

Wambo Coal Mine and Rail Spur Environmental Noise Monitoring

August 2022

Prepared for Wambo Coal Pty Limited

Wambo Coal Mine and Rail Spur

Environmental Noise Monitoring

August 2022

Wambo Coal Pty Limited

E220455 RP1

Version	Date	Prepared by	Approved by	Comments
0.1	10/10/2022	Will Moore	Ryan Bruniges	Draft
1.0	13/10/2022	Will Moore	Ryan Bruniges	Final
1.1	27/01/2023	Will Moore	Jesse Tribby	Minor met update

Approved by



Jesse Tribby

Senior Acoustic Consultant

27 January 2023

Level 3 175 Scott Street

Newcastle NSW 2300

This report has been prepared in accordance with the brief provided by Wambo Coal Pty Limited and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of Wambo Coal Pty Limited and no responsibility will be taken for its use by other parties. Wambo Coal Pty Limited may, at its discretion, use the report to inform regulators and the public.

© Reproduction of this report for educational or other non-commercial purposes is authorised without prior written permission from EMM provided the source is fully acknowledged. Reproduction of this report for resale or other commercial purposes is prohibited without EMM's prior written permission.

TABLE OF CONTENTS

1	Introduction	1
1.1	Background	1
1.2	Attended Noise Monitoring Locations	1
1.3	Terminology & Abbreviations	3
2	Regulator requirements and noise criteria	4
2.1	WCM Development Consent	4
2.2	WCRS Development Consent	4
2.3	Environment Protection Licence	4
2.4	Noise Management Plan	4
2.5	Noise Criteria	4
2.6	Meteorological Conditions	5
2.7	Modifying Factors	5
3	Methodology	6
3.1	Overview	6
3.2	Attended Noise Monitoring	6
3.3	Modifying Factors	7
3.4	Meteorological Conditions	7
3.5	Attended Noise Monitoring Equipment	7
4	Results	8
4.1	Total Measured Noise Levels	8
4.2	Modifying Factors	8
4.3	Attended Noise Monitoring	9
4.4	Atmospheric Conditions	10
5	Discussion	11
5.1	Noted Noise Sources	11
6	Summary	17

Appendices

Appendix A	Regulator documents	A.1
Appendix B	Calibration certificates	B.1

Tables

Table 1.1	Attended noise monitoring locations	1
Table 1.2	Terminology and abbreviations	3
Table 2.1	WCM Noise Criteria	4
Table 3.1	Attended noise monitoring equipment	7
Table 4.1	Measured noise levels – August 2022 ¹	8
Table 4.2	$L_{Aeq,15minute}$ generated by WCM against project approval criteria – August 2022	9
Table 4.3	$L_{A1,1minute}$ generated by WCM against project approval criteria – August 2022	9
Table 4.4	Measured atmospheric conditions – August 2022	10

Figures

Figure 1.1	WC noise monitoring locations	2
Figure 5.1	Example graph (refer to Section 5.1 for explanatory note)	11
Figure 5.2	Environmental Noise Levels, N01 – Wambo Road	12
Figure 5.3	Environmental Noise Levels, N16 – Jerrys Plains Road	13
Figure 5.4	Environmental Noise Levels, N20A – Redmanvale Road Central	14
Figure 5.5	Environmental Noise Levels, N21 – Wambo South	15
Figure 5.6	Environmental Noise Levels, N26 – Redmanvale Road South	16

1 Introduction

1.1 Background

Global Acoustics (now part of EMM) was engaged by Wambo Coal (WC) to conduct a monthly noise survey of operations at Wambo Coal Mine (WCM) and Wambo Coal Rail Spur (WCRS). WCM and WCRS operate under separate development consents while reporting has been combined for both. The purpose of the survey is to quantify and describe the existing acoustic environment around WCM and WCRS, and compare results with relevant limits.

WC operates underground mining operations located near Warkworth, NSW. The underground operations include associated surface facilities, including a coal handling and preparation plant (CHPP), conveyors, bins and other material-handling infrastructure.

The WCRS is located between Mt Thorley and Warkworth Village and includes the following components:

- a product coal stockpile and reclaim area, product coal conveyor, train load-out bin, rail loop and a rail spur from the WCM to Mount Thorley;
- rail transport of product coal to the market, an intermittent activity that can take place at any time; and
- a locomotive refuelling facility.

Attended environmental noise monitoring described in this report was undertaken during the night period of 17/18 August 2022 at five monitoring locations around WC.

1.2 Attended Noise Monitoring Locations

Monitoring locations for WC are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows the actual monitoring positions, not the location of residences.

Table 1.1 Attended noise monitoring locations

Site Reference ¹	EPA Point ²	Area Description	Properties Represented ³
N01	N/A	North Bulga	3, 7, 379
N16	20	Jerrys Plains Road	Privately-owned residences near Jerry's Plains
N20A	21	Redmanvale Road Central	Privately-owned residences near Jerry's Plains
N21	22	South Wambo	25, 35a
N26	23	Redmanvale Road South	Privately-owned residences near Jerry's Plains

- Notes:
1. Sourced from NMP – WA-ENV-MNP-503, November 2020.
 2. Sourced from Environment Protection Licence 529, February 2021.
 3. Property numbering is from Appendix 4 of DA 305-7-2003.

