Mannering Colliery

Environmental Noise Monitoring

May 2018

Prepared for

LDO Group

Global Acoustics

Noise and Vibration Analysis and Solutions

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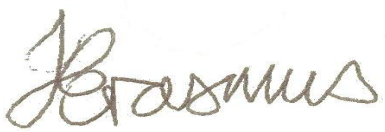

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EXECUTIVE SUMMARY

Global Acoustics was engaged by the LDO Group to conduct an attended noise survey around Mannering Colliery (MC), an underground coal mine in Mannering Park, NSW.

The purpose of the noise survey was to quantify and describe the acoustic environment around the site and compare results with limits specified in the project approval (06_0311).

Environmental noise monitoring described in this report was undertaken on 21/22 May 2018.

Operational Noise Assessment

MC complied with the relevant day, evening and night approval $L_{Aeq,15\ minute}$ and $L_{A1,1minute}$ noise limits at all sites during May 2018.

Low Frequency Noise Assessment

A low-frequency noise assessment was carried out in accordance with the EPA's 'Noise Policy for Industry' (NPfI). Low frequency modifying factors, where applicable, did not result in any exceedances of MC noise limits during the May 2018 survey.

Global Acoustics Pty Ltd

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Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged to conduct an attended noise survey around Mannering Colliery (MC), an underground coal mine at Mannering Park, NSW.

Environmental noise monitoring described in this report was undertaken on 21/22 May 2018.

The purpose of this survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

1.2 Monitoring Locations

There were three monitoring locations during this survey as detailed in Table 1.1 and shown on Figure 1.

Table 1.1: MC ATTENDED NOISE MONITORING LOCATIONS

Report Descriptor	Monitoring Location
RA1	Pacific Highway, Doyalson
RA2	Macquarie Shores Village, Doyalson North
RA3	Tall Timbers Road, Kingfisher Shores

1.3 Operations

The client has advised that MC was operating during the May 2018 monitoring period.

Figure 1: MC attended noise monitoring locations

1.4 Terminology & Abbreviations

Definitions of terminology and abbreviations, which may be used in this report, are provided in Table 1.2.

Table 1.2: TERMINOLOGY AND ABBREVIATIONS

Descriptor	Definition
L_A	The A-weighted root mean squared (RMS) noise level at any instant
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_{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_{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.
SEL	Sound exposure level (SEL), the A-weighted noise energy during a measurement period normalised to one second
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.
SC	Stability Class. Estimated from wind speed and sigma theta data.
Day	This is the period 7:00am to 6:00pm
Evening	This is the period 6:00pm to 10:00pm
Night	The period 10:00pm to 7:00am

2 PROJECT APPROVAL & CRITERIA

2.1 Project Approval

A project approval (06_0311) (the Approval) currently exists for MC. Modification 3 of the Approval specifies the noise requirements in Conditions 1 to 5 of Appendix 4A and Conditions 1 to 4 of Appendix 4B. These sections of the Approval have been reproduced in Appendix A.

2.2 Noise Management Plan

The Noise Management Plan (NMP) for MC was approved on 9 September 2008 by the Department of Planning and Infrastructure. The NMP details the monitoring requirements associated with the operational phase of the mine as well as any ongoing construction activities.

2.3 Project Specific Criteria

Table 1 in Appendix 4B of the Approval details relevant criteria and have been reproduced in Table 2.1.

Table 2.1: MC CRITERIA, dB[1]

Location	Day $L_{Aeq,15min}$	Evening $L_{Aeq,15min}$	Night $L_{Aeq,15min}$	Night $L_{A1,1min}$
4 – Di Rocco	40	40	40	49
5 - Kieghran	43	43	41	49
6 - Swan	42	42	41	49
7 - Druitt	39	39	39	47
8 - May	46	46	46	47
9 - Jeans	41	41	41	51
11 - Jeans	39	39	39	49
18 - Jeans	39	39	39	51
20 – Knight and all other residences	40	40	40	51

Notes:

1. *Day: 7:00am to 6:00pm ~ Evening: 6:00pm to 10:00pm ~Night: 10:00pm to 7:00am.*

Rural areas and residences have been divided into three receiver areas (and monitoring locations) in the NMP. Table 2.2 outlines the limiting criteria for each monitoring location.

Table 2.2: MC MONITORING LOCATIONS AND LIMITING CRITERIA, dB[1]

Location	Day $L_{Aeq,15min}$	Evening $L_{Aeq,15min}$	Night $L_{Aeq,15min}$	Night $L_{A1,1min}$
RA1	42	42	41	49
RA2	39	39	39	47
RA3	39	39	39	49

Notes:

1. *Day: 7:00am to 6:00pm ~ Evening: 6:00pm to 10:00pm ~Night: 10:00pm to 7:00am.*

2.4 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017, and supersedes the EPA's Industrial Noise Policy (INP, 2000). Assessment and reporting of modifying factors is to be carried out in accordance with Fact Sheet C of the NPfI.

NPfI modifying factors, as they are applicable to mining noise, are described in more detail below.

2.4.1 Tonality and Intermittent Noise

As defined in the NPfI:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Intermittent noise is noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.*

There were no intermittent noise sources from site during the survey. In addition, there is no equipment on site that is likely to generate tonal noise as defined in the NPfI.

2.4.2 Low Frequency Noise

As defined in the Noise Policy for Industry:

> *Low frequency noise is noise with an unbalanced spectrum and containing major components within the low-frequency range (10 – 160 Hz) of the frequency spectrum.*

The NPfI contains the current method of assessing low frequency noise, which is a 2 step process as detailed below:

> *Measure/assess source contribution C-weighted and A-weighted L_{eq},T levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level is 15 dB or more and:*
>
> - *where any of the 1/3 octave noise levels in Table C2 are exceeded by **up to and including** 5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> - *where any of the 1/3 octave noise levels in Table C2 are exceeded by **more than** 5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 and associated notes from the NPfI is reproduced below:

Table C2: One-third octave low-frequency noise thresholds.

Hz/dB(Z)	One-third octave $L_{Zeq,15min}$ threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Notes:

- dB(Z) = decibel (Z frequency weighted).
- For the assessment of low-frequency noise, care should be taken to select a wind screen that can protect the microphone from wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for

wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler, 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

- Low-frequency noise corrections only apply under the standard and/or noise-enhancing meteorological conditions.
- Where a receiver location has had architectural acoustic treatment applied (including alternative means of mechanical ventilation satisfying the Building Code of Australia) by a proponent, as part of consent requirements or as a private negotiated agreement, alternative external low-frequency noise assessment criteria may be proposed to account for the higher transmission loss of the building façade.
- Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or environment protection licence, and at locations nominated in the development consent or licence.

