Map Legend

- EIA Site Boundary
- 2km Survey Radius
- RVP Locations
- Turbine Locations
- Observation

N

Drawing Title: Buzzard Observations Breeding Raptor Surveys

Project Title: Proposed Extension of Life of Castledockrell Wind Farm

Drawn By	Checked By
SA	PM
Project No.	Fig.
210847	Fig. 7-4-33
Scale	Date
1:35,000	12/02/2024

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BZ030
BZ012
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BZ003
BZ002
BZ029
BZ017
BZ013
BZ009
BZ024
Map Legend
EIA Site Boundary
8km Survey Radius
Observation
N
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Drawing Title
Buzzard Incidental Observations
Project Title
Proposed Extension of Life of Castledockrell Wind Farm
Drawn By
SA
Checked By
PM
Project No.
210847
Fig.
Fig. 7-4-34
Scale
1:110,000
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12/02/2024
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15. SPARROWHAWK

Table 7-4 35 Sparrowhawk Vantage Point Survey Data

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-15m)	Band 2 (15 - 49m)	Band 3 (49 - 120m)	Band 4 (>200m)	Habitat and activity	Surveyor
SH001	VP1	25/10/2022	11:03	Sparrowhawk	2	15	15	0			improved agricultural grassland and hedgerows; travelling low, flew by VP spot and across road	CB
SH002	VP1	09/02/2023	10:59	Sparrowhawk	1	5	5	0	0	0	hedgerows and improved agricultural grassland; glimpsed travelling hedgerows	CB
SH003	VP1	24/07/2023	12:20	Sparrowhawk	1	155	0	0	108	0	improved agricultural grassland; hunting	KW
SH004	VP1	24/07/2023	17:51	Sparrowhawk	1	15	0	15	0	0	improved agricultural grassland; hunting	KW
SH005	VP2	28/09/2023	10:06	Sparrowhawk	1	10	10	0	0	0	arable crops, hedgerows and improved agricultural grassland; travelling	CB

Table 7-4 36 Sparrowhawk Breeding Walkover Survey Data

Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
SH001	14/06/2023	18:14	Sparrowhawk	1	improved agricultural grassland and hedgerows; travelling, mobbed by several swallows, female (suitable nesting habitat; possible breeder)	CB
SH002	15/06/2023	17:12	Sparrowhawk	1	arable crops and hedgerows; soaring, seen from quite a distance but much smaller than buzzard (suitable nesting habitat; possible breeder)	CB

Table 7-4 37 Sparrowhawk Breeding Raptor Survey Data

Ref.	BRVP	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
SH001	BRVP4	05/05/2023	17:15	Sparrowhawk	1	hedgerows and improved agricultural grassland, travelling low, dipped over hedgerow	summering; non-breeding	CB
SH002	BRVP6	07/07/2023	16:56	Sparrowhawk	1	hedgerows and improved agricultural grassland, travelling, female	suitable nesting habitat; possible breeder	CB
SH003	BRVP6	07/07/2023	17:16	Sparrowhawk	1	improved agricultural grassland and hedgerows, travelling to small clump of conifers, mobbed by buzzard right at the end	suitable nesting habitat; possible breeder	CB

Map Legend

- EIA Site Boundary
- 500m Radius of Turbines
- VP Locations
- Turbine Locations
- Observation

N

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Drawing Title	Sparrowhawk Observations Vantage Point Surveys
Project Title	Proposed Extension of Life of Castledockrell Wind Farm
Drawn By: SA	Checked By: PM
Project No.: 210847	Fig.: Fig. 7-4-35
Scale: 1:15,000	Date: 12/02/2024

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Map Legend

- EIA Site Boundary
- 500m Radius of Turbines
- Turbine Locations
- Observation

N

Drawing Title
Sparrowhawk Observations
Breeding Walkover Surveys

Project Title
Proposed Extension of Life of
Castledockrell Wind Farm

Drawn By	Checked By
SA	PM
Project No.	Fig.
210847	Fig. 7-4-36
Scale	Date
1:15,000	12/02/2024

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Map Legend

- EIA Site Boundary
- 2km Survey Radius
- RVP Locations
- Turbine Locations
- Observation

N

Drawing Title	Sparrowhawk Observations Breeding Raptor Surveys
Project Title	Proposed Extension of Life of Castledockrell Wind Farm
Drawn By: SA	Checked By: PM
Project No.: 210847	Fig.: Fig. 7-4-37
Scale: 1:35,000	Date: 12/02/2024

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Sensitive Information – Not for Widespread Distribution

APPENDIX 7-5

CONFIDENTIAL SURVEY DATA

APPENDIX 7-6

BIRD MONITORING PROGRAMME

Table of Contents

1. INTRODUCTION

1.1 Background

This Bird Monitoring Programme has been prepared by MKO for the Proposed Extension of Life of Castledockrell Wind Farm. It provides a timeframe and monitoring schedule for the bird population at the Site and to within 500m of all infrastructure during the operational and decommissioning phases, informed by surveys undertaken to date. Bird surveys were undertaken from October 2022 to September 2023. Key ornithological receptors (KORs) in the study area were identified based on these surveys.