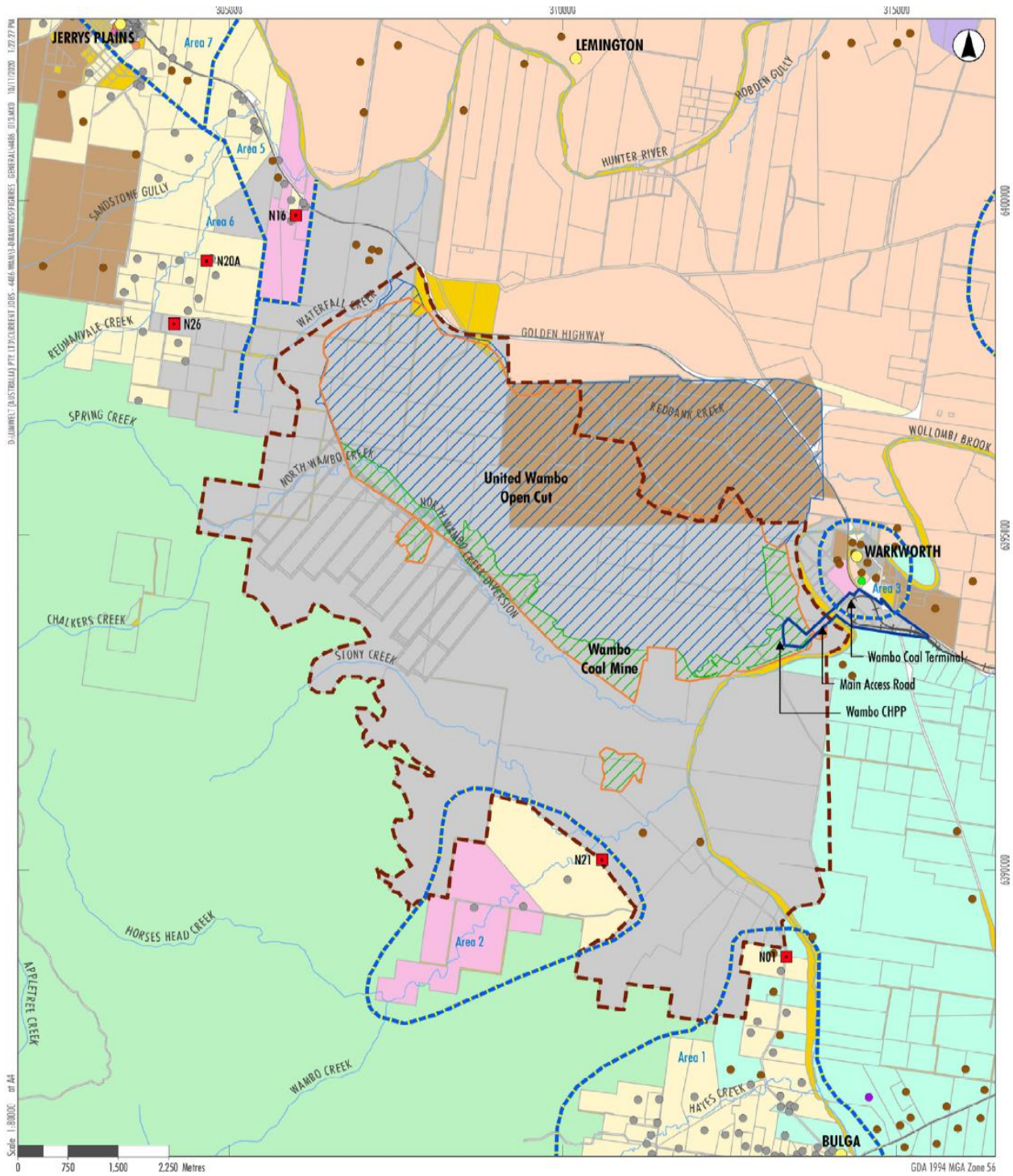


Figure 1.1 WC noise monitoring locations

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 and abbreviations

Descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise.
L _{Amax}	The maximum A-weighted noise level over a time period.
L _{A1}	The noise level which is exceeded for 1 per cent of the time.
L _{A,1minute}	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L _{A10}	The noise level which is exceeded for 10 percent of the time.
L _{Aeq}	The average noise A-weighted energy during a measurement period.
L _{A50}	The noise level which is exceeded for 50 per cent of the time and the median noise level during a measurement period.
L _{A90}	The level exceeded for 90 percent of the time. The L _{A90} level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes.
L _{Amin}	The minimum A-weighted noise level over a time period.
L _{Ceq}	The average C-weighted noise energy during a measurement period. The “C” weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
SC	Stability class (or category) is determined from measured wind speed and either sigma-theta or VTG.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	This is the period 7:00am to 6:00pm.
Evening	This is the period 6:00pm to 10:00pm.
Night	This is the period 10:00pm to 7:00am.
WC	Wambo Coal
WCM	Wambo Coal Mine
WCRS	Wambo Coal Road Spur

2 Regulator requirements and noise criteria

2.1 WCM Development Consent

The most current development consent for WCM is DA 305-7-2003 (MOD 18, 25 January 2022). Schedule 2, Part B of the WCM consent details specific conditions relating to noise generated by WCM. Relevant sections of the WCM consent are reproduced in Appendix A.

2.2 WCRS Development Consent

The most current development consent for Wambo Rail Loop is WCRS DA 177-8-2004 (MOD 3, 29 August 2019), last modified to include a rail refuelling facility. Schedule 2, Part B of the WCRS consent details specific conditions relating to noise generated by WCRS. Relevant sections of the WCRS consent are reproduced in Appendix A.

2.3 Environment Protection Licence

WCM holds Environment Protection Licence (EPL) No. 529 issued by the Environment Protection Authority (EPA) most recently on 30 September 2021. Relevant sections of the EPL are reproduced in Appendix A.

2.4 Noise Management Plan

Noise monitoring requirements are detailed in the Wambo Coal Noise Management Plan WA-ENV-MNP-503 (NMP, November 2020), prepared in accordance with the WCM and WCRS consents. Relevant sections of the NMP are reproduced in Appendix A.

2.5 Noise Criteria

Noise criteria detailed in Table 2.1. have been adopted for each monitoring location based on Phase 2 and 3 of the development consent (MOD 18) and the NMP.

Table 2.1 WCM Noise Criteria

Location	WCM Day $L_{Aeq,15minute}$	WCM Evening $L_{A15,minute}$	WCM Night $L_{Aeq,15minute}$	WCM Night $L_{A1,1minute}$
N01 ¹	38	38	38	48
N16	35	35	35	45
N20A	35	35	35	45
N21 ²	39	39	39	49
N26	35	35	35	45

Notes: 1. Noise criteria for the nearest privately-owned property (R003) have been adopted.

2. Noise criteria for the nearest privately-owned property (R025) have been adopted.

EPL noise criteria have not been updated for Phase 2 and 3 of operations. As noise criteria in the development consent and NMP are now more conservative than those in the EPL, they have been adopted in Table 2.1.

2.6 Meteorological Conditions

Meteorological conditions required for noise criteria to apply are consistent between the consent and EPL.

2.6.1 Development Consent

Appendix 5 of MOD 18 details specific meteorological conditions required for noise criteria to be applicable:

APPENDIX 5 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in condition B12 are to apply under all meteorological conditions except the following:
 - (a) where 3°C/100 metres (m) lapse rates have been assessed, then:
 - (i) wind speeds greater than 3 metres/second (m/s) measured at 10m above ground level;
 - (ii) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2m/s measured at 10m above ground level; or
 - (iii) temperature inversion conditions greater than 3°C/100m.
 - (b) where Pasquill Stability Classes have been assessed, then:
 - (i) wind speeds greater than 3m/s at 10m above ground level;
 - (ii) stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level;
 - (iii) stability category G temperature inversion conditions.

As lapse rates (VTG) were not measured directly, meteorological conditions have been assessed against Pasquill stability classes detailed in 1.(b).

2.6.2 Environment Protection Licence

Condition L5.5 of the EPL details meteorological conditions required for noise limits to apply:

- L5.5 The noise limits set out in condition L5.1 apply under all meteorological conditions except for the following:
- a) Wind speeds greater than 3 metres/second at 10 metres above the ground level;
 - 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.

Condition L5.5 is consistent with stability category conditions outlined in Appendix 5, 1.(b) of MOD 18.

2.7 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017. For assessment of modifying factors, the NPfI immediately superseded the 'Industrial Noise Policy' (INP, 2000), as outlined in the EPA document 'Implementation and transitional arrangements for the Noise Policy for Industry' (2017). Assessment and reporting of modifying factors has been undertaken in accordance with Fact Sheet C of the NPfI.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was conducted in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements.

Meteorological data was obtained from the WCM automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured noise levels.

