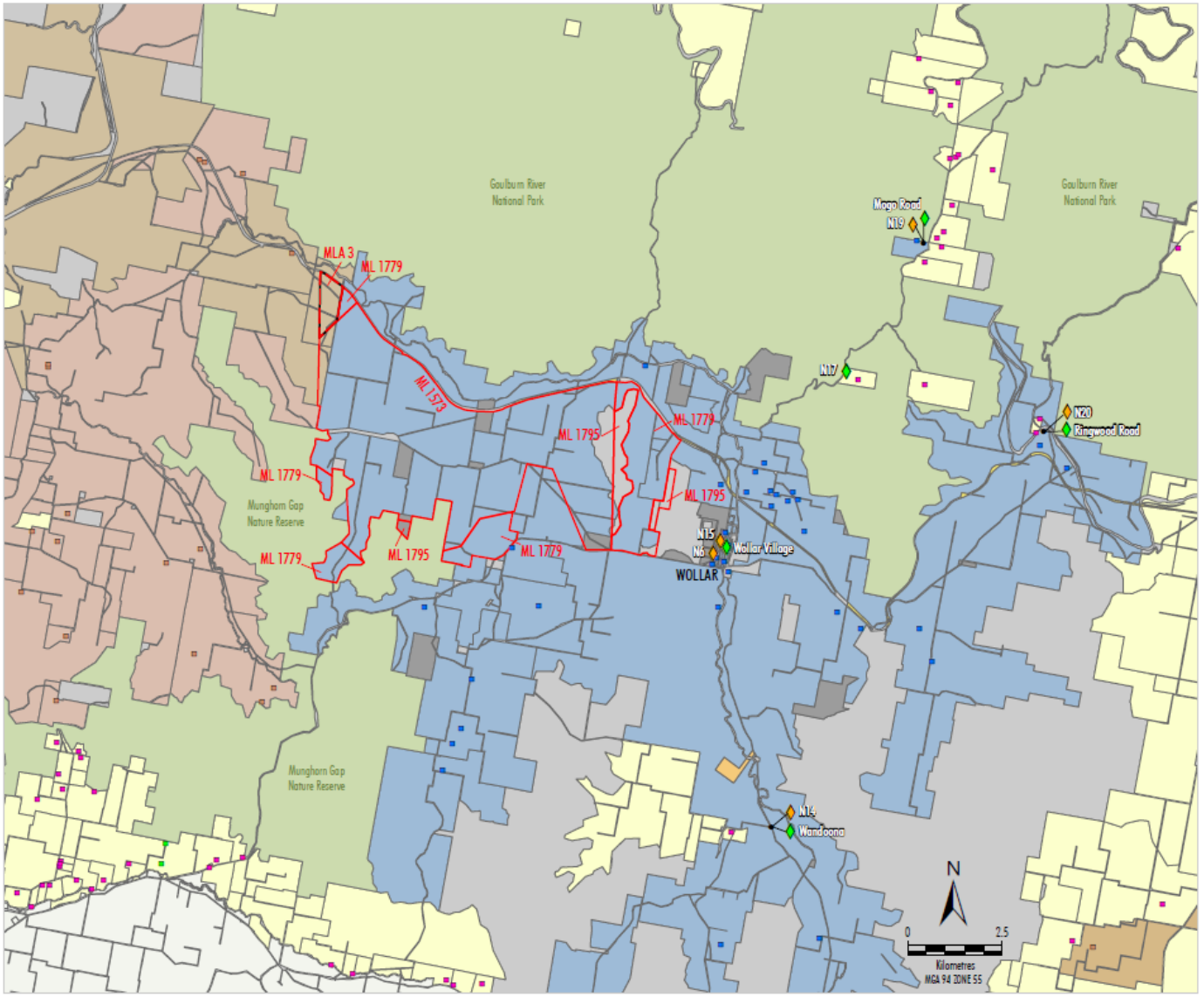
APPENDIX 3F

NOISE MONITORING DATA

Noise Monitoring Locations



LEGEND

- Mining Lease Boundary
- Mining Lease Application Boundary
- Peabody Energy
- Bylong Coal Project
- Moolarben Coal Mine
- Ulan Coal Mine
- Crown Land (Special Lease/Licence)
- Crown Land
- TransGrid
- Railway Land
- Relevant Private Landholder
- Other Land (Ownership not identified)
- National Parks and Wildlife Service
- Peabody Energy Dwelling
- Ulan/Moolarben Dwelling
- Private Dwelling
- Community Building

Noise Monitoring Sites

- Attended Noise
- Real-time Noise

Source: WCPL (2020); NSW Spatial Services (2020)

Peabody

WILPINJONG COAL MINE

Noise Monitoring Locations

Figure 3

Noise Monitoring Locations (Wollar)

LEGEND
- Peabody Energy
- Crown Land (Special Lease/Licence)
- Crown Land
- Railway Land
- Relevant Private Landholder
- 1 Landholder Reference Number
- Peabody Energy Dwelling
- Community Building
- Private Dwelling

Special Lease/Licence Holder

Noise Monitoring Sites
- Attended Noise
- Real-time Noise

Source: WCPL (2020); NSW Spatial Services (2020)

Peabody
WILPINJONG COAL MINE

Noise Monitoring Sites
- Wollar

Figure 4

Noise Monitoring Reports

Wilpinjong Coal

Environmental Noise Monitoring

January 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring
January 2020

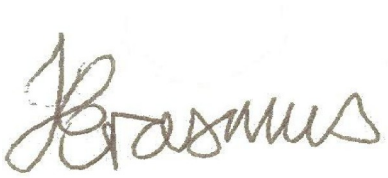
Reference: 20006_R01
Report date: 23 January 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Jonathan Erasmus Consultant	QA Review:	Robert Kirwan Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 15/16 January 2020 at eight locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N13	'Coonaroo' off Moolarben Road, Moolarben
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar
N21	'Wandoona', Barigan Road, Wollar

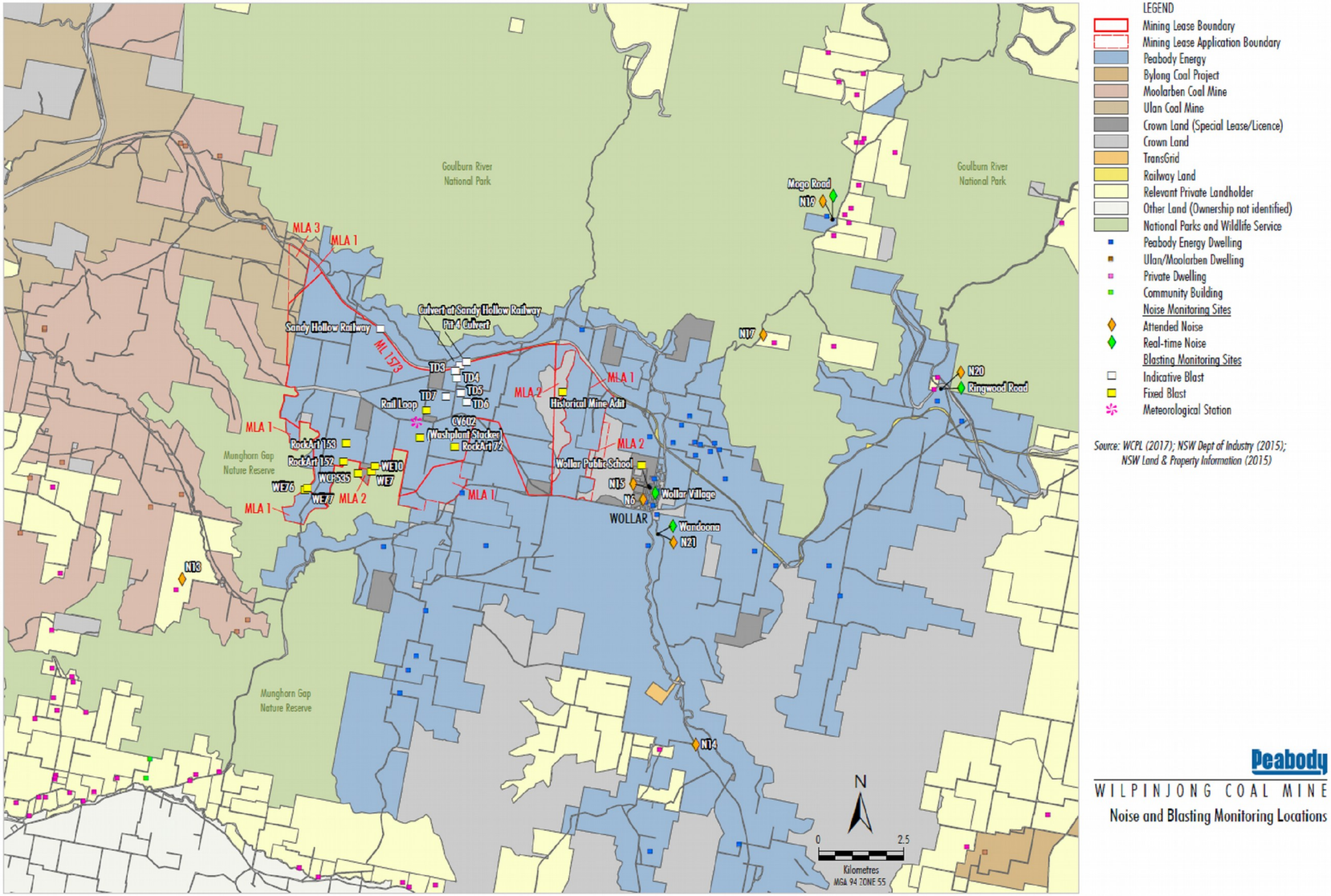


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in April 2019. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in June 2017. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45
N21	'Wandoona', Barigan Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017, and supersedes the EPA's Industrial Noise Policy (INP, 2000). Assessment and reporting of modifying factors is to be carried out in accordance with Fact Sheet C of the NPfI.

NPfI modifying factors, as they are applicable to mining noise, are described in more detail below.

2.5.1 Tonal and Intermittent Noise

As defined in the NPfI:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Intermittent noise is noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.*

2.5.2 Low-Frequency Noise

As defined in the NPfI:

> *Low frequency noise is noise with an unbalanced spectrum and containing major components within the low-frequency range (10 – 160 Hz) of the frequency spectrum.*

The NPfI contains the current method of assessing low-frequency noise, which is a 2 step process as detailed below:

> *Measure/assess source contribution C-weighted and A-weighted L_{eq},T levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level is 15 dB or more and:*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by **up to and including** 5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by **more than** 5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 and associated notes from the NPfI is reproduced below:

Table C2: One-third octave low-frequency noise thresholds.

Hz/dB(Z)	One-third octave $L_{Zeq,15min}$ threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Notes:

- dB(Z) = decibel (Z frequency weighted).
- For the assessment of low-frequency noise, care should be taken to select a wind screen that can protect the microphone from wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for

wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler, 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

- Low-frequency noise corrections only apply under the standard and/or noise-enhancing meteorological conditions.
- Where a receiver location has had architectural acoustic treatment applied (including alternative means of mechanical ventilation satisfying the Building Code of Australia) by a proponent, as part of consent requirements or as a private negotiated agreement, alternative external low-frequency noise assessment criteria may be proposed to account for the higher transmission loss of the building façade.
- Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or environment protection licence, and at locations nominated in the development consent or licence.

3 METHODOLOGY

3.1 Overview

Attended environmental noise monitoring was conducted in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Jonathan Erasmus.

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows an accurate determination of the contribution, if any, to measured noise levels by the source of interest (in this case WCP).

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or

- 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 $L_{A1,1minute}$ 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 (i.e. the highest level of the worst minute during the 15 minute measurement).

3.3 Attended Noise Monitoring

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	30131882	05/02/2021
Rion NA-28 sound level meter	00701424	14/06/2021
Pulsar 105 acoustic calibrator	78226	01/02/2021
Pulsar 106 acoustic calibrator	74813	21/02/2021

3.4 Modifying Factors

Years of monitoring have indicated that noise levels from mining operations, particularly those measured at significant distances from the source are relatively continuous and broad spectrum. Given this, noise levels from WCP at the monitoring locations are unlikely to be intermittent or tonal.

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

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

- WCP was the only low-frequency noise source.

All measurements meeting these conditions were evaluated for possible low-frequency penalty applicability in accordance with the NPfI.

3.5 Attended Real-Time Noise Monitor Comparison

WCP only noise levels from four attended monitoring locations are compared to results from nearby Sentinex units. Start times of attended and real-time measurements do not directly overlap. Real-time measurement with the most overlap with attended monitoring times are selected for comparison.

Attended monitoring locations and the real-time monitoring locations they represent are listed in Table 3.2 and shown in Figure 1.

Table 3.2: ATTENDED AND REAL-TIME MONITORING LOCATIONS FOR COMPARISON

Report Descriptor for Attended monitoring location	Real-Time Monitor ID	Monitoring Location
NA15	SX33-N1	Wollar Village
NA19	SX32-N1	North Mogo Road
NA20	SX30-N1	Ringwood Road, off Wollar Road
NA21	SX31-N1	'Wandoona', Barigan Road

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – JANUARY 2020[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	L_{Ceq} dB
N6	15/01/2020 23:18	52	49	49	48	48	47	44	55
N13	16/01/2020 00:50	49	35	31	29	28	26	24	55
N14	16/01/2020 00:25	52	38	33	32	31	29	17	54
N15	15/01/2020 22:59	48	46	45	42	41	40	38	59
N17	15/01/2020 22:29	56	55	54	53	52	51	49	56
N19	15/01/2020 22:04	49	44	42	41	40	37	33	54
N20	15/01/2020 23:47	79	69	58	55	35	26	22	61
N21	16/01/2020 00:51	54	49	41	37	28	22	19	59

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey.

None of the measurements satisfied the conditions outlined in Section 3.4 when assessing low-frequency noise. Therefore no further assessment of modifying factors was undertaken.

4.3 Attended Noise Monitoring

Table 4.2 to Table 4.3detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JANUARY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	15/01/2020 23:18	1.6	E	37	Yes	IA	Nil
N13	16/01/2020 00:50	0.9	E	35	Yes	25	Nil
N14	16/01/2020 00:25	1.3	E	35	Yes	IA	Nil
N15	15/01/2020 22:59	1.3	F	37	Yes	IA	Nil
N17	15/01/2020 22:29	1.6	F	38	Yes	IA	Nil
N19	15/01/2020 22:04	0.0	F	35	Yes	IA	Nil
N20	15/01/2020 23:47	0.5	E	35	Yes	IA	Nil
N21	16/01/2020 00:51	0.9	E	35	Yes	<25	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JANUARY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	15/01/2020 23:18	1.6	E	45	Yes	IA	Nil
N13	16/01/2020 00:50	0.9	E	45	Yes	28	Nil
N14	16/01/2020 00:25	1.3	E	45	Yes	IA	Nil
N15	15/01/2020 22:59	1.3	F	45	Yes	IA	Nil
N17	15/01/2020 22:29	1.6	F	45	Yes	IA	Nil
N19	15/01/2020 22:04	0.0	F	45	Yes	IA	Nil
N20	15/01/2020 23:47	0.5	E	45	Yes	IA	Nil
N21	16/01/2020 00:51	0.9	E	45	Yes	<25	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G*

temperature inversion conditions;

3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.4 Comparison of real time and attended noise results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.4. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.4: REAL-TIME AND ATTENDED NOISE LEVELS, JANUARY 2020[1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data[1]			Attended measurement
			Total L_{Aeq} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	15/01/2020 22:59	15/01/2020 23:00	36	34	19	IA
N19/SX32	15/01/2020 22:04	15/01/2020 22:00	37	22	7	IA
N20/SX30	15/01/2020 23:47	15/01/2020 23:45	37	34	19	IA
N21/SX31	16/01/2020 00:51	16/01/2020 00:45	37	35	NR	<25

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.5. 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 4.5: MEASURED ATMOSPHERIC CONDITIONS – JANUARY 2020

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	15/01/2020 23:18	26	0.0	-	8
N13	16/01/2020 00:50	23	0.0	-	8
N14	16/01/2020 00:25	26	0.0	-	8
N15	15/01/2020 22:59	26	0.0	-	8
N17	15/01/2020 22:29	28	0.0	-	8
N19	15/01/2020 22:04	30	0.0	-	8
N20	15/01/2020 23:47	27	0.0	-	8
N21	16/01/2020 00:51	25	0.0	-	8

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

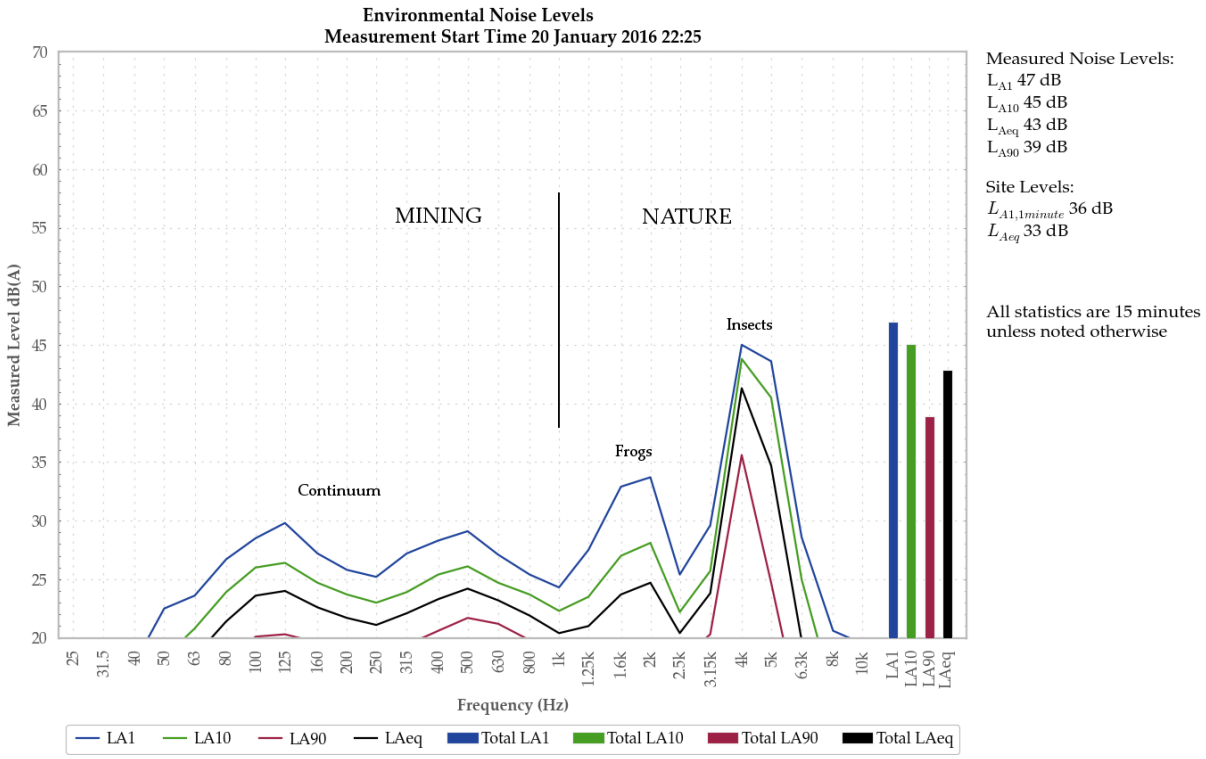


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

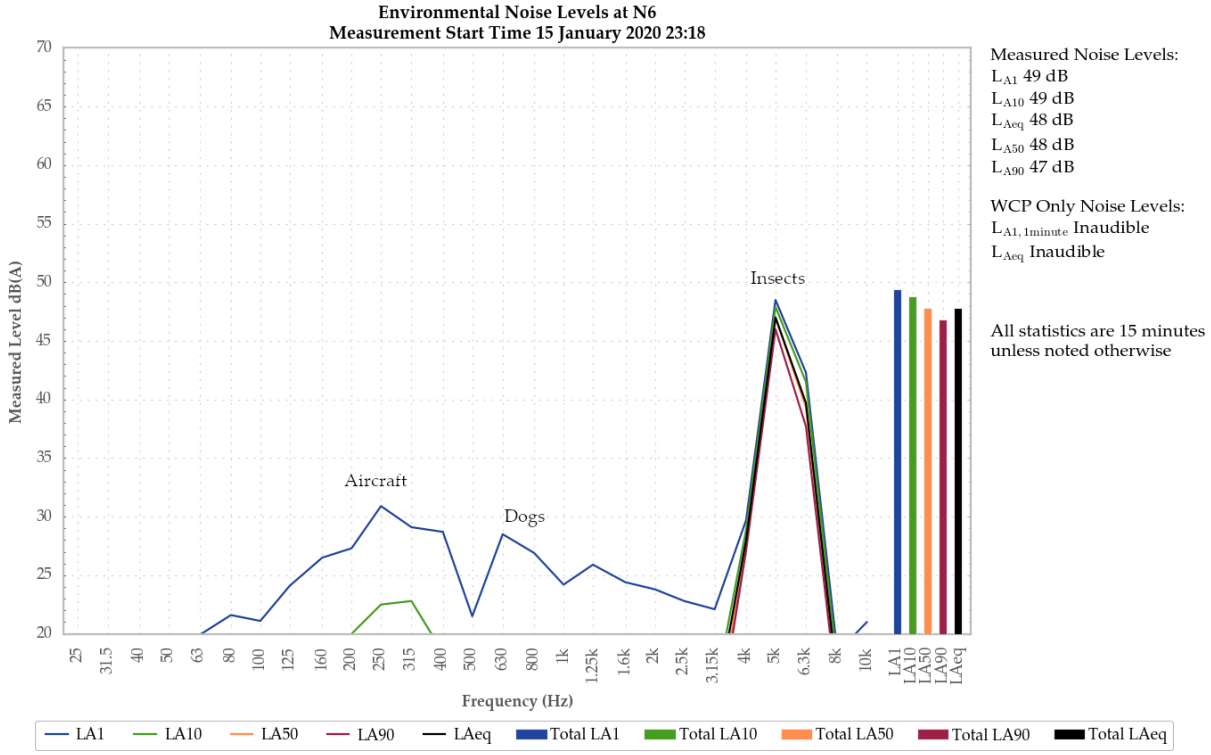


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Insects generated the measured L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

Aircraft and dogs were also noted.

5.1.2 N13

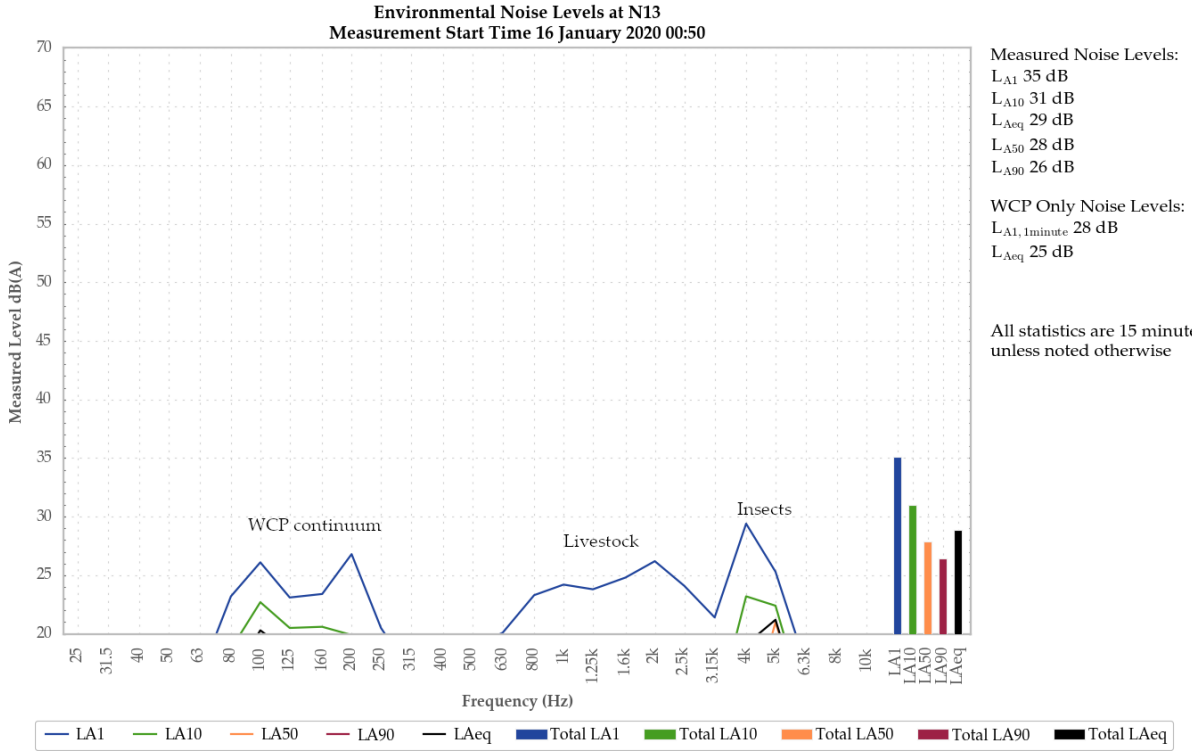


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

A low-level mining continuum from WCP was audible throughout the measurement generating a site only L_{Aeq} of 25 dB and $L_{A1,1minute}$ of 28 dB.

