Cullen Valley Mine

Environmental Noise Monitoring

Quarter 1 2016

Prepared for

Castlereagh Coal

Global Acoustics

Noise and Vibration Analysis and Solutions

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Environmental Noise Monitoring Quarter 1, 2016

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

EXECUTIVE SUMMARY

Global Acoustics was engaged to conduct a noise survey around Cullen Valley Mine (CVM), an open cut coal mine north west of Lithgow.

A modification to the development consent was issued to Lithgow Coal Company in December 2004 (DA-200-5-2003) for the continuation of open cut mining activities. Schedule 4, Conditions 2 to 8 of the consent gives details of the noise requirements. Cullen Valley Mine also operates in accordance with EPL 10341. Noise requirements are detailed in L4 of the licence.

Given that the site is currently under care and maintenance, monitoring was not undertaken during the evening period as there are no activities occurring at this time. Although noise monitoring was carried out during the day period, given the site is on significantly reduced operations, there is unlikely to be any off-site noise. Therefore the monitoring program has been modified slightly to take this into account. The duration of each day measurement was generally 10 minutes. The exceptions were when mining was audible; the duration of these measurements was increased to 15 minutes.

Environmental noise monitoring was conducted around Cullen Valley Mine during the day period of 10 February 2016. There were five monitoring locations.

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. During this survey attended monitoring was undertaken once at each measurement location during the day period.

Cullen Valley Mine complied with the consent and EPL $L_{Aeq,15minute}$ noise limits during monitoring undertaken for Quarter 1, 2016.

Global Acoustics Pty Ltd

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1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Castlereagh Coal to conduct a noise survey around Cullen Valley Mine (CVM), an open cut coal mine north west of Lithgow.

Environmental noise monitoring was conducted around Cullen Valley Mine during the day period of 10 February 2016. There were five monitoring locations.

Given that the site is currently under care and maintenance, monitoring was not undertaken during the evening period as there are no activities occurring at this time. Although noise monitoring was carried out during the day period, given the site is on significantly reduced operations, there is unlikely to be any off-site noise. Therefore the monitoring program has been modified slightly to take this into account. The duration of each day measurement was generally 10 minutes. The exceptions were when mining was audible; the duration of these measurements was increased to 15 minutes.

1.2 Noise Monitoring Locations

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

Table 1.1: ATTENDED NOISE MONITORING LOCATIONS

Descriptor	Owner	Monitoring Location
Red Springs	R. & B. Grabham	'Red Springs', Red Springs Road
Hillcroft	R. Dickens	'Hillcroft', Red Springs Road
Forest Lodge	R. Larkin	'Forest Lodge', Red Springs Road
Doble Gate	Doble	2775 Castlereagh Highway
Tilley	A. Tilley	Driveway of 2541 Castlereagh Highway

