01:00:00	1008	15	3	ESE	0	**9**
15/06/2023	02:00:00	1008.2	14	2	ESE	0	
15/06/2023	03:00:00	1008.3	15	0		0	
15/06/2023	04:00:00	1008.3	15	2	E	0	
15/06/2023	05:00:00	1008.3	15	2	ENE	0	
15/06/2023	06:00:00	1008.4	15	0		0	
15/06/2023	20:00:00	1007.6	23	5	WNW	0	
15/06/2023	21:00:00	1007.8	21	3	WNW	0	
15/06/2023	22:00:00	1008	20	3	WNW	0	
15/06/2023	23:00:00	1008.1	18	2	WNW	0	
16/06/2023	00:00:00	1007.9	16	2	NW	0	
16/06/2023	01:00:00	1007.7	15	2	ESE	0	**10**
16/06/2023	02:00:00	1007.4	14	0		0	
16/06/2023	03:00:00	1007.1	14	2	SSW	0	
16/06/2023	04:00:00	1006.6	13	2	SSE	0	
16/06/2023	05:00:00	1006.6	13	2	S	0	
16/06/2023	06:00:00	1006.2	14	2	W	0	
16/06/2023	20:00:00	1002.3	19	10	W	0	
16/06/2023	21:00:00	1002.9	18	10	W	0	
16/06/2023	22:00:00	1002.8	18	6	WNW	0	
16/06/2023	23:00:00	1002.7	17	3	NW	0	
17/06/2023	00:00:00	1002.5	16	2	WSW	0	
17/06/2023	01:00:00	1002.4	16	3	W	0	**11**
17/06/2023	02:00:00	1002.2	16	3	WNW	0	
17/06/2023	03:00:00	1001.5	15	2	W	0	
17/06/2023	04:00:00	1001.2	14	2	E	0	
17/06/2023	05:00:00	1000.8	13	3	SE	0	
17/06/2023	06:00:00	1000.6	12	3	SE	0	
17/06/2023	20:00:00	998.2	15	5	SSE	0	
17/06/2023	21:00:00	998.3	15	3	SE	0	
17/06/2023	22:00:00	998.1	15	3	SE	0	
17/06/2023	23:00:00	998.1	15	3	SSW	0	
18/06/2023	00:00:00	997.9	14	2	SSE	0	
18/06/2023	01:00:00	997.7	13	3	SE	0	**12**
18/06/2023	02:00:00	997.5	13	2	SSE	0	
18/06/2023	03:00:00	997.1	13	2	SW	0	
18/06/2023	04:00:00	996.9	13	3	SSE	0	
18/06/2023	05:00:00	996.5	14	3	SSW	0	
18/06/2023	06:00:00	996.6	14	5	SSW	0	
18/06/2023	20:00:00	994.5	18	8	NE	0.4	

18/06/2023	21:00:00	994.4	17	3	NE	1.2	13
18/06/2023	22:00:00	994.8	16	2	E	0	
18/06/2023	23:00:00	994.8	15	2	E	0	
19/06/2023	00:00:00	994.8	14	2	E	0	
19/06/2023	01:00:00	995	14	2	NNE	0	
19/06/2023	02:00:00	994.5	14	2	ENE	0	
19/06/2023	03:00:00	994.4	13	2	E	0	
19/06/2023	04:00:00	994.3	12	2	ENE	0	
19/06/2023	05:00:00	994.6	11	3	E	0	
19/06/2023	06:00:00	994.6	11	2	ESE	0	
19/06/2023	21:00:00	995.9	16	2	NNE	0.4	14
19/06/2023	22:00:00	995.9	14	2	ENE	0	
19/06/2023	23:00:00	996.1	13	3	E	0	
20/06/2023	00:00:00	995.9	13	3	E	0	
20/06/2023	01:00:00	995.8	13	3	ENE	0	
20/06/2023	02:00:00	995.8	13	2	ENE	0	
20/06/2023	03:00:00	995.7	13	2	E	0	
20/06/2023	04:00:00	995.9	12	2	S	0	
20/06/2023	05:00:00	995.8	12	2	S	0	
20/06/2023	06:00:00	995.6	13	2	E	0	
20/06/2023	21:00:00	997.7	16	5	NNE	0	15
20/06/2023	22:00:00	998.1	16	2	NW	0	
20/06/2023	23:00:00	998.5	15	5	NE	0	
21/06/2023	00:00:00	999	14	2	NNE	0	
21/06/2023	01:00:00	999.2	14	2	NNE	0	
21/06/2023	02:00:00	999.5	13	3	NNE	0	
21/06/2023	03:00:00	1000	13	3	ENE	0	
21/06/2023	04:00:00	1000.4	12	2	ENE	0	
21/06/2023	05:00:00	1000.6	13	3	NE	0	
21/06/2023	06:00:00	1001.1	12	3	E	0	
21/06/2023	21:00:00	1006.5	18	6	E	0	16