WCP continuum, livestock, and insect generated the measured L_{A1}. Insects and WCP continuum generated the measured L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

5.1.3 N14

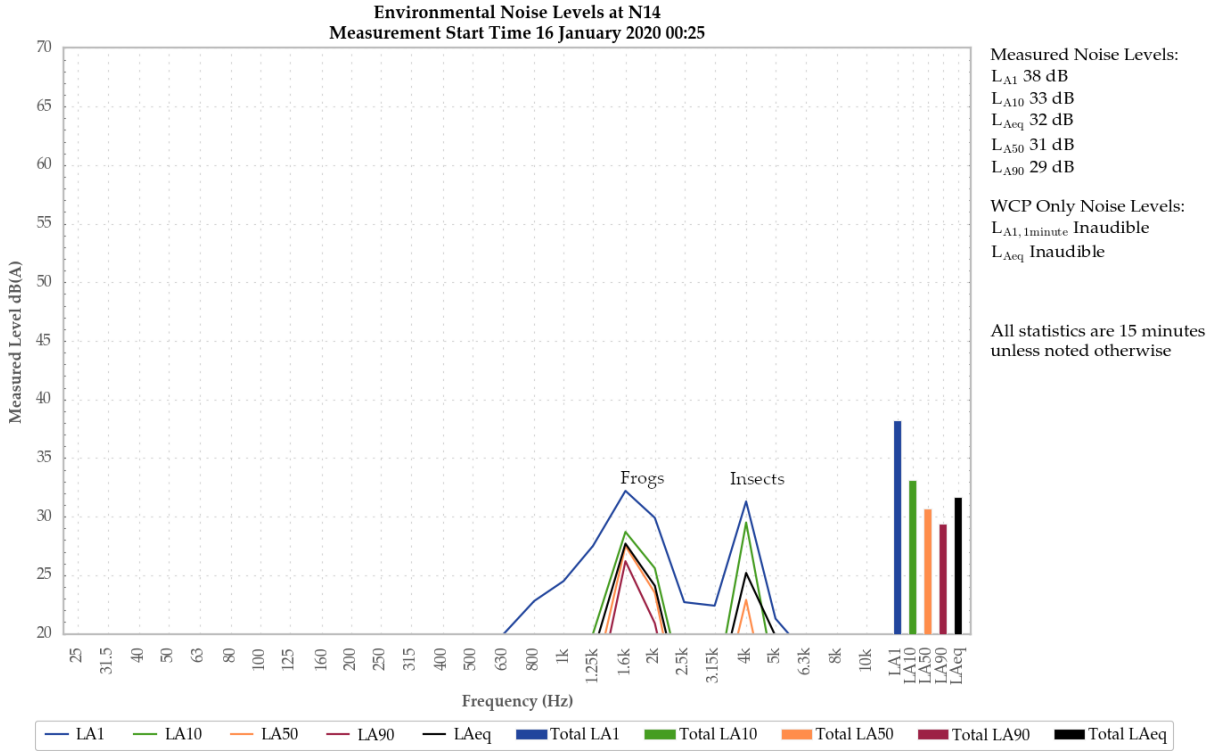


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

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

An aircraft was also noted.

5.1.4 N15

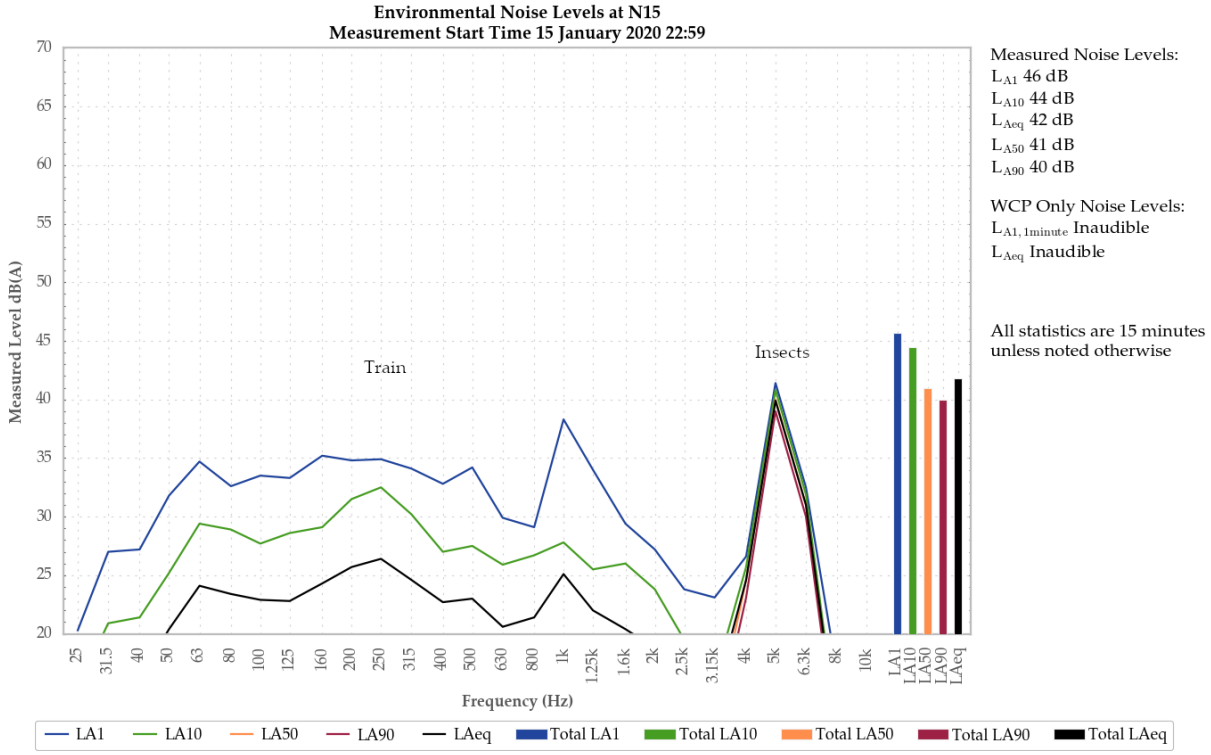


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Insects and a train generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Insects generated the measured L_{A50} and L_{A90}.

Road traffic was also noted.

5.1.5 N17

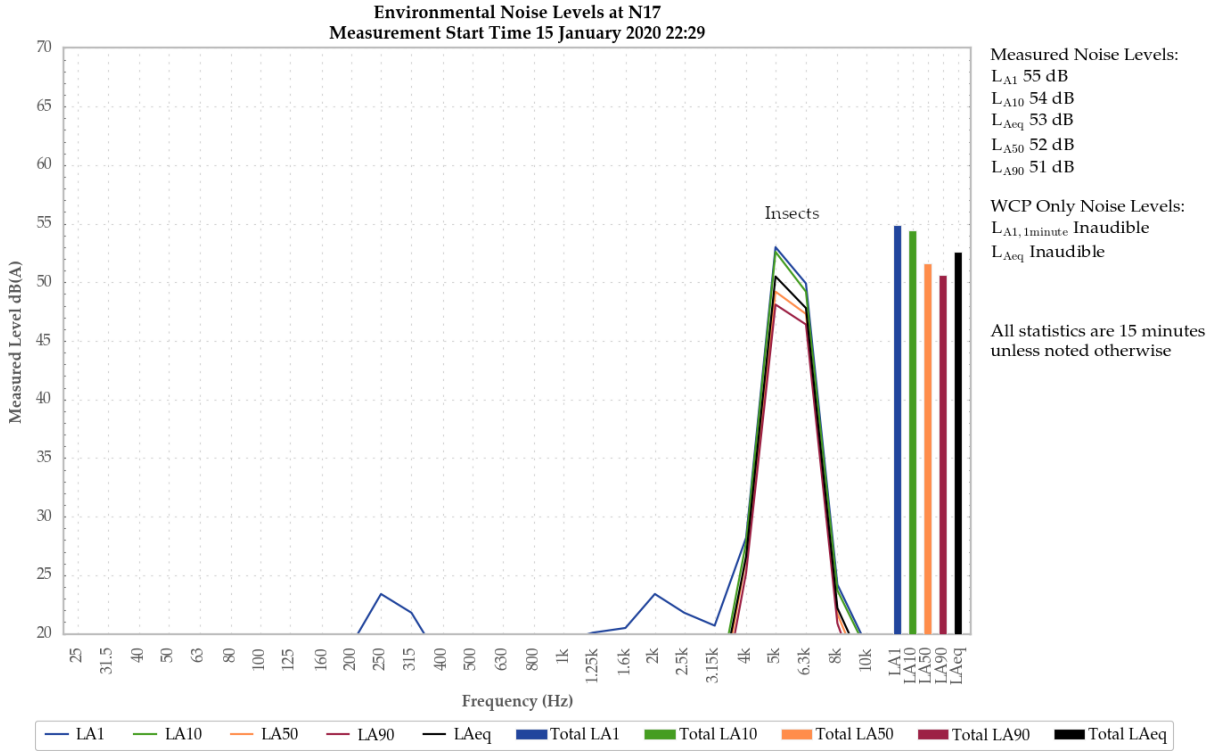


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

WCP was inaudible.

Insects generated the measured L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

An aircraft was also noted.

5.1.6 N19

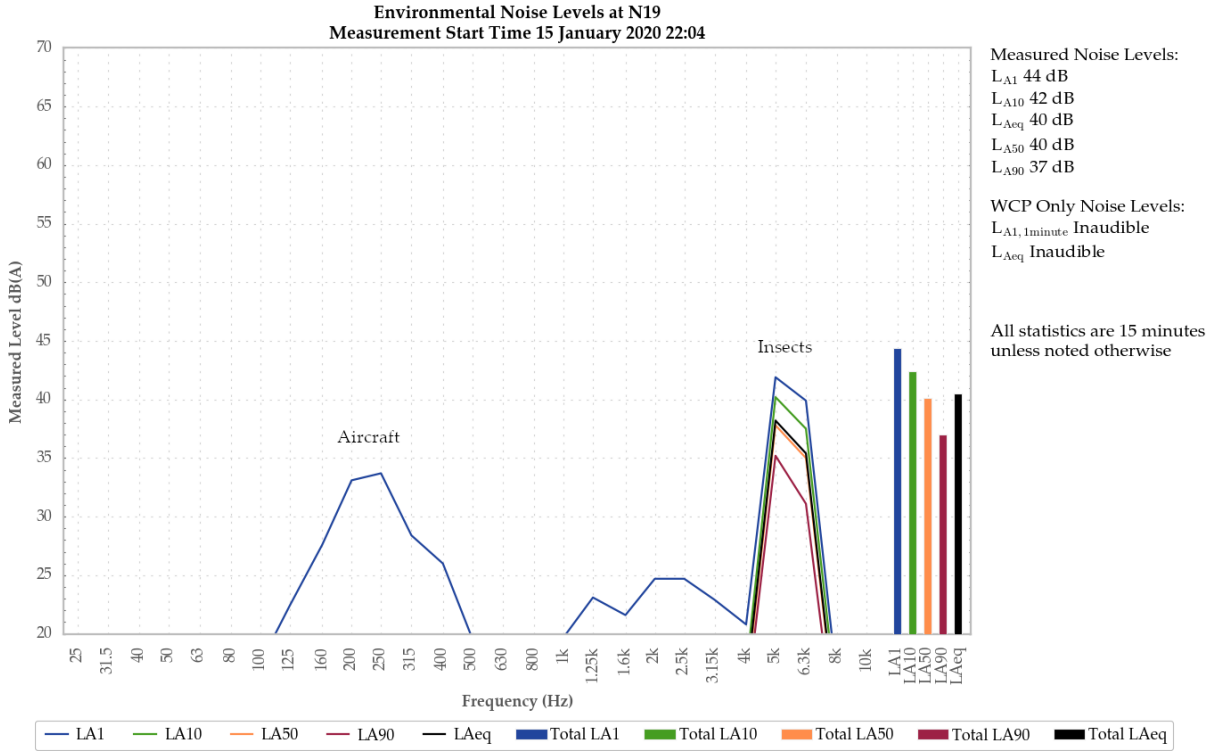


Figure 8: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible.

Insects generated the measured L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

An aircraft and birds were also noted.

5.1.7 N20

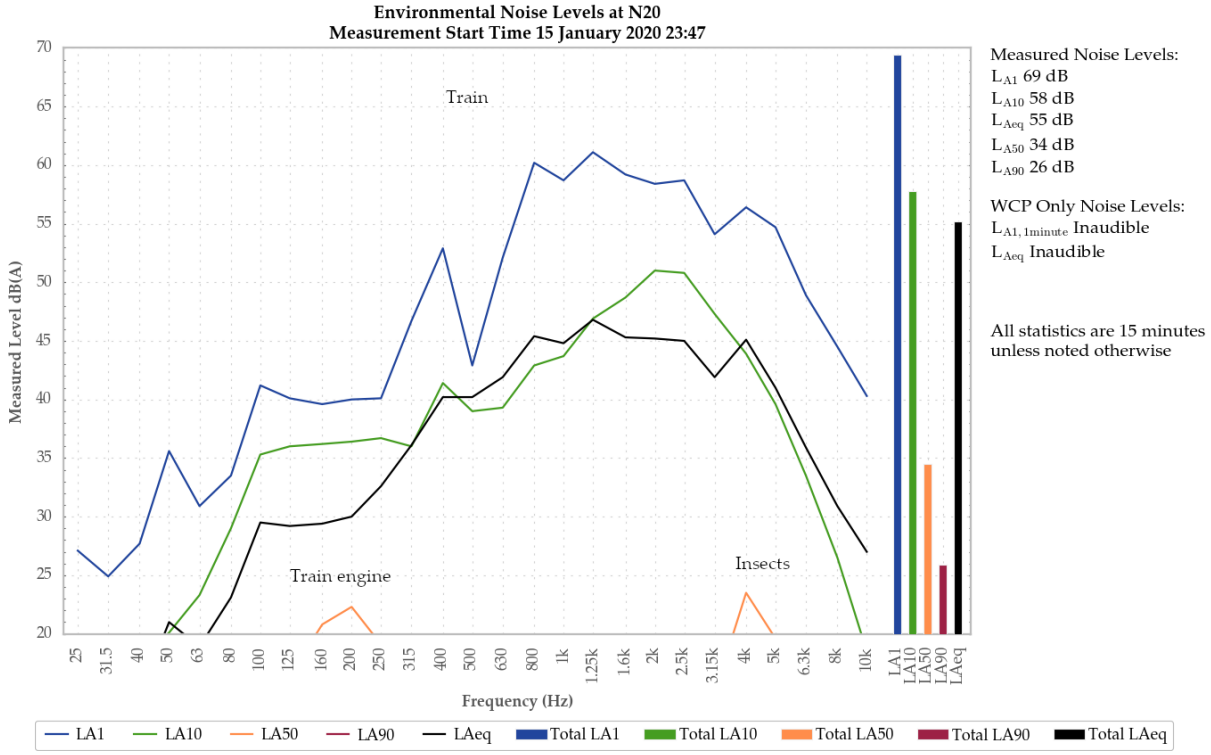


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible.

A train generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Train engine noise and insects generated the measured L_{A50} and L_{A90}.

Birds were also noted.

5.1.8 N21

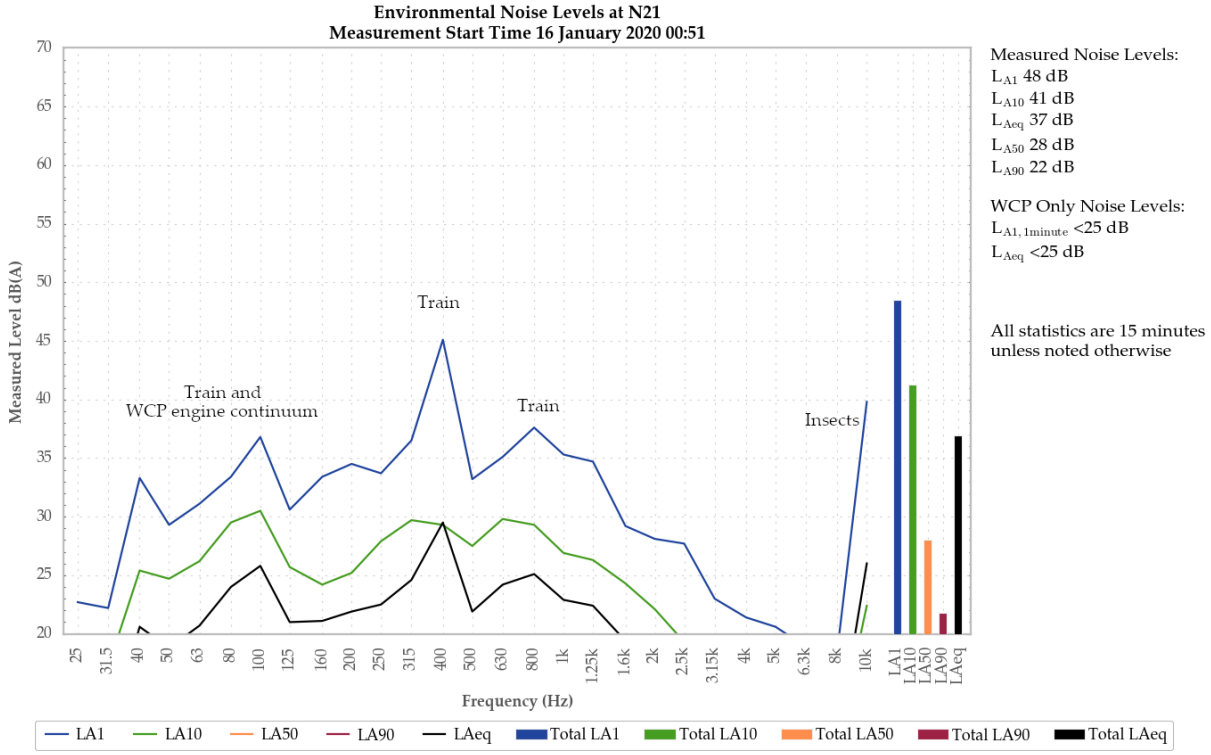


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

A low-level continuum from WCP was audible during the measurement generating the site-only $L_{Aeq,15minute}$ and $L_{A1,1minute}$ of less than 25 dB.

A train generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Insects and a mining continuum from WCP generated the measured L_{A50} and L_{A90}.

Road traffic and birds were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 15/16 January 2020 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the January 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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	40 (internal) When in use			-
900 – St Laurence O'Toole Catholic Church				

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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.

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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
Coonaroo	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West 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

Location	Site	Type	Easting[1]	Northing[1]	Justification
Ringwood Road	N20	Operator-attended Noise	785964.2	6419050.6	Location based near to community residence in discussions with DP&E and EPA on the 23 May 2017 to the East of the Mine.
Wandoona	N21	Operator-attended Noise	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP in May 2017.
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DP&E and EPA on the 23 May 2017 to the East of the Mine. N20 operator-attended Noise Monitoring (validation of real-time noise monitoring)
Wandoona[3]	-	Real-Time Noise - Mobile	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP. N21 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 DP&E and EPA of the results of this monitoring and advise if and when the monitoring at this location will be scaled back or discontinued.
3. The real-time noise monitor at Wandoona may be relocated in response to a complaint or identified noise issue at another location.
4. 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**.

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 DP&E and the EPA.

6.3.3 Methodology

Operator-attended noise monitoring will be undertaken at the locations and frequency 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 attended noise monitoring program resumed.

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

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

WCPL will:

a) Take immediate action in accordance with the NMS;
b) Arrange for additional operator-attended noise monitoring to occur at that site within 1 week; and
c) 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 $L_{Zeq,15minute}$ 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

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.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19073

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

Equipment Tested/ Model Number : NA-28
Instrument Serial Number : 30131882
Microphone Serial Number : 04739
Pre-amplifier Serial Number : 11942

Pre-Test Atmospheric Conditions
Ambient Temperature : 24.5°C
Relative Humidity : 54.5%
Barometric Pressure : 99.39kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 23.6°C
Relative Humidity : 51%
Barometric Pressure : 99.36kPa

Calibration Technician : Charlie Neil
Calibration Date : 5 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019

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 -

Acoustic Tests
31.5 Hz to 8kHz ±0.15dB
12.5kHz ±0.2dB
16kHz ±0.29dB
Electrical Tests
31.5 Hz to 20 kHz ±0.11dB

Environmental Conditions
Temperature ±0.2°C
Relative Humidity ±2.4%
Barometric Pressure ±0.015kPa

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 Australian/national standards.

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 Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19342

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thorton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	00701424
Microphone Serial Number :	01916
Pre-amplifier Serial Number :	01463

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	26°C	**Ambient Temperature :**	26°C
Relative Humidity :	40.2%	**Relative Humidity :**	40.7%
Barometric Pressure :	100.96kPa	**Barometric Pressure :**	100.32kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2019
Secondary Check: Eloise Burrows
Report Issue Date : 18 Jun 2019
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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19074

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

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

Atmospheric Conditions
Ambient Temperature : 23.8°C
Relative Humidity : 53.7%
Barometric Pressure : 100.09kPa

Calibration Technician : Charlie Neil
Calibration Date : 1 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019
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
Pre Adjustment	94.0	1000.0	94.4	1000.38
Post Adjustment	94.0	1000.0	94.1	1000.39

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.

Least Uncertainties of Measurement -

Specific Tests

Generated SPL	*±0.11dB*
Frequency	*±0.01%*
Distortion	*+0.45%*

Environmental Conditions

Temperature	*±0.2°C*
Relative Humidity	*±2.4%*
Barometric Pressure	*±0.015kPa*

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19124

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

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

Atmospheric Conditions
Ambient Temperature : 24°C
Relative Humidity : 50.4%
Barometric Pressure : 99.54kPa

Calibration Technician : Lucky Jaiswal **Secondary Check:** Lewis Boorman
Calibration Date : 21 Feb 2019 **Report Issue Date :** 22 Feb 2019

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
Measured Output	94.0	1000.0	94.0	1000.33

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.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.48%*	*Barometric Pressure*	*±0.015kPa*

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 Australian/national standards.

