Rix's Creek Coal Mine

Environmental Noise Monitoring

April 2017

Prepared for

Rix's Creek Pty Limited

Global Acoustics

Noise and Vibration Analysis and Solutions

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April 2017

Reference: 17151_R01_Draft01
Report date: 20 June 2017

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EXECUTIVE SUMMARY

Global Acoustics were engaged by Rix's Creek Mine to conduct a noise survey around their operations, situated north-west of the town of Singleton, NSW. The mine comprises the original Rix's Creek Mine (RCM), now known as Rix's Creek South (RCS), and the former Integra Open Cut Project Mine, now known as Rix's Creek North (RCN).

Attended environmental noise monitoring described in this report was undertaken at six locations on the night of 27/28 April 2017. The duration of each measurement was 15 minutes.

The purpose of the survey was to quantify and describe the acoustic environment around both operations and compare results with noise criteria outlined in the Rix's Creek Noise Management Plan (NMP).

Operational Noise Assessment

Noise levels from RCM complied with relevant criteria at all monitoring locations during the April 2017 monitoring survey.

Wind speed and/or estimated temperature inversion conditions resulted in development consent criteria not always being applicable at all locations.

Low Frequency Assessment

During April 2017, RCN and RCS complied with the relevant limits using the Broner method of assessing low frequency noise at all monitoring locations.

However, using the INP method of assessing low frequency noise, levels were above the relevant modifying factor trigger at NM03, NM04 and NM06. A 5 dB penalty was applied to the relevant site only L_{Aeq} for these measurements.

The resulting L_{Aeq} noise level exceeded RCS impact assessment criteria at NM06 by 4 dB. Resulting noise levels at NM03 and NM04 remained in compliance.

Global Acoustics Pty Ltd

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1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Rix's Creek Mine to conduct a noise survey around their operations, situated north-west of the town of Singleton, NSW. The mine comprises the original Rix's Creek Mine, now known as Rix's Creek South (RCS), and the former Integra Open Cut Project Mine, now known as Rix's Creek North (RCN).

The purpose of the survey was to quantify and describe the acoustic environment around both operations and compare results with noise criteria outlined in the Rix's Creek Noise Management Plan (NMP).

Environmental noise monitoring described in this report was undertaken during the night of 27/28 April 2017.

1.2 Attended Noise Monitoring Locations

In accordance with the NMP, there are a total of ten monitoring locations 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. Monitoring is not always undertaken at all locations each month. Further explanation is provided in Section 3 of this report.

Table 1.1: ATTENDED NOISE MONITORING LOCATIONS

Location Descriptor ID	EA Reference (RCN/RCS)[1]	Owner or Area	Monitoring Location
NM1	132/171	Bowman	End of Glennie Street, Camberwell
NM2	91/NA	Olofsson	Glennie Creek Road, Camberwell
NM3	47/NA	Cherry	893 Middle Falbrook Road, Middle Falbrook
NM4	19/12	Andrews	997 Bridgman Road, Bridgman
NM5	11/8	Ferraro	788 Bridgman Road, Obanvale
NM6	145/19	Murray	427 Bridgman Road, Obanvale
NM7	NA/61	Gardiner Circuit	McMahon Way, Singleton Heights
NM8	NA/152	Belmadar Way	Cnr Belmadar Way and Maison Dieu Road, Maison Dieu
NM9	NA/121	Llanrian Drive	Llanrian Drive, Gowrie
NM10[2]	NA/135	Long Point	End of Dights Crossing Road, Maison Dieu

Notes:

1. *NA indicates location was not included in the EA for that project; and*
2. *An offset correction has been applied to this measurement as the actual monitoring location is closer to RCM than the area it represents.*

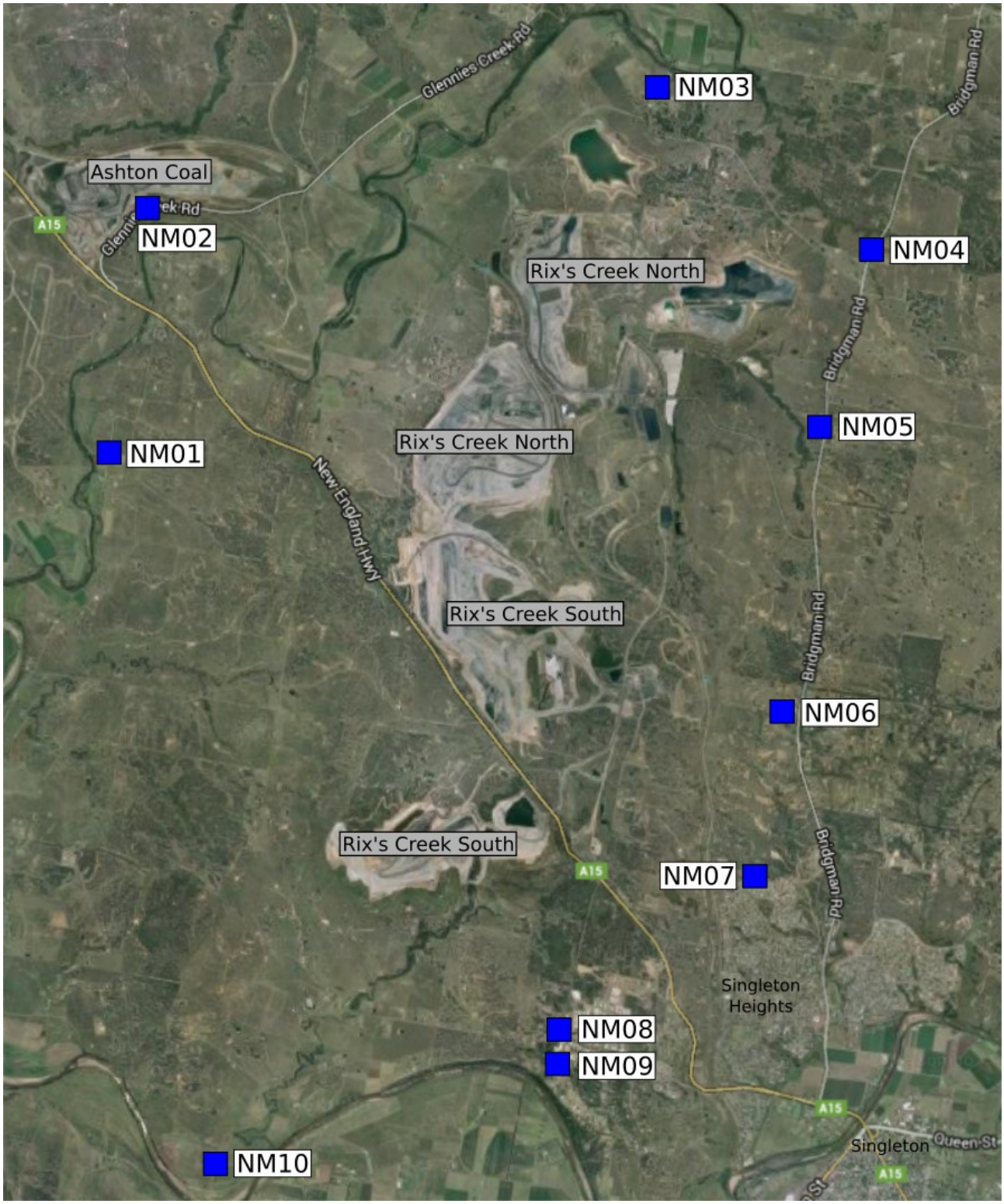


Figure 1: RCM Attended Noise Monitoring Locations

1.3 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
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.
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 PROJECT CONSENT AND CRITERIA

2.1 Project Specific Criteria

Compliance criteria are detailed in Table 2.1 and sourced from Rix's Creek NMP, approved February 2016. $L_{Aeq,15minute}$ criteria are applicable for the day (0700 to 1800), evening (1800 to 2200) and night (2200 to 0700) periods. $L_{A1,1minute}$ criteria are applicable for the night period only.

As stated in the Rix's Creek NMP, attended monitoring will be undertaken during the night only, with monitoring to commence at 9pm and results compared to all criteria.

Table 2.1: RIX'S CREEK IMPACT ASSESSMENT CRITERIA, dB

	Rix's Creek North (RCN) [1,3]		Rix's Creek South (RCS) [1,3]	
Location Descriptor ID	**$L_{Aeq,15minute}$**	**$L_{A1,1minute}$**	**$L_{Aeq,15minute}$**	**$L_{A1,1minute}$**
NM1	38	48	40	48
NM2	40	47	40	47 [2]
NM3	39	45	NA	NA
NM4	37	49	42	48
NM5	41	47	42	48
NM6	36	48	42	47
NM7	NA	NA	40	45
NM8	NA	NA	40	47
NM9	NA	NA	40	47
NM10	NA	NA	40	47

Notes:

1. *Criteria applicable for the night period only (10:00pm to 7:00am), however, as stated in the Rix's Creek NMP, attended monitoring undertaken during the night will commence at 9:00pm;*
2. *Criterion set as for Rix's Creek North in absence of data in EIS; and*
3. *NA indicates criteria not applicable at that location, as it was not included in the relevant EA, EIS, or Project Approval.*

2.2 Meteorological Conditions

The RCM NMP and Environment Protection License (EPL 3391, Dec 2015) outline required meteorological conditions for criteria to be applicable during attended noise monitoring.

L3.5 The noise emission limits identified in this licence apply under all meteorological conditions of:
a) Wind speeds up to 3m/s at 10 metres above the ground level; or
b) Temperature inversion conditions of up to 3oC/100m and wind speed up to 2m/s at 10 metres above the ground.

