APPENDIX 12-4

BACKGROUND NOISE SURVEY

REPORT

Background Noise Survey

Project Title: Gannow Renewable Energy Development, Co Galway

CLIENT	DOCUMENT REFERENCE	DATE
MKO	247501.0349NR03	9 June 2025

AWN Consulting Ltd, The Tecpro Building, IDA Business & Technology Park, Clonshaugh, Dublin 17, D17 XD90

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Our Reference	247501.0349NR03
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Client Address:	

Revision	Revision Date	Description

Details	Written by	Approved by
Signature		
Name	Miguel Cartuyvels	Mike Simms
Title	Acoustic Consultant	Principal Acoustic Consultant
Date	30 June 2025	

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This report considers the specific instructions and requirements of our client. It is not intended for third-party use or reliance, and no responsibility is accepted for any third party. The provisions in this report apply solely to this project and should not be assumed applicable to other developments without review and modification.

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1. INTRODUCTION

This note has been prepared to provide details and methodology of the background noise survey undertaken and confirm the derived background noise levels the various Noise Monitoring Locations (NMLs), for the Proposed Project.

2. BACKGROUND NOISE SURVEY

The noise survey and subsequent data analysis was carried out in accordance with best practice following the guidance contained in the Institute of Acoustics publication *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise* (May 2013), (IOA GPG).

2.1 Measurement Locations

The background noise survey was conducted through installing unattended sound level meters at 5 no. representative locations in the surrounding area. The co-ordinates for selected locations for the noise monitoring locations are outlined in Table 2-1 and identified on a map in Figure 2-1.

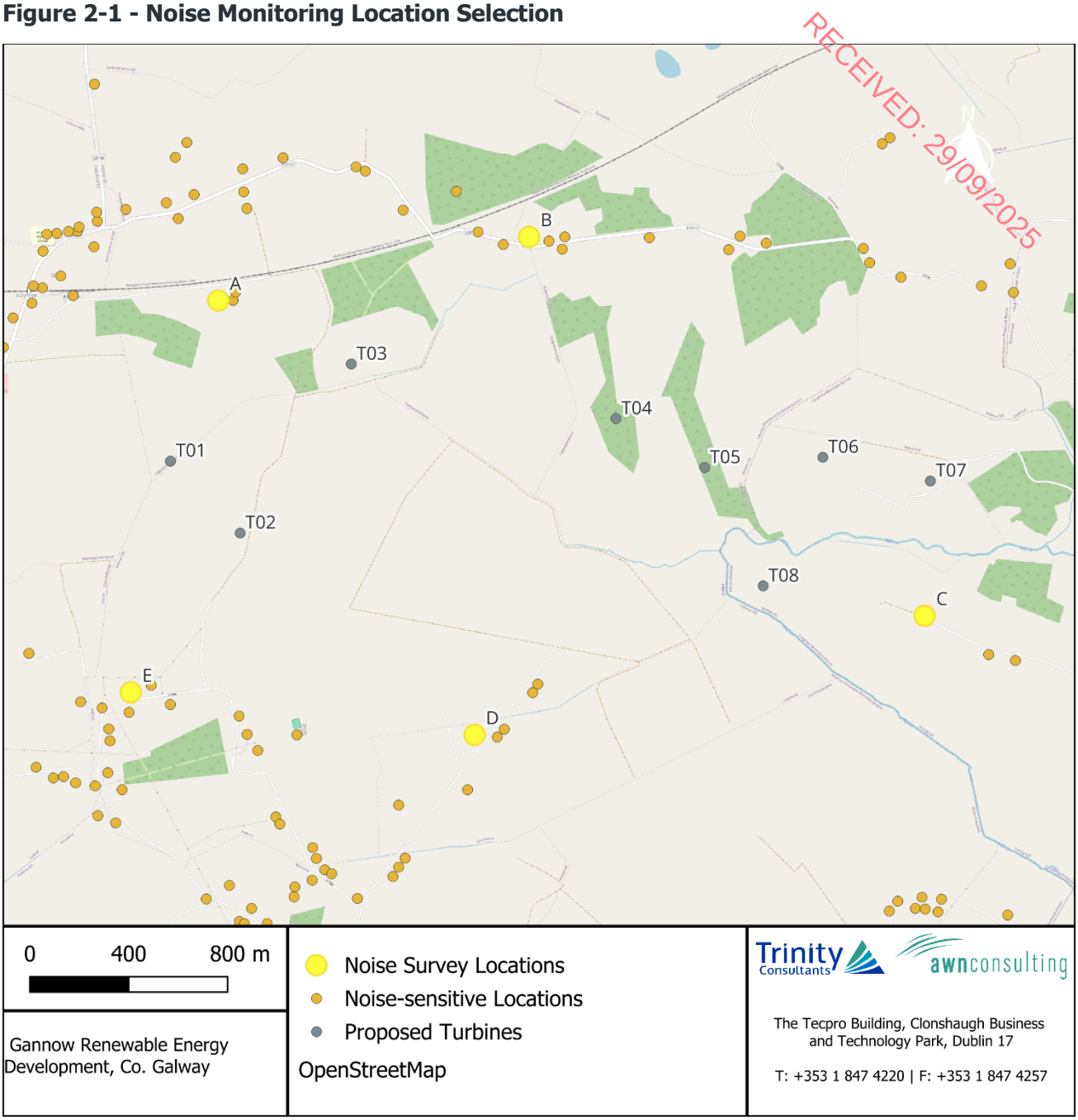
Table 2-1. Coordinates of Noise Monitoring Equipment

Location	Coordinates (ITM)	
	Easting	Northing
Loc A (H032)	560,199	730,248
Loc B (H020)	561,456	730,506
Loc C (H001)	563,057	728,973
Loc D (H310)	561,236	728,491
Loc E (H054)	559,845	728,663

Site visits by survey personnel were carried out during morning and afternoon periods; during these visits, primary noise sources contributing to noise environment were noted as being occasional local traffic noise, birdsongs, distant railway noise and distant agricultural activity. In respect of night-time periods, when noise due to traffic on local roads, agricultural activities and other sources tend to reduce, there was no indication of any significant local night-time sources of noise at any location. However, occasional train passes may be noticeable at locations A and B as they are relatively proximate to the railway. Review of Irish Rail timetable indicated train passes during early morning but none during the night-time period. No sources of vibration were noted at any of the survey locations.

In general, the significant noise sources in the area were noted to be local and distant traffic movements, activity in and around the residences, wind generated noise from local foliage and other typical anthropogenic sources typically found in such rural settings.

