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Background Noise Survey

Project Title: Lissingagroagh Wind Farm, Co Leitrim

CLIENT

Tobin Consulting
Engineers

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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

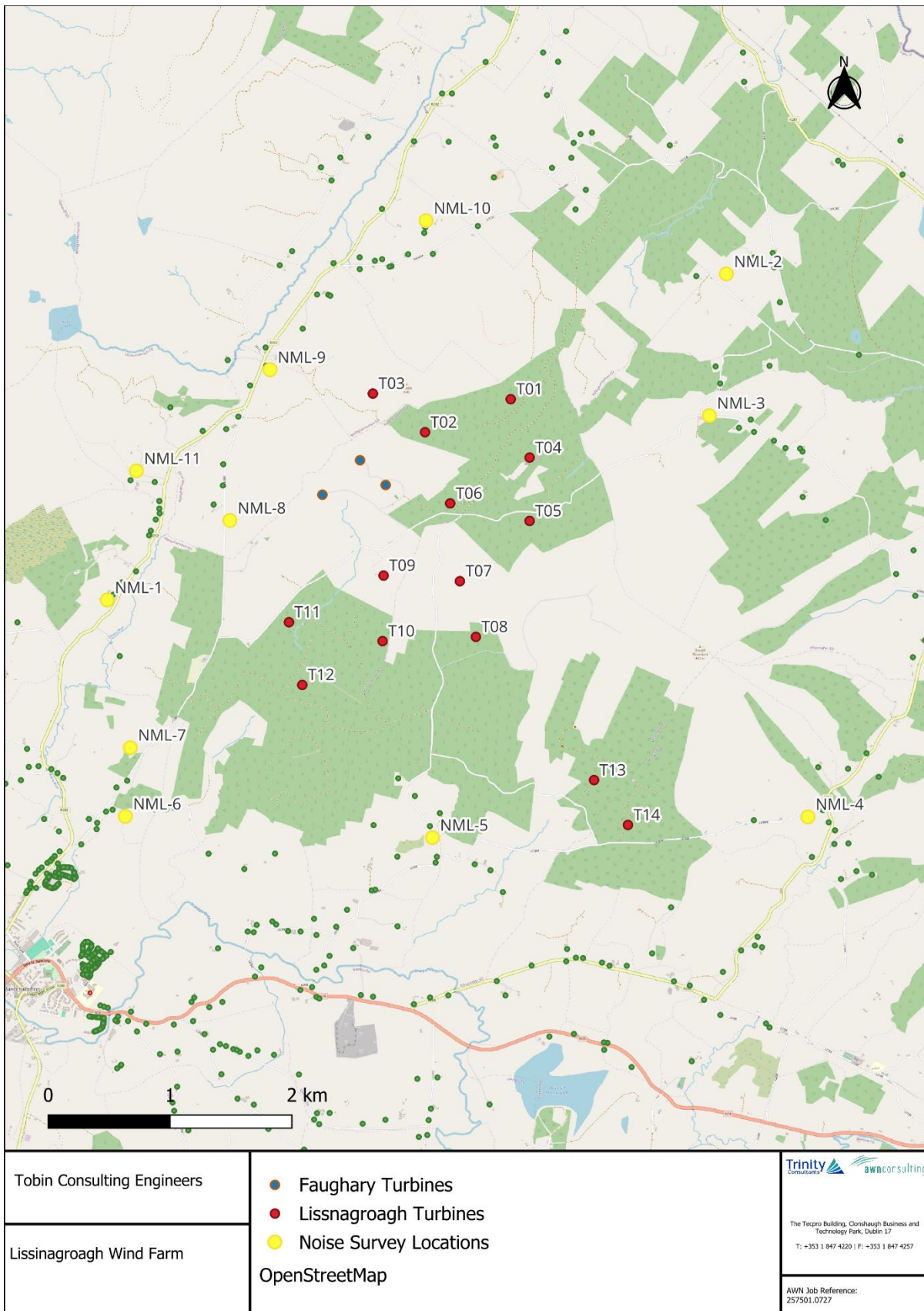
Location	Coordinates (ITM)	
	Easting	Northing
NML-1 (H0677)	589332	842725
NML-2 (H0842)	594119	845340
NML-3 (H0920)	594212	844226
NML-4 (H0565)	595036	840903
NML-5 (H0475)	591954	840734
NML-6 (H1487)	589433	840908
NML-7 (H0857)	589474	841471
NML-8 (H0046)	590291	843336
NML-9 (H0501)	591901	845796
NML-10 (H1574)	589523	843746
NML-11 (H0759)	590621	844573

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 distant traffic movements, activity in and around the residences and wind generated noise from local foliage and other typical anthropogenic sources typically found in such rural settings.

Both locations, B and C, were moved on 20 August 2019 to accommodate cattle in their previous measurement positions. In both cases, the change in location was minor and did not significantly affect the measured noise levels.

There were no perceptible sources of vibration noted at any of the survey locations

Figure 2-1. Noise Monitoring Locations



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
NML-1 (H0677)	13:30 hrs on 22 Sept 2021	10:10 hrs on 18 Nov 2021
NML-2 (H0842)	13:20 hrs on 18 Nov 2021	12:50 hrs on 9 Dec 2021
NML-3 (H0920)	13:00 hrs on 22 Sept 2021	12:40 hrs on 18 Nov 2021
NML-4 (H0565)	14:50 hrs on 18 Nov 2021	13:30 hrs on 30 Nov 2021
NML-5 (H0475)	11:30 hrs on 22 Sept 2021	13:00 hrs on 18 Nov 2021
NML-6 (H1487)	10:40 hrs on 18 Nov 2021	11:20 hrs on 9 Dec 2021
NML-7 (H0857)	11:00 hrs on 18 Nov 2021	11:50 hrs on 9 Dec 2021
NML-8 (H0046)	12:10 hrs on 22 Sept 2021	11:20 hrs on 18 Nov 2021
NML-9 (H0501)	10:50 hrs on 22 Sept 2021	09:50 hrs on 18 Nov 2021
NML-10 (H1574)	11:40 hrs on 18 Nov 2021	19:30 hrs on 1 Dec 2021
NML-11 (H0759)	12:10 hrs on 18 Nov 2021	12:30 hrs on 9 Dec 2021

A variety of wind speed and weather conditions were encountered over the survey periods in question.

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. Calibration certificates are provided in Appendix D.

Table 2-3. Details of Noise Measurement Instrumentation

Location Reference	Equipment Make and Model	Serial Number
NML-1 (H0677)	RION – NL-52	186671
NML-2 (H0842)	RION – NL-52	976162
NML-3 (H0920)	RION – NL-52	976162
NML-4 (H0565)	RION – NL-52	186668
NML-5 (H0475)	RION – NL-52	164426
NML-6 (H1487)	RION – NL-52	186671
NML-7 (H0857)	RION – NL-52	586940
NML-8 (H0046)	RION – NL-52	564809
NML-9 (H0501)	RION – NL-52	586940
NML-10 (H1574)	RION – NL-52	564809
NML-11 (H0759)	RION – NL-52	998413

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

Rain fall was monitored and logged using a Texas Instruments TR-525 console and a data logger that was installed on-site for the duration of the surveys. This allows for the identification of periods of rain fall to allow for the removal sample periods affect by rainfall from the noise monitoring data sets in line with best practice when calculating the prevailing background noise levels.

2.6 Wind Data

Wind data was measured at a meteorological mast located within the site of the proposed development and was supplied to AWN for data analysis.

2.6.1 Wind Shear

Wind speed collected at 90 m and 75 m were used to correct the wind speed up to an assessment hub height (HH) at 103.5 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: $U_1 = U_2 \times \left[\frac{\ln(H_1/z)}{\ln(H_2/z)} \right]$

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.

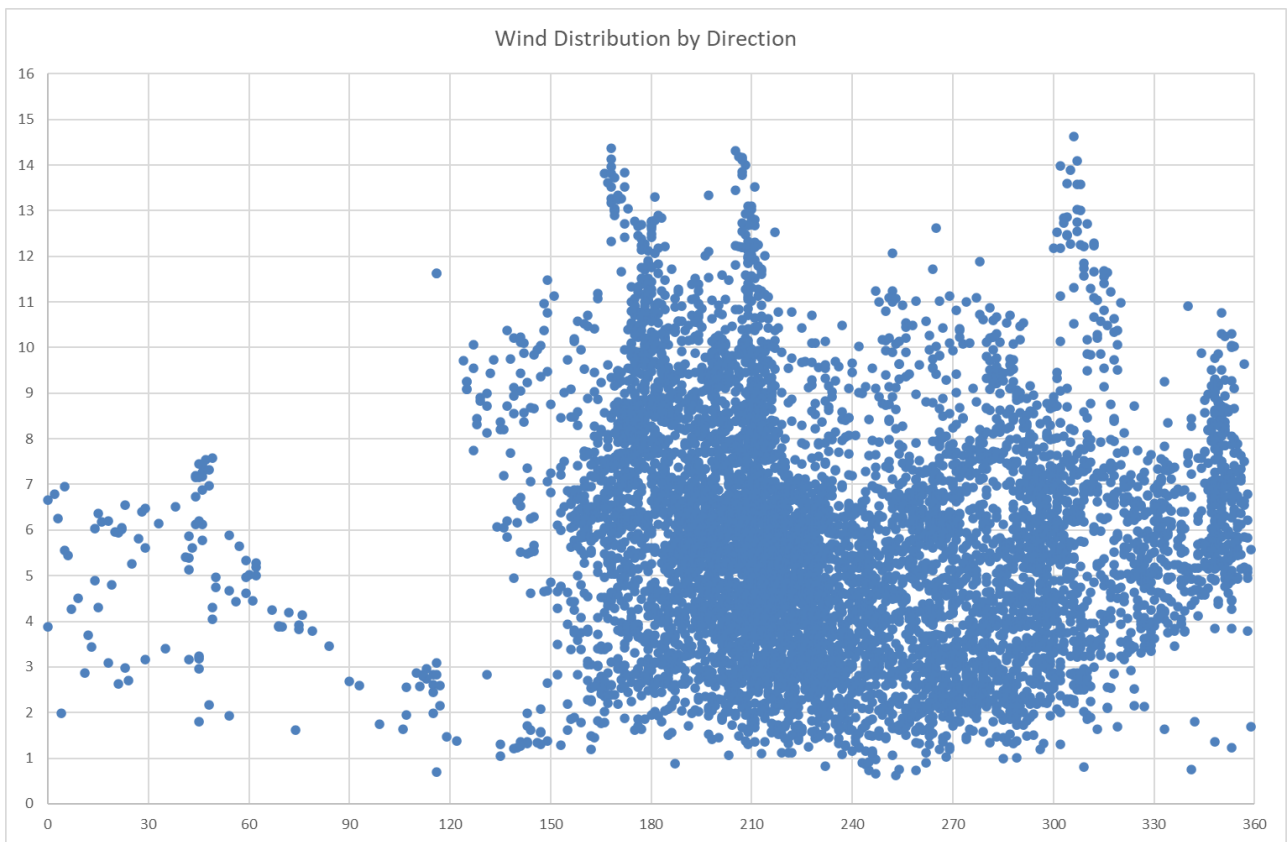


Figure 2-2. Distributions of Wind Speeds and Directions Over the Survey Period 22 Sept to 18 Nov 2021