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

Wilpinjong Coal

Environmental Noise Monitoring

February 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring
February 2020

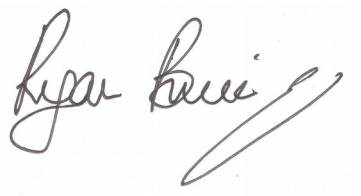
Reference: 20029_R01
Report date: 13 March 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Ryan Bruniges Consultant	QA Review:	Rob Kirwan Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 5/6 February 2020 at eight locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N13	'Coonaroo' off Moolarben Road, Moolarben
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar
N21	'Wandoona', Barigan Road, Wollar

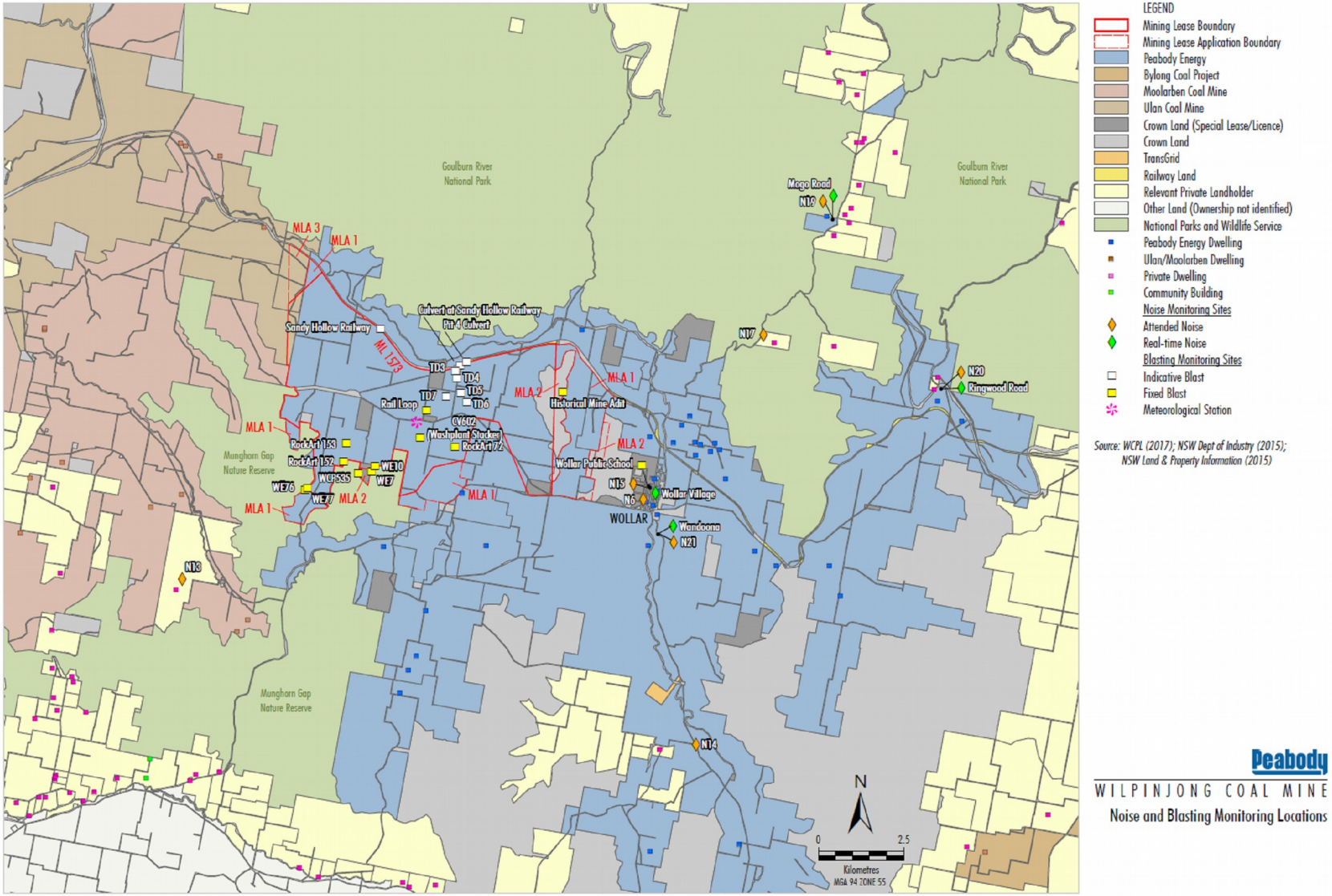


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in April 2019. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in June 2017. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45
N21	'Wandoona', Barigan Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017, and supersedes the EPA's Industrial Noise Policy (INP, 2000). Assessment and reporting of modifying factors is to be carried out in accordance with Fact Sheet C of the NPfI.

NPfI modifying factors, as they are applicable to mining noise, are described in more detail below.

2.5.1 Tonal and Intermittent Noise

As defined in the NPfI:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Intermittent noise is noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.*

2.5.2 Low-Frequency Noise

As defined in the NPfI:

> *Low frequency noise is noise with an unbalanced spectrum and containing major components within the low-frequency range (10 – 160 Hz) of the frequency spectrum.*

The NPfI contains the current method of assessing low-frequency noise, which is a 2 step process as detailed below:

> *Measure/assess source contribution C-weighted and A-weighted L_{eq},T levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level is 15 dB or more and:*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by **up to and including** 5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by **more than** 5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 and associated notes from the NPfI is reproduced below:

Table C2: One-third octave low-frequency noise thresholds.

Hz/dB(Z)	One-third octave $L_{Zeq,15min}$ threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Notes:

- dB(Z) = decibel (Z frequency weighted).
- For the assessment of low-frequency noise, care should be taken to select a wind screen that can protect the microphone from wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for

wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler, 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

- Low-frequency noise corrections only apply under the standard and/or noise-enhancing meteorological conditions.
- Where a receiver location has had architectural acoustic treatment applied (including alternative means of mechanical ventilation satisfying the Building Code of Australia) by a proponent, as part of consent requirements or as a private negotiated agreement, alternative external low-frequency noise assessment criteria may be proposed to account for the higher transmission loss of the building façade.
- Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or environment protection licence, and at locations nominated in the development consent or licence.

3 METHODOLOGY

3.1 Overview

Attended environmental noise monitoring was conducted in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Ryan Bruniges.

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows an accurate determination of the contribution, if any, to measured noise levels by the source of interest (in this case WCP).

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or

- 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 $L_{A1,1minute}$ 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 (i.e. the highest level of the worst minute during the 15 minute measurement).

3.3 Attended Noise Monitoring

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	00701424	14/06/2021
Rion NA-28 sound level meter	01070590	25/06/2020
Pulsar Model 106 acoustic calibrator	74813	21/02/2021
Pulsar Model 106 acoustic calibrator	79631	22/01/2021

3.4 Modifying Factors

Years of monitoring have indicated that noise levels from mining operations, particularly those measured at significant distances from the source are relatively continuous and broad spectrum. Given this, noise levels from WCP at the monitoring locations are unlikely to be intermittent or tonal.

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

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

- WCP was the only low-frequency noise source.

All measurements meeting these conditions were evaluated for possible low-frequency penalty applicability in accordance with the NPfI.

3.5 Attended Real-Time Noise Monitor Comparison

WCP only noise levels from four attended monitoring locations are compared to results from nearby Sentinex units. Start times of attended and real-time measurements do not directly overlap. Real-time measurement with the most overlap with attended monitoring times are selected for comparison.

Attended monitoring locations and the real-time monitoring locations they represent are listed in Table 3.2 and shown in Figure 1.

Table 3.2: ATTENDED AND REAL-TIME MONITORING LOCATIONS FOR COMPARISON

Report Descriptor for Attended monitoring location	Real-Time Monitor ID	Monitoring Location
NA15	SX33-N1	Wollar Village
NA19	SX32-N1	North Mogo Road
NA20	SX30-N1	Ringwood Road, off Wollar Road
NA21	SX31-N1	'Wandoona', Barigan Road

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – FEBRUARY 2020[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	L_{Ceq} dB
N6	06/02/2020 01:06	53	45	41	38	36	31	28	60
N13	06/02/2020 01:19	41	36	31	29	27	25	23	51
N14	06/02/2020 00:18	50	43	32	31	25	22	20	57
N15	05/02/2020 23:04	56	49	46	44	44	33	27	58
N17	05/02/2020 22:30	46	45	44	43	43	42	40	47
N19	05/02/2020 22:02	50	38	35	32	31	27	25	50
N20	05/02/2020 23:36	76	68	42	53	29	25	23	61
N21	06/02/2020 00:45	58	55	48	44	39	28	26	65

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey.

None of the measurements satisfied the conditions outlined in Section 3.4 when assessing low-frequency noise. Therefore no further assessment of modifying factors was undertaken.

4.3 Attended Noise Monitoring

Table 4.2 to Table 4.3 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – FEBRUARY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	06/02/2020 01:06	5.4	E	37	No	IA	NA
N13	06/02/2020 01:19	5.0	E	35	No	IA	NA
N14	06/02/2020 00:18	4.2	E	35	No	IA	NA
N15	05/02/2020 23:04	1.1	E	37	Yes	IA	Nil
N17	05/02/2020 22:30	1.0	E	38	Yes	IA	Nil
N19	05/02/2020 22:02	0.9	E	35	Yes	IA	Nil
N20	05/02/2020 23:36	3.5	F	35	No	IA	NA
N21	06/02/2020 00:45	5.5	D	35	No	IA	NA

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – FEBRUARY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	06/02/2020 01:06	5.4	E	45	No	IA	NA
N13	06/02/2020 01:19	5.0	E	45	No	IA	NA
N14	06/02/2020 00:18	4.2	E	45	No	IA	NA
N15	05/02/2020 23:04	1.1	E	45	Yes	IA	Nil
N17	05/02/2020 22:30	1.0	E	45	Yes	IA	Nil
N19	05/02/2020 22:02	0.9	E	45	Yes	IA	Nil
N20	05/02/2020 23:36	3.5	F	45	No	IA	NA
N21	06/02/2020 00:45	5.5	D	45	No	IA	NA

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G*

temperature inversion conditions;

3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.4 Comparison of real time and attended noise results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.4. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.4: REAL-TIME AND ATTENDED NOISE LEVELS, FEBRUARY 2020[1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data[1]			Attended measurement
			Total L_{Aeq} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	05/02/2020 23:04	05/02/2020 23:00	41	39	23	IA
N19/SX32	05/02/2020 22:02	05/02/2020 22:00	30	25	NR	IA
N20/SX30	05/02/2020 23:36	05/02/2020 23:30	42	27	30	IA
N21/SX31	06/02/2020 00:45	06/02/2020 00:45	46	44	31	IA

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.5. 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 4.5: MEASURED ATMOSPHERIC CONDITIONS – FEBRUARY 2020

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	06/02/2020 01:06	23	2.1	70	8
N13	06/02/2020 01:19	22	1.6	110	8
N14	06/02/2020 00:18	23	2.3	100	8
N15	05/02/2020 23:04	24	0.4	30	7
N17	05/02/2020 22:30	24	0.5	90	8
N19	05/02/2020 22:02	23	1.5	80	7
N20	05/02/2020 23:36	24	1.8	90	8
N21	06/02/2020 00:45	23	2.7	70	8

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

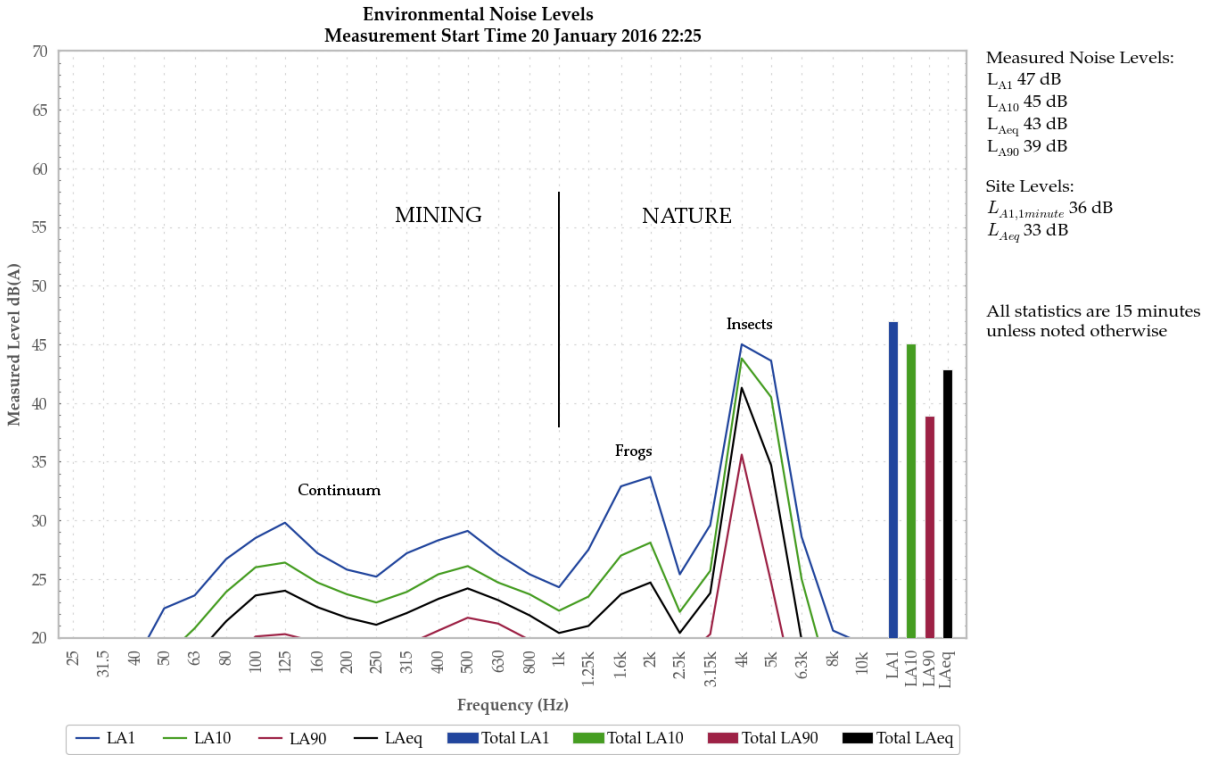


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

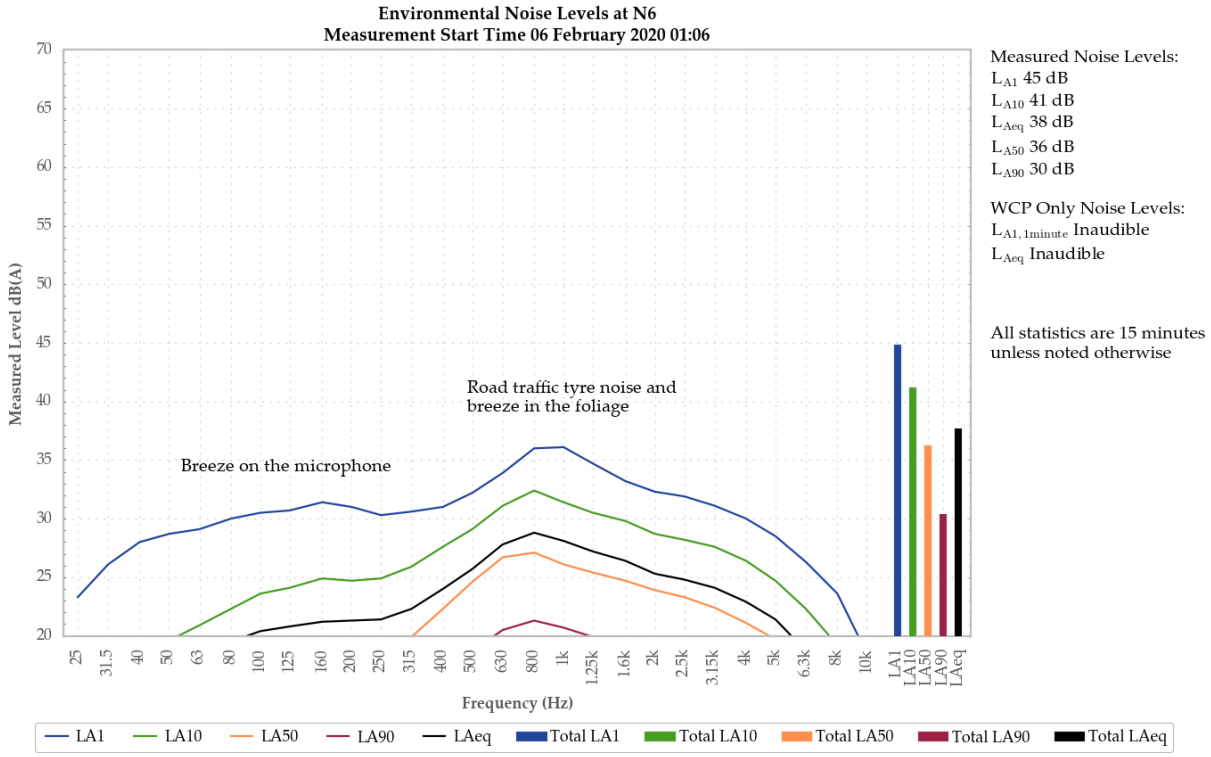


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Breeze in the foliage and on the microphone contributed to all measured noise levels. Road traffic tyre noise contributed to the measured L_{A1}, L_{A10}, and L_{Aeq}.

5.1.2 N13

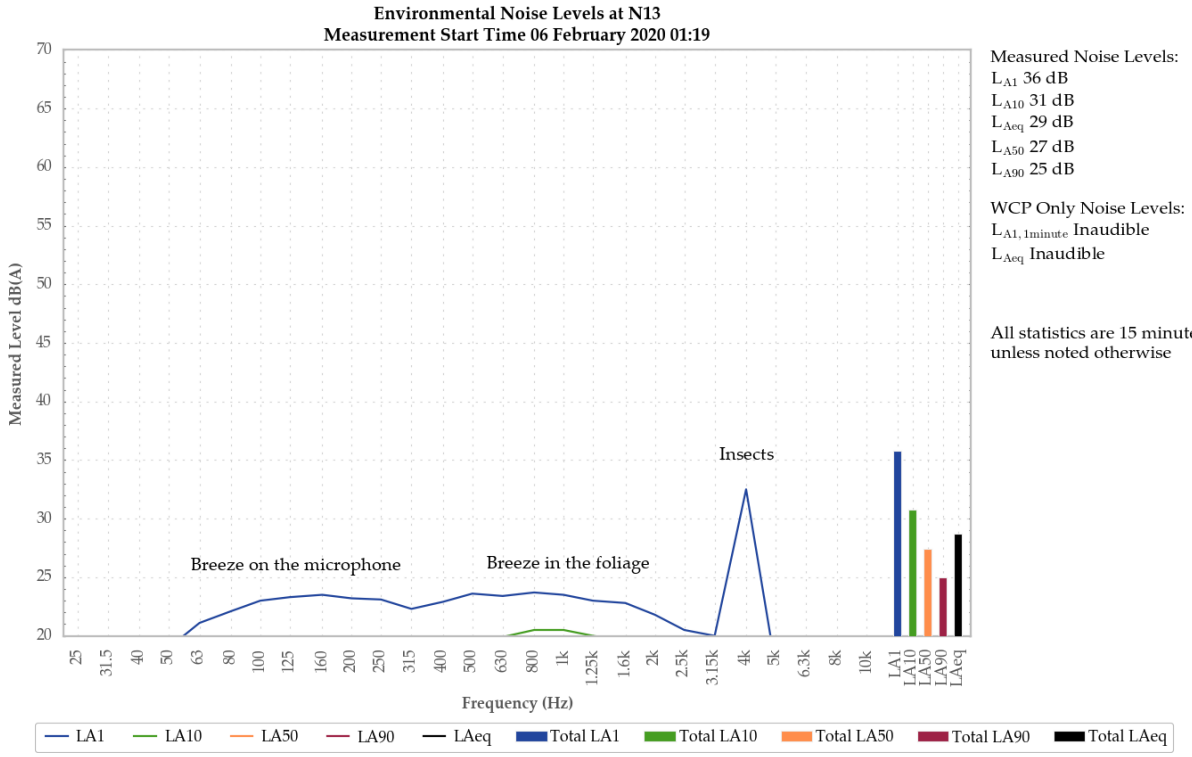


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Breeze in the foliage and on the microphone were primarily responsible for all measured noise levels. Insects contributed to the measured L_{A1}.

5.1.3 N14

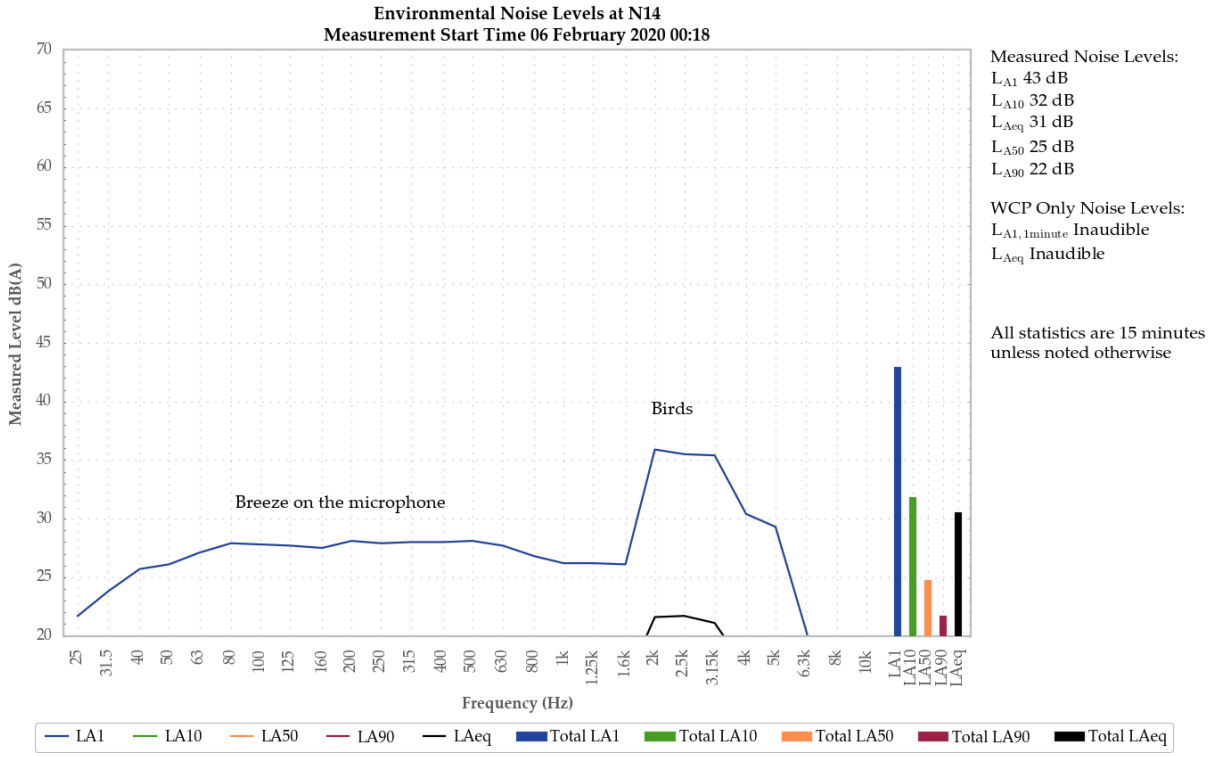


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Breeze on the microphone and in the foliage were primarily responsible for all measured noise levels. Birds contributed to the measured L_{A1}.

Insects were also noted.

5.1.4 N15

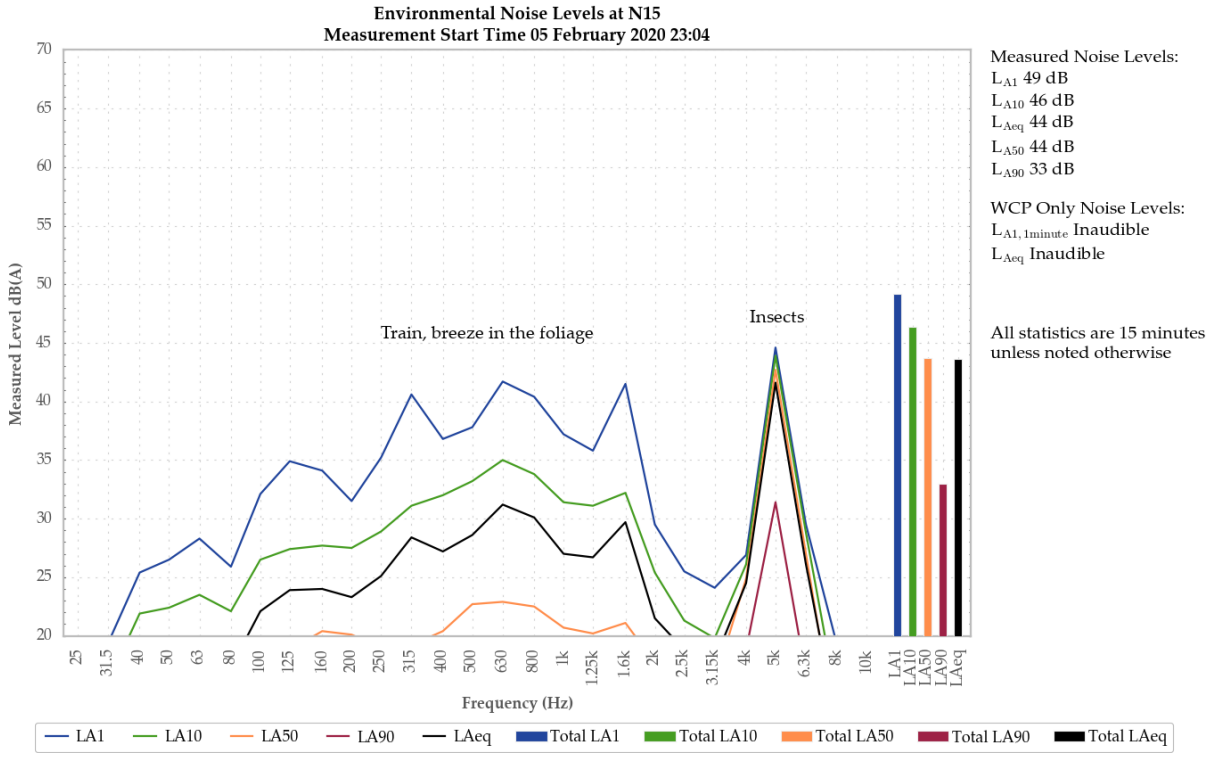


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Insects primarily generated the measured levels. A train contributed to the measured L_{A1}, L_{A10} and L_{Aeq}.

