Baal Bone Colliery

Annual Noise Monitoring

July 2020

Prepared for

Baal Bone Colliery

Global Acoustics

Noise and Vibration Analysis and Solutions

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Annual Noise Monitoring
July 2020

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Prepared for

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Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

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1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Baal Bone Colliery (BBC) to conduct a noise survey around its underground coal mining operations near Cullen Bullen, NSW. The purpose of the survey was to quantify and describe the acoustic environment around the site and compare results with the specified limits.

Attended environmental noise monitoring described in this report was undertaken during the day, evening and night periods of 30 July 2020. Figure 1 shows the monitoring locations.

1.2 Monitoring Locations

There were two monitoring locations during this survey as detailed in Table 1.1 and shown on Figure 1. It should be noted that this figure shows the actual monitoring position, not the location of residences.

Table 1.1: BBC MONITORING LOCATIONS

Report Descriptor	Monitoring Location
R1	Lot 95 DP 755759, Ben Bullen
R2/R3	Lot 3 and Lot 4 DP 724531, Ben Bullen

Figure 1: BBC Attended Noise Monitoring Locations

1.3 Operations

Historically, operations at BBC included underground extraction of coal using longwall machinery and underground conveyors, as well as surface coal handling and processing infrastructure. BBC commenced closure activities in December 2019, after being in care and maintenance since 2012. There were approximately twenty people working at the site on the day monitoring was undertaken. The following activities were taking place during the day period of monitoring:

- Dozer was working on the ROM pushing up from 7.00 am to 16.00 hr;
- An 87 tonne excavator and a 40 tonne moxy was on the ROM cleaning up and backfilling areas to form haul roads between 07.00 – 1600;
- A 49 tonne excavator was on the end of the haul road on a stockpile south of the Central Void loading a moxy with backfill;
- A water pump was running at the Box Cut all day;
- The Baal Bone crew towed an eimco from No 4 adit (near the drain) up to the workshop, they used an eimco and the Manitou to move the U/S eimco;
- The Baal Bone crew worked on eimcos in the workshop;
- A Daracon work site was being demobilised; and
- Other general activities were undertaken with the Manitou.

There were no exceedances, complaints or noise related incidents recorded by BBC since the previous monitoring was carried out (July 2019).

1.4 Terminology & Abbreviations

Some definitions of terms and abbreviations, which may be used in this report, are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
L_A	The A-weighted root mean squared (RMS) noise level at any instant
L_{Amax}	The maximum A-weighted noise level over a time period or for an event
L_{A1}	The noise level which is exceeded for 1 per cent of the time
L_{A10}	The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels
L_{A50}	The noise level which is exceeded for 50 per cent of the time
L_{A90}	The level exceeded for 90 percent of the time, which is approximately the average of the minimum noise levels. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes
L_{Amin}	The minimum A-weighted noise level over a time period or for an event
L_{Aeq}	The average noise energy during a measurement period
L_{pk}	The unweighted peak noise level at any instant
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
ABL	Assessment background level (ABL), the 10^{th} percentile background noise level for a single period (day, evening or night) of a 24 hour monitoring period
RBL	Rating background level (RBL), the background noise level for a period (day, evening or night) determined from ABL data
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. Estimated from wind speed and sigma theta data
IA	Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, but could not be quantified
Day	This is the period 7:00am to 6:00pm
Evening	This is the period 6:00pm to 10:00pm
Night	This is the period 10:00pm to 7:00am

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current project approval for activities at BBC is Project Approval 09_0178 (MOD 2, December 2015). Schedule 3 of the project approval details specific conditions relating to noise generated by BBC. Relevant sections of the modified approval are included in Appendix A.

2.2 Environment Protection Licence

BBC holds Environment Protection Licence (EPL) No. 765 issued by the Environment Protection Authority (EPA) most recently on 21 February 2020. Relevant noise conditions are reproduced in Appendix A.

2.3 Noise Management Plan

The Baal Bone NMP has been prepared in accordance with Schedule 3, Condition 6 of PA 09_0178. Relevant sections have been included in Appendix A.

Impact assessment criteria for BBC are detailed in Table 2.1. These criteria have been selected as the most appropriate criteria for each monitoring location and are consistent between the EPL and project approval.

Table 2.1: PROJECT SPECIFIC CRITERIA

Descriptor	Monitoring Location	Day/Evening/Night Assessment Criterion $L_{Aeq,15minute}$ dB	Night Assessment Criterion $L_{A1,1minute}$ dB
R1	Muldoon Residence (Lot 95 DP 755759, Ben Bullen)	46	47
R2	Speirs Residence (Lot 4 DP 734531, Ben Bullen)	41	48
R3	Desch Residence (Lot 3 DP 734531, Ben Bullen)	41	48

2.4 Meteorological Conditions

Condition L4.3 of the EPL outlines meteorological conditions required for criteria to be applicable. Noise criteria detailed in the EPL apply under all meteorological conditions except for the following:

(a) *Wind speeds greater than 3 metres/second at 10 metres above the ground level;*

(b) *Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or*

(c) Stability category G temperature inversion conditions.

2.5 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017. For assessment of modifying factors, the NPfI immediately superseded the 'Industrial Noise Policy' (INP, 2000), as outlined in the EPA document 'Implementation and transitional arrangements for the Noise Policy for Industry' (2017). Assessment and reporting of modifying factors has been undertaken in accordance with Fact Sheet C of the NPfI.

3 METHODOLOGY

3.1 Overview

All noise monitoring was conducted at the nearest residences in accordance with Australian Standard AS1055 ' Acoustics, Description and Measurement of Environmental Noise', relevant NSW EPA requirements and the BBC NMP. Meteorological data was obtained from the BBC automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured noise levels.

3.2 Attended Noise Monitoring

During this survey, annual attended monitoring was undertaken at two locations during the day, evening, and night period. Two consecutive measurements during each period were carried out. The duration of each measurement was 15 minutes. Atmospheric condition measurement was also undertaken at each monitoring location.

Attended monitoring was conducted by Cam Le Messurier. Cam is an Acoustic Consultant with a year of experience in environmental noise monitoring and sound power testing. He is also responsible for calculations and reporting.

This survey presents noise levels gathered during attended monitoring that are the result of many sounds reaching the sound level meter microphone during monitoring. Received levels from various noise sources were noted during attended monitoring and particular attention was paid to the extent of BBC's contribution, if any, to measured levels. At each receptor location, BBC's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (in the absence of any other noise) was measured directly, where possible, or, determined by frequency analysis.

If the exact contribution of the source of interest (in this case BBC) cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise descriptors in accordance with Section 7.1 of the NPfI. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted as NM in this report are due to one or more of the following reasons:

- Site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- Site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- It was not feasible, nor reasonable to employ methods such as move closer and back calculate. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant

source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

A measurement of $L_{A1,1minute}$ corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms this is the highest noise level, or L_{Amax}, received from the site during the entire measurement period (i.e. the highest level of the worst minute during the 15 minute measurement).

Often extraneous noise events (for example, road traffic pass-bys and dogs) interfere with the measurement of site noise levels in the frequency range of interest. Where required, the sound level meter is paused during these occurrences to aid in quantification of the site only $L_{Aeq,15minute}$ level.

3.3 Modifying Factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable, such that the site-only L_{Aeq} was not "NM" or less than a maximum cut off value (e.g. "<20 dB" or "<30dB").

If applicable, modifying factors have been reported and added to measured site-only L_{Aeq} noise levels when meteorological conditions satisfied requirements for site noise criteria to be applicable. Low-frequency modifying factors have only been applied to site-only L_{Aeq} levels if BBC was the only contributing low-frequency noise source.

3.4 Attended Monitoring Equipment

The equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix B.

Table 3.1: MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	30131882	05/02/2021
Pulsar 105 acoustic calibrator	78226	11/03/2022

4 RESULTS

4.1 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.2 Attended Noise Monitoring

Noise levels measured at each location during attended surveys are provided in Table 4.1, discussion as to the noise sources responsible for these measured levels is provided in Chapter 5 of this report.