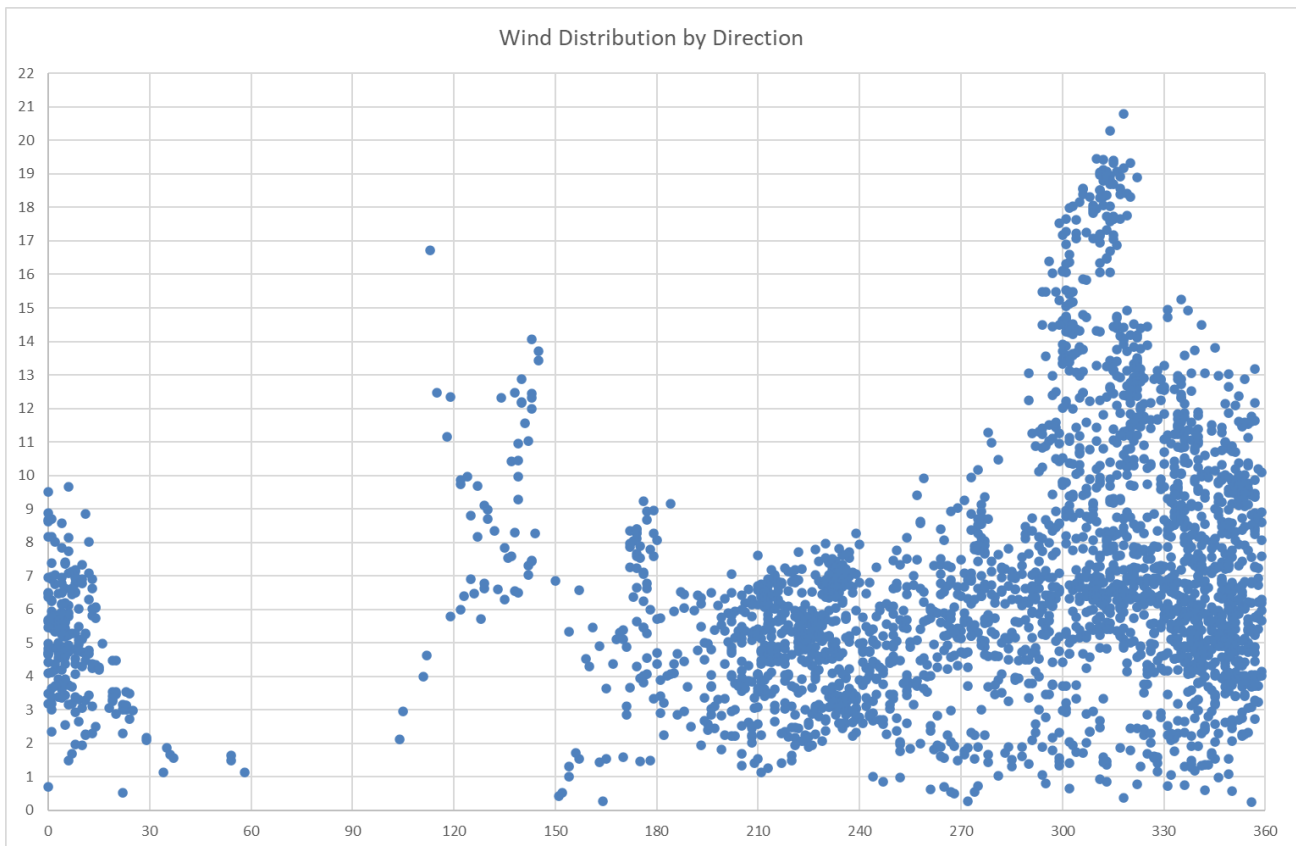


Figure 2-3. Distributions of Wind Speeds and Directions Over the Survey Period 18 Nov to 9 Dec 2021

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 2-4.

Table 2-4. 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.

In accordance with the guidance, noise from existing operational windfarms must not form part of the background noise. The data sets collected at all locations have been directionally filtered to exclude periods where the measurement locations were downwind of Faughary Wind Farm. As such, the lowest background noise conditions are captured to provide a worst-case assessment.

2.9 Derived Background Noise Levels

The derived background noise levels dB $L_{A90,10min}$ for daytime and nighttime are presented in Table 2-5 and Table 2-6 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 the assessment hub height of 103.5 m. 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 2-5. Derived Background Noise Levels at Assessment Hub Height - Daytime

Locations	Period	Background Noise Levels dB LA90 at standardised 10m height wind speed m/s for 103.5 m Hub Height							
		3	4	5	6	7	8	9	10
NML-1 (H0677)	Day	26.8	27.7	29.2	31.2	33.4	35.8	38.0	40.1
NML-2 (H0842)	Day	23.7	25.6	27.9	30.5	33.4	36.4	39.5	42.7
NML-3 (H0920)	Day	29.1	30.2	32.0	34.3	36.8	39.1	41.0	42.3
NML-4 (H0565)	Day	26.4	27.1	28.1	29.4	30.8	32.2	33.6	34.8
NML-5 (H0475)	Day	35.3	35.1	36.1	37.8	39.9	42.1	44.1	45.4
NML-6 (H1487)	Day	30.9	31.7	32.6	33.8	35.1	36.5	38.1	39.8
NML-7 (H0857)	Day	30.1	31.0	32.2	33.6	35.1	36.8	38.6	40.5
NML-8 (H0046)	Day	26.0	27.6	29.7	31.1	33.2	35.9	38.4	40.6
NML-9 (H0501)	Day	30.7	32.0	33.8	35.8	38.0	40.1	41.8	41.8
NML-10 (H1574)	Day	39.2	39.6	40.3	41.4	42.7	44.3	46.2	48.4
NML-11 (H0759)	Day	28.6	29.8	31.1	32.6	34.3	36.1	38.0	39.9

Table 2-6. Derived Background Noise Levels at Assessment Hub Height – Night-time

Locations	Period	Background Noise Levels dB LA90 at standardised 10m height wind speed m/s for 103.5 m Hub Height							
		3	4	5	6	7	8	9	10
NML-1 (H0677)	Night	23.5	24.3	25.7	27.7	30.1	32.8	35.7	38.7
NML-2 (H0842)	Night	25.6	27.6	29.7	31.9	34.3	37.0	39.9	43.2
NML-3 (H0920)	Night	29.6	31.0	32.7	34.5	36.6	38.8	41.3	43.8
NML-4 (H0565)	Night	25.3	26.2	27.0	27.8	28.7	29.8	31.1	32.8
NML-5 (H0475)	Night	34.0	34.7	35.7	37.0	38.5	40.1	41.8	43.6
NML-6 (H1487)	Night	29.0	29.6	30.4	31.4	32.8	34.4	36.5	39.1
NML-7 (H0857)	Night	28.3	29.1	30.2	31.8	33.7	35.9	38.3	40.9
NML-8 (H0046)	Night	22.4	24.5	26.8	27.9	29.8	33.3	36.5	39.4
NML-9 (H0501)	Night	29.6	31.4	33.4	35.1	36.4	36.9	36.9	36.9

Locations	Period	Background Noise Levels dB L _{A90} at standardised 10m height wind speed m/s for 103.5 m Hub Height							
		3	4	5	6	7	8	9	10
NML-10 (H1574)	Night	38.9	39.2	39.8	40.6	41.8	43.1	44.7	46.6
NML-11 (H0759)	Night	27.2	28.8	30.4	31.9	33.4	35.1	36.9	39.0

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 B. INSTALLATION PHOTOGRAPHS

Appendix Figure B-1. Location NML-1 Installation



Appendix Figure B-2. Location NML-2 Installation



Appendix Figure B-3. Location NML-3 Installation



Appendix Figure B-4. Location NML-4 Installation

Photograph not available for Location NML-4.

Appendix Figure B-5. Location NML-5 Installation



Appendix Figure B-6. Location NML-6 Installation



Appendix Figure B-7. Location NML-7 Installation



Appendix Figure B-8. Location NML-8 Installation



Appendix Figure B-9. Location NML-9 Installation



Appendix Figure B-10. Location NML-10 Installation



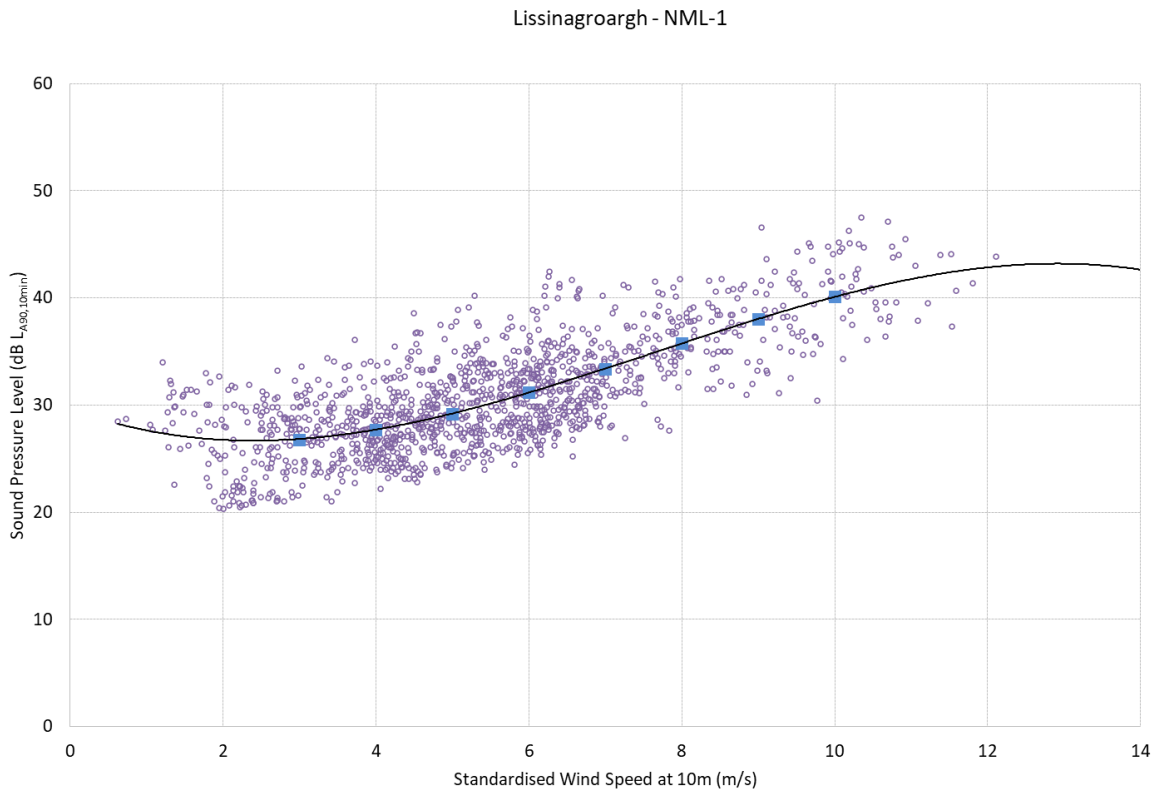
Appendix Figure B-11. Location NML-11 Installation