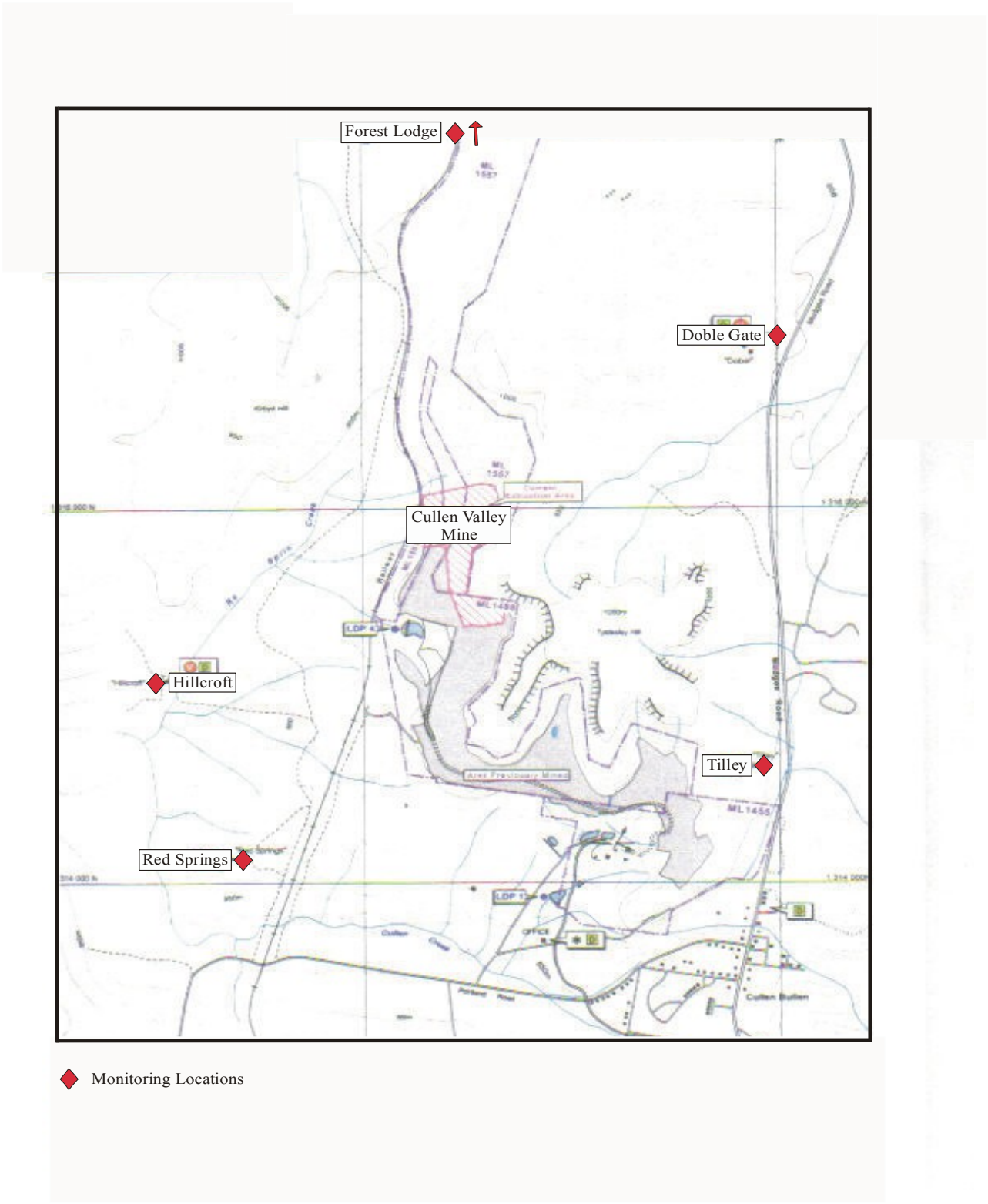

Figure 1: Attended Noise Monitoring Locations

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_{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
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
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	This is the period 10:00pm to 7:00am

2 CONSENTS AND CRITERIA

This section discusses the relevant regulatory approvals relating to noise monitoring and assessment for the Cullen Valley Mine. The relevant conditions relating to noise from the development consent and Environmental Protection Licence (EPL) are reproduced in Appendix A.

2.1 Project Specific Criteria

2.1.1 Development Consent

Lithgow Coal Company obtained development consent in December 2004 (DA-200-5-2003) for the continuation of open cut mining activities. Schedule 4, Conditions 2 to 8 of the consent details the noise requirements. Noise limits as described under the Cullen Valley Mine Development Consent are detailed in Table 2.1.

Table 2.1: CULLEN VALLEY MINE DEVELOPMENT CONSENT NOISE LIMITS, dB

Descriptor	Day	Evening	Night	
	$L_{Aeq,15minute}$	$L_{Aeq,15minute}$	$L_{Aeq,15minute}$	$L_{A1,1minute}$
Red Springs	37	35	35	45
Hillcroft	35	35	35	45
Forest Lodge	40	40	38	45
Doble Gate	43	38	35	45
Tilley	43	38	35	45

Land acquisition criteria are detailed in Table 2.2.

