

Wilpinjong Coal Mine

Environmental noise monitoring

Prepared for Wilpinjong Coal Pty Ltd

August 2024

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E231296 RP8

August 2024

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28 August 2024

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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP, the site), an open cut coal mine near Wollar NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the night period of 19 August 2024 at six monitoring locations.

1.2 Attended monitoring locations

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

Table 1.1 Attended noise monitoring locations

Location ID	Description	Coordinates (MGA 55)	
		Easting	Northing
N6	St Laurence O’Toole Catholic Church representative of Wollar Village south	777300	6415717
N14	‘Tichular’ intersection of Tichular and Barigan Roads, Tichular	778792	6408625
N15	Track off Barigan Street near Wollar Public School, Wollar Village	777452	6416159
N17	Mogo Road, off Araluen Road, Wollar	780771	6420641
N19	North Mogo Road, Mogo	782645	6424151
N20	Ringwood Road, off Wollar Road, Wollar	785964	6419051

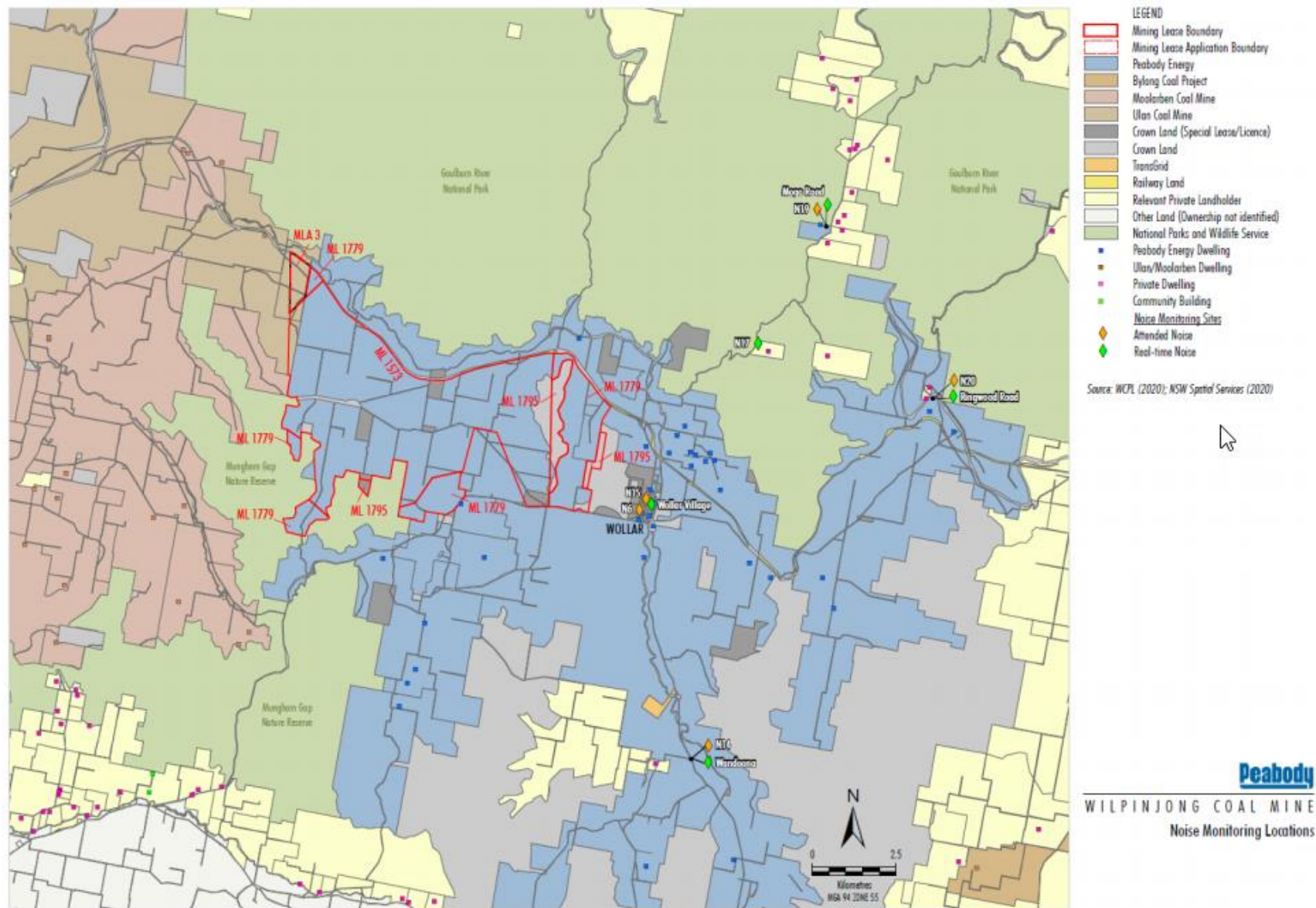


Figure 1.1 Attended noise monitoring locations

1.3 Terminology and 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

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1% of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1% of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10% of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50% of the time, also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90% of the time, also referred to as the “background” noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy 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.
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	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

The most current development consent associated with activities at WCP is the 'Wilpinjong Extension Project SSD-6764' (April 2017), which covers all current operations and has replaced the previous consent (05-0021). Relevant sections of the consent are reproduced in Appendix B.1.

2.2 Environment protection licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently in March 2023. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version (Version 8) of the NMP was approved in January 2023. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise impact limits based on both the consent and EPL are as shown in Table 2.1.

Table 2.1 Noise impact limits, dB

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
N6 ¹	36	37	37	45
N14	35	35	35	45
N15	36	37	37	45
N17 ²	36	36	38	45
N19	35	35	35	45
N20	35	35	35	45

Notes:

1. N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the consent, as the church is no longer a place of worship.
2. N17 noise limits have been determined based on the assumption that N17 is property 102 in accordance with Appendix 5 Figure 1 of Development Consent SSD-6764.

2.5 Meteorological conditions

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

As detailed in the WCP consent and NMP, noise criteria apply under all meteorological conditions except the following:

- wind speeds greater than 3m/s at 10m above ground level;
- stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or
- stability category G temperature inversion conditions.

2.6 Additional requirements

Monitoring and reporting have been done in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022. 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 have been undertaken in accordance with Fact Sheet C of the NPfI.

Condition 6 in Appendix 6 of the development consent details specific methodology for assessment of low-frequency noise, which is consistent with methodology in Fact Sheet C of the NPfI. Low frequency modifying factors have been assessed in accordance with both the development consent and NPfI.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done 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 WCP automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured site noise levels.

3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the night period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site's contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15\text{minute}}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods such as to move closer and back calculate. Cases may include 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.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate of may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1\text{minute}}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1\text{minute}}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site-only L_{Aeq} .