3 METHODOLOGY

3.1 Overview

Attended monitoring was conducted in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. Atmospheric condition measurement was also undertaken.

Meteorological data was obtained from the MC meteorological station. This allowed correlation of atmospheric parameters and measured noise levels. Sigma theta is used to calculate vertical temperature gradient (VTG) in accordance with procedures detailed in the NPfI.

3.2 Attended Noise Monitoring

During this survey, monthly attended monitoring was undertaken once at each location during day, evening and night periods. The duration of each measurement was 15 minutes.

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows the most accurate determination of the contribution, if any, to measured noise levels from MC.

If the exact contribution of the source of interest 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 levels, for example, L_{A10}, L_{A50} or L_{A90}. 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 as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

Therefore, 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 or reasonable to employ NPfI 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 was quantified by measuring or estimating the highest noise level emitted from a site noise source during the entire measurement period (i.e. the highest level of the worst minute during the 15 minute measurement).

3.3 Modifying Factors

Years of monitoring have indicated that noise levels from mining operations, particularly those measured at significant distances from the source are relatively continuous and broad spectrum. Given this, noise levels from MC at the monitoring locations are unlikely to be intermittent or tonal.

Assessment of low-frequency modifying factors is necessary when application of the maximum correction could potentially result in an exceedance of the relevant site-only L_{Aeq} criterion. Low-frequency analysis is therefore undertaken for measurements in this report where:

- meteorological conditions resulted in criteria being applicable;
- contributions from MC were audible and directly measurable, such that the site-only L_{Aeq} was not "NM" or less than a maximum cut off value (e.g. "<20 dB" or "<30dB");
- contributions from MC were within 5 dB of the relevant L_{Aeq} criterion, as 5 dB is the maximum penalty that can be applied by low-frequency modifying factors; and
- MC was the dominant low-frequency noise source.

All measurements meeting these conditions were evaluated for possible low frequency penalty applicability in accordance with the NPfI.

3.4 Monitoring Equipment

Equipment detailed in Table 3.1 was used to measure environmental noise levels. Calibration certificates are provided in Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	00370304	16/11/2018
Pulsar 106 acoustic calibrator	81334	18/12/2019

4 RESULTS

4.1 Attended Noise Monitoring

Overall noise levels measured at each location during attended measurement are provided in Table 4.1.

Table 4.2 and Table 4.3 compare measured levels with $L_{Aeq,15minute}$ and $L_{A1,1minute}$ criteria detailed in the Approval. Criteria is then applied if weather conditions are in accordance with the Approval and NPfI. Discussion as to the noise sources responsible for these measured levels is provided in Section 5 of this report.

Table 4.1: MEASURED NOISE LEVELS – MAY 2018[1]

Location	Start Date and Time	L_{A1} (dB)	L_{A10} (dB)	L_{Aeq} (dB)	L_{A90} (dB)
		Day			
RA1	22/05/2018 11:39	82	78	73	57
RA2	22/05/2018 12:02	49	40	40	36
RA3	22/05/2018 12:26	54	47	43	37
		Evening			
RA1	21/05/2018 20:23	81	76	71	51
RA2	21/05/2018 20:50	41	38	37	36
RA3	21/05/2018 21:16	44	43	41	40
		Night			
RA1	21/05/2018 22:54	78	67	65	40
RA2	21/05/2018 22:26	40	37	36	34
RA3	21/05/2018 22:00	48	41	41	38

Notes:

1. *Noise levels in this table are not necessarily the result of activities at MC.*

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY MC AGAINST OPERATIONAL NOISE IMPACT ASSESSMENT CRITERIA – MAY 2018

Location	Start Date and Time	Wind Speed (m/s)	VTG (°C / 100m)[1]	L_{Aeq} Criteria (dB)	Criteria Applies?[2]	MC L_{Aeq} (dB)[3]	Exceedance (dB)[4,5]
			Day				
RA1	22/05/2018 11:39	2.7	-2.0	42	Yes	IA	Nil
RA2	22/05/2018 12:02	2.8	-2.0	39	Yes	IA	Nil
RA3	22/05/2018 12:26	1.9	-2.0	39	Yes	IA	Nil
			Evening				
RA1	21/05/2018 20:23	2.4	3.0	42	Yes	IA	Nil
RA2	21/05/2018 20:50	1.5	3.0	39	Yes	IA	Nil
RA3	21/05/2018 21:16	0.6	3.0	39	Yes	IA	Nil
			Night				
RA1	21/05/2018 22:54	0.5	3.0	41	Yes	IA	Nil
RA2	21/05/2018 22:26	0.8	3.0	39	Yes	IA	Nil
RA3	21/05/2018 22:00	0.3	3.0	39	Yes	IA	Nil

Notes:

1. *Sigma theta data is used to calculate Vertical Temperature Gradient (VTG) in accordance with procedures detailed in the NPfI;*
2. *In accordance with Appendix 4A of the Approval, noise emission limits do not apply for wind speeds greater than 3m/s at 10 metres above ground level; stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *These are results for MC in the absence of all other noise sources;*
4. *Bold results in red are those greater than the relevant criterion (if applicable); and*
5. *NA in exceedance column means atmospheric conditions outside conditions specified in Approval and so criterion is not applicable.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY MC AGAINST OPERATIONAL NOISE IMPACT ASSESSMENT CRITERIA – MAY 2018

Location	Start Date and Time	Wind Speed (m/s)	VTG (°C / 100m)[1]	$L_{A1,1min}$ Criteria (dB)	Criteria Applies?[2]	MC $L_{A1,1min}$ (dB)[3]	Exceedance (dB)[4,5]
RA1	21/05/2018 22:54	0.5	3.0	49	Yes	IA	Nil
RA2	21/05/2018 22:26	0.8	3.0	47	Yes	IA	Nil
RA3	21/05/2018 22:00	0.3	3.0	49	Yes	IA	Nil

Notes:

1. *Sigma theta data is used to calculate Vertical Temperature Gradient (VTG) in accordance with procedures detailed in the NPfI;*
2. *In accordance with Appendix 4A of the Approval, noise emission limits do not apply for wind speeds greater than 3m/s at 10 metres above ground level; stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *These are results for MC in the absence of all other noise sources;*
4. *Bold results in red are those greater than the relevant criterion (if applicable); and*
5. *NA in exceedance column means atmospheric conditions outside conditions specified in Approval and so criterion is not applicable.*

4.2 Low Frequency Noise Assessment

Measured MC only noise levels were assessed for the applicability of low frequency modifying factors in accordance with the EPA's NPfI.