Table 4.1: MEASURED NOISE LEVELS – JULY 2020[1]

Location	Start Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A50} dB	L_{A90} dB	L_{Amin} dB
Day								
R1	30/07/2020 16:07	59	55	43	42	32	28	25
R1	30/07/2020 16:31	62	57	52	47	33	27	24
R2/R3	30/07/2020 15:25	60	49	38	37	31	28	26
R2/R3	30/07/2020 15:42	66	49	38	37	30	27	24
Evening								
R1	30/07/2020 21:23	60	58	56	53	52	41	27
R1	30/07/2020 21:41	58	56	54	50	49	29	27
R2/R3	30/07/2020 20:36	49	34	33	32	31	30	28
R2/R3	30/07/2020 20:56	48	39	35	32	31	30	28
Night								
R1	30/07/2020 22:01	60	58	55	52	52	43	27
R1	30/07/2020 22:19	60	57	55	52	51	43	26
R2/R3	30/07/2020 22:45	51	38	32	31	30	29	27
R2/R3	30/07/2020 23:03	41	38	34	32	31	30	28

Notes:

1. *Levels in this table are not necessarily the result of activity at BBC.*

Table 4.2 to Table 4.3 detail noise levels from BBC in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with BBC's EPL.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY BBC AGAINST IMPACT ASSESSMENT CRITERIA – JULY 2020

Location	Start Date and Time	Wind Speed m/s	Stability Class	Criterion dB	Criterion Applies?[1]	BBC $L_{Aeq,15min}$ dB [2,3]	Exceedance [3,4]
			Day				
R1	30/07/2020 16:07	2.5	D	46	Yes	IA	Nil
R1	30/07/2020 16:31	2.9	C	46	Yes	IA	Nil
R2/R3	30/07/2020 15:25	2.4	A	41	Yes	IA	Nil
R2/R3	30/07/2020 15:42	2.2	C	41	Yes	IA	Nil
			Evening				
R1	30/07/2020 21:23	1.3	F	46	Yes	<25	Nil
R1	30/07/2020 21:41	0.9	F	46	Yes	<25	Nil
R2/R3	30/07/2020 20:36	1.4	F	41	Yes	IA	Nil
R2/R3	30/07/2020 20:56	1.4	F	41	Yes	IA	Nil
			Night				
R1	30/07/2020 22:01	0.9	E	46	Yes	<25	Nil
R1	30/07/2020 22:19	0.9	F	46	Yes	<25	Nil
R2/R3	30/07/2020 22:45	1.1	E	41	Yes	IA	Nil
R2/R3	30/07/2020 23:03	1.0	F	41	Yes	IA	Nil

Notes:

1. *Noise emission limits apply for all meteorological conditions except those detailed in Section 2.4;*
2. *Site-only $L_{Aeq,15minute}$ attributed to BBC, including modifying factors if applicable;*
3. *Bold results in red indicate exceedance of the relevant criterion (if applicable); and*
4. *NA in exceedance column means atmospheric conditions outside conditions specified in Section 2.4, therefore criterion was not applicable.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY BBC AGAINST IMPACT ASSESSMENT CRITERIA – JULY 2020

Location	Start Date and Time	Wind Speed m/s	Stability Class	Criterion dB	Criterion Applies?[1]	BBC $L_{A1,1min}$ dB [2,3]	Exceedance [3,4]
R1	30/07/2020 22:01	0.9	E	47	Yes	<25	Nil
R1	30/07/2020 22:19	0.9	F	47	Yes	<25	Nil
R2/R3	30/07/2020 22:45	1.1	E	48	Yes	IA	Nil
R2/R3	30/07/2020 23:03	1.0	F	48	Yes	IA	Nil

Notes:

1. *Noise emission limits apply for all meteorological conditions except those detailed in Section 2.4;*
2. *Site-only $L_{A1,1minute}$ attributed to BBC, including modifying factors if applicable;*
3. *Bold results in red indicate exceedance of the relevant criterion (if applicable); and*
4. *NA in exceedance column means atmospheric conditions outside conditions specified in Section 2.4, therefore criterion was not applicable.*

4.3 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.4. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.4: MEASURED ATMOSPHERIC CONDITIONS –JULY 2020

Location	Start Date and Time	Temperature Degrees	Wind Speed m/s [1]	Wind Direction Degrees [1,2]	Cloud Cover Eighths
Day					
R1	30/07/2020 16:07	14	1.2	320	2
R1	30/07/2020 16:31	13	0.7	330	0
R2/R3	30/07/2020 15:25	17	1.5	340	2
R2/R3	30/07/2020 15:42	17	1.1	340	2
Evening					
R1	30/07/2020 21:23	10	0.4	150	6
R1	30/07/2020 21:41	9	0.8	150	6
R2/R3	30/07/2020 20:36	14	-	-	5
R2/R3	30/07/2020 20:56	9	-	-	6
Night					
R1	30/07/2020 22:01	10	-	-	7
R1	30/07/2020 22:19	9	-	-	7
R2/R3	30/07/2020 22:45	11	-	-	7
R2/R3	30/07/2020 23:03	10	-	-	7

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the BBC AWS.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken and the following figures display frequency ranges of various noise sources at each location for L_{A1}, L_{A10}, L_{Aeq}, L_{A50} and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 2 where it can be seen that frogs and insects are generating noise at frequencies above 1000 Hz while mining noise is at frequencies less than 1000 Hz, which is typical. Adding levels at frequencies that relate to mining only allows separate statistical results to be calculated. This analysis cannot always be performed if there are significant levels of other noise at the same frequencies as mining, such as dogs, cows, or (most commonly) road traffic.

It should be noted that the method of summing statistical values up to a cut-off frequency can overstate the L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

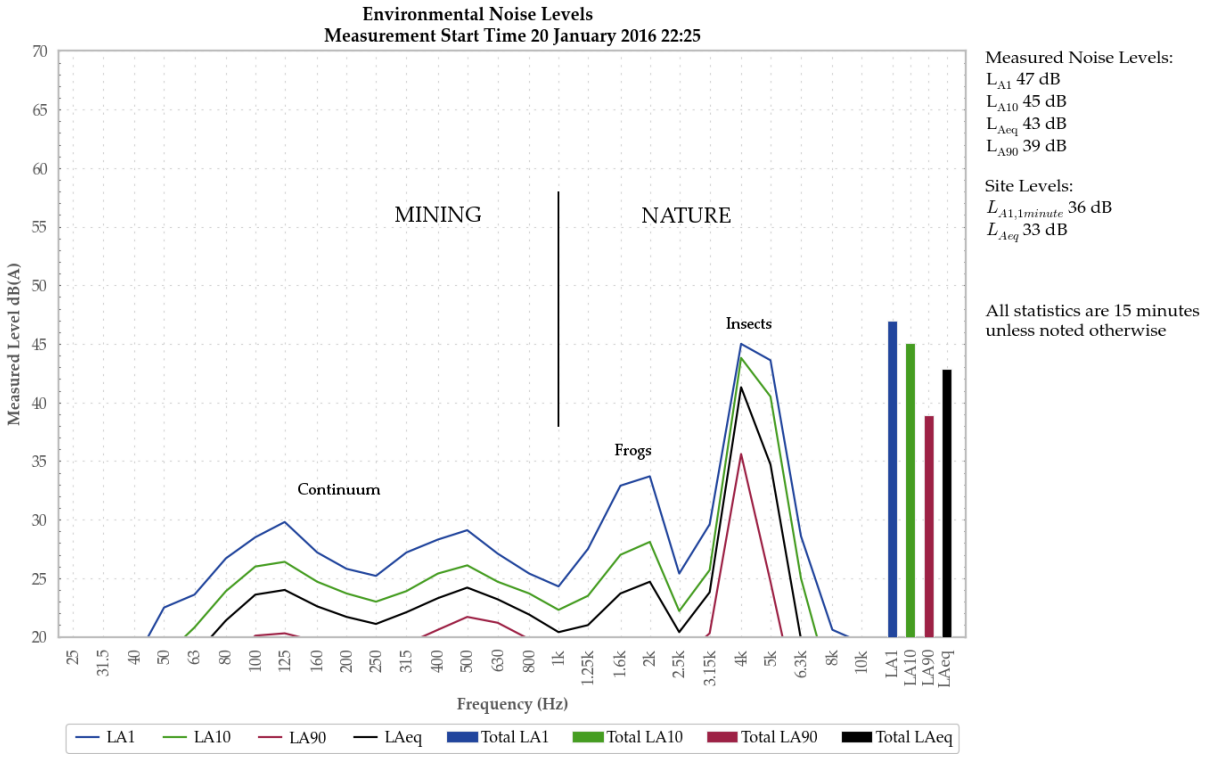

Figure 2: Example Graph (refer to section 5.1 for explanatory note)