Birds and breeze in the foliage were also noted.

5.1.5 N17

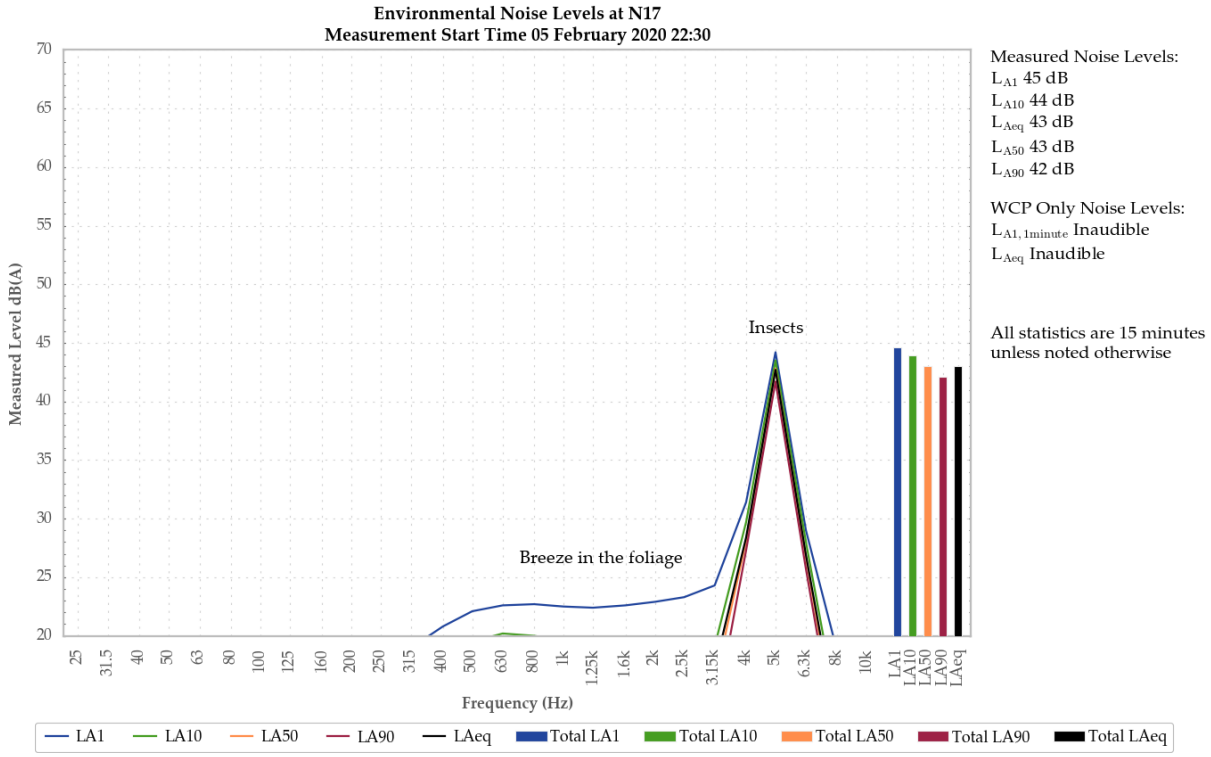


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

WCP was inaudible.

Insects generated measured levels.

Breeze in the foliage was also noted.

5.1.6 N19

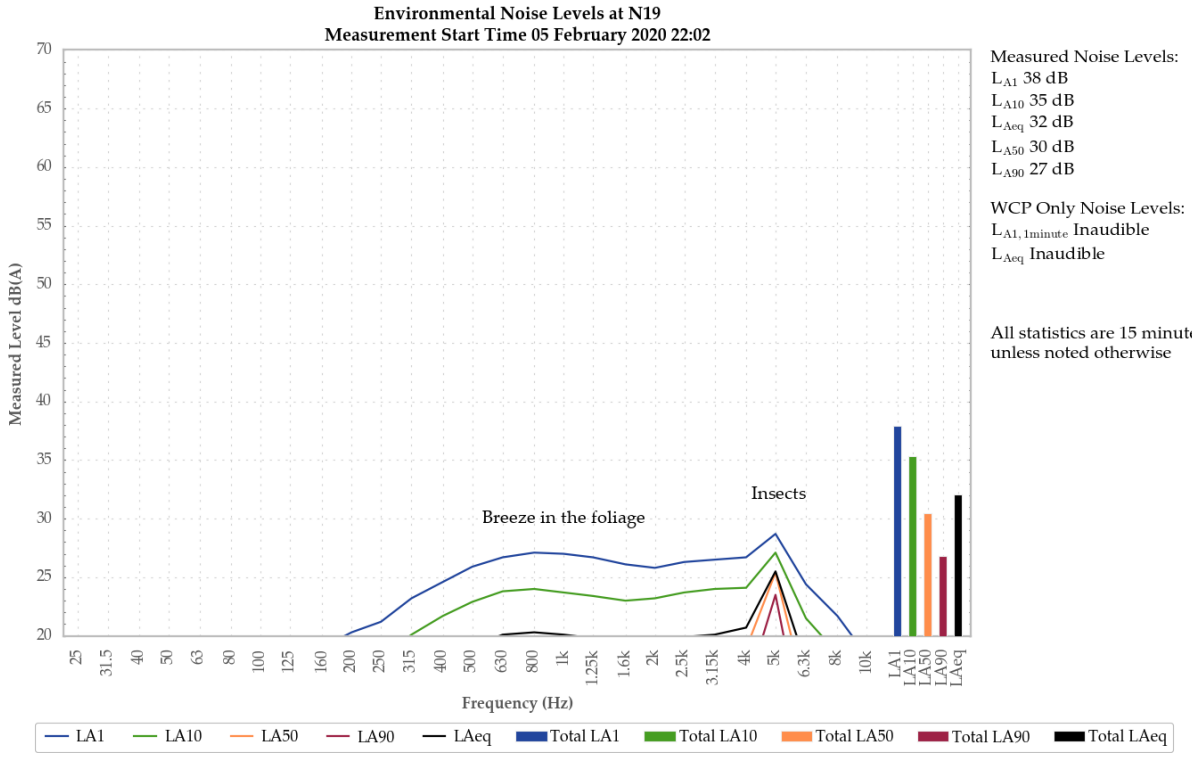


Figure 8: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible.

Insects and breeze in the foliage combined to generate all measured noise levels.

Animals in the foliage, bats and an aircraft were also noted.

5.1.7 N20

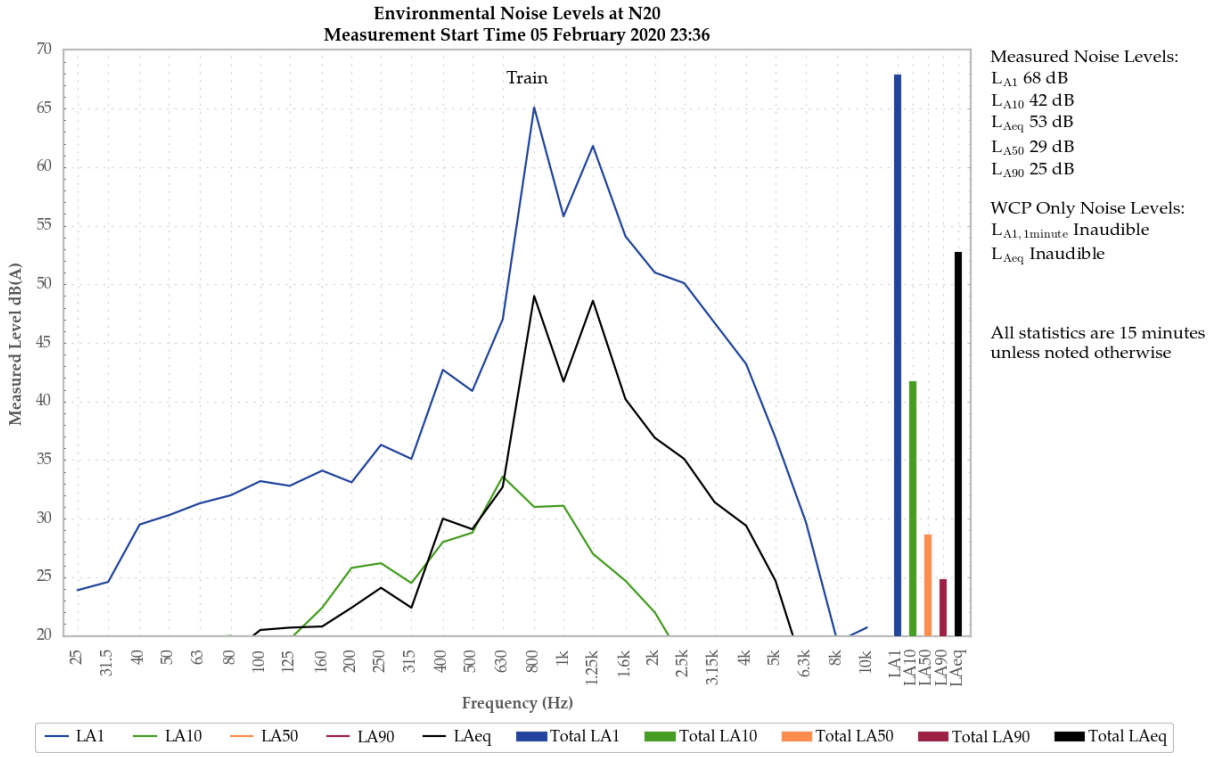


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible.

A train was responsible for the measured L_{A1}, L_{A10} and L_{Aeq}. Insects and breeze in the foliage contributed to the measured L_{A90}.

5.1.8 N21

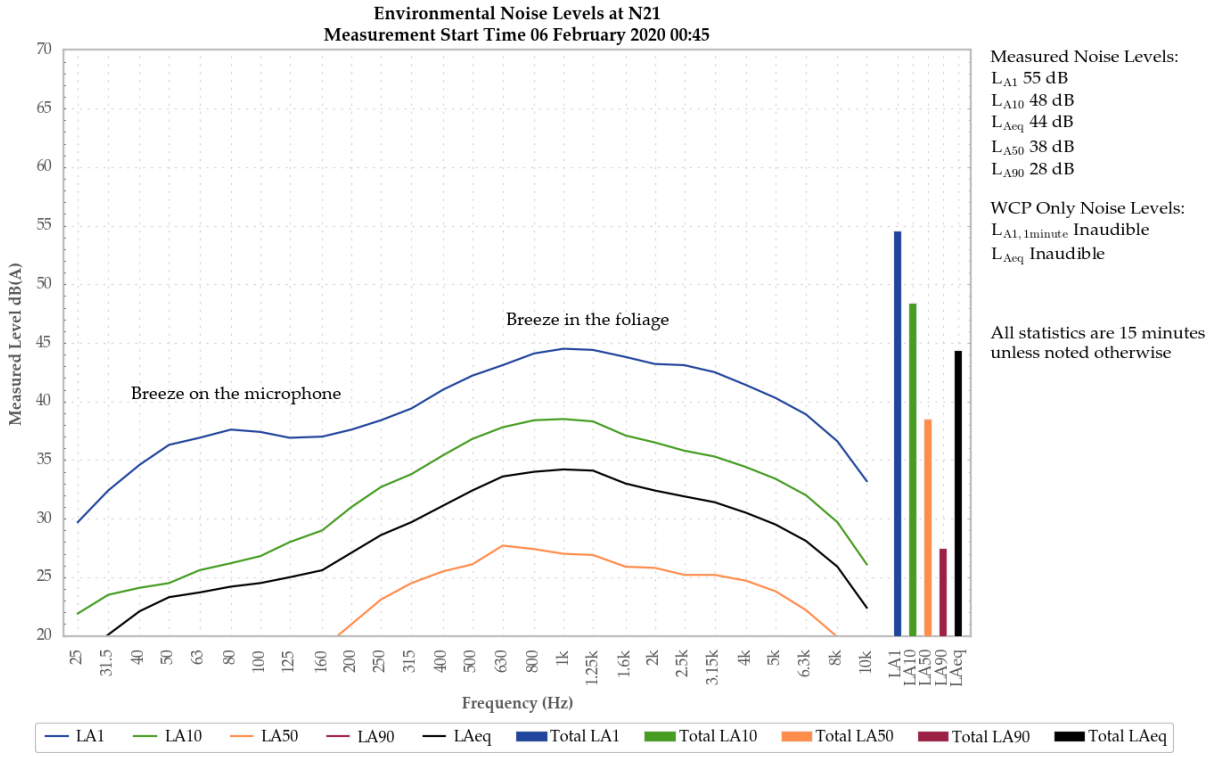


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

WCP was inaudible.

Breeze in the foliage and on the microphone were responsible for all measured levels.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 5/6 February 2020 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the February 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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	40 (internal) When in use			-
900 – St Laurence O'Toole Catholic Church				

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
   - evaluates and reports on:
     - the effectiveness of the noise management system;
     - compliance against the noise criteria in this consent; and
     - compliance against the noise operating conditions;
   - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
   - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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.

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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
Coonaroo	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West 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

Location	Site	Type	Easting[1]	Northing[1]	Justification
Ringwood Road	N20	Operator-attended Noise	785964.2	6419050.6	Location based near to community residence in discussions with DP&E and EPA on the 23 May 2017 to the East of the Mine.
Wandoona	N21	Operator-attended Noise	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP in May 2017.
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DP&E and EPA on the 23 May 2017 to the East of the Mine. N20 operator-attended Noise Monitoring (validation of real-time noise monitoring)
Wandoona[3]	-	Real-Time Noise - Mobile	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP. N21 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 DP&E and EPA of the results of this monitoring and advise if and when the monitoring at this location will be scaled back or discontinued.
3. The real-time noise monitor at Wandoona may be relocated in response to a complaint or identified noise issue at another location.
4. 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**.

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 DP&E and the EPA.

6.3.3 Methodology

Operator-attended noise monitoring will be undertaken at the locations and frequency 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 attended noise monitoring program resumed.

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

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

WCPL will:

a) Take immediate action in accordance with the NMS;
b) Arrange for additional operator-attended noise monitoring to occur at that site within 1 week; and
c) 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.

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.

APPENDIX

B CALIBRATION CERTIFICATES

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 C19342

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thorton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	00701424
Microphone Serial Number :	01916
Pre-amplifier Serial Number :	01463

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	26°C	**Ambient Temperature :**	26°C
Relative Humidity :	40.2%	**Relative Humidity :**	40.7%
Barometric Pressure :	100.96kPa	**Barometric Pressure :**	100.32kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2019
Secondary Check: Eloise Burrows
Report Issue Date : 18 Jun 2019
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 organization 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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate
Calibration Number C18363

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
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 :	21.3°C	**Ambient Temperature :**	22.7°C
Relative Humidity :	41.7%	**Relative Humidity :**	39.2%
Barometric Pressure :	100.95kPa	**Barometric Pressure :**	100.89kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 25 Jun 2018
Secondary Check: Lewis Boorman
Report Issue Date : 25 Jun 2018
Approved Signatory : Juan Aguero

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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.12dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.18dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.31dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19124

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	Pulsar Model 106
Instrument Serial Number :	74813

Atmospheric Conditions

Ambient Temperature :	24°C
Relative Humidity :	50.4%
Barometric Pressure :	99.54kPa

Calibration Technician :	Lucky Jaiswal	**Secondary Check:**	Lewis Boorman
Calibration Date :	21 Feb 2019	**Report Issue Date :**	22 Feb 2019

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
Measured Output	94.0	1000.0	94.0	1000.33

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.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.48%*	*Barometric Pressure*	*±0.015kPa*

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19029

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

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 79631

Atmospheric Conditions
Ambient Temperature : 23.1°C
Relative Humidity : 58.2%
Barometric Pressure : 99.49kPa

Calibration Technician : Charlie Neil
Calibration Date : 22 Jan 2019
Secondary Check: Lewis Boorman
Report Issue Date : 24 Jan 2019
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
Measured Output	94.0	1000.0	94.3	1000.38

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.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.5%*	*Barometric Pressure*	*±0.013kPa*

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 Australian/national standards.

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

Wilpinjong Coal

Environmental Noise Monitoring

March 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring March 2020

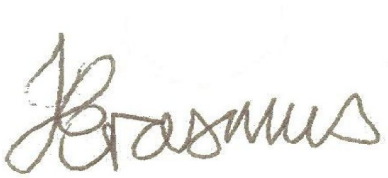
Reference: 20048_R01
Report date: 26 March 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Jonathan Erasmus Consultant	QA Review:	Robert KIrwan Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 11/12 March 2020 at eight locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N13	'Coonaroo' off Moolarben Road, Moolarben
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar
N21	'Wandoona', Barigan Road, Wollar

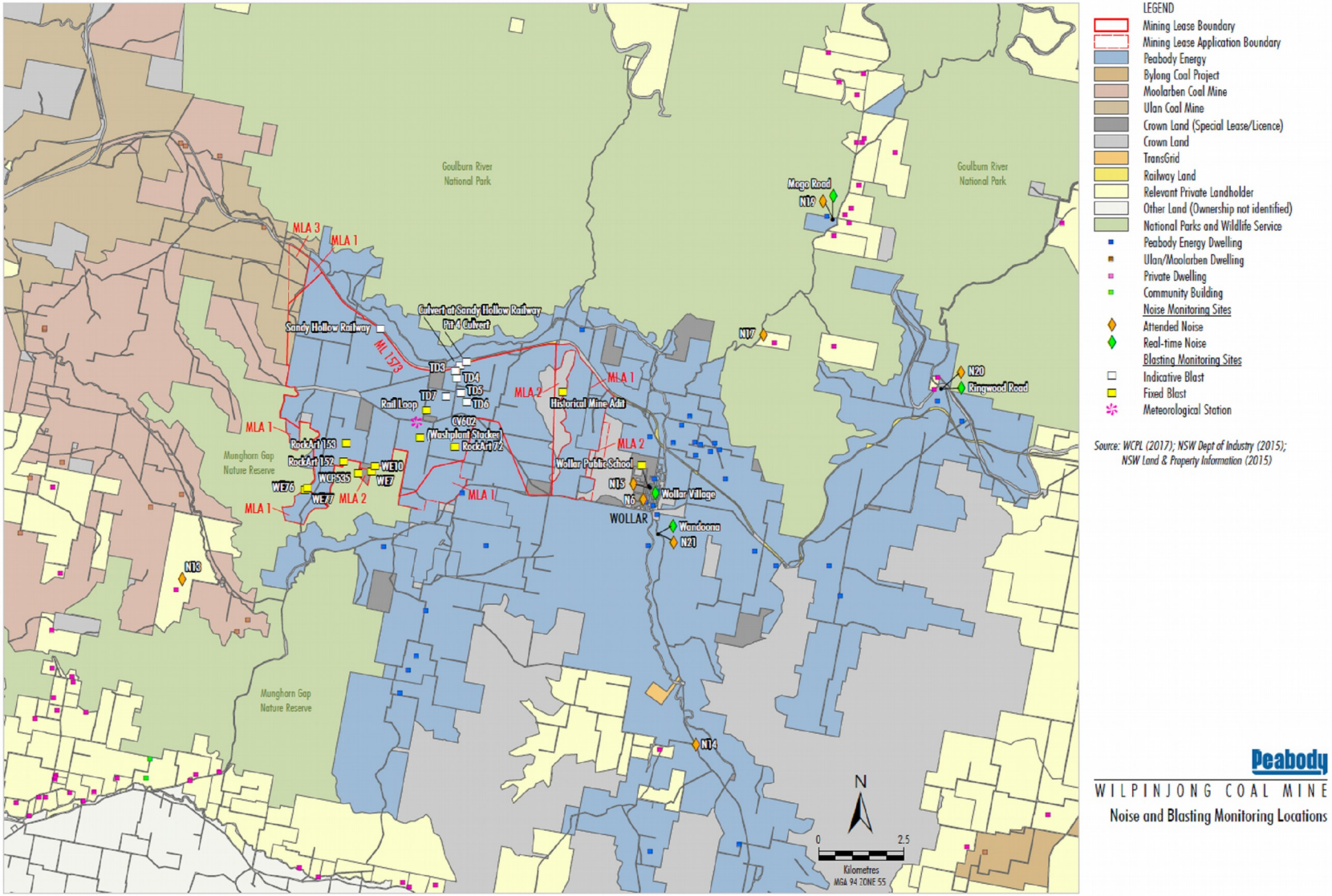


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 2.

Table 2: TERMINOLOGY & 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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in April 2019. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in June 2017. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 3.

Table 3: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45
N21	'Wandoona', Barigan Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017, and supersedes the EPA's Industrial Noise Policy (INP, 2000). Assessment and reporting of modifying factors is to be carried out in accordance with Fact Sheet C of the NPfI.

NPfI modifying factors, as they are applicable to mining noise, are described in more detail below.

2.5.1 Tonal and Intermittent Noise

As defined in the NPfI:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Intermittent noise is noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.*

2.5.2 Low-Frequency Noise

As defined in the NPfI:

> *Low frequency noise is noise with an unbalanced spectrum and containing major components within the low-frequency range (10 – 160 Hz) of the frequency spectrum.*

The NPfI contains the current method of assessing low-frequency noise, which is a 2 step process as detailed below:

> *Measure/assess source contribution C-weighted and A-weighted L_{eq},T levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level is 15 dB or more and:*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by **up to and including** 5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by **more than** 5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 and associated notes from the NPfI is reproduced below:

Table C2: One-third octave low-frequency noise thresholds.

Hz/dB(Z)	One-third octave $L_{Zeq,15min}$ threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Notes:

- dB(Z) = decibel (Z frequency weighted).
- For the assessment of low-frequency noise, care should be taken to select a wind screen that can protect the microphone from wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for

wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler, 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

- Low-frequency noise corrections only apply under the standard and/or noise-enhancing meteorological conditions.
- Where a receiver location has had architectural acoustic treatment applied (including alternative means of mechanical ventilation satisfying the Building Code of Australia) by a proponent, as part of consent requirements or as a private negotiated agreement, alternative external low-frequency noise assessment criteria may be proposed to account for the higher transmission loss of the building façade.
- Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or environment protection licence, and at locations nominated in the development consent or licence.

3 METHODOLOGY

3.1 Overview

Attended environmental noise monitoring was conducted in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Jonathan Erasmus.

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows an accurate determination of the contribution, if any, to measured noise levels by the source of interest (in this case WCP).

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or

- 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 $L_{A1,1minute}$ 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 (i.e. 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 analyser is paused during these occurrences to aid in quantification of the site only $L_{Aeq,15minute}$ level.

3.3 Attended Noise Monitoring

The equipment used to measure environmental noise levels are listed in Table 4. Calibration certificates are included as Appendix B.

Table 4: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	01070590	25/06/2020
Rion NA-28 sound level meter	30131882	05/02/2021
Pulsar 106 acoustic calibrator	79631	22/01/2021
Rion NC-73 acoustic calibrator	11248306	25/06/2020

3.4 Modifying Factors

Years of monitoring have indicated that noise levels from mining operations, particularly those measured at significant distances from the source are relatively continuous and broad spectrum. Given this, noise levels from WCP at the monitoring locations are unlikely to be intermittent or tonal.

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

- meteorological conditions resulted in criteria being applicable;

- contributions from WCP were audible and directly measurable, such that the site-only L_{Aeq} was not "NM" or less than a maximum cut off value (e.g. "<20 dB" or "<30dB");
- contributions from WCP were within 5 dB of the relevant L_{Aeq} criterion, as 5 dB is the maximum penalty that can be applied by low-frequency modifying factors; and
- WCP was the only low-frequency noise source.

All measurements meeting these conditions were evaluated for possible low-frequency penalty applicability in accordance with the NPfI.

3.5 Attended Real-Time Noise Monitor Comparison

WCP only noise levels from four attended monitoring locations are compared to results from nearby Sentinex units. Start times of attended and real-time measurements do not directly overlap. Real-time measurement with the most overlap with attended monitoring times are selected for comparison.