Figure 2-1 - Noise Monitoring Location Selection



2.2 Measurement Periods

The periods of noise measurements used in the background noise monitoring assessment are outlined in

Table 2-2. The survey was deemed completed when an adequate number of datasets had been measured as recommended in the IOA GPG to determine a suitable representation of the typical background noise.

Table 2-2. Measurement periods of Noise Monitoring Equipment

Location Reference	Survey Period	
	Start Date	End Date
Loc A (H032)	13 February 2025	18 March 2025
Loc B (H020)	13 February 2025	18 March 2025
Loc C (H001)	13 February 2025	18 March 2025
Loc D (H310)	13 February 2025	18 March 2025
Loc E (H054)	13 February 2025	18 March 2025

2.3 Measurement Procedure

Measurements were conducted at all locations over the survey periods outlined in

Table 2-2. Data samples for all measurements (noise, rainfall, and wind) were logged continuously at 10-minute interval periods for the duration of the survey. The $L_{Aeq,10min}$ and $L_{A90,10min}$ noise parameters were measured in this instance and the results were saved to the instrument memory for later analysis.

Survey personnel noted potential primary noise sources contributing to noise build-up during the installation and removal of the sound level meters from site.

2.4 Instrumentation

Table 2-3 confirms the details of the noise monitoring instrumentation installed at each location.

Table 2-3. Details of Noise Measurement Instrumentation

Location Reference	Equipment Make and Model	Serial Number
Loc A (H032)	Rion NL52	564808
Loc B (H020)	Rion NL52	976162
Loc C (H001)	Rion NL52	186671
Loc D (H310)	Rion NL52	186668
Loc E (H054)	Rion NL52	998411

Before and after the survey the measurement apparatus was check calibrated using a Brüel & Kjær type 4231 Sound Level Calibrator where appropriate. Instruments were calibrated on each interim visit and any drift noted. All calibration drifts were less than ±0.2 dB and within acceptable tolerances outlined in the IOA GPG.

2.5 Rainfall Data

Rainfall was monitored and logged using one Rain Gauge data logger that was installed at Locations A and B over the duration of the survey.

2.6 Wind Data

Average wind speed and direction was measured in 10-minute intervals at an on-site meteorological mast and provided to AWN. The coordinates of the met mast are provided in Table 2-4. A copy of the met mast installation report is included in Appendix 12.5 of the EIAR Chapter.

Table 2-4. Wind Measurement Location

Co-ordinates (ITM)	
Easting	Northing
562365	729810

2.6.1 Wind Shear

Wind speed collected at 65 m and 80 m were used to correct the wind speed up to an assessment hub height (HH) at 100 m, as per the methodology outlined in the IOA GPG.

The calculated HH wind speeds were then corrected to the 'standardised' 10 m height wind speed in accordance with the IOA GPG. The 'standardised' wind speed is the industry standard for referencing wind speeds with respect to wind turbines.

The calculated hub height wind speeds have been corrected standardised to 10 m height using a fixed correction. The standardised is a wind speed measured at a height different than 10 m (generally measured at the turbine hub height) which is expressed to a reference height of 10 m using a roughness length of 0.05 for standardisation purpose in accordance with the IEC 61400-11 standard:

Roughness Length Shear Profile: $U_1 = U_2 \times [(\ln(H_1/z))/ (\ln(H_2/z))]$

Where:

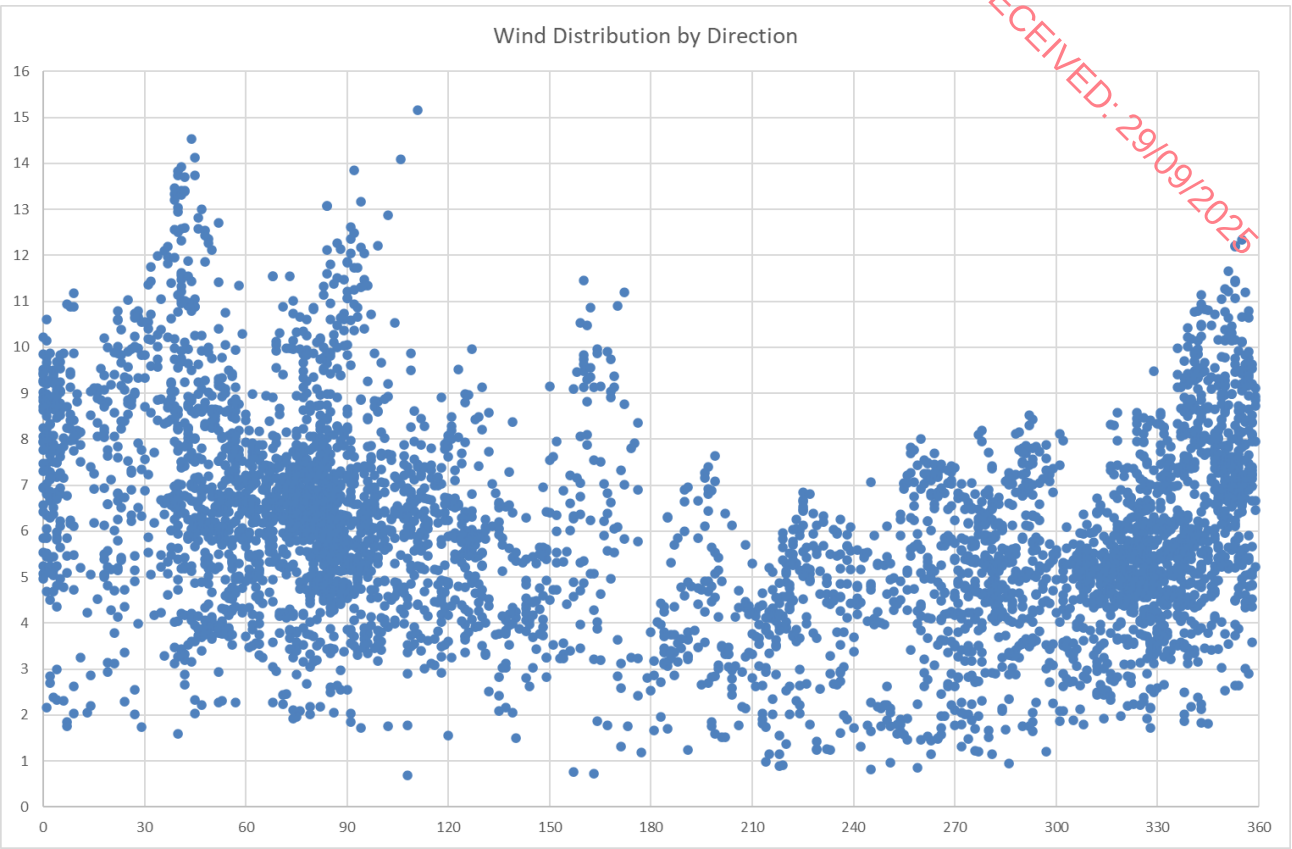
H_1	The height of the wind speed to be calculated (10m)
H_2	The height of the measured or calculated HH wind speed.
U_1	The wind speed to be calculated.
U_2	The measured or calculated HH wind speed.
Z	The roughness length.