5.1.1 R1 – Day

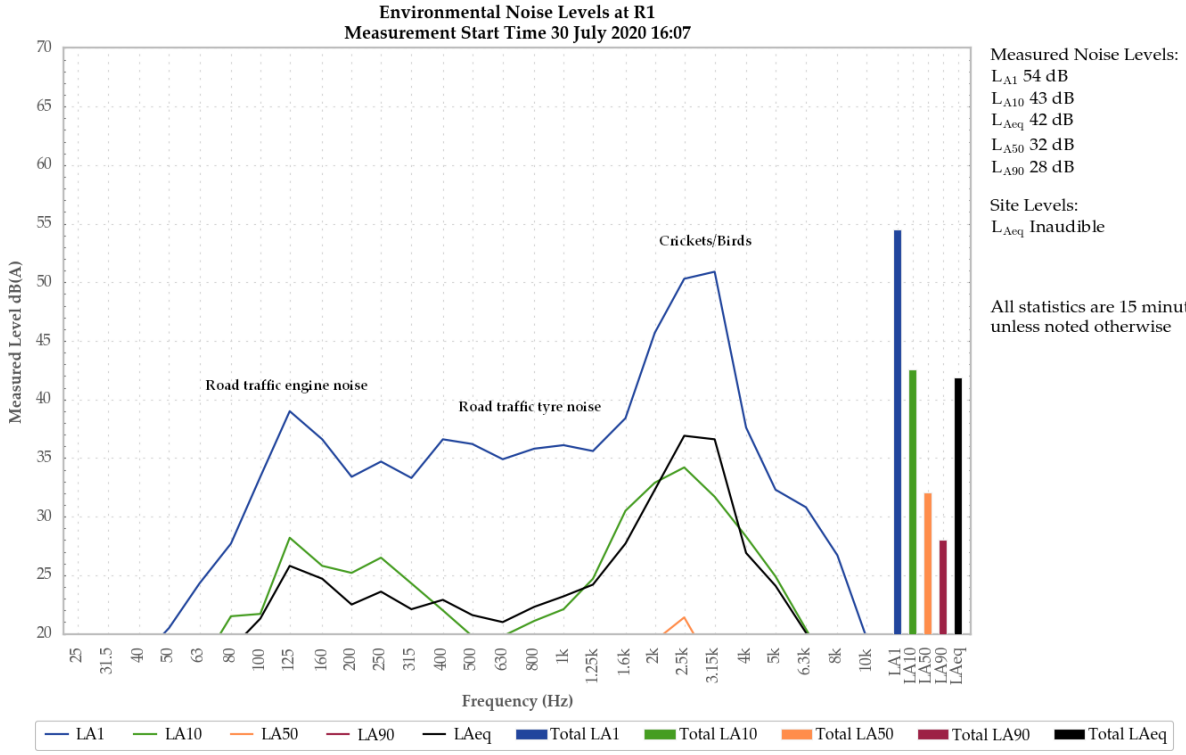

Figure 3: Environmental Noise Levels, R1

BBC was inaudible during the measurement.

Crickets and birds primarily generated the measured noise levels. Road traffic tyre and engine noise were minor contributors to the measured L_{A10} and L_{Aeq}.

Livestock were also noted.

5.1.2 R1 – Day

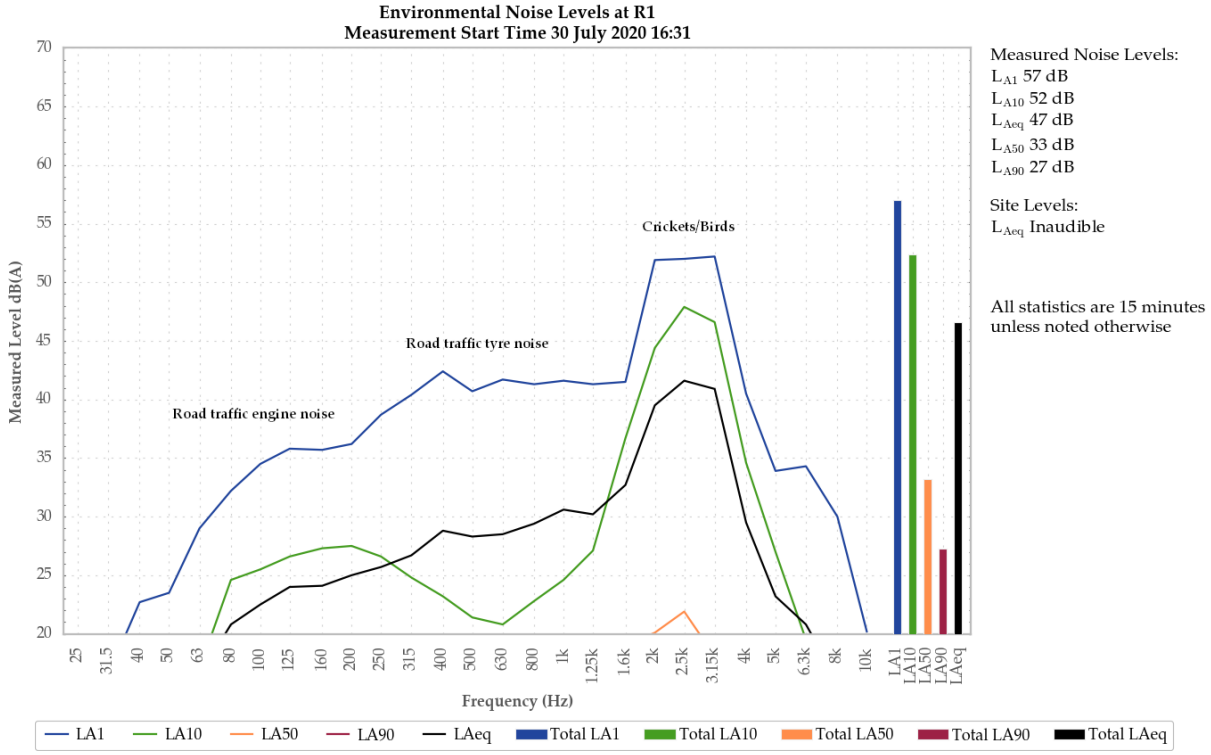

Figure 4: Environmental Noise Levels, R1

BBC was inaudible during the measurement.

Crickets and birds primarily generated the measured noise levels. Road traffic noise also contributed to the measured L_{Aeq}.

Dogs were also noted.