Attended monitoring locations and the real-time monitoring locations they represent are listed in Table 5 and shown in Figure 1.

Table 5: ATTENDED AND REAL-TIME MONITORING LOCATIONS FOR COMPARISON

Report Descriptor for Attended monitoring location	Real-Time Monitor ID	Monitoring Location
NA15	SX33-N1	Wollar Village
NA19	SX32-N1	North Mogo Road
NA20	SX30-N1	Ringwood Road, off Wollar Road
NA21	SX31-N1	'Wandoona', Barigan Road

4 RESULTS

4.1 Total Measured Noise Levels

Overall noise levels measured at each location during attended measurement are provided in Table 6. Discussion as to the noise sources responsible for these measured levels is provided in Chapter 5 of this report.

Table 6: MEASURED NOISE LEVELS – MARCH 2020[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	L_{Ceq} dB
N6	11/03/2020 23:11	44	38	34	30	28	25	23	47
N13	12/03/2020 00:53	46	35	32	31	30	29	27	49
N14	12/03/2020 00:16	50	32	23	24	20	18	16	54
N15	11/03/2020 22:52	48	38	35	31	29	27	25	46
N17	11/03/2020 22:24	48	34	31	29	28	26	23	54
N19	11/03/2020 22:00	50	47	44	40	36	33	30	51
N20	11/03/2020 23:40	36	34	33	28	25	22	20	47
N21	12/03/2020 00:40	46	32	26	25	24	23	21	53

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey.

None of the measurements satisfied the conditions outlined in Section 3.4 when assessing low-frequency noise. Therefore no further assessment of modifying factors was undertaken.

4.3 Attended Noise Monitoring

Table 7 to Table 8detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 7: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MARCH 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	11/03/2020 23:11	3.3	E	37	No	IA	NA
N13	12/03/2020 00:53	2.6	E	35	Yes	28	Nil
N14	12/03/2020 00:16	3.1	E	35	No	IA	NA
N15	11/03/2020 22:52	3.5	E	37	No	IA	NA
N17	11/03/2020 22:24	3.5	E	38	No	IA	NA
N19	11/03/2020 22:00	3.8	E	35	No	IA	NA
N20	11/03/2020 23:40	3.2	E	35	No	IA	NA
N21	12/03/2020 00:40	2.9	E	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 8: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MARCH 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	11/03/2020 23:11	3.3	E	45	No	IA	NA
N13	12/03/2020 00:53	2.6	E	45	Yes	31	Nil
N14	12/03/2020 00:16	3.1	E	45	No	IA	NA
N15	11/03/2020 22:52	3.5	E	45	No	IA	NA
N17	11/03/2020 22:24	3.5	E	45	No	IA	NA
N19	11/03/2020 22:00	3.8	E	45	No	IA	NA
N20	11/03/2020 23:40	3.2	E	45	No	IA	NA
N21	12/03/2020 00:40	2.9	E	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*

2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.4 Comparison of real time and attended noise results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 9. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 9: REAL-TIME AND ATTENDED NOISE LEVELS, MARCH 2020[1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data[1]			Attended measurement
			Total L_{Aeq} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	11/03/2020 22:52	11/03/2020 22:45	45	27	26	IA
N19/SX32	11/03/2020 22:00	11/03/2020 22:00	37	35	30	IA
N20/SX30	11/03/2020 23:40	11/03/2020 23:45	28	23	18	IA
N21/SX31	12/03/2020 00:40	12/03/2020 00:45	28	24	NR	IA

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 10. 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 10: MEASURED ATMOSPHERIC CONDITIONS – MARCH 2020

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	11/03/2020 23:11	19	2.3	60	0
N13	12/03/2020 00:53	17	1.0	120	1
N14	12/03/2020 00:16	18	-	-	1
N15	11/03/2020 22:52	19	1.7	80	0
N17	11/03/2020 22:24	18	-	-	0
N19	11/03/2020 22:00	18	1.4	30	0

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N20	11/03/2020 23:40	18	1.6	100	0
N21	12/03/2020 00:40	19	-	-	0

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

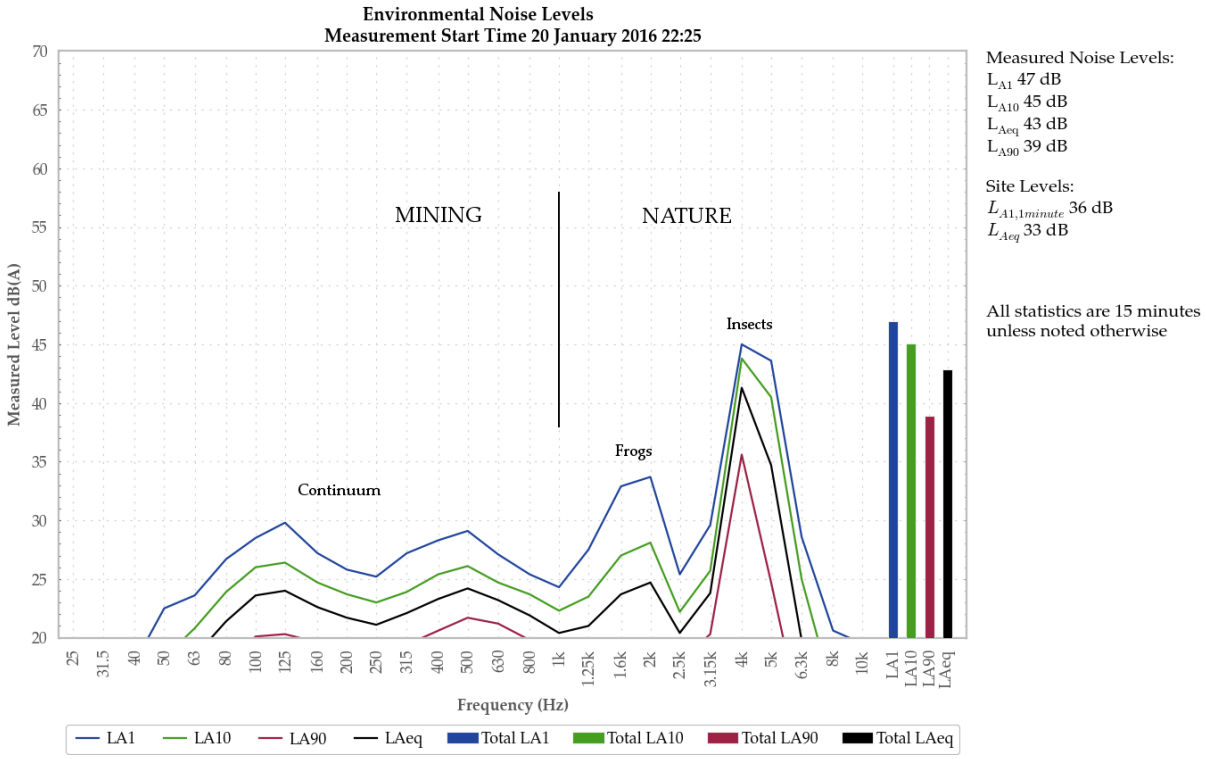


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

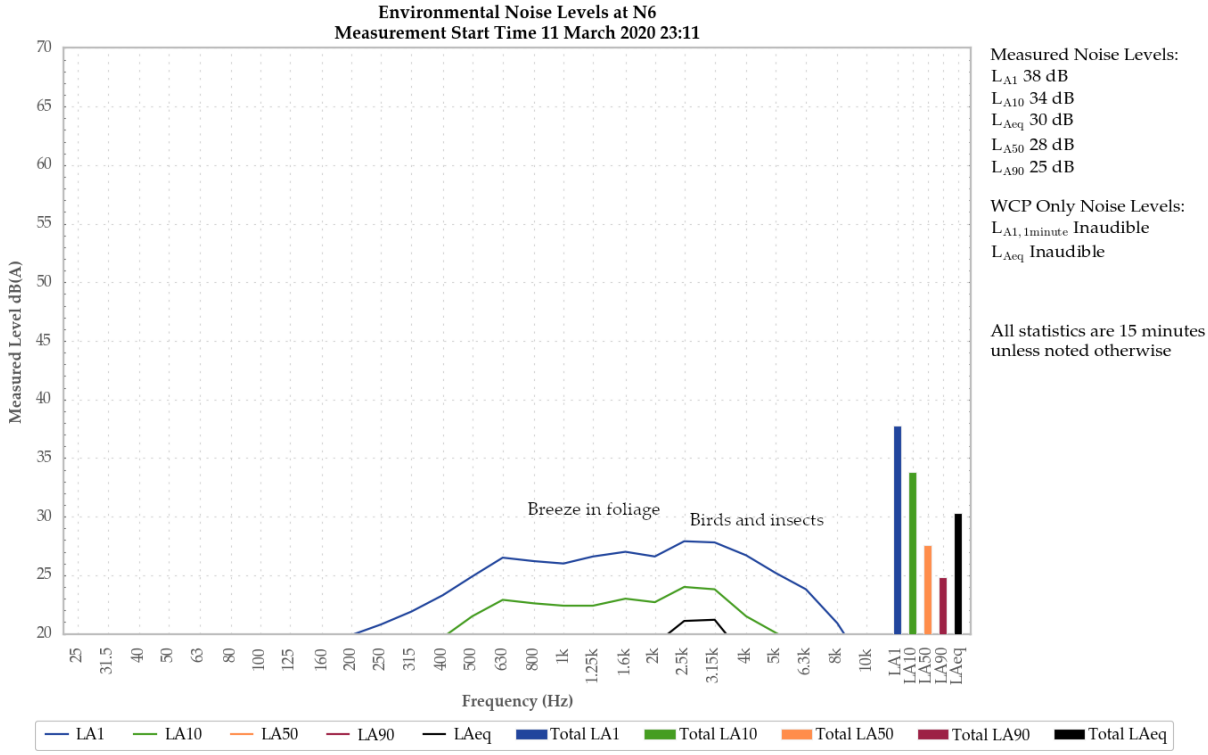


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Birds, insects, and breeze in foliage generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Insects and breeze in foliage generated the measured L_{A50} and L_{A90}.

A train and dogs were also noted.

5.1.2 N13

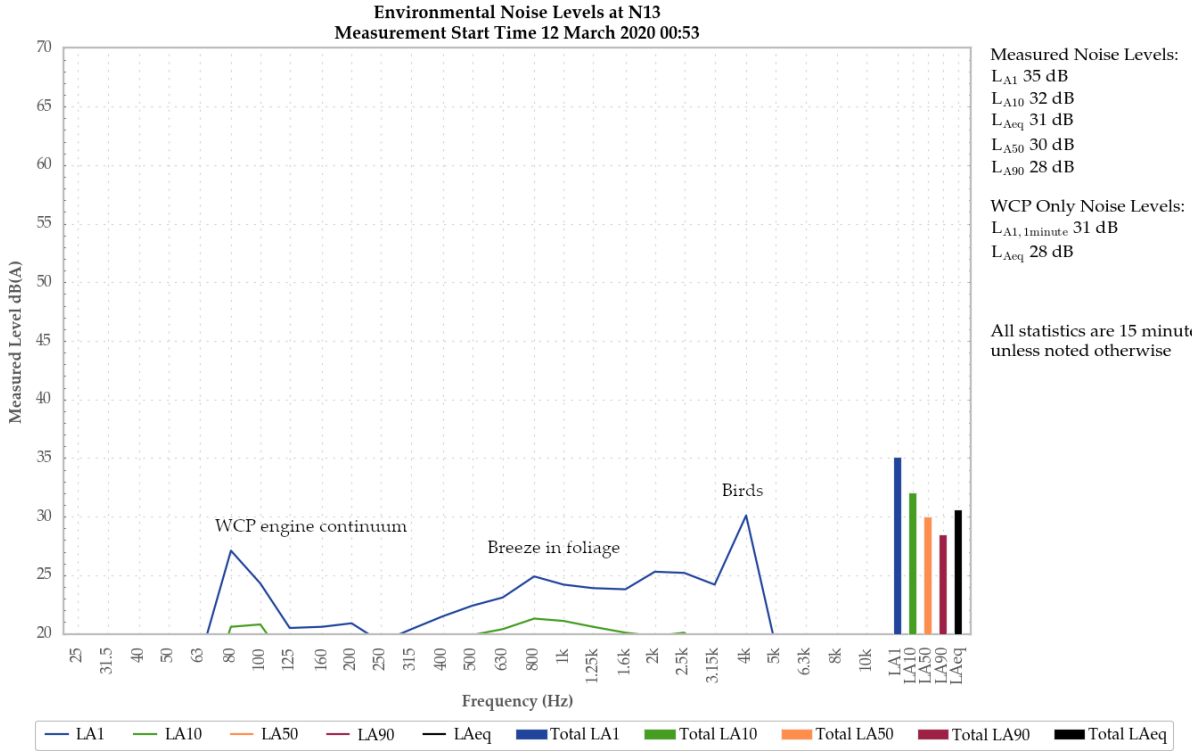


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

An engine continuum from WCP was audible throughout the measurement generating a site only L_{Aeq} of 28 and $L_{A1,1minute}$ of 31 dB.

Birds, WCP engine surges and breeze in foliage generated the measured L_{A1} and L_{Aeq}. WCP engine continuum and breeze in foliage generated the measured L_{A10}, L_{A50}, and L_{A90}.

Frogs, insects, and bats were also noted.

5.1.3 N14

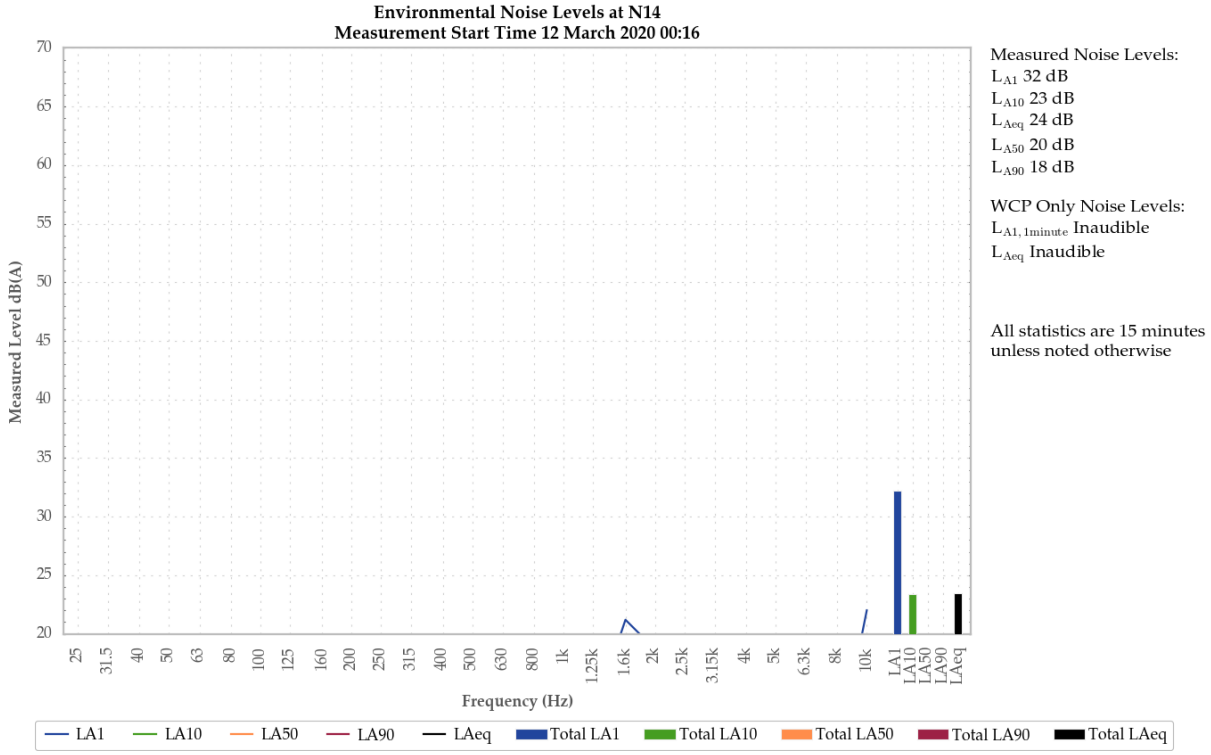


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Birds, frogs, and insects generated the measured L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

5.1.4 N15

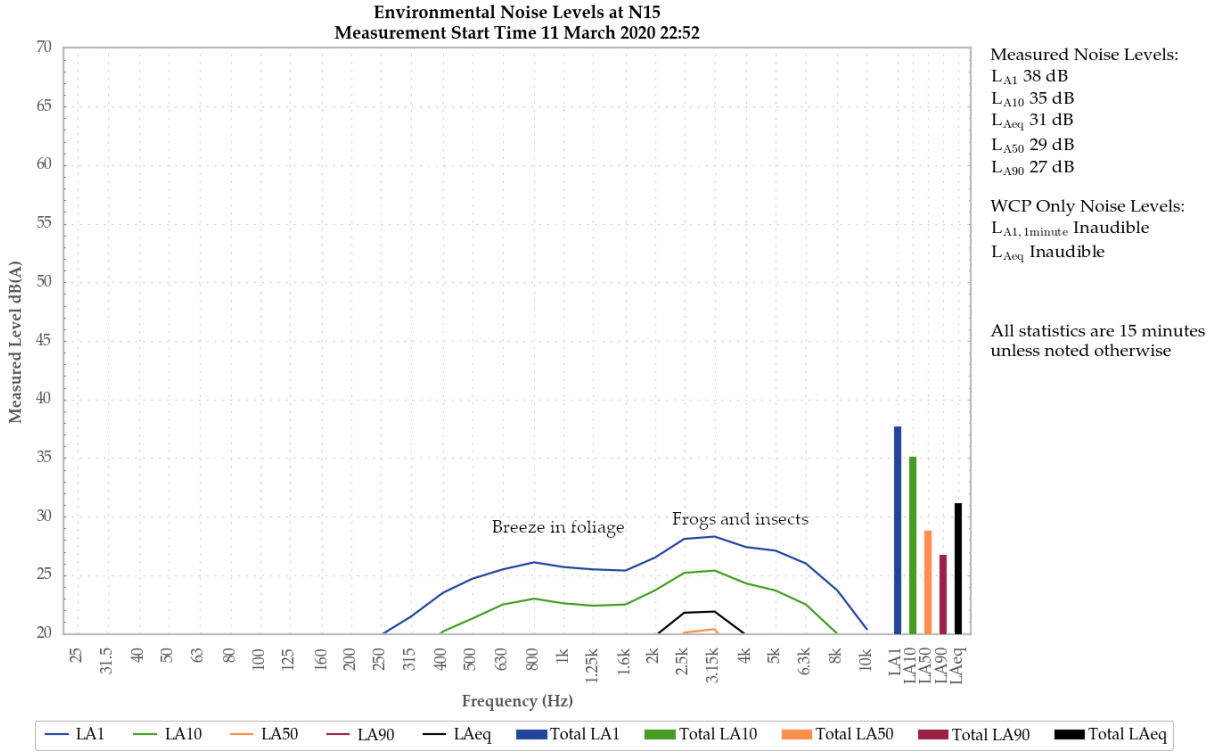


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Frogs, insects, and breeze in foliage generated the measured L_{A1} and L_{A10}. Insects and frogs generated the measured L_{Aeq}, L_{A50}, and L_{A90}.

5.1.5 N17

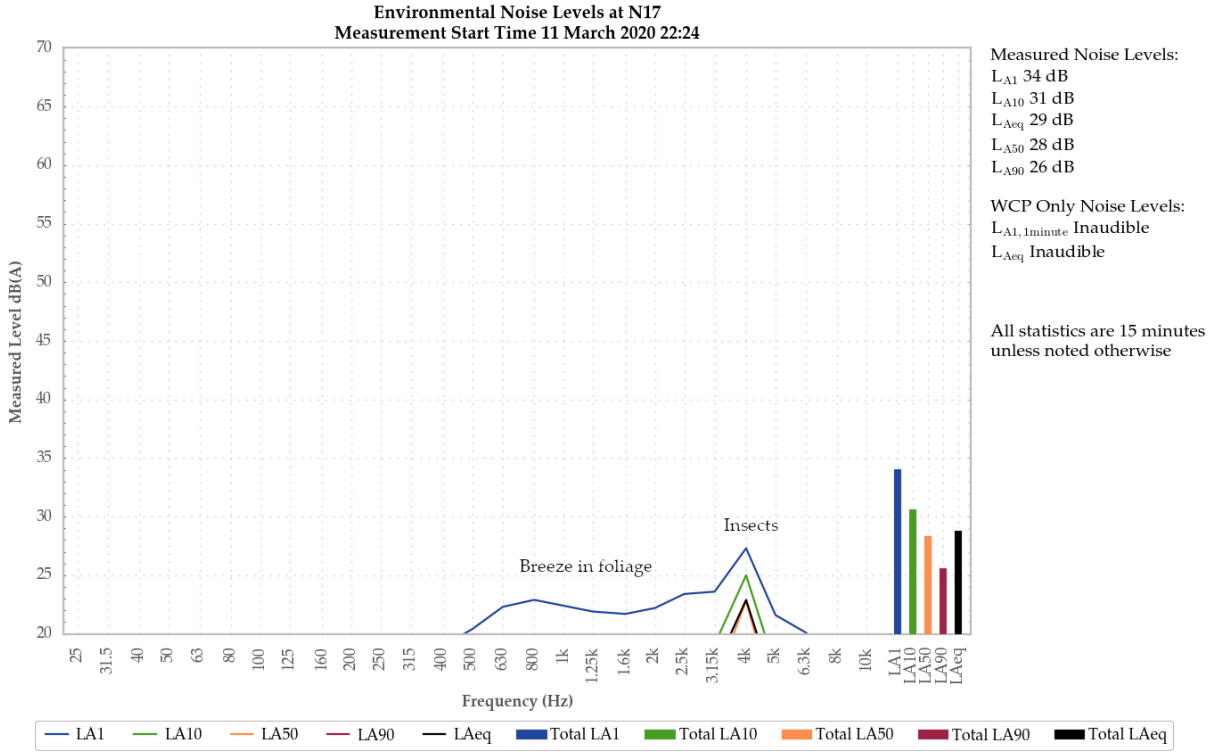


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

WCP was inaudible.

Insects and breeze in foliage generated the measured L_{A1}. Insects generated the measured L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

Bats and an aircraft were also noted.

5.1.6 N19

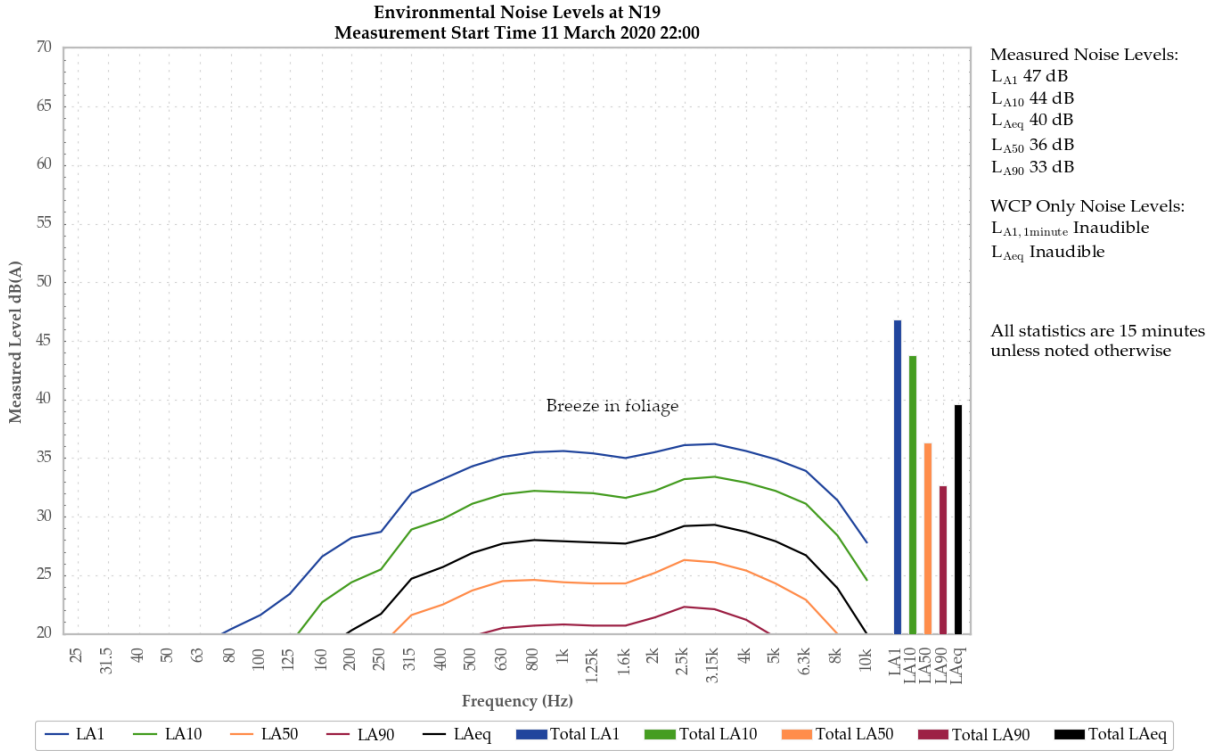


Figure 8: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible.