The objectives of the Bird Monitoring Programme are:

- To record birds using the study area and their interaction with operating turbines.
- To monitor short-term and long-term effects on bird populations in the study area, with a particular emphasis on birds of high conservation concern (birds listed on Annex I of the EU Birds Directive or on the Red List of Birds of Conservation Concern in Ireland).
- To undertake collision monitoring for potential bird fatalities as a result of a collision with turbine blades.
- To report on the findings of monitoring at the end of Years 1, 2, 3, 5, 10 and 15 of the operational life of the wind farm.
- To ensure any required decommissioning phase monitoring is scheduled to avoid impacts on birds of conservation concern during the decommissioning phase.

1.2 Key Ornithological Receptors

Table 7-7-1 lists the key ornithological receptors (KORs) recorded within the Site during surveys conducted from October 2022 to September 2023 inclusive. These species form the basis of the Bird Monitoring Programme.

Table 7-7-1 Key ornithological receptors identified during surveys

Species	Scientific Name	Conservation Status
Black-headed Gull	*Chroicocephalus ridibundus*	SCI of Wexford Harbour and Slobs SPA
Lesser Black-backed Gull	*Larus fuscus*	SCI of Wexford Harbour and Slobs SPA
Peregrine Falcon	*Falco peregrinus*	Annex I of Birds Directive
Kestrel	*Falco tinnunculus*	BoCCI Red Listed
Buzzard	*Buteo buteo*	Species sensitive to wind farm developments (Raptor Species)
Sparrowhawk	*Accipiter nisus*	Species sensitive to wind farm developments (Raptor Species)

2. METHODOLOGY

2.1 Operational Monitoring

Operational monitoring will be undertaken in Years 1, 2, 3, 5, 10 and 15 of the lifetime of the wind farm, following SNH (2009) guidance. The surveys that will be undertaken are:

- Monthly distribution and abundance surveys: breeding walkover surveys (adapted Brown & Shepherd) and winter walkover surveys.

- **Targeted bird collision surveys (corpse searches) will be undertaken by a trained dog and handler. The surveys will include detection and scavenger trials, to correct for these two biases and ensure the resulting data is robust.**

2.1.1 Distribution and Abundance Surveys

2.1.1.1 Breeding Walkover Survey

During monitoring years, breeding walkover surveys will follow the adapted Brown & Shepherd (1993) survey methods. The survey methodology will be similar to methods employed for baseline EIAR surveys which will allow a comparison of data to be made for each monitoring year.

The timing of visits will follow the recommendations of Calladine ***et al.*** (2009). Transects should ensure all areas of suitable breeding/ foraging habitat are approached to within 100m. Target species will include waders, raptors, waterbirds, gulls and other birds of conservation concern. Along with target species, all additional species observed will be recorded to inform the evaluation of supporting habitat. These surveys will follow the same routes that were followed during pre-planning surveys.

A total of six site visits will be undertaken during the breeding season for each monitoring year and timed to coincide with the breeding period of April - September. Notes will be recorded on nesting and territorial behaviour and breeding signs using standard BTO codes. Non-breeding behaviour such as birds flying over the site will also be recorded.

2.1.1.2 Winter Walkover Survey

During monitoring years, winter walkover surveys will follow methodology adapted from the breeding walkover methodology outlined in Brown and Shepherd (1993) and Calladine ***et al.*** (2009), combined with Common Bird Census methods (British Trust for Ornithology, 2021). The survey methodology will be similar to methods employed for baseline EIAR surveys which will allow a comparison of data to be made for each monitoring year.

Transects should be walked across different habitat complexes within the survey area where access allows. Target species will include waders, raptors, waterbirds, gulls and other birds of conservation concern. Along with target species, all additional species observed will be recorded to inform the evaluation of supporting habitat. These surveys will follow the same routes that were followed during pre-planning surveys.

A total of six site visits will be undertaken during daylight hours in the winter season for each monitoring year and timed to coincide with the winter period of October - March. Notes will be recorded using standard BTO codes.

2.1.2 Collision Monitoring

Carcass searches for bird casualties as a result of collision with turbines will follow survey methods broadly based on guidelines issued by the NatureScot (SNH, 2009) and search methods adopted by Duffy and Steward (2008). The Site will be visited once per month during operational Years 1, 2, 3, 5, 10 and 15 of the lifetime of the wind farm. It is proposed to undertake a minimum of one visit per month during each survey year by a trained dog and handler. During each visit, searches will be undertaken at each operating turbine location by a trained dog and handler. Edkins (2014) "Impacts of Wind Energy Developments on Birds and Bats: Looking into The Problem", recommends the "search width should be equal to the maximum rotor tip height". Given a turbine rotor tip height of 120 meters the search area surrounding the base of the turbine would be taken as a diameter of 120 meters centred on the turbine base. This area will be the subject of target searches for bird casualties. Searches will incorporate the use of transects spaced at 10m intervals apart with the observer covering 5m on either side for each transect. Locations

and coordinates of transect routes will be confirmed using a portable GPS recording device. Recording sheets will be used to document bird carcasses encountered in the field.

