Invincible Colliery – Environmental Noise Monitoring Quarter 3 - 2022

Prepared for

Castlereagh Coal

September 2022

Document Details

Invincible Colliery – Environmental Noise Monitoring Quarter 3 – 2022

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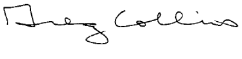
2222373_220928	0	Gregory Collins-MAAS		28 September 2022

Table of Contents

Table Index

Figure Index

1. Introduction

1.1 Background

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

Attended environmental noise monitoring was undertaken at three locations around IC during the day period on 26 September 2022. The site is currently under care and maintenance and consequently noise monitoring was not undertaken during the evening or night-time periods as there are no site activities taking place during these times.

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 IC.

1.2 Noise Monitoring Locations

There are three noise monitoring locations around IC and are provided in Table 1-1 and Figure 1-1.

Table 1-1 IC Noise Monitoring Locations

Descriptor	Owner	Monitoring Location
NM 1, Cullen Bullen Centre	M. Crane	Mudgee Road
NM 2, Cullen Bullen West	-	Off Carson Siding Road and Farley Street
NM 3, Cullen Bullen South	R. Crane	Off Cullen Valley Haul Road

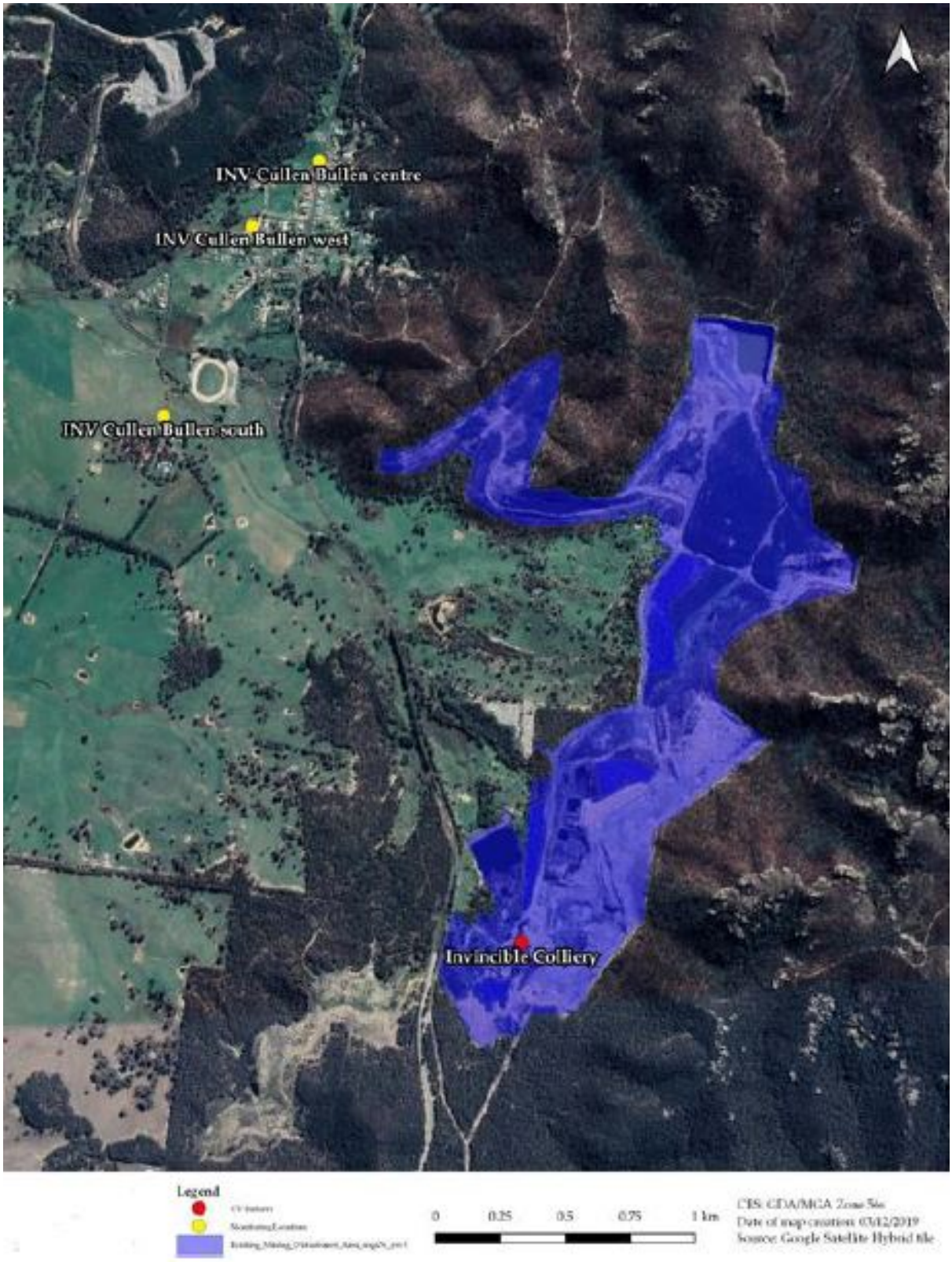


Figure 1-1 IC Noise Monitoring Locations

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

Castlereagh Coal obtained modification to Project Approval in February 2018 (07-0127) for the continuation of open cut mining activities. Schedule 3, Conditions1 to 5 of the approval outlines the noise requirements. Noise limits as described under the IC Project Approval are shown in Table 2.1.

Table 2-1 IC Project Approval Criteria dB(A)

Descriptor	Day $L_{Aeq(15min)}$	Evening $L_{Aeq(15min)}$	Night $L_{Aeq(15min)}$
All Privately Owned Land	35	35	35

Note 1 An agreement with respect to noise emissions has been negotiated between Invincible Colliery and the owner of "Billabong" and "Hillview" properties. The owner of the two residences has confirmed that predicted noise levels are acceptable, despite the predicted noise levels being greater than the calculated noise criterion. These two residences are also subject to acquisition upon request. As such there is no noise criterion for these two residences and monitoring is no longer undertaken.