None of the measurements satisfied the conditions outlined in Section 3.3. Therefore no further assessment was undertaken.

4.3 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.4. Atmospheric condition data is routinely recorded during each measurement to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.4: MEASURED ATMOSPHERIC CONDITIONS – MAY 2018

Location	Start Date and Time	Temperature (°C)	Wind Speed (m/s) [1]	Wind Direction (°MN) [1]	Cloud Cover (1/8s)
		Day			
RA1	22/05/2018 11:39	21	1.8	300	1
RA2	22/05/2018 12:02	22	0.6	260	1
RA3	22/05/2018 12:26	22	0.0	-	1
		Evening			
RA1	21/05/2018 20:23	15	0.6	310	0
RA2	21/05/2018 20:50	14	0.3	310	0
RA3	21/05/2018 21:16	14	0.0	-	0
		Night			
RA1	21/05/2018 22:54	14	0.0	-	0
RA2	21/05/2018 22:26	13	0.0	-	0
RA3	21/05/2018 22:00	13	0.0	-	0

Notes:

1. *"-" indicates calm conditions at 1.8 metres.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.2 and Table 4.3 present compliance calculations based on data gathered during attended monitoring. These noise levels are the result of multiple 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 MC's contribution, if any, to measured levels. At each monitoring location, MC's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (in the absence of any other noise) was, where possible, measured directly or determined by frequency analysis. Time variations of noise sources in each measurement and their temporal characteristics, have been taken into account via statistical descriptors.

From these observations summaries have been derived for each location. The following report sections provide these summaries. Statistical 1/3 octave band analysis of environmental noise was undertaken, and the figures following this section display the frequency ranges for various noise sources at each location for L_{A1}, L_{A10}, L_{A90} and L_{Aeq}. 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; mining noise is at frequencies less than 1000 Hz (this 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; this can be dogs, cows, or, most commonly, road traffic. The local power station was identified as a source of low frequency noise.

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 considered accurate for L_{Aeq}.

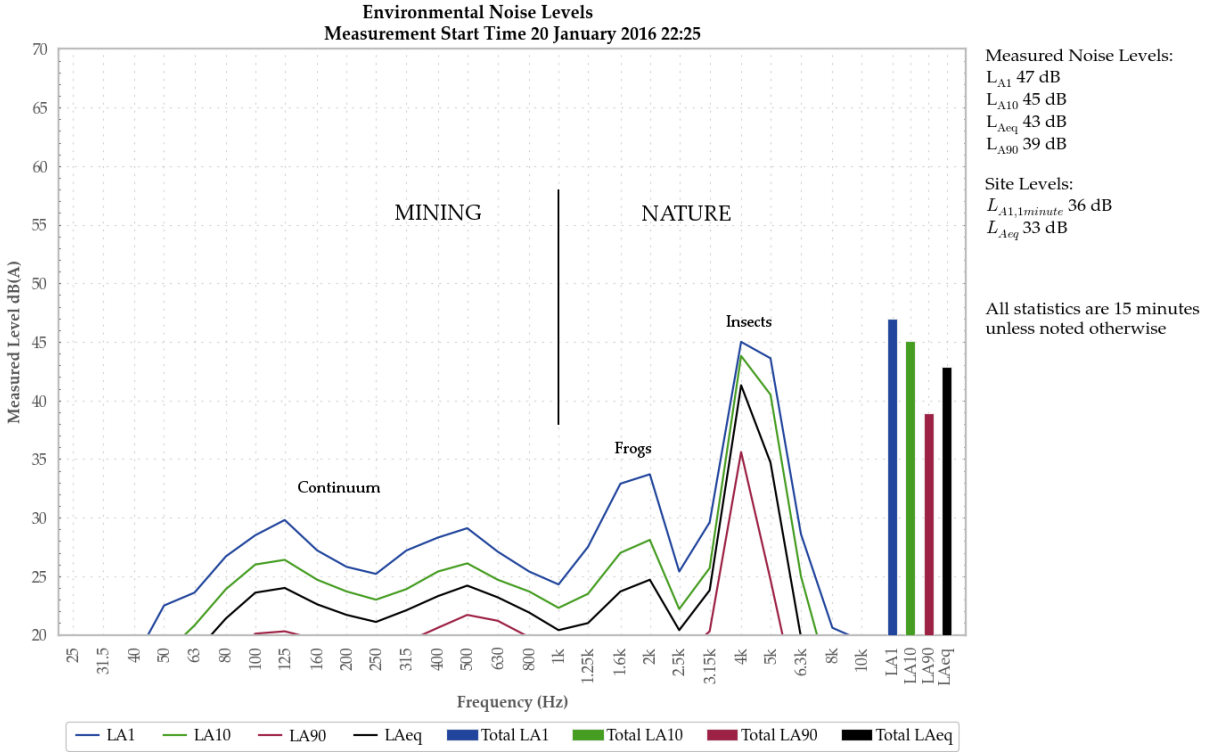

Figure 2: Sample Graph (See Section 5.1 for explanation)

