



Hayes McKenzie — Consultants in Acoustics

3719 Breezy Hill WF

Background Measurements Report

Report HM: 3719_R01_EXT1

22 April 2025

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Background Measurements Report
Report HM: 3719_R01_EXT1,
22 April 2025

Prepared for: SLR Consulting Limited
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Director

Document Control

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EXT1	14/03/2025	Frist draft issue to client
EXT2	22/04/2025	Updated draft issued

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1. INTRODUCTION

- 1.1 This report describes the baseline noise measurements that have been undertaken, and the derivation of appropriate noise limits for the Proposed Development, which is located to the southwest of Cumnock, East Ayrshire.
- 1.2 Baseline noise measurements were carried out at four locations, agreed with East Ayrshire Council's appointed independent acoustics consultant, in line with ETSU-R-97, *The Assessment and Rating of Noise from Wind Farms* and the Institute of Acoustics document, *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Noise from Wind Turbines*. Measured noise levels have been correlated with hub height wind speeds (standardised to 10 m height) measured using a LiDAR situated within the Proposed Development area.
- 1.3 Noise limits have been derived according to ETSU-R-97, *The Assessment and Rating of Noise from Wind Farms*.

2. POLICY AND GUIDANCE

- 2.1 Baseline noise measurements were carried out in accordance with the methodology prescribed by ETSU-R-97 *The Assessment and Rating of Noise from Wind Turbines*, and the accompanying guidance produced by the Institute of Acoustics (IOA) in their document, *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Noise from Wind Turbines*. These guidance documents are discussed below.

The Assessment and Rating of Noise from Wind Farms: ETSU-R-97

- 2.2 ETSU-R-97, *The Assessment and Rating of Noise from Wind Farms*, presents the recommendations of the Working Group on Noise from Wind Turbines, set up in 1993 by the Department of Trade and Industry (DTI) as a result of difficulties experienced in applying the noise guidelines existing at the time to wind farm noise assessments. The

group comprised independent experts on wind turbine noise, wind farm developers, DTI personnel and local authority Environmental Health Officers. In September 1996 the Working Group published its findings by way of report ETSU-R-97. This document describes a framework for the measurement of wind farm noise and specifies noise limits, which were derived with reference to existing standards and guidance relating to noise emission from various sources.

- 2.3 ETSU-R-97 recommends that, although noise limits should be set relative to existing background and should reflect the variation of both turbine and background noise with wind speed; this can imply very low noise limits in particularly quiet areas, in which case, *“it is not necessary to use a margin above background in such low-noise environments. This would be unduly restrictive on developments which are recognised as having wider global benefits. Such low limits are, in any event, not necessary in order to offer a reasonable degree of protection to the wind farm neighbour.”*
- 2.4 For daytime periods, the noise limit is 35-40 dB L_{A90} or 5 dB(A) above the 'quiet daytime hours' prevailing background noise, whichever is the greater. The actual value within the 35-40 dB(A) range depends on the number of dwellings in the vicinity; the impact of the limit on the number of kWh generated; and the duration and level of exposure.
- 2.5 For night-time periods the noise limit is 43 dB L_{A90} or 5 dB(A) above the prevailing night-time hours background noise, whichever is the greater. The 43 dB(A) lower limit is based on an internal sleep disturbance criteria of 35 dB(A) with an allowance of 10 dB(A) for attenuation through an open window and 2 dB(A) subtracted to account for the use of the L_{A90} rather the L_{Aeq} noise measurement index ((see Paragraph 2.6 (below)).
- 2.6 At properties that are occupied by residents with a direct financial benefit from the wind farm, the daytime and night-time lower limiting values are increased to 45 dB L_{A90} .
- 2.7 It is stated that the $L_{A90,10min}$ noise descriptor should be adopted for both background and wind farm noise levels and that, for the wind farm noise, this is likely to be between 1.5 and 2.5 dB less than the L_{Aeq} measured over the same period. The $L_{Aeq,t}$ is the equivalent continuous 'A' weighted sound pressure level occurring over the measurement period 't'. It is often used as a description of the average ambient noise level. Use of the L_{A90} descriptor for wind farm noise allows reliable measurements to be made without corruption from relatively loud, transitory noise events from other sources.
- 2.8 With regard to multiple wind farms in a given area, ETSU-R-97 specifies that the absolute noise limits and margins above background should relate to the cumulative impact of all wind turbines in the area contributing to the noise received at the properties in question. Existing wind farms should therefore be included in cumulative predictions of noise level

for proposed wind turbines and not considered as part of the prevailing background noise.

A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise

- 2.9 In May 2013, the IOA published A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise. This was subsequently endorsed by the Scottish Government and is referenced in Web Based Planning Advice, Onshore Wind Turbines. The publication of the Good Practice Guide (GPG) followed a review of current practice carried out for the Department of Energy and Climate Change (DECC) and an IOA discussion document which preceded the GPG.
- 2.10 The GPG includes sections on Context; Background Data Collection; Data Analysis and Noise Limit Derivation; Noise Predictions; Cumulative Issues; Reporting; and Other Matters including Planning Conditions, Amplitude Modulation, Post Completion Measurements and Supplementary Guidance Notes. The Context section states that the guide “presents current good practice in the application of the ETSU-R-97 assessment methodology for all wind turbine development above 50 kW, reflecting the original principles within ETSU-R-97, and the results of research carried out and experience gained since ETSU-R-97 was published”. It adds that “the noise limits in ETSU-R-97 have not been examined as these are a matter for Government”.
-

3. CONSULTATION WITH EAST AYRSHIRE COUNCIL

- 3.1 East Ayrshire Council were contacted in May 2024 to establish the contact with the third-party acoustics consultant reviewing wind farm noise impact assessments on their behalf.
- 3.2 Subsequently, the assessment methodology and measurement locations were agreed with the external consultant in June 2024.
- 3.3 The relevant email conversations are presented in Appendix A.