Table 2.2: CULLEN VALLEY MINE LAND ACQUISITION CRITERIA, dB

Descriptor	Day	Evening/Night
	$L_{Aeq,15minute}$	$L_{Aeq,15minute}$
Red Springs	42	40
Hillcroft	40	40
Doble Gate	43	40
Tilley	43	40

The noise criteria in Table 2.1 and Table 2.2 apply under meteorological conditions of:

- Wind speed up to 3 metres per second at 10 metres above ground level; and
- Temperature inversion conditions of up to 3 degrees Celsius per 100 metres, and wind speeds of up to 2 metres per second at 10 metres above ground level.

2.1.2 EPA Licence

Cullen Valley Mine operates in accordance with EPL 10341. Noise requirements are detailed in L4 of the licence (see Appendix A). Noise limits as described under the Cullen Valley Mine EPL are detailed in Table 2.3.

Table 2.3: CULLEN VALLEY MINE EPL NOISE LIMITS, dB

Descriptor	Mining Condition	Day	Evening	Night	
		$L_{Aeq,15minute}$	$L_{Aeq,15minute}$	$L_{Aeq,15minute}$	$L_{A1,1minute}$
Red Springs	Mining east of railway line	35	35	35	45
Red Springs	Mining west of railway line	43	38	35	45
Hillcroft	Mining east of railway line	35	35	35	45
Hillcroft	Mining west of railway line	43	38	35	45
Forest Lodge	-	40	40	40	45
Doble Gate	-	43	38	35	45
Tilley	-	43	38	35	45

The noise criteria in Table 2.3 apply under all meteorological conditions except for the following:

- Wind speeds greater than 3 metres per second at 10 metres above ground level; and
- Stability category F temperature inversion conditions and wind speeds greater than 2 metres per second at 10 metres above ground level; or
- Stability category G temperature inversion conditions.

Cullen Valley Mine has been mining east of the railway line, but is currently under care and maintenance.

2.2 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.

2.2.1 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 Cullen Valley 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.

2.3 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 are detailed in Table 2.4.

Table 2.4: 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 practice note is not yet available, low frequency noise results from Cullen Valley have been assessed using the INP and Broner methods when considering the applicability of low frequency modifying factors.

3 METHODOLOGY

3.1 Attended Noise Monitoring

Attended monitoring was conducted at five sites in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken.

Given the site is on care and maintenance, the duration of each day measurement was generally 10 minutes. The exceptions were when mining was audible; the duration of these measurements was increased to 15 minutes. During this survey attended monitoring was undertaken once at each measurement location during the day period. Meteorological data has been sourced from the Australian Bureau of Meteorology Bathurst weather station.

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 Cullen Valley Mine).

As indicated in section L4.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Tonality and low frequency from Cullen Valley were assessed by analysis of the measured L_{Aeq} spectrum.

The terms "Inaudible" (IA) and "Not Measurable" (NM) may be used in this report. 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) we consider it not necessary to attempt to accurately quantify site 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 we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting if deemed necessary.

The following equipment 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	00701424	22/05/2017
Pulsar 106 acoustic calibrator	74813	8/07/2017

4 RESULTS

4.1 Attended Noise Monitoring

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

Table 4.1: MEASURED NOISE LEVELS – QUARTER 1, 2016

Location	Start Date and Time	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A90} dB
Red Springs	10/02/2016 11:34	43	35	32	25
Hillcroft	10/02/2016 11:49	45	39	40	32
Forest Lodge	10/02/2016 12:21	40	35	32	27
Doble Gate	10/02/2016 12:46	54	51	46	29
Tilley	10/02/2016 13:03	81	71	67	39

Notes:

1. *Levels in this table are not necessarily the result of activity at Cullen Valley Mine.*

4.2 Development Consent Criteria and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ noise levels from the Cullen Valley site in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the mine's development consent.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY CULLEN VALLEY MINE AGAINST CONSENT IMPACT ASSESSMENT CRITERIA – QUARTER 1, 2016

Location	Start Date and Time	Wind Speed m/s [2]	VTG $^{o}C/100m$ [3]	L_{Aeq} Consent Criterion dB	Criterion Applies? [1]	CVM L_{Aeq} dB [3,4,5]	Exceedance [6]
Red Springs	10/02/2016 11:34	3.6	-2.0	37	No	IA	NA
Hillcroft	10/02/2016 11:49	5.7	-2.0	35	No	IA	NA
Forest Lodge	10/02/2016 12:21	5.7	-2.0	40	No	IA	NA
Doble Gate	10/02/2016 12:46	6.2	-2.0	43	No	IA	NA
Tilley	10/02/2016 13:03	5.1	-2.0	43	No	IA	NA

Notes:

1. *Noise emission limits apply the following meteorological conditions:*
   - *Wind speed up to 3 metres per second at 10 metres above ground level; and*
   - *Temperature inversion conditions of up to 3 degrees Celsius per 100 metres, and wind speeds of up to 2 metres per second at 10 metres above ground level;*
2. *Met data sourced from the Australian Bureau of Meteorology Bathurst weather station;*
3. *Standard daytime vertical temperature gradient assumed;*
4. *These are results for Cullen Valley Mine in the absence of all other noise sources;*
5. *NM denotes audible but not measurable, IA denotes inaudible;*
6. *Bolded results in red are those greater than the relevant criterion (if applicable);*
7. *NA in exceedance column means atmospheric conditions outside specified in the development consent and so criterion is not applicable.*

Table 4.3 $L_{Aeq,15mintue}$ GENERATED BY CULLEN VALLEY MINE AGAINST CONSENT LAND ACQUISITION CRITERIA – QUARTER 1, 2016

Location [7]	Start Date and Time	Wind Speed m/s [1]	VTG $^{o}C/100m$ [1]	L_{Aeq} Consent Criterion dB	Criterion Applies? [2]	CVM L_{Aeq} dB [3,4,5]	Exceedance [6]
Red Springs	10/02/2016 11:34	3.6	-2.0	42	No	IA	NA
Hillcroft	10/02/2016 11:49	5.7	-2.0	40	No	IA	NA
Doble Gate	10/02/2016 12:46	6.2	-2.0	43	No	IA	NA
Tilley	10/02/2016 13:03	5.1	-2.0	43	No	IA	NA

Notes:

1. *Met data sourced from the Australian Bureau of Meteorology Bathurst weather station, standard daytime vertical temperature gradient assumed;*
2. *Noise emission limits apply the following meteorological conditions:*
   - *Wind speed up to 3 metres per second at 10 metres above ground level; and*
   - *Temperature inversion conditions of up to 3 degrees Celsius per 100 metres, and wind speeds of up to 2 metres per second at 10 metres above ground level;*
3. *These are results for Cullen Valley Mine in the absence of all other noise sources;*
4. *NM denotes audible but not measurable, IA denotes inaudible;*
5. *Bolded results in red are those greater than the relevant criterion (if applicable);*
6. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable; and*
7. *No land acquisition criteria specified for Forest Lodge.*

4.3 EPL Criteria and Weather Conditions

Table 4.4 details $L_{Aeq,15minute}$ noise levels from the Cullen Valley site in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the mine's EPL.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY CULLEN VALLEY MINE AGAINST EPL CRITERIA - QUARTER 1, 2016