If a bird carcass is found, the following details will be recorded: GPS location of each bird carcass, photographic record, carcass condition (intact - carcass that is completely intact or not badly composed); scavenged (evidence that the carcass was fed upon by a scavenger/predator); or feather spot (ten or more feathers indicating predation or scavenging or two or more primary feathers must be present to consider the carcass a casualty), distance from the turbine, date, time, etc..

Carcass removal trials and searcher efficiency trials will be undertaken to account for the ability of the dog team to find bird carcasses and the likelihood of scavenging of corpses by animals. This is done to ensure a more accurate estimation of the total number of collision victims. During carcass removal trials, a carcass is placed in a study area periodically and is monitored for a set number of days or until scavengers remove the carcass (this can be done with the use of a trail camera). A determination on carcass removal is made when no body parts containing flesh or bone or >10 disarticulated feathers can be found. During searcher efficiency trials, a number of carcasses are placed in a study area by one worker, then searched for by another worker with the dog. These may be conducted on the same day as surveys are carried out to avoid flooding the area with carcasses and increasing scavenger activity. The result of these trials provides a correction factor that can be applied to the results of the carcass searches.

2.1.3 Summary

Table 7-7-2 summarises the proposed bird monitoring schedule for each monitoring year.

Table 7-7-2 Proposed bird monitoring schedule.

Survey	Phase	Period	Visits	Survey Method
Breeding Walkover Surveys	Years 1, 2, 3, 5, 10 and 15	Commencing at the beginning of the breeding season and continuing for six months thereafter.	1 visit per month (April – September) for each monitoring year	Adapted Brown & Shepherd Surveys
Winter Walkover Surveys	Years 1, 2, 3, 5, 10 and 15	Commencing at the beginning of the non-breeding season and continuing for six months thereafter.	1 visit per month (October – March) for each monitoring year	Adapted Brown & Shepherd Surveys
Collision Monitoring	Years 1, 2, 3, 5, 10 and 15	Commencing at the beginning of the breeding or non-breeding season and continuing for 12	1 visit per month for each monitoring year	Targeted corpse searches at turbine base.

Survey	Phase	Period	Visits	Survey Method
		months thereafter.		

2.2 Decommissioning Monitoring

It is proposed that decommissioning works will commence outside the bird nesting season (1st of March to 31st of August inclusive) to avoid the most sensitive time of the year for most bird species with the potential to use the site and its environs.

Decommissioning surveys will be undertaken prior to the initiation of decommissioning works at the Site. The survey will aim to identify sensitive sites (e.g. nests or roosts). Any requirement for decommissioning works to run into the subsequent breeding season following commencement will be subject to a repeat of the pre-commencement bird surveys to confirm the absence of breeding birds of conservation concern once per month during the breeding season (April to July).

Monitoring will be undertaken by a suitably qualified ornithologist. The survey will include a thorough walkover survey to a 500m radius of the development footprint and/or all works areas. If winter roosts or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the decommissioning phase. If the roost/nest is found to be active during the decommissioning phase no decommissioning works shall be undertaken, decommissioning works will cease within a species-specific buffer of this location (Forestry Commission Scotland, 2006; Goodship and Furness, 2022; Ruddock and Whitfield, 2007) in line with best practice. No decommissioning works shall be permitted within the buffer until it can be demonstrated that the roost or nest is no longer occupied.

All site staff and subcontractors will be made aware of any restrictions to be imposed by means of a toolbox talk and a map of the 'no-work zone' will be made available to all decommissioning staff. The restricted area will also be marked off using hazard-tape fencing to alert all personnel on site to the suspension of decommissioning works within that area.

2.3 Reporting

A report summarising the findings of bird monitoring surveys will be submitted to the Planning Authority at the end of each monitoring year (i.e., Year 1, 2, 3, 5, 10 and 15). The report will provide the results of the surveys and discuss potential impacts on birds (particularly KORs) and any recommendations that may inform additional mitigation measures during the operational phase of the Site.

Maps outlining flight lines of key target species will be produced using GIS software applications to accompany the final report at the end of each monitoring year.

3. BIBLIOGRAPHY

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Calladine, J., Garner, G., Wernham, C. and Thiel, A (2009). The influence of survey frequency on population estimates of moorland breeding birds. ***Bird Study***, 56: 381-388.

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Goodship, N.M. and Furness, R.W. (2022). Disturbance distances review: an updated literature review of disturbance distance of selected bird species. NatureScot Research Report 1283, Inverness, Scotland.

Ruddock, M. and Whitfield, D. P. (2007). A review of disturbance distances in selected bird species. Natural Research, Banchory, UK.

SNH (2009). Monitoring the impact of onshore wind farms on birds. Scottish Natural Heritage, Inverness, Scotland.