4. BASELINE NOISE MEASUREMENTS

- 4.1 Baseline noise measurements have been carried out to characterise the existing noise environment and to allow for appropriate noise limits to be derived for the Proposed Development in line with the agreements with East Ayrshire Council.

Noise Survey Instrumentation

- 4.2 Rion NL-52 sound level meters corresponding to the Class 1 standard in BS EN 61672 were used for the noise measurements. The calibration certificates for the sound level meters and the Brüel and Kjær 4231 Class 1 sound level calibrators (serial number 2699280 and 3022368) used for the surveys are given in Appendix B.
- 4.3 The microphones were fitted with double skin windshields based on the recommended design in ETSU W/13/00386/REP and mounted on a tripod at a height of 1.2-1.5 m. wind speeds and noise measurements were averaged for successive 10-minute measurement intervals.
- 4.4 Wind speeds were measured at a number of heights between 10 and 149 m using a LiDAR sited within the Proposed Development site. To monitor rainfall over the duration of the noise measurements, acoustic rain gauges were installed at two of the baseline measurement locations: Ravenscroft and Rankinston.
- 4.5 The noise survey covered the period from 23rd July to 4th September 2024.

Noise Survey Measurement Locations

- 4.6 The measurement locations were selected based on noise predictions for a preliminary turbine layout. The locations of these dwellings suggested these properties would be amongst the nearest receptors to the turbines of the Proposed Development.
- 4.7 The measurement locations are shown at Figure 1, below, which also shows the location of the proposed wind turbines (at the time of the baseline measurements).



Figure 1 – Baseline Measurement Locations

4.8 The measurement positions and equipment used at each location are described at Table 1.

Table 1 – Baseline Noise Measurement Details

Location Name	Easting	Northing	Meter Serial Number	Date of Last Calibration (valid for 2 years)
Drumbowie	246584	615346	00810320	10/01/2024
Ravenscroft	254970	614211	00821099	24/03/2023
Rankinston Farm	246139	613104	01032421	08/02/2024
Seaview	245165	613381	00231706	07/07/2024

- 4.9 The sound level meters were calibrated before and after installation, and at the interim visit when batteries were changed and data was downloaded. The GPG states that a calibration drift of no greater than 0.5 dB during the survey period is within an acceptable tolerance. A drift of no greater than 0.2 dB was measured on any of the sound level meters during the survey which is within the allowable tolerance.
- 4.10 A description of the measurement position and noise environment at each measurement location is provided at Appendix C.

Wind Data Calculations

- 4.11 The measured acoustic data has been correlated with the standardised 10 m height wind speed derived from the data measured using the on-site LiDAR in order to determine the prevailing background noise level during the night and quiet daytime periods.
- 4.12 The 82 m hub height wind speed was calculated from the measured 89 m and 79 m height wind speeds based on the wind shear exponent between the two measured heights using the formula:

$$V_h = V_1 \left[\frac{H_h}{H_u} \right]^m$$

where: V_h is the hub height wind speed at height H_h , and V_1 is the upper measured wind speed at height H_u

and: m is the shear exponent according to:

$$m = \left(\log \frac{U_1}{U_2} \right) / \left(\log \frac{H_1}{H_2} \right)$$

where: U_1 is the wind speed at height H_1 and U_2 is the wind speed at height H_2 .

- 4.13 The standardised 10 m height wind speed was calculated by correcting the calculated hub height wind speed at 82 m, assuming a logarithmic wind shear profile as described by the following formula;

$$V_{10} = V_h \left(\frac{\ln \left(\frac{10}{z_0} \right)}{\ln \left(\frac{h}{z_0} \right)} \right),$$

Where: V_{10} is the 10 m wind speed, V_h is the wind speed at hub height h , and Z_0 is the reference ground roughness length of 0.05 m.

- 4.14 Appendix D shows the wind speed and direction data measured throughout the night and quiet daytime periods of the background noise survey.

Data Filtering

- 4.15 The measured noise data was filtered into the relevant time periods for night-time and quiet daytime hours, and any period where rainfall was measured at any of the rain gauges was excluded from the derivation of the average baseline noise levels at all locations.
- 4.16 Some manual filtering of atypical elevated noise events evident in the baseline data were excluded from the analysis. These excluded datapoints are shown on the charts presented in Appendix E.

Baseline Results

- 4.17 Appendix E shows the measured background noise levels over a range of wind speeds for each measurement location during the quiet daytime hours and night-time periods, correlated with the standardised 10 m height wind speed. A 3rd order polynomial regression line has been plotted through the average measured noise data to derive the prevailing background noise levels.
- 4.18 The results in Appendix E also show the measured data that was excluded due to the filtering described above.
- 4.19 The resulting derived prevailing background noise levels at each location are summarised in Table 2.