3.2 Attended Noise Monitoring

During this survey, monthly attended monitoring was undertaken during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric condition measurement was also undertaken at each monitoring location.

This survey presents noise levels gathered during attended monitoring that are the result of many sounds reaching the sound level meter microphone during monitoring. Received levels from various noise sources were noted during attended monitoring and particular attention was paid to the extent of WCM/WCRS's contribution, if any, to measured levels. At each receptor location, WCM/WCRS's $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ (in the absence of any other noise) was measured directly, where possible, or, determined by frequency analysis.

If the exact contribution of the source of interest (in this case WCM) 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 descriptors in accordance with Section 7.1 of the NPfl. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods (eg measure closer and back calculate) to determine a value for reporting.

All sites noted as NM in this report are due to one or more of the following reasons:

- Site noise levels were extremely low and unlikely, in many cases, to be even noticed.
- Site noise levels were masked by another relatively loud noise source that is characteristic of the environment (eg breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer.
- It was not feasible, nor reasonable to employ methods such as move closer and back calculate. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

A measurement of $L_{A1,1\text{minute}}$ corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms this is the highest noise level, or L_{Amax} , received from the site during the entire measurement period (ie the highest level of the worst minute during the 15 minute measurement).

Often extraneous noise events (for example, road traffic pass-bys and dogs) interfere with the measurement of site noise levels in the frequency range of interest. Where required, the sound level meter is paused during these occurrences to aid in quantification of the site only noise.

3.3 Modifying Factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable, such that the site only L_{Aeq} was not “NM” or less than a maximum cut off value (eg “<20 dB” or “<30dB”).

If applicable, modifying factors have been reported and added to measured site only L_{Aeq} noise levels when meteorological conditions satisfied requirements for site noise criteria to be applicable. Low-frequency modifying factors have only been applied to site-only L_{Aeq} levels if WCM/WCR was the only contributing low-frequency noise source.

3.4 Meteorological Conditions

Meteorological data was obtained from the WCM meteorological station; this was logged at 10-minute intervals. Atmospheric parameters include wind speed, wind direction, rainfall, and sigma theta. When meteorological data is provided in less than 15-minute intervals, an analysis must be conducted to determine the meteorological conditions present for the majority of each measurement period and whether those conditions result in noise criteria being applicable or not.

3.5 Attended Noise Monitoring Equipment

Equipment used to measure environmental noise levels is detailed in Table 3.1. 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 meter	01070590	09/06/2024
Rion NA-28 sound level meter	00370304	24/11/2022
Pulsar 106 acoustic calibrator	74813	09/06/2024
Pulsar 105 acoustic calibrator	81334	29/11/2023

4 Results

4.1 Total Measured Noise Levels

Overall noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the noise sources responsible for these measured levels is provided in Section 5 of this report.

Table 4.1 Measured noise levels – August 2022 ¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{Aeq} dB	L _{A50} dB	L _{A90} dB	L _{Amin} dB
N01	17/08/2022 23:00	43	41	40	39	39	38	35
N16	17/08/2022 23:13	63	61	52	49	41	39	36
N20A	17/08/2022 22:26	43	39	36	34	34	32	29
N21	17/08/2022 22:29	50	49	48	46	46	44	42
N26	17/08/2022 22:00	47	39	34	32	31	28	25

Notes: 1. Levels in this table are not necessarily the result of activity at WCM or WCRS.

4.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 7.

There were no modifying factors, as defined in the NPfI, applicable during the survey.

4.3 Attended Noise Monitoring

Table 4.2 and Table 4.3 detail noise levels from WCM in the absence of other noise sources. Noise criteria are applicable if weather conditions during the measurement were within parameters outlined in the WCM development consent.

Table 4.2 $L_{Aeq,15minute}$ generated by WCM against project approval criteria – 17/18 August 2022

Location	Start Date and Time	Wind Speed m/s ¹	Stability Class ¹	Criterion dB ⁵	Criterion Applies? ²	WCM L_{Aeq} dB ^{3,4}	Exceedance dB ^{4,5}
N01	17/08/2022 23:00	0.2	F	38	Yes	IA	Nil
N16	17/08/2022 23:13	0.7	E	35	Yes	IA	Nil
N20A	17/08/2022 22:26	0.4	F	35	Yes	IA	Nil
N21	17/08/2022 22:29	0.4	F	39	Yes	IA	Nil
N26	17/08/2022 22:00	0.8	E	35	Yes	IA	Nil

- Notes:
1. Stability Class calculated using sigma theta method provided by NPfI.
 2. Noise emission limits identified in the above table apply under all meteorological conditions except wind speeds greater than 3 m/s at 10 metres above ground level; or stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 metres above ground level, or stability category G temperature inversion conditions.
 3. Site only $L_{Aeq,15minute}$ attributed to WCM, including modifying factors if applicable.
 4. Bold results in red indicate an exceedance of relevant criterion.
 5. NA in exceedance column means atmospheric conditions outside conditions specified in development consent, therefore criterion was not applicable, or there is no applicable criterion.

Table 4.3 $L_{A1,1minute}$ generated by WCM against project approval criteria – August 2022

Location	Start Date and Time	Wind Speed m/s ¹	Stability Class ¹	Criterion dB ⁵	Criterion Applies? ²	WCM $L_{A1,1min}$ dB ^{3,4}	Exceedance dB ^{4,5}
N01	17/08/2022 23:00	0.2	F	48	Yes	IA	Nil
N16	17/08/2022 23:13	0.7	E	45	Yes	IA	Nil
N20A	17/08/2022 22:26	0.4	F	45	Yes	IA	Nil
N21	17/08/2022 22:29	0.4	F	49	Yes	IA	Nil
N26	17/08/2022 22:00	0.8	E	45	Yes	IA	Nil

- Notes:
1. Stability Class calculated using sigma theta method provided by NPfI.
 2. Noise emission limits identified in the above table apply under all meteorological conditions except wind speeds greater than 3 m/s at 10 metres above ground level; or stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 metres above ground level, or stability category G temperature inversion conditions.
 3. Site only $L_{A1,1minute}$ attributed to WCM, including modifying factors if applicable.
 4. Bold results in red indicate an exceedance of relevant criterion.
 5. NA in exceedance column means atmospheric conditions outside conditions specified in development consent, therefore criterion was not applicable, or there is no applicable criterion.

4.4 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.4. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.4 Measured atmospheric conditions – August 2022

Location	Start Date and Time	Temperature °C	Wind Speed m/s	Wind Direction °Magnetic North ¹	Cloud Cover 1/8s
N01	17/08/2022 23:00	6	0.0	-	0
N16	17/08/2022 23:13	7	0.0	-	0
N20A	17/08/2022 22:26	8	0.0	-	0
N21	17/08/2022 22:29	6	0.0	-	0
N26	17/08/2022 22:00	8	0.0	-	0

Notes: 1. "-" indicates calm conditions at monitoring location.

2. "NR" denotes not recorded.

Meteorological data used for compliance assessment is sourced from the WCM AWS.