21/06/2023	22:00:00	1007.1	15	10	ESE	0	
21/06/2023	23:00:00	1007.3	14	11	ESE	0	
22/06/2023	00:00:00	1007.9	13	11	ESE	0	
22/06/2023	01:00:00	1007.9	13	11	ESE	0	
22/06/2023	02:00:00	1008.1	13	8	ESE	0	
22/06/2023	03:00:00	1008.5	11	2	E	0	
22/06/2023	04:00:00	1008.4	9	6	ESE	0	
22/06/2023	05:00:00	1008.5	10	5	SE	0	
22/06/2023	06:00:00	1008.5	11	5	SE	0	
22/06/2023	21:00:00	1008.2	18	5	NNW	0	17
22/06/2023	22:00:00	1008.5	17	5	NW	0	
22/06/2023	23:00:00	1008.2	17	6	NW	0	
23/06/2023	00:00:00	1008	16	8	WNW	0	
23/06/2023	01:00:00	1007.6	16	10	WNW	0	
23/06/2023	02:00:00	1007.2	16	8	NW	1	
23/06/2023	03:00:00	1006.7	15	6	WNW	1.4	
23/06/2023	04:00:00	1006.5	15	5	WNW	1	
23/06/2023	05:00:00	1006.2	16	6	WNW	0	
23/06/2023	06:00:00	1006.1	16	8	WNW	0	
23/06/2023	21:00:00	1006.5	18	8	NNE	0	18
23/06/2023	22:00:00	1006.8	18	5	N	0	
23/06/2023	23:00:00	1006.9	18	6	NNW	0	
24/06/2023	00:00:00	1007.1	18	6	NW	0	
24/06/2023	01:00:00	1006.8	17	5	NW	0	
24/06/2023	02:00:00	1006.4	17	6	NW	0	

24/06/2023	03:00:00	1006.5	17	6	NW	0	
24/06/2023	04:00:00	1006.4	17	5	NW	0	
24/06/2023	05:00:00	1006.6	18	5	NW	0	
24/06/2023	06:00:00	1007	18	6	NW	0	
24/06/2023	21:00:00						
24/06/2023	22:00:00						
24/06/2023	23:00:00						
25/06/2023	00:00:00						
25/06/2023	01:00:00						
25/06/2023	02:00:00						
25/06/2023	03:00:00						
25/06/2023	04:00:00						
25/06/2023	05:00:00						
25/06/2023	06:00:00						**19**
25/06/2023	21:00:00						
25/06/2023	22:00:00						
25/06/2023	23:00:00						
26/06/2023	00:00:00						
26/06/2023	01:00:00						
26/06/2023	02:00:00						
26/06/2023	03:00:00						
26/06/2023	04:00:00						
26/06/2023	05:00:00						
26/06/2023	06:00:00						**20**
26/06/2023	21:00:00						
26/06/2023	22:00:00						
26/06/2023	23:00:00						
27/06/2023	00:00:00						
27/06/2023	01:00:00						
27/06/2023	02:00:00						
27/06/2023	03:00:00						
27/06/2023	04:00:00						
27/06/2023	05:00:00						
27/06/2023	06:00:00						**21**
27/06/2023	21:00:00						
27/06/2023	22:00:00						
27/06/2023	23:00:00						
28/06/2023	00:00:00						
28/06/2023	01:00:00						
28/06/2023	02:00:00						
28/06/2023	03:00:00						
28/06/2023	04:00:00						
28/06/2023	05:00:00						
28/06/2023	06:00:00						**22**
Autumn 2023							
21/08/2023	21:00:00	1006	17	10	ESE	0	
21/08/2023	22:00:00	1005.8	16	3	ESE	0	
21/08/2023	23:00:00	1005.8	16	5	ESE	0	
22/08/2023	00:00:00	1005.9	16	6	ESE	0	
22/08/2023	01:00:00	1006	15	6	ESE	1	
22/08/2023	02:00:00	1006.2	15	6	ESE	0.8	
22/08/2023	03:00:00	1006.2	15	10	SE	0	
22/08/2023	04:00:00	1006.4	14	10	SE	0	
22/08/2023	05:00:00	1006.7	14	6	SE	0.2	
22/08/2023	06:00:00	1006.7	14	6	SE	0.2	**1**
22/08/2023	21:00:00	1011	15	5	SSE	0	

22/08/2023	22:00:00	1010.9	14	2	SSW	0	2