5.1.1 RA1 - Day

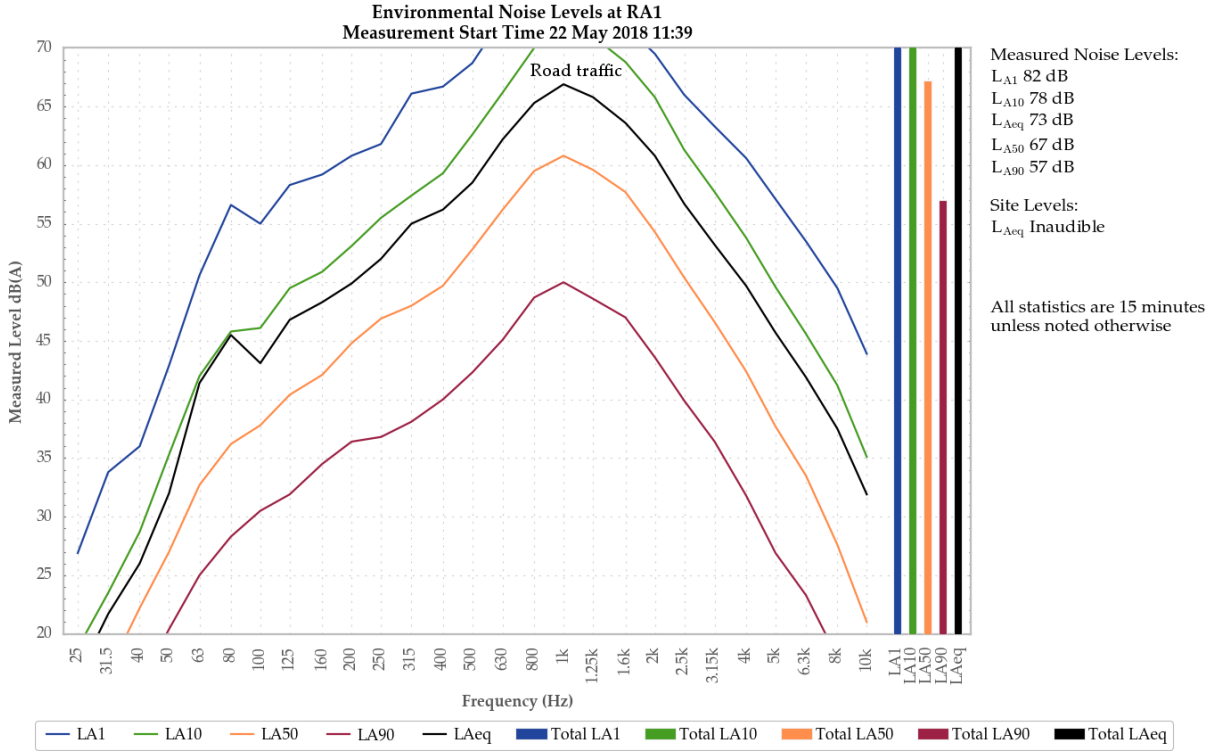

Figure 3: Environmental Noise Levels, RA1 - Pacific Highway, Doyalson

MC was inaudible during the measurement.

Highway road traffic generated all measured levels.

Aircraft and birds were also noted.

5.1.2 RA2 - Day

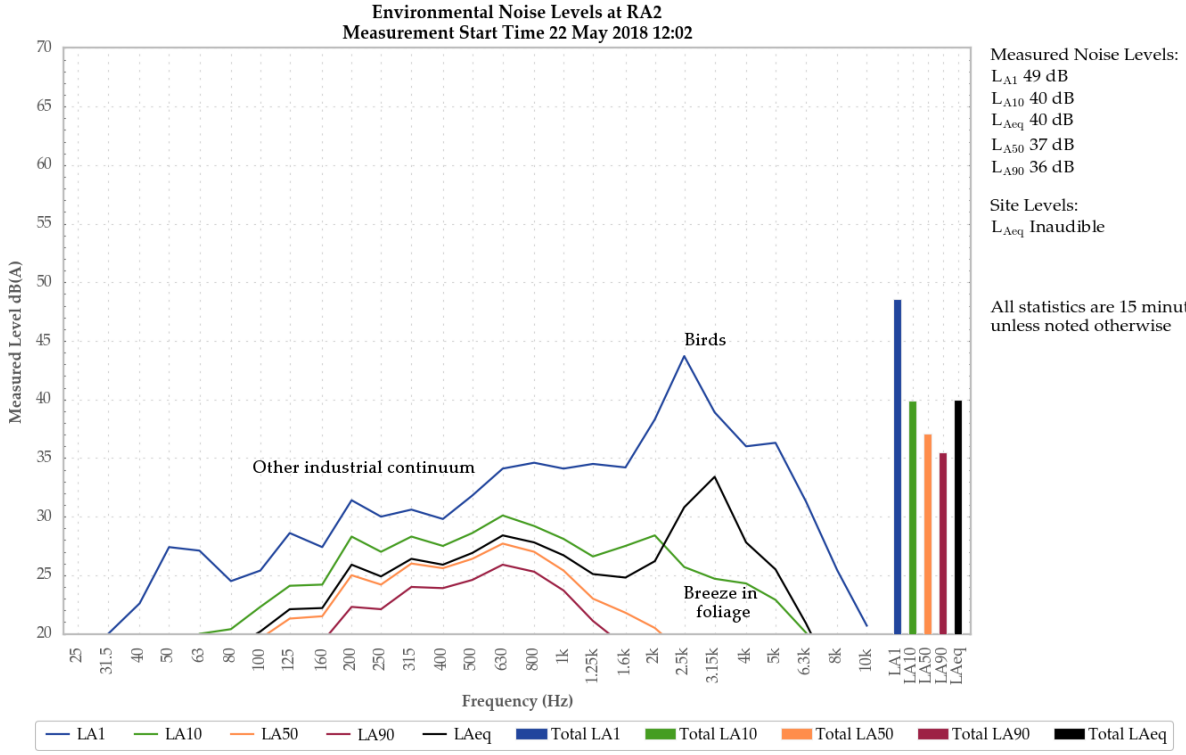

Figure 4: Environmental Noise Levels, RA2 - Macquarie Shores Village

MC was inaudible during the measurement.

Birds were primarily responsible for the measured L_{A1} and contributed to the measured L_{Aeq}. Other industrial continuum generated the measured L_{A50} and L_{A90}, and contributed to all other measured levels. Breeze in foliage was a minor contributor to the measured L_{A10}.

Residential noise and road traffic were also noted.