APPENDIX C. REGRESSION ANALYSIS ON DATA SETS

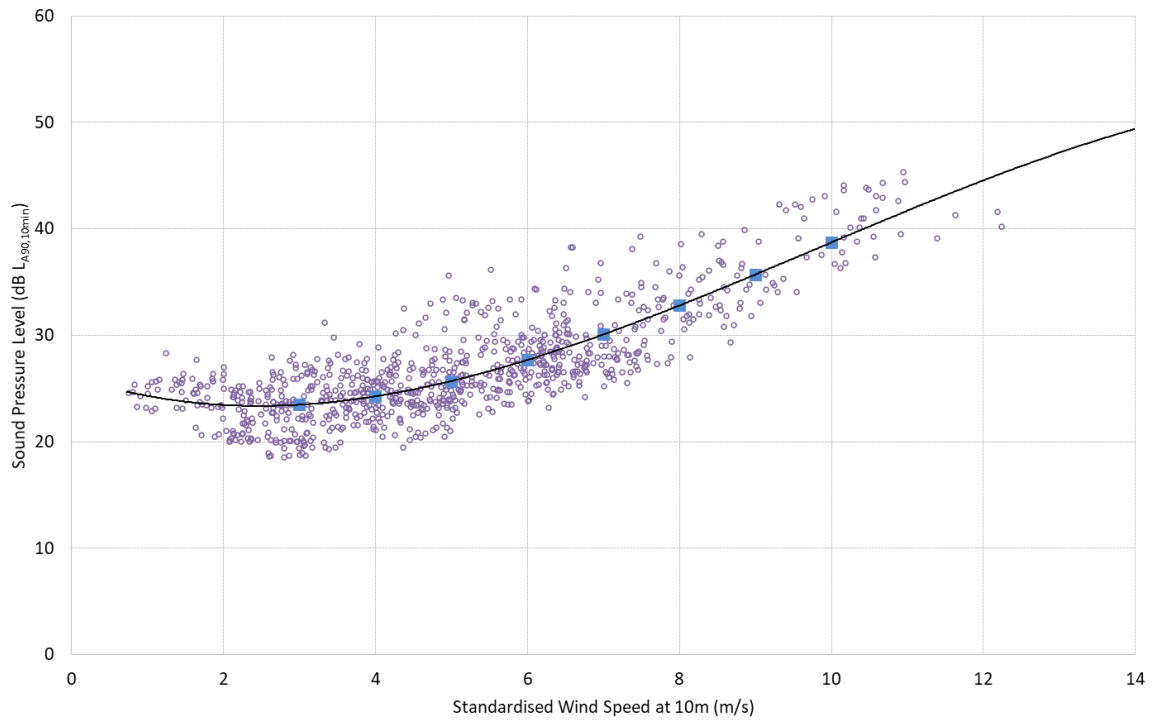
The following graphs present the data sets for each location. In each case, the daytime data is presented first and the night-time data below.

Appendix Figure C-1. Location NML-1 Daytime noise levels



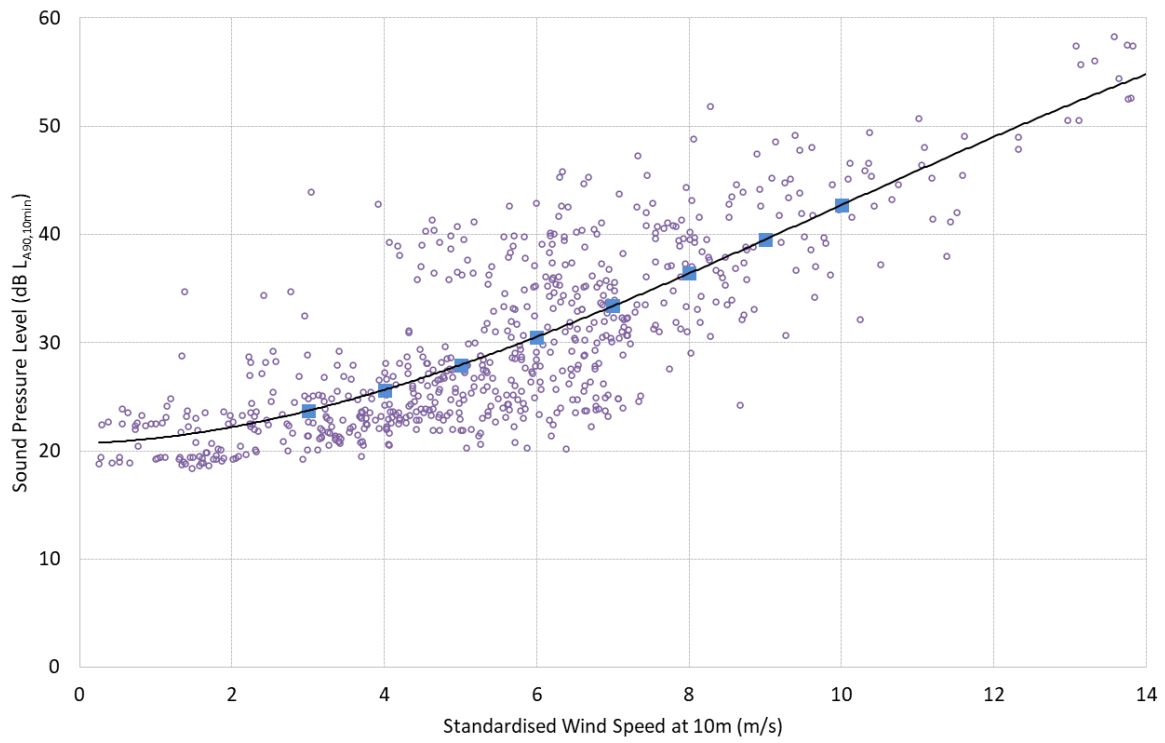
Appendix Figure C-2. Location NML-1 Night-time noise levels

Lissnagroargh - NML-1



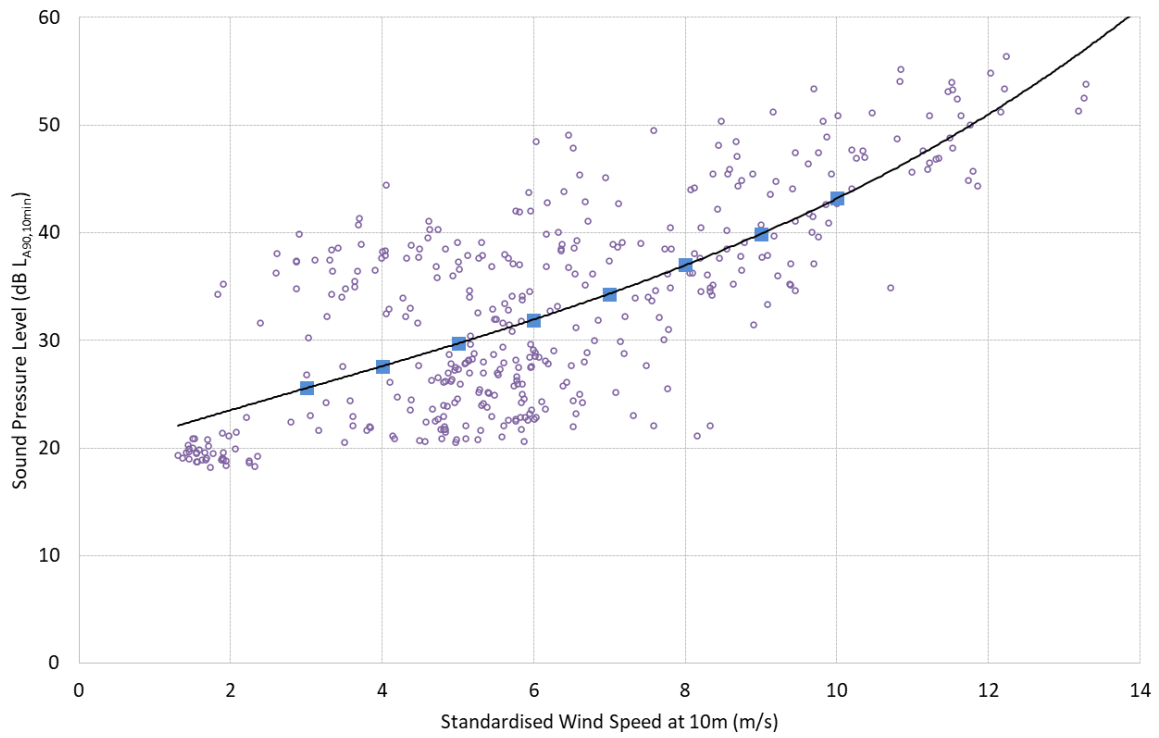
Appendix Figure C-3. Location NML-2 Daytime noise levels

Lissinagroagh - NML-2



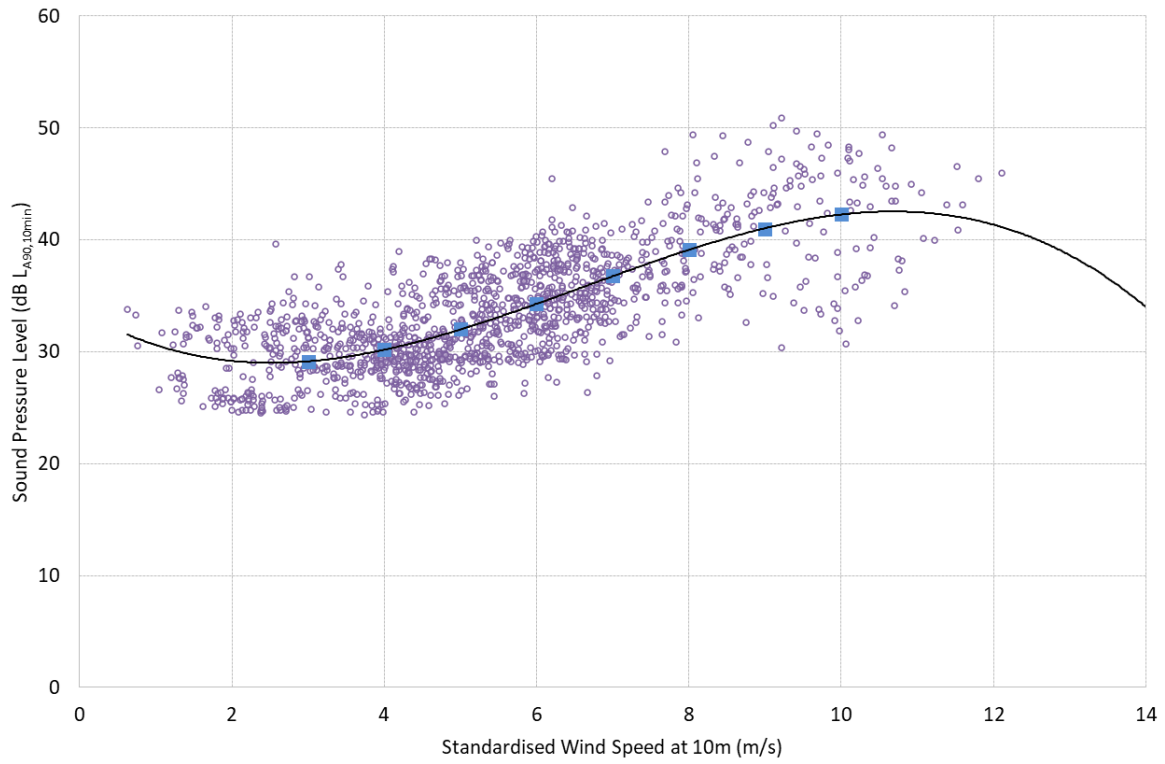
Appendix Figure C-4. Location NML-2 Night-time noise levels