APPENDIX 11-1

EXAMPLES OF LOCAL AUTHORITY AND AN BORD PLEANÁLA DECISIONS

APPENDIX 11-1: EXAMPLES OF LOCAL COUNCIL AND AN BORD PLEANALA DECISIONS

The following examples of Local Council and An Bord Pleanala decisions support the use of background +5dB at night-time, in line with the IOA Good Practice Guide, ETSU-R-97 and currently draft Revised Wind Energy Development Guidelines 2019

Cronalaght WF Extension in Gaoth Dobhair

Condition 4 of the Amendment grant (PL 05.247194) states:

> *"Wind turbine noise arising from the proposed development, by itself or in combination with other existing or permitted wind energy development in the vicinity, shall not exceed the greater of:*
>
> *(a) 5 dB(A) above background noise levels or*
>
> *(b) 43 dB(A) $L_{90,10min}$*
>
> *when measured externally at dwellings or other sensitive receptors. All of the noise mitigation measures set out in the submitted documentation shall be fully complied with."*

Co. Clare- An Bord Pleanála Reference Number: PL 03.234010

Condition 12 states:

> *"Noise levels measured externally during the operation of the development at the nearest existing noise sensitive location shall not exceed 5 dB(A) above ambient noise levels. Procedures for the purpose of determining compliance with this limit shall be submitted to and agreed in writing with the planning authority prior to commencement of development."*

Ballycumber WF Co Wicklow

Condition 7 states:

> *"Noise levels from the proposed development when measured at the nearest noise sensitive location shall not exceed 43 dB(A) L90 (10 minutes) or 5 dB(A) above background, whichever is greater. Measurements shall be made in accordance with ISO recommendation 1996/1 (Acoustic Description and Measurement of Environmental Noise Part 1: Basic Qualities and Procedures)".*

Tipperary County Council, Ref. No. 13/231 and PL.23.243357,

Condition 6 for T1 and Ref. No. 15/600561 and PL 92.245874 with Condition 7 for T2. Both conditions have the same noise limits with limits reproduced below:

> *"Wind turbine noise arising from the proposed development, by itself or in combination with other existing or permitted wind energy development in the vicinity, shall not exceed the greater of 5 dB(A) above background noise levels or 43 dB(A) $L_{90,10min}$ when measured externally at dwellings or other sensitive receptors. Prior to commencement of development, the developer shall submit to, and agree in writing with, the planning authority a noise compliance monitoring programme for the subject development. All noise measurements shall be carried out in accordance with ISO Recommendation R 1996 "Assessment of Noise with Respect to Community Response," as amended by ISO Recommendations R 1996-1. The results of the initial noise compliance monitoring shall be submitted to, and agreed in writing with, the planning authority within six months of commissioning of the wind turbine"*

Cork, Kilberrihert WF

Reference No. in Planning Register REG NO. 10//579. Condition 30 states:

> *"Noise levels emanating from the proposed development when measured externally at a noise sensitive location, shall not exceed 43 dB(A). or a maximum increase of 5 dB(A) above background noise at nearby noise sensitive locations."*

Mayo County Planning Register Reference Number: P. 11/495 An Bord Pleanála Reference Number: PL 16.241592

Condition 9 states:

> *"Noise levels emanating from the proposed development following commissioning when measured externally at a noise sensitive location shall not exceed the greater of 43dB(A) L_{90}, or 5dB(A) above background levels. If the noise contains a discrete, continuous note (whine, hiss, screech, hum, etc.), or if there are distinct impulses in the noise (bangs, clicks, clatters or thumps), or if the noise is irregular enough in character to attract attention, a penalty of +5 dB(A) shall be applied to the measured noise level and this increased level shall be used in assessing compliance with the specified levels. All noise measurements shall be made in accordance with I.S.O. Recommendations R1996/1 and 2 "Acoustics – Description and measurement of Environmental noise"*

Cronalaght 2 Windfarm

The Cronalaght 2 Wind farm was permitted by Donegal County Council Planning Ref. No. 16/50989, amendment in An Bord Pleanala Grant, Ref. No. PL 05.247194, Condition 4.

The An Bord Pleanala planning permission Condition 4 limit is:

> *"Wind turbine noise arising from the proposed development, by itself or in combination with other existing or permitted wind energy development in the vicinity, shall not exceed the greater of:*
>
> *(a) 5 dB(A) above background noise levels or*
>
> *(b) 43 dB(A) $L_{90,10min}$*
>
> *when measured externally at dwellings or other sensitive receptors. All of the noise mitigation measures set out in the submitted documentation shall be fully complied with.*
>
> *Prior to commencement of development, the developer shall submit to and agree in writing with the planning authority a noise compliance monitoring programme for the subject development, including any mitigation measures such as the de-rating of particular turbines. All noise measurements shall be carried out in accordance with ISO Recommendation R 1996 "Assessment of Noise with Respect to Community Response," as amended by ISO Recommendations R 1996-1. The results of the initial noise compliance monitoring shall be submitted to, and agreed in writing with, the planning authority within six months of commissioning of the wind farm"*

Ballincurry 2 Turbine WF

The development was permitted by Tipperary County Council, Ref. No. 13/231 and PL.23.243357, with Condition 6 for T1 and Ref. No. 15/600561 and PL 92.245874 with Condition 7 for T2. Both conditions have the same noise limits with limits reproduced below:

> *"Wind turbine noise arising from the proposed development, by itself or in combination with other existing or permitted wind energy development in the vicinity, shall not exceed the greater of 5 dB(A) above background noise levels or 43 dB(A) $L_{90,10min}$ when measured externally at dwellings or other sensitive receptors. Prior to commencement of*

development, the developer shall submit to, and agree in writing with, the planning authority a noise compliance monitoring programme for the subject development. All noise measurements shall be carried out in accordance with ISO Recommendation R 1996 "Assessment of Noise with Respect to Community Response," as amended by ISO Recommendations R 1996-1. The results of the initial noise compliance monitoring shall be submitted to, and agreed in writing with, the planning authority within six months of commissioning of the wind turbine"

APPENDIX 11-2

PHOTOS OF NOISE MONITORS IN-SITU

APPENDIX 11-2: PHOTOS OF NOISE MONITORS IN-SITU

Noise Monitors In-Situ, images captured 29 March 2024.