2.3 Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP). Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.3.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Impulsive noise has high peaks of short duration and a sequence of such peaks.*
>
> *Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.*

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source, are relatively continuous. Given this, noise levels from RCM at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.4 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

> *Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.*

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper *"A Simple Method for Low Frequency Noise Emission Assessment"* (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C-weighted noise level at a receptor exceeds the relevant modifying factor trigger, a 5 dB penalty (modifying factor) is added to measured levels. This method is included to provide a comparison with the INP method.

Low Frequency Assessment Methods

Low frequency assessment methods are detailed in Table 2.2.

Table 2.2: LOW FREQUENCY ASSESSMENT METHODS AND MODIFYING FACTOR TRIGGERS

Method	Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L_{Ceq}	>60	>65
INP, total	Site only L_{Ceq} minus site only L_{Aeq}	>=15	>=15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a Draft Industrial Noise Guideline (ING) was released in September 2015, low frequency noise results from RCM have been compared to the assessment methods and modifying factor triggers presented above. The applicability of these triggers has been considered when applying low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Overview

Noise monitoring was conducted at the monitoring locations in accordance with the Environment Protection Authority 'Industrial Noise Policy' guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'.

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits; it allows an accurate determination of the contribution, if any, to measured noise levels by the source of interest (in this case RCM).

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 emitted from the RCM noise source during the entire measurement period (i.e. the highest level of the worst minute during the 15-minute measurement).

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than L_{Aeq} 30 dB, which is insignificant in terms of any applicable criterion.

If site noise were 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. All sites noted NM in this report are due to insignificant absolute values.

3.2 Attended Noise Monitoring

Due to the number and distance between monitoring locations in the NMP, it is not possible to determine compliance at each individual residence. As a result a risk-based assessment has been adopted where attended noise monitoring targets locations where operational noise from RCM is likely to be highest. Residences surrounding RCM have been grouped generally according to the locality and local acoustic environment. These groups are referenced in the relevant EAs as Noise Assessment Groups (NAG).

Compliance monitoring is undertaken in accordance with the following procedure outlined in the NMP:

> Compliance monitoring is to be conducted at locations indicated as being in the zone of meteorological enhancement by the predictive noise model. The procedure for determining which locations to monitor is as follows:
>
> 1. The acoustic consultant undertaking the monitoring will access the predictive model website for the site for the upcoming night shift. The model results will indicate graphically the predicted zone of meteorological enhancement;
> 2. A monitoring plan will be developed by the consultant for the upcoming night period. Locations are to include:
>
> a. If a clear zone of meteorological enhancement is indicated, one location in the opposite direction to the zone of predicted enhancement, and, all locations located within the predicted zone of enhancement; and
>
> b. If relatively neutral conditions are predicted with no clear zone of meteorological enhancement, the eight locations nearest the mine will be monitored. NM01, NM03 and NM10 would be excluded, as non-compliance at those locations in the absence of meteorological enhancement is unlikely due to distance from the Mine.
>
> 3. A minimum of six locations are to be monitored per night.
>
> Once monitoring commences, the consultant will apply best judgment to either proceed with the original monitoring plan, or a modified plan if monitoring results justify a change.

Other relevant sections of the NMP regarding attended noise monitoring are provided in Appendix A.

3.3 Meteorological Data

One on-site Automatic Weather Station (AWS) is currently located within each of the RCS and RCN mining lease areas. Each complies with AS2923-1987 'Ambient Air – Guide for measurement of horizontal wind for air quality applications' and the INP. These AWSs provide representative weather data for RCM including wind speed and direction, sigma theta, solar radiation, humidity, rainfall and temperature.

Weather data will be used to determine the validity of noise monitoring results in accordance with the INP. Wind speed and rain data will be used for this purpose. Extreme temperature inversions will be considered G-class inversions, as determined by use of sigma theta and wind speed to categorise inversion strength, in accordance with Appendix E of the INP.

For the purpose of determining valid meteorological conditions for which noise criteria apply:

- The Rix's Creek South AWS will be used for assessment of Rix's Creek South; and
- The Rix's Creek North AWS will be used for assessment of Rix's Creek North.

3.4 Modification Factors

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels from RCM at the monitoring locations are unlikely to be intermittent or impulsive. In addition, there is no equipment on site at RCM that would generate impulsive noise as defined in the INP. However, low frequency noise from RCM has been addressed.

3.5 Attended Noise 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	01070590	06/11/2017
Pulsar 106 acoustic calibrator	79631	30/03/2019

4 RESULTS

On the night environmental monitoring was conducted, noise enhancement was predicted to be in a northerly/north easterly direction.

Monitoring was conducted at NM09 to the south. Monitoring was then conducted at locations NM07, NM06, NM05, NM04 and NM03 to the east, north east and north.

4.1 Overall Noise Levels

Overall noise levels measured at each location during attended measurement 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 – APRIL 2017[1]

Location	Start Date and Time[2]	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{A50} dB	L_{Aeq} dB	L_{A90} dB	L_{Amin} dB	L_{Ceq} dB
NM03	28/04/2017 00:02	43	36	35	33	33	32	30	56
NM04	27/04/2017 23:23	39	34	32	31	31	29	28	52
NM05	27/04/2017 22:28	45	37	34	31	32	29	27	54
NM06	27/04/2017 21:55	49	46	45	43	43	40	37	56
NM06	27/04/2017 22:52	51	46	44	40	41	37	35	56
NM07	27/04/2017 21:30	47	40	37	35	35	33	31	52
NM09	27/04/2017 21:00	42	38	32	28	30	26	25	50

Notes:

1. *Levels in this table are not necessarily the result of activity at RCM; and*
2. *All measurements are 15 minutes duration.*

4.2 Rix's Creek North

Noise levels generated by activity at RCN are shown in Table 4.2 and Table 4.3. Table 4.2 compares measured levels with $L_{Aeq,15minute}$ impact assessment criteria. Criteria are then applied if weather conditions are in accordance with relevant limits. Discussion as to the noise sources responsible for these measured levels is provided in Section 5 of this report.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY RCN AGAINST IMPACT ASSESSMENT CRITERIA – APRIL 2017

Location	Start Date and Time	Wind Speed m/s	Wind Direction	VTG °C/100m[1]	$L_{Aeq,15min}$ Criterion dB[6]	Criterion Applies?[2,6]	RCN $L_{Aeq,15min}$ dB [3,4,5]	Exceedance [6]
NM03	28/04/2017 00:02	2.8	300	-1.0	39	Yes	33	Nil
NM04	27/04/2017 23:23	1.3	289	-1.0	37	Yes	31	Nil
NM05	27/04/2017 22:28	0.8	70	-1.0	41	Yes	NM	Nil
NM06	27/04/2017 21:55	1.4	164	-1.0	36	Yes	IA	Nil
NM06	27/04/2017 22:52	0.5	93	0.5	36	Yes	IA	Nil
NM07	27/04/2017 21:30	1.2	32	0.5	NA	NA	IA	NA
NM09	27/04/2017 21:00	0.9	100	-1.0	NA	NA	IA	NA

Notes:

1. *Sigma theta data used to calculate Vertical Temperature Gradient (VTG) in accordance with procedures detailed in the INP;*
2. *Noise emission criteria apply for winds up to 3 metres per second (at a height of 10 metres); or temperature inversion conditions up to 3°C/100m and wind speeds up to 2 metres per second;*
3. *These are results for RCN in the absence of all other noise sources;*
4. *NM denotes audible but not measurable, IA denotes inaudible;*
5. *Bold results in red are those greater than the relevant criterion (if applicable); and*
6. *NA in criterion applies and exceedance columns mean atmospheric conditions outside conditions specified or limits not available for that location and so criterion is not applicable, NA in $L_{Aeq,15minute}$ criterion column means criterion not specified for this location.*

Table 4.3 compares measured levels with RCN $L_{A1,1minute}$ impact assessment criteria. Criteria are then applied if weather conditions are in accordance with relevant limits.

Table 4.3: $L_{A1,1minute}$ GENERATED BY RCN AGAINST IMPACT ASSESSMENT CRITERIA – APRIL 2017

Location	Start Date and Time	Wind Speed m/s	Wind Direction	VTG °C/100m[1]	$L_{A1,1min}$ Criterion dB[6]	Criterion Applies?[2,6]	RCN $L_{A1,1min}$ dB [3,4,5]	Exceedance [6]
NM03	28/04/2017 00:02	2.8	300	-1.0	45	Yes	36	Nil
NM04	27/04/2017 23:23	1.3	289	-1.0	49	Yes	34	Nil
NM05	27/04/2017 22:28	0.8	70	-1.0	47	Yes	NM	Nil
NM06	27/04/2017 21:55	1.4	164	-1.0	48	Yes	IA	Nil
NM06	27/04/2017 22:52	0.5	93	0.5	48	Yes	IA	Nil
NM07	27/04/2017 21:30	1.2	32	0.5	NA	NA	IA	NA
NM09	27/04/2017 21:00	0.9	100	-1.0	NA	NA	IA	NA

Notes:

1. *Sigma theta data used to calculate Vertical Temperature Gradient (VTG) in accordance with procedures detailed in the INP;*
2. *Noise emission criteria apply for winds up to 3 metres per second (at a height of 10 metres); or temperature inversion conditions up to 3°C/100m and wind speeds up to 2 metres per second;*
3. *These are results for RCN in the absence of all other noise sources;*
4. *NM denotes audible but not measurable, IA denotes inaudible;*
5. *Bold results in red are those greater than the relevant criterion (if applicable); and*
6. *NA in criterion applies and exceedance columns mean atmospheric conditions outside conditions specified or limits not available for that location and so criterion is not applicable, NA in $L_{Aeq,15minute}$ criterion column means criterion not specified for this location.*