Low-frequency modifying factor penalties have only been applied to site-only L_{Aeq} if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

The NPfI reference curve has been added to the graphs in Section 5 to provide site noise level context. The reference curve has been converted from dB(Z) to dB(A), as shown in Table 3.1, so that it can be compared to the A-weighted graphs in Section 5.

Table 3.1 NPfI reference curve adjusted for A-weighting, dB

Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
NPfI Reference (Z)	92	89	86	77	69	61	54	50	50	48	48	46	44
NPfI Reference (A)	22	26	29	27	24	22	19	20	24	26	29	30	31

3.4 Instrumentation and personnel

Attended noise monitoring was conducted by Will Moore. Qualifications, experience, and/or demonstration of competence in accordance with the Approved Methods is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.2. Calibration certificates are provided in Appendix C.

Table 3.2 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA-28 sound level meter	00701424	01/06/2025	IEC 61672-1:2002
Pulsar 105 acoustic calibrator	78226	26/02/2026	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Total noise levels measured during each attended 15-minute measurement 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 Total measured noise levels, dB – August 2024 ¹

Location	Start date and time	L _{Amax}	L _{A1}	L _{A10}	L _{Aeq}	L _{A50}	L _{A90}	L _{Amin}
N6	19/08/2024 22:47	48	41	39	37	36	34	32
N14	19/08/2024 23:45	56	53	52	50	49	47	42
N15	19/08/2024 23:15	55	53	48	42	33	31	29
N17	19/08/2024 22:22	51	29	24	23	21	20	18
N19	19/08/2024 22:00	45	29	26	24	24	22	20
N20	20/08/2024 00:15	51	48	46	43	41	39	34

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

Low-frequency linear spectra measured from all sources during each attended 15-minute measurement are shown in Table 4.2. If low-frequency noise levels from site triggered a modifying factor, additional analysis is provided in Section 4.2 of this report.

Table 4.2 Measured low-frequency L_{eq} noise levels, dB(Z) - August 2024 ¹

Location	Start date and time	Frequency (Hz)											
		12.5	16	20	25	31.5	40	50	63	80	100	125	160
N6	19/08/2024 22:47	-	47	42	43	35	36	35	36	37	35	33	29
N14	19/08/2024 23:45	-	47	43	43	42	41	45	39	39	39	34	30
N15	19/08/2024 23:15	54	50	57	55	57	51	49	48	44	42	42	43
N17	19/08/2024 22:22	-	-	-	38	33	30	27	24	24	23	21	17
N19	19/08/2024 22:00	-	-	-	37	32	30	28	27	25	20	17	15
N20	20/08/2024 00:15	-	-	41	41	34	34	33	31	31	30	27	22

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

2. "-" indicates noise levels were too low to be measured by the sound level meter.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.3. The wind speed, direction, and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

Table 4.3 **Measured atmospheric conditions – August 2024**

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction ° Magnetic north ¹	Cloud cover 1/8s
N6	19/08/2024 22:47	7	0.8	270	1
N14	19/08/2024 23:45	9	<0.5	-	0
N15	19/08/2024 23:15	10	<0.5	-	1
N17	19/08/2024 22:22	12	<0.5	-	1
N19	19/08/2024 22:00	12	<0.5	-	0
N20	20/08/2024 00:15	6	1.0	260	2

Notes: 1. “-” indicates calm conditions at monitoring location.

4.2 Site only noise levels

4.2.1 Modifying factors

Measured site-only levels were assessed for the application of modifying factors in accordance with the NPfl and methodology described in Section 3.3. There were no modifying factors applicable during the survey. Mining noise was analysed and did not satisfy requirements for tonal, intermittent, or low frequency modifying factors, as defined in the NPfl.

4.2.2 Monitoring results

Table 4.4 provides site noise level levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

Table 4.4 Site noise levels and limits – August 2024

Location	Start date and time	Wind		Stability class	Limits apply? ¹	Site limits, dB		Site levels, dB		Exceedances, dB	
		Speed m/s	Direction ⁴			L _{Aeq,15minute}	L _{A1,1minute}	L _{Aeq,15minute} ²	L _{A1,1minute}	L _{Aeq,15minute}	L _{A1,1minute}
N6	19/08/2024 22:47	0.9	89	E	Yes	37	45	IA	IA	Nil	Nil
N14	19/08/2024 23:45	0.0	-	F	Yes	35	45	<30	<30	Nil	Nil
N15	19/08/2024 23:15	0.0	-	E	Yes	37	45	IA	IA	Nil	Nil
N17	19/08/2024 22:22	1.1	42	E	Yes	38	45	<20	<20	Nil	Nil
N19	19/08/2024 22:00	0.9	37	E	Yes	35	45	IA	IA	Nil	Nil
N20	20/08/2024 00:15	0.7	43	F	Yes	35	45	IA	IA	Nil	Nil

- Notes:
1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 0.
 2. Site-only L_{Aeq,15minute}, includes modifying factor penalties if applicable.
 3. N/A in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in consent.
 4. Degrees magnetic north, “-” indicates calm conditions.

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 and provided in this section. Statistical 1/3 octave-band analysis of environmental noise was done and the following figures display frequency ranges of various noise sources at each location for L_{A1} , L_{A10} , L_{Aeq} , L_{A50} , and L_{A90} descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1,000 Hz, while industrial noise is observed at frequencies less than 1,000 Hz.