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class	L_{Aeq} EPL Criterion dB	Criterion Applies? [2]	CVM L_{Aeq} dB [3,4,5]	Exceedance [6]
Red Springs	10/02/2016 11:34	3.6	A	35	No	IA	NA
Hillcroft	10/02/2016 11:49	5.7	A	35	No	IA	NA
Forest Lodge	10/02/2016 12:21	5.7	A	40	No	IA	NA
Doble Gate	10/02/2016 12:46	6.2	A	43	No	IA	NA
Tilley	10/02/2016 13:03	5.1	A	43	No	IA	NA

Notes:

1. *Met data sourced from the Australian Bureau of Meteorology Bathurst weather station;*
2. *Noise emission limits are excluded for wind speeds greater than 3 metres per second at 10 metres above ground level, stability category F temperature inversion conditions and wind speeds greater than 2 metres per second at 10 metres above ground level, and stability category G temperature inversion conditions;*
3. *These are results for Cullen Valley Mine in the absence of all other noise sources;*
4. *NM denotes audible but not measurable, IA denotes inaudible;*
5. *Bolded results in red are those greater than the relevant criterion (if applicable); and*
6. *NA in exceedance column means atmospheric conditions outside conditions specified in EPL and so criterion is not applicable.*

4.4 Low Frequency Assessment

Table 4.5 provides statistics for attended noise monitoring undertaken around Cullen Valley Mine during Quarter 1, 2016. Results have been filtered using the met exclusion criteria stipulated in Cullen Valley's consent.

Table 4.5: ATTENDED MEASUREMENT STATISTICS FOR CULLEN VALLEY MINE – QUARTER 1, 2016

Conditions	Total for Quarter 1, 2016
Number of measurements	5
Number of measurements where Cullen Valley Mine was measurable and criterion applied	0

None of the five measurements occurred during which Cullen Valley Mine was measurable (not "inaudible" or "not measurable") and where meteorological conditions resulted in criteria applying. Low frequency noise has not been assessed further in this report.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.6. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions at microphone height during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.6: MEASURED ATMOSPHERIC CONDITIONS – QUARTER 1, 2016

Location	Start Date and Time	Temperature °C	Wind Speed m/s	Wind Direction	Cloud Cover 1/8s
Red Springs	10/02/2016 11:34	35	0.5	120	2
Hillcroft	10/02/2016 11:49	33	0.4	260	2
Forest Lodge	10/02/2016 12:21	35	0.5	270	2
Doble Gate	10/02/2016 12:46	32	0.5	300	3
Tilley	10/02/2016 13:03	31	0.6	20	3

Notes:

1. *Wind speed and direction measured at 1.8 metres.*

5 SUMMARY OF COMPLIANCE

Environmental noise monitoring was conducted around Cullen Valley Mine during the day period of 10 February 2016.

Given that the site is currently under care and maintenance, monitoring was not undertaken during the evening period as there are no activities occurring at this time. Although noise monitoring was carried out during the day period, given the site is on significantly reduced operations, there is unlikely to be any off-site noise. Therefore the monitoring program has been modified slightly to take this into account. The duration of each day measurement was generally 10 minutes. The exceptions were when mining was audible; the duration of these measurements was increased to 15 minutes.

Cullen Valley Mine complied with the consent and EPL $L_{Aeq,15minute}$ noise limits at all monitoring locations during Quarter 1, 2016 monitoring.

Global Acoustics Pty Ltd

APPENDIX

A STATUTORY REQUIREMENTS

Development consent (DA-200-5-2003) applies to the Cullen Valley operation. The noise section is reproduced below.

A.1 CULLEN VALLEY MINE DEVELOPMENT CONSENT

Schedule 4 – Specific Environmental Conditions

NOISE

Noise Limits

2. [2]The Applicant shall ensure that the noise generated by the development does not exceed the noise limits in Table 1 at any privately-owned residence.