Note: A roughness length of 0.05m is used to standardise hub height wind speeds to 10m height in the IEC 61400-11:2003 standard, regardless of what the actual roughness length seen on a site may have been. This 'normalisation' procedure was adopted for comparability between test results for different turbines.

Any reference to wind speed in this chapter should be understood to be the standardised 10 m height wind speed unless otherwise stated.

Figure 2-2 presents the distributions of the measured wind speed and wind direction over the survey period.

Figure 2-2. Distributions of Wind Speeds and Directions Over the Survey Period



2.7 Selection of Measurement Locations and Methodology

The purpose of the noise survey is to determine the background noise at representative noise sensitive locations (NSLs) within the receiving environment surrounding the Proposed Wind Farm site.

The survey locations were identified with consideration of the potential turbine noise contribution from the Proposed Wind Farm assessed using noise prediction modelling and supported by reviewing aerial images and street side images where available on website e.g., Google Earth and Bing Maps.

The assessment methodology in the EIAR is in accordance with the Institute of Acoustics document A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (2013) hereafter referred to as the IOA GPG.

The following text summaries the guidance from the IOA GPG for the selection of background noise survey locations:

- The selection of suitable noise monitoring locations for background noise surveys is not straightforward and only general guidance can be given as it is not possible to be prescriptive.
- Often there are practical constraints on where equipment can be placed, and a considerable degree of experience-based judgement is required when selecting these positions.
- Any contribution to background noise levels of noise from an existing wind farm must be excluded when assigning background noise and setting noise limits for a new development.
- No general guidance can therefore be given on the number of measurement locations as this will be site-specific.

A robust assessment of the noise impacts of the wind farm necessitates a detailed survey of the background noise at houses in the vicinity of the Proposed Wind Farm.

2.8 Data Analysis

The following sections present a summary of the statistical analysis carried out on the noise monitoring data to derive the background noise curves at each NML. Background noise data sets can be re-analysed for various scenarios should this be required, for instance, if the proposed HH changes or alternative hub heights are considered.

2.8.1 Assessment Periods

The results presented in the following sections refer to the noise data collated during 'quiet periods' of the day and night as defined in the IOA GPG. These periods are defined in Table 2-5.

Table 2-5. Daytime and Night Periods

Period Description	Period Definition
Daytime (Amenity Hours)	ETSU-R-97 defines the amenity hours as: 18.00 to 23.00 Monday to Friday. 13.00 to 23.00 on Saturdays; and, 07.00 to 23.00 on Sundays.
Night	ETSU-R-97 defines the night-time hours as 23.00 to 07.00 every day

The data sets have been assessed separately for both daytime and night-time periods as outlined in Table 3 and analysed with respect to the methods outlined in the IOA GPG.

2.8.2 Atypical Noise Data

The data sets have been filtered to remove issues such as the dawn chorus and the influence of other atypical noise sources. An example of atypical sources would be short, isolated periods of raised noise levels attributable to local sources, vehicles, agricultural activity, boiler flues, operation of gardening equipment etc. In addition, sample periods affected by rainfall or when rainfall resulted in prolonged periods of atypical noise levels have also been removed from the data sets. This approach is in line with the guidance contained in the IOA GPG.

2.9 Derived Background Noise Levels

The derived background noise levels dB $L_{A90,10min}$ for daytime and nighttime are presented in Table 2-6 and Table 2-7 respectively. These levels have been derived using regression analysis carried out on the data sets measured in line with best practice guidance contained in the IOA GPG and its SGN No. 2 Data Collection; Background noise levels are calculated based on a hub height of 104 m, this being the highest hub height of the candidate turbines. Appendix C presents the regression analysis charts for daytime and night-time periods from each NML.

These background noise levels will be used to determine the appropriate turbine noise limits in accordance with the adopted turbine noise criteria as set out in Chapter 12 (Noise and Vibration) of the EIAR.

Table 2-6. Derived Background Noise Levels at Assessment Hub Height - Daytime

Locations	Period	Background Noise Levels dB L_{A90} at standardised 10m height wind speed m/s for 104 m Hub Height							
		3	4	5	6	7	8	9	10
Loc A (H032)	Day	24.2	24.8	26.3	28.7	31.5	34.8	38.1	41.5
Loc B (H020)	Day	22.8	23.7	25.5	27.9	30.8	34.1	37.4	40.6
Loc C (H001)	Day	22.2	23.4	25.6	28.5	31.9	35.7	39.6	43.4
Loc D (H310)	Day	35.3	35.2	35.5	36.2	37.2	38.6	40.3	42.4
Loc E (H054)	Day	33.3	33.2	33.7	34.5	35.7	37.3	39.2	41.6

Table 2-7. Derived Background Noise Levels at Assessment Hub Height – Night-time

Locations	Period	Background Noise Levels dB L_{A90} at standardised 10m height wind speed m/s for 104 m Hub Height							
		3	4	5	6	7	8	9	10
Loc A (H032)	Night	17.1	17.4	19.2	22.2	26.1	30.6	35.5	40.4
Loc B (H020)	Night	17.4	17.8	19.8	22.9	26.9	31.5	36.5	41.5
Loc C (H001)	Night	18.1	18.7	20.8	23.9	27.9	32.4	37.3	42.2
Loc D (H310)	Night	33.0	33.2	33.8	34.8	36.1	37.8	39.8	42.3
Loc E (H054)	Night	30.6	30.6	31.1	32.1	33.5	35.4	37.8	40.7

