Cullen Valley Mine – Environmental Noise Monitoring Quarter 2 - 2023

Prepared for

Castlereagh Coal

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Relationships Attention Professional Trust

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Cullen Valley Mine – Environmental Noise Monitoring Quarter 2 – 2023

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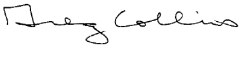
2222373_230628	0	Gregory Collins-MAAS		28 June 2023

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1. Introduction

1.1 Background

RAPT Consulting has been engaged to undertake environmental noise monitoring around Cullen Valley Mine (CVM) for Castlereagh Coal, an open cut coal mine north-west of Lithgow.

Attended environmental noise monitoring was undertaken at five locations around CVM during the day period on 21 June 2023. CVM currently operates a six day per week roster from 6.30 am to 5.00 pm Monday to Friday and 6.30 am to 2.30 pm Saturdays

The purpose of the monitoring was to quantify and describe the ambient noise environment around the site a compare the results with specified noise limits associated with CVM.

1.2 Noise Monitoring Locations

There are five noise monitoring locations around CVM and are provided in Table 1-1 and Figure 1-1.

Table 1-1 CVM Noise Monitoring Locations

Descriptor	Owner	Monitoring Location
NM 1, Red Springs	R & B Grabham	'Red Springs', Red Springs Road
NM 2, Hillcroft	R. Dickens	'Hillcroft', Red Springs Road
NM 3, Forest Lodge	R. Larkin	'Forest Lodge', Red Springs Road
NM 4, Doble Gate	Doble	2775 Castlereagh Highway
NM 5, Tilley	A.Tilley	Driveway of 2541 Castlereagh Highway