22/08/2023	23:00:00	1010.8	13	2	SSW	0	
23/08/2023	00:00:00	1010.6	13	0		0	
23/08/2023	01:00:00	1010.5	13	0		0	
23/08/2023	02:00:00	1010.3	13	0		0	
23/08/2023	03:00:00	1010.3	12	2	SW	0	
23/08/2023	04:00:00	1009.9	11	3	WSW	0	
23/08/2023	05:00:00	1009.7	11	3	SW	0	
23/08/2023	06:00:00	1009.4	11	3	SW	0	
23/08/2023	21:00:00	1016.9	14	3	W	0	3
23/08/2023	22:00:00	1017	14	5	W	0	
23/08/2023	23:00:00	1017	14	5	WSW	0	
24/08/2023	00:00:00	1016.9	13	2	W	0	
24/08/2023	01:00:00	1016.8	13	0		0	
24/08/2023	02:00:00	1016.2	13	0		0	
24/08/2023	03:00:00	1016.1	13	3	WNW	0.2	
24/08/2023	04:00:00	1016.2	13	6	NW	0	
24/08/2023	05:00:00	1016	12	5	NNW	0	
24/08/2023	06:00:00	1016.1	12	6	NNW	0	
24/08/2023	21:00:00	1013.4	14	10	WSW	0.2	4
24/08/2023	22:00:00	1013.6	13	3	WSW	0.2	
24/08/2023	23:00:00	1013.4	13	3	W	0	
25/08/2023	00:00:00	1012.9	13	2	W	0	
25/08/2023	01:00:00	1012.5	13	2	SW	0.2	
25/08/2023	02:00:00	1012.4	13	0		0	
25/08/2023	03:00:00	1011.9	13	2	W	0.6	
25/08/2023	04:00:00	1011.4	13	0		0	
25/08/2023	05:00:00	1011.1	13	3	W	0	
25/08/2023	06:00:00	1010.8	13	3	WNW	0.6	
25/08/2023	21:00:00	1011.3	14	5	WNW	0	5
25/08/2023	22:00:00	1011.7	14	6	NW	0	
25/08/2023	23:00:00	1011.7	13	6	NW	0	
26/08/2023	00:00:00	1011.9	13	5	NW	0	
26/08/2023	01:00:00	1012.4	12	6	NW	0	
26/08/2023	02:00:00	1012.4	12	5	W	0	
26/08/2023	03:00:00	1012.4	12	6	WNW	0	
26/08/2023	04:00:00	1011.9	12	10	W	0	
26/08/2023	05:00:00	1011.5	12	8	WNW	0	
26/08/2023	06:00:00	1011.9	12	5	W	0	
26/08/2023	21:00:00	1015.4	15	5	WNW	0	6
26/08/2023	22:00:00	1016	14	3	WNW	0	
26/08/2023	23:00:00	1016.1	14	6	NW	0	
27/08/2023	00:00:00	1016.1	14	5	W	0	
27/08/2023	01:00:00	1016	13	6	WNW	0	
27/08/2023	02:00:00	1016	13	5	W	0	
27/08/2023	03:00:00	1015.7	13	5	W	0	
27/08/2023	04:00:00	1015.1	13	3	W	0	
27/08/2023	05:00:00	1014.9	13	5	W	0.2	
27/08/2023	06:00:00	1014.5	12	0		1.2	
27/08/2023	21:00:00	1017.9	14	5	WNW	0	7
27/08/2023	22:00:00	1018.7	14	5	WNW	0	
27/08/2023	23:00:00	1018.9	13	5	W	0	
28/08/2023	00:00:00	1019	13	5	W	0	
28/08/2023	01:00:00	1019.2	13	5	WSW	0	
28/08/2023	02:00:00	1019	13	3	WSW	0	
28/08/2023	03:00:00	1019	13	3	WSW	0	

28/08/2023	04:00:00	1019.1	13	2	SW	0	
28/08/2023	05:00:00	1018.9	13	3	WSW	0	
28/08/2023	06:00:00	1019.1	13	2	SW	0	
28/08/2023	21:00:00	1015.9	14	3	W	0	8
28/08/2023	22:00:00	1015.6	14	3	W	0	
28/08/2023	23:00:00	1015.6	13	2	SW	0	
29/08/2023	00:00:00	1015.1	12	3	SW	0.2	
29/08/2023	01:00:00	1014.5	12	2	SSE	1	
29/08/2023	02:00:00	1014	12	2	SSE	0.4	
29/08/2023	03:00:00	1013.6	12	2	NE	0.8	
29/08/2023	04:00:00	1013.5	12	3	NNE	0.4	
29/08/2023	05:00:00	1013.8	12	2	NNW	0	
29/08/2023	06:00:00	1014	13	3	NNW	0	
29/08/2023	21:00:00	1013.5	13	6	WNW	0	9
29/08/2023	22:00:00	1013.6	13	6	WNW	0	