4.3 Rix's Creek South

Noise levels generated by activity at RCS are shown in Table 4.4 and Table 4.5. Table 4.4 compares measured levels with $L_{Aeq,15minute}$ impact assessment criteria. Criteria are then applied if weather conditions are in accordance with relevant limits. Discussion as to the noise sources responsible for these measured levels is provided in Section 5 of this report.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY RCS AGAINST IMPACT ASSESSMENT CRITERIA – APRIL 2017

Location	Start Date and Time	Wind Speed m/s	Wind Direction	VTG °C/100m[1]	$L_{Aeq,15min}$ Criterion dB	Criterion Applies?[2,6]	RCS $L_{Aeq,15min}$ dB [3,4,5]	Exceedance [6]
NM03	28/04/2017 00:02	3.5	304	0.5	NA	NA	IA	NA
NM04	27/04/2017 23:23	2.8	306	0.5	42	No	NM	NA
NM05	27/04/2017 22:28	2.3	326	0.5	42	No	IA	NA
NM06	27/04/2017 21:55	2.8	330	0.5	42	No	43	NA
NM06	27/04/2017 22:52	2.3	308	-1.0	42	Yes	41	Nil
NM07	27/04/2017 21:30	2.8	318	3.0	40	No	30	NA
NM09	27/04/2017 21:00	1.5	329	0.5	40	Yes	NM	Nil

Notes:

1. *Sigma theta data used to calculate Vertical Temperature Gradient (VTG) in accordance with procedures detailed in the INP;*
2. *Noise emission criteria apply for winds up to 3 metres per second (at a height of 10 metres); or temperature inversion conditions up to 3°C/100m and wind speeds up to 2 metres per second;*
3. *These are results for RCS in the absence of all other noise sources;*
4. *NM denotes audible but not measurable, IA denotes inaudible;*
5. *Bold results in red are those greater than the relevant criterion (if applicable);*
6. *NA in criterion applies and exceedance columns mean atmospheric conditions outside conditions specified or limits not available for that location and so criterion is not applicable, NA in $L_{Aeq,15minute}$ criterion column means criterion not specified for this location; and*
7. *An offset correction of -1.3dB has been applied to this measurement.*

Table 4.5 compares measured levels with RCS $L_{A1,1minute}$ impact assessment criteria. Criteria are then applied if weather conditions are in accordance with relevant limits.

Table 4.5: $L_{A1,1minute}$ GENERATED BY RCS AGAINST IMPACT ASSESSMENT CRITERIA – APRIL 2017

Location	Start Date and Time	Wind Speed m/s	Wind Direction	VTG °C/100m[1]	$L_{A1,1min}$ Criterion dB	Criterion Applies?[2,6]	RCS $L_{A1,1min}$ dB [3,4,5]	Exceedance [6]
NM03	28/04/2017 00:02	3.5	304	0.5	NA	NA	IA	NA
NM04	27/04/2017 23:23	2.8	306	0.5	48	No	NM	NA
NM05	27/04/2017 22:28	2.3	326	0.5	48	No	IA	NA
NM06	27/04/2017 21:55	2.8	330	0.5	47	No	49	NA
NM06	27/04/2017 22:52	2.3	308	-1.0	47	Yes	46	Nil
NM07	27/04/2017 21:30	2.8	318	3.0	45	No	35	NA
NM09	27/04/2017 21:00	1.5	329	0.5	47	Yes	NM	Nil

Notes:

1. *Sigma theta data used to calculate Vertical Temperature Gradient (VTG) in accordance with procedures detailed in the INP;*
2. *Noise emission criteria apply for winds up to 3 metres per second (at a height of 10 metres); or temperature inversion conditions up to 3°C/100m and wind speeds up to 2 metres per second;*
3. *These are results for RCS in the absence of all other noise sources;*
4. *NM denotes audible but not measurable, IA denotes inaudible;*
5. *Bold results in red are those greater than the relevant criterion (if applicable); and*
6. *NA in criterion applies and exceedance columns mean atmospheric conditions outside conditions specified or limits not available for that location and so criterion is not applicable, NA in $L_{Aeq,15minute}$ criterion column means criterion not specified for this location; and*
7. *An offset correction of -1.3dB has been applied to this measurement.*

4.4 Low Frequency Assessment

Low frequency results for each monitoring location are presented in Table 4.6. Where the results in Table 4.6 are greater than the INP or Broner low frequency modifying factor trigger due to activities at RCM a 5 dB modifying factor correction is applied to the measured noise level (if applicable).

Applicability of the low frequency correction is determined by a number of factors including whether or not RCM was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). The low frequency correction was not applicable for any of the measurements.

Table 4.6: LOW FREQUENCY NOISE MODIFYING FACTOR ASSESSMENT – APRIL 2017

Location	Start Date and Time	RCN only L_{Aeq} dB [1]	RCS only L_{Aeq} dB [1]	Broner low frequency modifying factor trigger dB [2]	Broner, Site only L_{Ceq} dB [3,6] RCN/RCS	INP low frequency modifying factor trigger dB [4]	INP, Site only L_{Ceq} minus site only L_{Aeq} dB [5,6] RCN/RCS	Criteria Applies? RCN/RCS [7]	Comments
NM03	28/04/2017 00:02	33	IA	>60	56/IA	>=15	**23**/IA	Yes/No	RCN continuum
NM04	27/04/2017 23:23	31	NM	>60	52/NM	>=15	**21**/IA	Yes/No	RCN continuum
NM05	27/04/2017 22:28	NM	IA	>60	NM/IA	>=15	NM/IA	Yes/No	Regular road traffic noise
NM06	27/04/2017 21:55	IA	43	>60	IA/56	>=15	IA/13	Yes/No	RCS continuum
NM06	27/04/2017 22:52	IA	41	>60	IA/56	>=15	IA/**15**	Yes/Yes	RCS continuum
NM07	27/04/2017 21:30	IA	30	>60	IA/NA	>=15	IA/NA	NA/No	RCS continuum and regular road traffic noise
NM09	27/04/2017 21:00	IA	NM	>60	IA/NM	>=15	IA/NM	NA/Yes	RCS continuum, another mine continuum and traffic/town continuum

Notes:

1. *RCN and RCS $L_{Aeq,15minute}$ provided as a guide. Limits not available for some locations;*
2. *Night L_{Ceq} modifying factor trigger as detailed in Broner (2010);*
3. *These are measured or calculated site only Broner C-weighted noise levels, NM denotes site levels were audible but not measurable, IA denotes site noise was inaudible. Where it is not possible to determine the site only Broner result due to the presence of other low frequency noise sources occurring during the measurement, or where site only level is 5 dB or more less than criterion, this is noted as NA (not available) and no further assessment has been undertaken. Guidance is provided in the Comments column;*
4. *Low frequency modifying factor trigger as detailed in the INP;*
5. *These are measured or calculated site only INP results (site only L_{Ceq} minus site only L_{Aeq}), NM denotes site levels were audible but not measurable, IA denotes site noise was inaudible. Where it is not possible to determine the site only INP result due to the presence of other low frequency noise sources occurring during the measurement, or where site only level is 5 dB or more less than criterion, this is noted as NA (not available) and no further assessment has been undertaken. Guidance is provided in the Comments column;*
6. *Bold results are greater than the relevant modifying factor trigger and criteria apply; and*
7. *Noise emission limits apply for winds up to 3 metres per second (at a height of 10 metres); or temperature inversion conditions up to 3°C/100m and wind speeds up to 2 metres per second. No further low frequency assessment undertaken where criterion do not apply due to meteorological conditions.*

Table 4.7: MEASURED NOISE LEVELS FOR RCM AGAINST LOW FREQUENCY NOISE CRITERIA – APRIL 2017

Location	Start Date and Time	RCN only L_{Aeq} dB	RCS only L_{Aeq} dB	Modifying factor correction dB	Relevant L_{Aeq} impact assessment criteria RCN/RCS dB	Site only L_{Aeq} with modifying factor correction applied[1] dB	Exceedance of impact assessment criterion dB [1]
NM03	28/04/2017 00:02	33	IA	5 (INP only)	39/NA	38 (RCN)	No
NM04	27/04/2017 23:23	31	NM	5 (INP only)	37/42	36 (RCN)	No
NM06	27/04/2017 22:52	IA	41	5 (INP only)	36/42	**46** (RCS)	Yes

Notes:

1. *Bold results in red indicate exceedance of the relevant criterion.*

4.5 Measured Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.8. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.8: MEASURED ATMOSPHERIC CONDITIONS – APRIL 2017[1,2]

Location	Start Date and Time	Temperature degrees C	Wind Speed m/s	Wind Direction Degrees	Cloud Cover 1/8s
NM03	28/04/2017 00:02	14	0.5	250	7
NM04	27/04/2017 23:23	14	0.0	-	8
NM05	27/04/2017 22:28	15	0.0	-	8
NM06	27/04/2017 21:55	14	1.1	0	7
NM06	27/04/2017 22:52	14	0.0	-	8
NM07	27/04/2017 21:30	15	0.0	-	7
NM09	27/04/2017 21:00	13	0.7	330	7

Notes:

1. *Wind speed and direction measured at 1.8 metres; and*
2. *"-" indicates calm conditions.*

Weather station data from RCN and RCS is used to determine compliance with specified noise criteria.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.5 present data gathered during attended monitoring. These noise levels 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 RCM's contribution, if any, to measured levels. At each receptor location, RCM'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, their temporal characteristics, are taken into account via statistical descriptors.

Other mines that may be audible at times are Ravensworth Complex, Hunter Valley Operations (HVO), Mount Thorley Warkworth (MTW), Ashton Coal and Wambo Coal mine (WCM).

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 charts following in 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.

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}.