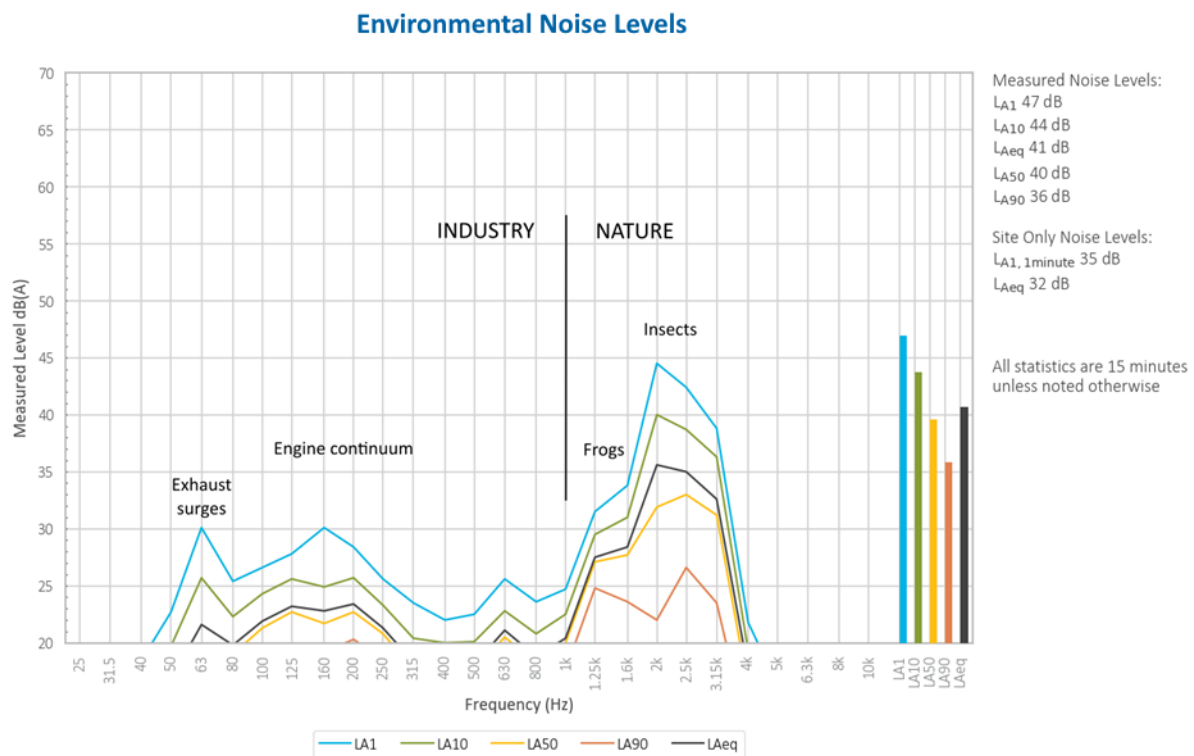


Figure 5.1 Example graph (refer to Section 5.1 for explanatory note)

5.2 N6

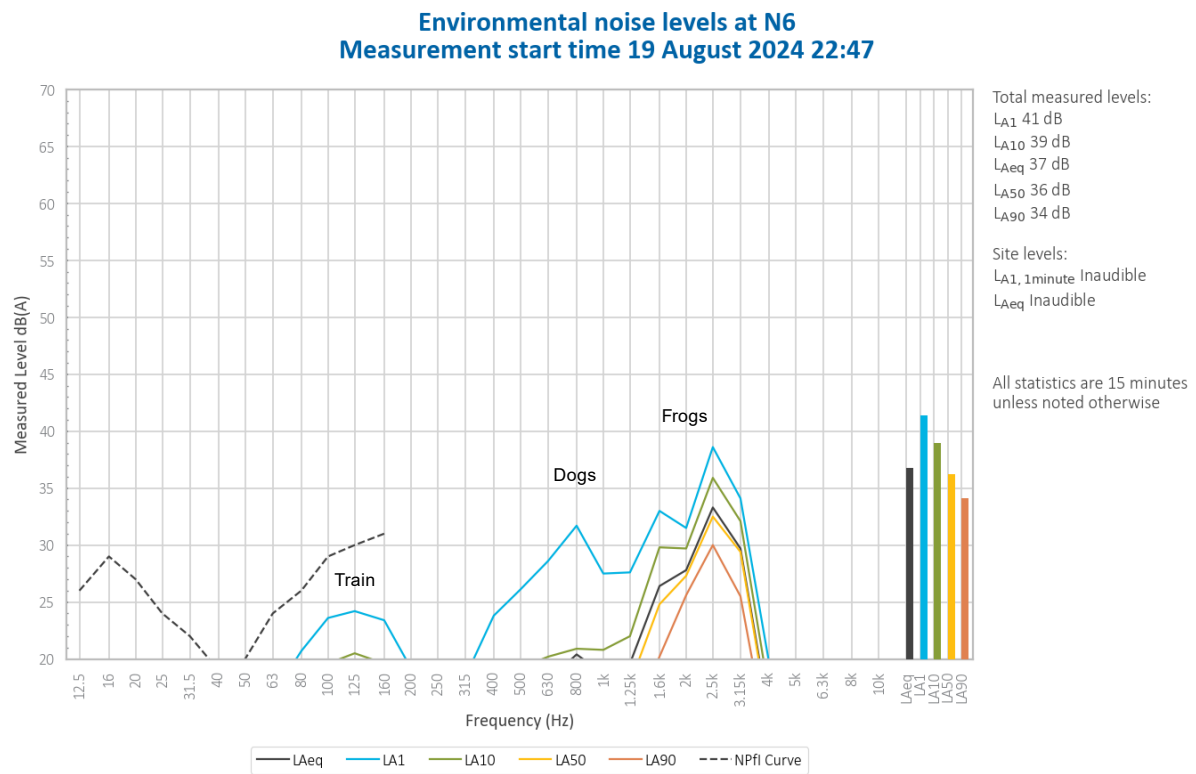


Figure 5.2 Environmental noise levels N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was inaudible during the measurement.

Frogs generated total measured levels.

Noise from dogs, livestock and a train were also noted.