29/08/2023	23:00:00	1013.9	12	5	W	0	
30/08/2023	00:00:00	1013.6	12	6	WNW	0	
30/08/2023	01:00:00	1013.4	12	5	WNW	0	
30/08/2023	02:00:00	1013.1	12	5	WNW	0	
30/08/2023	03:00:00	1013.1	12	6	WNW	0	
30/08/2023	04:00:00	1012.7	12	6	WNW	0	
30/08/2023	05:00:00	1012.4	12	5	NW	0	
30/08/2023	06:00:00	1012.2	11	6	NNW	0	
30/08/2023	21:00:00	1009	13	3	S	0.2	10
30/08/2023	22:00:00	1008.7	12	6	SSE	0	
30/08/2023	23:00:00	1008.4	12	8	SSE	0	
31/08/2023	00:00:00	1007.7	11	6	ESE	0	
31/08/2023	01:00:00	1007.1	11	5	E	0.8	
31/08/2023	02:00:00	1006.2	11	5	E	0.4	
31/08/2023	03:00:00	1005.3	11	5	ESE	0	
31/08/2023	04:00:00	1004.8	11	3	E	0.2	
31/08/2023	05:00:00	1004.3	11	3	ESE	4.4	
31/08/2023	06:00:00	1004.5	11	2	SE	4.6	
31/08/2023	21:00:00	1006.2	15	3	WNW	0	11
31/08/2023	22:00:00	1006.4	14	3	W	0	
31/08/2023	23:00:00	1006.7	13	3	WNW	0	
01/09/2023	00:00:00	1006.8	13	2	NNW	0	
01/09/2023	01:00:00	1007.1	11	3	NW	0	
01/09/2023	02:00:00	1007	12	0		0	
01/09/2023	03:00:00	1007	12	2	NW	0	
01/09/2023	04:00:00	1007.1	12	0		0	
01/09/2023	05:00:00	1007.3	12	0		0	
01/09/2023	06:00:00	1007.4	13	0		0	
01/09/2023	21:00:00	1014.9	16	5	NE	0	12
01/09/2023	22:00:00	1015.5	16	5	NNE	0	
01/09/2023	23:00:00	1015.6	15	5	N	0	
02/09/2023	00:00:00	1016.2	14	5	N	0	
02/09/2023	01:00:00	1017	14	3	NNW	0	
02/09/2023	02:00:00	1017.4	12	3	NW	0	
02/09/2023	03:00:00	1017.6	12	3	N	0	
02/09/2023	04:00:00	1017.9	13	2	NE	0	
02/09/2023	05:00:00	1018.4	12	3	NNW	0	
02/09/2023	06:00:00	1019.3	12	2	N	0	
02/09/2023	21:00:00	1025.3	17	6	NW	0	
02/09/2023	22:00:00	1025.5	16	10	NW	0	
02/09/2023	23:00:00	1025.5	15	3	NNW	0	

03/09/2023	00:00:00	1026.2	14	3	NNW	0	13
03/09/2023	01:00:00	1026.7	13	5	NNW	0	
03/09/2023	02:00:00	1026.4	13	0		0	
03/09/2023	03:00:00	1026.6	14	2	WNW	0	
03/09/2023	04:00:00	1026.6	13	2	NW	0	
03/09/2023	05:00:00	1025.8	13	0		0	
03/09/2023	06:00:00	1025.7	14	0		0	
03/09/2023	21:00:00	1025.1	16	6	N	0	14
03/09/2023	22:00:00	1025.2	14	6	N	0	
03/09/2023	23:00:00	1025.1	15	5	N	0	
04/09/2023	00:00:00	1025	15	3	NNE	0	
04/09/2023	01:00:00	1024.9	14	3	NNE	0	
04/09/2023	02:00:00	1024.3	13	2	N	0	
04/09/2023	03:00:00	1023.5	12	2	NNE	0	
04/09/2023	04:00:00	1023.4	13	5	NNE	0	
04/09/2023	05:00:00	1022.7	13	3	NNE	0	
04/09/2023	06:00:00	1022.4	12	5	N	0	
04/09/2023	21:00:00	1018.7	22	5	NE	0	15
04/09/2023	22:00:00	1018.8	21	8	NE	0	
04/09/2023	23:00:00	1018.5	21	11	NNE	0	
05/09/2023	00:00:00	1018.2	21	11	NNE	0	
05/09/2023	01:00:00	1018.1	20	10	NE	0	
05/09/2023	02:00:00	1017.6	20	11	NE	0	
05/09/2023	03:00:00	1017.1	20	10	NE	0	
05/09/2023	04:00:00	1016.5	19	11	NE	0	
05/09/2023	05:00:00	1016.7	19	11	NE	0	
05/09/2023	06:00:00	1016.5	19	10	NE	0	

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