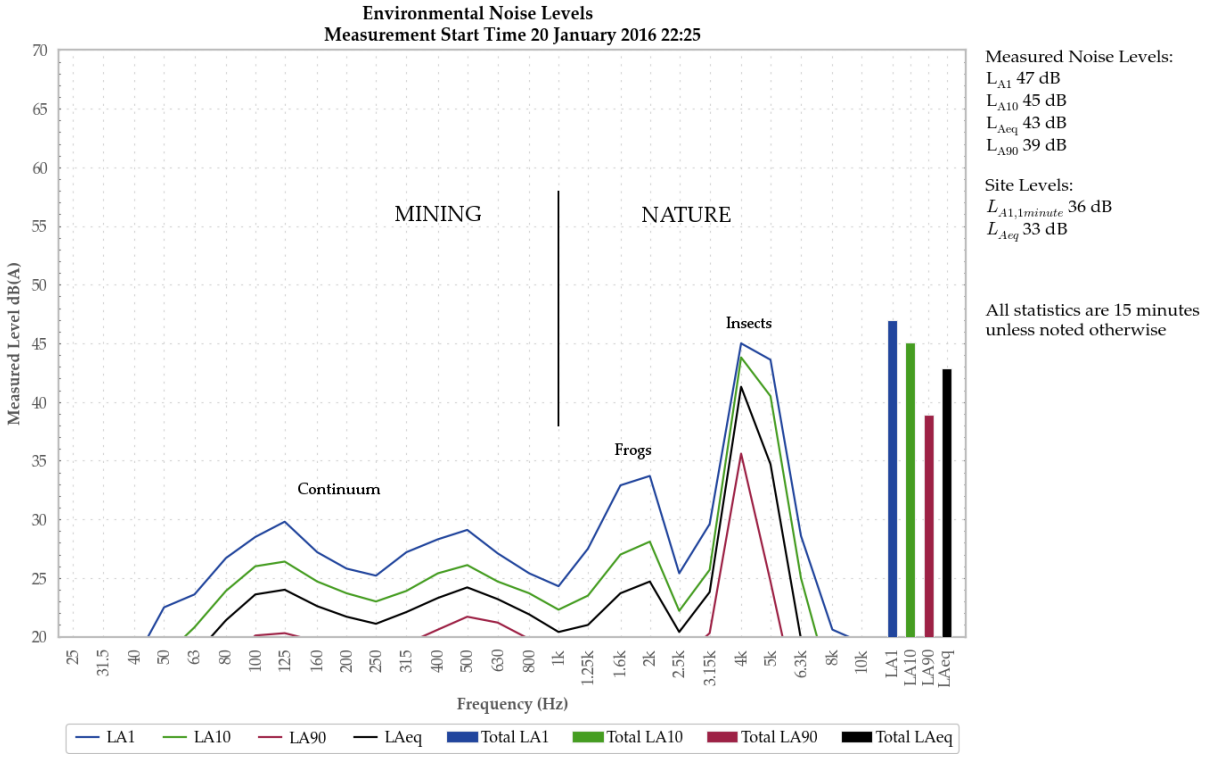


Figure 2: Sample graph (see Section 5.1 for explanation)

5.1.1 NM03 – 28 April 2017

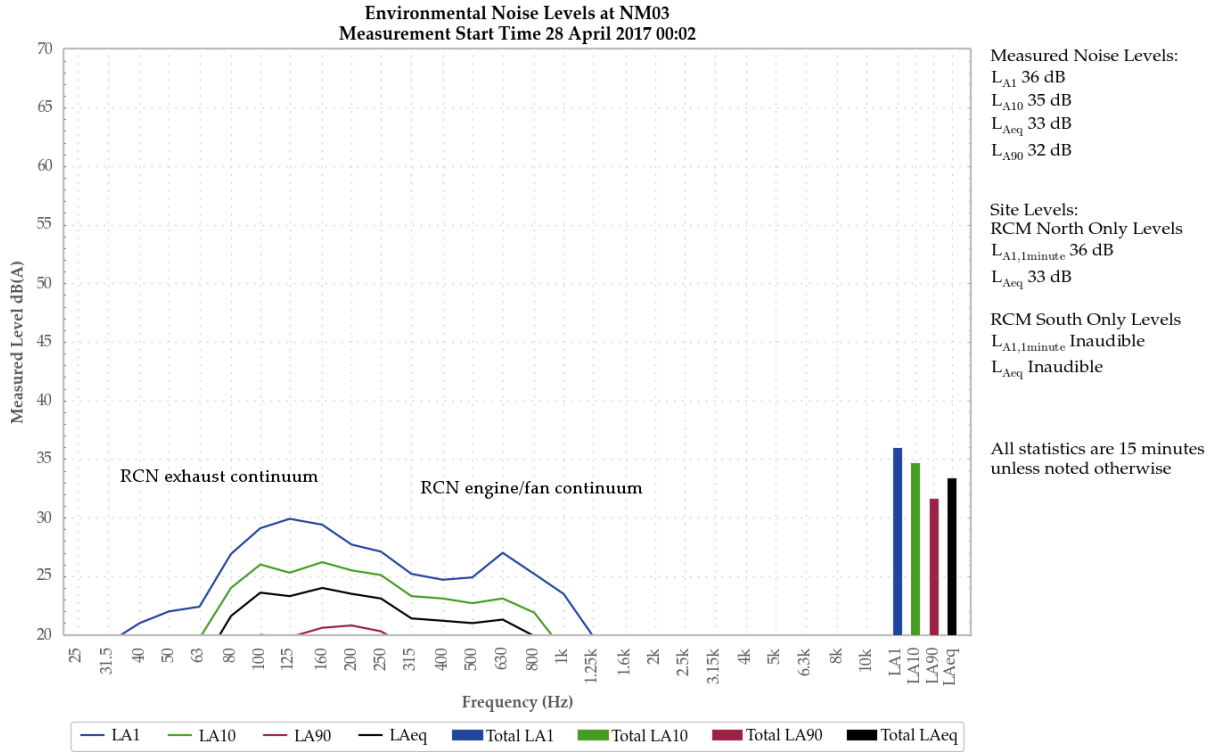


Figure 3: Environmental Noise Levels, NM03 – 893 Middle Falbrook Road, Middle Falbrook

An exhaust, engine and fan continuum from RCN was audible, generating the RCN only L_{Aeq} of 33 dB and $L_{A1,1minute}$ of 36 dB.

RCS was inaudible.

RCN was responsible for the L_{A1}, L_{A10}, L_{Aeq} and L_{A90}.

Insects and frogs were also noted.

5.1.2 NM04 – 27 April 2017

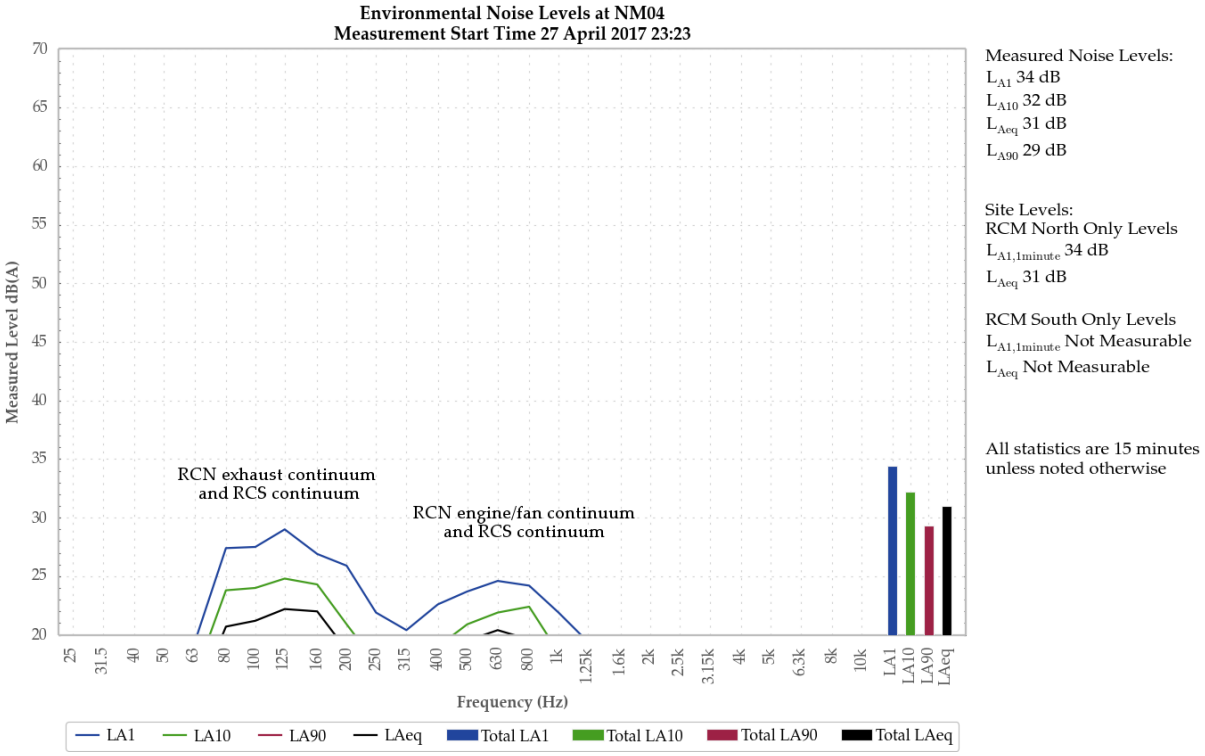


Figure 4: Environmental Noise Levels, NM04 – 997 Bridgman Road, Bridgman

An exhaust, engine and fan continuum from RCN was audible, generating the RCN only L_{Aeq} of 31 dB and $L_{A1,1minute}$ of 34 dB.