APPENDIX A. GLOSSARY OF ACOUSTIC TERMS

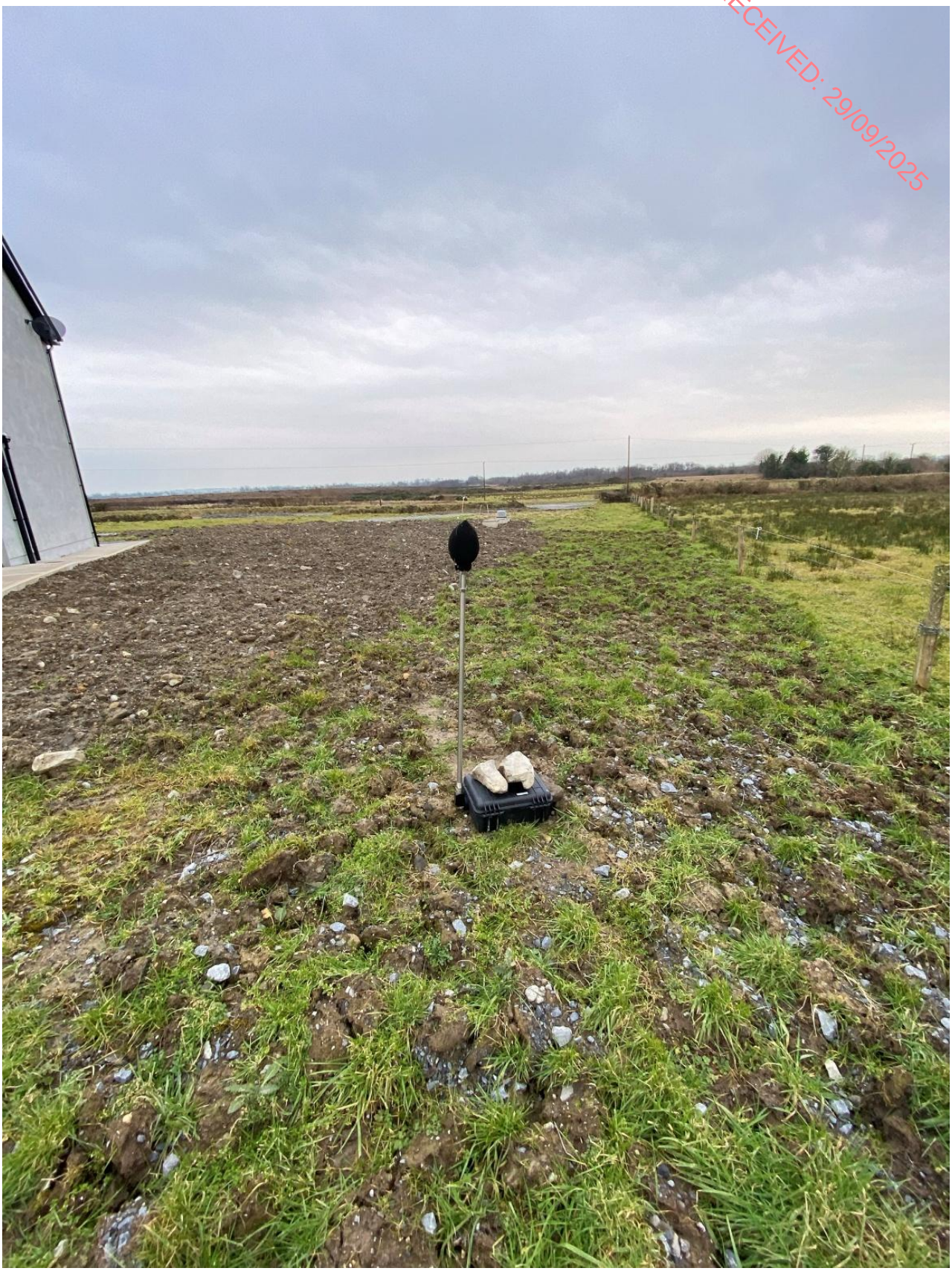
Background noise	The noise level rarely fallen below in any given location over any given time period, often classed according to daytime, evening or night-time periods.
dB	Abbreviation for 'decibel'.
dB(A)	Abbreviation for the decibel level of a sound that has been A-weighted.
Dawn Chorus	Noise due to birds which can occur at sunrise.
Decibel	The unit normally employed to measure the magnitude of sound.
Directivity	The property of a sound source that causes more sound to be radiated in one direction than another.
L_{A90}	The noise level exceeded 90% of the time during a measurement period, often used for the measurement of background noise.
Level	The general term used to describe a sound once it has been converted into decibels.
Sound level meter	An instrument for measuring sound pressure level.