5.1.3 R2/R3 – Day

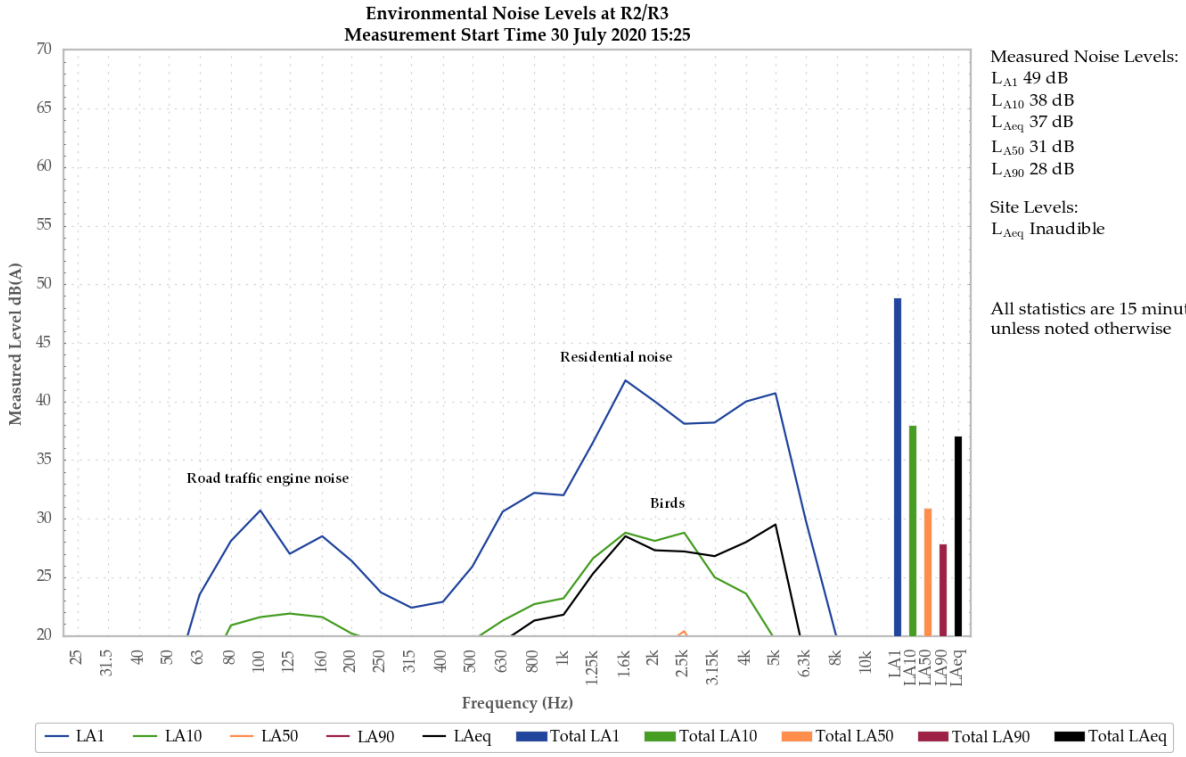

Figure 5: Environmental Noise Levels, R2/R3

BBC was inaudible during the measurement.

Residential noise and birds generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Birds and breeze in the foliage were responsible for the measured L_{A50} and L_{A90}.

Road traffic was also noted.

5.1.4 R2/R3 – Day

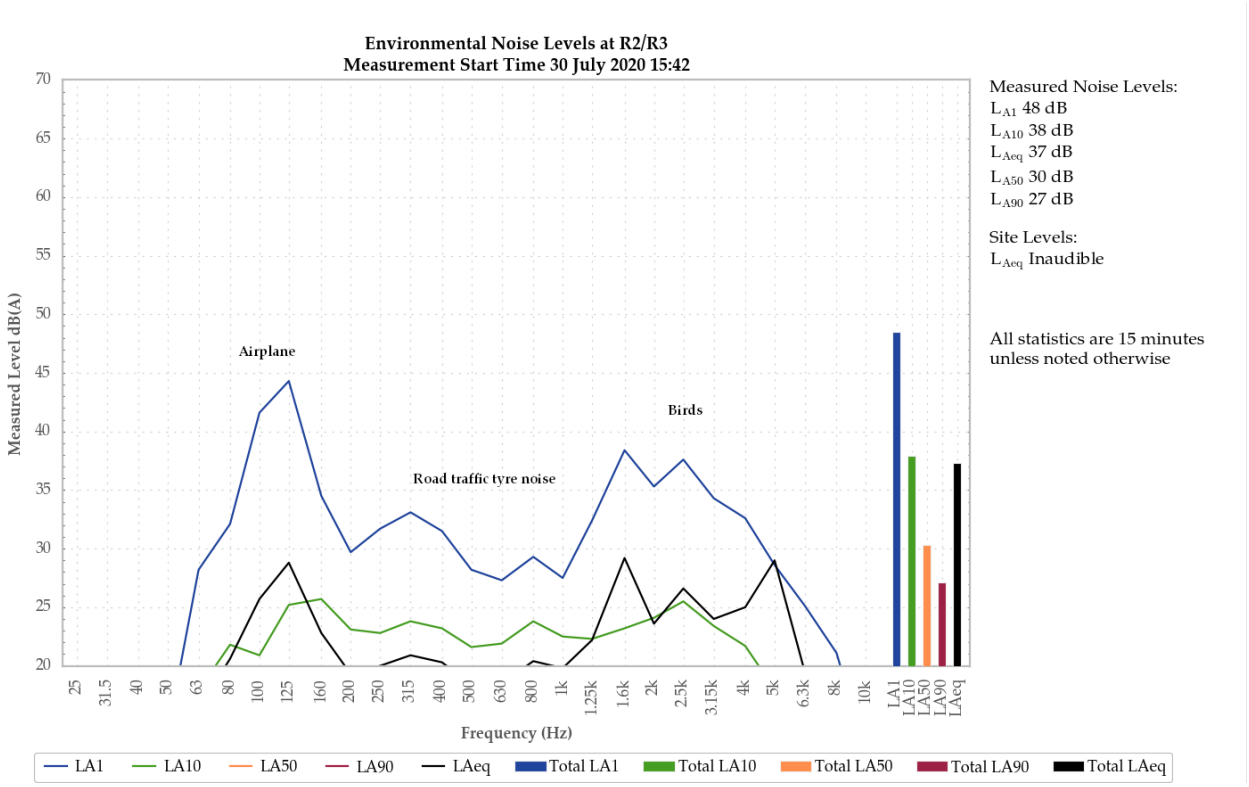

Figure 6: Environmental Noise Levels, R2/R3

BBC was inaudible during the measurement.

Birds and aircraft noise primarily generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Road traffic noise was a minor contributor to the measured L_{A10} and L_{Aeq}. Birds and traffic noise were responsible for the measured L_{A50} and L_{A90}.

Dogs were also noted.

5.1.5 R1 – Evening

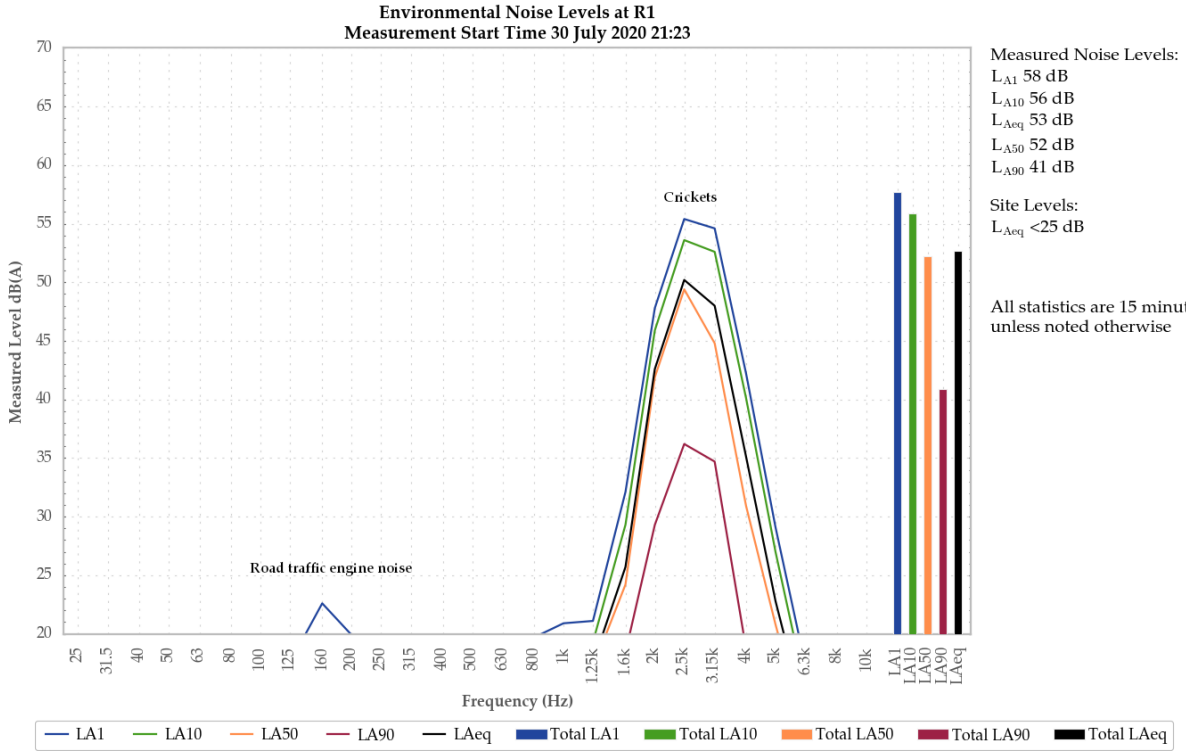

Figure 7: Environmental Noise Levels, R1

A low-level continuum from BBC was audible at low levels throughout the measurement, generating a site-only L_{Aeq} of less than 25 dB.