Breeze in foliage generated the measured L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

Frogs and insects were also noted.

5.1.7 N20

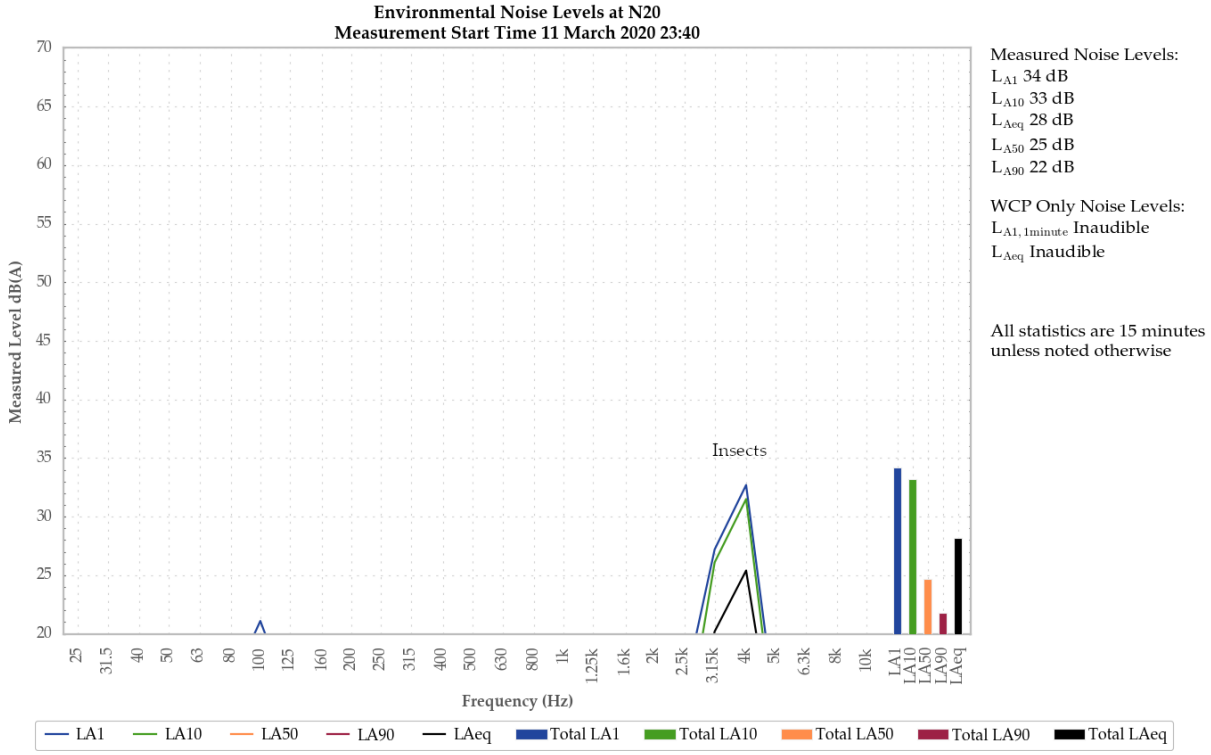


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible.

Insects generated the measured L_{A1}, L_{A10}, L_{Aeq}, L_{A50}, and L_{A90}.

Farm equipment noise and breeze in foliage were also noted.

5.1.8 N21

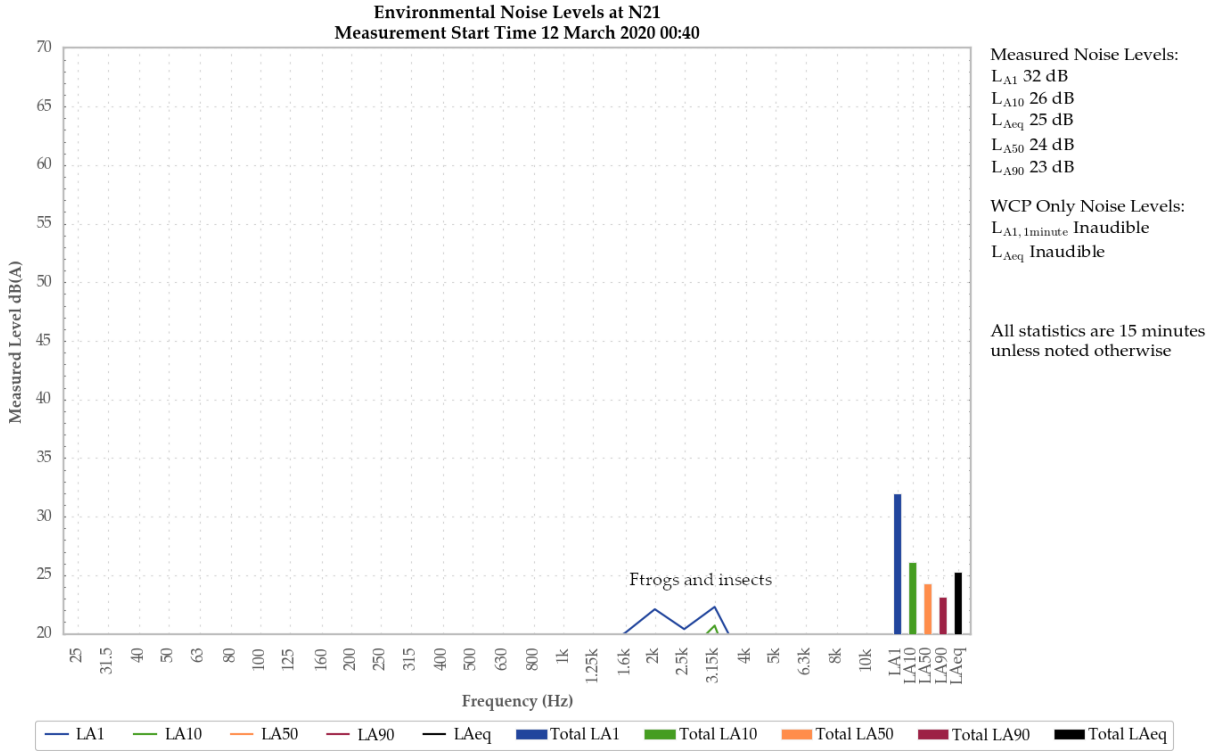


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

WCP was inaudible.

Frogs and insects generated the measured LA1and L_{A10} and with a train the measured L_{Aeq}, L_{A50}, and L_{A90}.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 11/12 March 2020 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the March 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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	40 (internal) When in use			-
900 – St Laurence O'Toole Catholic Church				

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
   - evaluates and reports on:
     - the effectiveness of the noise management system;
     - compliance against the noise criteria in this consent; and
     - compliance against the noise operating conditions;
   - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
   - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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.

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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
Coonaroo	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West 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

Location	Site	Type	Easting[1]	Northing[1]	Justification
Ringwood Road	N20	Operator-attended Noise	785964.2	6419050.6	Location based near to community residence in discussions with DP&E and EPA on the 23 May 2017 to the East of the Mine.
Wandoona	N21	Operator-attended Noise	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP in May 2017.
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DP&E and EPA on the 23 May 2017 to the East of the Mine. N20 operator-attended Noise Monitoring (validation of real-time noise monitoring)
Wandoona[3]	-	Real-Time Noise - Mobile	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP. N21 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 DP&E and EPA of the results of this monitoring and advise if and when the monitoring at this location will be scaled back or discontinued.
3. The real-time noise monitor at Wandoona may be relocated in response to a complaint or identified noise issue at another location.
4. 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**.

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 DP&E and the EPA.

6.3.3 Methodology

Operator-attended noise monitoring will be undertaken at the locations and frequency 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 attended noise monitoring program resumed.

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

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

WCPL will:

a) Take immediate action in accordance with the NMS;
b) Arrange for additional operator-attended noise monitoring to occur at that site within 1 week; and
c) 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

6.3.6 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.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate
Calibration Number C18363

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
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 :	21.3°C	**Ambient Temperature :**	22.7°C
Relative Humidity :	41.7%	**Relative Humidity :**	39.2%
Barometric Pressure :	100.95kPa	**Barometric Pressure :**	100.89kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 25 Jun 2018
Secondary Check: Lewis Boorman
Report Issue Date : 25 Jun 2018
Approved Signatory : Juan Aguero

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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.12dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.18dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.31dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19073

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	NA-28
Instrument Serial Number :	30131882
Microphone Serial Number :	04739
Pre-amplifier Serial Number :	11942

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	24.5°C	**Ambient Temperature :**	23.6°C
Relative Humidity :	54.5%	**Relative Humidity :**	51%
Barometric Pressure :	99.39kPa	**Barometric Pressure :**	99.36kPa

Calibration Technician : Charlie Neil
Calibration Date : 5 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019

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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

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.

Accoustic 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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator

IEC 60942-2017

Calibration Certificate

Calibration Number C19029

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

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 79631

Atmospheric Conditions
Ambient Temperature : 23.1°C
Relative Humidity : 58.2%
Barometric Pressure : 99.49kPa

Calibration Technician : Charlie Neil
Calibration Date : 22 Jan 2019
Secondary Check: Lewis Boorman
Report Issue Date : 24 Jan 2019

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
Measured Output	94.0	1000.0	94.3	1000.38

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.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.5%*	*Barometric Pressure*	*±0.013kPa*

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C18364

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

Equipment Tested/ Model Number : Rion NC-73
Instrument Serial Number : 11248306

Atmospheric Conditions
Ambient Temperature : 20.9°C
Relative Humidity : 43.3%
Barometric Pressure : 100.73kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 25 Jun 2018
Secondary Check: Lewis Boorman
Report Issue Date : 26 Jun 2018
Approved Signatory : Ken Williams

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

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
Measured Output	94.0	1000.0	94.0	991.10

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.06dB*	*Relative Humidity*	*±2.5%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.017kPa*
Distortion	*±0.5%*		

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 Australian/national standards.

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

Wilpinjong Coal

Environmental Noise Monitoring

April 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring
April 2020

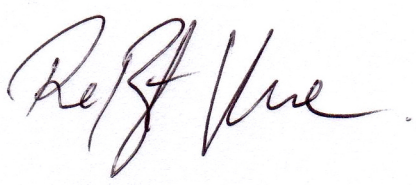
Reference: 20066_R01
Report date: 11 May 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Jesse Tribby Consultant	QA Review:	Robert Kirwan Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 20/21 April 2020 at eight locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N13	'Coonaroo' off Moolarben Road, Moolarben
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar
N21	'Wandoona', Barigan Road, Wollar

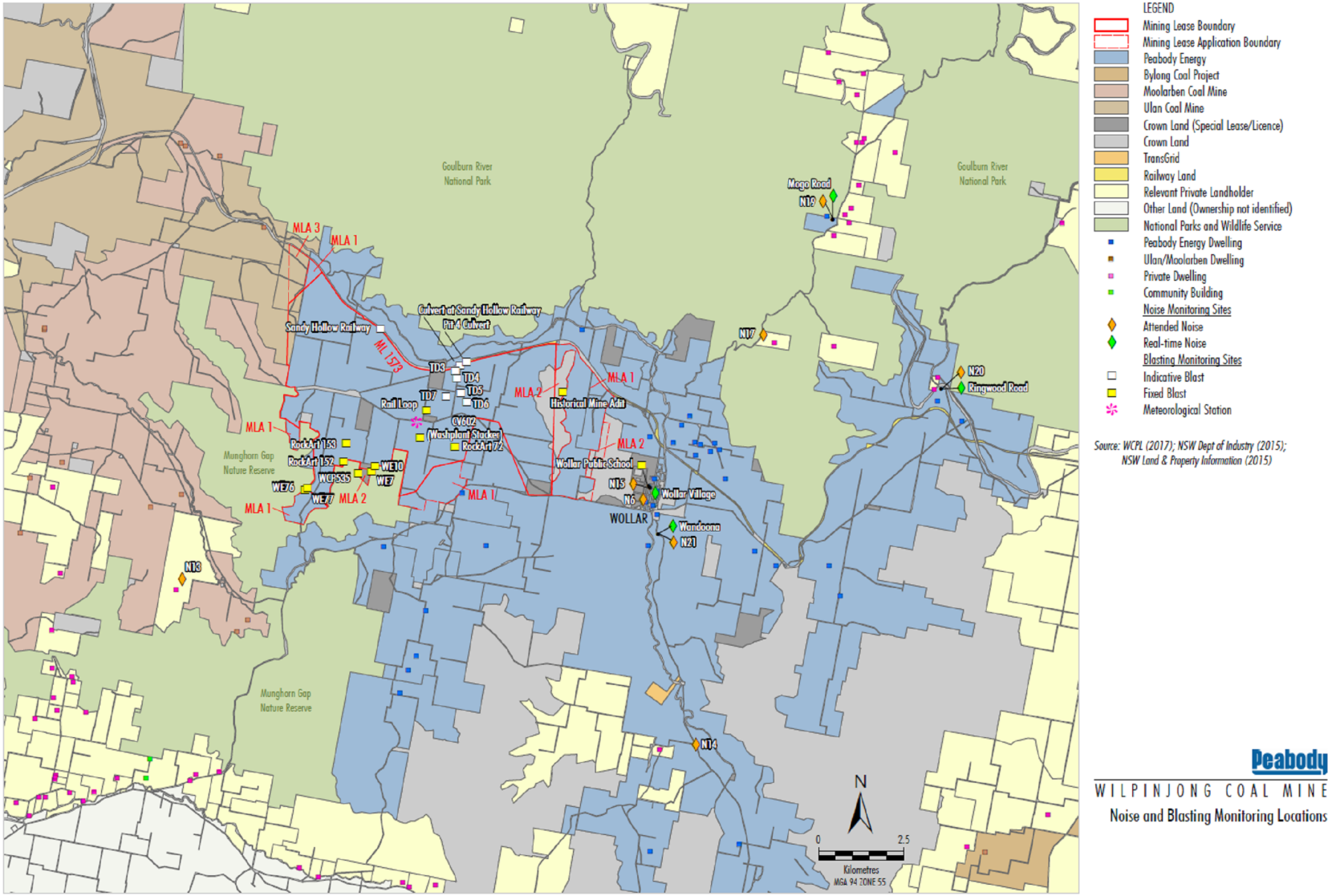


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in April 2019. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in June 2017. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45
N21	'Wandoona', Barigan Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017, and supersedes the EPA's Industrial Noise Policy (INP, 2000). Assessment and reporting of modifying factors is to be carried out in accordance with Fact Sheet C of the NPfI.

NPfI modifying factors, as they are applicable to mining noise, are described in more detail below.

2.5.1 Tonal and Intermittent Noise

As defined in the NPfI:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Intermittent noise is noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.*

2.5.2 Low-Frequency Noise

As defined in the NPfI:

> *Low frequency noise is noise with an unbalanced spectrum and containing major components within the low-frequency range (10 – 160 Hz) of the frequency spectrum.*

The NPfI contains the current method of assessing low-frequency noise, which is a 2 step process as detailed below:

> *Measure/assess source contribution C-weighted and A-weighted L_{eq},T levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level is 15 dB or more and:*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by **up to and including** 5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by **more than** 5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 and associated notes from the NPfI is reproduced below:

Table C2: One-third octave low-frequency noise thresholds.

Hz/dB(Z)	One-third octave $L_{Zeq,15min}$ threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Notes:

- dB(Z) = decibel (Z frequency weighted).
- For the assessment of low-frequency noise, care should be taken to select a wind screen that can protect the microphone from wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for

wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler, 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

- Low-frequency noise corrections only apply under the standard and/or noise-enhancing meteorological conditions.
- Where a receiver location has had architectural acoustic treatment applied (including alternative means of mechanical ventilation satisfying the Building Code of Australia) by a proponent, as part of consent requirements or as a private negotiated agreement, alternative external low-frequency noise assessment criteria may be proposed to account for the higher transmission loss of the building façade.
- Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or environment protection licence, and at locations nominated in the development consent or licence.

3 METHODOLOGY

3.1 Overview

Attended environmental noise monitoring was conducted in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Ryan Bruniges.

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows an accurate determination of the contribution, if any, to measured noise levels by the source of interest (in this case WCP).

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or

- 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 $L_{A1,1minute}$ 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 (i.e. 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 analyser is paused during these occurrences to aid in quantification of the site only $L_{Aeq,15minute}$ level.

3.3 Monitoring Equipment

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	00701424	14/06/2021
Rion NA-28 sound level meter	30131882	05/02/2021
Pulsar 106 acoustic calibrator	74813	21/02/2021
Pulsar 105 acoustic calibrator	78226	01/02/2021

3.4 Modifying Factors

Years of monitoring have indicated that noise levels from mining operations, particularly those measured at significant distances from the source are relatively continuous and broad spectrum. Given this, noise levels from WCP at the monitoring locations are unlikely to be intermittent or tonal.

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

- meteorological conditions resulted in criteria being applicable;

- contributions from WCP were audible and directly measurable, such that the site-only L_{Aeq} was not "NM" or less than a maximum cut off value (e.g. "<20 dB" or "<30dB");
- contributions from WCP were within 5 dB of the relevant L_{Aeq} criterion, as 5 dB is the maximum penalty that can be applied by low-frequency modifying factors; and
- WCP was the only low-frequency noise source.

All measurements meeting these conditions were evaluated for possible low-frequency penalty applicability in accordance with the NPfI.

3.5 Attended Real-Time Noise Monitor Comparison

WCP only noise levels from four attended monitoring locations are compared to results from nearby Sentinex units. Start times of attended and real-time measurements do not directly overlap. Real-time measurement with the most overlap with attended monitoring times are selected for comparison.

Attended monitoring locations and the real-time monitoring locations they represent are listed in Table 3.2 and shown in Figure 1.

Table 3.2: ATTENDED AND REAL-TIME MONITORING LOCATIONS FOR COMPARISON

Report Descriptor for Attended monitoring location	Real-Time Monitor ID	Monitoring Location
NA15	SX33-N1	Wollar Village
NA19	SX32-N1	North Mogo Road
NA20	SX30-N1	Ringwood Road, off Wollar Road
NA21	SX31-N1	'Wandoona', Barigan Road

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – APRIL 2020[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
N6	21/04/2020 01:57	45	36	33	30	29	27	24
N13	21/04/2020 01:09	46	30	23	22	20	18	17
N14	21/04/2020 00:58	37	28	25	24	23	22	20
N15	20/04/2020 23:36	46	37	34	32	31	28	26
N17	20/04/2020 22:55	47	39	34	32	30	29	26
N19	20/04/2020 22:26	52	30	24	23	21	20	18
N20	21/04/2020 00:15	53	32	27	26	23	19	18
N21	21/04/2020 01:27	50	40	36	34	33	31	28

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey.

One of the measurements in this survey satisfied the conditions outlined in Section 3.4 and were assessed for low-frequency modifying factors in Table 4.2.

Table 4.2: LOW-FREQUENCY MODIFYING FACTOR ASSESSMENT – APRIL 2020

Location	Start Date and Time	Measured WCP-only L_{Aeq} dB	Measured WCP-only L_{Ceq} dB	WCP-only $L_{Ceq} - L_{Aeq}$ dB[1]	Max exceedance of ref spectrum Result[2]	Penalty dB[3]
N21	21/04/2020 01:27	34	49	15	Nil	Nil

Notes:

1. *As per NPfI, if $L_{Ceq} - L_{Aeq} \geq 15$ dB further assessment of low- frequency noise required as detailed in Sections 2.5.2 and 3.4 of this report;*
2. *As per NPfI, compare measured spectrum against reference spectrum to determine if the low-frequency modifying factor is triggered and application of penalty is required; and*
3. *Bold results indicate that NPfI low-frequency modifying factor has been triggered and application of correction is required.*

4.3 Attended Noise Monitoring

Table 4.3 to Table 4.4 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.3: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – APRIL 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	21/04/2020 01:57	0.7	F	37	Yes	30	Nil
N13	21/04/2020 01:09	1.0	F	35	Yes	IA	Nil
N14	21/04/2020 00:58	0.7	F	35	Yes	<20	Nil
N15	20/04/2020 23:36	0.0	F	37	Yes	31	Nil
N17	20/04/2020 22:55	0.0	F	38	Yes	31	Nil
N19	20/04/2020 22:26	0.0	F	35	Yes	<25	Nil
N20	21/04/2020 00:15	0.0	F	35	Yes	<25	Nil
N21	21/04/2020 01:27	0.8	F	35	Yes	34	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.4: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – APRIL 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	21/04/2020 01:57	0.7	F	45	Yes	37	Nil
N13	21/04/2020 01:09	1.0	F	45	Yes	IA	Nil
N14	21/04/2020 00:58	0.7	F	45	Yes	<20	Nil
N15	20/04/2020 23:36	0.0	F	45	Yes	39	Nil
N17	20/04/2020 22:55	0.0	F	45	Yes	38	Nil
N19	20/04/2020 22:26	0.0	F	45	Yes	<25	Nil
N20	21/04/2020 00:15	0.0	F	45	Yes	<25	Nil
N21	21/04/2020 01:27	0.8	F	45	Yes	41	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*

2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.4 Comparison of real time and attended noise results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.5. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.5: REAL-TIME AND ATTENDED NOISE LEVELS, APRIL 2020[1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data[1]			Attended measurement
			Total L_{Aeq} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	20/04/2020 23:36	20/04/2020 23:30	37	36	NR	31
N19/SX32	20/04/2020 22:26	20/04/2020 22:30	23	20	18	<25
N20/SX30	21/04/2020 00:15	21/04/2020 00:15	29	24	20	<25
N21/SX31	21/04/2020 01:27	21/04/2020 01:30	NR	NR	NR	34

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.6. 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 4.6: MEASURED ATMOSPHERIC CONDITIONS – APRIL 2020

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	21/04/2020 01:57	11	0.0	-	0
N13	21/04/2020 01:09	11	0.6	90	0
N14	21/04/2020 00:58	12	0.0	-	0
N15	20/04/2020 23:36	15	0.0	-	0
N17	20/04/2020 22:55	13	0.0	-	0
N19	20/04/2020 22:26	16	0.0	-	0

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N20	21/04/2020 00:15	11	0.0	-	0
N21	21/04/2020 01:27	11	0.0	-	0