Appendix Figure B-1. Location A Installation

Appendix Figure B-2. Location B Installation

Appendix Figure B-3. Location C Installation

Appendix Figure B-4. Location D Installation

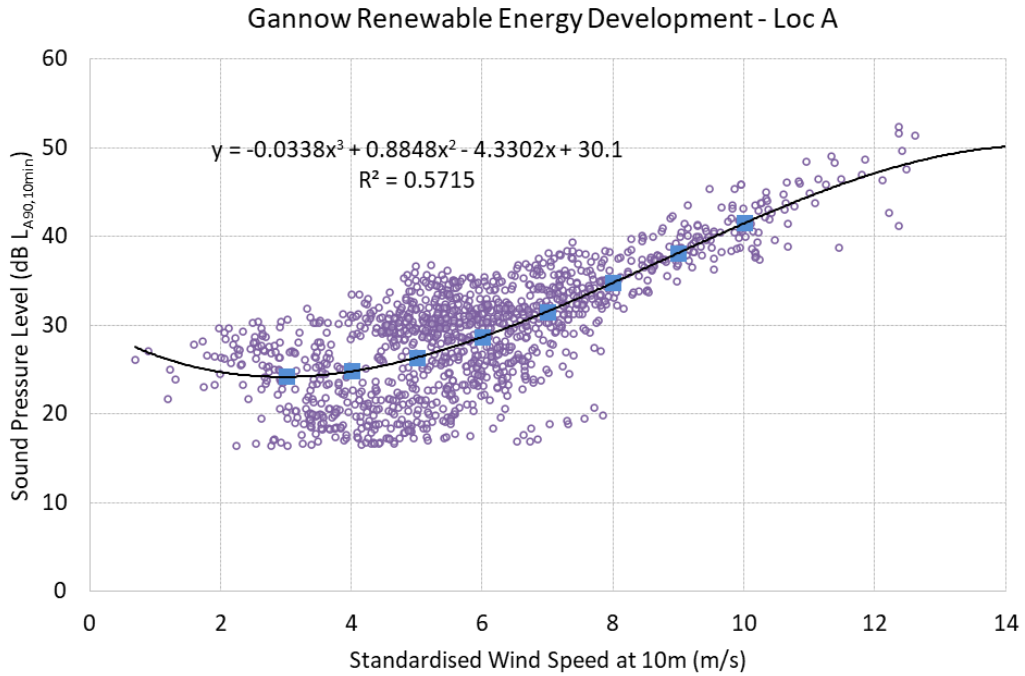


Appendix Figure B-5. Location E Installation

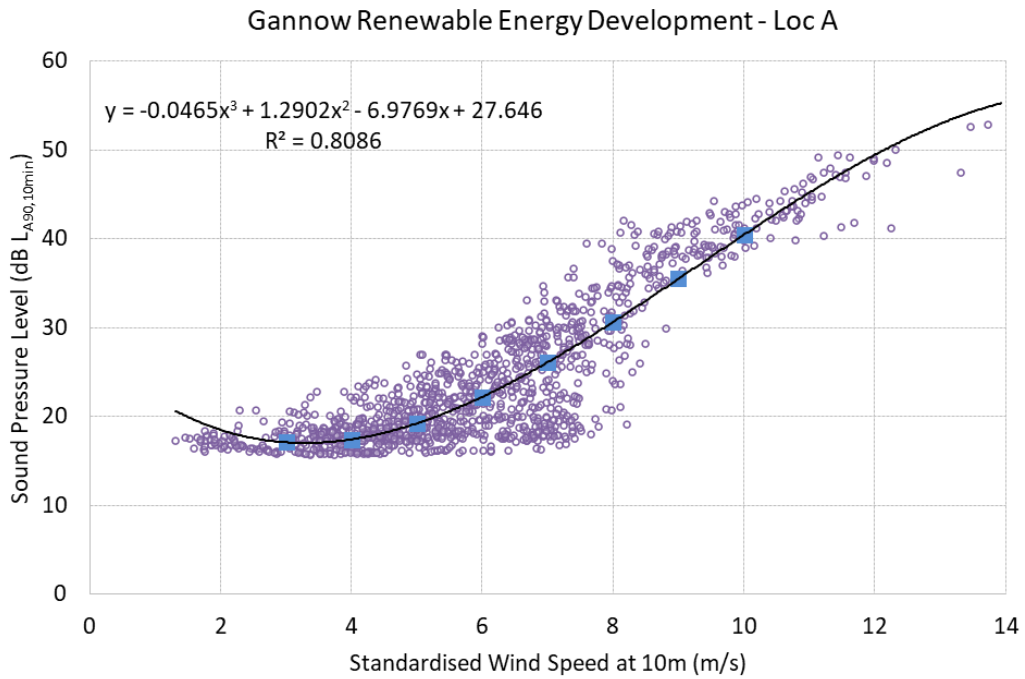
APPENDIX C. REGRESSION ANALYSIS ON DATA SETS

The following graphs present the data sets for each location. In each case, the daytime data is presented first and the night-time data below.

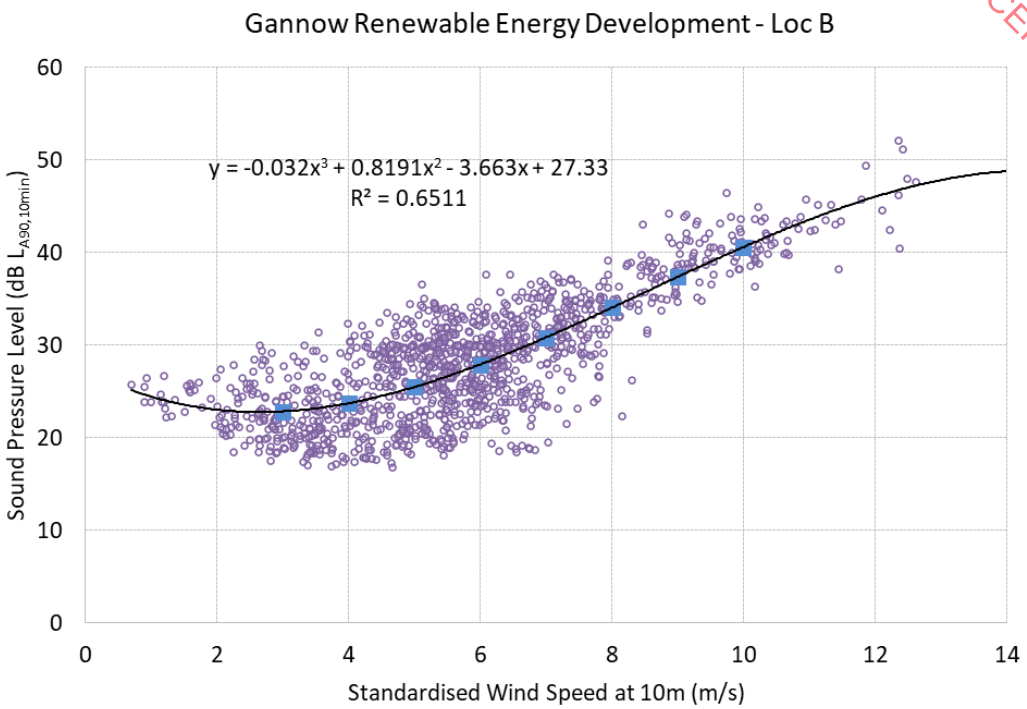
Appendix Figure C-1. Location A Daytime noise levels



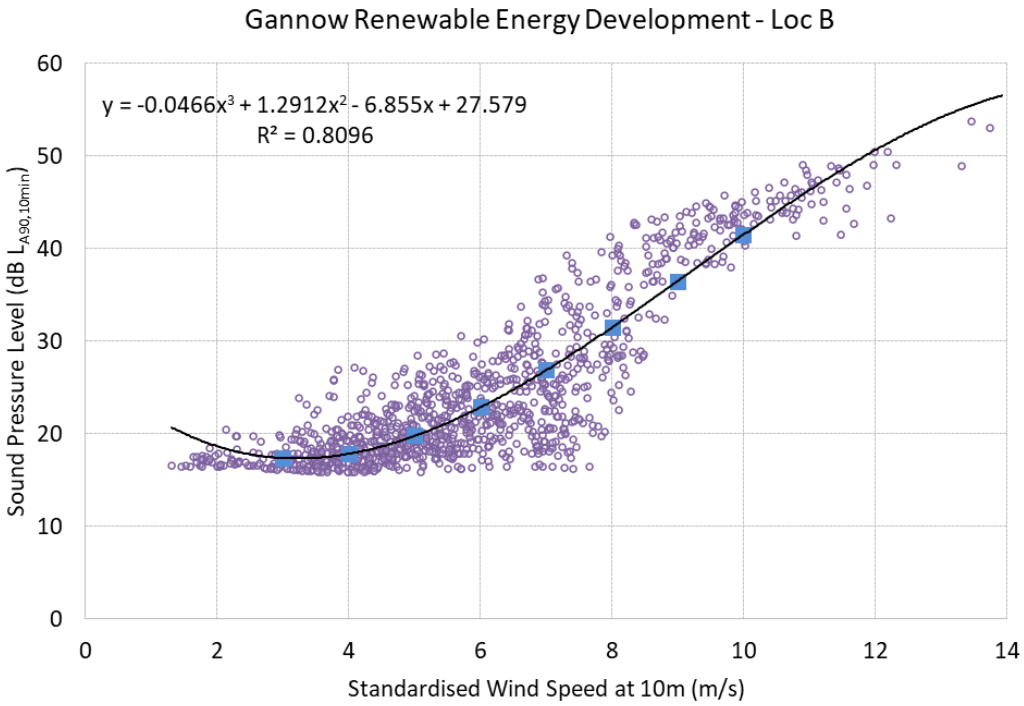
Appendix Figure C-2. Location A Night-time noise levels