Crickets were responsible for the measured noise levels.

Road traffic engine and tyre noise were also noted.

5.1.6 R1 – Evening

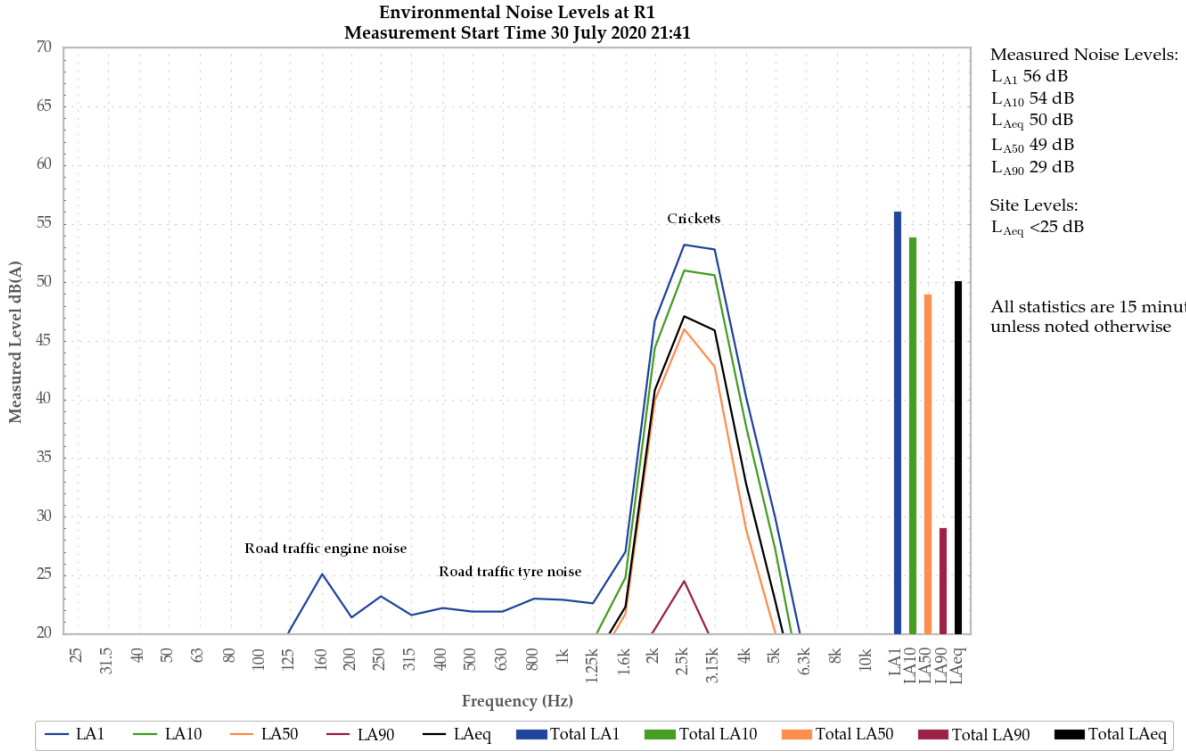

Figure 8: Environmental Noise Levels, R1

A low-level continuum from BBC was audible throughout the measurement, generating a site-only L_{Aeq} of less than 25 dB.

Crickets were responsible for the measured noise levels.

Birds and road traffic noise were also noted.

5.1.7 R2/R3 – Evening

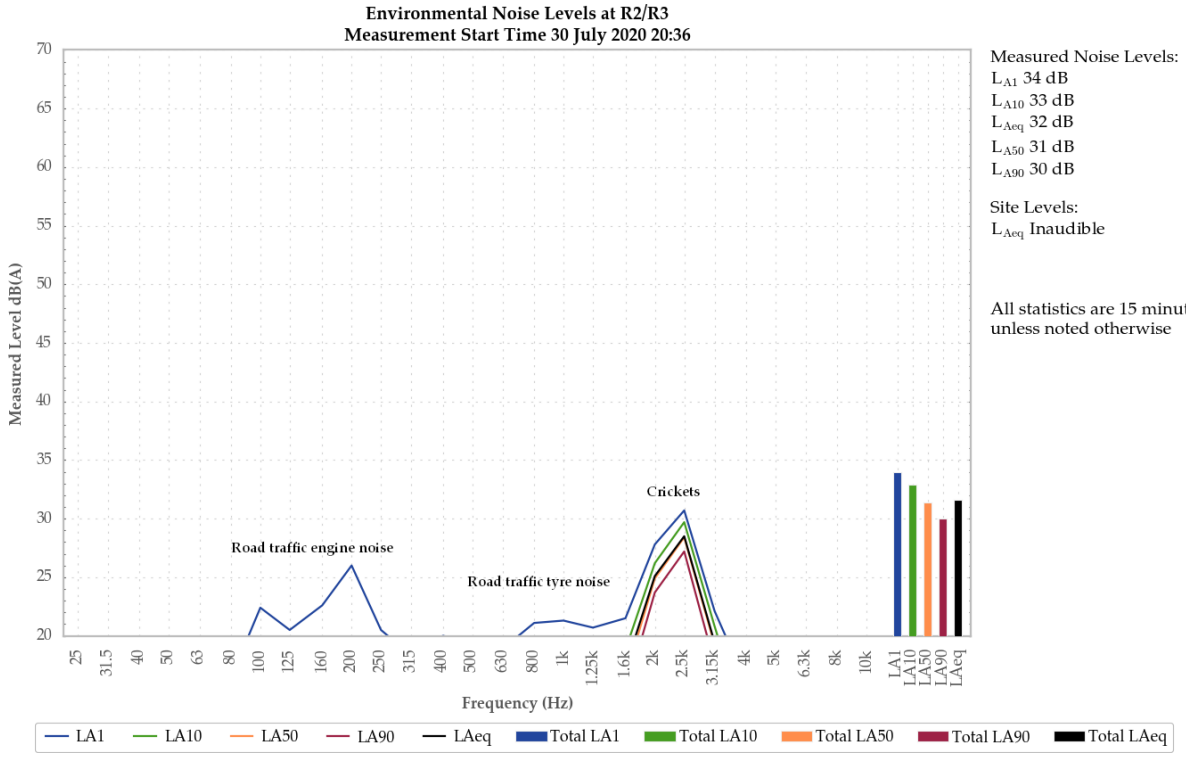

Figure 9: Environmental Noise Levels, R2/R3

BBC was inaudible throughout the measurement.

Crickets were responsible for the measured noise levels.

Road traffic noise and residential noise were also noted.