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

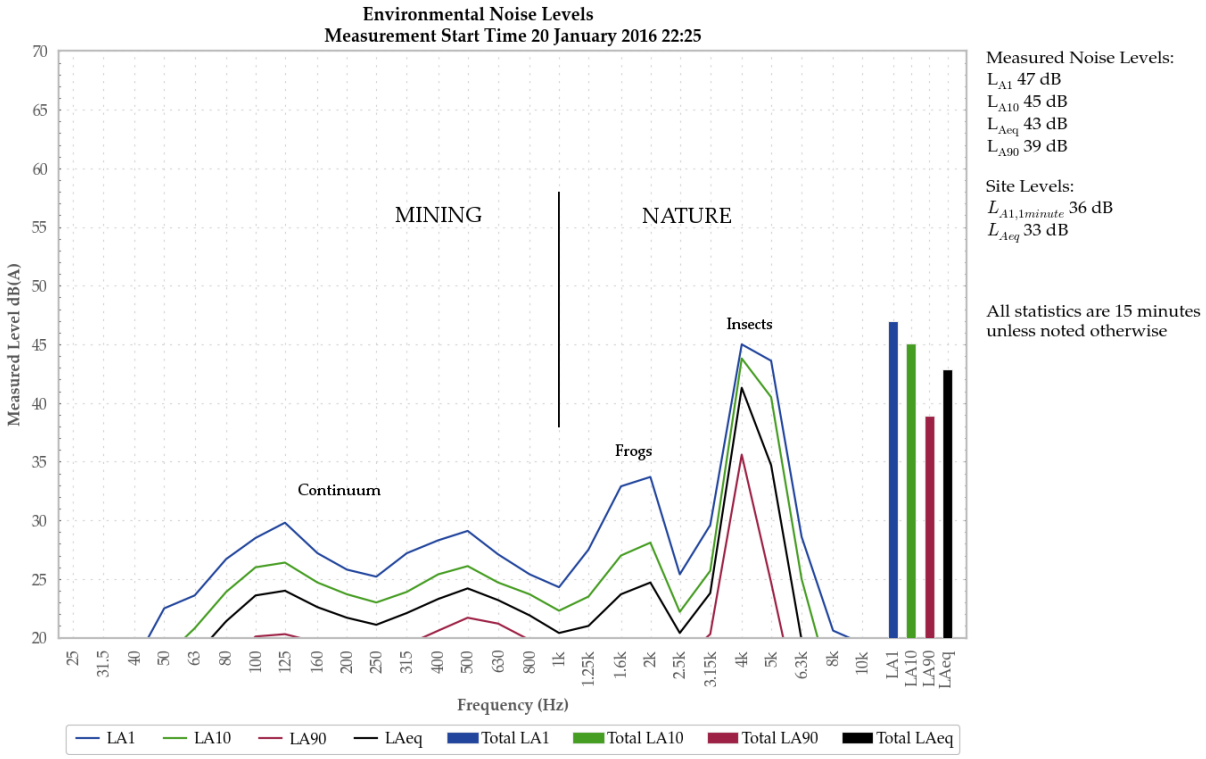


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

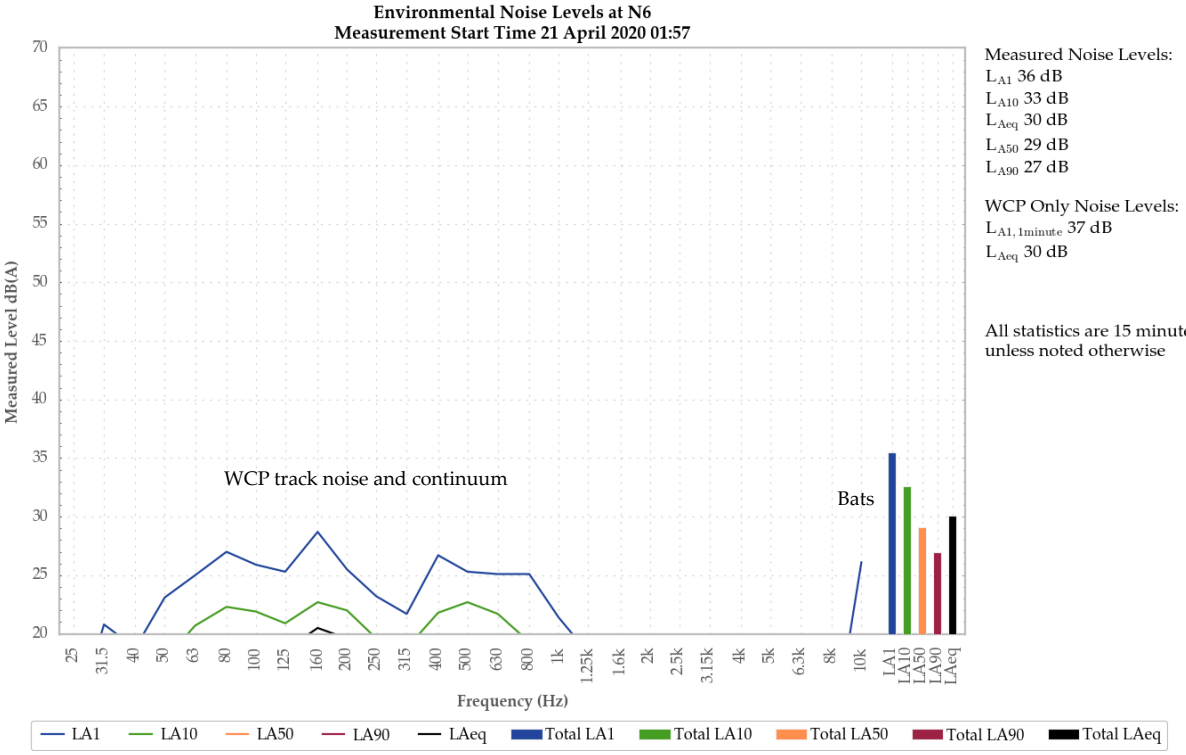


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

Track noise and mining continuum from WCP was audible throughout the measurement and generated the measured site-only L_{Aeq} of 30 dB. An engine and exhaust surge generated the measured $L_{A1,1minute}$ of 37 dB.

Continuum and mining noise sources from WCP were responsible for the measured noise levels.

Bats and insects were also noted.

5.1.2 N13

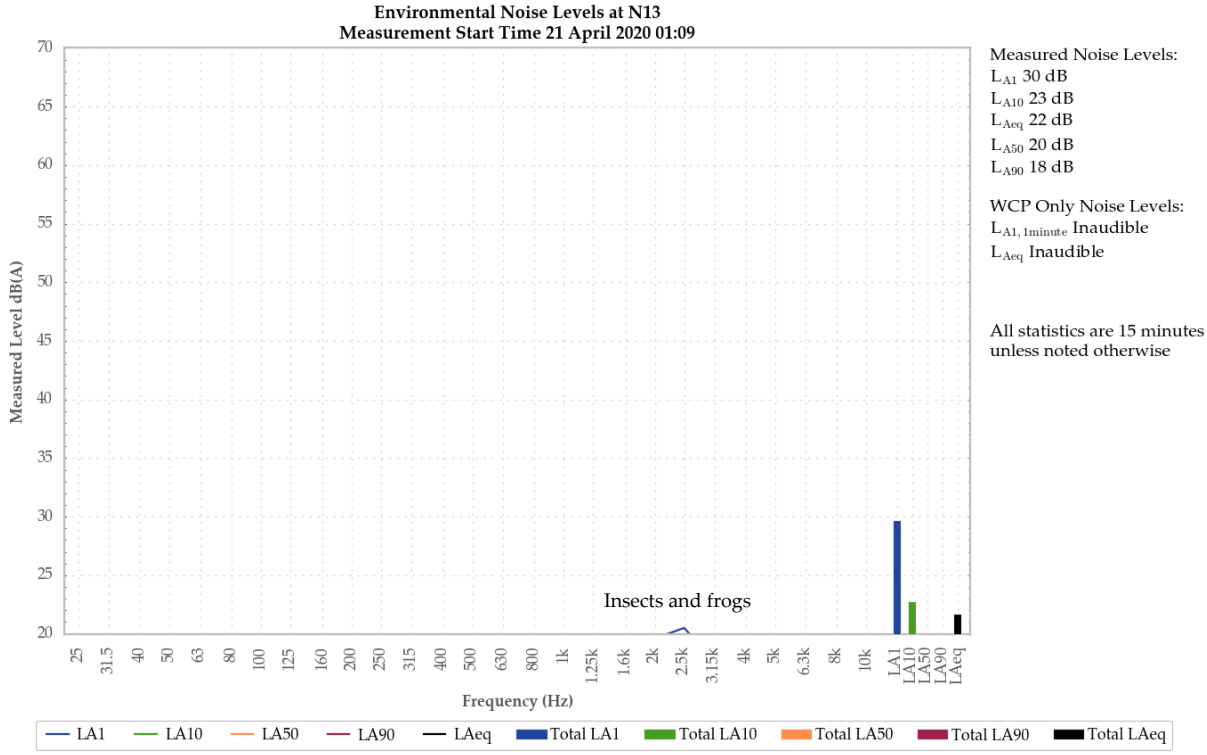


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible during the measurement.

Insects and frogs were primarily responsible for the measured noise levels. The noise floor of the measurement instrument also contributed to the measured L_{A50} and L_{A90}.

Birds and bats were also noted.

5.1.3 N14

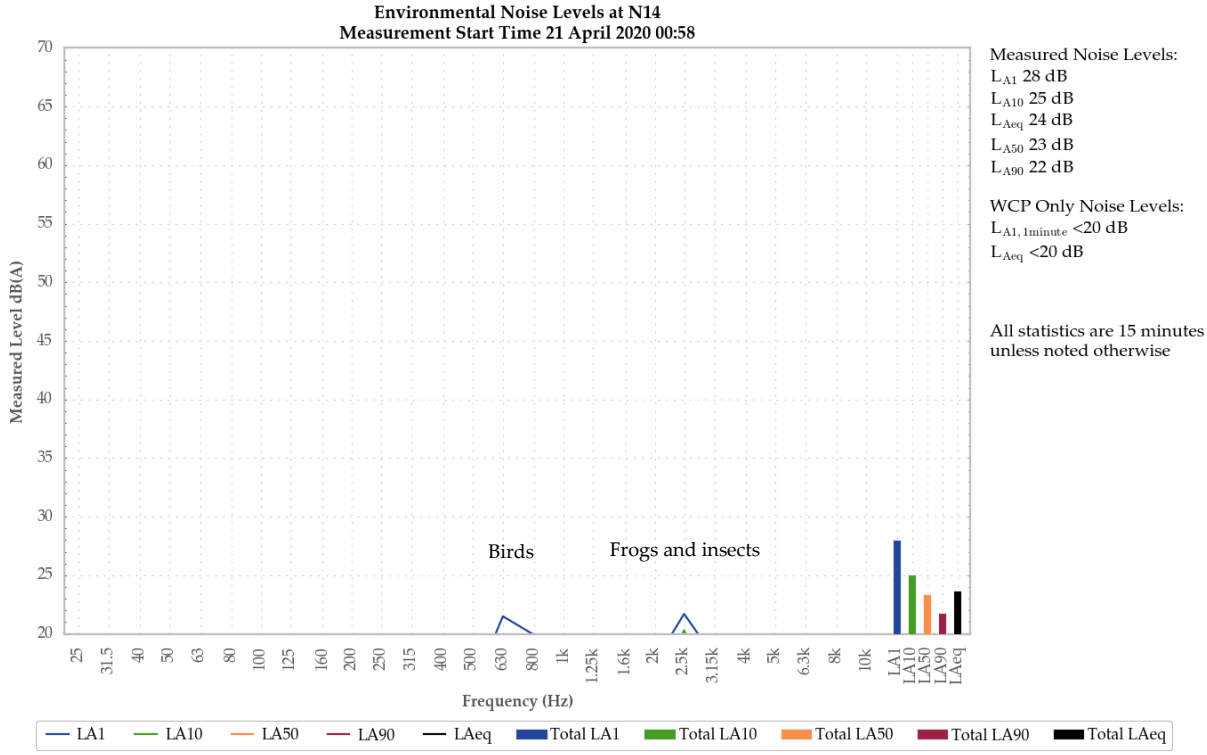


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

A mining continuum from WCP was audible at very low levels during the measurement and generated the site-only $L_{Aeq,15minute}$ and $L_{A1,1minute}$ of less than 20 dB.

Birds, frogs, and insects were responsible for the measured noise levels.

Cows were also noted.

5.1.4 N15

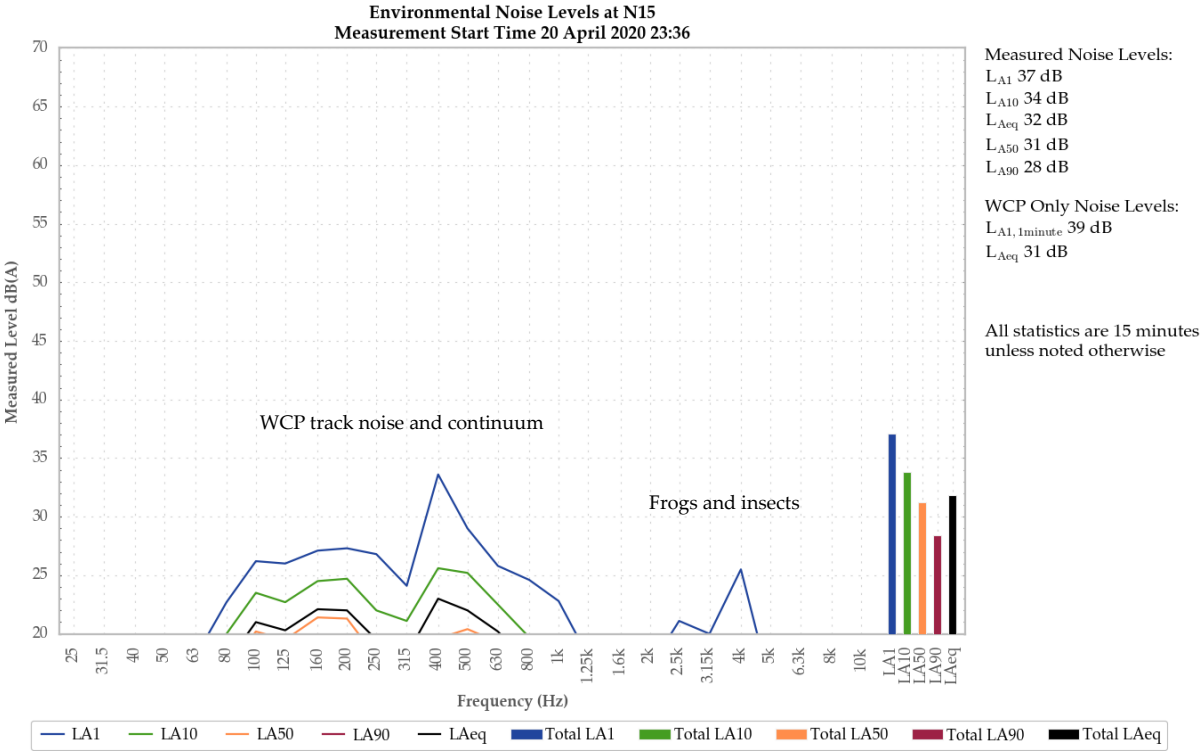


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

Track noise and mining continuum from WCP was audible throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of 31 dB. Track noise generated the measured site-only $L_{A1,1minute}$ of 39 dB. Transmission and impact noise were also noted.

Continuum and mining noise sources from WCP were primarily responsible for the measured noise levels. Frogs and insects were a minor contributor to the measured L_{Aeq}, L_{A50}, and L_{A90}.

Bats and a distant train were also noted.

5.1.5 N17

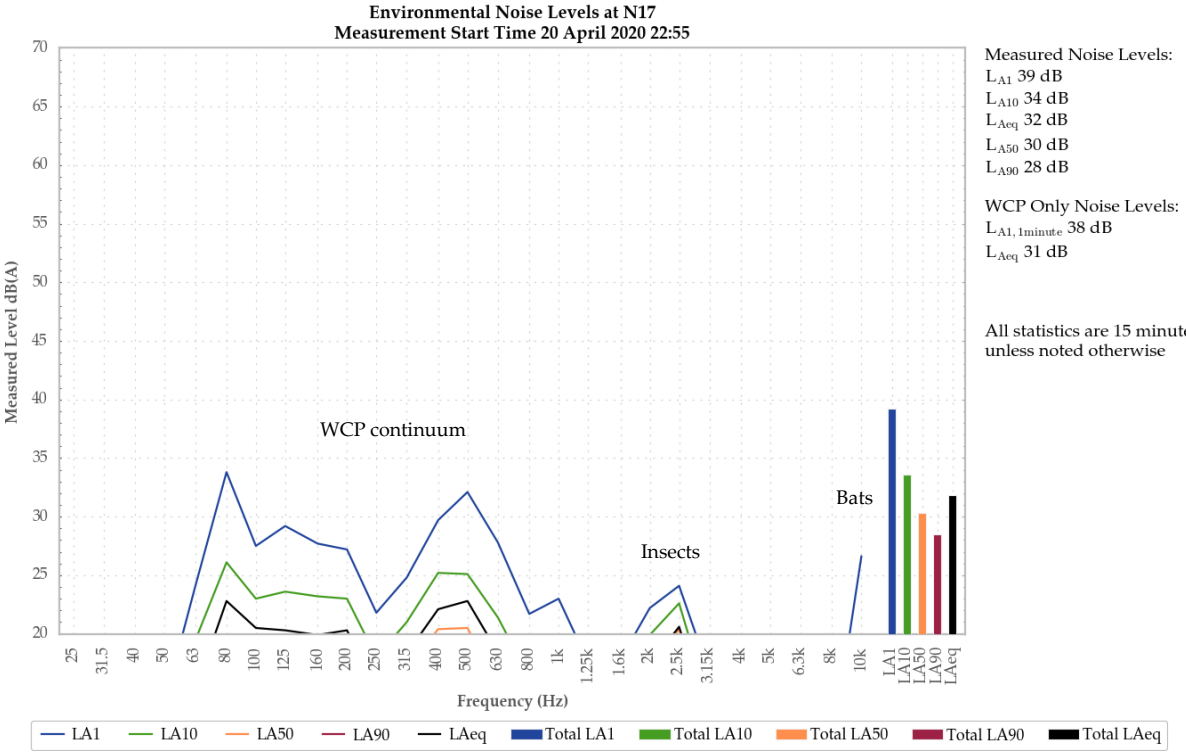


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

An engine and mining continuum from WCP was audible throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of 31 dB. A surge in exhaust and fan noise generated the measured site-only $L_{A1,1minute}$ of 38 dB.

Continuum and mining noise sources from WCP were primarily responsible for the measured noise levels. Bats contributed to the measured L_{A1}. Insects contributed to the measured L_{Aeq}, L_{A50}, and L_{A90}.

5.1.6 N19

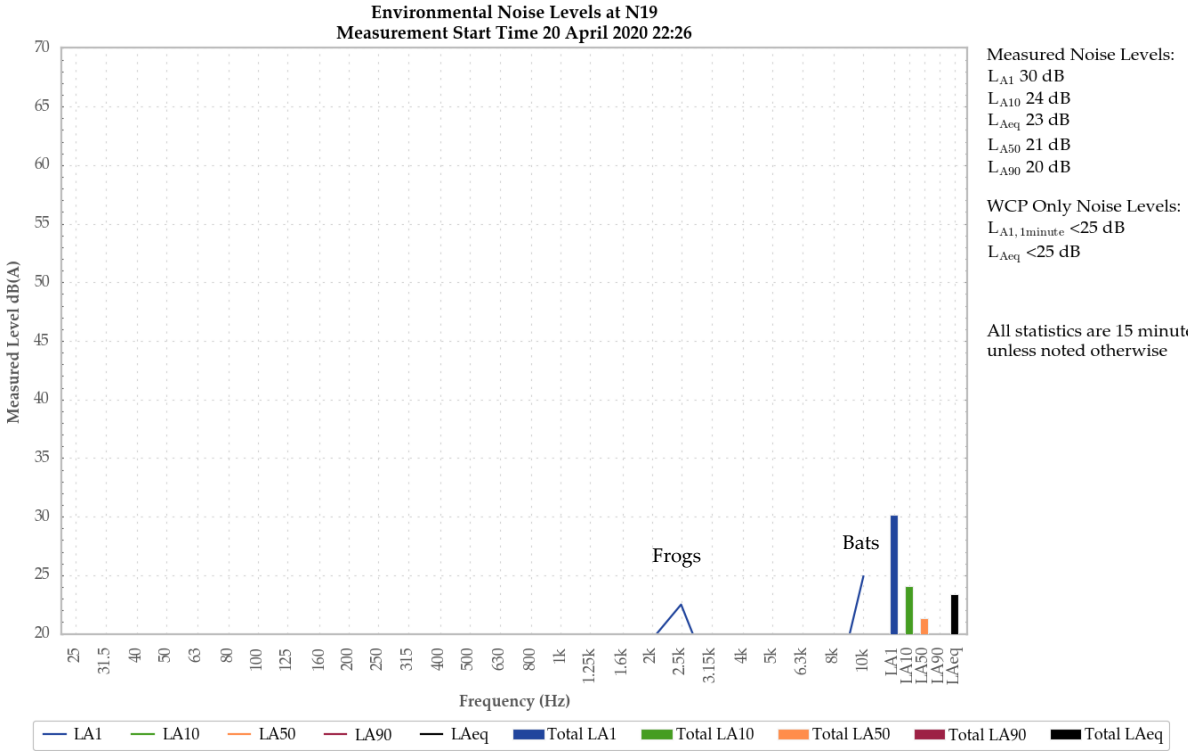


Figure 8: Environmental Noise Levels – N19, Upper Mogo Road

A mining continuum from WCP was audible at low levels during the measurement and generated the site-only $L_{Aeq,15minute}$ and $L_{A1,1minute}$ of less than 25 dB.

Frogs were primarily responsible for the measured noise levels. Bats contributed to the measured L_{A1}. The noise floor of the measurement instrument contributed to the measured L_{A90}.

A distant train was also noted.

5.1.7 N20

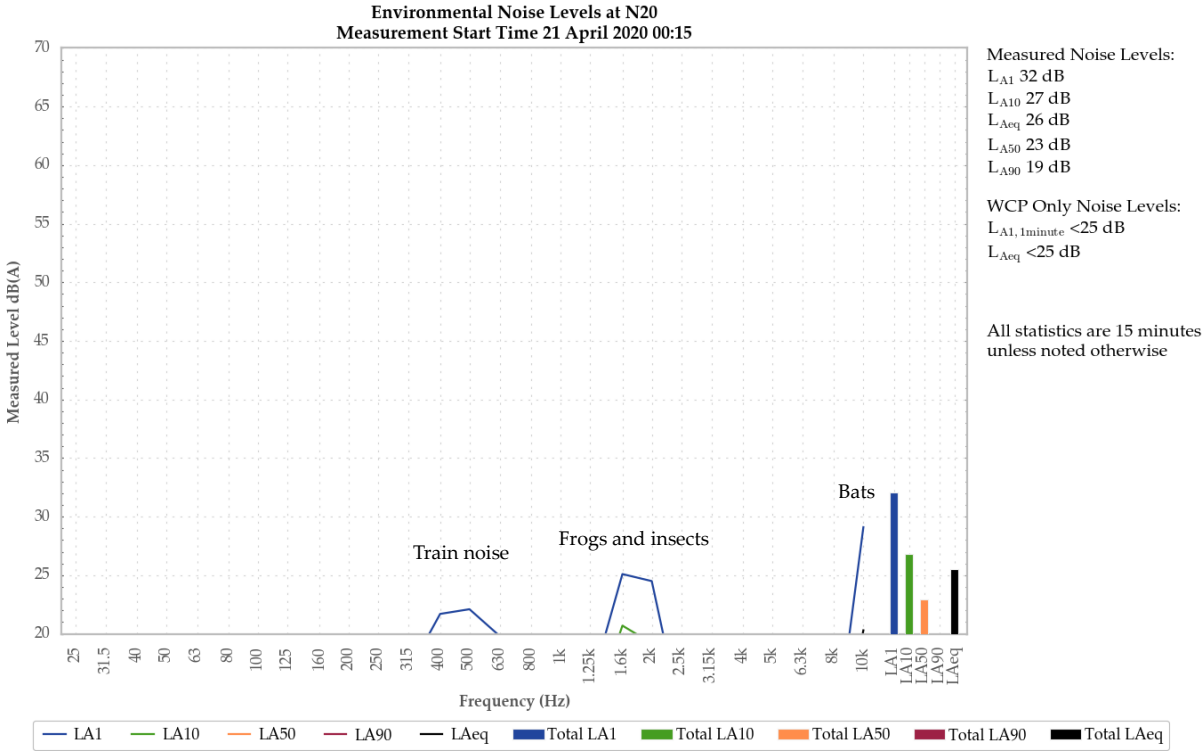


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

A mining continuum from WCP was audible at low levels during the measurement and generated the measured site-only L_{Aeq} and $L_{A1,1minute}$ of less than 25 dB.

Frogs and insects were primarily responsible for the measured noise levels. Bats contributed to the measured L_{A1}.

A distant train and birds were also noted.