5.1.3 RA3 - Day

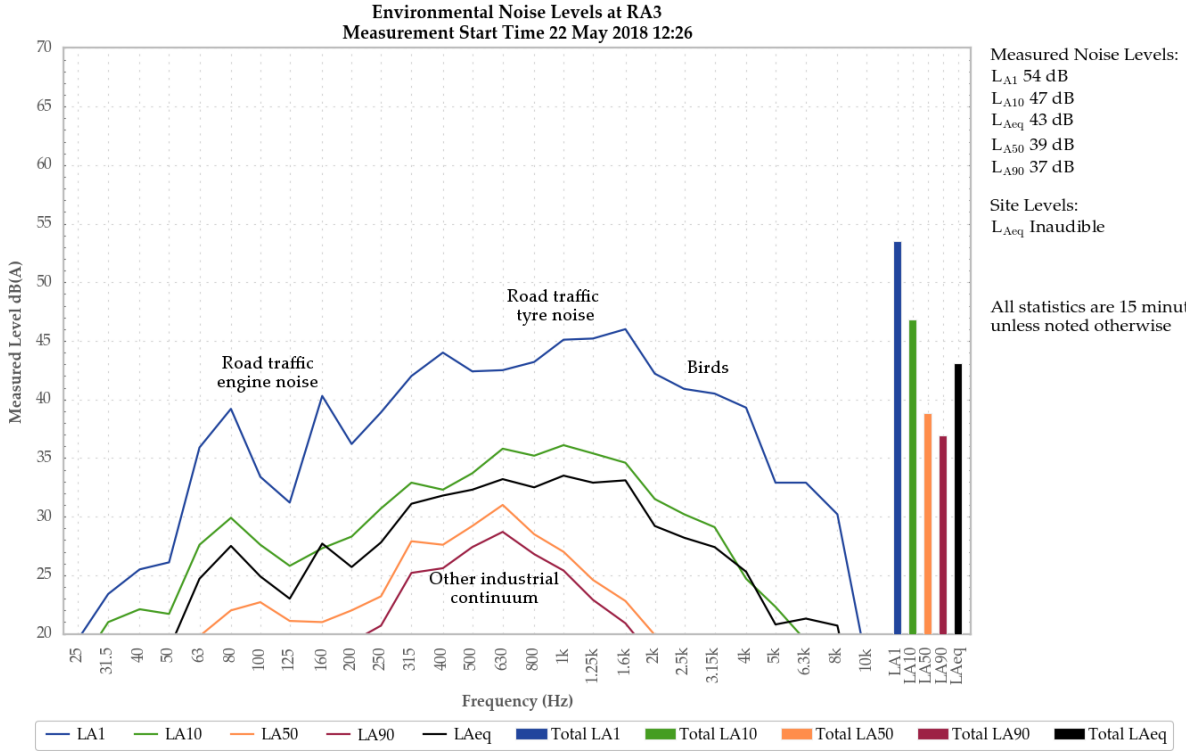

Figure 5: Environmental Noise Levels, RA3 - Tall Timbers Road

MC was inaudible during the measurement.

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

Aircraft were also noted.

5.1.4 RA1 - Evening

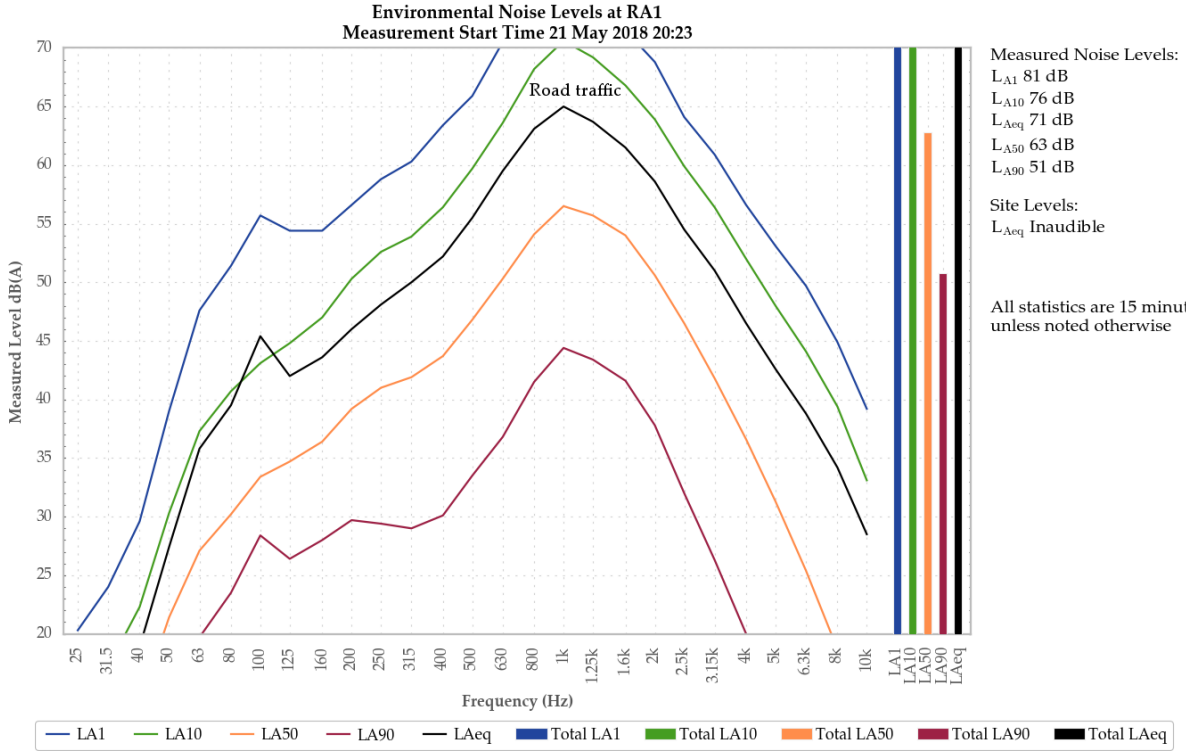

Figure 6: Environmental Noise Levels, RA1 - Pacific Highway, Doyalson

MC was inaudible during the measurement.

Highway road traffic noise generated all measured levels.