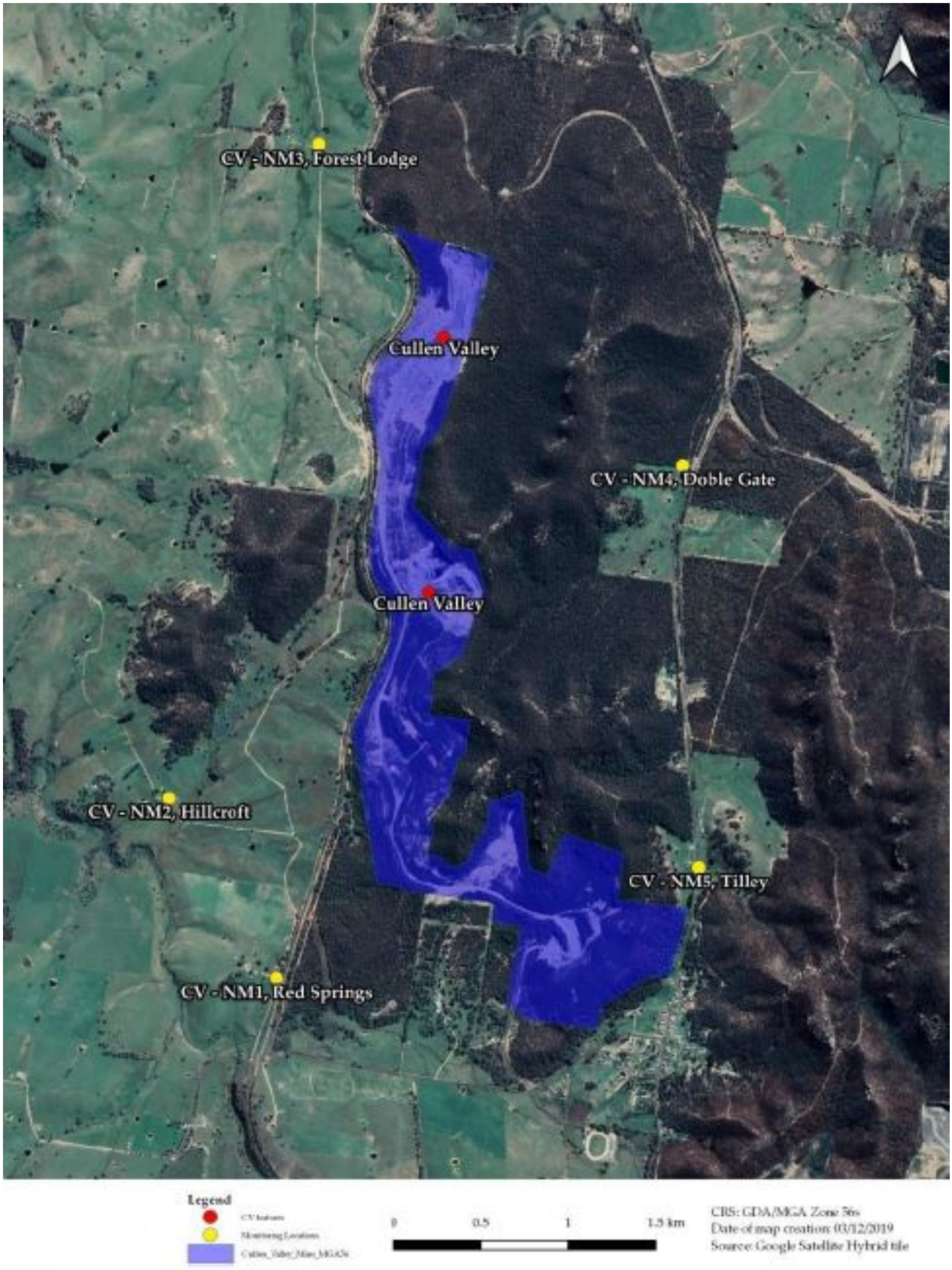


Figure 1-1 CVM Noise Monitoring Locations

1.3 Relevant Guidelines

The relevant policies and guidelines for noise assessments in NSW that have been considered during the preparation of this assessment include:

- Noise Policy for Industry (NPfI), Environment Protection Authority (EPA), 2017
- Australian Standard AS 1055:2018, “Acoustics – Description and Measurement of Environmental Noise”

1.4 Limitations

The purpose of the report is to provide an independent acoustic assessment.

It is not the intention of the assessment to cover every element of the acoustic environment, but rather to conduct the assessment with consideration to the prescribed work scope.

The findings of the acoustic assessment represent the findings apparent at the date and time of the assessment undertaken. It is the nature of environmental assessments that all variations in environmental conditions cannot be assessed and all uncertainty concerning the conditions of the ambient environment cannot be eliminated. Professional judgement must be exercised in the investigation and interpretation of observations.

In conducting this assessment and preparing the report, current guidelines for acoustics, noise were referred to. This work has been conducted in good faith with RAPT Consulting’s understanding of the client’s brief and the generally accepted consulting practice.

No other warranty, expressed or implied, is made as to the information and professional advice included in this report. It is not intended for other parties or other uses.

2. Noise Objectives

The relevant conditions pertaining to noise from the development consent and Environmental Protection Licence (EPL) are provided in Appendix C.

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 outlines the noise requirements. Noise limits as described under the CVM Development Consent are shown in Table 2.1.

Table 2-1 CVM Development Consent Noise Criteria dB(A)

Descriptor	Day $L_{Aeq(15min)}$	Evening $L_{Aeq(15min)}$	Night	
			$L_{Aeq(15min)}$	$L_{A1(1min)}$
NM 1 Red Springs	37	35	35	45
NM 2 Hillcroft	35	35	35	45
NM 3 Forest Lodge	40	40	38	45
NM 4 Doble Gate	43	38	35	45
NM 5 Tilley	43	38	35	45

Land acquisition criteria are shown in Table 2-2.