A low-level continuum from RCS was audible, but was not measurable.

RCN was responsible for measured levels.

Insects, frogs and dogs were also noted.

5.1.3 NM05 – 27 April 2017

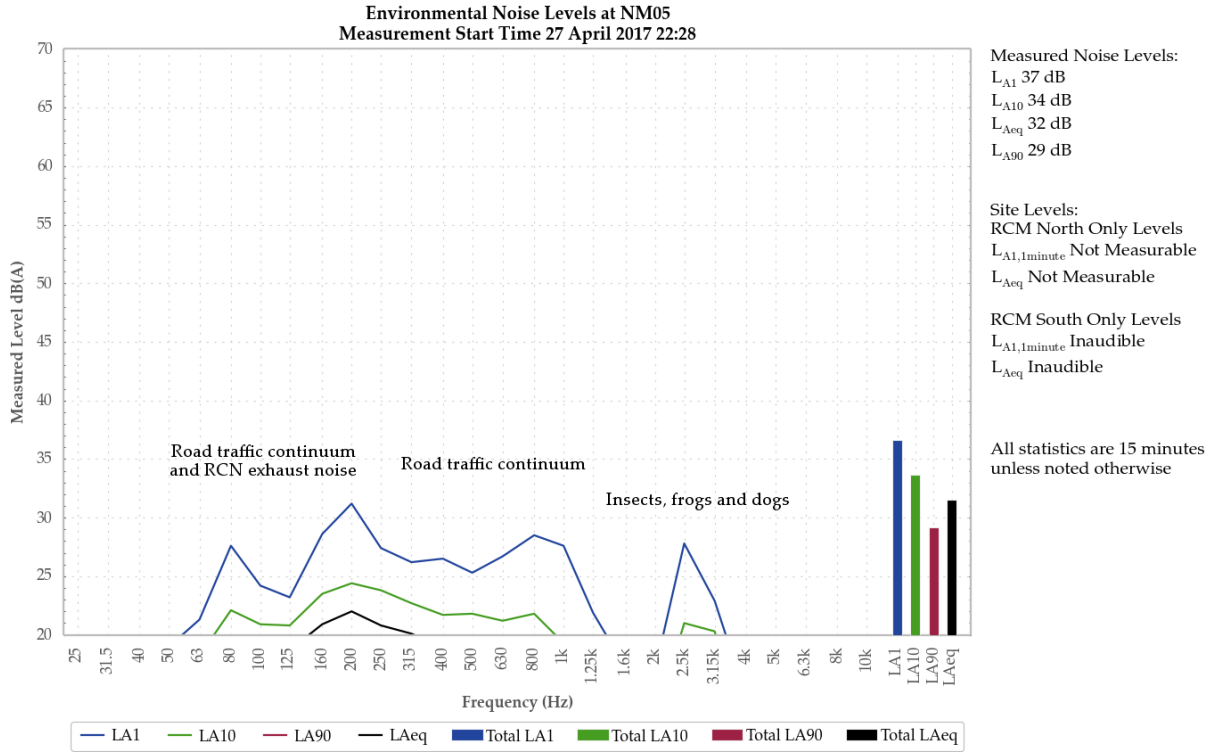


Figure 5: Environmental Noise Levels, NM05 – 788 Bridgman Road, Obanvale

A low-level exhaust and reverse quacker from RCN were audible but not measurable.

RCS was inaudible.

Dogs contributed to the L_{A1}, while road traffic contributed to the L_{A1} and was responsible for the L_{A10}, L_{Aeq} and L_{A90}.

Insects and frogs were also noted.

5.1.4 NM06 – 27 April 2017

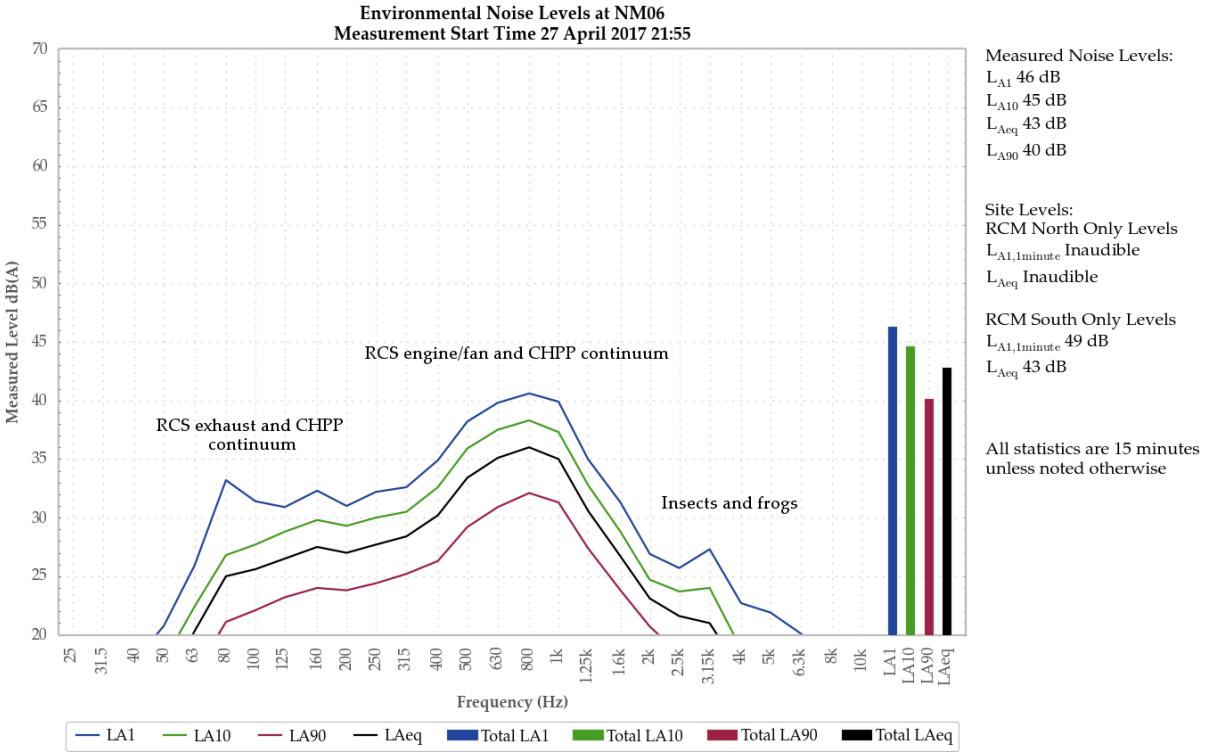


Figure 6: Environmental Noise Levels, NM06 – 427 Bridgman Road, Obanvale

RCN was inaudible.

An exhaust, engine, fan and CHPP continuum from RCS was audible, generating the RCS only L_{Aeq} of 43 dB. Impact noise generated the $L_{A1,1minute}$ of 49 dB.

RCS was responsible for all measured levels.

Insects, frogs and breeze in foliage were also noted.

The OCE was contacted at the completion of this measurement during which it was advised that coal trucks hauling to the ROM would be suspended shortly (at shift change). A second measurement was undertaken.

5.1.5 NM06 – 27 April 2017 – Remeasure

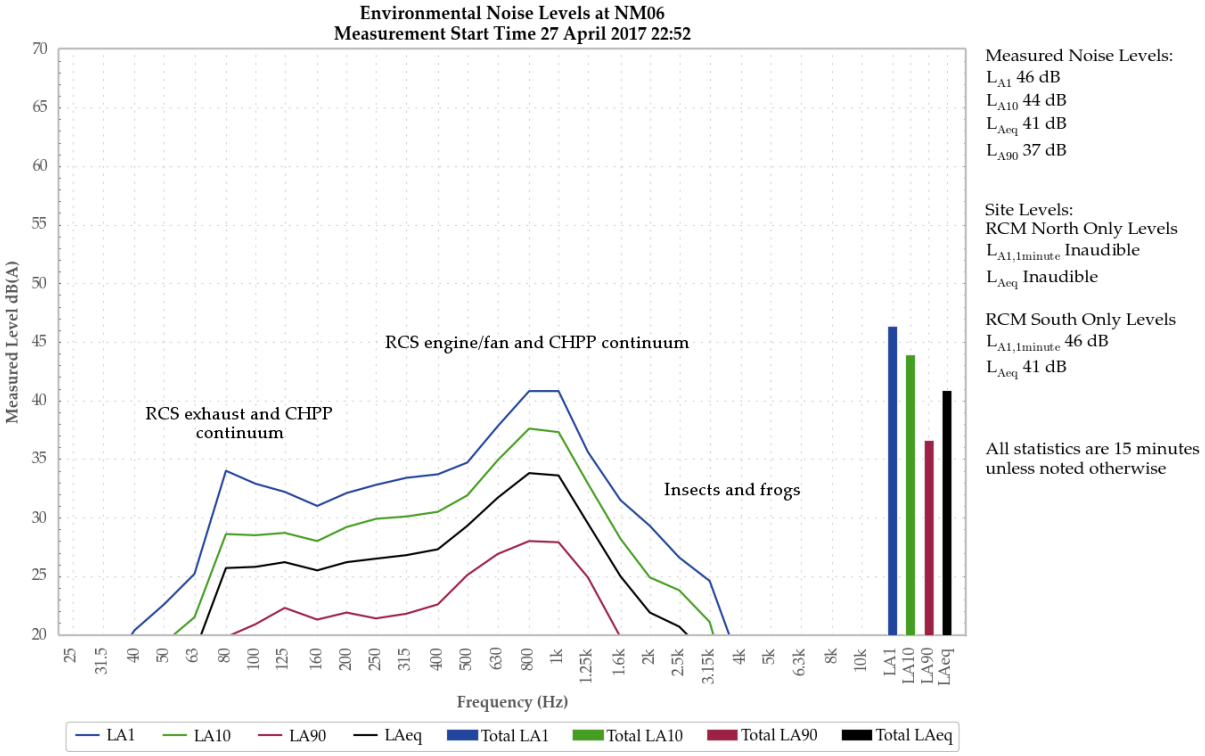


Figure 7: Environmental Noise Levels, NM06 – 427 Bridgman Road, Obanvale

RCN was inaudible.