5.1.8 R2/R3 – Evening

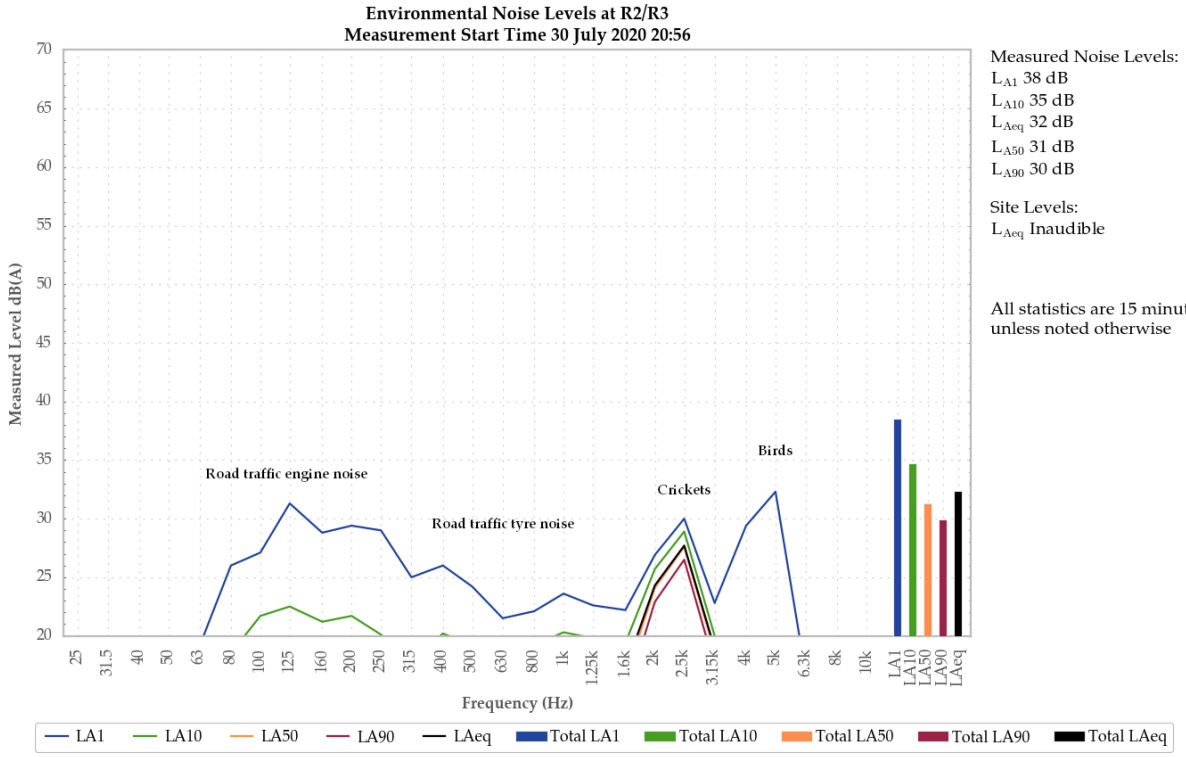

Figure 10: Environmental Noise Levels, R2/R3

BBC was inaudible during the measurement.

Crickets were primarily responsible for the measured noise levels. Birds and road traffic noise contributed to the measured L_{A1}.

Dogs were also noted.

5.1.9 R1 – Night

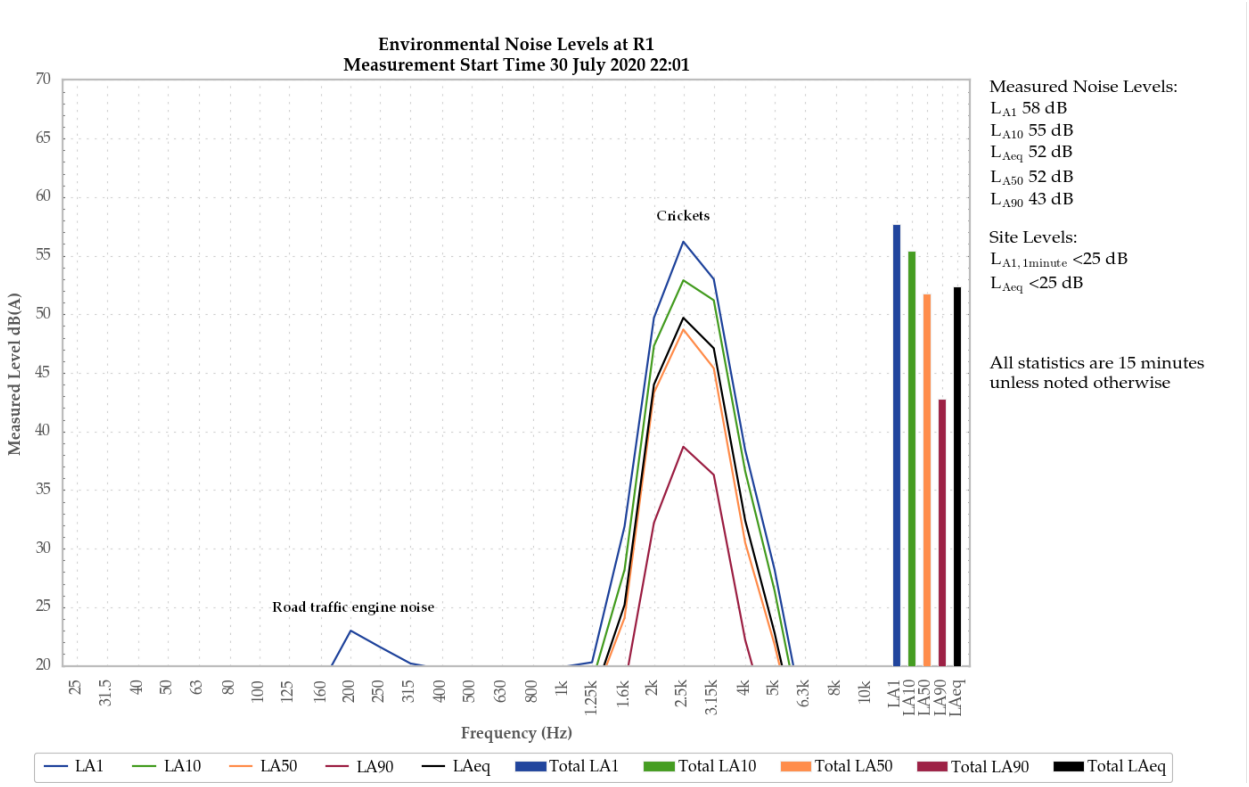

Figure 11: Environmental Noise Levels, R1

A low-level continuum from BBC was audible throughout the measurement, generating a site-only L_{Aeq} and $L_{A1,1minute}$ of less than 25 dB.

Crickets generated the measured noise levels.

Road traffic was also noted.

5.1.10 R1 – Night

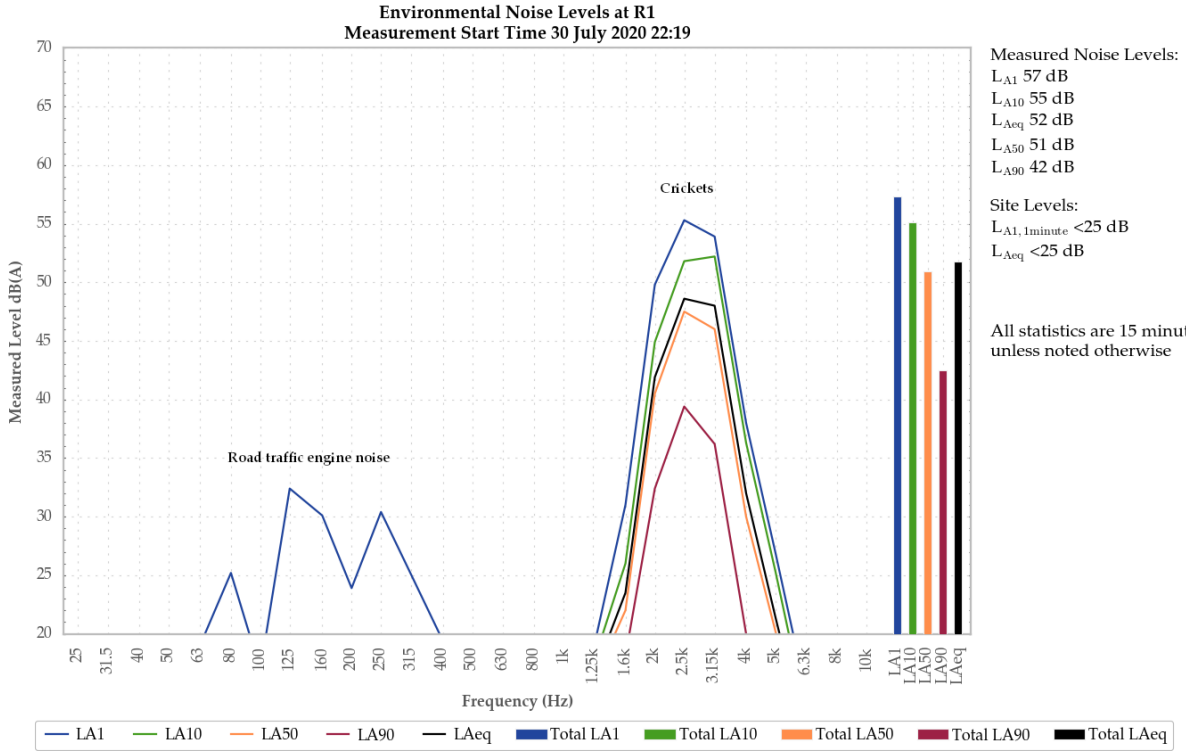

Figure 12: Environmental Noise Levels, R1

A low-level continuum from BBC was audible throughout the measurement, generating a site-only L_{Aeq} and $L_{A1,1minute}$ of less than 25 dB.

Crickets generated the measured noise levels.

Road traffic noise was also noted.