Table 2 – Prevailing Background Noise Levels at each Measurement Location, dB L_{A90}

Location Name	Time Period	Standardised 10 m height wind speeds									
		3	4	5	6	7	8	9	10	11	12
Drumbowie	Night-time	22.5	24.7	27.4	30.5	33.6	36.6	39.1	41.0	41.9	41.6
	Quiet Day	23.9	25.9	28.4	31.1	34.1	37.1	40.0	42.7	45.2	47.2
Ravenscroft	Night-time	25.4	27.0	28.9	31.2	33.7	36.4	39.2	42.1	44.9	47.7
	Quiet Day	28.2	29.5	31.1	33.0	35.1	37.6	40.4	43.4	46.8	50.5
Rankinston Farm	Night-time	29.1	31.0	32.9	35.0	37.3	39.9	42.8	46.1	49.8	54.0
	Quiet Day	28.5	30.4	32.6	35.0	37.7	40.5	43.5	46.7	50.0	53.4
Seaview	Night-time	22.8	24.9	27.5	30.5	33.6	36.8	39.8	42.3	44.4	45.6
	Quiet Day	24.3	26.2	28.5	31.2	34.1	37.1	40.0	42.8	45.1	47.1

5. DERIVATION OF NOISE LIMITS

- 5.1 The night and daytime noise limits have been derived from the prevailing background noise levels in line with ETSU-R-97. The resultant noise limits are shown in Appendix E along with the background noise levels.
- 5.2 The resultant derived noise limits are summarised at Table 3. As the residents of Ravenscroft and Rankinston Farm are financially involved (FI) with the Proposed Development, the ETSU-R-97 financially involved noise limit apply, and these are also shown in the table.

Table 3 – Derived Noise Limits at each Measurement Location, dB L_{A90}

Location Name	Time Period	Standardised 10 m height wind speeds									
		3	4	5	6	7	8	9	10	11	12
Drumbowie	Night-time	43.0	43.0	43.0	43.0	43.0	43.0	44.1	46.0	46.9	46.6
	Lower Daytime	35.0	35.0	35.0	36.1	39.1	42.1	45.0	47.7	50.2	52.2
	Upper Daytime	40.0	40.0	40.0	40.0	40.0	42.1	45.0	47.7	50.2	52.2
Ravenscroft	Night-time	43.0	43.0	43.0	43.0	43.0	43.0	44.2	47.1	49.9	52.7
	Lower Daytime	35.0	35.0	36.1	38.0	40.1	42.6	45.4	48.4	51.8	55.5
	Upper Daytime	40.0	40.0	40.0	40.0	40.1	42.6	45.4	48.4	51.8	55.5
	Night FI	45.0	45.0	45.0	45.0	45.0	45.0	45.0	47.1	49.9	52.7
	Daytime FI	45.0	45.0	45.0	45.0	45.0	45.0	45.4	48.4	51.8	55.5
Rankinston Farm	Night-time	43.0	43.0	43.0	43.0	43.0	44.9	47.8	51.1	54.8	59.0
	Lower Daytime	35.0	35.4	37.6	40.0	42.7	45.5	48.5	51.7	55.0	58.4
	Upper Daytime	40.0	40.0	40.0	40.0	42.7	45.5	48.5	51.7	55.0	58.4
	Night FI	45.0	45.0	45.0	45.0	45.0	45.0	47.8	51.1	54.8	59.0
	Daytime FI	45.0	45.0	45.0	45.0	45.0	45.5	48.5	51.7	55.0	58.4
Seaview	Night-time	43.0	43.0	43.0	43.0	43.0	43.0	44.8	47.3	49.4	50.6
	Lower Daytime	35.0	35.0	35.0	36.2	39.1	42.1	45.0	47.8	50.1	52.1
	Upper Daytime	40.0	40.0	40.0	40.0	40.0	42.1	45.0	47.8	50.1	52.1

6. CONCLUSIONS

- 6.1 Baseline noise measurements were undertaken at four residential receptor locations in the vicinity of the Proposed Development.
 - 6.2 The results of the baseline noise measurements were used to derive appropriate noise limits in line with ETSU-R-97, *The Assessment and Rating of Noise from Wind Farms*, the Institute of Acoustics document, *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Noise from Wind Turbines* and the methodology agreed with East Ayrshire Council.
-

7. REFERENCES

British Standards Institution, 1994. *Specification for sound level meters*. BS EN 60651:1994.

Department of Energy and Climate Change, 2011. Report on DECC Research Contract 01.08.09.01/492A (Analysis), Analysis of How Noise Impacts are Considered in the Determination of Wind Farm Planning Applications.

Department of Trade and Industry, 1996. *Noise Measurements in Windy Conditions*. ETSU W/13/00386/REP.

ETSU-R-97, 1996. The Assessment and Rating of Noise from Wind Farms. AA

Institute of Acoustics, July 2012. Discussion Document on A Good Practice Guide to the Application of ETSU-R-97 for Wind Turbine Noise Assessment.

Institute of Acoustics, May 2013. A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise.

Appendix A

Consultation with East Ayrshire Council

Rob Shepherd

From: Steve Summers [REDACTED]
Sent: 24 June 2024 14:52
To: Rob Shepherd
Cc: Mitchell, Graham
Subject: RE: 3719 Breezy Hill Wind Farm - Scoping Response (ref 24/0003/S36SCP) - Noise consultation [OFFICIAL]

Hi Rob,

The proposed noise measurement locations are appropriate given the information you have provided. ACCON will not need to attend the equipment installation.

I have looked at the questions posed at the end of the Noise section of the Scoping Report and my responses are set out in blue.

Q13.1 Is it acceptable to scope out detailed construction predictions and for construction noise to be controlled through a construction and environmental management plan (CEMP) that will be prepared at the time of construction?

This question no longer applies, based on your email.