5.1.5 RA2 - Evening

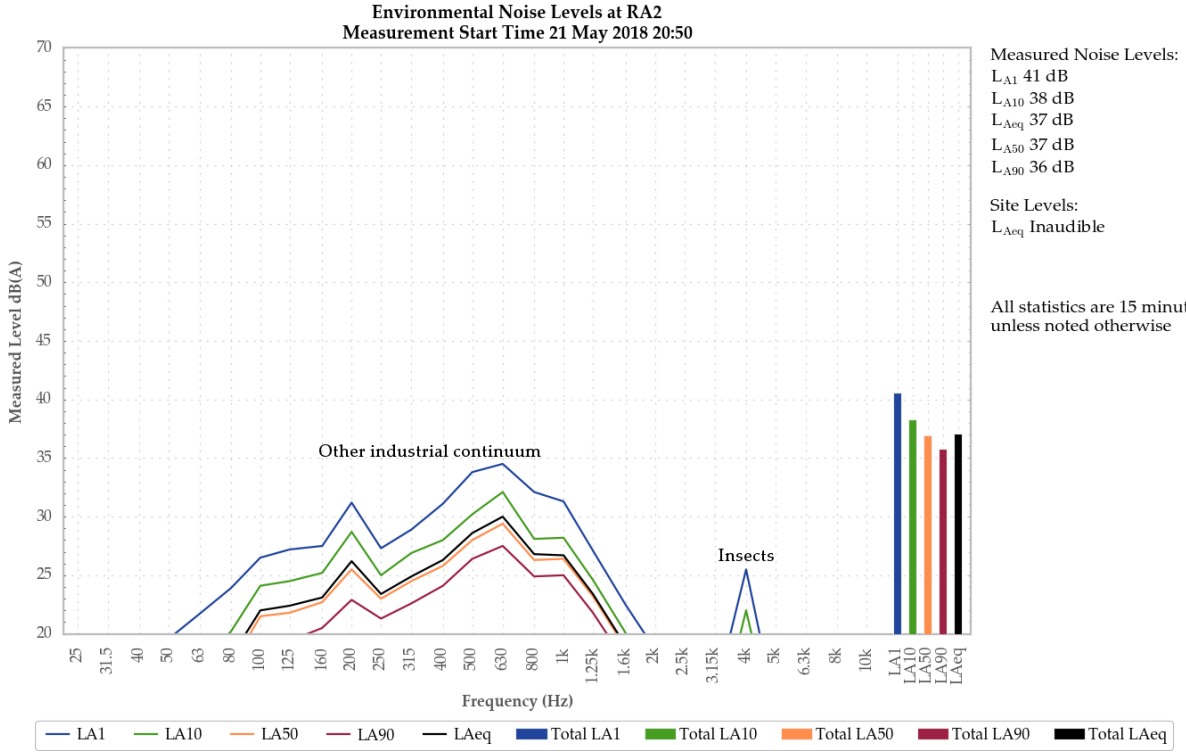

Figure 7: Environmental Noise Levels, RA2 - Macquarie Shores Village

MC was inaudible during the measurement.

Other industrial continuum generated all measured levels.

Insects, road traffic, an aircraft and residential noises were also noted.

5.1.6 RA3 - Evening

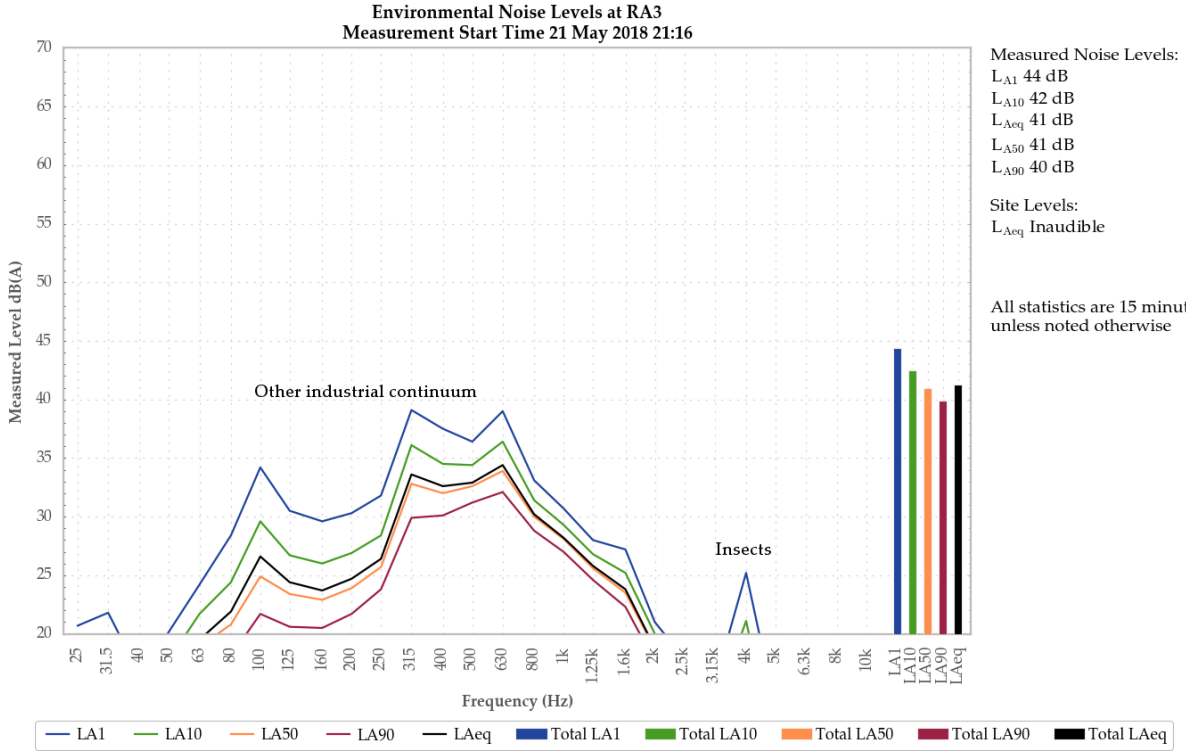

Figure 8: Environmental Noise Levels, RA3 - Tall Timbers Road

MC was inaudible during the measurement.

Other industrial continuum generated all measured levels.

Road traffic, insects and an aircraft were also noted.

5.1.7 RA1 - Night

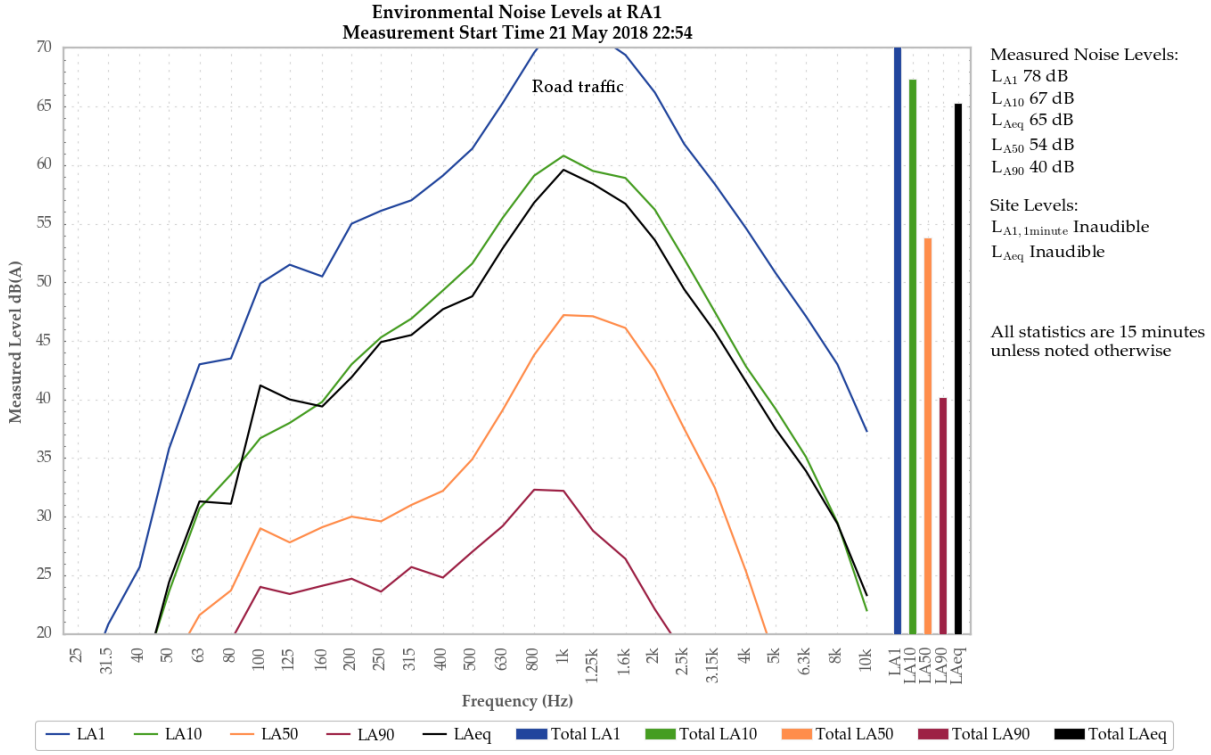

Figure 9: Environmental Noise Levels, RA1 - Pacific Highway, Doyalson

MC was inaudible during the measurement.