Lissinagroagh - NML-2



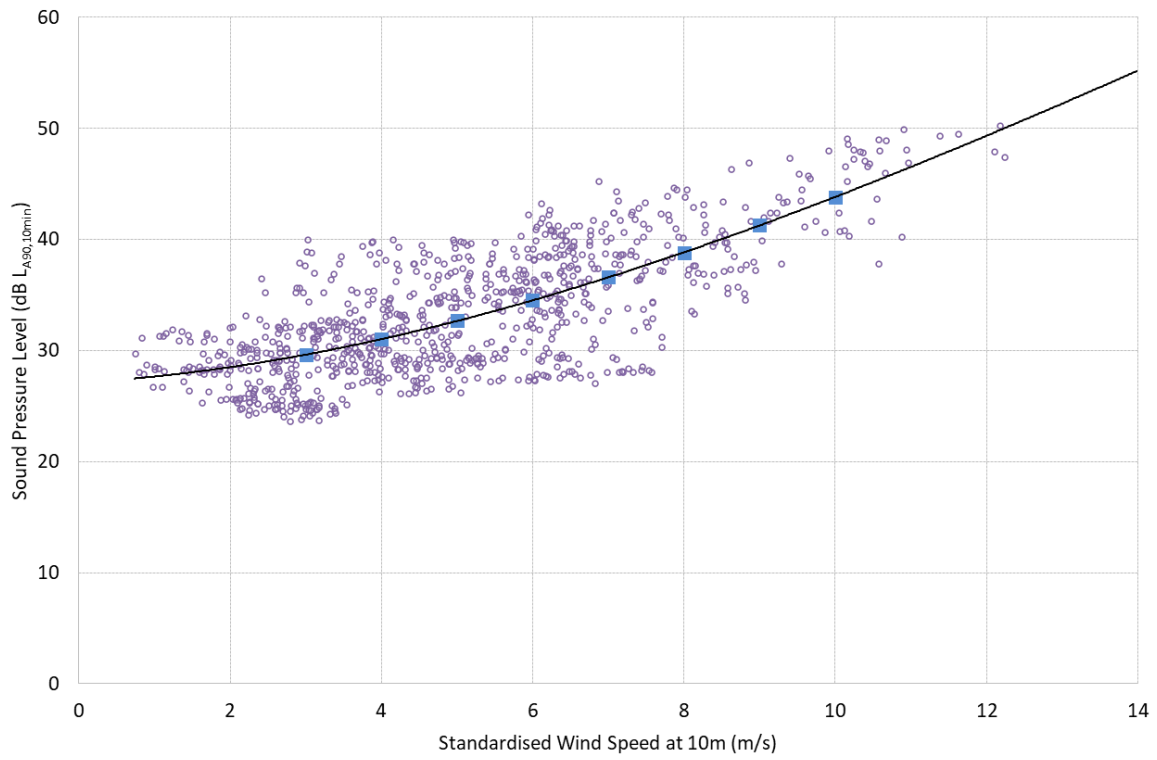
Appendix Figure C-5. Location NML-3 Daytime noise levels

Lissnagroargh - NML-3



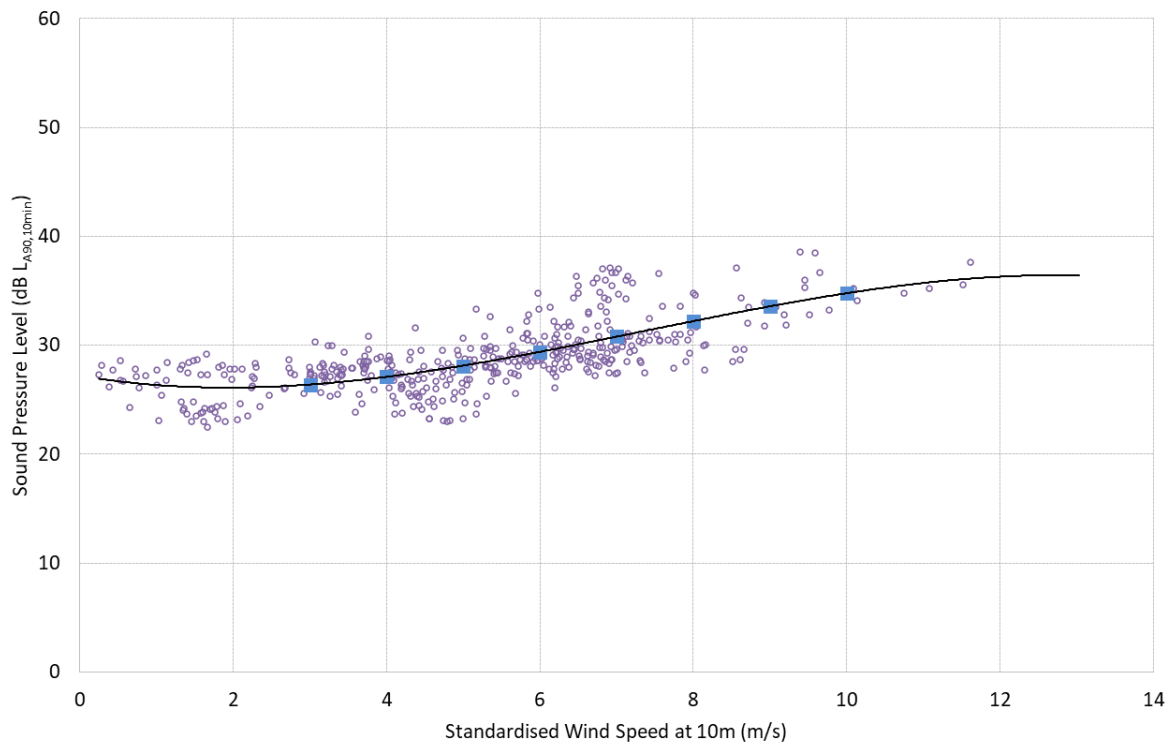
Appendix Figure C-6. Location NML-3 Night-time noise levels

Lissnagroargh - NML-3



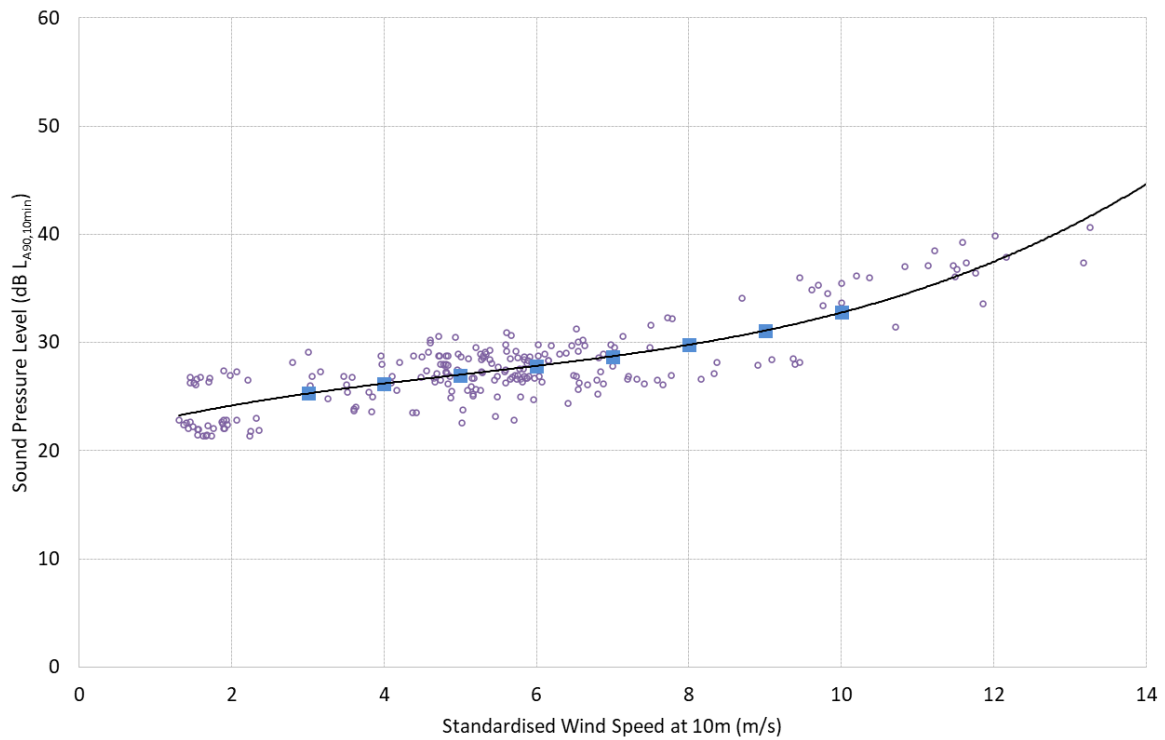
Appendix Figure C-7. Location NML-4 Daytime noise levels