Day	Evening	Night		Land Descriptor
$L_{Aeq(15minute)}$			$L_{A1(1minute)}$	
43	38	35	45	• Ryan • Tesoriero • Fitzgerald • Tilley • Red Springs (during mining to the west of the railway line) • Hillcroft (during mining to the west of the railway line) • Dobson • Williams • Northey
40	40	38	45	Forest Lodge
37	35	35	45	Red Springs (during mining to the east of the railway line)
35	35	35	45	Hillcroft (during mining east of the railway line) and all other land (including vacant land)

Table 1: Noise Limits dB(A)

However, if the Applicant has a written noise agreement with any landowner, and a copy of this agreement has been forwarded to the Department and DEC, then the Applicant may exceed the noise limits in Table 1 for the landowner' s land in accordance with the terms of the noise agreement.

Note: For more information on the individually named properties in Table 1 see Appendix 3.

Additional Noise Mitigation - Forest Lodge

3. Upon receiving a written request from the landowner, the Applicant shall investigate (and subsequently implement) all reasonable and feasible measures to mitigate the noise impacts of the development on the residence identified as Forest Lodge in the map in Appendix 3, in consultation with the landowner, and to the satisfaction of the Director-General.

Continuous Improvement

4. The Applicant shall:

(a) investigate ways to reduce the noise generated by the development;
(b) implement best practice noise mitigation measures at the development; and
(c) report on these investigations and the implementation of any new noise mitigation measures at the development in the AEMR.

Land Acquisition Criteria

5. If the noise generated by the development exceeds the criteria in Table 2, the Applicant shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in Conditions 3-5 of Schedule 5.

Day	Evening	Night	Land Descriptor
$L_{Aeq(15minute)}$			
43	40	40	• Ryan • Tesoriero • Fitzgerald • Tilley • Red Springs (during mining to the west of the railway line) • Hillcroft (during mining to the west of the railway line) • Dobson • Williams • Northey
42	40	40	Red Springs (during mining to the east of the railway line)
40	40	40	Hillcroft (during mining east of the railway line) and all other land (including vacant land)

Table 2: Land acquisition criteria dB(A)

Notes:

1. For more information on the individually named properties in Table 2 see Appendix 3.
2. Noise from the development is to be measured at the most affected point or within the residential boundary or at the most affected point within 30m of the dwelling (rural situations) where the dwelling is more than 30m from the boundary to determine compliance with the $L_{Aeq(15minute)}$ noise limits in Table 1 and 2.
3. For the purpose of noise measures required for this condition, the $L_{Aeq(15minute)}$ noise level must be measured or computed at the nearest or most affected residence over a period of 15 minutes using "FAST" response on the sound level meter. For the purpose of the noise criteria for this condition, 5dB(A) must be added to the measured level if the noise is substantially tonal or impulsive in character.
4. Where it can be demonstrated that direct measurement of noise from the development is impractical, the DEC may accept alternative means of determining compliance. See Chapter 11 of the NSW Industrial Noise Policy.
5. The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.
6. Noise from the development is to be measured at 1m from the dwelling façade to determine compliance with the $L_{A1(1minute)}$ noise limits in Tables 1 and 2.
7. The noise emission limits identified in Condition 2 and 5 apply under meteorological conditions of:
   - Wind speed up to 3m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3oC/100m and wind speed up to 2m/s at 10 metres above the ground in accordance with the definitions provided in the Industrial Noise Policy; and
     - Temperature inversion conditions do not apply in conditions 2 and 5 where the noise limits are assessed at 43 $L_{Aeq(15minute)}$.
8. Construction noise is considered to be operational noise for the purposes of this consent.

Noise Monitoring

6. [3]Within 3 months of the date of this consent, unless otherwise approved by the DEC, the Applicant shall establish a continuous noise monitoring system adjacent to the meteorological weather station required under this consent. This system must be capable of recording L_{Amax}, L_{A1}, L_{A90} and L_{Aeq} noise levels in 15-minute statistical intervals. Unless otherwise agreed, the results of this monitoring must be reported to the DEC on a monthly basis, and included in the AEMR.