5 Discussion

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations summaries have been derived for the location where an exceedance was measured and provided in this chapter. Statistical 1/3 octave-band analysis of environmental noise was undertaken and the following figures display frequency ranges of various noise sources at each location for LA1, LA10, LAeq, LA50 and LA90 descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1 where it can be seen that frogs and insects are generating noise at frequencies above 1000 Hz while mining noise is at frequencies less than 1000 Hz, which is typical. Adding levels at frequencies that relate to mining only allows separate statistical results to be calculated. This analysis cannot always be performed if there are significant levels of other noise at the same frequencies as mining, such as dogs, cows, or (most commonly) road traffic.

It should be noted that the method of summing statistical values up to a cut-off frequency can overstate the LA1 result by a small margin but is entirely accurate for LAeq.

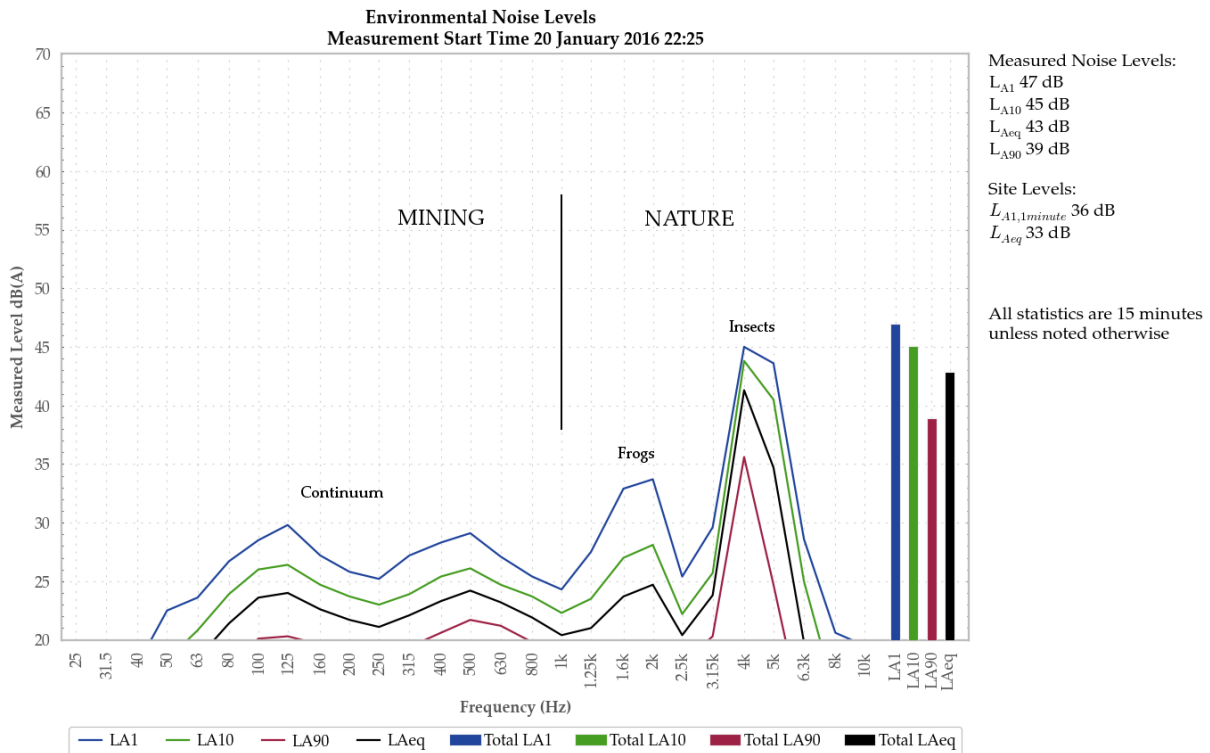


Figure 5.1 Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N01

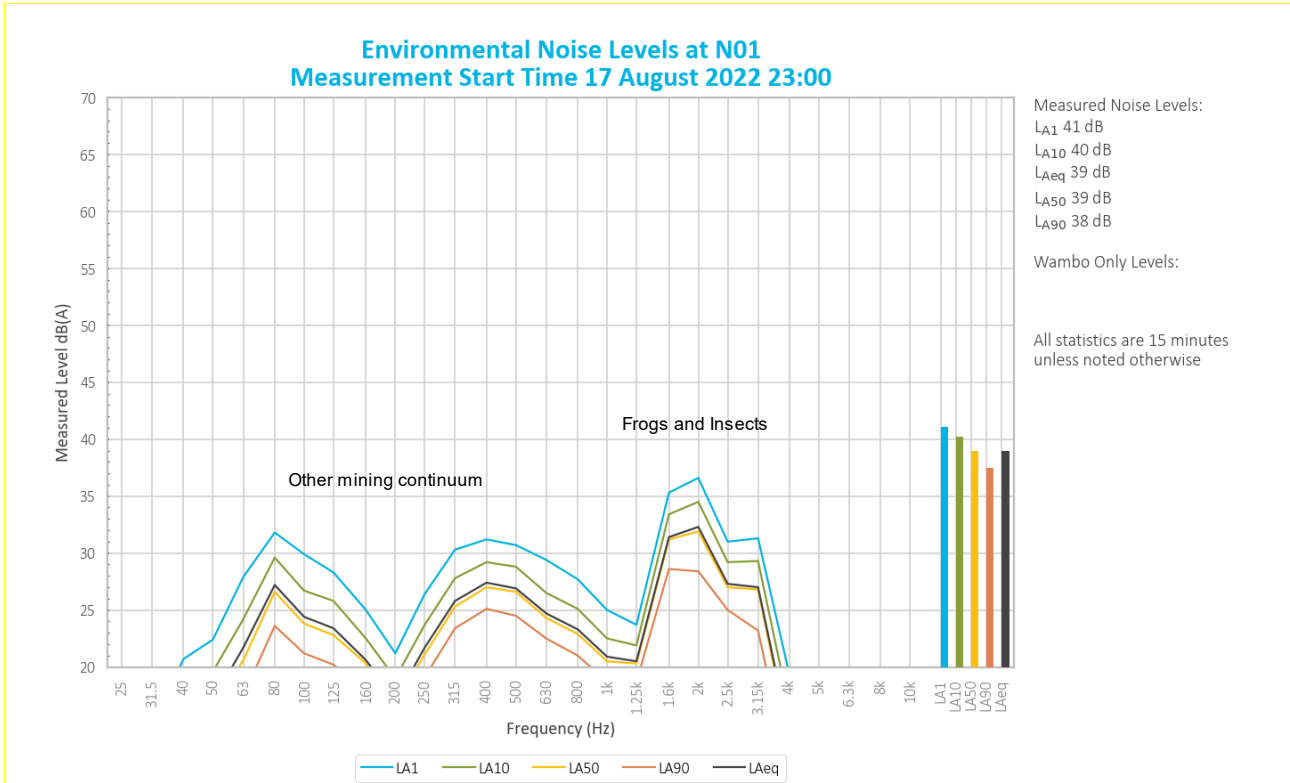


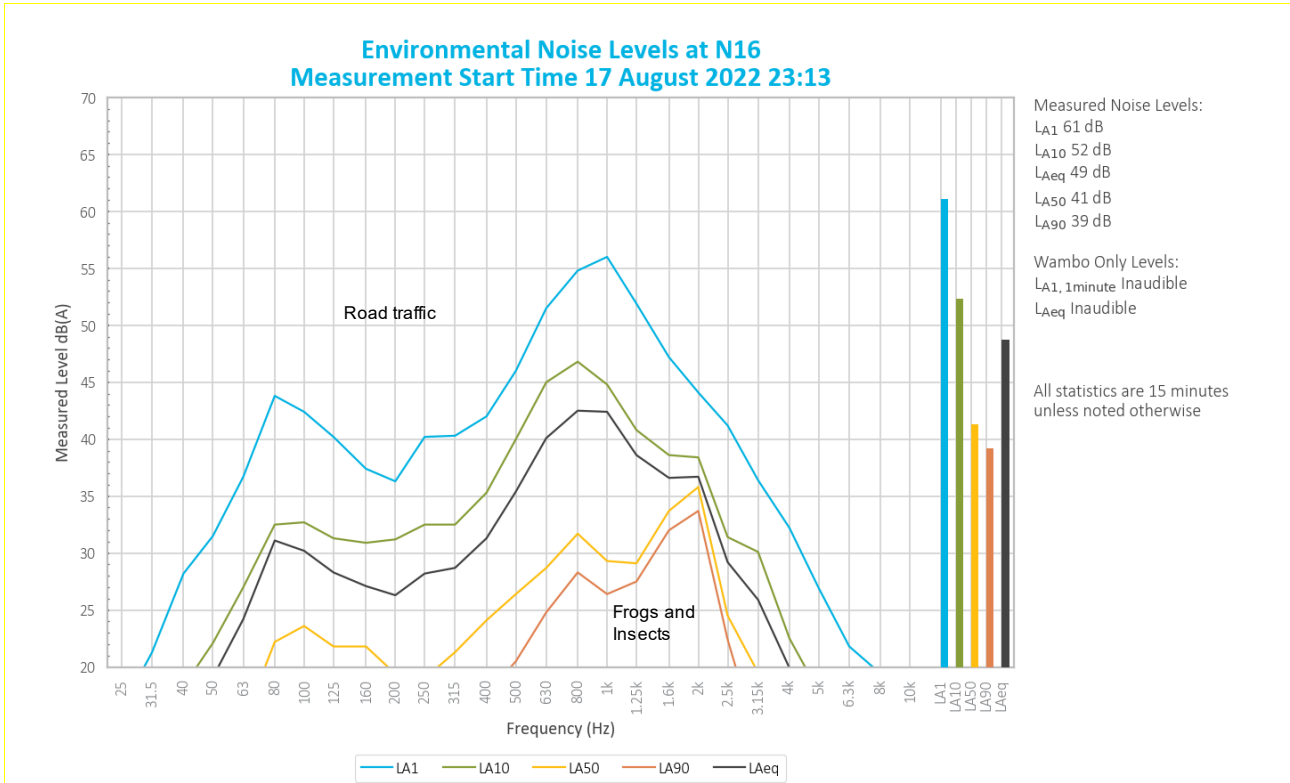
Figure 5.2 Environmental Noise Levels, N01 – Wambo Road

WCM was inaudible during the measurement.

Frogs, insects and continuum from other mines generated measured noise levels.

Noise from bats was also noted.

5.1.2 N16



WCM was inaudible during the measurement.

Road traffic generated the measured LA1, LA10 and LAeq. Frogs and insects generated the measured LA50 and LA90.

Continuum from another mine and noise from livestock was also noted.

5.1.3 N20A

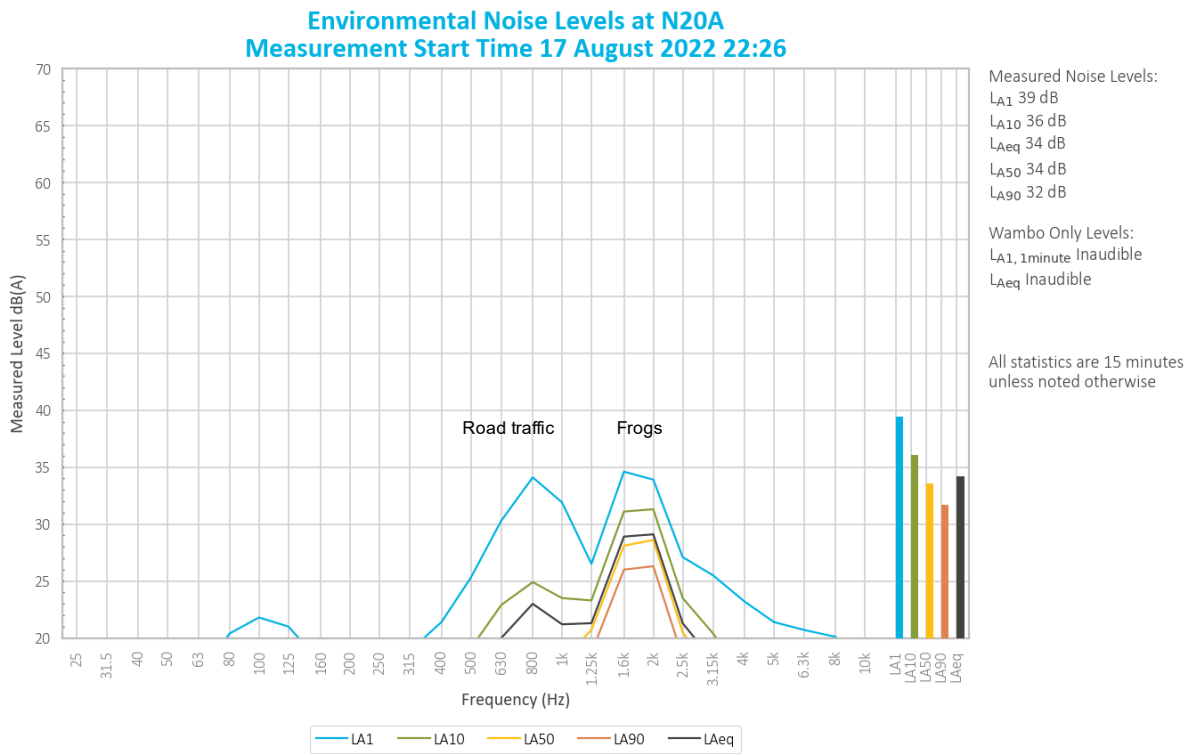


Figure 5.4 Environmental Noise Levels, N20A – Redmanvale Road Central

WCM was inaudible during the measurement.

Frogs were primarily responsible for the measured noise levels. Road traffic contributed to the measured LA1.

Continuum from another mine was also noted.