Lissinagroagh - NML-4



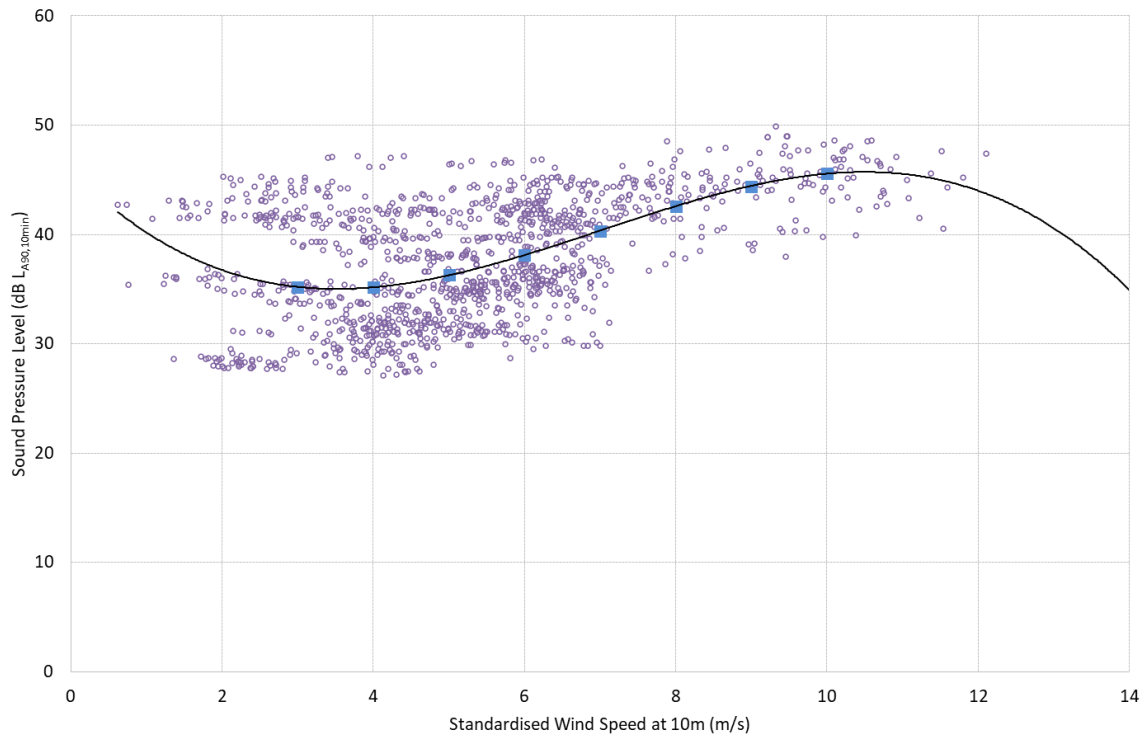
Appendix Figure C-8. Location NML-4 Night-time noise levels

Lissinagroagh - NML-4



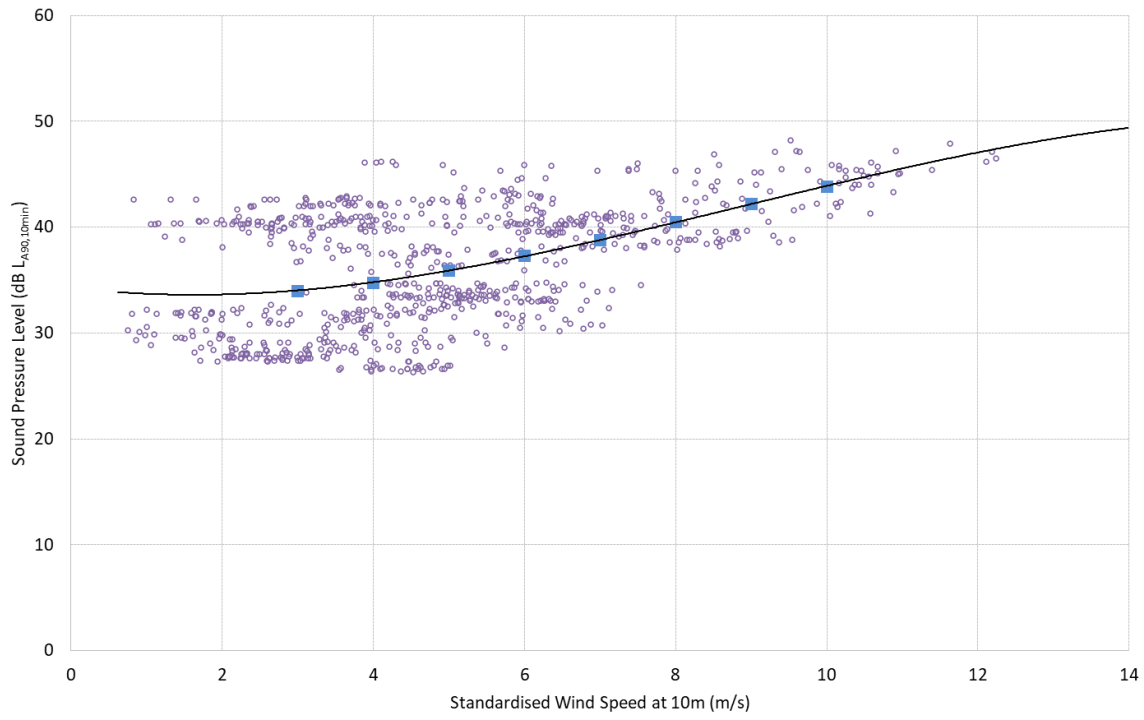
Appendix Figure C-9. Location NML-5 Daytime noise levels

Lissinagroagh - NML-5



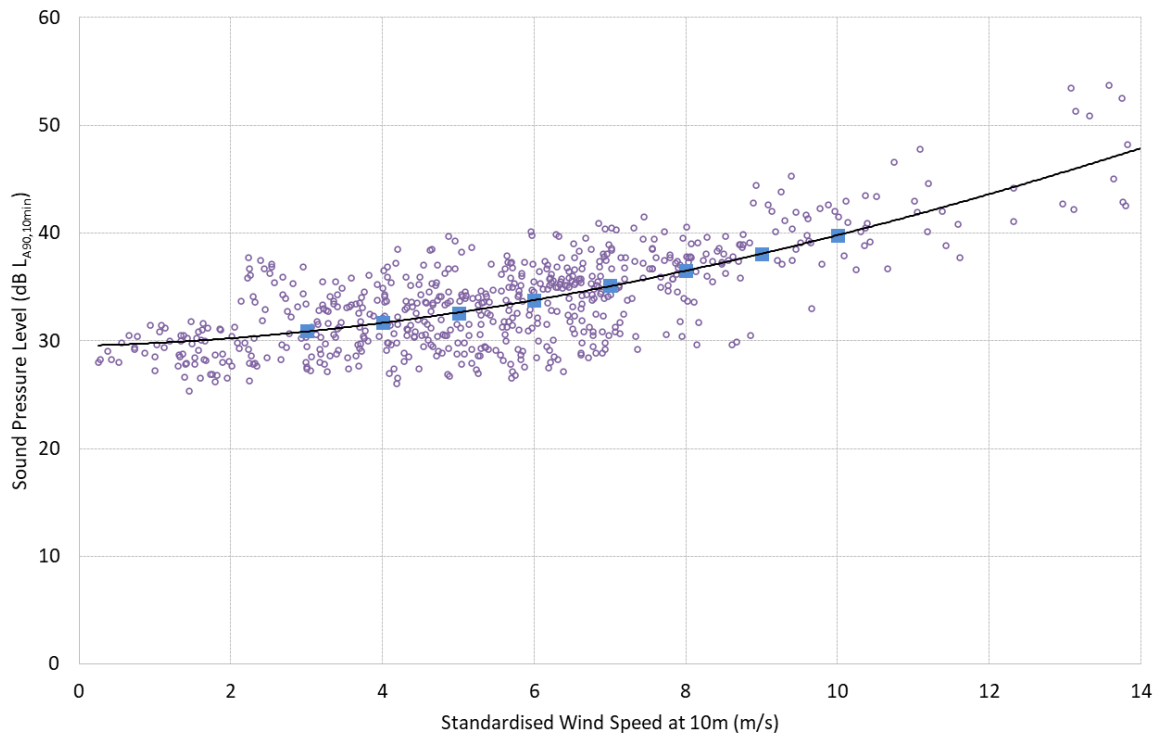
Appendix Figure C-10. Location NML-5 Night-time noise levels

Lissinagroagh - NML-5



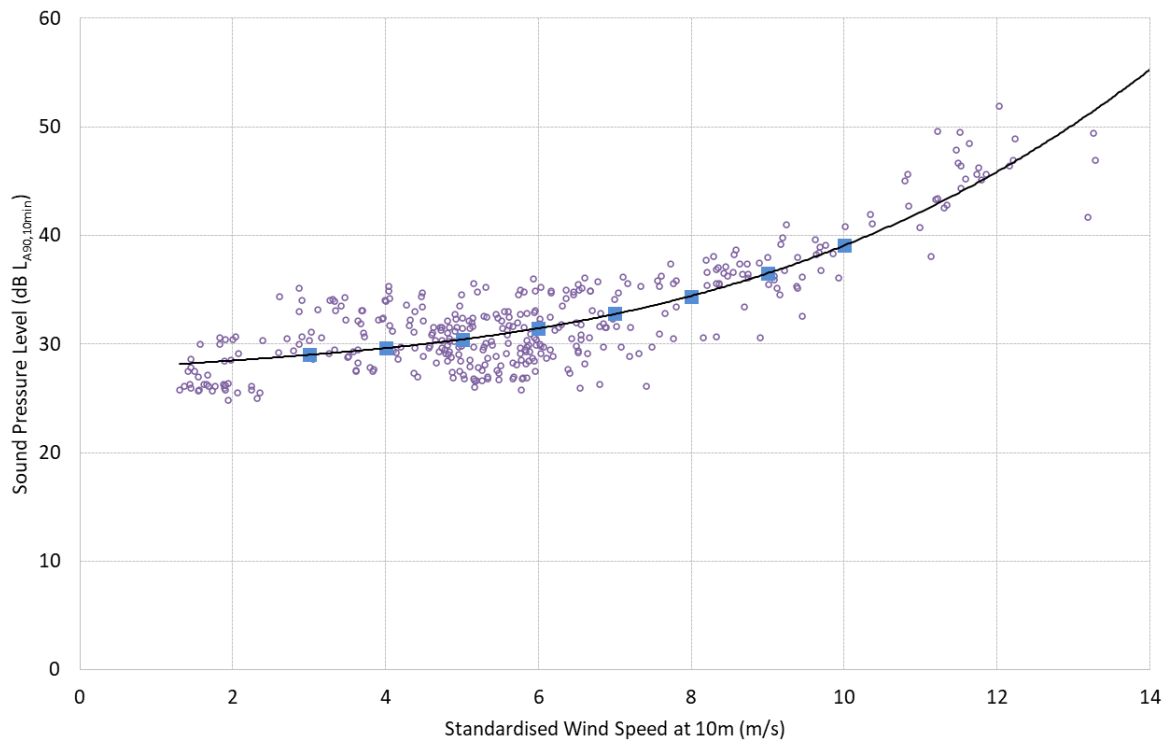
Appendix Figure C-11. Location NML-6 Daytime noise levels