5.3 N14

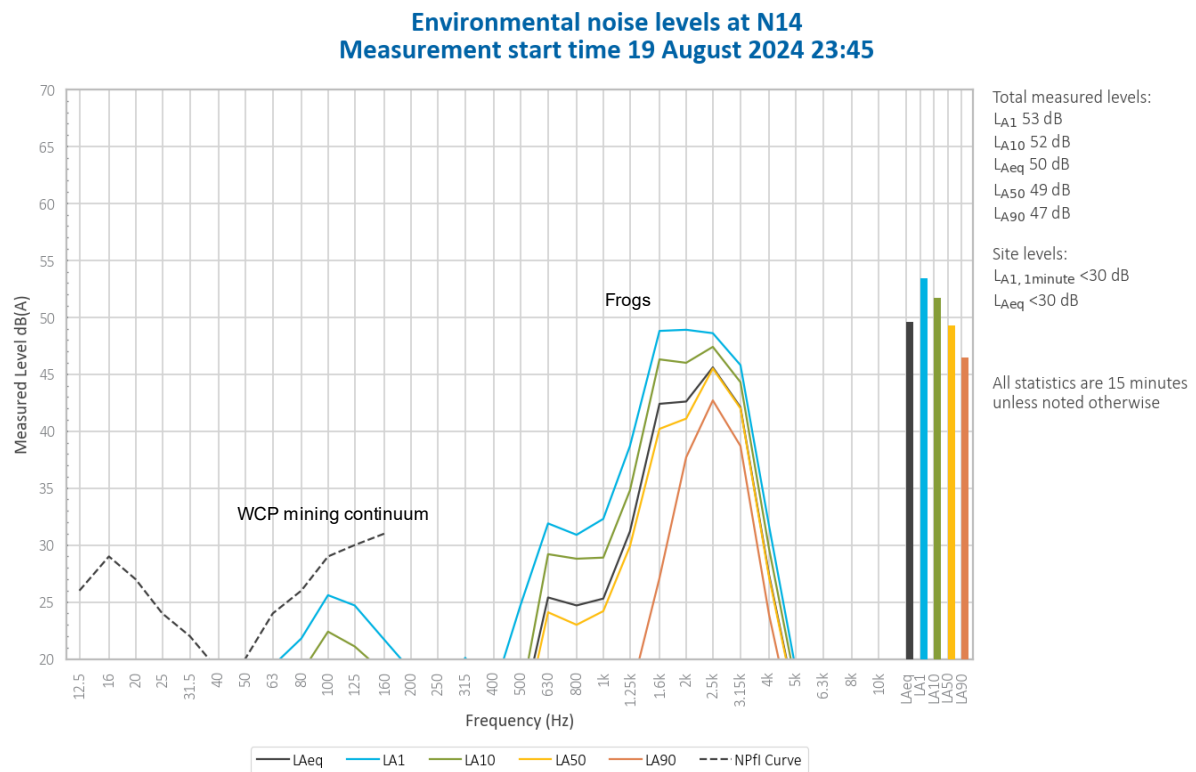


Figure 5.3 Environmental noise levels N14, 'Tichular', intersection of Tichular and Barigan Roads

A mining continuum from WCP was audible throughout the measurement, generating a site only L_{Aeq} and $L_{A1, 1\text{minute}}$ of less than 30 dB.

Frogs generated total measured levels.

5.4 N15

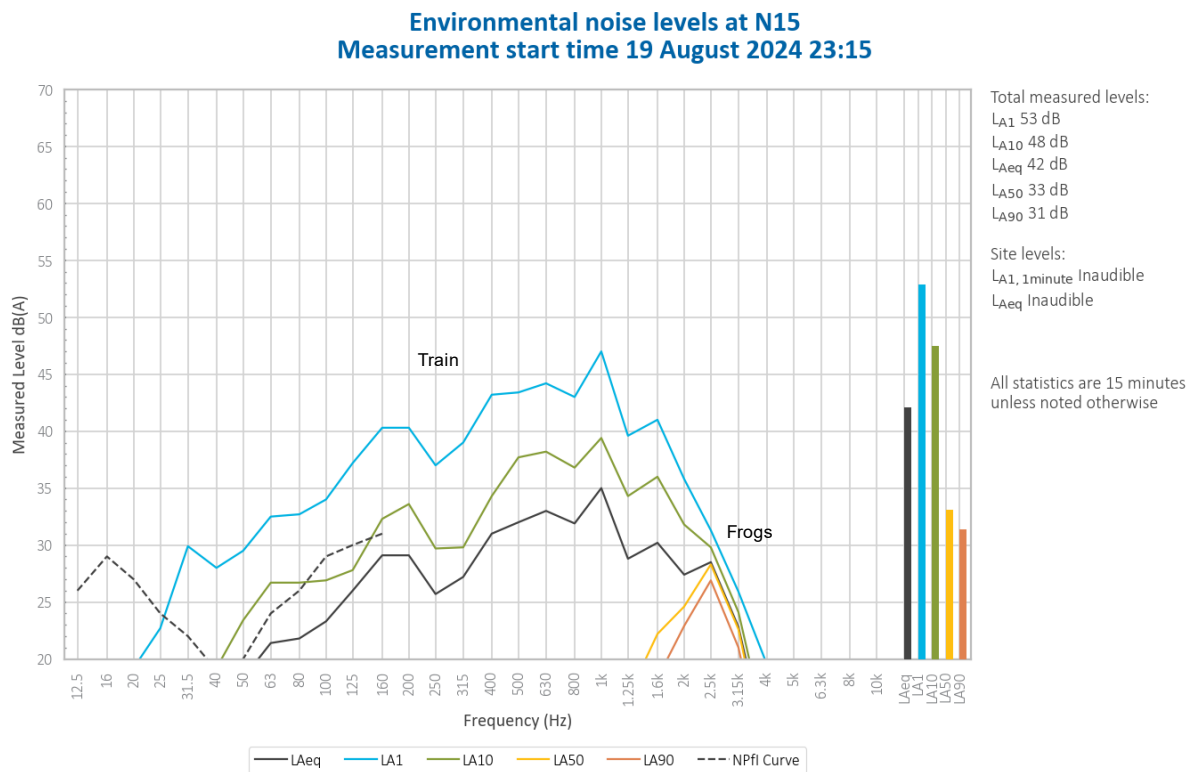


Figure 5.4 Environmental noise levels N15, track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible during the measurement.

A train generated the measured L_{A1} , L_{A10} and L_{Aeq} . Frogs generated the measured L_{A50} and L_{A90} .

Noise from road traffic was also noted.