Table 2-2 CVM Land Acquisition Criteria dB(A)

Descriptor	Day $L_{Aeq(15min)}$	Evening/Night $L_{Aeq(15min)}$
NM1 Red Springs	42	40

Descriptor	Day $L_{Aeq(15min)}$	Evening/Night $L_{Aeq(15min)}$
NM 2 Hillcroft	40	40
NM4 Doble Gate	43	40
NM 5 Tilley	43	40

The noise objectives outlined in Table 2-1 and 2-2 apply under meteorological conditions of:

- Wind speeds up to 3 metres per second at 10 metres above ground level, and
- Temperature inversions 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 Environmental Protection Licence

CVM holds EPL 10341 issued by the Environment Protection Authority most recently on 14 May 2015. Noise objectives are detailed in L4 of the EPL. Noise limits as described in the Cullen Valley Mine EPL are shown in Table 2.3.

Table 2-3 CVM EPL Noise Criteria dB(A)

Descriptor	Mining Condition	Day $L_{Aeq(15min)}$	Evening $L_{Aeq(15min)}$	Night	
				$L_{Aeq(15min)}$	$L_{A1(1min)}$
NM 1 Red Springs	Mining east of railway line	35	35	35	45
NM 1 Red Springs	Mining west of railway line	43	38	35	45
NM 2 Hillcroft	Mining east of railway line	35	35	35	45

Descriptor	Mining Condition	Day $L_{Aeq(15min)}$	Evening $L_{Aeq(15min)}$	Night	
				$L_{Aeq(15min)}$	$L_{A1(1min)}$
NM 2 Hillcroft	Mining west of railway line	43	38	35	45
NM 3 Forest Lodge	-	40	40	40	45
NM 4 Doble Gate	-	43	38	35	45
NM 5 Tilley	-	43	38	35	45

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.

2.2 Modifying Factors

Fact Sheet C of the EPA's Noise Policy for Industry (NPfI) provides guidance relating to corrections for annoying noise characteristics.

As defined in the NPfI:

- Tonal noise: noise containing a prominent frequency and characterised by a definite pitch.
- Low Frequency Noise: noise with an unbalanced spectrum and containing major components within the low-frequency range (10–160 Hz) of the frequency spectrum.
- Intermittent noise: noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.

Modifying factor corrections outlined in Table C-1 of the NPfI are reproduced in Table 2-4

Table 2-4 Modifying Factor Corrections

Factor	Assessment/ measurement	When to apply	Correction[1]	Comments
Tonal noise	One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method (ISO1996.2-2007 – Annex D).	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: • 5 dB or more if the centre frequency of the band containing the tone is in the range 500–10,000 Hz • 8 dB or more if the centre frequency of the band containing the tone is in the range 160–400 Hz • 15 dB or more if the centre frequency of the band containing the tone is in the range 25–125 Hz.	5 dB[2,3]	Third octave measurements should be undertaken using unweighted or Z-weighted measurements. Note: Narrow-band analysis using the reference method in ISO1996-2:2007, Annex C may be required by the consent/regulatory authority where it appears that a tone is not being adequately identified, e.g. where it appears that the tonal energy is at or close to the third octave band limits of contiguous bands.
Low-frequency noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10–160 Hz	Measure/assess source contribution C- and A-weighted Leq,T levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and: • where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2-	2 or 5 dB[2]	A difference of 15 dB or more between C- and A-weighted measurements identifies the potential for an unbalance spectrum and potential increased annoyance. The values in Table C2 are derived from Moorhouse (2011) for DEFRA fluctuating low-frequency noise criteria with corrections to reflect

Factor	Assessment/ measurement	When to apply	Correction[1]	Comments
		dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period • where any of the one-third octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2-dB(A) positive adjustment applies for the daytime period		external assessment locations.
Intermittent noise	Subjectively assessed but should be assisted with measurement to gauge the extent of change in noise level.	The source noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible.	5 dB	Adjustment to be applied for night-time only.
Duration	Single-event noise duration may range from 1.5 min to 2.5 h.	One event in any assessment period.	0 to 20 dB(A)	The project noise trigger level may be increased by an adjustment depending on duration of noise (see Table C3).
Maximum adjustment	Refer to individual modifying factors.	Where two or more modifying factors are indicated.	Maximum correction of 10 dB(A)2	

Factor	Assessment/ measurement	When to apply	Correction[1]	Comments
			(excluding duration correction).	