Lissinagroagh - NML-6



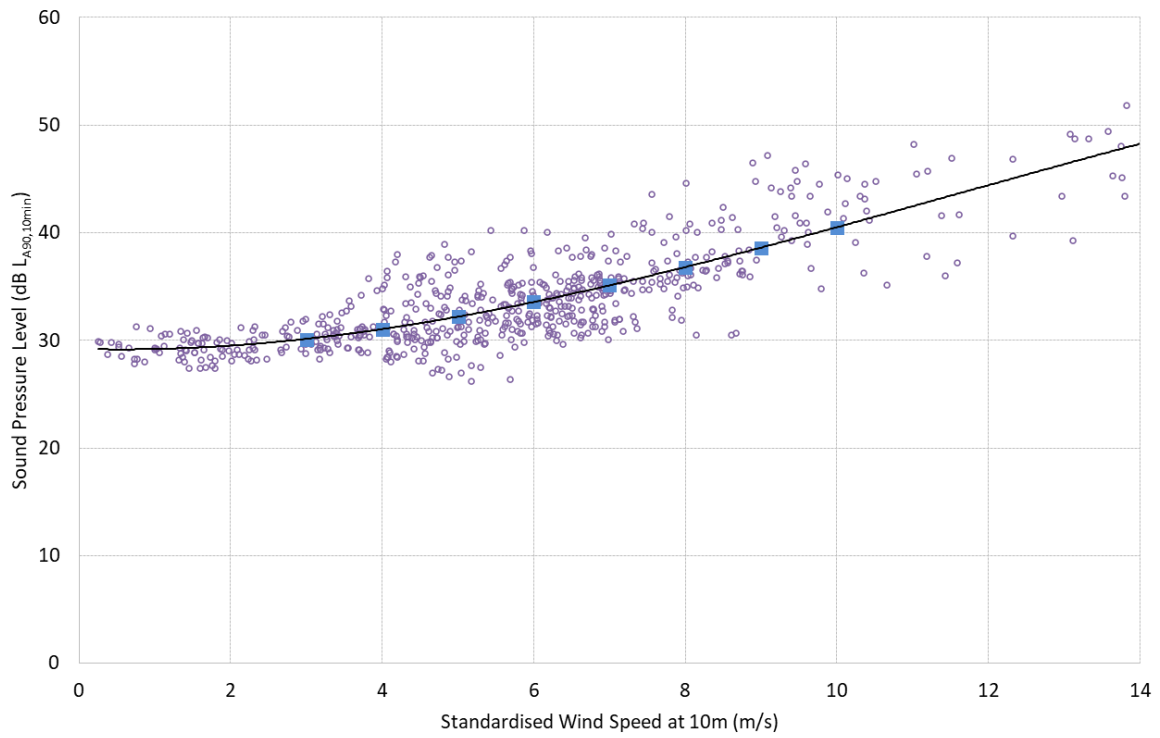
Appendix Figure C-12. Location NML-6 Night-time noise levels

Lissinagroagh - NML-6



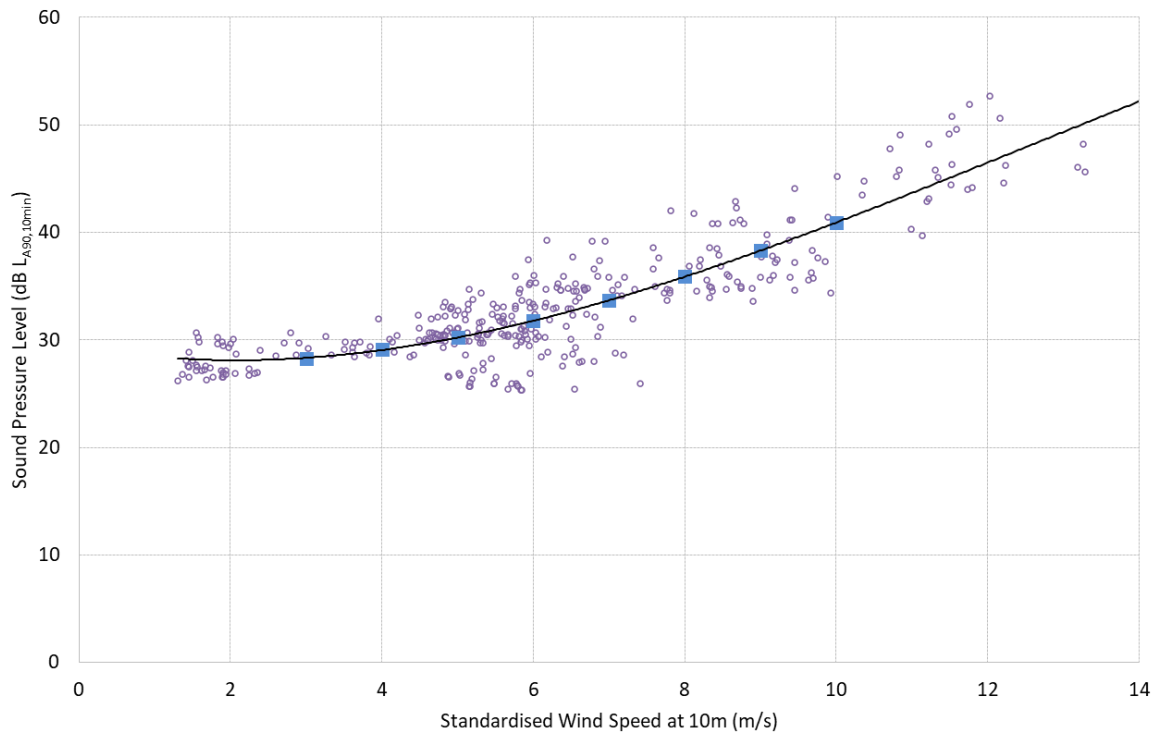
Appendix Figure C-13. Location NML-7 Daytime noise levels

Lissinagroagh - NML-7



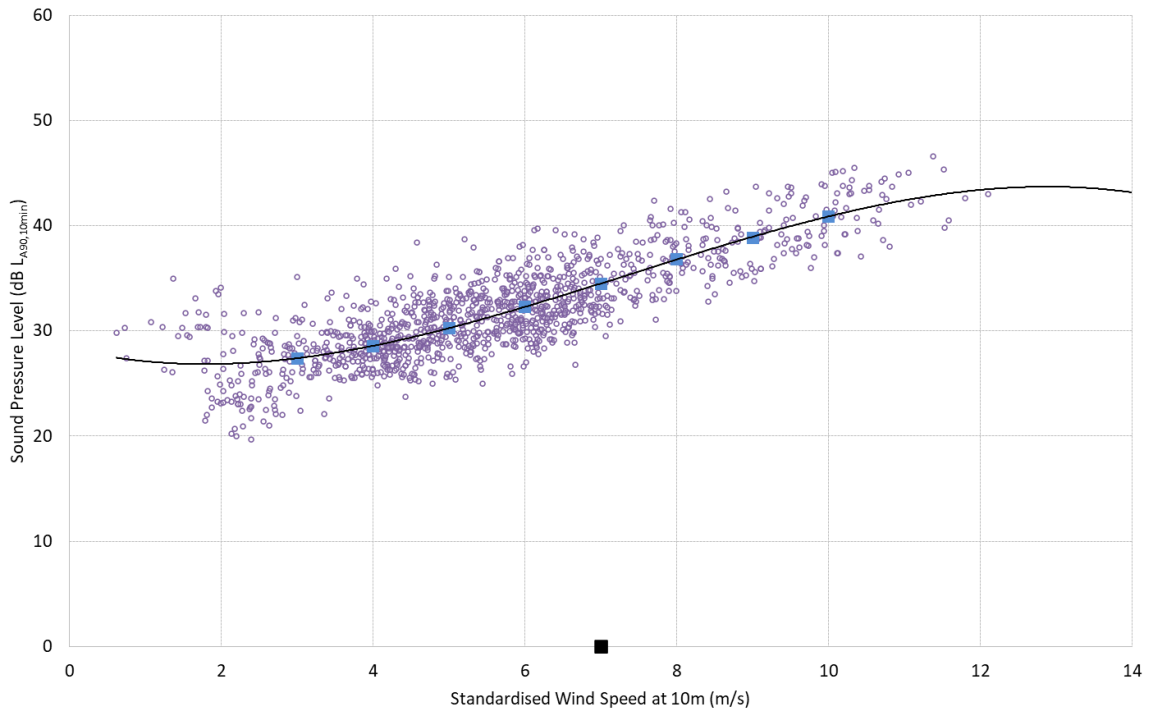
Appendix Figure C-14. Location NML-7 Night-time noise levels

Lissinagroagh - NML-7



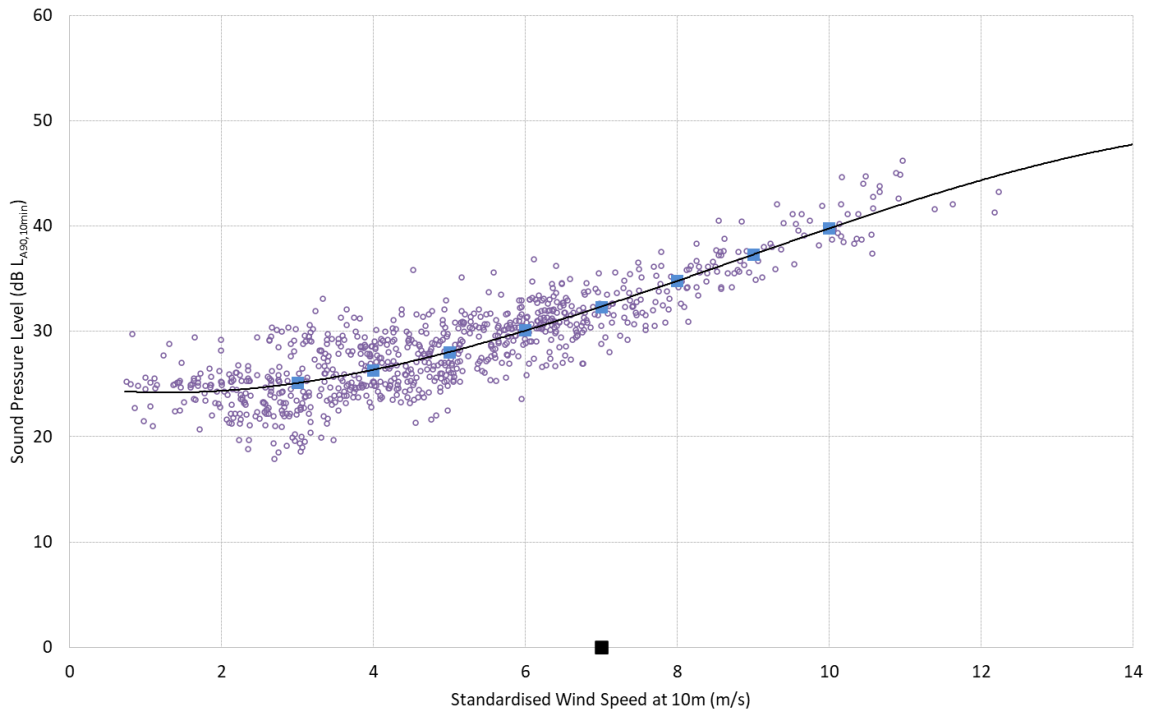
Appendix Figure C-15. Location NML-8 Daytime noise levels