5.5 N17

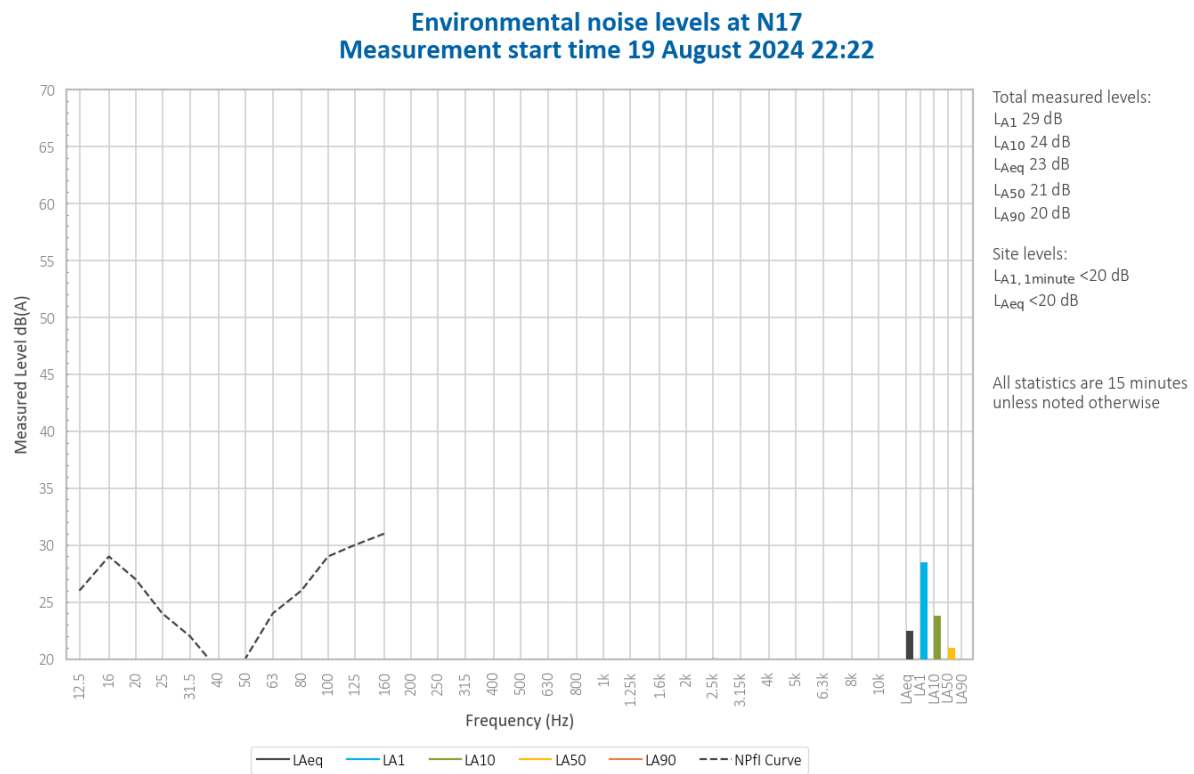


Figure 5.5 Environmental noise levels N17, Mogo Road (1)

A mining continuum from WCP was audible throughout the measurement, generating a site only L_{Aeq} and $L_{A1,1minute}$ of less than 20 dB.

Frogs generated total measured levels. Continuum from WCP contributed to the measured L_{A50} and L_{A90} .

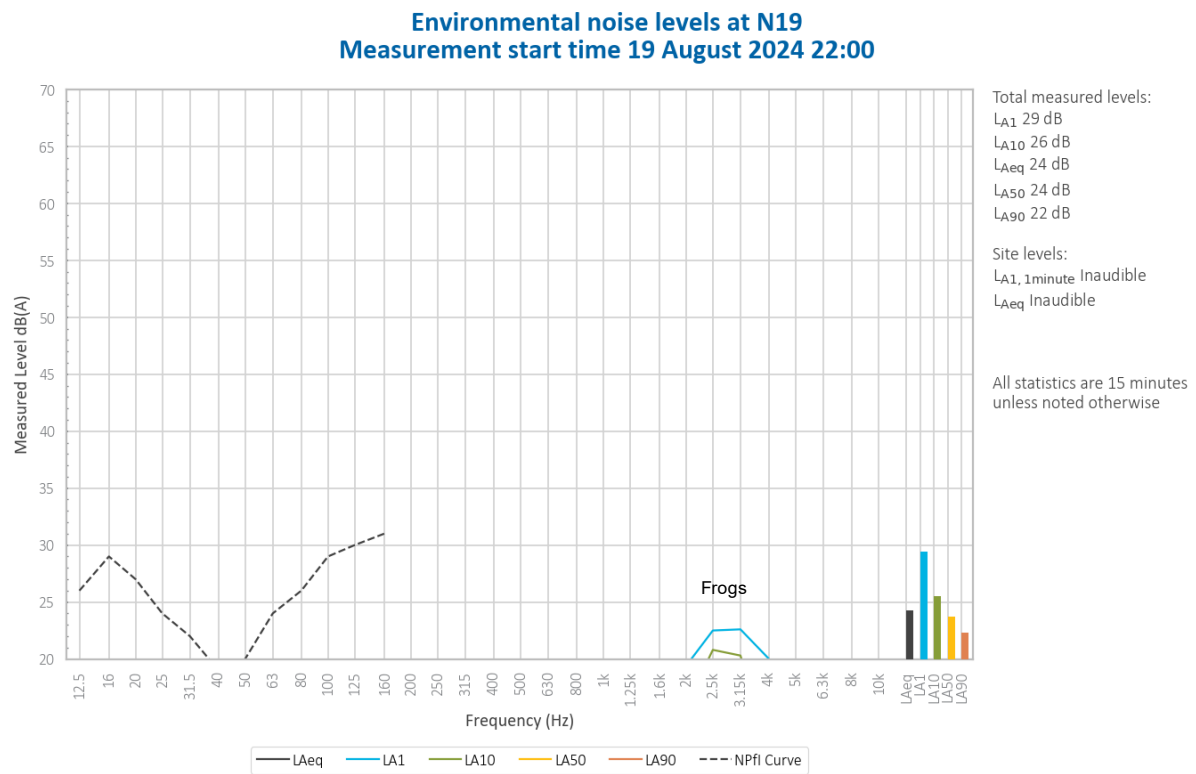


Figure 5.6 Environmental noise levels N19, Mogo Road (2)

WCP was inaudible during the measurement.

Frogs generated total measured levels.

Noise from an aeroplane was also noted at low levels.

5.7 N20

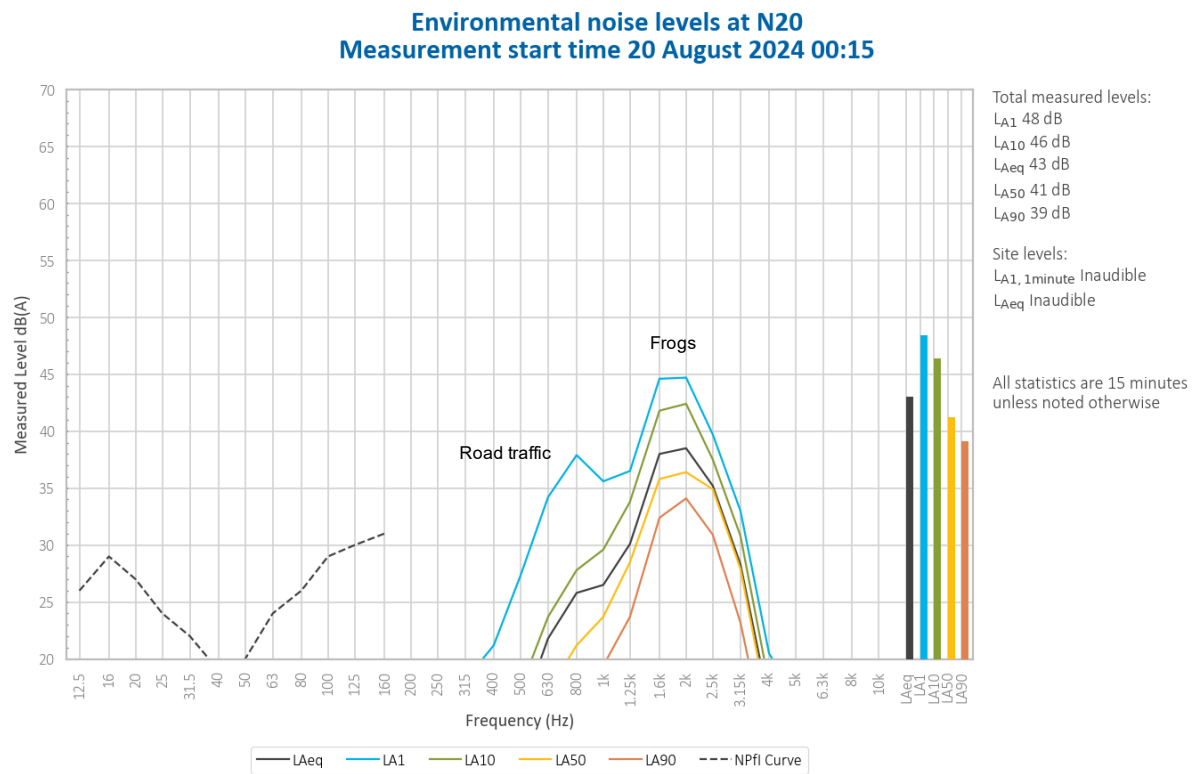


Figure 5.7 Environmental noise levels N20, Ringwood Road

WCP was inaudible during the measurement.