An exhaust, engine, fan and CHPP continuum from RCS was audible, generating the RCS only L_{Aeq} of 41 dB. A surge in exhaust noise generated the $L_{A1,1minute}$ of 46 dB.

RCS generated measured levels.

Insects, frogs and dogs were also noted.

The second measurement complied with relevant impact assessment criteria and no further action was taken.

5.1.6 NM07 – 27 April 2017

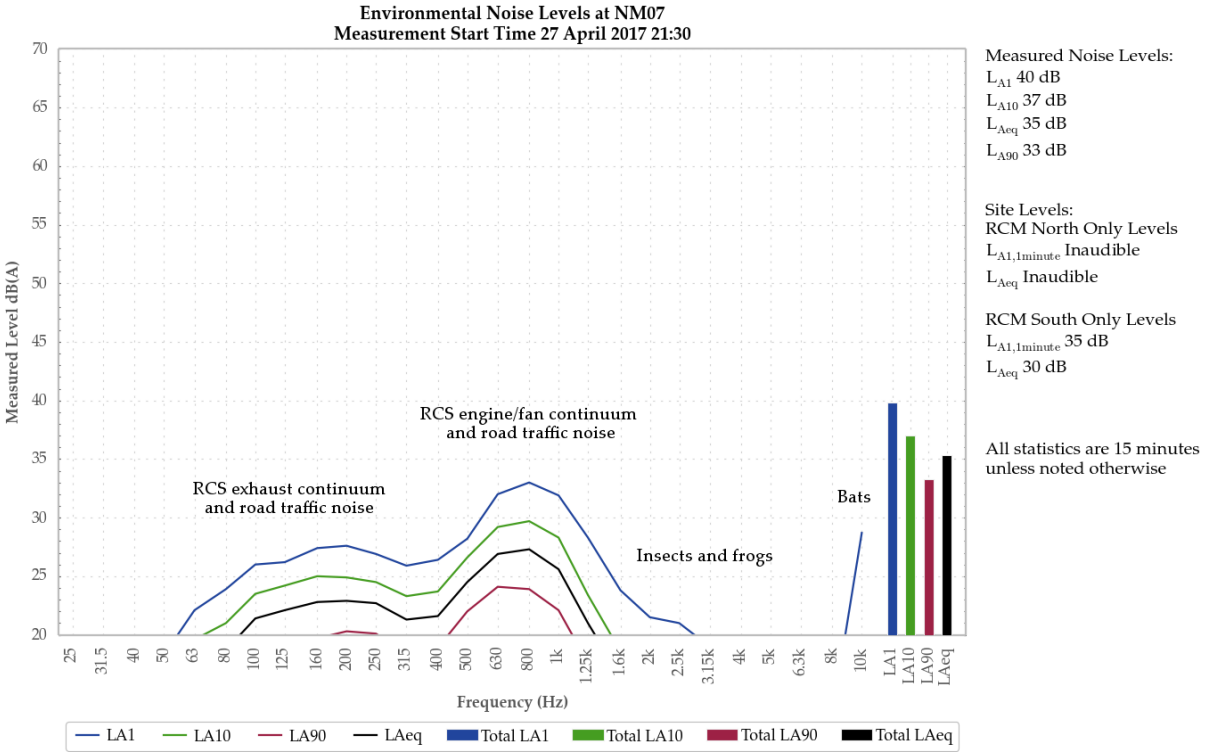


Figure 8: Environmental Noise Levels, NM07 – McMahon Way, Singleton Heights

RCN was inaudible.

An exhaust, engine and fan continuum from RCS was audible, generating the RCS only L_{Aeq} of 30 dB. A surge in exhaust noise generated the $L_{A1,1minute}$ of 35 dB.

Road traffic contributed to the L_{Aeq} and L_{A90} and was responsible for the L_{A1} and L_{A10}. RCS contributed to the L_{Aeq} and L_{A90}.

Insects, dogs, frogs and bats were also noted.

5.1.7 NM09 – 27 April 2017

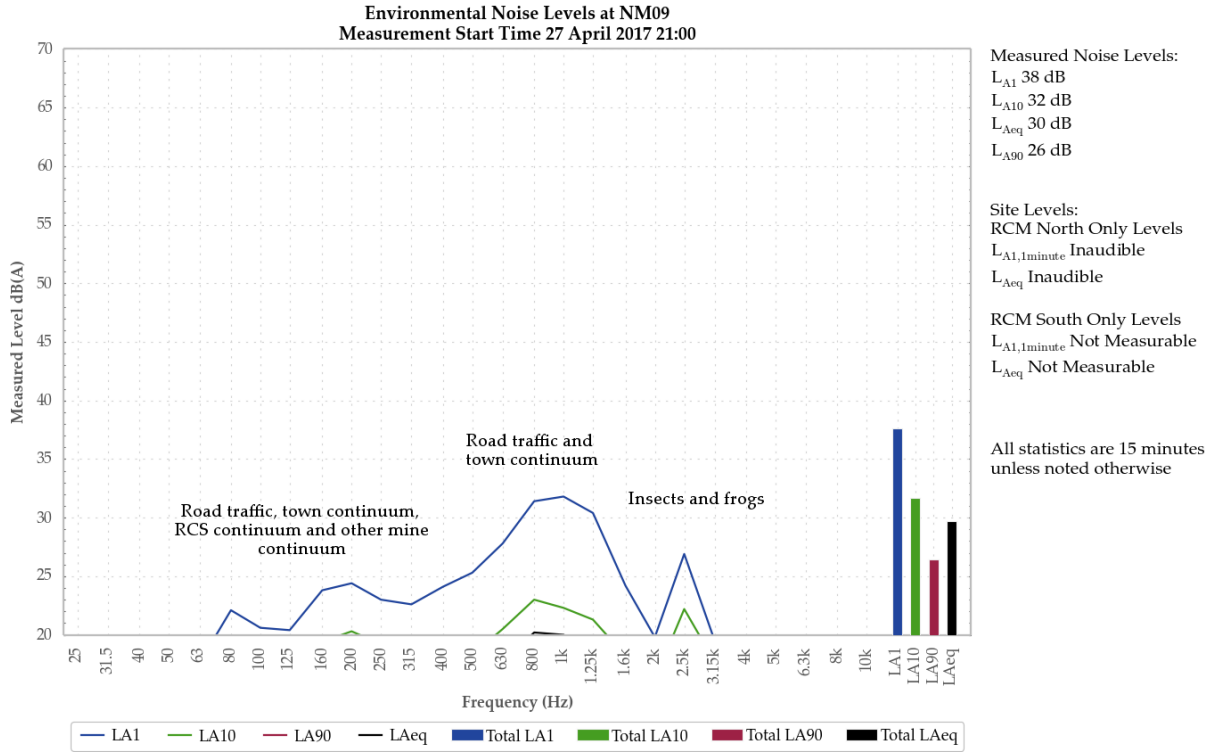


Figure 9: Environmental Noise Levels, NM09 – Llanrian Drive, Gowrie

RCN was inaudible.

A low-level continuum from RCS was audible but was not measurable.

A town and road traffic continuum was responsible for all measured levels.

Insects, frogs and another mine continuum were also noted.

6 SUMMARY OF COMPLIANCE

Global Acoustics were engaged by Rix's Creek Mine to conduct a noise survey around their operations, situated north-west of the town of Singleton, NSW. The mine comprises the original Rix's Creek Mine, now known as Rix's Creek South (RCS), and the former Integra Open Cut Project Mine, now known as Rix's Creek North (RCN).

Environmental noise monitoring described in this report was undertaken during the night of 27/28 April 2017.

The purpose of the survey was to quantify and describe the acoustic environment around both operations and compare results with noise criteria outlined in the Rix's Creek Noise Management Plan (NMP).

6.1 Operational Noise Assessment

Noise levels from RCM complied with relevant criteria at all monitoring locations during the April 2017 monitoring survey.

Wind speed and/or estimated temperature inversion conditions resulted in development consent criteria not always being applicable at all locations.

6.2 Low Frequency Assessment

During April 2017, RCN and RCS complied with the relevant limits using the Broner method of assessing low frequency noise at all monitoring locations.

However, using the INP method of assessing low frequency noise, levels were above the relevant modifying factor trigger at NM03, NM04 and NM06. A 5 dB penalty was applied to the relevant site only L_{Aeq} for these measurements.

The resulting L_{Aeq} noise level exceeded RCS impact assessment criteria at NM06 by 4 dB. Resulting noise levels at NM03 and NM04 remained in compliance.

Global Acoustics Pty Ltd

APPENDIX

A NOISE MANAGEMENT PLAN

5. Attended Noise Compliance Monitoring

5.1.1 INTRODUCTION

Attended monitoring is required to assess compliance with regulatory limits. Note: As described in this document it does not address the 25% of privately owned land aspect of Schedule 3, Condition 2 of the Rixs Creek North Cut Project Approval. As recommended in the 2011 Independent Environmental Audit, the requirement to assess affectation of 25% of privately owned land should be removed as a requirement (for all criteria); it is not practical to determine and has no relevance to resident amenity.