Lissinagroagh - NML-8



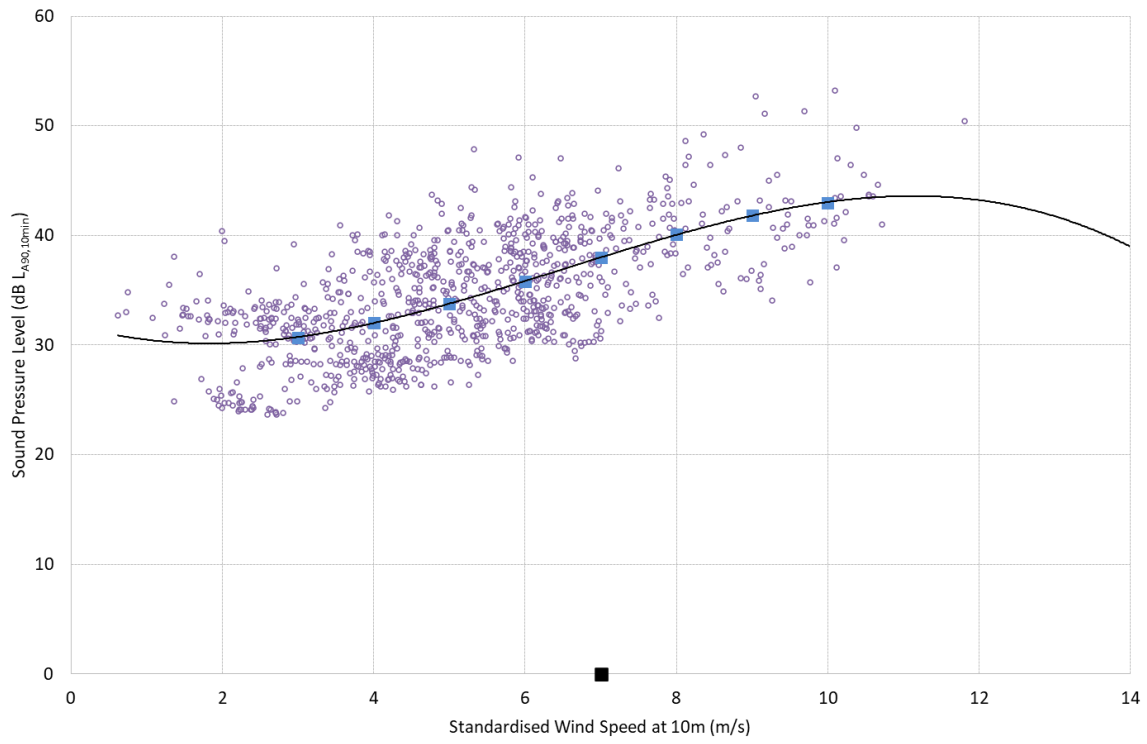
Appendix Figure C-16. Location NML-8 Night-time noise levels

Lissinagroagh - NML-8



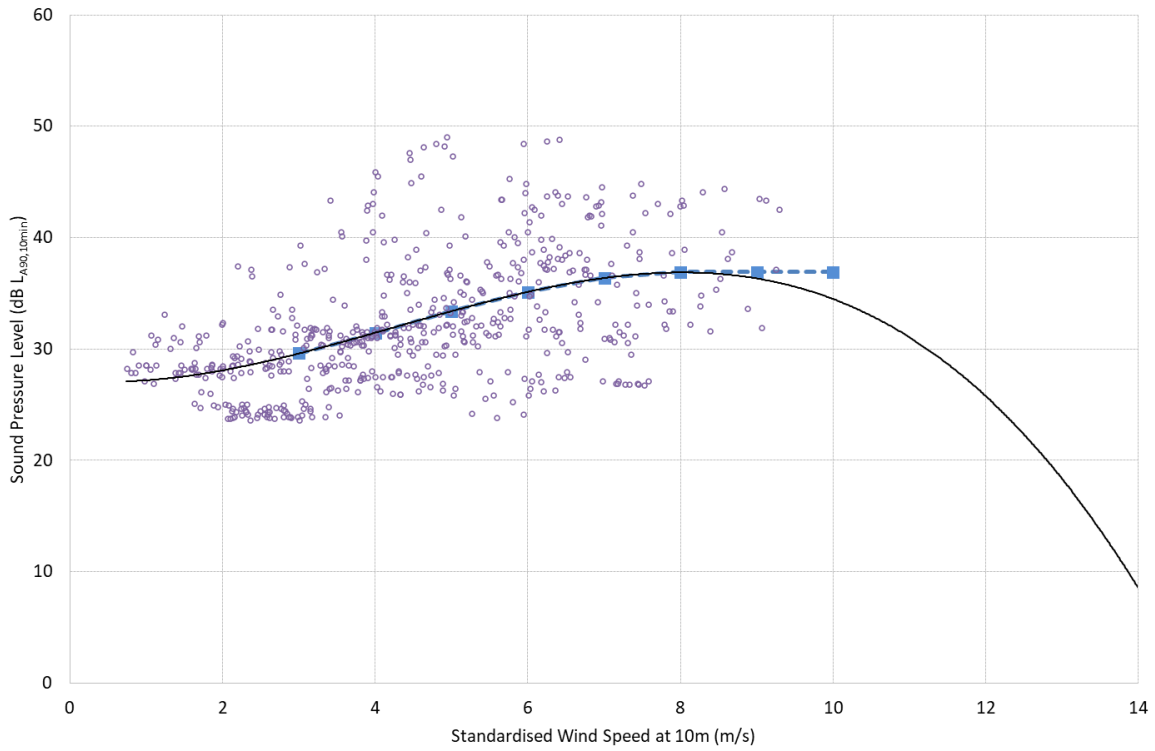
Appendix Figure C-17. Location NML-9 Daytime noise levels

Lissinagroagh - NML-9



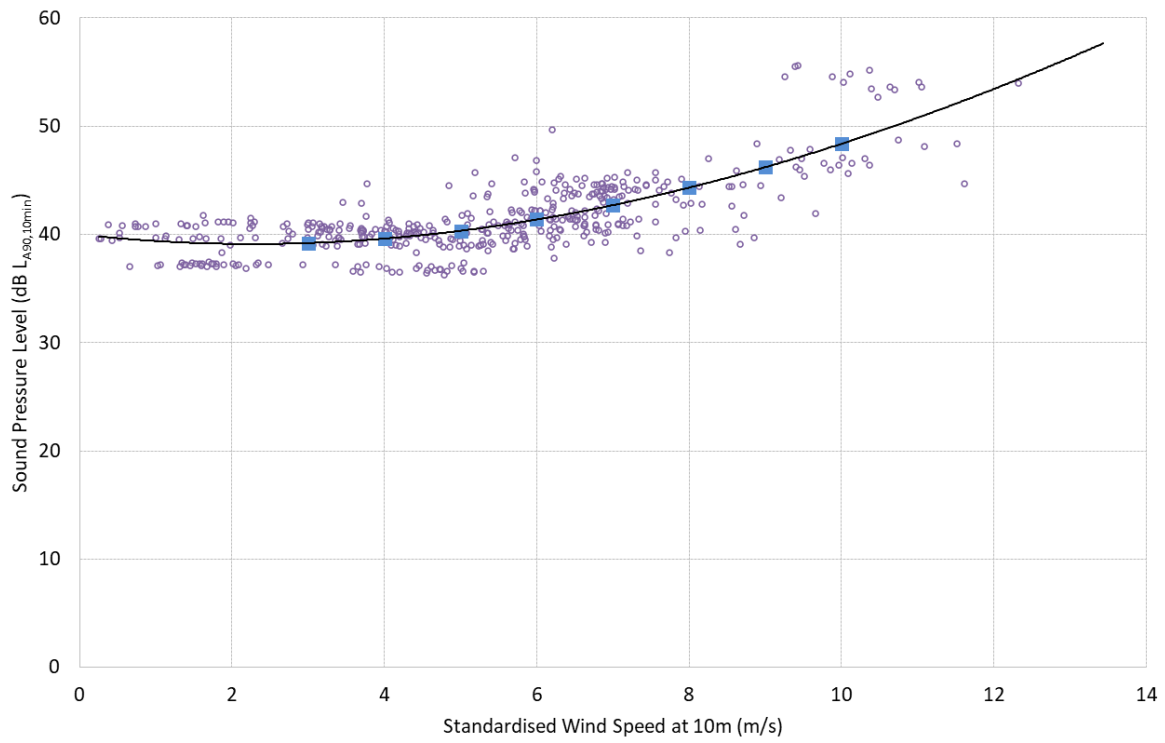
Appendix Figure C-18. Location NML-9 Night-time noise levels

Lissinagroagh - NML-9



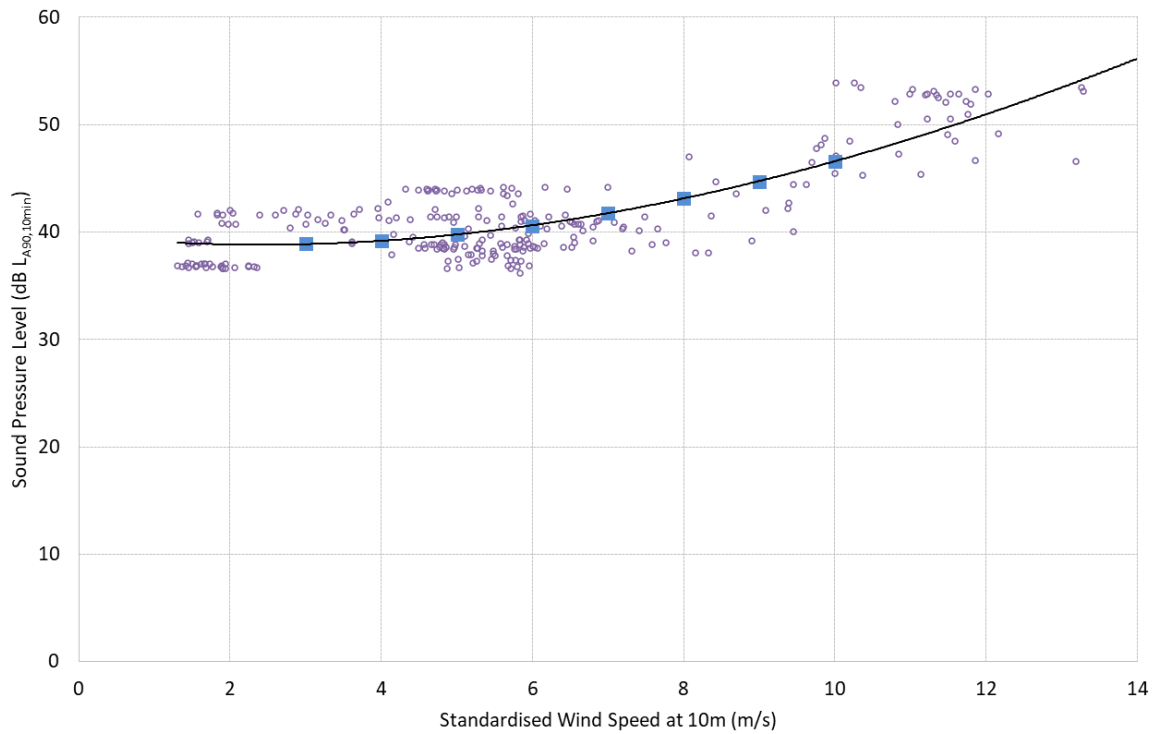
Appendix Figure C-19. Location NML-10 Daytime noise levels