Frogs generated total measured levels.

Noise from road traffic was also noted.

6 Summary

EMM was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits from the relevant EPL and consent.

Attended environmental noise monitoring described in this report was done during the night period of 19 August 2024 at six monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the August 2024 survey.

Appendix A

Noise perception and examples

A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
Up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or quarter) as loud

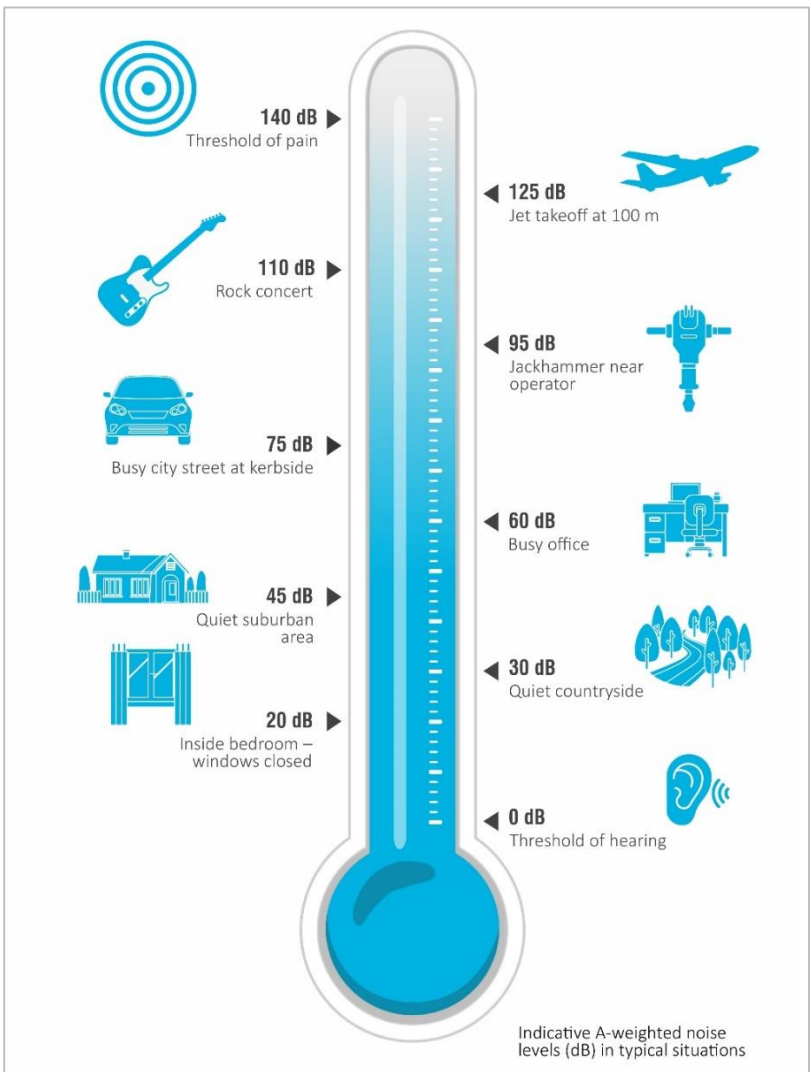


Figure A.1 Common noise levels

Appendix B

Regulator documents

B.1 Development consent

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Applicant 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
102, 903, 908, 933, and 959

Note: To interpret the land referred to in Table 1, see the applicable figures in Appendix 5.

MITIGATION UPON REQUEST

2. Upon receiving a written request from the owner of any residence on the land listed in Table 2, the Applicant must implement additional noise mitigation measures at or in the immediate 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*. They must also be reasonable and feasible and proportionate with the level of predicted impact.

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 Secretary for resolution.

Table 2: Land subject to additional mitigation upon request

Mitigation Basis	Residence
Noise	102, 903, 908 and 933

Note: To interpret the land referred to in Table 2, see the applicable figures in Appendix 5.

NOISE

Noise Criteria

3. The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 3 at any residence on privately-owned land or at the other specified locations.

Table 3: Noise criteria dB(A)

Location	Day	Evening	Night	
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)
102	36	36	38	45
Wollar Village – Residential	36	37	37	45
All other privately owned land	35	35	35	45
901 – Wollar School	35 (internal) 45 (external) When in use			-
150A – St Luke's Anglican Church 900 – St Laurence O'Toole Catholic Church	40 (internal) When in use			-

Note: To interpret the locations referred to in Table 3, see the applicable figures in Appendix 5.

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy* (as may be updated from time to time). Appendix 6 sets out the meteorological conditions under which these criteria apply along with any modifications to the *NSW Industrial Noise Policy* and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Applicant has an agreement with the owner/s of the relevant residence of land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

APPENDIX 6 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 3 of schedule 3 are to apply under all meteorological conditions except the following:
 - (a) wind speeds greater than 3 m/s at 10 m above ground level; or
 - (b) stability category F temperature inversions and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) stability category G temperature inversion conditions.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located on the site.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.
4. This monitoring must be carried out at least 12 times a year, unless the Secretary directs otherwise.
5. Unless otherwise agreed with the Secretary, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
 - (a) monitoring locations for the collection of representative noise data;
 - (b) meteorological conditions during which collection of noise data is not appropriate;
 - (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
 - (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.
6. The assessment of excessive levels of low frequency noise generated by the mine shall be as follows: Measure/assess C- and A-weighted Leq,T levels over same time period. Where the C minus A level is 15dB or more and:
 - where any of the 1/3 octave noise levels in Table 6-1 are exceeded by up to 5dB 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 1/3 octave noise levels in Table 6-1 are exceeded by more than 5dB and cannot be mitigated, a 5 dB(A) positive adjustment to measured/predicted A weighted levels applies for the evening/night period and a 2dB positive adjustment applies for the daytime period.