Q13.2 Will operational noise from the BESS be considered acceptable if the predicted rating noise level (according to BS 4142) is 35 dB L_Ar,Tr or below?

This is likely to be the case, but the argument to justify this should be set out in the noise assessment alongside the usual BS4142 assessment.

Q13.3 Can operational wind farm noise be scoped out where predicted operational noise levels from the Proposal in isolation are below 30 dB L_A90?

Yes, especially as the cumulative levels are also shown to be below 35 dB L_A90 for these receptors on the initial assessment provided.

Q13.4 Is it acceptable to re-use the background noise data that informed the noise limits set out in the planning conditions for North Kyle Energy Project in the derivation of appropriate cumulative operational noise limits?

This question no longer applies, based on your email.

Q13.5 Will the operational noise impact be considered to be acceptable where cumulative operational predicted noise levels are below the greater of plus 5 dB above background or 35-40 dB L_A90 during the daytime, and 43 dB L_A90 at night?

Yes. The noise report should justify the choice of the fixed part of the daytime limit in accordance with ETSU-R-97 and IOA GPG guidance.

Please let me know if anything is not clear.

Kind regards
Steve

Steve Summers
Associate Director

ACCON UK
ENVIRONMENTAL CONSULTANTS

EIA ● Noise ● Vibration ● Air Quality ● Lighting ● Ecology

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From: Rob Shepherd [REDACTED]
Sent: Wednesday, June 12, 2024 4:27 PM
To: Steve Summers [REDACTED]
Cc: Mitchell, Graham [REDACTED]
Subject: RE: 3719 Breezy Hill Wind Farm - Scoping Response (ref 24/0003/S36SCP) - Noise consultation [OFFICIAL]

Dear Steve,

I've been passed your contact details by Graham Mitchell at East Ayrshire Council as the consultant acting for them on wind farm applications – in this case the proposed Breezy Hill Wind Farm. I'm therefore writing to you to set out our proposed baseline noise measurement locations, and to invite you to the installation of the noise monitoring equipment.

The Breezy Hill wind farm scoping report (attached) was submitted in May 2024, and the chapter 13 sets out the noise assessment methodology. I've also attached EAC's scoping response (dated 22nd May 2024). The scoping report indicated that the preference would be to use existing baseline noise data from the consented North Kyle wind farm EIA, however, although the nearest noise sensitive properties have noise limits set in the North Kyle planning conditions, the limits are not based on background noise measurements carried out at these locations (and the noise limits were apportioned to take into account other wind farms).

We therefore intend to carry out baseline noise measurements at the nearest noise sensitive receptors to the proposed development to enable up-to-date noise limits to be derived from background noise measurements referenced to hub-height wind speeds measured on the proposed Breezy Hill Wind Farm site. The intention will be to derive appropriate noise limits for the Breezy Hill wind farm using the 'remaining noise budget' approach that take into account operational noise from other wind farms in the vicinity.

The proposed baseline noise measurement locations have been chosen by reviewing noise sensitive properties where predicted operational noise levels from the proposed development are above 30 dB LA90 and predicted cumulative operational noise levels are above 35 dB LA90. The attached figure shows both the predicted noise levels for Breezy Hill acting alone and in cumulatively with other wind farms in the vicinity, and highlights the following properties as our proposed baseline noise measurement locations ([link to alternative map](#)):

Description	Grid Reference	X	Y	Latitude	Longitude	Postcode	Address (near)
Ravenscroft	NS 45955 14218	245955	614218	55.39764	-4.43399	KA6 7HJ	Ravenscroft, Rankinston, East Ayrshi
Rankinston	NS 46151 13121	246151	613121	55.38785	-4.43029	KA6 7HB	Rankinston, East Ayrshire, Scotland,
Seaview	NS 45175 13330	245175	613330	55.38943	-4.4458	KA6 7HQ	Rankinston, East Ayrshire, Scotland,

My understanding is that we currently have agreement from Ravenscroft and Seaview, but we don't yet have consent from the resident of Rankinston. We are keen to carry out the baseline noise measurements as soon as possible so that the measurements can be completed before any of the North Kyle turbines (currently under construction) become operational.

In addition, we may carry out measurements at [Drumbowie](#) as the residents indicated at a recent public exhibition that they would be happy for measurements to be carried out at their property. However as predicted cumulative operational noise levels are below 35 dB LA90, baseline measurements at this location are not strictly necessary.

I'd be grateful if you could review and let me know if you agree with the selected baseline measurement locations, and if you would like to attend the installation of the noise monitoring equipment.

Please don't hesitate to get in touch if you'd like to discuss.

Kind regards,
Rob

Rob Shepherd

MEng MIOA

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From: Mitchell, Graham < >
Sent: Monday, June 10, 2024 11:57 AM
To: Rob Shepherd 
Cc: Donnette Briggs 
Subject: RE: 3719 Breezy Hill Wind Farm - Scoping Response (ref 24/0003/S36SCP) - Noise consultation [OFFICIAL]

CLASSIFICATION: **OFFICIAL**

Morning Rob,

Apologies, I'd overlooked your previous email in amongst the deluge of others that come in regularly.

Our noise consultant is ACCON UK Ltd and you can get in touch with Steve Summers at: 
 or 

In terms of Environmental Health if you just email  and your email will be passed to an appropriate officer to consider.