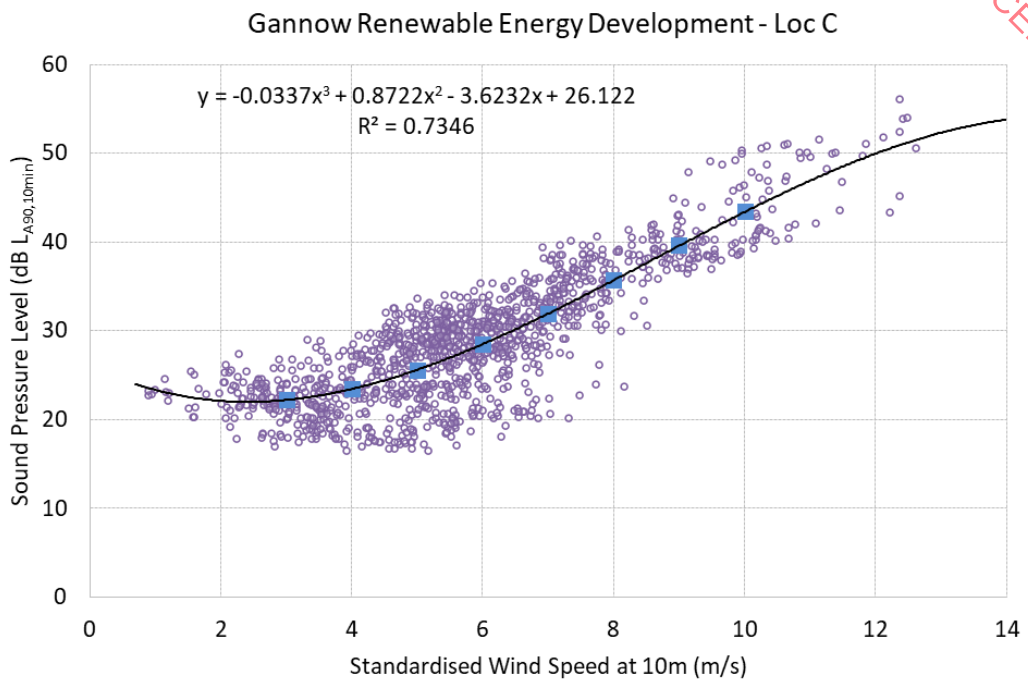
Appendix Figure C-3. Location B Daytime noise levels



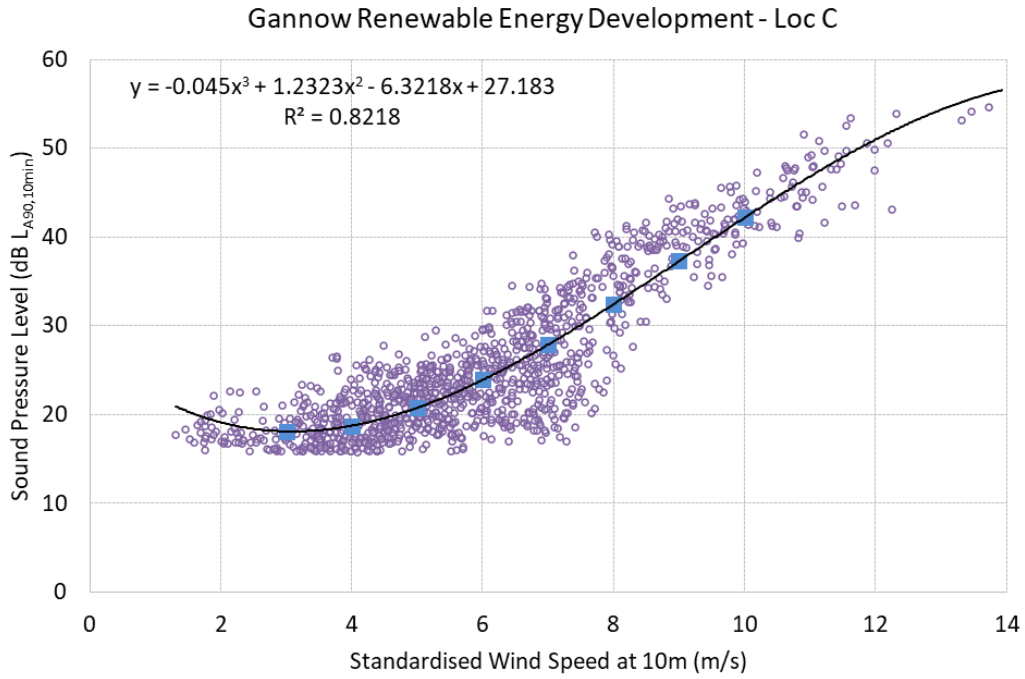
Appendix Figure C-4. Location B Night-time noise levels