Location 69

Location 15

Location 23

Location 50

APPENDIX 11-3

METHODOLOGY FOR CALCULATING WIND SHEAR, DIFFERENT HUB HEIGHTS AND STANDARDISING HUB HEIGHT WIND SPEED

APPENDIX 11-3: METHODOLOGY FOR CALCULATING WIND SHEAR, DIFFERENT HUB HEIGHTS AND STANDARDISING HUB HEIGHT WIND SPEED

Wind Speed Calculations for Hub Height

A GOOD PRACTICE GUIDE TO THE APPLICATION OF ETSU-R-97 FOR THE ASSESSMENT AND RATING OF WIND TURBINE NOISE

Institute of Acoustics

4.5 Wind Shear Corrections

4.5.1 Basing the predictions on sound power data tested in accordance with the IEC 61400-11 standard (or equivalent) should mean that the wind reference used corresponds to hub height wind speeds, standardised to 10 m height using a fixed correction (see **Annex A**). These predictions can then be compared to background levels and/or associated noise limits derived using an equivalent wind speed reference, which will have wind shear taken into account directly.

4.5.2 When this is not the case, for example when considering background data measured against direct wind speed measurements at 10 m height, it is necessary to apply corrections to account for this. Any such corrections should be clearly outlined and detailed in any noise assessment so that they can be reviewed by any assessor. The assessment should be made using the most detailed information available.

4.5.3 Examples of methods which can be used to correct predictions to account for wind shear effects, when only using a 10 m mast, are included in **Supplementary Guidance Note 4** (wind shear). This note presents methods to calculate corrections on the basis of long-term data measured at different heights, but as such data may not be available for a specific site, typical shear values are also presented. Alternatively, similarly derived corrections representing typical (average) shear values can be applied to the wind speed reference used for the derived typical background noise levels.

4.5.4 The following simplified method is proposed for ease of use: applying a fixed correction by subtracting the following factors from the wind speed reference used in the turbine predictions: 1 m/s for turbine hub heights of up to 30 m, 2 m/s for hub heights of up to 60 m and 3 m/s for hub heights of more than 60 m. Such a generic approach would be suitable in the context of a study made using a 10 m mast to limit costs, in the absence of site-specific data.

4.5.5 If it can be demonstrated that the predicted levels are below the applicable lower fixed limits regardless of wind speed, it can be seen that wind shear would not have an effect on the assessment and this may form the basis of a suitable planning condition.