Note 1 Corrections to be added to the measured or predicted levels, except in the case of duration where the adjustment is to be made to the criterion.

Note 2 Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.

Note 3 Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the ISO1996-2:2007 standard.

Table C2 from the NPfI shows the one third octave low-frequency noise thresholds and is reproduced in Table 2-5.

Table 2-5 One Third Octave Low-Frequency Noise Thresholds

Hz/dB(Z)	One-Third Octave $L_{zeq(15min)}$ Threshold Level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Notes:

- dB(Z) = decibel (Z frequency weighted).
- For the assessment of low-frequency noise, care should be taken to select a wind screen that can protect the microphone from wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler, 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.
- Low-frequency noise corrections only apply under the standard and/or noise-enhancing meteorological conditions.
- Where a receiver location has had architectural acoustic treatment applied (including alternative means of mechanical ventilation satisfying the Building Code of Australia) by a proponent, as part of consent requirements or as a private negotiated agreement, alternative external low-frequency noise assessment criteria may be proposed to account for the higher transmission loss of the building façade.
- Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or environment protection licence, and at locations nominated in the development consent or licence.

3. Noise Monitoring

Noise monitoring was undertaken by RAPT Consulting on 21 June 2023 at the five monitoring locations as identified in Table 1-1 and Figure 1-1.

The attended noise measurements were conducted using a RION NL-42 Sound Level Meter with Type 2 Precision. 1 x 15-minute measurements were undertaken at each location for the daytime period. The attended noise surveys were conducted with consideration to the procedures described in Australian Standard AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise" and the NSW Noise Policy for Industry (NPfI). Calibration was checked before and after each measurement and no significant drift occurred. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics – Sound level meters – Specifications. Logged data was reviewed and filtered to exclude any extraneous data during the monitoring period. The monitoring was undertaken during calm conditions.

Details regarding the noise monitoring are provided in Table 2-1.

Table 3-1 Noise Monitoring Details

Noise Monitoring Details					
Monitoring Location	NM 1 Red Springs	NM2 Hillcroft	NM3 Forest Lodge	NM4 Double Gate	NM5 Tilley
Noise Monitor Type	Rion NL-42	Rion NL-42	Rion NL-42	Rion NL-42	Rion NL-42
Serial Number	00572567	00572567	00572567	00572567	00572567
Measurement Time	11:22am – 11:37am	11:45am – 12:00am	12:14pm – 12:29pm	12:45pm-1:00pm	1:05pm – 1:20pm
Pre-Measurement Reference	93.7	93.7	93.7	93.7	93.7
Post Measurement Reference	93.7	93.7	93.7	93.7	93.7
Time Response	Fast	Fast	Fast	Fast	Fast
Engineering Units	dB(A) SPL	dB(A) SPL	dB(A) SPL	dB(A) SPL	dB(A) SPL
Temperature Celsius	9º	9º	9º	10º	10º
Wind Speed	<5m/s	<5m/s	<5m/s	<5m/s	<5m/s

If the exact contribution of the source of interest cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise levels, for

example, LA10, LA50 or LA90. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Imperceptible' (IP) or ' Immeasurable' (IM) may also be used in this report. When site noise is noted as IP, no site noise was perceptible at the monitoring location. When site noise is noted as IM, this means some noise was perceptible but could not be quantified. If site noise was IM due to masking but estimated to be significant in relation to a relevant criterion, methods as per the NPfI (e.g. measure closer and back calculate) to determine a value for reporting could be utilised.