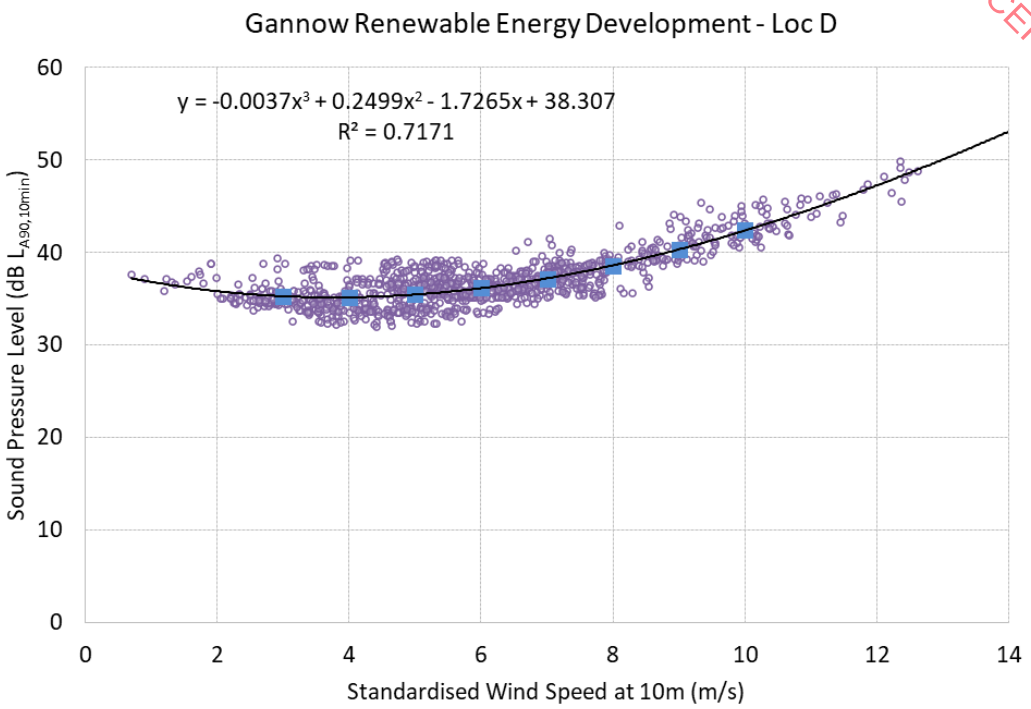
Appendix Figure C-5. Location C Daytime noise levels



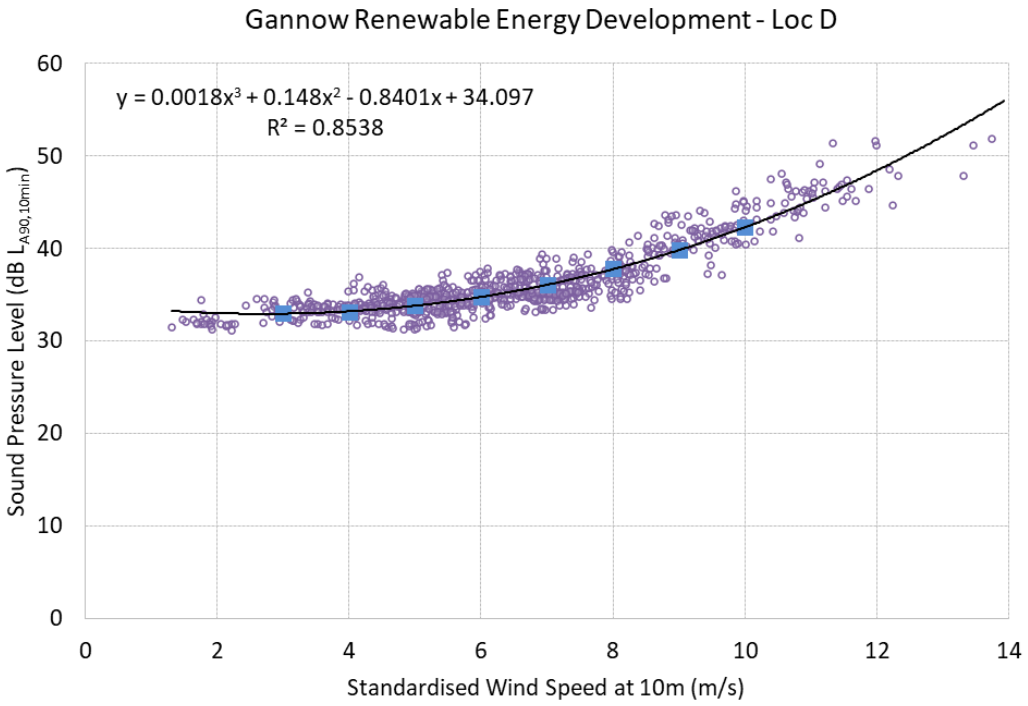
Appendix Figure C-6. Location C Night-time noise levels



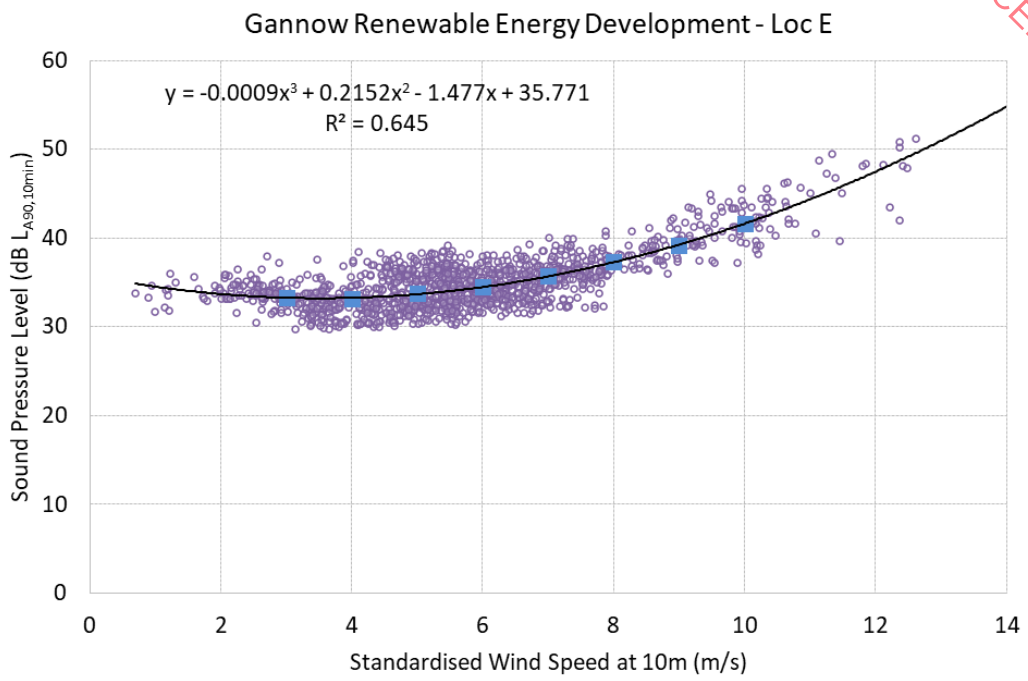
Appendix Figure C-7. Location D Daytime noise levels