The noise objectives outlined in Table 2-1 do not apply under meteorological conditions of:

- Wind speeds greater than 3 metres per second at 10 metres above ground level
- Temperature inversions greater than 3 degrees Celsius per 100 metres, and wind speeds of greater than 2 metres per second at 10 metres above ground level, and
- Temperature inversion conditions greater than 3 degrees Celsius per 100metres.

2.1.2 Environmental Protection Licence

IC holds EPL 1095 issued by the Environment Protection Authority (EPA) most recently on 14 May 2015. Noise objectives are detailed in L4 of the EPL. Noise limits as described in the Invincible Colliery EPL are shown in Table 2.2.

Table 2-2 IC EPL Noise Criteria dB(A)

Descriptor	Day $L_{Aeq(15min)}$	Evening $L_{Aeq(15min)}$	Night $L_{Aeq(15min)}$
All Privately Owned Land	40	35	35

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

A. During rain and wind speeds greater than 3 metres/second at 10 metres above ground level, and

B. Under 'non-significant' weather 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 2-3

Table 2-3 Modifying Factor Corrections

Factor	Assessment/ measurement	When to apply	Correction[2]	Comments
Tonal noise	One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method	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	5 dB[3,4]	Third octave measurements should be undertaken using unweighted or Z-weighted measurements.

Factor	Assessment/ measurement	When to apply	Correction[2]	Comments
	(ISO1996.2-2007 – Annex D).	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.		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-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	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 external assessment locations.

Factor	Assessment/ measurement	When to apply	Correction[2]	Comments
		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		
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 (excluding duration correction).	

Note 2 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 3 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 4 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 2-4.

Table 2-4 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 26 September 2022 at the three 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 3-1.