Highway road traffic noise generated all measured levels.

Insects were also noted.

5.1.8 RA2 - Night

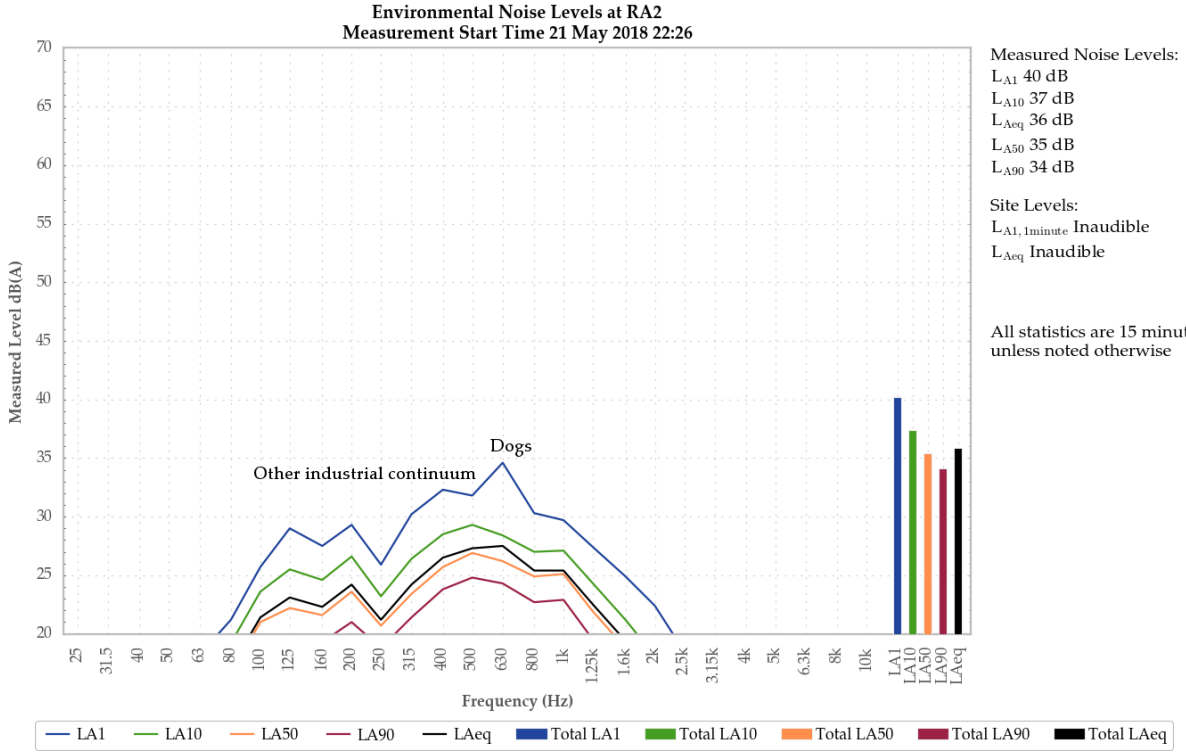

Figure 10: Environmental Noise Levels, RA2 - Macquarie Shores Village

MC was inaudible during the measurement.

Other industrial continuum primarily generated all measured levels. Dogs were a minor contributor the measured L_{A1}.

Road traffic, insects and birds were also noted.

5.1.9 RA3 - Night

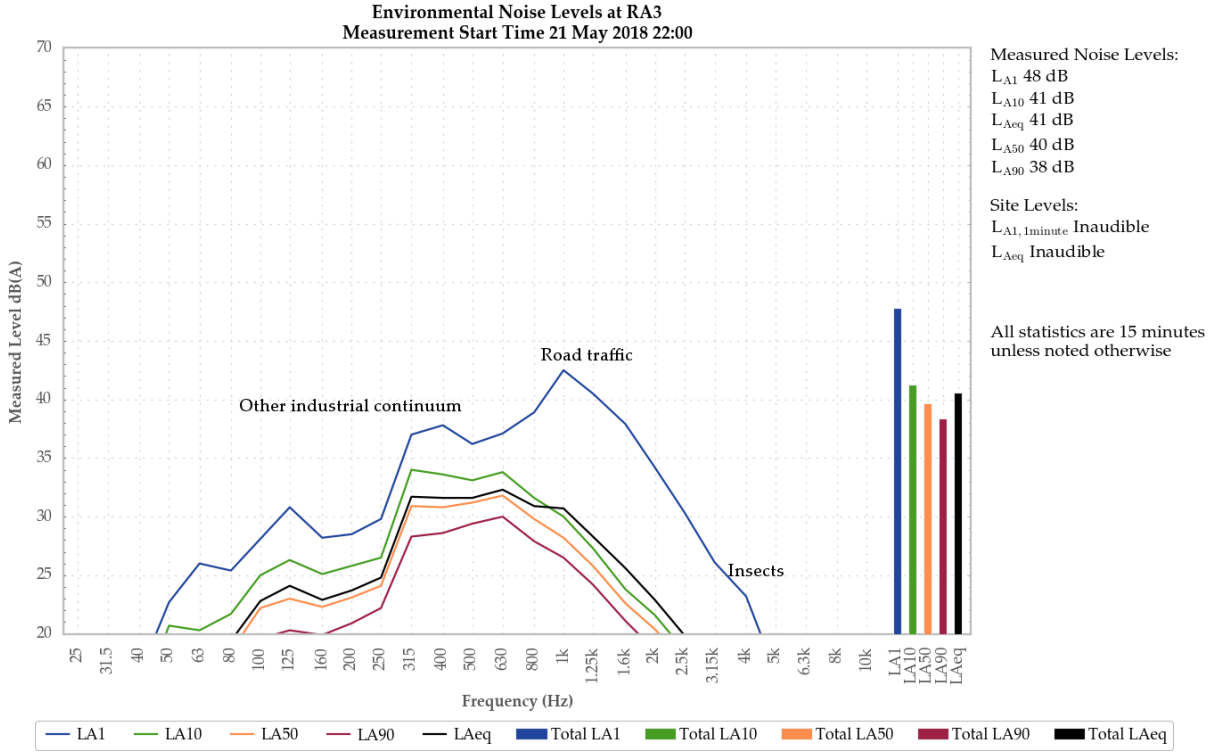

Figure 11: Environmental Noise Levels, RA3 - Tall Timbers Road.