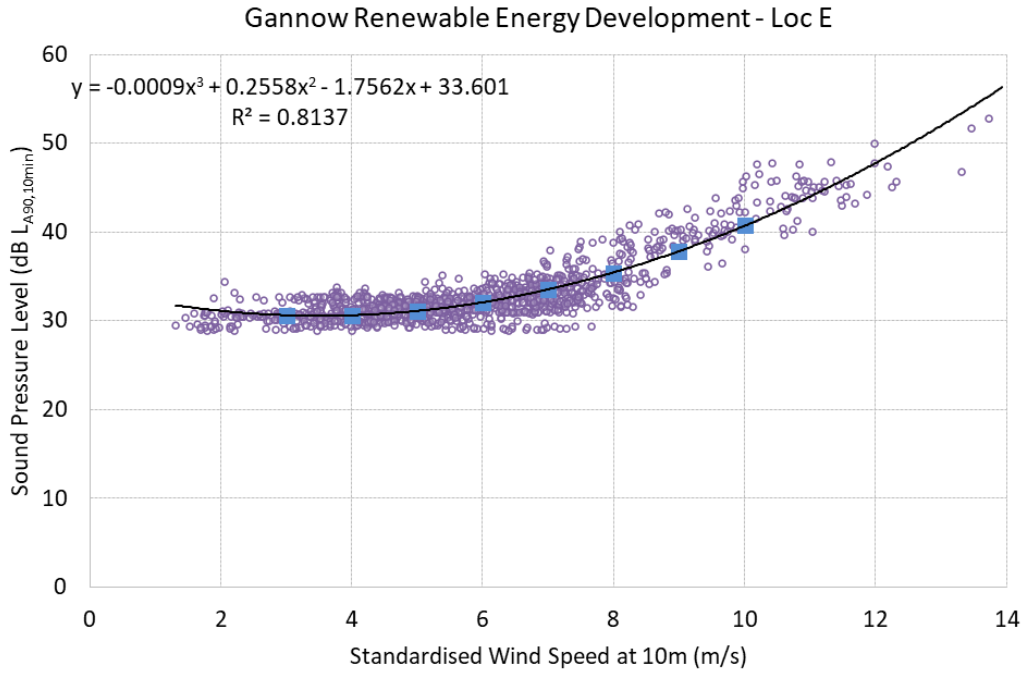
Appendix Figure C-8. Location D Night-time noise levels



Appendix Figure C-9. Location E Daytime noise levels



Appendix Figure C-10. Location E Nighttime noise levels



Location A (H032)

ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 10 September 2024 **Certificate Number: UCRT24/2197**

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Customer	AWN Consulting Limited The Tecpro Building 17, Clonshaugh Business & Technology Park Dublin

Order No.	2423			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00564808
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	76921
	Rion	Microphone	UC-59	21306
	Rion	Calibrator	NC-75	34724227
		Calibrator adaptor type if applicable		NC-75-022
Performance Class	1			
Test Procedure	TP 10. SLM 61672-3:2013			
	Procedures from IEC 61672-3:2013 were used to perform the periodic tests.			
Type Approved to IEC 61672-1:2013	Yes			
	If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013			
Date Received	06 September 2024		ANV Job No.	UKAS24/09634
Date Calibrated	10 September 2024			

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.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	05 September 2022	UCRT22/2064	0653

Location B (H020)

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

UKAS CALIBRATION 0653

Date of Issue: 19 September 2024 **Certificate Number: UCRT24/2249**

Calibrated at & Certificate issued by:
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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Customer	AWN Consulting Limited The Tecpro Building 17, Clonshaugh Business & Technology Park Dublin

Order No.	2423			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00976162
	Rion	Firmware		2.1
	Rion	Pre Amplifier	NH-25	87063
	Rion	Microphone	UC-59	13407
	Rion	Calibrator	NC-75	34724227
		Calibrator adaptor type if applicable		NC-75-022
Performance Class	1			
Test Procedure	TP 10. SLM 61672-3:2013 *Procedures from IEC 61672-3:2013 were used to perform the periodic tests.*			
Type Approved to IEC 61672-1:2013	Yes *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013*			
Date Received	06 September 2024	ANV Job No.	UKAS24/09634	
Date Calibrated	19 September 2024			

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.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	02 September 2022	UCRT22/2053	0653

Location C (H001)

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 06 June 2024

Certificate Number: UCRT24/1832

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
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E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Customer	AWN Consulting Ltd The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90
Order No.	2408
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00186671
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76821
Rion	Microphone	UC-59	16877
Rion	Calibrator	NC-75	34334830
	Calibrator adaptor type if applicable		NC-75-022

Performance Class	1
Test Procedure	TP 10. SLM 61672-3:2013
	Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
Type Approved to IEC 61672-1:2013	Yes
	If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013
Date Received	29 May 2024 ANV Job No. UKAS24/05402
Date Calibrated	06 June 2024

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.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	16 May 2022	UCRT22/1656	0653

Location D (H310)

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 13 June 2023 **Certificate Number: UCRT23/1774**

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
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E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Customer	AWN Consulting Limited The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90 Ireland			
Order No.	AWN200423			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00186668
	Rion	Firmware		2.1
	Rion	Pre Amplifier	NH-25	76701
	Rion	Microphone	UC-59	12813
	Rion	Calibrator	NC-74	34536109
		Calibrator adaptor type if applicable		NC-74-002
Performance Class	1			
Test Procedure	TP 10. SLM 61672-3:2013 *Procedures from IEC 61672-3:2013 were used to perform the periodic tests.*			
Type Approved to IEC 61672-1:2013	Yes *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013*			
Date Received	13 June 2023		ANV Job No.	UKAS23/06399
Date Calibrated	13 June 2023			

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.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	03 May 2022	UCRT22/1600	0653

Location E (H054)

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 20 February 2024

Certificate Number: UCRT24/1281

Calibrated at & Certificate issued by:
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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Customer	AWN Consulting Limited The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90 Ireland			
Order No.	2358			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00998411
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	98625
	Rion	Microphone	UC-59	17215
	Brüel & Kjær	Calibrator	4231	2263026
		Calibrator adaptor type if applicable		UC 0210
Performance Class	1			
Test Procedure	TP 10. SLM 61672-3:2013 *Procedures from IEC 61672-3:2013 were used to perform the periodic tests.*			
Type Approved to IEC 61672-1:2013	Yes *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013*			
Date Received	19 February 2024		ANV Job No.	UKAS24/02147
Date Calibrated	20 February 2024			

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.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	01 February 2022	UCRT22/1140	0653