APPENDIX 11-4

DERIVED BACKGROUND NOISE LEVELS

APPENDIX 11-4: DERIVED BACKGROUND NOISE LEVELS

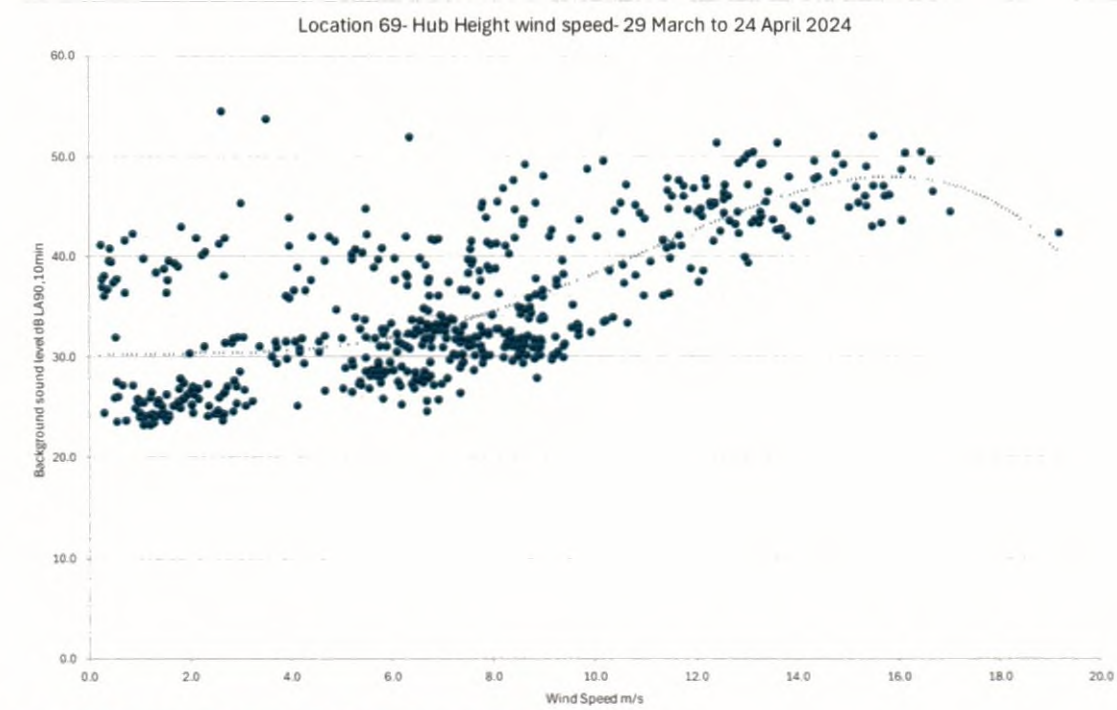

Figure A1-1 Background Noise Levels NML1 – Location 69 – Hub Height

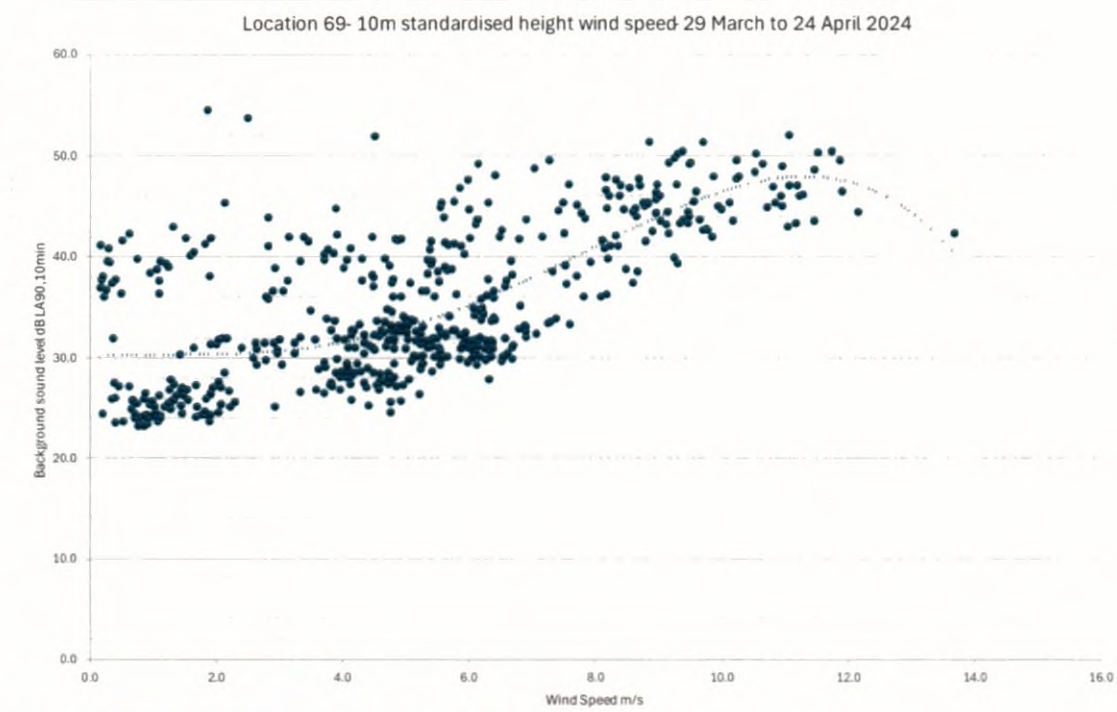

Figure A1-2 Background Noise Levels NML1 – Location 69 – 10m Height

Table A1-1 Predicted noise levels from the Proposed Development in a South Westerly wind direction at NML1 – Location 69

Wind Speed m/s (10m standardised)	Predicted noise level L_{A90},dB
4	14.1
5	17.4
6	22.8
7	24.5
8	26.5
9	27.3
10	27.3
11	27.3
12	27.3

APPENDIX 11-5

CALIBRATION CERTIFICATES OF NOISE INSTRUMENTS

APPENDIX 11-5: CALIBRATION CERTIFICATES OF NOISE INSTRUMENTS

MTS Calibration Ltd,
The Grange Business Centre,
Belasis Avenue,
Billingham TS23 1LG,
England
Telephone: 01642 876 410

CERTIFICATE OF CALIBRATION

Approved Signatory:

Tony Sherris

Issued by: MTS Calibration Ltd

Date of Issue: 08 March 2023 **Certificate Number:** 38149

Sound Level Meter

Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1

Client: Brendan Oreilly

Instrument Make: Larson Davis
Instrument Model: LxT1L
Serial Number: 0005992

6

Associated Equipment	Make	Model	Serial number
Preamplifier	PCB	PRMLxT1L	028029
Microphone	PCB	377B02	147913
Calibrator	Larson Davis	CAL200	18140
Calibrator supplied by	the Client, with the SLM		

The measurements were performed at The Grange Business Centre, Belasis Avenue, TS23 1LD. The results only apply to the items tested.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1

Test results summary, detailed results are shown on subsequent pages.