Attended monitoring at all receptor locations will be at night only commencing from 9pm, with results compared to all criteria (day, evening and night). Atmospheric conditions and noise propagation are usually the same on the evening/night and night/day time boundaries. Note also that receptors near to, or exposed to, the New England Highway have a completely different noise environment in the day due to traffic such that mining noise is unlikely to be a problem. This is consistent with the Independent Review Of Cumulative Noise Impacts -Camberwell Village (WMPL, May 2010), which states:

> *The L_{Aeq} levels near the New England Highway are predominately due to road traffic and associated heavy vehicles, rather than mining or other industrial noise, and is unlikely to decrease in the future.*

5.1.2 FREQUENCY

Attended compliance monitoring is to be undertaken one night per calendar month.

5.1.3 LOCATIONS

Compliance cannot be determined at each individual resident so on the monitoring night monitoring is targeted to locations where operational noise is likely to be the highest. These monitoring locations are selected by the following procedure.

Residences surrounding the Mine have been grouped generally according to the locality and local acoustic environment. These groupings are referenced in the relevant EAs as Noise Assessment Groups (NAG). Monitoring locations, including the receptor reference numbers from the relevant EAs and the NAG each represents, are listed in Table 5-6.

Compliance monitoring is to be conducted at locations indicated as being in the zone of meteorological enhancement by the predictive noise model. The procedure for determining which locations to monitor is as follows:

1. The acoustic consultant undertaking the monitoring will access the predictive model website for the site for the upcoming night shift. The model results will indicate graphically the predicted zone of meteorological enhancement;
2. A monitoring plan will be developed by the consultant for the upcoming night period. Locations are to include:
    a. If a clear zone of meteorological enhancement is indicated, one location in the opposite direction to the zone of predicted enhancement, and, all locations located within the predicted zone of enhancement; and

b. If relatively neutral conditions are predicted with no clear zone of meteorological enhancement, the eight locations nearest the mine will be monitored. NM01, NM03 and NM10 would be excluded, as non-compliance at those locations in the absence of meteorological enhancement is unlikely due to distance from the Mine.

3. A minimum of six locations are to be monitored per night.

Once monitoring commences, the consultant will apply best judgment to either proceed with the original monitoring plan, or a modified plan if monitoring results justify a change.

The procedure for monitoring when a clear zone of meteorological enhancement is predicted is:

1. The first monitoring location will be the potentially most affected location in the opposite direction to the zone of predicted enhancement to confirm noise emission in that direction is well below compliance criteria;
2. If the Mine L_{Aeq} is more than 2 dB below the relevant criterion at the first location (L_{Aeq} < criterion minus 2 dB), the consultant will proceed with the original plan and move to the locations within the predicted zone of enhancement;
3. If the Mine L_{Aeq} is within 2 dB of the relevant criterion (L_{Aeq} >= criterion minus 2 dB), the consultant will monitor at the next most potentially affected location in the same general direction from the Mine. This procedure will be repeated until the Mine L_{Aeq} is more than 2 dB below the relevant criterion. Result acceptance procedures in Section 5.1.7 will be applied;
4. The consultant will then proceed with the original plan; and
5. If fatigue management rules result in insufficient time to monitor all locations, the consultant will apply best judgement to determine which locations will provide the best indication of compliance with the time available.

The procedure for monitoring when no clear zone of meteorological enhancement is predicted is:

1. The first monitoring location will be the potentially most affected location based on forecast and prevailing meteorological conditions;
2. If compliance is demonstrated, the consultant will proceed with the original plan;
3. If non-compliance is measured at any location, result acceptance procedures in Section 5.1.7 will be applied. Any locations in the same general direction from the Mine that were omitted in the original plan will be included; and
4. If fatigue management rules result in insufficient time to monitor all locations, the consultant will apply best judgement to determine which locations will provide the best indication of compliance with the time available.

The consultant shall maintain a fatigue management policy, which will be provided to the Mine and/or regulators on request.

Table 5-6 Attended Monitoring Locations

NMP ID	EA Ref. (ICO/RCM) [1]	Owner or Area	NAG [2]
NM01	132/171	Bowman	6 (ICO) / M (RCM)
NM02	91/NA	Olofsson	4 (ICO)
NM03	47/NA	Cherry	B, C, F, 1, 6 and 12 (ICO)
NM04	19/12	Andrews	11 and A (ICO) / A (RCM)
NM05	11/8	Ferraro	10 and 11 (ICO) / A (RCM)
NM06	145/19	Murray	9 (ICO) / B and C (RCM)
NM07	NA/61	Gardiner Circuit	8 (ICO) / D and E (RCM)
NM08	NA/152	Belmadar Way	NA / J, G and F (RCM)
NM09	NA/121	Llanrian Drive	NA / H (RCM)
NM10	NA/135	Long Point	NA / K and I (RCM)

Notes: 1. NA indicates location was not included in the EA for that project; and

2. Indicates the NAG reference the location represents from the relevant EAs.

Figure 5-1 illustrates attended monitoring locations.

5.1.4 METHODS

Attended monitoring is to be conducted in accordance with the *'Industrial Noise Policy' (INP)* guidelines and *Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'*. The duration of each measurement is to be 15 minutes.

As indicated in L3.3, L3.4 & L3.5 of EPL 3391:

L3.3 Noise from the premises is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise level limits in this licence unless otherwise stated.

Where it can be demonstrated that direct measurement of noise from the premises is impractical, the EPA may accept alternative means of determining compliance. See Chapter 11 of the NSW Industrial Noise Policy.

The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.

L3.4 Noise from the premises is to be measured at 1 m from the dwelling facade to determine compliance with the LA1(1minute) noise limits in this licence.

L3.5 The noise emission limits identified in this licence apply under all meteorological conditions of: a) Wind speeds up to 3m/s at 10 metres above the ground level; or

b) Temperature inversion conditions of up to 3oC/100m and wind speed up to 2m/s at 10 metres above the ground.

In most cases, monitoring near the residence is impractical due to barking dogs or issues with obtaining access. In all cases, measurements are to be undertaken at a suitable and representative location.

Some measurement results may be inconclusive and reported as "Inaudible" (IA) or "Not Measurable" (NM). When site noise is noted as IA then there was no site noise at the monitoring location. However, if site noise is noted as NM, this means some noise was audible but could not be quantified. This means that noise from the site was either very low, or, being masked by other noise that was relatively loud. In the former case (very low site levels) it is not considered necessary to attempt to accurately quantify site NM noise as it would be significantly less than any criterion and most unlikely to cause annoyance (and in many cases, to be even noticed).

If site noise were NM due to masking then suitable methods must be employed as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for assessment of compliance.

As indicated in the notes below Table 2 of the Rixs Creek North Project Approval:

Noise generated by the projects is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.

The procedures and exemptions will include the assessment of modifying factors from Section 4 of the INP, where applicable. Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent or impulsive. However, tonality and low frequency are to be assessed by analysis of the measured L_{Aeq} and/or L_{Ceq} spectrum.

5.1.5 METEOROLOGICAL MONITORING

One on-site Automatic Weather Station (AWS) is currently located within each of the Rixs Creek South and Rixs Creek North mining lease areas. Each complies with AS2923-1987 Ambient Air – Guide for measurement of horizontal wind for air quality applications and the INP. These AWS provide representative weather data for the Mine including wind speed and direction, sigma theta, solar radiation, humidity, rainfall and temperature. Weather data will be used to determine the validity of noise monitoring results in accordance with the INP. Wind speed and rain data will be used for this purpose. Extreme temperature inversions will be considered G-class inversions, as determined by use of sigma theta and wind speed to categorise inversion strength, in accordance with Appendix E of the INP.

For the purpose of determining valid meteorological conditions for which noise criteria apply:

- The Rixs Creek South AWS will be used for assessment of Rixs Creek South; and
- The Rixs Creek North AWS will be used for assessment of Rix's Creek North.

5.1.6 DATA TO BE COLLECTED

Data shall be collected in 15 minute periods and the Mine only L_{Aeq} result recorded. Low pass filtering will be used to remove extraneous noise such as insects when applicable. Other extraneous noise may be paused from the data set or excluded by other means. Statistical data must be one-third octave.

Assessment of impact is to include consideration of mining activity and atmospheric conditions during each measurement. Wind speed and/or estimated temperature inversion conditions may result in regulatory criteria not being applicable in accordance with the INP.

The Mine only L_{Ceq} result should be collected simultaneously. Low pass filtering will be used to remove extraneous high spectrum noise when required

A low frequency noise penalty of 5 dB is to be added to the Mine only L_{Aeq} result when noise from the mine causes:

- The Mine only C weighted reading to exceed L_{Ceq} 65 dB during the day or evening periods; or
- The Mine only C weighted reading to exceed L_{Ceq} 60 dB during the night period.

The following information must be recorded during attended noise monitoring:

- Time and date;
- Location;
- Name of person carrying out the monitoring;
- Serial number of equipment used;
- Noted sources and noise levels, direction and frequency from source of interest;
- Duration of monitoring;
- Measured noise levels including L_{Aeq}, L_{Amax}, L_{Amin}, L_{A1}, L_{A10}, L_{A50} and L_{A90}, and
- Weather conditions including temperature, relative humidity, wind speed average, wind speed maximum, wind direction and estimated cloud cover.

5.1.7 RESULT ACCEPTANCE

A 15 minute measurement shall be taken and assessed against the applicable criterion. If the Mine only L_{Aeq} result is below the criterion, then the consultant will record it, note the site has passed and move on to the next monitoring location.