Therefore, all sites noted as IM in this report are due to one or more of the following reasons:

- Site noise levels were extremely low and unlikely to be noticed in many circumstances
- Site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer, and/or
- It was not feasible or reasonable to utilise methods such as move closer and back calculate. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

Modifying Factors

Previous experience has indicated that noise levels from mining operations, particularly those measured at signifcant distances from the source are relatively continuous and broad spectrum. Given this, noise levels from CVM at the monitoring locations are unlikely to be intermittent or tonal.

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

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

All measurements meeting these conditions were evaluated for possible low-frequency penalty with consideration to the NPfI.

3.1 Noise Monitoring Results

Overall noise levels at each location are provided in Table 4-1.

Table 3-2 Overall Noise Monitoring Results

Location	Measurement Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{A50} dB	L_{Aeq} dB	L_{A90} dB	L_{Amin} dB	L_{Ceq} dB
NM1 Red Springs	21/06/23 11:22am – 11:37am	58	43	36	31	34	28	25	56
NM2 Hillcroft	21/06/23 11:45am – 12:00am	62	38	31	27	31	25	22	52
NM3 Forest Lodge	21/06/23 12:14pm – 12:29pm	58	43	38	35	36	33	31	49
NM4 Doble Gate	21/06/23 12:45pm- 1:00pm	80	77	68	44	64	28	23	70
NM5 Tilley	21/06/23 1:05pm – 1:20pm	81	77	65	42	63	30	25	69

Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the EPA's NPfI.

There were no intermittent or tonal noise sources, as defined in the NPfI audible from site during the survey. Additionally, none of the measurements satisfied the conditions outlined in section 2.2 when assessing low-frequency noise. Therefore, no further assessment of modifying factors was undertaken.

3.2 Development Consent Assessment

Table 3-3 and 3-4 outline $L_{Aeq(15min)}$ noise levels from CVM in the absence of other noise sources and compares against impact assessment and land acquisition criteria respectively. Criteria are applied if weather conditions are in line with the mine's development consent.

Table 3-3 LAeq(15min) CVM Noise Levels Comparison with assessment Criteria

Location	Measurement Date and Time	LAeq Consent Criteria dB	CVM LAeq dB	Exceedance	Notes
NM1 Red Springs	21/06/23 11:22am – 11:37am	37	Imperceptible	No	CVM was imperceptible. Birds, Cattle, insects and light breeze generated the measured levels.
NM2 Hillcroft	21/06/23 11:45am – 12:00am	35	Imperceptible	No	CVM was imperceptible. Birds, insects and light breeze generated the measured levels
NM3 Forest Lodge	21/06/23 12:14pm – 12:29pm	40	Imperceptible	No	CVM was imperceptible. Birds, insects, aircraft and breeze generated the measured levels
NM4 Doble Gate	21/06/23 12:45pm- 1:00pm	43	Imperceptible	No	CVM was imperceptible. Road Traffic, Birds, insects and light breeze generated the measured levels
NM5 Tilley	21/06/23 1:05pm – 1:20pm	43	Imperceptible	No	CVM was imperceptible. Road Traffic, Birds, insects and light breeze generated the measured levels

Table 3-4 LAeq(15min) CVM Noise Levels Comparison with Land Acquisition Criteria

Location	Measurement Date and Time	LAeq Land Acquisition Criteria dB	CVM LAeq dB	Exceedance
NM1 Red Springs	21/06/23 11:22am – 11:37am	37	Imperceptible	No
NM2 Hillcroft	21/06/23 11:45am – 12:00am	35	Imperceptible	No
NM3 Forest Lodge	21/06/23 12:14pm – 12:29pm	40	Imperceptible	No
NM4 Doble Gate	21/06/23 12:45pm-1:00pm	43	Imperceptible	No
NM5 Tilley	21/06/23 1:05pm – 1:20pm	43	Imperceptible	No

3.3 EPL Assessment

Table 3-5 outlines $L_{Aeq(15min)}$ noise levels from CVM in the absence of other noise sources and compares against its' EPL. Criteria are applied if weather conditions are in line with the mine's development consent.