Tests performed	Section	Results of test	Page	Comments
Calibration Certificate	22		1	
Additional information			2	
Indication with Calibrator Supplied	10	No Limit	3	
Self-Generated Noise	11	No Limit	3	
Frequency and Time-weightings at 1kHz	14	Complies	3	
Long term stability	15	Complies	3	
High stability	21	Complies	3	
Acoustic Tests	12	Complies	4	
Frequency Weighting A	13	Complies	5	
Frequency Weighting C	13	Complies	6	
Frequency Weighting Z	13	Complies	7	
Level Linearity	16	Complies	8	
Level Linearity Range Control	17		n/a	SLM only has one range
Tone-burst Response	18	Complies	9	
Peak C sound level	19	Complies	10	
Overload indication	20	Complies	11	

The instrument was within the above specification as received - no modifications were made

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3: 2013 for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2013, to demonstrate that the model of sound level meter fully conformed to the Class 1 specifications in IEC 61672-1: 2013, the sound level meter submitted for testing conforms to the Class 1 specifications of IEC 61672-1: 2013

Additional tests performed	Reference	
Microphone full frequency response	38151	See additional certificate
Filter calibration, third octave or octave	38149F	See additional certificate
Calibrator calibration	38152U	See additional UKAS certificate

MTS Calibration Ltd,
The Grange Business Centre,
Belasis Avenue,
Billingham TS23 1LG,
England
Telephone: 01642 876 410

CERTIFICATE OF CALIBRATION

Approved Signatory:

Tony Sherris

Issued by: MTS Calibration Ltd

Date of Issue: 05 August 2022 **Certificate Number:** 37266

Sound Level Meter

Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1

Client: Environmental Measurements
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

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Instrument Make: Larson Davis
Instrument Model: LxT1L
Serial Number: 0005990

Associated Equipment	Make	Model	Serial number
Preamplifier	Larson Davis	PRMLxT1L	055804
Microphone	PCB	377B02	316349
Calibrator	Brüel & Kjær	4231	3014620
Calibrator supplied by	MTS for this calibration		

The measurements were performed at Elvington Close, Billingham, TS23 3YS. The results only apply to the items tested.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1

Test results summary, detailed results are shown on subsequent pages.

Tests performed	Section	Results of test	Page	Comments
Calibration Certificate	22		1	
Additional information			2	
Indication with Calibrator Supplied	10	No Limit	3	
Self-Generated Noise	11	No Limit	3	
Frequency and Time-weightings at 1kHz	14	Complies	3	
Long term stability	15	Complies	3	
High stability	21	Complies	3	
Acoustic Tests	12	Complies	4	
Frequency Weighting A	13	Complies	5	
Frequency Weighting C	13	Complies	6	
Frequency Weighting Z	13	Complies	7	
Level Linearity	16	Complies	8	
Level Linearity Range Control	17		n/a	SLM only has one range
Tone-burst Response	18	Complies	9	
Peak C sound level	19	Complies	10	
Overload indication	20	Complies	11	

The instrument was within the above specification as received - no modifications were made

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3: 2013 for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2013, to demonstrate that the model of sound level meter fully conformed to the Class 1 specifications in IEC 61672-1: 2013, the sound level meter submitted for testing conforms to the Class 1 specifications of IEC 61672-1: 2013

Additional tests performed	Reference	
Microphone full frequency response	37268	See additional certificate
Filter calibration, third octave or octave	37266F	See additional certificate

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England
Telephone: 01642 876 410

CERTIFICATE OF CALIBRATION

Approved Signatory:

Tony Sherris

Issued by: MTS Calibration Ltd

Date of Issue: 02 August 2023 **Certificate Number:** 38648

Sound Level Meter

Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1

Client: Brendan Oreilly

Instrument Make: Larson Davis
Instrument Model: LxT1L
Serial Number: 0005660

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Associated Equipment	Make	Model	Serial number
Preamplifier	Larson Davis	PRMLxT1L	055684
Microphone	PCB	377B02	305875
Calibrator	Larson Davis	CAL200	9175
Calibrator supplied by	MTS for this calibration		

The measurements were performed at The Grange Business Centre, Belasis Avenue, TS23 1LG. The results only apply to the items tested.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1

Test results summary, detailed results are shown on subsequent pages.

Tests performed	Section	Results of test	Page	Comments
Calibration Certificate	22		1	
Additional information			2	
Indication with Calibrator Supplied	10	No Limit	3	
Self-Generated Noise	11	No Limit	3	
Frequency and Time-weightings at 1kHz	14	Complies	3	
Long term stability	15	Complies	3	
High stability	21	Complies	3	
Acoustic Tests	12	Complies	4	
Frequency Weighting A	13	Complies	5	
Frequency Weighting C	13	Complies	6	
Frequency Weighting Z	13	Complies	7	
Level Linearity	16	Complies	8	
Level Linearity Range Control	17		n/a	SLM only has one range
Tone-burst Response	18	Complies	9	
Peak C sound level	19	Complies	10	
Overload indication	20	Complies	11	

The instrument was within the above specification as received - no modifications were made

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3: 2013 for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2013, to demonstrate that the model of sound level meter fully conformed to the Class 1 specifications in IEC 61672-1: 2013, the sound level meter submitted for testing conforms to the Class 1 specifications of IEC 61672-1: 2013

Additional tests performed	Reference	
Microphone full frequency response	38650	See additional certificate
Filter calibration, third octave or octave	38648F	See additional certificate

MTS Calibration Ltd,
The Grange Business Centre,
Belasis Avenue,
Billingham TS23 1LG,
England
Telephone: 01642 876 410

CERTIFICATE OF CALIBRATION

Approved Signatory:

Tony Sherris

Issued by: MTS Calibration Ltd

Date of Issue: 05 August 2022 **Certificate Number:** 37269

Sound Level Meter

Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1

Client: Environmental Measurements for Brendan O'Reilly
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

Instrument Make: Larson Davis
Instrument Model: LxT1L
Serial Number: 0005046

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Associated Equipment	Make	Model	Serial number
Preamplifier	Larson Davis	PRMLxT1L	042734
Microphone	PCB	377B02	172753
Calibrator	Brüel & Kjær	4231	2343058
Calibrator supplied by	MTS for this calibration		

The measurements were performed at Elvington Close, Billingham, TS23 3YS. The results only apply to the items tested.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1

Test results summary, detailed results are shown on subsequent pages.