Regards

Graham

From: Rob Shepherd [REDACTED]
Sent: 10 June 2024 11:45
To: Mitchell, Graham [REDACTED]
Cc: Donnette Briggs [REDACTED]
Subject: RE: 3719 Breezy Hill Wind Farm - Scoping Response (ref 24/0003/S36SCP) - Noise consultation

Hi Graham,

I'm following up my email below, just to check that you received it, and to see if you are able to put me in touch with the relevant people in the Environmental Health department, or your appointed external consultants, so that I can discuss and agree our specific approach to the operational noise impact assessment for the proposed Breezy Hill Wind Farm.

Many thanks,
Rob

Rob Shepherd
MEng MIOA
Associate Director | Hayes McKenzie Partnership Ltd

 [REDACTED]
 [REDACTED]

Registered in England and Wales at Unit 3, Oakridge Office Park, Whaddon, Salisbury SP5 3HT. Registration No. 5211418

From: Rob Shepherd
Sent: Tuesday, May 28, 2024 1:56 PM
To: [REDACTED] [\[REDACTED\]@east-ayrshire.gov.uk](mailto:[REDACTED]@east-ayrshire.gov.uk)
Subject: 3719 Breezy Hill Wind Farm - Scoping Response (ref 24/0003/S36SCP) - Noise consultation

Dear Graham,

I'm emailing about the proposed Breezy Hill Wind Farm to which you've provided a scoping response (dated 22nd May 2024). We are carrying out the noise impact assessment for the proposed development, and in due course would like to agree aspects of the noise assessment methodology, which may include baseline noise measurements, with East Ayrshire Council.

I understand from your response that the council entrusts the review of wind farm noise impact assessments to a third-party acoustics consultant. Please can you put us in touch with the relevant Environmental Health Services contact and the Council's noise consultant?

In response to the other matters raised in the noise section of the scoping response I can confirm that:

- a. We will present a construction noise assessment that compares predicted construction noise levels against the relevant noise limits described in BS 5228-1:2009+A1:2014, *Code of practice for noise and vibration control on construction and open sites. Noise*.
- b. The noise assessment will also consider operational noise from the BESS, which will be assessed in line with BS 4142:2014+A1:2019, *Methods for rating and assessing industrial and commercial sound*.

Kind regards,
Rob

Rob Shepherd
MEng MIOA
Associate | Hayes McKenzie Partnership Ltd

 [REDACTED]

 
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Please consider donating to the Provost's chosen charity for the next two years to help people living with Motor Neurone Disease.
<https://eastayrshi.re/provostcharitydonation>

Appendix B

Calibration Certificates



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 21 June 2024

Certificate Number: UCRT24/1880

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

Page	1	of	2	Pages
Approved Signatory				
K. Mistry				

Customer Hayes McKenzie Partnership Ltd
Unit 3
Oakridge Office Park
Whaddon
Salisbury
SP5 3HT

Order No. 1001/309

Test Procedure Procedure TP 1 Calibration of Sound Calibrators

Description Acoustic Calibrator

Identification	Manufacturer	Instrument	Model	Serial No.
	Brüel & Kjær	Calibrator	4231	2699280

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No. UKAS24/06453

Date Received 20 June 2024

Date Calibrated 21 June 2024

Previous Certificate	Dated	15 June 2023
	Certificate No.	UCRT23/1790
	Laboratory	0653

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CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number

UCRT24/1880

Page 2 of 2 Pages

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	Manufacturer	Type
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

94.05 ± 0.10 dB rel 20 µPa

Functional Tests and Observations

The frequency of the sound produced was	999.99 ± 0.12 Hz
The total distortion was	0.37 ± 0.04 % Distortion

During the measurements environmental conditions were

Temperature	23	to	23 °C
Relative Humidity	46	to	52 %
Barometric Pressure	100.3	to	100.4 kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

..... END

Note:

Calibrator adjusted prior to calibration?	NO
Initial Level	N/A dB
Initial Frequency	N/A Hz

Additional Comments The results on this certificate only relate to the items calibrated as identified above.
None

Calibrated by: K. Zablocki

R 1



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 27 November 2023

Certificate Number: UCRT23/2516

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

Page	1	of	2	Pages
Approved Signatory				
K. Mistry				

Customer Hayes McKenzie Partnership Ltd
Unit 3
Oakridge Office Park
Whaddon
Salisbury
SP5 3HT

Order No. 1001/290

Test Procedure Procedure TP 1 Calibration of Sound Calibrators

Description Acoustic Calibrator

Identification	Manufacturer	Instrument	Model	Serial No.
	Brüel & Kjær	Calibrator	4231	3022368 (SAL 5)

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No. UKAS23/11810

Date Received 24 November 2023

Date Calibrated 27 November 2023

Previous Certificate	Dated	08 December 2022
	Certificate No.	UCRT22/2449
	Laboratory	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.

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number

UCRT23/2516

Page 2 of 2 Pages

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	Manufacturer	Type
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

94.12 ± 0.10 dB rel 20 µPa

Functional Tests and Observations

The frequency of the sound produced was	1000.02 ± 0.12 Hz
The total distortion was	0.18 ± 0.03 % Distortion

During the measurements environmental conditions were

Temperature	23	to	25 °C
Relative Humidity	36	to	47 %
Barometric Pressure	98.7	to	98.8 kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

..... END

Note:

Calibrator adjusted prior to calibration?	NO
Initial Level	N/A dB
Initial Frequency	N/A Hz

Additional Comments The results on this certificate only relate to the items calibrated as identified above.
None