Table 3-5 LAeq(15min) CVM Noise Levels Comparison with EPL

Location	Measurement Date and Time	LAeq Land Acquisition Criteria dB	CVM LAeq dB	Exceedance
NM1 Red Springs	21/06/23 11:22am – 11:37am	35	Imperceptible	No
NM2 Hillcroft	21/06/23 11:45am – 12:00am	35	Imperceptible	No
NM3 Forest Lodge	21/06/23 12:14pm – 12:29pm	40	Imperceptible	No
NM4 Doble Gate	21/06/23 12:45pm-1:00pm	43	Imperceptible	No
NM5 Tilley	21/06/23 1:05pm – 1:20pm	43	Imperceptible	No

4. Conclusion

RAPT Consulting has undertaken environmental noise monitoring around Cullen Valley Mine (CVM) for Castlereagh Coal, an open cut coal mine north-west of Lithgow.

Attended environmental noise monitoring was undertaken at five locations around CVM during the day period on 21 June 2023. CVM currently operates a six day per week roster from 6.30 am to 5.00 pm Monday to Friday and 6.30 am to 2.30 pm Saturdays.

The purpose of the monitoring was to quantify and describe the ambient noise environment around the site a compare the results with specified noise limits associated with CVM.

CVM was imperceptible at the time of measurements and no contributions from activities within CVM could be measured off-site. Therefore, based on the results of the measurements and attended observations, emissions from the site were considered compliant with the criteria established

Appendix A: Legislative Criteria

Schedule 4 Condition 2-8 of Development Consent (DA-200-5-2003) provides noise requirements for CVM and is provided below.

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 land:

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

Table 2: Land acquisition criteria dB(A)

Notes:

- *For more information on the individually named properties in Table 2 see Appendix 3.*
- *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 $L_{Aeq(15\ minute)}$ noise limits in Table 1 and 2.*
- *For the purpose of noise measures required for this condition, the $L_{Aeq\ (15\ minute)}$ 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.*
- *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.*
- *The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.*
- *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.*
- *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 3°C/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 $L_{Aeq(15\ minute)}$.*
- *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.

L4 of EPL No. 10341 provides noise requirements for CVM and is provided 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:

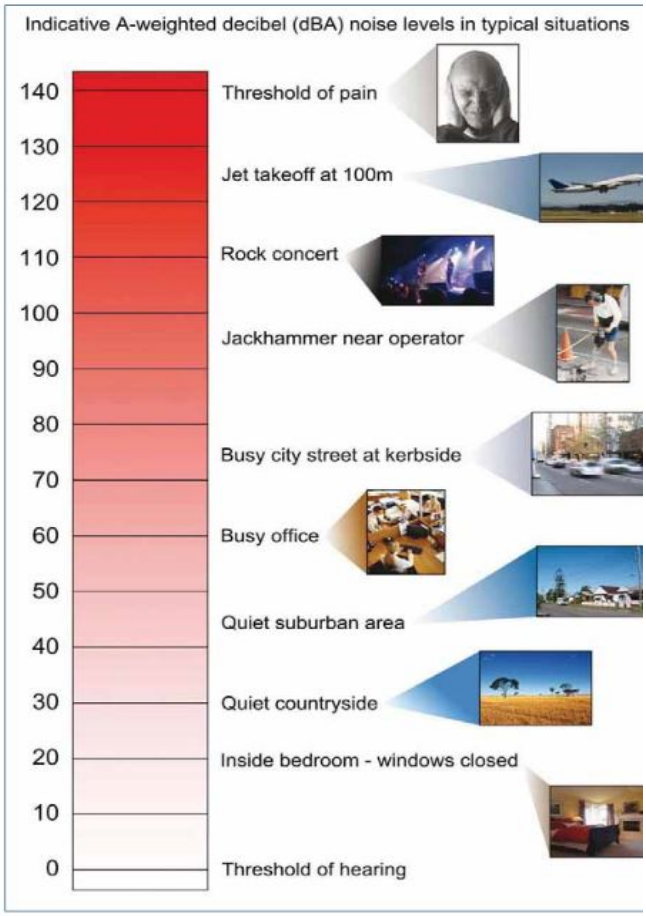
i) at the most affected point at a location where there is no dwelling at the location; or
ii) at the most affected point within an area at a location prescribed by conditions L4.5(a) or L4.5(b).