Table 3-1 Noise Monitoring Details

Noise Monitoring Details			
Monitoring Location	NM 1 Cullen Bullen West	NM2 Cullen Bullen Centre	NM3 Cullen Bullen South
Noise Monitor Type	Rion NL-42	Rion NL-42	Rion NL-42
Serial Number	00572567	00572567	00572567
Measurement Time	1:05pm – 1:20pm	12:45pm – 1:00pm	1:25pm – 1:40pm
Pre-Measurement Reference	93.7	93.7	93.7
Post Measurement Reference	93.7	93.7	93.7
Time Response	Fast	Fast	Fast
Engineering Units	dB(A) SPL	dB(A) SPL	dB(A) SPL
Temperature Celsius	16º	16º	16º
Wind Speed	<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 quantifed. 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 IC 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 Invincible Colliery 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 IC 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
- Invincible Colliery 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 3-2.

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
NM 1 Cullen Bullen West	26/09/22 1:05pm – 1:20pm	66	61	45	37	46	34	29	56
NM 2 Cullen Bullen Centre	26/09/22 12:45pm – 1:00pm	74	68	64	53	59	45	39	66
NM 3 Cullen Bullen South	26/09/22 1:25pm – 1:40pm	68	58	41	36	45	34	32	54

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 Project Approval Assessment

Table 3-3 outlines $L_{Aeq(15min)}$ noise levels from IC 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) IC Noise Levels Comparison with assessment Criteria

Location	Measurement Date and Time	LAeq Consent Criteria dB	IC LAeq dB	Exceedance	Notes
NM 1 Cullen Bullen West	26/09/22 1:05pm – 1:20pm	35	Imperceptible	No	IC was imperceptible. Birds, traffic, and light breeze generated the measured levels.

Location	Measurement Date and Time	LAeq Consent Criteria dB	IC LAeq dB	Exceedance	Notes
NM 2 Cullen Bullen Centre	26/09/22 12:45pm – 1:00pm	35	Imperceptible	No	IC was imperceptible. Birds, traffic, and light breeze generated the measured levels.
NM 3 Cullen Bullen South	26/09/22 1:25pm – 1:40pm	35	Imperceptible	No	IC was imperceptible. Birds, traffic, and light breeze generated the measured levels.

3.3 EPL Assessment

Table 3-4 outlines $L_{Aeq(15min)}$ noise levels from IC 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 3-4 LAeq(15min) IC Noise Levels Comparison with EPL

Location	Measurement Date and Time	L_{Aeq} Criteria dB	IC LAeq dB	Exceedance
NM 1 Cullen Bullen West	26/09/22 1:05pm – 1:20pm	40	Imperceptible	No
NM 2 Cullen Bullen Centre	26/09/22 12:45pm – 1:00pm	40	Imperceptible	No
NM 3 Cullen Bullen South	26/09/22 1:25pm – 1:40pm	40	Imperceptible	No

4. Conclusion

RAPT Consulting has undertaken environmental noise monitoring around Invincible Colliery (IC) for Castlereagh Coal, an open cut coal mine north-west of Lithgow.

Attended environmental noise monitoring was undertaken at three locations around IC during the day period on 28 September 2022. The site is currently under care and maintenance and consequently noise monitoring was not undertaken during the evening or night-time periods as there are no site activities taking place during these times.

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 IC.

IC was imperceptible at the time of measurements and no contributions from activities within IC 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

Planning Approval 07-0127 provides noise requirements for IC and is provided below.

NOISE

Acquisition Upon Request

1. If a written request for acquisition was made by the owner of the land listed in Table 1, before the approval of Modification 5, the Proponent must acquire the land in accordance with the procedures in conditions 5 and 6 of schedule 4.

Table 1: Land subject to acquisition upon request

Residence
Billabong, Hillview

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 3.

Noise Criteria

2. The Proponent must ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land.

Table 2: Noise criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
393 (Billabong)	*40*	*40*	*35*	*45*
394 (Hillview)	*43*	*43*	*35*	*45*
All other privately owned land	*35*	*35*	*35*	*45*

Note: To interpret the locations referred to in Table 2, see the applicable figures in Appendix 3.