Calibrated by: K. Zablocki

R 1



CERTIFICATE OF CALIBRATION

Date of Issue: 10 January 2024

Certificate Number: TCRT24/1031

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

Page 1 of 2 Pages
Approved Signatory

K. Mistry

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer Hayes McKenzie Partnership Ltd
Unit 3
Oakridge Office Park
Whaddon
Salisbury
SP5 3HT

Order No. 1001/294
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00810320 (HMP 37)
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	98923
Rion	Microphone	UC-59	18638
Rion	Calibrator	NC-75	34334830
	Calibrator adaptor type if applicable		NC-75-022

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 09 January 2024 **ANV Job No.** TRAC24/01011
Date Calibrated 10 January 2024

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
	13 January 2022	TCRT22/1022	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT24/1031

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source		Manufacturer
Internet download date if applicable		N/A
Case corrections available		Yes
Uncertainties of case corrections		Yes
Source of case data		Manufacturer
Wind screen corrections available		Yes
Uncertainties of wind screen corrections		Yes
Source of wind screen data		Manufacturer
Mic pressure to free field corrections		Yes
Uncertainties of Mic to F.F. corrections		Yes
Source of Mic to F.F. corrections		Manufacturer
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator		Specified
Customer or Lab Calibrator		Lab Calibrator
Calibrator adaptor type if applicable		NC-75-022
Calibrator cal. date		18 December 2023
Calibrator cert. number		UCRT23/2596
Calibrator cal cert issued by		ANV Measurement Systems
Calibrator SPL @ STP	94.01	dB Calibration reference sound pressure level
Calibrator frequency	1000.00	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Extension Cable (No Wind Shield)

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.14	22.04	± 0.30 °C
Humidity	38.5	39.8	± 3.00 %RH
Ambient Pressure	101.99	101.93	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	93.9	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A	C	Z
	11.5	17.0	23.7
	dB	dB	dB
	UR	UR	UR

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: B. Bogdan

R 2

Additional Comments

None



CERTIFICATE OF CALIBRATION

Date of Issue: 24 March 2023

Certificate Number: TCRT23/1263

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer Hayes McKenzie Partnership Ltd
Unit 3
Oakridge Office Park
Whaddon
Salisbury
SP5 3HT

Order No. 1001/276

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	Manufacturer	Instrument	Type	Serial No. / Version
	Rion	Sound Level Meter	NL-52	00821099 - REN2
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	21140
	Rion	Microphone	UC-59	04066
	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 24 March 2023

ANV Job No. TRAC23/03152

Date Calibrated 24 March 2023

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
	22 March 2021	TCRT21/1201	ANV Measurement Systems

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CERTIFICATE OF CALIBRATION



Certificate Number

TCRT23/1263

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source		Manufacturer
Internet download date if applicable		N/A
Case corrections available		Yes
Uncertainties of case corrections		Yes
Source of case data		Manufacturer
Wind screen corrections available		Yes
Uncertainties of wind screen corrections		Yes
Source of wind screen data		Manufacturer
Mic pressure to free field corrections		Yes
Uncertainties of Mic to F.F. corrections		Yes
Source of Mic to F.F. corrections		Manufacturer
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator		Specified
Customer or Lab Calibrator		Lab Calibrator
Calibrator adaptor type if applicable		NC-74-002
Calibrator cal. date		23 March 2023
Calibrator cert. number		UCRT23/1384
Calibrator cal cert issued by		ANV Measurement Systems
Calibrator SPL @ STP	94.04	dB Calibration reference sound pressure level
Calibrator frequency	1001.98	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Extension Cable (No Wind Shield)

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	23.39	23.37	± 0.30 °C
Humidity	39.4	43.8	± 3.00 %RH
Ambient Pressure	98.62	98.57	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.1	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A	C	Z
	11.6	16.0	23.4
	dB	dB	dB
	UR	UR	UR

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: B. Bogdan

Additional Comments

None

R 1



CERTIFICATE OF CALIBRATION

Date of Issue: 08 February 2024

Certificate Number: TCRT24/1129

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
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Page 1 of 2 Pages
Approved Signatory

K. Mistry

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer Hayes McKenzie Partnership Ltd
Unit 3
Oakridge Office Park
Whaddon
Salisbury
SP5 3HT

Order No. 1001/298
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	01032421(HMP51)
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	32449
Rion	Microphone	UC-59	20804
Rion	Calibrator	NC-75	34334830
	Calibrator adaptor type if applicable		NC-75-022

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 07 February 2024 **ANV Job No.** TRAC24/02059
Date Calibrated 08 February 2024

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
	11 February 2022	TCRT22/1106	ANV Measurement Systems

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CERTIFICATE OF CALIBRATION



Certificate Number

TCRT24/1129

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source		Manufacturer
Internet download date if applicable		N/A
Case corrections available		Yes
Uncertainties of case corrections		Yes
Source of case data		Manufacturer
Wind screen corrections available		Yes
Uncertainties of wind screen corrections		Yes
Source of wind screen data		Manufacturer
Mic pressure to free field corrections		Yes
Uncertainties of Mic to F.F. corrections		Yes
Source of Mic to F.F. corrections		Manufacturer
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator		Specified
Customer or Lab Calibrator		Lab Calibrator
Calibrator adaptor type if applicable		NC-75-022
Calibrator cal. date		22 January 2024
Calibrator cert. number		UCRT24/1118
Calibrator cal cert issued by		ANV Measurement Systems
Calibrator SPL @ STP	94.00	dB Calibration reference sound pressure level
Calibrator frequency	1000.00	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Extension Cable (No Wind Shield)