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: Glossary of Acoustic Terms

Term	Definition
dB	Decibel is the unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics. The picture below indicates typical noise levels from common noise sources. 
dB(A)	Frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at very low and very high frequencies.
$L_{Aeq(period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{A10(period)}$	The sound pressure level that is exceeded for 10% of the measurement period.
$L_{A90(period)}$	The sound pressure level that is exceeded for 90% of the measurement period.
L_{Amax}	The maximum sound level recorded during the measurement period.

Noise sensitive receiver	An area or place potentially affected by noise which includes: A residential dwelling. An educational institution, library, childcare centre or kindergarten. A hospital, surgery or other medical institution. An active (e.g. sports field, golf course) or passive (e.g. national park) recreational area. Commercial or industrial premises. A place of worship.
Rating Background Level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
Feasible and Reasonable (Noise Policy for Industry Definition)	**Feasible** mitigation measure is a noise mitigation measure that can be engineered and is practical to build and/or implement, given project constraints such as safety, maintenance and reliability requirements. Selecting **Reasonable** measures from those that are feasible involves judging whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the mitigation measure. To make a judgement, consider the following: Noise impacts Noise mitigation benefits Cost effectiveness of noise mitigation Community views.
Sound power level (SWL)	The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in dB(A).

Appendix C: Calibration Certificates

Acoustic Research Labs Pty Ltd
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North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013

Calibration Certificate
Calibration Number C22063

Client Details Rapt Consulting
18-19/10 Kenrick Street
The Junction NSW 2291

Equipment Tested/ Model Number : Rion NL-42EX
Instrument Serial Number : 00572567
Microphone Serial Number : 170404
Pre-amplifier Serial Number : 72905

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	23°C	Ambient Temperature :	23.6°C
Relative Humidity :	48.2%	Relative Humidity :	47.7%
Barometric Pressure :	100.51kPa	Barometric Pressure :	100.51kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 4 Feb 2022
Secondary Check: Rhys Gravelle
Report Issue Date : 4 Feb 2022

Approved Signatory : Ken Williams

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

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -

		Environmental Conditions	
Acoustic Tests		*Temperature*	*±0.1°C*
125Hz	*±0.15dB*	*Relative Humidity*	*±1.9%*
1kHz	*±0.13dB*	*Barometric Pressure*	*±0.014kPa*
8kHz	*±0.14dB*		
Electrical Tests	*±0.10dB*		

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

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

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

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

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

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Sound Calibrator

IEC 60942-2017

Calibration Certificate

Calibration Number C21662

Client Details Rapt Consulting
18-19/10 Kenrick Street
The Junction, NSW, 2291

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 79635

Atmospheric Conditions
Ambient Temperature : 24.9°C
Relative Humidity : 36.8%
Barometric Pressure : 99.7kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 07 Oct 2021
Secondary Check: Matthew Calleja
Report Issue Date : 8 Oct 2021

Approved Signatory : Ken Williams

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

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	93.70	1000.40

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942 2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Specific Tests	Least Uncertainties of Measurement -	Environmental Conditions	
Generated SPL	0.11dB	Temperature	0.2°C
Frequency	0.18%	Relative Humidity	2.4%
Distortion	0.50%	Barometric Pressure	0.013kPa

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

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

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

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172
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