MC was inaudible during the measurement.

Road traffic was primarily responsible for the measured L_{A1}. Other industrial continuum generated the measured L_{A10}, L_{Aeq}, L_{A50} and L_{A90}, and contributed to the measured L_{A1}.

Insects were also noted.

6 SUMMARY OF COMPLIANCE

Global Acoustics was engaged to conduct an attended noise survey around MC, an underground coal mine at Mannering Park, NSW.

Environmental noise monitoring described in this report was undertaken on 21/22 May 2018.

The purpose of the survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

MC complied with the relevant day, evening and night approval $L_{Aeq,15\ minute}$ and $L_{A1,1minute}$ noise limits at all sites during May 2018.

Low Frequency Noise Assessment

A low frequency noise assessment was carried out in accordance with the EPA's NPfI. Low-frequency modifying factors, where applicable, did not result in any exceedances of MC noise limits during the May 2018 survey.

Global Acoustics Pty Ltd

APPENDIX

A PROJECT APPROVAL

NSW Department of Planning Project Approval 06_0311 applies to the MC. The noise section is reproduced below:

SCHEDULE 3
SPECIFIC ENVIRONMENTAL CONDITIONS

NOISE

Noise Impact Criteria

1. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1 at any residence on privately owned land.

Table 1: Noise limits dB(A)

Day $L_{Aeq(15\ min)}$	***Evening*** $L_{Aeq(15\ min)}$	***Night***		***Location*** (as listed in Appendix 4)
		$L_{Aeq(15\ min)}$	$L_{A1(1\ min)}$	
49	49	35	49	4 – di Rocco
47	47	35	49	5 – Keighran
44	44	35	49	6 – Swan
43	43	43	50	7 – Druitt
46	46	46	50	8 – May
45	45	45	52	9 – Jeans
40	40	40	52	11 – Jeans
43	43	43	52	18 – Jeans
44	44	44	52	20 – Knight and all other Chain Valley Bay residences

Note: The location of the land referred to in Table 1 is shown on the figure in Appendix 4.

Noise generated by the project is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy* (as may be updated from time-to-time). Appendix 4A sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Proponent has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

This condition only has effect prior to recommencement of underground coal extraction at Mannering Colliery. At all other times, conditions 1 to 4 of Appendix 4B have effect in its place.

Noise Mitigation

2. The Proponent shall prepare a report on potential noise mitigation measures for noisy equipment and activities undertaken on the site to the satisfaction of the Secretary. This report must be:
   (a) prepared by a suitably qualified acoustic expert;
   (b) submitted to the Secretary by the end of September 2008; and
   (c) accompanied by an action plan for the implementation of any reasonable and feasible recommendations of the report.

Noise Monitoring

3. The Proponent shall prepare a Noise Monitoring Program for the project to the satisfaction of the Secretary. This program must:
   (a) be submitted to the Secretary by the end of September 2008;
   (a1) be revised in consultation with the EPA and be submitted to the Secretary by the end of April 2016; and
   (b) include the use of continuous and attended noise monitoring measures to monitor the performance of the project.

The Proponent shall implement the approved Noise Monitoring Program as approved from time to time by the Secretary.

APPENDIX 4A: NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Tables 1 and 2 in Appendix 4B are to apply under all meteorological conditions except the following:
   (a) wind speeds greater than 3m/s at 10 metres above ground level;
   (b) stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 m above ground level; or
   (c) stability category G temperature inversion conditions.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station located on the site.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

4. This monitoring must be carried out at least once a month (at least two weeks apart) for the first 12 months following recommencement of underground coal extraction, and then quarterly thereafter, unless the Secretary directs otherwise.

   Note: The Secretary may direct that the frequency of attended monitoring increase or decrease at any time during the life of the project.

5. Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
   (a) monitoring locations for the collection of representative noise data;
   (b) meteorological conditions during which collection of noise data is not appropriate;
   (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2006
Calibration Certificate

Calibration Number C16643

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

Equipment Tested/ Model Number : Rion NA-28
Instrument Serial Number : 00370304
Microphone Serial Number : 10421
Pre-amplifier Serial Number : 60313

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	22.2°C	**Ambient Temperature :**	22.4°C
Relative Humidity :	46.6%	**Relative Humidity :**	44.5%
Barometric Pressure :	99.95kPa	**Barometric Pressure :**	99.95kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 16/11/2016
Secondary Check: Sandra Minto
Report Issue Date : 17/11/2016

Approved Signatory : Juan Aguero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	*Pass*	14: Level linearity on the reference level range	*Pass*
11: Acoustical tests of a frequency weighting	*Pass*	15: Level linearity incl. the level range control	*Pass*
12: Electrical tests of frequency weightings	*Pass*	16: Toneburst response	*Pass*
13: Frequency and time weightings at 1 kHz	*Pass*	17: Peak C sound level	*Pass*
		18: Overload Indication	*Pass*

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 test 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.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.12dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.18dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.31dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

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

NATA WORLD RECOGNISED 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.

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 60942-2004

Calibration Certificate

Calibration Number C17682_Reissued

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

Equipment Tested/ Model Number : Pulsar 106
Instrument Serial Number : 81334

Atmospheric Conditions
Ambient Temperature : 23.5°C
Relative Humidity : 49.8%
Barometric Pressure : 98.79kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 18 Dec 2017
Secondary Check: Riley Cooper
Report Issue Date : 27 Mar 2018
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressure Level	*Pass*	5.3.2: Frequency Generated	*Pass*
5.2.3: Short Term Fluctuation	*Pass*	5.5: Total Distortion	*Pass*

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
Measured Output	94.0	1000.0	94.1	1000.36

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 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	*±0.1dB*	*Temperature*	*±°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±%*
Frequency	*±0.01%*	*Barometric Pressure*	*±kPa*
Distortion	*±0.5%*		

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

NATA
WORLD RECOGNISED 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.

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