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.82	23.45	± 0.30 °C
Humidity	52.2	52.2	± 3.00 %RH
Ambient Pressure	98.16	98.07	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.1	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A	C	Z
	10.6	16.1	22.7
	dB	dB	dB
	UR	UR	UR

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: B. Bogdan

R 2

Additional Comments

None



CERTIFICATE OF CALIBRATION

Date of Issue: 07 July 2023

Certificate Number: TCRT23/1495

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 Hayes McKenzie Partnership
Unit 3
Oakridge Office Park
Whaddon
Salisbury
SP5 3HT

Order No. 1001/282

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	Manufacturer	Instrument	Type	Serial No. / Version
	Rion	Sound Level Meter	NL-52	00231706
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	21654
	Rion	Microphone	UC-59	04775
	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 06 July 2023

ANV Job No. TRAC23/07305

Date Calibrated 07 July 2023

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
	29 June 2021	TCRT21/1443	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT23/1495

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable		N/A
Case corrections available		Yes
Uncertainties of case corrections		Yes
Source of case data	Manufacturer	
Wind screen corrections available		Yes
Uncertainties of wind screen corrections		Yes
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections		Yes
Uncertainties of Mic to F.F. corrections		Yes
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Lab Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	03 July 2023	
Calibrator cert. number	UCRT23/1863	
Calibrator cal cert issued by	ANV Measurement Systems	
Calibrator SPL @ STP	93.99	dB Calibration reference sound pressure level
Calibrator frequency	1002.01	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Extension Cable (No Wind Shield)

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	24.89	24.56	± 0.30 °C
Humidity	38.0	36.3	± 3.00 %RH
Ambient Pressure	100.48	100.45	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.0	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A	C	Z
	12.1	16.2	21.7
	dB	dB	dB
	UR	UR	UR

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: K. Zablocki

R 1

Additional Comments

None

Appendix C

Baseline Measurement Location Details

Drumbowie

Description of Measurement Position

Drumbowie is located to the northwest of the Proposed Development. The noise monitoring equipment was located in a grassy area above the back garden, approximately 2.5 m from the garden wall which was at a lower elevation. The measurement position was chosen to be as far from tall trees surrounding the property as possible.

Description of Local Noise Environment

At the site visits, the predominant noise sources affecting the local environment included farm traffic, very distant road traffic noise, wind in the surrounding trees, birdsong and occasional aeroplanes overhead.



Ravenscroft

Description of Measurement Position

Ravenscroft is located to the northwest of the Proposed Development. The noise monitoring equipment was located in a grassy back garden area, approximately 2.5 m from a quiet oil tanker, located near a wire fence for sheep. The rain gauge was located on a nearby fence post.

Description of Local Noise Environment

At the site visits, the predominant noise sources affecting the local environment included farm traffic, farm animals (particularly sheep) and birdsong.



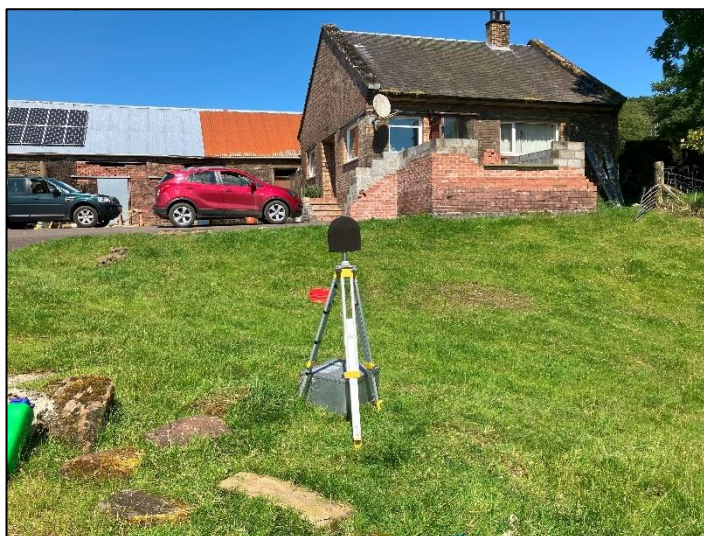
Rankinston Farm

Description of Measurement Position

Rankinston Farm is located to the west of the Proposed Development. The noise monitoring equipment was located to the side of the property in a grassy area avoiding the large trees that dominate the rear of the property as much as possible, and approximately 3.5 m from a low stone wall. The rain gauge was located on a nearby fence post.

Description of Local Noise Environment

At the site visits, the predominant noise sources affecting the local environment included dogs, birdsong, sheep, wind in the trees and planes overhead.



Seaview

Description of Measurement Position

Seaview is located to the west of the Proposed Development. The noise monitoring equipment was located in a grassy paddock to the northwest of the property. The measurement position was chosen to be as far from tall trees surrounding the property as possible.