5.1.4 N21

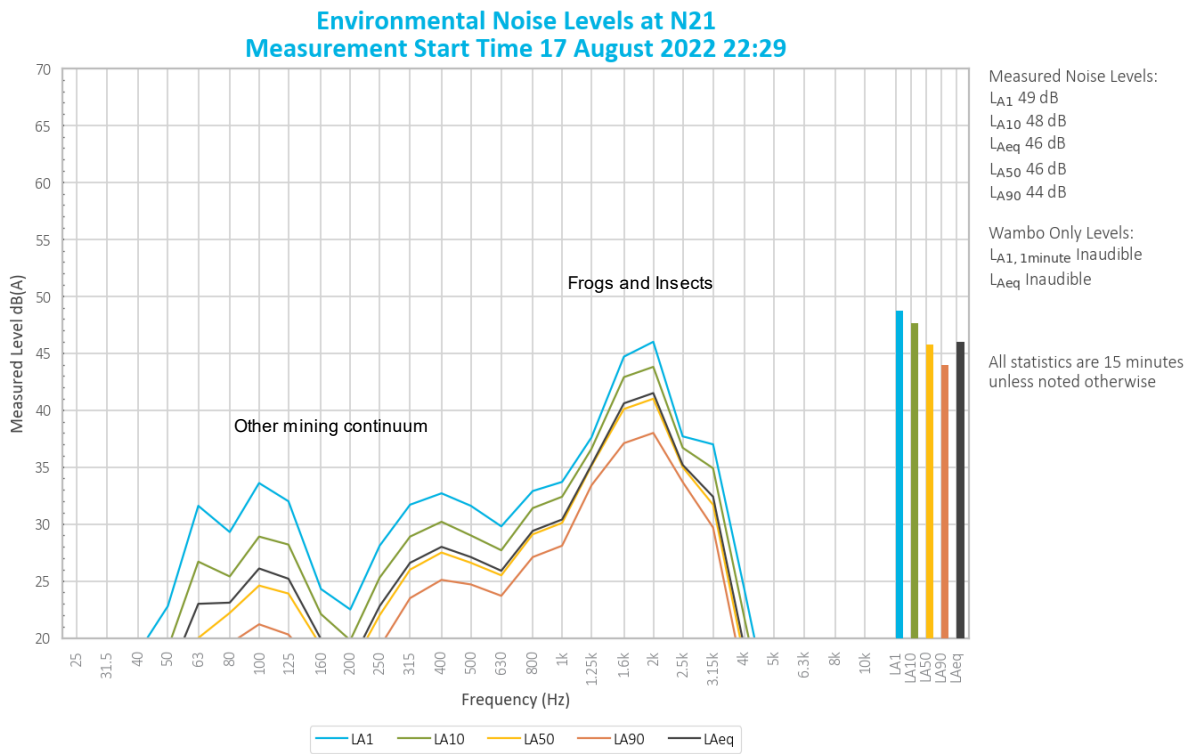


Figure 5.5 Environmental Noise Levels, N21 – Wambo South

WCM was inaudible during the measurement.

Frogs and insects generated measured noise levels.

Continuum from another mine was also noted.

5.1.5 N26

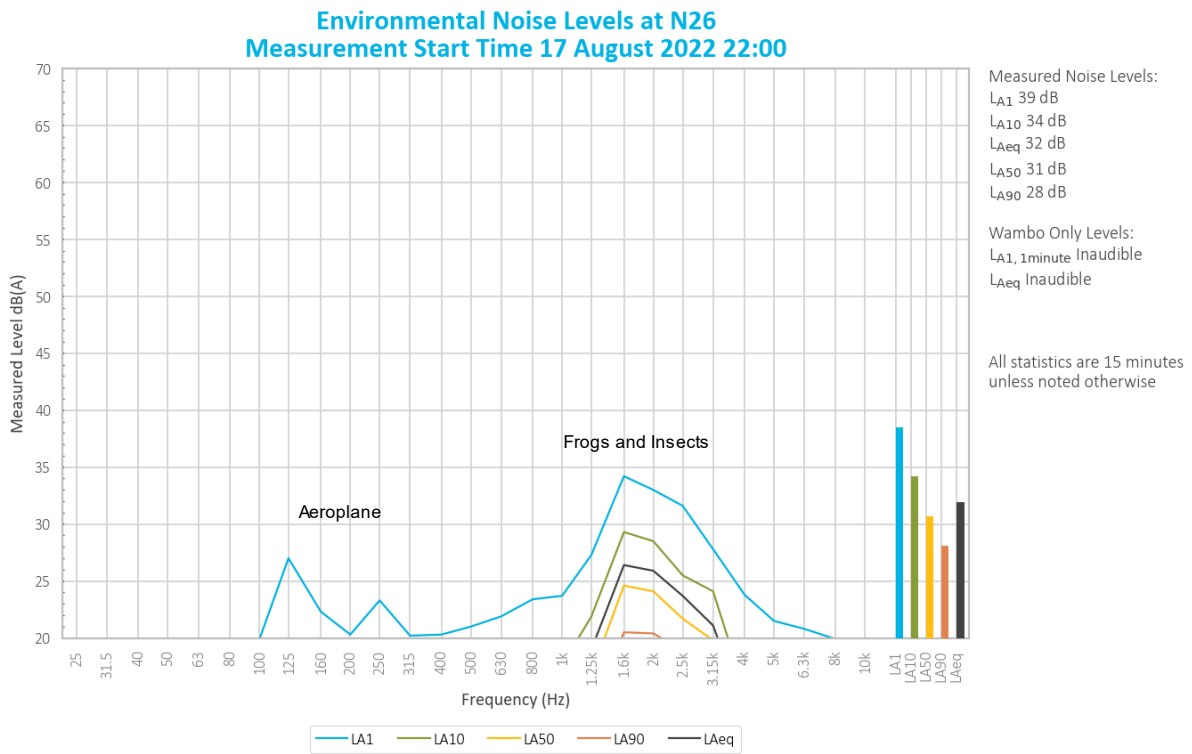


Figure 5.6 Environmental Noise Levels, N26 – Redmanvale Road South

WCM was inaudible during the measurement.

Frogs and insects generated the measured noise levels.

Continuum from another mine and noise from road traffic and an aeroplane was also noted.

6 Summary

Global Acoustics was engaged by WC to conduct a monthly noise survey of operations at WCM and WCRS. The purpose of the survey is to quantify and describe the existing acoustic environment and compare results with relevant limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 17/18 August 2022 at five monitoring locations

Noise levels from WCM and WCRS complied with the relevant development consent noise limits during the August 2022 survey at all monitoring locations. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Appendix A

Regulator documents

A.1 Wambo Coal Mine Development Consent

- B13. During Phase 2 and Phase 3, the Applicant must ensure that the noise generated by the Wambo Mining Complex does not exceed the criteria in Table 4 at any residence^a on privately-owned land.