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

However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the noise criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

Operating Conditions

3. The Proponent must:
   (a) implement all reasonable and feasible measures to minimise the operational, low frequency and road noise of the project;
   (b) minimise the noise impacts of the project during meteorological conditions when the noise criteria in this consent do not apply (see Appendix 4);
   (c) co-ordinate noise management at the site with the Cullen Valley and Baal Bone mines, to minimise any cumulative noise impacts; and
   (d) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this approval.

Noise Management Plan

4. Prior to recommencing mining operations, unless the Secretary agrees otherwise, the Proponent must prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the relevant noise criteria and operating conditions in this approval;
   (c) describe the proposed noise management system in detail; and

(d) include a noise monitoring program that:
- evaluates and reports on:
  - the effectiveness of the noise management system;
  - compliance against the noise criteria in this approval; and
- compliance against the noise operating conditions; and
- defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

5. The Noise Management Plan approved by the Secretary must be implemented.

L4 of EPL No. 1095 provides noise requirements for IC and is provided below.

L4 Noise limits

L4.1 Noise from the premises must not exceed:

a) 40 dB(A) LAeq(15 minute) during the day (7 am to 6 pm); and
b) 35 dB(A) LAeq(15 minute) at all other times except as expressly provided by this licence;

at any residence on privately owned land.

Where LAeq means the equivalent continuous noise level – the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

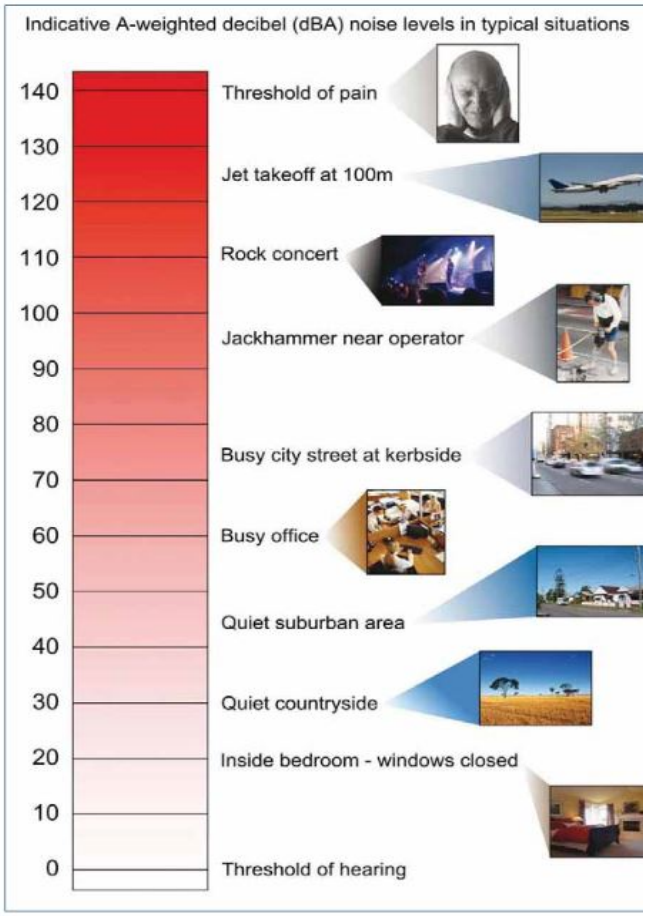
Note: The licensee may exceed the limits set in L5.1 only if the licensee has a written negotiated noise agreement with the landowner of the premises in question and has provided a copy of this agreement to the EPA.

L4.2 To determine compliance with condition(s) L5.1 noise must be measured at, or computed for, the most affected point or within the residential boundary, or at the most affected point within 30 m of a dwelling (rural situations) where the dwelling is more than 30 m from the boundary. A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000)".

L4.3 The noise emission limits identified in this licence apply under all meteorological conditions except:
a) during rain and wind speeds (at 10m height) greater than 3m/s; and
b) under "non-significant weather conditions".

Note: Field meteorological indicators for non-significant weather conditions are described in the NSW Industrial Noise Policy, Chapter 5 and Appendix E in relation to wind and temperature inversions.

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

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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.

PAGE 1 OF 1

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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
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

PAGE 1 OF 1