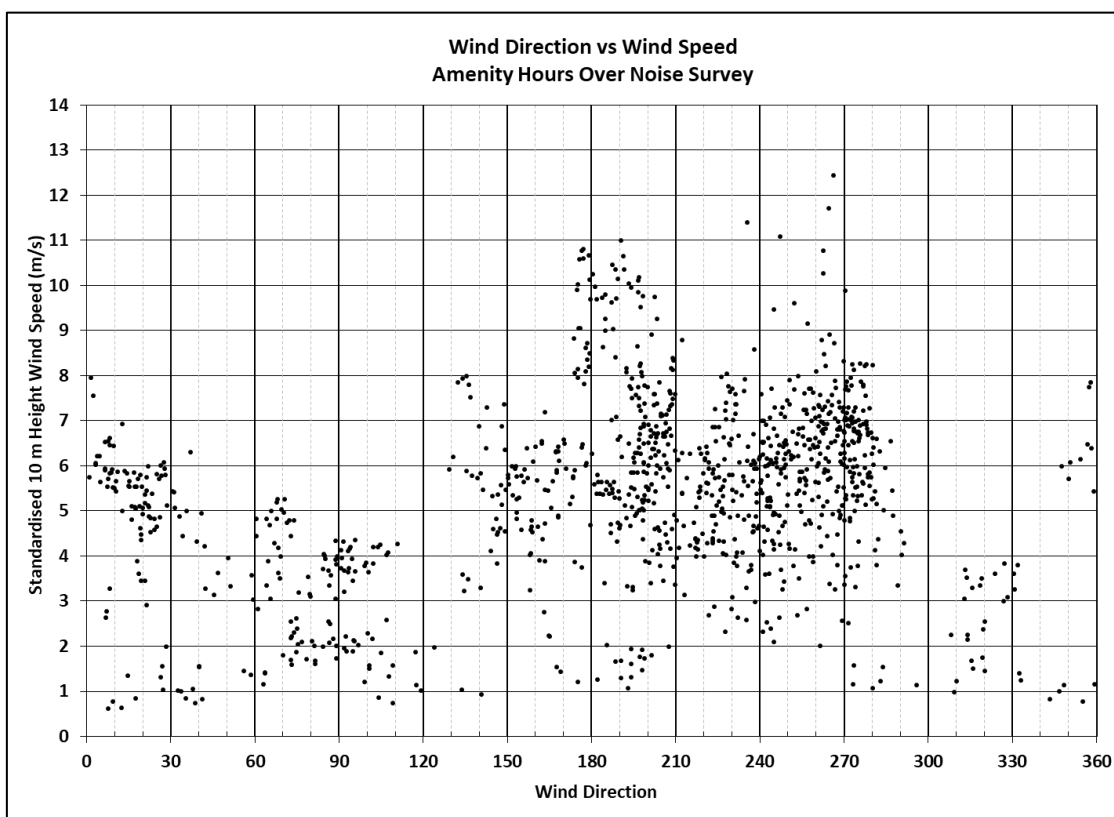
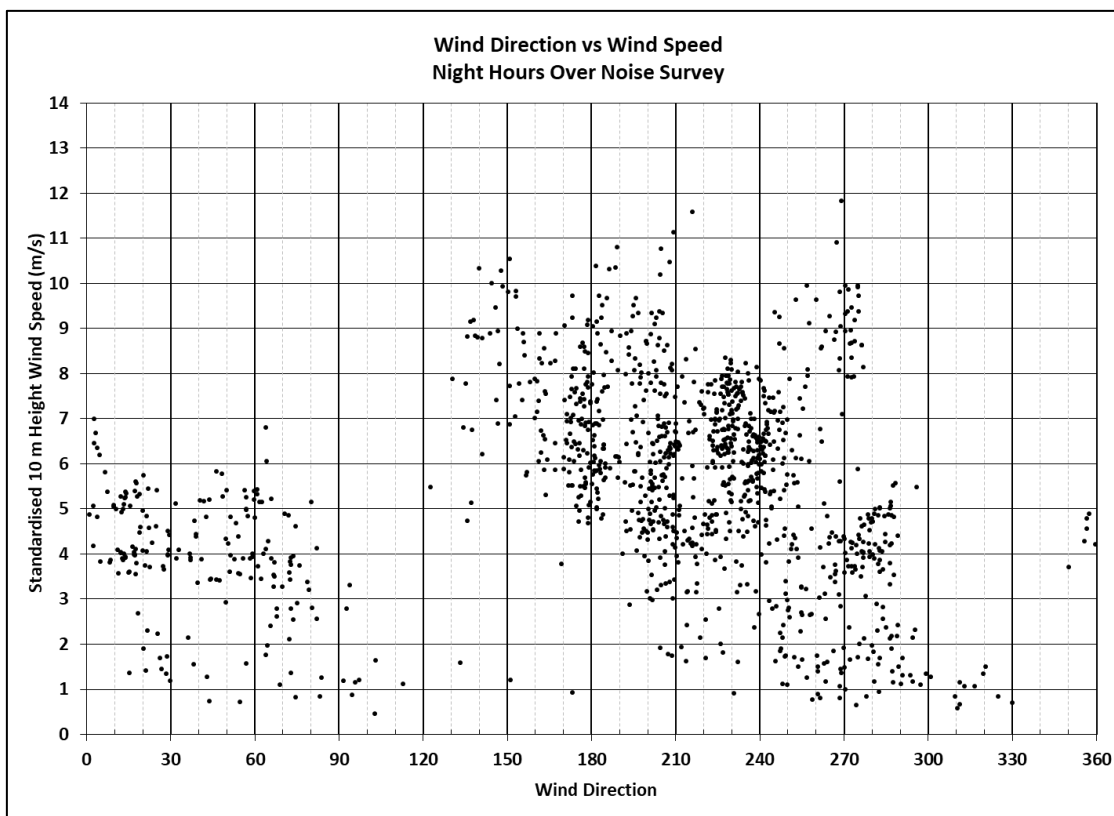
Description of Local Noise Environment

At the site visits, the predominant noise sources affecting the local environment included animals (ducks, chickens and horses), wind in taller grass, and birdsong.



Appendix D

Wind Conditions During Survey



Appendix E

Baseline Measurement Results and Derived Noise Limits