Table 4: Operational noise criteria dB(A) for Phase 2 and Phase 3

Noise Assessment Area	Noise Assessment Location	Day <i>L_{Aeq}</i> (15 min)	Evening <i>L_{Aeq}</i> (15 min)	Night <i>L_{Aeq}</i> (15 min)	Night <i>L_{A1}</i> (1 min)
Area 1 - North Bulga	R003	38	38	38	48
	R007 R379	37	37	37	47
	All other privately-owned residences	35	35	35	45
Area 2 - South Wambo	R025	39	39	39	49
	R035a	37	37	37	47
	All other privately-owned residences	35	35	35	45

Noise Assessment Area	Noise Assessment Location	Day <i>L_{Aeq}</i> (15 min)	Evening <i>L_{Aeq}</i> (15 min)	Night <i>L_{Aeq}</i> (15 min)	Night <i>L_{A1}</i> (1 min)
Area 3 - Warkworth Village	All other privately-owned residences	44	44	43	53
All other areas	All privately-owned residences	35	35	35	45

^a The Noise Assessment Areas referred to in Table 4 are shown in Appendix 1.

- B14. Noise generated by the Wambo Mining Complex must be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the *NSW Industrial Noise Policy* (EPA, 2000). Appendix 5 of this consent sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.
- B15. The noise criteria in Table 3 and Table 4 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

PART C ADDITIONAL PROCEDURES

ACQUISITION UPON REQUEST

- C1. Deleted

Table 11: Deleted

ADDITIONAL MITIGATION UPON REQUEST

- C2. Upon receiving a written request from the owner of any residence on the privately-owned land^a listed in Table 11 or Table 12, the Applicant must implement additional mitigation measures at or in the vicinity of the residence in consultation with the landowner. These measures must be consistent with the measures outlined in the *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments* (NSW Government, 2018). They must also be reasonable and feasible, proportionate to the level of predicted impact and directed towards reducing the relevant noise and/or air quality impacts of the development. The Applicant must also be responsible for the reasonable costs of ongoing maintenance of these additional mitigation measures until the cessation of mining operations.

Table 12: Land subject to additional mitigation upon request

Mitigation Basis	Land
Noise	R003, R025

^a The locations of the land referred to in Table 12 is shown in Appendix 1.

- C3. If within 3 months of receiving this request from the owner, the Applicant and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

A.2 Wambo Rail Spur Development Content

TABLE 2 – SPECIAL ENVIRONMENTAL CONDITIONS

NOISE

Noise Operating Conditions

- B1. The Applicant must:
- (a) take all reasonable steps to minimise all noise associated with the development, including during noise-enhancing meteorological conditions;
 - (b) operate a noise management system commensurate with the risk of impact to ensure compliance with the relevant conditions of this consent;
 - (c) only use locomotives and rolling stock that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL and use reasonable endeavours to ensure that rolling stock is selected to minimise noise;
 - (d) use all reasonable efforts to co-ordinate noise management on the site with the noise management at Wambo mine; and
 - (e) carry out regular attended noise monitoring to determine whether the development is complying with the relevant conditions of this consent.

ACQUISITION UPON REQUEST

- C1. Upon receiving a written request for acquisition from the owner of the privately-owned land^a listed in Table 3, the Applicant must acquire the land in accordance with the procedures in conditions C3 to C10, inclusive.

Table 3: Land subject to acquisition upon request

R019

^a The location of the land referred to in Table 3 is shown on the figure in Appendix 3.

A.3 Environmental Protection Licence 529

L5 Noise limits

L5.1 Noise generated at the premises must not exceed the noise limits presented in the table below. The noise limits in the table below represent the noise contribution from the premises.

Receiver Land Number	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LA1(1 minute)
EPA Point 20 in NMG1	40	40	40	50
EPA Point 21 in NMG2	40	40	40	50
EPA Point 22 in NMG3	40	40	40	50
EPA Point 23 in NMG4	38	38	38	50
Residence 019	59	59	59	
Residence 003 and 025 in NMG3	40	40	40	50
Residence 016 and 039 in NMG1	40	40	40	50
Residence 029, 042 and 345 in NMG4	40	40	40	50
Residence 033 and 320 in NMG2	40	40	40	50
Residence 006 and 007 in NMG3	39	39	39	50
Residence 048 and 343	39	39	39	50
Residence 017 in NMG1	38	38	38	50
Residence 030, 035, 049, 075 and 379	38	38	38	50
Residence 346 and 348 in NMG4	38	38	38	50
Residence 344 in NMG2	37	37	37	50
Residence 043, 163, 380 and 381	37	37	37	50
All other privately owned residences in Appendix 4 of DA 305-7-2003 29 August 2019	35	35	35	50

- L5.2 Limits and Residences referenced in condition L5.1 are from Appendix 4 and Table 3 - Phase 1 in DA 305-7-2003 dated 29 August 2019 (EPA Reference DOC19/1117963).
- L5.3 Noise monitoring groups (NMG) referenced in Condition 5.1 are from the document titled "Wambo Coal Mine Noise Monitoring Groups Noise Modelling Evaluation" Global Acoustics dated 16 August 2019, EPA Reference DOC19/704212.
- L5.4 For the purpose of Condition L5.1:
- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
 - Evening is defined as the period from 6pm to 10pm; and
 - Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.
- L5.5 The noise limits set out in condition L5.1 apply under all meteorological conditions except for the following:
- Wind speeds greater than 3 metres/second at 10 metres above the ground level;
 - Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
 - Stability category G temperature inversion conditions.
- L5.6 For the purposes of condition L5.5:
- Data recorded by the closest and most representative meteorological station installed on the premises at EPA Identification Point 17 must be used to determine meteorological conditions; and
 - Temperature inversion conditions (stability category) are to be determined by the methods referred to in Fact Sheet D of the Noise Policy for Industry (2017).

POINT 20,21,22,23

Assessment period	Minimum frequency in a reporting period	Minimum duration within assessment period	Minimum number of assessment period
Night	Monthly	15 minutes	1 operation day

- M9.2 To assess compliance with condition L5.1, attended noise monitoring must be undertaken in accordance with Conditions L5.4 to L5.6:
- at the EPA points 20,21,22 and 23 identified in P1.3;
 - occur every calendar month in a reporting period; and
 - occur during one night time period as defined in the Noise Policy for Industry 2017 for a minimum of 15 minutes at each location from a), and when relevant b) during the night.
- M9.3 For the purposes of compliance monitoring and determining the noise generated at the premises the modification factors in the EPA's Fact Sheet C of the Noise Policy for Industry (2017) must be applied, as appropriate, to the noise levels measured by noise monitoring equipment.

Definitions

Noise refers to 'sound pressure levels' for the purpose of conditions L5.1 to L5.6 and condition M10.

5.0 Noise Monitoring Program

5.1 Attended Noise Monitoring

WCPL attended noise monitoring is carried out monthly. The monitoring is conducted by a WCPL appointed acoustic specialist who measures and describes the acoustic environment at each attended monitoring location. The attended noise monitoring results are compared with noise impact assessment criteria (as defined in Section 3.1) to assess compliance. Attended noise monitoring is considered the preferred method for determining compliance with prescribed limits because it allows for an accurate determination of the contribution, if any, made by industrial noise sources to measured ambient noise levels.