Lissinagroagh - NML-10



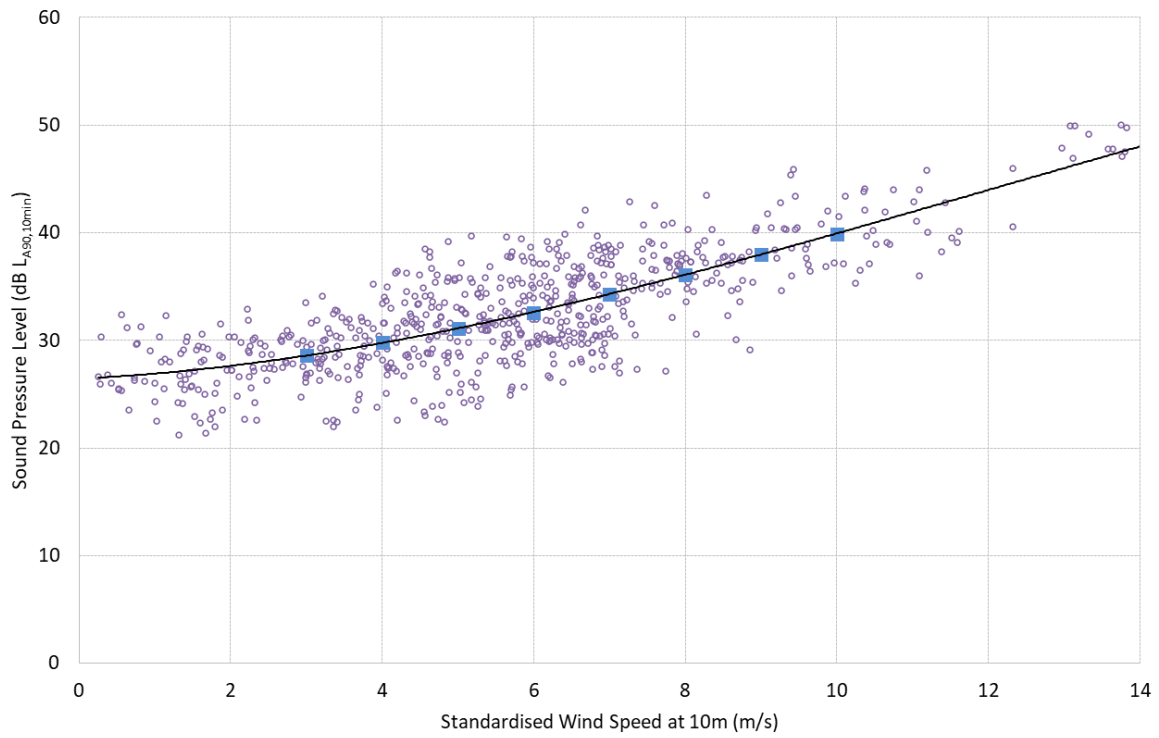
Appendix Figure C-20. Location NML-10 Night-time noise levels

Lissinagroagh - NML-10



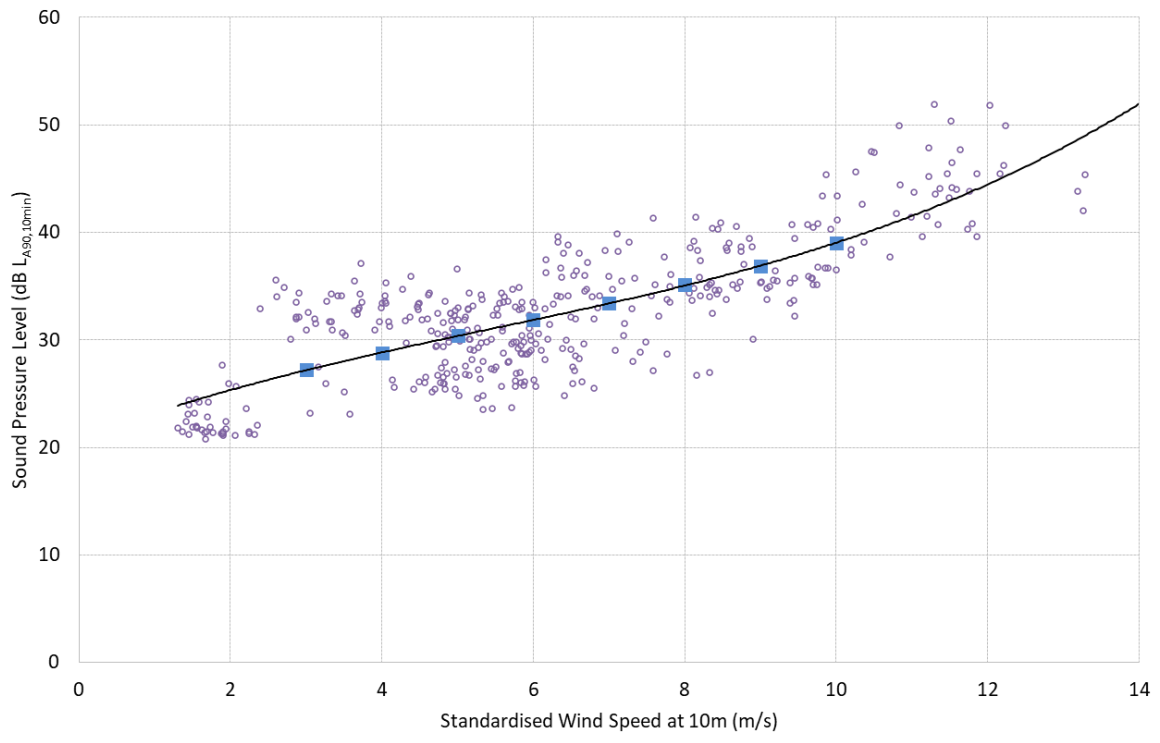
Appendix Figure C-21. Location NML-11 Daytime noise levels

Lissinagroagh - NML-11



Appendix Figure C-22. Location NML-11 Night-time noise levels

Lissinagroagh - NML-11



APPENDIX D. CALIBRATION CERTIFICATES

Location NML-1 and NML-6



CERTIFICATE OF CALIBRATION



Date of Issue: 12 May 2020

Certificate Number: UCRT20/1415

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

Page 1 of 2 Pages
Approved Signatory
K. Mistry

Customer AWN Consulting
The Tecpro Building
IDA Business and Technology Park
Clonshaugh
Dublin 17

Order No. RM/20/Cal019
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

<i>Manufacturer</i>	<i>Instrument</i>	<i>Type</i>	<i>Serial No. / Version</i>
Rion	Sound Level Meter	NL-52	00186671
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76821
Rion	Microphone	UC-59	16877
Brüel & Kjær	Calibrator	4231	2205805
	Calibrator adaptor type if applicable		UC 0210

Performance Class 1
Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.
Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003
Date Received 30 April 2020 ANV Job No. UKAS20/04240
Date Calibrated 12 May 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	20 April 2018	UCRT18/1437	0653

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Location NML-2 and NML-3



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 17 July 2020

Certificate Number: UCRT20/1661

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

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Web: www.noise-and-vibration.co.uk

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Approved Signatory

K. Mistry

Customer AWN Consulting
 The Tecpro Building
 IDA Business and Technology Park
 Clonshaugh
 Dublin 17

Order No. 2055
 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		2.0
Rion	Pre Amplifier	NH-25	76279
Rion	Microphone	UC-59	12055
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 16 July 2020

ANV Job No. UKAS20/07375

Date Calibrated 17 July 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	23 August 2019	UCRT19/1930	0653

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Location NML-4



**CERTIFICATE
OF
CALIBRATION**



0653

Date of Issue: 07 May 2020

Certificate Number: UCRT20/1405

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

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Approved Signatory
K. Mistry

Customer AWN Consulting
 The Tecpro Building
 IDA Business and Technology Park
 Clonshaugh
 Dublin 17

Order No. RM/20/Cal019
 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		2.0
Rion	Pre Amplifier	NH-25	76701
Rion	Microphone	UC-59	12813
Brüel & Kjær	Calibrator	4231	2205805
	Calibrator adaptor type if applicable		UC 0210

Performance Class 1

Test Procedure

TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002

YES

Approval Number

21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received

30 April 2020

ANV Job No.

UKAS20/04240

Date Calibrated

07 May 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	20 April 2018	UCRT18/1436	0653

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Location NML-5



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 07 May 2020

Certificate Number: UCRT20/1405

Issued by:

ANV Measurement Systems

Beaufort Court
17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

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Web: www.noise-and-vibration.co.uk

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K. Mistry

Customer AWN Consulting
The Tecpro Building
IDA Business and Technology Park
Clonshaugh
Dublin 17

Order No. RM/20/Cal019
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		2.0
Rion	Pre Amplifier	NH-25	76701
Rion	Microphone	UC-59	12813
Brüel & Kjær	Calibrator	4231	2205805
	Calibrator adaptor type if applicable		UC 0210

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 30 April 2020

ANV Job No. UKAS20/04240

Date Calibrated 07 May 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	20 April 2018	UCRT18/1436	0653

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Location NML-7 and NML-9



**CERTIFICATE
OF
CALIBRATION**



Date of Issue: 28 October 2020

Certificate Number: UCRT20/2049

Calibrated at & Certificate issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way


Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

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Approved Signatory

K. Mistry

Customer AWN Consulting Limited
 The Tecpro Building
 IDA Business and Technology Park
 Clonshaugh
 Dublin 17
 Ireland

Order No. PO-2083
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00586940
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	87059
Rion	Microphone	UC-59	17049
Brüel & Kjær	Calibrator	4231	3010369
	Calibrator adaptor type if applicable		UC 0210

Performance Class 1
Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.
Type Approved to IEC 61672-1:2002 **YES** **Approval Number** 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003
Date Received 19 October 2020 **ANV Job No.** UKAS20/10584
Date Calibrated 28 October 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	15 August 2018	UCRT18/1831	0653

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Location NML-8 and NML-10



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 28 October 2020

Certificate Number: UCRT20/2049

Calibrated at & Certificate issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

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Approved Signatory
K. Mistry

Customer AWN Consulting Limited
 The Tecpro Building
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 Clonshaugh
 Dublin 17
 Ireland

Order No. PO-2083
 Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
 Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00586940
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	87059
Rion	Microphone	UC-59	17049
Brüel & Kjær	Calibrator	4231	3010369
	Calibrator adaptor type if applicable		UC 0210

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 19 October 2020 ANV Job No. UKAS20/10584

Date Calibrated 28 October 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	15 August 2018	UCRT18/1831	0653

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Location NML-11



**CERTIFICATE
OF
CALIBRATION**



0653

Date of Issue: 22 January 2020

Certificate Number: UCRT20/1095

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way


Milton Keynes MK5 8HL

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Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory

K. Mistry

Customer AWN Consulting
 The Tecpro Building
 IDA Business and Technology Park
 Clonshaugh
 Dublin 17

Order No. AWNC150120QTE
 Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
 Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00998413
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	98627
Rion	Microphone	UC-59	15920
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
 Test Procedure TP 2.SLM 61672-3 TPS-49
 Procedures from IEC 61672-3:2006 were used to perform the periodic tests.
 Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02
 If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003
 Date Received 17 January 2020 ANV Job No. UKAS20/01036
 Date Calibrated 22 January 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	Initial Calibration		

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.