If the Mine only L_{Aeq} result exceeds the criterion, is attributable to the Mine, and taken in valid meteorological conditions, then the following steps are to be followed:

1. Consultant will record the reading, advise the Mine of the criterion exceedance and proceed to Step 2. The Mine will implement remedial action as required.
2. Within 75 minutes after the first measurement (and no earlier than 10pm) a second 15 minute measurement is to be made. If this second result exceeds the criterion then proceed to Step 3, otherwise proceed to Step 4.
3. If the result is attributable to the Mine and taken in valid meteorological conditions then proceed to Step 5.
4. The consultant will record the result, note the site has passed, schedule an additional monitoring test to be undertaken at the location within 1 week, and move on to the next monitoring location.
5. The consultant will record the result, note the site has failed and is deemed a '*noise affected night*' at that location. An additional monitoring test should be scheduled to be undertaken at the same location within 1 week, and move on to the next monitoring location.

If the Mine only L_{Aeq} result exceeds the criterion, is attributable to the Mine, and taken in invalid meteorological conditions, the consultant will record it, advise the Mine a measurement has exceeded the criterion, and move on to the next monitoring location.

As detailed in Section 6.2.3 of this NMP, the OCE is to be advised of any potential noise exceedance detected during attended monitoring. The flow chart in Figure 6-5 details the attended monitoring exceedance procedure.

5.1.8 COMPLIANCE CRITERIA

Table 5-7 sets out night period noise compliance criteria. Rixs Creek North criteria are sourced from the Project Approval. Rixs Creek South $L_{Aeq,15minute}$ intrusive noise criteria are based on proposed criteria nominated in the EIS. $L_{A1,1minute}$ criteria are based on sleep disturbance criteria for the relevant NAG derived in the EIS.

$L_{Aeq,15minute}$ criteria are applicable for the day (07:00 to 18:00), evening (18:00 to 22:00) and night (22:00 to 07:00) periods. $L_{A1,1minute}$ criteria are applicable for the night period only.

Table 5-7 Compliance Criteria

NMP ID	EA Ref. (ICO/RCM) [1]	Rix's Creek North		Rixs Creek South	
		$L_{Aeq,15minute}$ dB	$L_{A1,1minute}$ dB	$L_{Aeq,15minute}$ dB	$L_{A1,1minute}$ dB
NM01	132/171	38	48	40	48
NM02	91/NA	40	47	40	47 [1]
NM03	47/NA	39	45	NA	NA
NM04	19/12	37	49	42	48
NM05	11/8	41	47	42	48
NM06	145/19	36	48	42	47
NM07	NA/61	NA	NA	40	45
NM08	NA/152	NA	NA	40	47
NM09	NA/121	NA	NA	40	47
NM10	NA/135	NA	NA	40	47

Notes: 1. Criterion set as for Rixs Creek North in the absence of data in the EIS; and

2. NA indicates criteria not applicable at that location, as it was not included in the relevant EA, EIS or Project Approval.

5.1.9 REPORTING

Attended monitoring reports should include a comparison to criteria detailed in the relevant project approval. All attended measurement result analysis should consider criteria applicability (for impact,

mitigation, cumulative and acquisition criteria) with regard to wind speed and vertical temperature gradient.

All results that exceed criteria, including instances where the second measurement indicates compliance with criteria, shall be reported to DP&E the following day along with actions taken to reduce the noise.

All monitoring that results in a night being deemed a '*noise affected night*' in accordance with Section 5.1.7 shall be reported to DP&E and the affected community as per the notification requirements.

5.1.10 EXCEEDANCE PROCEDURE

.Procedures to be followed in the event of a measured noise exceedance are outlined in Section 6.2.3

6.2.3 ATTENDED COMPLIANCE MONITORING EXCEEDANCE MEASURED

Any exceedance of a noise criterion is to be acted upon immediately it is measured. The acoustic consultant undertaking attended monitoring is to contact the Mine to advice of the problem and discuss possible changes to operations that should lead to compliance. A remeasure is required to evaluate the effectiveness of any change implemented as outlined in Section 5.1.7, if the measurement was made in valid meteorological conditions. The Senior Environmental Officer and/or the Environmental Officer should also be advised of the exceedance.

Responsibility: Noise Monitoring Consultant

Timing: Each event

The Department of Planning & Environment (Singleton Compliance Branch) and/or the Environment Protection Authority is to be informed of any noise criterion exceedance.

Responsibility: Senior Environmental Officer or Environmental Officer

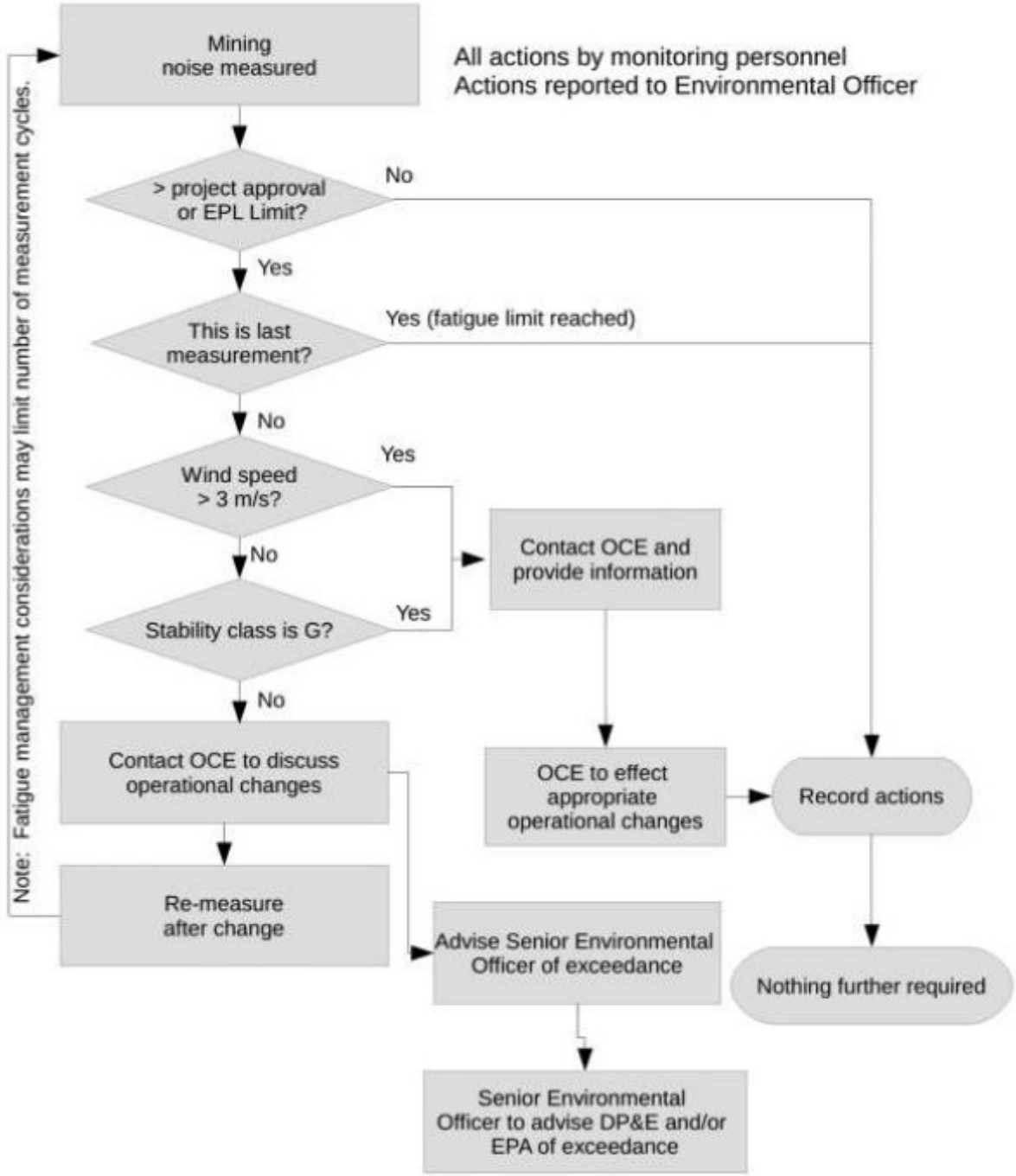
Timing: Each event

This Noise Management Plan is to be issued to any consultant conducting attended noise monitoring for the site so they understand all relevant procedures.

Responsibility: Environmental Officer

Timing: On commencement of contract and every time this document is updated.

Figure 6-5 Attended Monitoring Exceedance Procedure



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 C15583

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	01070590
Microphone Serial Number :	00533
Pre-amplifier Serial Number :	70607

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	20.6°C	**Ambient Temperature :**	21.2°C
Relative Humidity :	56.3%	**Relative Humidity :**	62.4%
Barometric Pressure :	98.64kPa	**Barometric Pressure :**	98.56kPa

Calibration Technician : Corey Stewart **Secondary Check:** Kate Alchin
Calibration Date : 06/11/2015 **Report Issue Date :** 10/11/2015

Approved Signatory : Ken Williams

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	*±0.120dB*	*Temperature*	*±0.3°C*
12.5kHz	*±0.165dB*	*Relative Humidity*	*±4.1%*
16kHz	*±0.245dB*	*Barometric Pressure*	*±0.1kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.121dB*		

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.

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Sound Calibrator
IEC 60942-2004
Calibration Certificate

Calibration Number C17149

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

Equipment Tested/ Model Number : Pulsar 106
Instrument Serial Number : 79631

Atmospheric Conditions
Ambient Temperature : 21.9°C
Relative Humidity : 54.6%
Barometric Pressure : 98.84kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 30/03/2017
Secondary Check: Riley Cooper
Report Issue Date : 31/03/2017
Approved Signatory : Juan Aguero

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	1000.38

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

Generated SPL	*±0.11dB*
Short Term Fluct.	*±0.02dB*
Frequency	*±0.01%*
Distortion	*±0.5%*

Environmental Conditions

Temperature	*±0.05°C*
Relative Humidity	*±0.46%*
Barometric Pressure	*±0.017kPa*

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

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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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