Operator attended noise measurements are conducted during night period³ operations to quantify noise emissions from WCPL as well as the overall level of ambient noise.

Noise levels (LA_{max} and LA_{eq}) from the Mine are quantified over a 15 minute measurement period. In addition, the overall levels of ambient noise (i.e. LA_{max} , LA_{1s} , LA_{10} , LA_{50} , LA_{90} , and LA_{eq}) over the 15 minute period will be quantified and characterised.

Attended noise monitoring will be conducted at a representative location in accordance with the NPfI and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'.

Attended noise monitoring is undertaken at five locations as shown in Table 5. The attended noise monitoring network locations have been strategically chosen to provide sufficiently appropriate noise monitoring coverage (refer to Figure 5).

Table 5: Attended Noise Monitoring Locations

Noise Assessment Area*	Site Ref	EPL529 ID	Description	Approximate Co-ordinates (MGA 94, z56)		Representative Addresses
				Easting	Northing	
1	N01	N/A	North Bulga	313352	6388696	3, 7, 379
2	N21	22	South Wambo	310586	6390149	25, 35a
-	N16	20	Jerrys Plains Road	308000	6399785	Privately owned residences near Jerry's Plains
-	N20A	21	Redmanvale Road Central	304666	6399100	Privately owned residences near Jerry's Plains
-	N26	23	Redmanvale Road South	304172	6398160	Privately owned residences near Jerry's Plains

Notes for Table 5

* The Noise Assessment Areas are shown on Figure 5

³In general, weather enhancing conditions are more likely to occur at night which has the greatest potential to cause an exceedance. This approach is consistent with the NSW Draft Guidelines: Mining Noise Monitoring Application Note. However WCPL will review the data in accordance with this Noise Management Plan to determine if there are compelling reasons to revert back to day time attended monitoring. Please note that evening and night time noise level criteria are the same.

Measurement of rail pass-by noise levels was removed from the monitoring program in Version 5 of the NMP, following a demonstrated history of compliance. Monitoring will be recommenced if triggered by complaint or change in rolling stock used to transport coal from WCPL.

Meteorological data from the WCPL meteorological station will be utilised to correlate atmospheric parameters and measured noise levels. Ground level atmospheric condition measurement is also undertaken during attended monitoring. Noise criteria only apply in meteorological conditions specified in the conditions. A detailed Compliance Assessment Methodology has been developed to determine the individual noise contributions of the separate United Wambo and Wambo operations (Section 6.1).

Modifying factors will be assessed in accordance with the NPfI.

Appendix B

Calibration certificates

B.1 Calibration Certificates



Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number **C22373**

Client Details	EMM Consulting Suite 6, Level 1, 146 Hunter Street Newcastle NSW 2300
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	01070590
Microphone Serial Number :	08184
Pre-amplifier Serial Number :	52329
Pre-Test Atmospheric Conditions	Post-Test Atmospheric Conditions
Ambient Temperature : 25.7°C	Ambient Temperature : 25.4°C
Relative Humidity : 31.9%	Relative Humidity : 32.4%
Barometric Pressure : 100.18kPa	Barometric Pressure : 100.11kPa
Calibration Technician : Lucky Jaiswal	Secondary Check: Max Moore
Calibration Date : 9 Jun 2022	Report Issue Date : 20 Jun 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	Pass
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 1 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 -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13dB	Temperature	±0.1°C
1kHz	±0.13dB	Relative Humidity	±1.9%
8kHz	±0.14dB	Barometric Pressure	±0.014kPa
Electrical Tests	±0.13dB		

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.



**Acoustic
Research
Labs Pty Ltd**

Unit 36/14 Loyalty Rd
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 C20674

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	00370304
Microphone Serial Number :	10421
Pre-amplifier Serial Number :	60313
Pre-Test Atmospheric Conditions	Post-Test Atmospheric Conditions
Ambient Temperature : 22°C	Ambient Temperature : 21.9°C
Relative Humidity : 50.6%	Relative Humidity : 50.1%
Barometric Pressure : 100.08kPa	Barometric Pressure : 100.09kPa
Calibration Technician : Lucky Jaiswal	Secondary Check: Max Moore
Calibration Date : 24 Nov 2020	Report Issue Date : 25 Nov 2020
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	Pass
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 1 periodic tests of IEC 61672-3:2013, 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 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Least Uncertainties of Measurement - Environmental Conditions			
Acoustic Tests		Temperature	±0.2°C
125Hz	±0.12dB	Relative Humidity	±2.4%
1kHz	±0.11dB	Barometric Pressure	±0.015kPa
8kHz	±0.13dB		
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.



**Acoustic
Research
Labs Pty Ltd**

Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

**Sound Calibrator
IEC 60942:2017**

Calibration Certificate

Calibration Number C22374

Client Details	EMM Consulting Suite 6, Level 1, 146 Hunter Street Newcastle NSW 2300		
Equipment Tested/ Model Number :	Pulsar Model 106		
Instrument Serial Number :	74813		
Atmospheric Conditions			
Ambient Temperature :	25.8°C		
Relative Humidity :	33.6%		
Barometric Pressure :	100.19kPa		
Calibration Technician :	Lucky Jaiswal	Secondary Check:	Max Moore
Calibration Date :	09 Jun 2022	Report Issue Date :	20 Jun 2022
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	94.09	1000.30

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.

Uncertainties of Measurement -			
Specific Tests	Environmental Conditions		
Generated SPL	±0.10dB	Temperature	±0.1°C
Frequency	±0.13%	Relative Humidity	±1.9%
Distortion	±0.20%	Barometric Pressure	±0.014kPa

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



**Acoustic
Research
Labs** Pty Ltd

Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C21832

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

Equipment Tested/ Model Number : Pulsar Model 105
Instrument Serial Number : 81334

Atmospheric Conditions

Ambient Temperature : 25°C
Relative Humidity : 49.6%
Barometric Pressure : 100.8kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 29 Nov 2021
Secondary Check: Harrison Kim
Report Issue Date : 2 Dec 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	94.19	1000.30

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	Uncertainties of Measurement -	
	Environmental Conditions	
Generated SPL	±0.11dB	Temperature ±0.1°C
Frequency	±0.07%	Relative Humidity ±1.9%
Distortion	±0.50%	Barometric Pressure ±0.014kPa

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.

Australia

SYDNEY

Ground floor 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE

Level 3 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE

Level 1 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

CANBERRA

Level 2 Suite 2.04
15 London Circuit
Canberra City ACT 2601

ADELAIDE

Level 4 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE

Suite 8.03 Level 8 454 Collins
Street
Melbourne VIC 3000
T 03 9993 1900

PERTH

Suite 9.02 Level 9 109 St
Georges Terrace
Perth WA 6000

Canada

TORONTO

2345 Young Street Suite 300
Toronto ON M4P 2E5

VANCOUVER

60 W 6th Ave Suite 200
Vancouver BC V5Y 1K1



[linkedin.com/company/emm-consulting-pty-limited](https://www.linkedin.com/company/emm-consulting-pty-limited)



emmconsulting.com.au