Tests performed	Section	Results of test	Page	Comments
Calibration Certificate	22		1	
Additional information			2	
Indication with Calibrator Supplied	10	No Limit	3	
Self-Generated Noise	11	No Limit	3	
Frequency and Time-weightings at 1kHz	14	Complies	3	
Long term stability	15	Complies	3	
High stability	21	Complies	3	
Acoustic Tests	12	Complies	4	
Frequency Weighting A	13	Complies	5	
Frequency Weighting C	13	Complies	6	
Frequency Weighting Z	13	Complies	7	
Level Linearity	16	Complies	8	
Level Linearity Range Control	17		n/a	SLM only has one range
Tone-burst Response	18	Complies	9	
Peak C sound level	19	Complies	10	
Overload indication	20	Complies	11	

The instrument was within the above specification as received - no modifications were made

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3: 2013 for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2013, to demonstrate that the model of sound level meter fully conformed to the Class 1 specifications in IEC 61672-1: 2013, the sound level meter submitted for testing conforms to the Class 1 specifications of IEC 61672-1: 2013

Additional tests performed	Reference	
Microphone full frequency response	37271	See additional certificate
Filter calibration, third octave or octave	37269F	See additional certificate

MTS Calibration Ltd,
The Grange Business Centre,
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Billingham TS23 1LG,
England
Telephone: 01642 876 410

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CERTIFICATE OF CALIBRATION

Approved Signatory:

Tony Sherris

Issued by: MTS Calibration Ltd
Performed by Tony Sherris
Date of Issue: 08 April 2024 **Certificate Number:** 39535U

Sound Calibrator

Client: Environmental Measurements
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

The Device calibrated was:

Larson Davis **Model CA250** **Serial Number 1405**

The measurements were performed at Elvington Close, Billingham, TS23 3YS and the measured values were as follows:

Output Level 1:	114.07	dB re 20µPa	± 0.14 dB (k= 2)
Fundamental Frequency 1:	249.83	Hz	± 0.11 Hz (k= 2)
Total Harmonic Distortion 1:	0.79	%	± 0.021 % (k= 2)

This measurement is valid only for the above device configured for calibration of a WS-2 microphone under the stated environmental conditions. For deviation of prevailing conditions, the manufacturer's literature for the calibrator should be referred to.

Date of Measurements: 08 April 2024 *Date of Receipt:* 03 April 2024

Method of calibration MTS Calibration Ltd work procedure WP01 issue U3-1

A Reference Calibrator was used to establish the sensitivity of the measurement chain. The same measurement chain is then used to determine the output level of the Object Calibrator by the difference between its output and that of the nominated Reference Calibrator. Four independent measurements of the third-octave band sound pressure levels produced by the Reference Calibrators and the Object Calibrator are averaged to minimise uncertainties of the calibration. The measurement chain consists of a calibrated, Reference Microphone, Reference Preamplifier and Reference Analyser.

As well as providing a traceable measurement of the sound pressure level in the cavity of the Object Calibrator, the Calibrator's frequency and total harmonic distortion are also measured. Frequency is determined from the average of four independent measurements using a multimeter. The total harmonic distortion is measured from the average of three independent measurements by third octave analysis, subtracting the level of the fundamental frequency from the sum of the combined harmonics in the frequency band to 20kHz. The complete procedure is detailed in the MTS Calibration Ltd work procedure WP01.

The sound pressure level generated by the calibrator in its WS2 configuration was measured by reference to the reference Sound Calibrator as shown in the Test Equipment section below.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k (individually calculated as above), providing a coverage probability of approximately 95%. The uncertainty evaluation has been calculated in accordance with the current version of UKAS publication M3003. The uncertainty quoted for the Distortion Measurement is the Distortion Percentage as measured, multiplied by our Uncertainty as calculated for the individual measurement or our CMC, whichever is the larger.

Measurement Conditions:

Temperature	21	°C	± 1 °C
Atmospheric Pressure	1001	mBar	± 2 mBar
Relative Humidity	47	%	± 5 %

Test Equipment used during this calibration:

Equipment	Manufacturer	Model	Serial No.	Traceability Ref.	Calibration Due
Reference Calibrator	Larson Davis	CA 250	0695	TE 103	Jun-26
Multimeter	HP	34401A	36146A63804	TE 105	Dec-24
Microphone	B&K	4133	810486	TE 155	Sep-24
Real-Time Analyser (set 1)	Larson Davis	2900	0492	TE 108	Aug-24

End of Certificate