Table 6-1: One-third octave low frequency noise thresholds

Hz/dB(Z)	One-third octave $L_{Zeq,15minute}$ 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

B.2 Environmental protection licence

L5 Noise limits

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

locations referred to in the table below are indicated in Appendix 5 - Figures 1 and 2 of Development Consent number SSD-6764 dated 24 April 2017.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village - residential	36	37	37	45
All other privately owned land	35	35	35	45
102	36	36	38	45
Wollar school	35 (internal), 45 (external) when in use			
St Luke's Anglican Church & St Laurence O'Toole Catholic Church	40 (internal) when in use			

Note: The above noise limits do not apply at properties where the licensee has a written agreement with the landowner to exceed the noise limits.

L5.2 For the purpose of condition L5.1;

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays.
- Evening is defined as the period 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and Public Holidays.

L5.3 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 ground level; or
- Stability category F temperature inversions and wind speeds greater than 2m/s at 10m above ground level; or
- Stability category G temperature inversion conditions.

L5.4 For the purpose of condition L5.3:

- The meteorological data to be used for determining meteorological conditions is the data recorded by the meteorological weather station identified as EPA identification Point 21 in condition P1.1; and
- 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.

L5.5 To determine compliance:

a) With the Leq(15 minute) noise limits in condition L5.1, 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 L5.1, the noise measurement equipment must be located within 1 metre of a dwelling façade.

c) With the noise limits in condition L5.1, 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 L5.5(a) or L5.5(b).

L5.6 A non-compliance of condition L5.1 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 conditions L5.5(a) and L5.5(b); and/or
- b) at a point other than the most affected point at a location.

L5.7 For the purpose 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.

6 Noise Monitoring Program

WCPL utilise a combination of operator-attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria from Development Consent (SSD-6467). Operator-attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 6**. Unattended real-time noise monitoring is primarily utilised as a proactive noise control system; providing noise alerts when predetermined noise levels are triggered so mining operations can be modified where noise levels are influenced by noise from the Project.

6.1 Monitoring Locations

Operator-attended noise monitoring locations have been chosen considering the following criteria:

- In any given direction, the site is as close as reasonably practical to the nearest Private Receiver;
- There is no closer Private Receiver that is not monitored;
- The site is unlikely to cause concern to any person residing on nearby private property; and
- The site can be safely accessed by the persons carrying out the noise monitoring.

WCPL will undertake operator-attended noise monitoring as identified in **Table 7** (**Figure 3** and **Figure 4**). Real-time noise monitoring units are relocated from time to time, to assist with additional targeted noise monitoring and in response to community complaints. Real-time noise monitoring locations will be reviewed and modified as necessary in response to monitoring results, changes to the operation, or as a result of community consultation.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 7** with consideration to the above criteria. WCPL will update this NMP, in consultation with DPE and the EPA.

Table 7 Noise Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
Tichular	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
Wollar Village	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
Mogo Rd	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
Mogo Rd	N19	Operator-attended Noise	782644.5	6424151.1	Location based on the nearest and residential community structure to the North-East of the Mine
Ringwood Road	N20	Operator-attended Noise	785964.2	6419050.6	Location based near to community residence in discussions with DPE and EPA on the 23 May 2017 to the East of the Mine.
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions

Location	Site	Type	Easting ¹	Northing ¹	Justification
Wollar Village ³	-	Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine N15 operator-attended Noise Monitoring (validation of real-time noise monitoring)
Mogo Rd ³	-	Real-Time Noise - Fixed	782644.5	6424151.1	Location based on the nearest non-mine owned residence to the East of the Mine N19 operator-attended Noise Monitoring (validation of real-time noise monitoring)
Ringwood Road	-	Real-Time Noise - Fixed	785964.2	6419050.6	Location based near to community residence in discussions with DPE and EPA on the 23 May 2017 to the East of the Mine. N20 operator-attended Noise Monitoring (validation of real-time noise monitoring)
Tichular ³	-	Real-Time Noise - Mobile	778791.9	6408624.7	Location based on recommendations from noise specialist (Global Acoustics) review of this NMP (Version 4). N14 operator-attended Noise Monitoring (validation of real-time noise monitoring)

Notes:

1. MGA94, Zone 55
2. Monitoring will be undertaken at this location until it can be demonstrated that the noise contribution from the Mine is negligible. At this point, WCPL will notify DPE and EPA of the results of this monitoring and advise if and when the monitoring at this location will be scaled back or discontinued. The real-time noise monitor at Tichular may be relocated in response to a complaint or identified noise issue at another location.
3. Where continuous monitors are located at compliance locations (e.g. privately-owned receivers), WCPL will conduct a review of the identification/characterisation of mine-related noise by the real-time monitoring system at that location by comparing against observed mine-related noise identified during operator-attended monitoring (i.e. validate the identification of mine related noise and filtering of extraneous noise sources by the real-time system). Refer to **Section 6.5**.

6.2 Meteorological Monitoring

WCPL maintains a continuous on-site meteorological monitoring station that complies with the requirements of the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (DEC, 2007). The location of this meteorological monitoring station is shown on **Figure 3**.

WCPL's meteorological monitoring station is capable of continuous real-time measurement of temperature lapse rate in accordance with the INP (EPA, 2000).

The meteorological station is routinely calibrated by appropriately accredited technicians. The following parameters are monitored:

- a) Rainfall;
- b) Relative humidity;
- c) Temperature – measured at 2, 10 and 60 m above ground level;
- d) Wind speed – horizontal and vertical;
- e) Wind direction – measured at 10 m above ground level;
- f) Sigma theta;
- g) Pasquill stability classification;
- h) Solar radiation; and
- i) Temperature lapse rate.

Meteorological forecasting will be undertaken as specified in **Section 5.4**.

As required by EPL12425, when the meteorological station is unavailable for a period of time greater than 48 hours, WCPL must notify the EPA and state what alternative weather monitoring arrangements will be put in place until the return to service of the meteorological station.

6.3 Operator-attended Noise Monitoring

6.3.1 Purpose

Operator-attended noise monitoring will be used to evaluate compliance against the Noise Criteria detailed in **Table 6**.

6.3.2 Summary

Operator-attended noise will be undertaken in accordance with **Table 8**.

Table 8 Operator-attended Noise Monitoring Summary

Element	Description
Locations	- As per Table 7, Figure 3 and Figure 4
Period	Night-time period (10 pm to 7 am) being the most sensitive time period for noise.
Frequency	12 times per year¹ (i.e. one night per month); plus 12 times per year¹ (i.e. one night per month) at locations as identified in Table 7 to validate real-time noise monitoring data (Section 6.5).