5.1.11 R2/R3 – Night

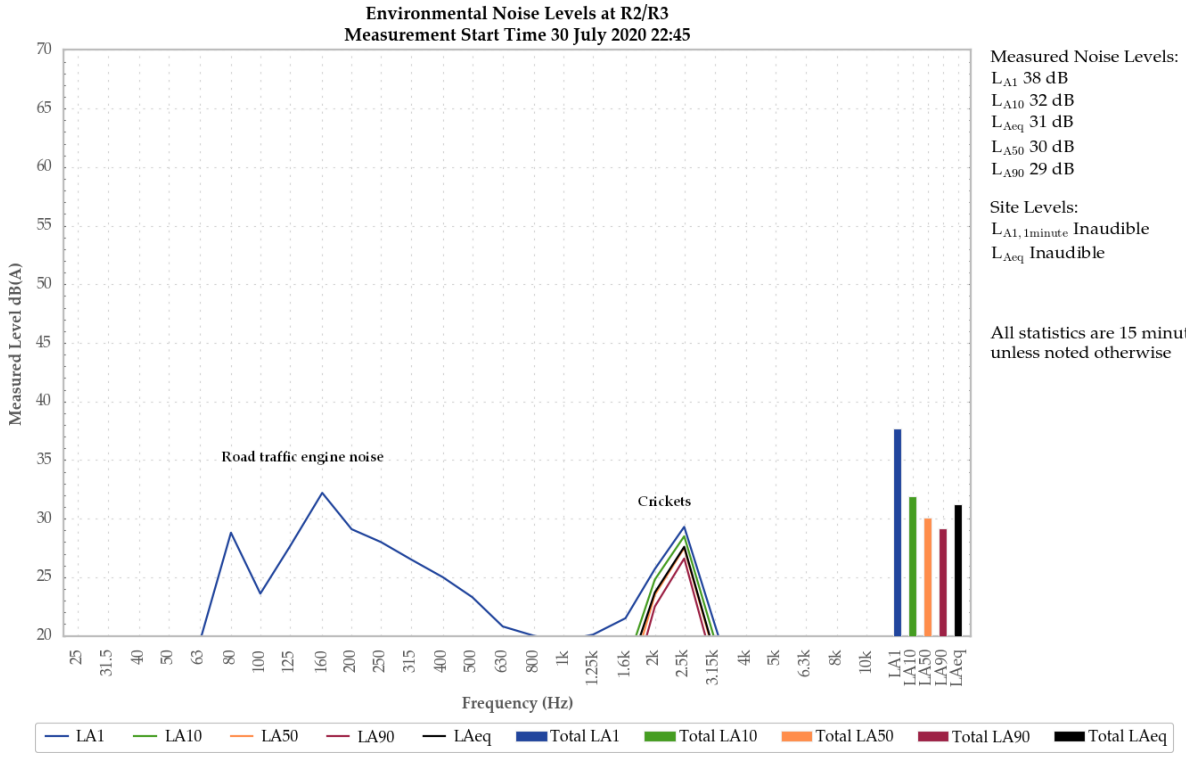

Figure 13: Environmental Noise Levels, R2/R3

BBC was inaudible during the measurement.

Road traffic engine/tyre noise and crickets were responsible for the measured L_{A1}. Crickets were also responsible for the measured L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

5.1.12 R2/R3 – Night

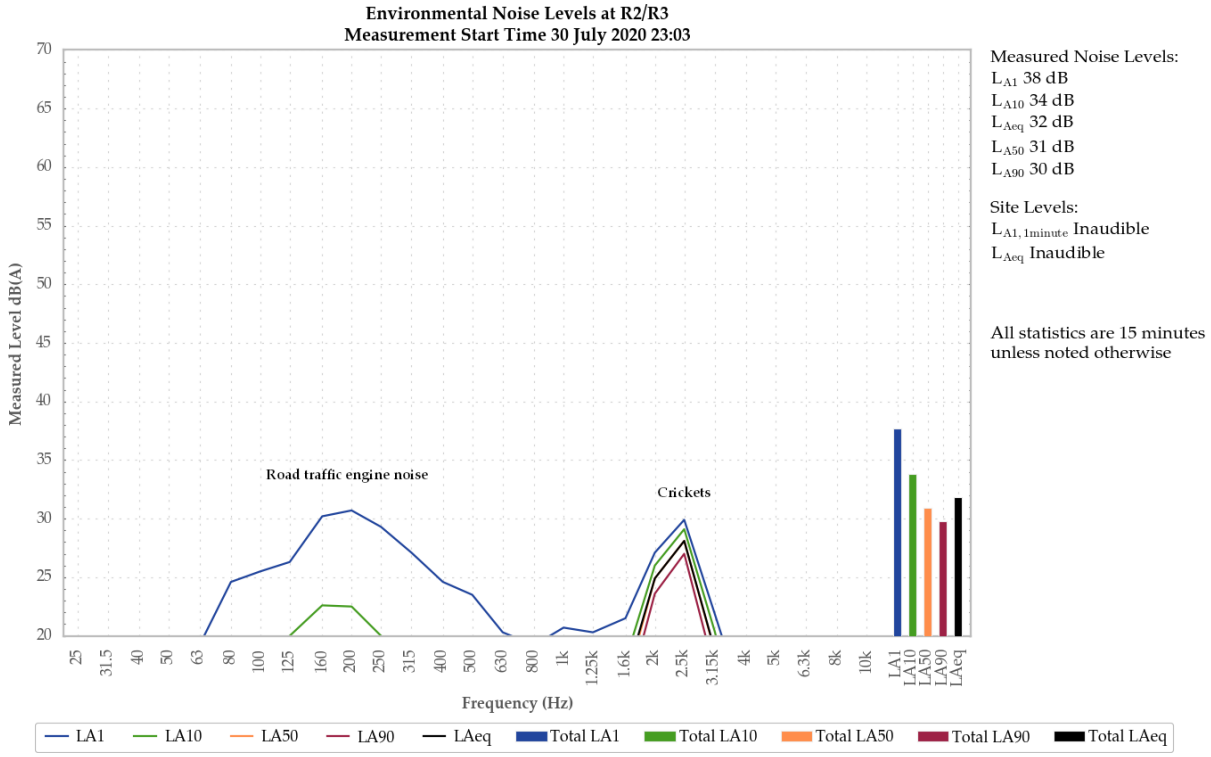

Figure 14: Environmental Noise Levels, R2/R3

BBC was inaudible during the measurement.

Road traffic engine noise and crickets were responsible for the measured L_{A1} and L_{A10}. Crickets were also responsible for the measured L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

6 SUMMARY

The following summaries apply to annual attended noise monitoring conducted for Baal Bone Colliery. Attended environmental noise monitoring described in this report was undertaken during the day, evening, and night periods of 30 July 2020. The purpose of the survey is to quantify and describe the acoustic environment around the site and compare with specified limits.

There were no exceedances, complaints or noise related incidents recorded by BBC since the previous monitoring was carried out (July 2019).

Noise levels from BBC complied with the relevant noise limits during the July 2020 survey. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

Project Approvals

The most recent version of the project approval was approved in December 2015. Sections relating to noise are reproduced below.

NOISE

Noise Impact Assessment Criteria

4. By 31 December 2011, the Proponent shall ensure that the noise generated by the project does not exceed the long term noise impact assessment criteria in Table 2 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 2: Long Term Noise Impact Assessment Criteria

Location	***All periods***	***Night***
	dB(A) $L_{Aeq\ (15\ min)}$	*dB(A)* $L_{A1\ (1\ min)}$
R1	46	47
R2	41	48
R3	41	48
All other privately-owned land	35	45

5. Until 31 December 2011, the Proponent shall ensure that the noise generated by the project does not exceed the interim noise impact assessment criteria in Table 3 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 3: Interim Noise Impact Assessment Criteria

Location	***All periods***	***Night***
	dB(A) $L_{Aeq\ (15\ min)}$	*dB(A)* $L_{A1\ (1\ min)}$
R1	48	47
R2	43	48
R3	43	48
All other privately-owned land	35	45

Notes to Tables 2 and 3:

- *To interpret the locations referred to in Table 2, see the applicable figure in Appendix 2;*
- *Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy; and*
- *These noise impact assessment criteria do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.*

Noise Management Plan

6. The Proponent shall prepare a Noise Management Plan for the project, to the satisfaction of the Secretary. The plan must:
   (a) be prepared in consultation with EPA, and submitted to the Secretary for approval within 6 months of the date of this approval; and
   (b) include a Noise Monitoring Program, that uses a combination of real-time and supplementary attended monitoring measures, and includes a protocol for determining exceedances with the relevant conditions of this approval.