7. The Applicant shall undertake quarterly attended noise monitoring of the noise generated by the development at representative locations around the site to the satisfaction of the Director-General, and in general accordance with the NSW Industrial Noise Policy and AS1055-1997: Acoustics – Description and Measurement of Environmental, or its latest version.

8. Within 3 months of the date of this consent, the Applicant shall prepare (and then implement) a Noise Monitoring Program for the development in consultation with DEC, and to the satisfaction of the Director-General. This program must include a noise monitoring protocol for evaluating compliance with the criteria in Tables 1 and 2.

A.2 Cullen Valley Mine EPA Licence

Environment Protection Licence No. 10341 applies to Cullen Valley Mine. Noise requirements are detailed in L4 of the licence and are reproduced below.

L4 Noise limits

L4.1 Noise generated at the premises must not exceed the noise limits presented in the table below.

Locality and Location	Day - LAeq (15 minute)	Evening - LAeq (15 minute)	Night - LAeq (15 minute)	Night - LA1 (1 minute)
"Red Springs" (mining east of railway line)	35	35	35	45
"Red Springs" (mining west of railway line)	43	38	35	45
"Forest Lodge"	40	40	40	45
"Hillcroft" (mining east of railway line)	35	35	35	45
* "Red Springs"mining west of railway line), "Hillcroft" (mining west of railway line), "Ryan", Tesorio", "Fitzgerald", "Tilley", "Dobson", "Williams", "Northey"	43	38	35	45

L4.2 Where LAeq means the equivalent continuous noise level - the level of noise equivalent to the energy-average of noise levels occuring over a measurment period, and where;

a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays;
b) Evening is defined as the period 6pm to 10pm; and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and Public Holidays.

Where the licensee has a written noise agreement with any landowner detailed above, the licensee may exceed the noise limits specified for the relevant location above in accordance with the terms of the noise agreement with that landowner.

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

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

L4.4 For the purpose of condition L4.3:

a) Data recorded by the meteorological station identified as EPA Licence Point 5 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

L4.5 To determine compliance:

a) with the Leq(15 minute) noise limits in condition L4.1, the noise measurement equipment must be located:

i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or
ii) within 30 metres of a dwelling façade, but not closer than 3 metres where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable
iii) within approximately 50 metres of the boundary of a National Park or Nature Reserve

b) with the LA1(1 minute) noise limits in condition L4.1, the noise measurement equipment must be located within 1 metre of a dwelling façade.

c) with the noise limits in condition L4.1, the noise measurement equipment must be located:

i) at the most affected point at a location where there is no dwelling at the location; or
ii) at the most affected point within an area at a location prescribed by conditions L4.5(a) or L4.5(b).

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

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

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

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 C15226

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

Equipment Tested/ Model Number : Rion NA-28
Instrument Serial Number : 00701424
Microphone Serial Number : 01916
Pre-amplifier Serial Number : 01463

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	20°C	**Ambient Temperature :**	21.6°C
Relative Humidity :	55.7%	**Relative Humidity :**	53%
Barometric Pressure :	99.62kPa	**Barometric Pressure :**	99.82kPa

Calibration Technician : Dennis Kim
Calibration Date : 22/05/2015
Secondary Check: Sandra Minto
Report Issue Date : 25/05/2015

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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Level 7 Building 2 423 Pennant Hills Rd
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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C15325

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

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 74813

Atmospheric Conditions
Ambient Temperature : 21.9°C
Relative Humidity : 44%
Barometric Pressure : 100.6kPa

Calibration Technician : Dennis Kim
Calibration Date : 08/07/2015
Secondary Check: Sandra Minto
Report Issue Date : 13/07/2015

Approved Signatory : Ken Williams

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

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	*±0.09dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±4.1%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.1kPa*
Distortion	*±0.26%*		

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

NATA
WORLD RECOGNISED ACCREDITATION

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