Notes: ¹ Monitoring frequency at Mogo Road (N19) and Ringwood Road (N20) will remain at the frequency identified in **Table 8** during the commencement of operations in Pit 8. A review of the monitoring frequency at N19 and N20 will be undertaken during subsequent reviews of this NMP in consultation with WCPL's noise specialist and relevant government agencies.

6.3.3 Methodology

Operator-attended noise monitoring will be undertaken as outlined in **Table 8** by an independent acoustic consultant and guided by the requirements of the INP (EPA, 2000) and *AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'*. Routine operator-attended noise monitoring will be undertaken during night-time periods (10 pm - 7 am).

If any of the Noise Criteria are exceeded, a second measurement will be taken at the same location within 75 minutes of the first measurement. If the second measurement does not exceed the Noise Criteria, as defined in **Table 6**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria, then:

- The noise consultant will immediately report both results to the WCPL Environment and Community Manager or delegate immediately;
- Upon confirming the exceedances are deemed a non-compliance in accordance with the **Figure 5**, WCPL will report both results to DPE and EPA immediately, upon confirming the exceedance (**Section 9.0**).

WCPL will:

- Take immediate action in accordance with the NMS;
- Arrange for additional operator-attended noise monitoring to occur at that site within 1 week; and
- Deploy the mobile real-time noise monitor to measure and record the noise at that site for at least a 1 week period.

WCPL will also investigate any changes to the mine operations, and may revisit the noise model on the basis of the noise measurements recorded at the site.

The acoustic noise consultant will consider the modification factors in **Section 4** of the INP (EPA, 2000) during the evaluation of attending monitoring results.

The assessment of excessive levels of low frequency noise generated by the mine shall be as follows: Measure/assess C- and A-weighted Leq,T levels over same time period. Where the C minus A level is 15dB or more and:

- Where any of the 1/3 octave noise levels in **Table 9** are exceeded by up to 5dB 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 1/3 octave noise levels in **Table 9** are exceeded by more than 5dB and cannot be mitigated, a 5 dB(A) positive adjustment to measured/predicted A weighted levels applies for the evening/night period and a 2dB positive adjustment applies for the daytime period.

Table 9 One-third Octave Low Frequency Noise Thresholds

Hz/dB(Z)	One-third octave LZeq,15minute 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

6.3.4 Data Collection

Data and observations are collected in 15 minute periods and the Leq dBA results recorded. The Leq dBC noise levels will also be recorded to assess low frequency noise. All acoustic instrumentation will comply with AS 1259.2-1990 'Acoustics – Sound level meters – Integrating – Averaging'. Comprehensive field notes will be taken to indicate both mine related and non-mine related noise sources and when they occurred. Notes about maximum mine noise levels (source and times) will also be taken. All percentiles (LAMax, LA1, LA10, LA50, LA90, LAMin, LAeq) are measured in A weighting.

Where practicable, the LA1 measurement will be undertaken at 1 m from the dwelling façade and the LAeq measurement within 30 m of the dwelling. Where impracticable, measurements will be undertaken at a suitable and representative location as close to the dwelling as practicable.

6.3.5 Evaluation of Compliance

Tables 10 and 11 summarises the definition used by WCPL in this NMP for the evaluation of compliance with Development Consent (SSD-6764). The reporting requirements and actions that WCPL will take in the event of an exceedance or non-compliance are detailed in **Figure 5** and **Section 6.3.7**.

Table 10 Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is deemed to have occurred when an operator-attended noise monitoring result, measured in accordance with the INP and Development Consent (SSD-6764), exceeds the Noise Criteria in Table 6 . The noise must be solely attributable to the Mine and under the applicable meteorological conditions (Section 6.3.6).

Table 11 Definition of a Non-Compliance

Term	Definition
Non-compliance	A non-compliance is deemed to have occurred when a second operator-attended noise monitoring result [measured in accordance with the INP and Development Consent (SSD-6764)], taken within 75 minutes of an exceedance, also exceeds the Noise Criteria in Table 6 and either the first and or the second measured noise result is more than 2dBA above the Noise Criteria. Reporting requirements for a non-compliance are detailed in Section 6.3.7 .

6.3.6 Applicable Meteorological Conditions

The Noise Criteria in **Table 6** are to be applied under all meteorological conditions except for the following:

- Wind speeds greater than 3 m/s at 10 m above ground level; or
- Stability category F temperature inversions and wind speeds greater than 2 m/s at 10 m above ground level; or
- Stability category G temperature inversion conditions.

Except for wind speed at microphone height, the data used for determining meteorological conditions will be that recorded by the meteorological station located on the Mine site.

It should be noted that when assessing wind conditions to determine the potential for noise level alteration by the refraction of sound-waves through the atmosphere, meteorological measurements should be undertaken at a height of 10 m above the ground level, in accordance with Section 5 of the INP (EPA, 2000). Local meteorological conditions, including near-surface winds are measured at the inbuilt meteorological station (2 m); however, in accordance with the INP (EPA, 2000), the 2 m data cannot be used to determine impacts from sound-wave refraction. The 2 m meteorological data is used to assess local meteorological conditions that may increase ambient noise levels including surface winds and rainfall.

Appendix C

Calibration certificates

C.1 Calibration certificates



Sound Level Meter IEC 61672-3:2013 Calibration Certificate Calibration Number C23317

Client Details EMM Consulting Level 3, 175 Scott Street Newcastle NSW 2300	
Equipment Tested/ Model Number : NA-28 Instrument Serial Number : 00701424 Microphone Serial Number : 01916 Pre-amplifier Serial Number : 01463 Firmware Version : 2.0	
Pre-Test Atmospheric Conditions Ambient Temperature : 24°C Relative Humidity : 46% Barometric Pressure : 100.6kPa	Post-Test Atmospheric Conditions Ambient Temperature : 22.6°C Relative Humidity : 46.6% Barometric Pressure : 100.6kPa
Calibration Technician : Max Moore Calibration Date : 1 Jun 2023	Secondary Check: Dylan Selge Report Issue Date : 2 Jun 2023
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.

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Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C24155

Client Details EMM Consulting
Level 3, 175 Scott Street
Newcastle NSW 2300

Equipment Tested/ Model Number : Model 105
Instrument Serial Number : 78226

Atmospheric Conditions

Ambient Temperature : 25.3 °C
Relative Humidity : 53.6 %
Barometric Pressure : 100.41 kPa

Calibration Technician : Peter Elters
Calibration Date : 26 Feb 2024
Secondary Check: Rhys Gravelle
Report Issue Date : 26 Feb 2024

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	94.03	1000.30

The sound calibrator has been shown to conform to the class 1 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	±0.10 dB	Temperature ±0.1 °C
	Frequency	±0.07 %	Relative Humidity ±1.9 %
	Distortion	±0.20 %	Barometric Pressure ±0.11 kPa

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.
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