Operating Conditions

7. The Proponent shall:
   (a) implement best practice noise management, including all reasonable and feasible noise mitigation measures to minimise the operational, low frequency, rail, and road traffic noise generated by the project;

   (b) regularly assess the real-time noise monitoring and meteorological forecasting data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this approval,

   to the satisfaction of the Secretary.

Road Haulage Management Plan

8. The Proponent shall prepare and implement a Road Haulage Management Plan for the project to the satisfaction of the Secretary. This plan must:
   (a) be submitted to the Secretary for approval 3 months prior to any proposal to truck more than 5,000 tonnes of coal per month from the mine;
   (b) detail the procedures for the ongoing assessment of noise impacts on residences as a result of road haulage of coal from the project; and
   (c) detail the procedures for the ongoing identification and implementation of reasonable and feasible noise mitigation works at residences adversely impacted by road haulage noise directly attributable to the project.

Environment Protection Licence

BBC holds EPL No. 765. The relevant sections are reproduced below.

L4 Noise limits

L4.1 Noise generated from the premises must not exceed the noise limits in the table below. The locations referred to in the table below are indicated on Project Approval 09_0178, Baal Bone Coal Project, Appendix 2, Figure 2 - Noise Receivers.

Location	All Periods	Night
	dB(A) LAeq (15 min)	dB(A) LA1 (1 min)
R1 (Muldoon residence Lot95 DP755759 Ben Bullen)	46	47
R2 (Speirs residence Lot4 DP734531 Ben Bullen)	41	48
R3 (Desch residence Lot3 DP734531 Ben Bullen)	41	48
All other privately-owned land	35	45

Note: The above noise limits do not apply at properties where the licensee has a written agreement with the landowner regarding the applicable noise limit.

L4.2 For the purposes of condition L4.1:

a) All Periods refers to day, evening and night time; and
b) Night is defined as the period between 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

L4.3 Noise limits set out in condition L4.1 apply under all meteorological conditions except for the following:

a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
c) Stability category G temperature inversion conditions.

L4.4 For the purposes of condition L4.3:
a) Data recorded by the meteorological station identified as EPA Licence Point 13 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

L4.5 To determine compliance:

a) with the Leq(15 minute) noise limits in condition L4.1, the noise measurement equipment must be located:
(i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or
(ii) within 30 metres of a dwelling facade, but not closer than 3 metres where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable
(iii) within approximately 50 metres of the boundary of a National Park or Nature Reserve.
b) with the noise limits in condition L4.1, the noise measurement equipment must be located:
(i) at the most affected point at a location where there is no dwelling at the location; or the property boundary closest to the premises; or
(ii) at the most affected point within an area at a location prescribed by condition L4.5(a).

L4.6 A non-compliance of condition L4.1 will still occur where noise generated from the premises in excess of the appropriate limit is measured:

a) at a location other than an area prescribed by condition L4.5(a); and/or
b) at a point other than the most affected point at a location.

L4.7 For the purposes of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

Noise Management Plan

The relevant sections of the BBC Noise Management Plan related to the noise monitoring program are reproduced below.

5. NOISE MONITORING PROGRAM

The NMP has been developed to address assessment procedures normally required by the EPA and DP&E; noise exposure for three residential receptors (R1, R2 and R3); and, assess compliance status with the noise conditions in PA 09_0178.

5.1 Attended Noise Monitoring

While Baal Bone is not an operating mine (from January 2013), attended monitoring frequency will be annual, provided that no significant changes in noise trends are identified.

Attended monitoring will be undertaken at receptors R1 and R2/R3 annually or as required to address reported noise incidents. As R2 and R3 are within 50 meters proximity of each other, monitoring for these locations will be concurrent and be taken at the midway point between them.

Scheduled operator attended noise monitoring will be undertaken during day, evening and night time assessment periods. Noise measurements at each assessment location will be undertaken over two consecutive 15 minute periods. The measurement results reported will include the L_{Amax}, L_{A1}, L_{Aeq} and L_{A90} levels and measured/calculated L_{Amax} and L_{Aeq} contributions from Baal Bone Colliery.

When direct measurement is not feasible to verify Baal Bone Colliery noise contributions, modelling will be undertaken to confirm the contribution. The measured or calculated contributed noise level will be adopted to assess against the criteria of PA 09_0178.

Attended noise monitoring will be increased in frequency to quarterly prior to the recommencement of mining operations.

5.2 Noise Measurement

Noise measurements will be undertaken in accordance with the Australian Standards AS1055-1997 "Acoustics - Description and Measurement of Environmental Noise' and the EPA's INP.

Noise from Baal Bone Colliery will be measured or predicted as an $L_{Aeq\ 15min}$ level at the most affected point on or within the residential property boundary or if this is more than 30 m from the residence, at the most affected point within 30 m of the residence. L_{Amax} noise from Baal Bone Colliery will be measured or predicted to outside a residential bedroom window during the night-time period between 10.00 pm and 7.00 am.

Noise measurements for the purpose of assessing compliance will be undertaken with instrumentation calibrated by a NATA Certified Laboratory. Instrumentation calibration levels will be checked with a portable calibrator immediately before and after the measurements, with the variation in calibration levels not exceeding ±0.5 dB. Copies of the meter calibration certificates will be attached to the attended noise monitoring report.

5.4 Meteorological Conditions

Meteorological conditions will be determined from the Baal Bone Colliery weather station. The station is programmed to provide mean and maximum parameters at 15 minute intervals. The reported parameters will include wind speed, wind direction, temperature, and humidity data. In the event the Baal Bone Colliery weather station data is not available, data from the Lithgow Meteorological Station located in Birdwood St, Lithgow will be used.

6.1 Reporting Attended Noise Monitoring Results

The attended noise monitoring reports will include the following:

- Date and time of the monitoring,
- Details and qualifications of person(s) who conducted the monitoring,
- A map identifying noise measurement locations,
- Details of meteorological conditions,
- Confirmation of site operating conditions,
- Measured LAmax, 15min, LA1, 15min, LA10, 15min , LA50, 15min, LA90, 15min and LAeq, 15min levels,
- Measured/calculated LAeq, 15min and LA max contributions from Baal Bone Colliery,
- Description of noise sources identified during the monitoring,
- Noise compliance/non-compliance status of Baal Bone Colliery during the monitoring, and
- Summary of noise incidents reported at Baal Bone Colliery since the previous report.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
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Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19073

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : NA-28
Instrument Serial Number : 30131882
Microphone Serial Number : 04739
Pre-amplifier Serial Number : 11942

Pre-Test Atmospheric Conditions
Ambient Temperature : 24.5°C
Relative Humidity : 54.5%
Barometric Pressure : 99.39kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 23.6°C
Relative Humidity : 51%
Barometric Pressure : 99.36kPa

Calibration Technician : Charlie Neil
Calibration Date : 5 Feb 2019

Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, 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 test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013

Least Uncertainties of Measurement -

Acoustic Tests
31.5 Hz to 8kHz ±0.15dB
12.5kHz ±0.2dB
16kHz ±0.29dB
Electrical Tests
31.5 Hz to 20 kHz ±0.11dB

Environmental Conditions
Temperature ±0.2°C
Relative Humidity ±2.4%
Barometric Pressure ±0.015kPa

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report

NATA

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C20155

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Dr Thornton NSW 2322
Equipment Tested/ Model Number :	Pulsar Model 105
Instrument Serial Number :	78226

Atmospheric Conditions

Ambient Temperature :	23.4°C
Relative Humidity :	53.8%
Barometric Pressure :	101.2kPa

Calibration Technician :	Lucky Jaiswal	**Secondary Check:**	Alannah Squires
Calibration Date :	11 Mar 2020	**Report Issue Date :**	12 Mar 2020

Approved Signatory : Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	*Pass*
Frequency Generated	*Pass*
Total Distortion	*Pass*

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.13	1000.37

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.09%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.09%*	*Barometric Pressure*	*±0.015kPa*

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

* The tests <1000 kHz are not covered by Acoustic Research Labs Pty Ltd NATA accreditation.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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