5.1.8 N21

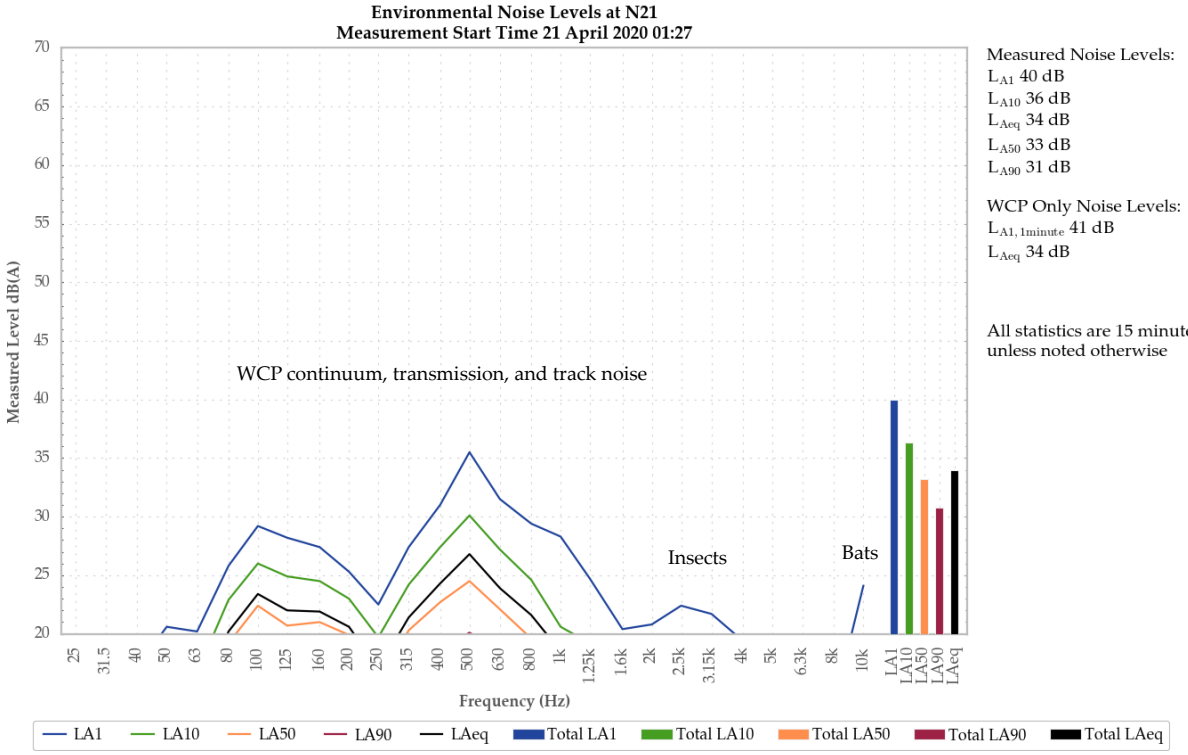


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

A mining continuum from WCP was audible throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of 34 dB. Track noise was responsible for the measured site-only $L_{A1,1minute}$ of 41 dB. Reverse alarms, engines, fans, and transmission noise were also noted.

Continuum and mining noise sources from WCP were responsible for the measured noise levels.

Insects, bats, and a distant train were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 20/21 April 2020 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the April 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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
Coonaroo	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West 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

Location	Site	Type	Easting[1]	Northing[1]	Justification
Ringwood Road	N20	Operator-attended Noise	785964.2	6419050.6	Location based near to community residence in discussions with DP&E and EPA on the 23 May 2017 to the East of the Mine.
Wandoona	N21	Operator-attended Noise	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP in May 2017.
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DP&E and EPA on the 23 May 2017 to the East of the Mine. N20 operator-attended Noise Monitoring (validation of real-time noise monitoring)
Wandoona[3]	-	Real-Time Noise - Mobile	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP. N21 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 DP&E and EPA of the results of this monitoring and advise if and when the monitoring at this location will be scaled back or discontinued.
3. The real-time noise monitor at Wandoona may be relocated in response to a complaint or identified noise issue at another location.
4. 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**.

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 DP&E and the EPA.

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.

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria (**Table 6**) has occurred, WCPL will, at the earliest opportunity:

- Report non-compliance to DP&E and EPA, immediately upon confirmation (**section 9.1**).
- Notify affected landowners (**section 9.1**).
- Take all feasible and reasonable and steps to ensure that the non-compliance ceases and does not recur;
- Consider all feasible and reasonable and options for remediation (where relevant) and submit a report to the DP&E describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Secretary; and
- Review and, if necessary, revise this NMP (**Section 10**), to the satisfaction of the Secretary.

APPENDIX

B CALIBRATION CERTIFICATES

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 C19342

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thorton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	00701424
Microphone Serial Number :	01916
Pre-amplifier Serial Number :	01463

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	26°C	**Ambient Temperature :**	26°C
Relative Humidity :	40.2%	**Relative Humidity :**	40.7%
Barometric Pressure :	100.96kPa	**Barometric Pressure :**	100.32kPa

Calibration Technician :	Lucky Jaiswal	**Secondary Check:**	Eloise Burrows
Calibration Date :	14 Jun 2019	**Report Issue Date :**	18 Jun 2019

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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013

Calibration Certificate

Calibration Number C19073

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

Equipment Tested/ Model Number : NA-28
Instrument Serial Number : 30131882
Microphone Serial Number : 04739
Pre-amplifier Serial Number : 11942

Pre-Test Atmospheric Conditions
Ambient Temperature : 24.5°C
Relative Humidity : 54.5%
Barometric Pressure : 99.39kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 23.6°C
Relative Humidity : 51%
Barometric Pressure : 99.36kPa

Calibration Technician : Charlie Neil
Calibration Date : 5 Feb 2019

Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019

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 -

Acoustic Tests
31.5 Hz to 8kHz: ±0.15dB
12.5kHz: ±0.2dB
16kHz: ±0.29dB
Electrical Tests
31.5 Hz to 20 kHz: ±0.11dB

Environmental Conditions
Temperature ±0.2°C
Relative Humidity ±2.4%
Barometric Pressure ±0.015kPa

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

NATA

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19124

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

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

Atmospheric Conditions
Ambient Temperature : 24°C
Relative Humidity : 50.4%
Barometric Pressure : 99.54kPa

Calibration Technician : Lucky Jaiswal **Secondary Check:** Lewis Boorman
Calibration Date : 21 Feb 2019 **Report Issue Date :** 22 Feb 2019

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
Measured Output	94.0	1000.0	94.0	1000.33

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.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.48%*	*Barometric Pressure*	*±0.015kPa*

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19074

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

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

Atmospheric Conditions
Ambient Temperature : 23.8°C
Relative Humidity : 53.7%
Barometric Pressure : 100.09kPa

Calibration Technician : Charlie Neil
Calibration Date : 1 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019
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
Pre Adjustment	94.0	1000.0	94.4	1000.38
Post Adjustment	94.0	1000.0	94.1	1000.39

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.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.45%*	*Barometric Pressure*	*±0.015kPa*

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 Australian/national standards.

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

Wilpinjong Coal

Environmental Noise Monitoring

May 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring May 2020

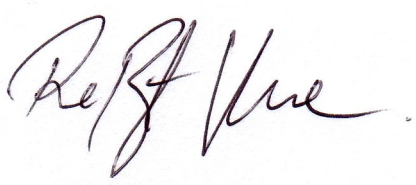
Reference: 20079_R01
Report date: 2 June 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Tambalyn Durney Consultant	QA Review:	Rob Kirwan Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 11/12 May 2019 at eight locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N13	'Coonaroo' off Moolarben Road, Moolarben
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar
N21	'Wandoona', Barigan Road, Wollar

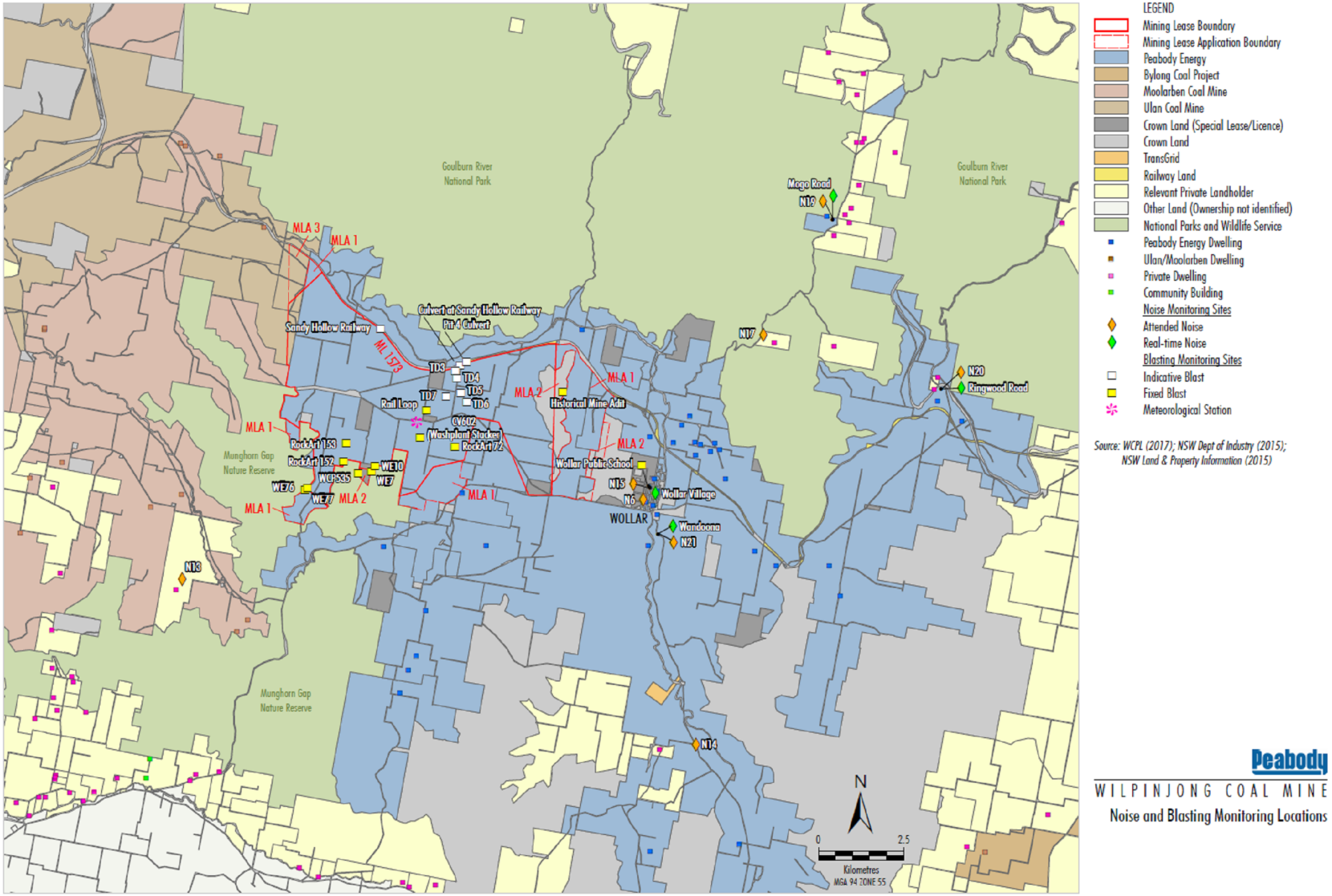


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 2.

Table 2: TERMINOLOGY & 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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in April 2019. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in June 2017. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 3.

Table 3: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45
N21	'Wandoona', Barigan Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 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', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Ryan Bruniges.

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 WCP) 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or

- 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 $L_{A1,1minute}$ 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 (i.e. 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 $L_{Aeq,15minute}$ level.

3.3 Attended Noise Monitoring

The equipment used to measure environmental noise levels are listed in Table 4. Calibration certificates are included as Appendix B.

Table 4: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	1070590	25/06/2020
Rion NA-28 sound level meter	701424	14/06/2021
Rion NC-73 acoustic calibrator	11248306	17/06/2021
Pulsar 106 acoustic calibrator	74813	21/02/2021

3.4 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 (e.g. "<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 WCP was the only contributing low-frequency noise source.

3.5 Attended Real-Time Noise Monitor Comparison

WCP only noise levels from four attended monitoring locations are compared to results from nearby Sentinex units. Start times of attended and real-time measurements do not directly overlap. Real-time measurement with the most overlap with attended monitoring times are selected for comparison.

Attended monitoring locations and the real-time monitoring locations they represent are listed in Table 5 and shown in Figure 1.

Table 5: ATTENDED AND REAL-TIME MONITORING LOCATIONS FOR COMPARISON

Report Descriptor for Attended monitoring location	Real-Time Monitor ID	Monitoring Location
NA15	SX33-N1	Wollar Village
NA19	SX32-N1	North Mogo Road
NA20	SX30-N1	Ringwood Road, off Wollar Road
NA21	SX31-N1	'Wandoona', Barigan Road

4 RESULTS

4.1 Total Measured Noise Levels

Overall noise levels measured at each location during attended measurement are provided in Table 6. Discussion as to the noise sources responsible for these measured levels is provided in Chapter 5 of this report.

Table 6: MEASURED NOISE LEVELS – MAY 2020[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
N6	12/05/2020 01:16	53	47	41	37	30	23	19
N13	12/05/2020 01:24	47	44	35	32	27	24	21
N14	12/05/2020 00:20	47	30	24	22	20	19	17
N15	11/05/2020 23:05	39	27	21	20	19	18	17
N17	11/05/2020 22:32	38	24	19	18	17	15	14
N19	11/05/2020 22:05	36	26	21	19	16	15	14
N20	11/05/2020 23:39	39	33	29	25	22	19	17
N21	12/05/2020 00:54	42	36	33	28	25	22	19

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

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 3.4.

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

4.3 Attended Noise Monitoring

Table 7 to Table 8 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 7: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MAY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	12/05/2020 01:16	0.0	F	37	Yes	IA	Nil
N13	12/05/2020 01:24	0.0	G	35	No	27	NA
N14	12/05/2020 00:20	0.8	F	35	Yes	IA	Nil
N15	11/05/2020 23:05	0.8	F	37	Yes	IA	Nil
N17	11/05/2020 22:32	0.0	G	38	No	IA	NA
N19	11/05/2020 22:05	0.7	G	35	No	IA	NA
N20	11/05/2020 23:39	0.0	G	35	No	IA	NA
N21	12/05/2020 00:54	0.0	F	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 8: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MAY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	12/05/2020 01:16	0.0	F	45	Yes	IA	Nil
N13	12/05/2020 01:24	0.0	G	45	No	36	NA
N14	12/05/2020 00:20	0.8	F	45	Yes	IA	Nil
N15	11/05/2020 23:05	0.8	F	45	Yes	IA	Nil
N17	11/05/2020 22:32	0.0	G	45	No	IA	NA
N19	11/05/2020 22:05	0.7	G	45	No	IA	NA
N20	11/05/2020 23:39	0.0	G	45	No	IA	NA
N21	12/05/2020 00:54	0.0	F	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*

2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.4 Comparison of real time and attended noise results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 9. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 9: REAL-TIME AND ATTENDED NOISE LEVELS, MAY 2020[1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data[1]			Attended measurement
			Total L_{Aeq} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	11/05/2020 23:05	11/05/2020 23:00	26	22	19	IA
N19/SX32	11/05/2020 22:05	11/05/2020 22:00	19	10	7	IA
N20/SX30	11/05/2020 23:39	11/05/2020 23:30	26	21	24	IA
N21/SX31	12/05/2020 00:54	12/05/2020 01:00	42	41	23	IA

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 10. 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 10: MEASURED ATMOSPHERIC CONDITIONS – MAY 2020

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	12/05/2020 01:16	4	0.0	-	0
N13	12/05/2020 01:24	6	0.8	20	0
N14	12/05/2020 00:20	7	0.0	-	0
N15	11/05/2020 23:05	5	0.0	-	0
N17	11/05/2020 22:32	8	0.0	-	0
N19	11/05/2020 22:05	13	0.0	-	0

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N20	11/05/2020 23:39	2	0.5	270	0
N21	12/05/2020 00:54	3	0.0	-	0

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

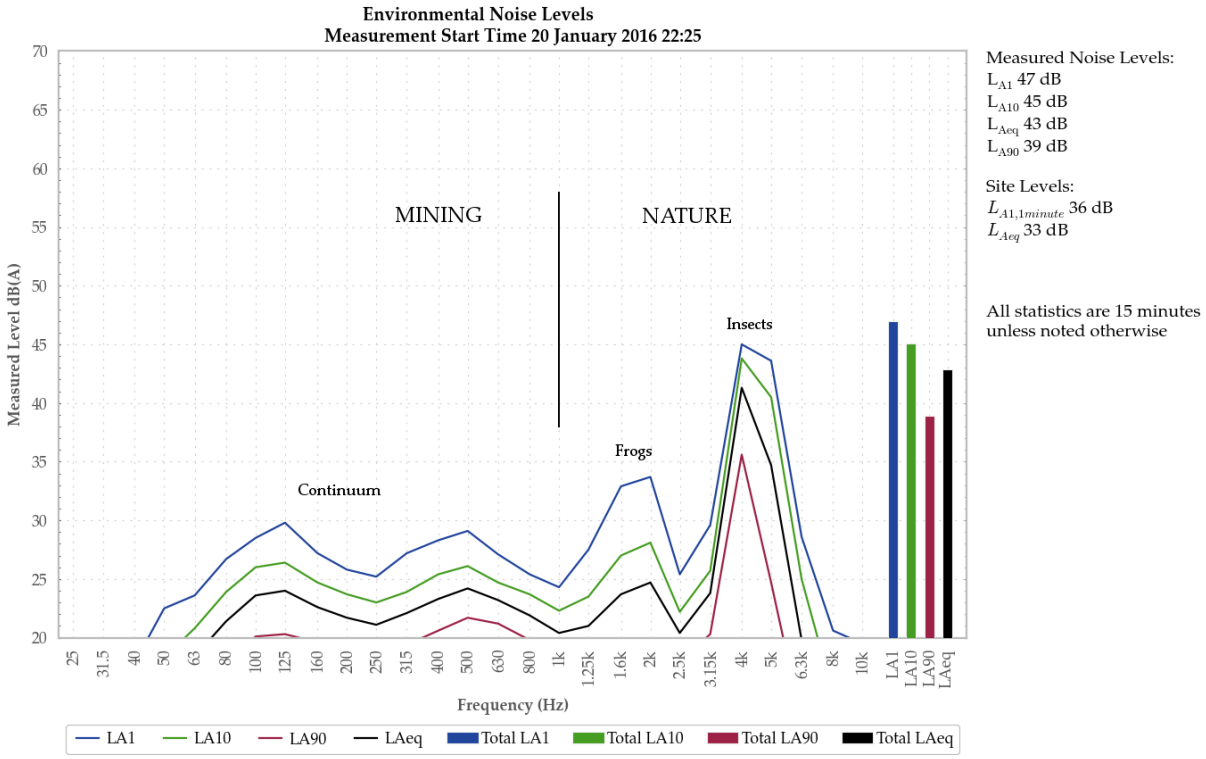


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

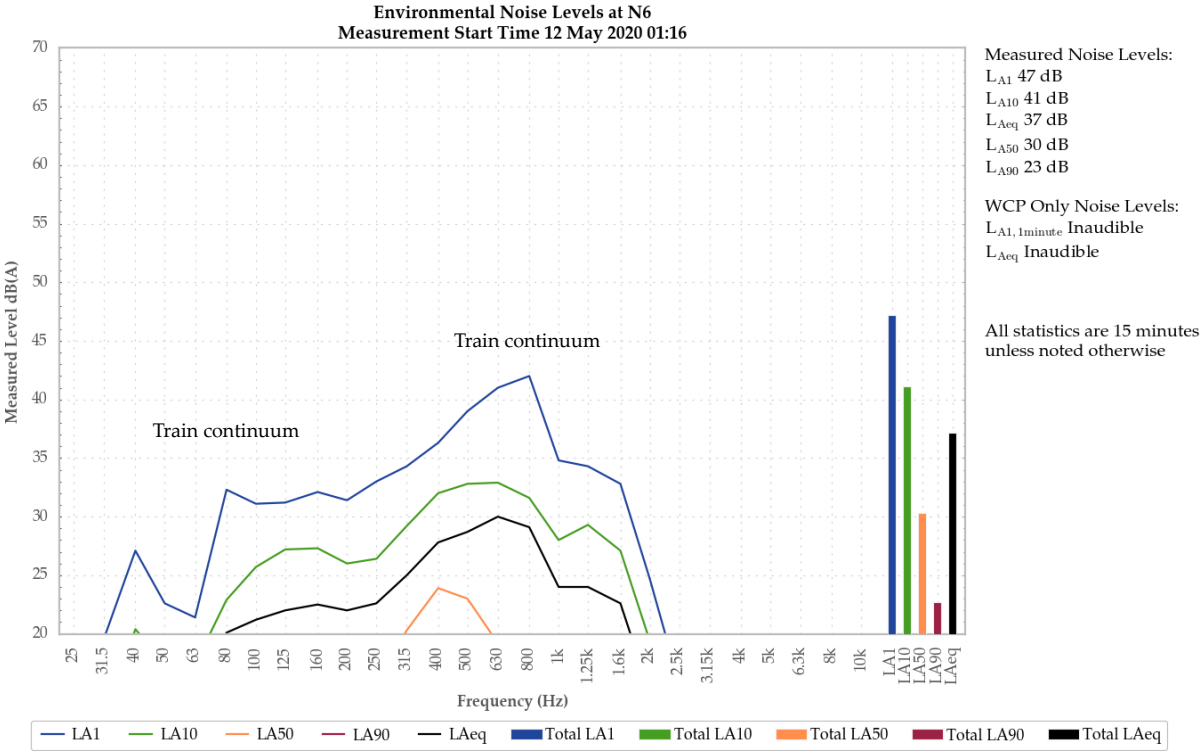


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Trains were responsible for all measured levels.

5.1.2 N13

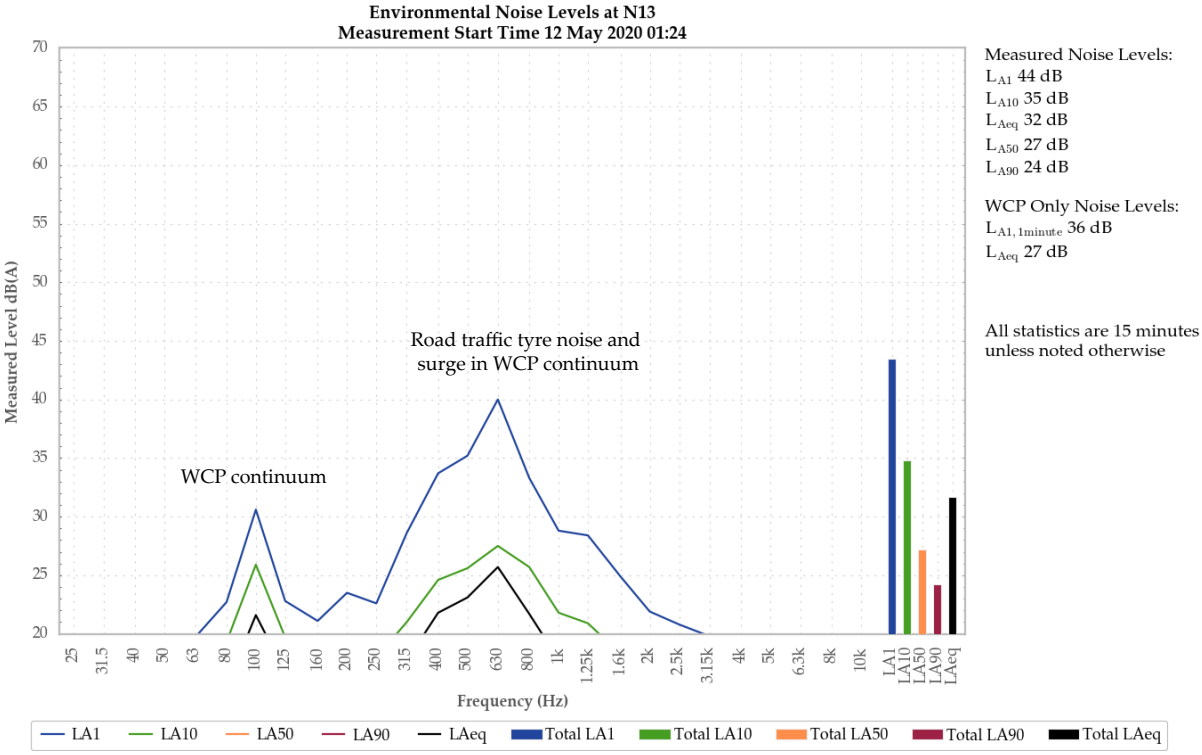


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

A continuum from WCP was audible throughout the measurement generating a site-only $L_{Aeq,15minute}$ of 27 dB and a $L_{A1,1minute}$ of 36 dB.

Road traffic tyre noise primarily generated the measured L_{A1}, L_{A10}, and L_{Aeq}. WCP continuum generated the L_{A50} and L_{A90}. WCP continuum and surges also contributed to the measured L_{A1}, L_{A10}, and L_{Aeq}.

Insects were also noted.

5.1.3 N14

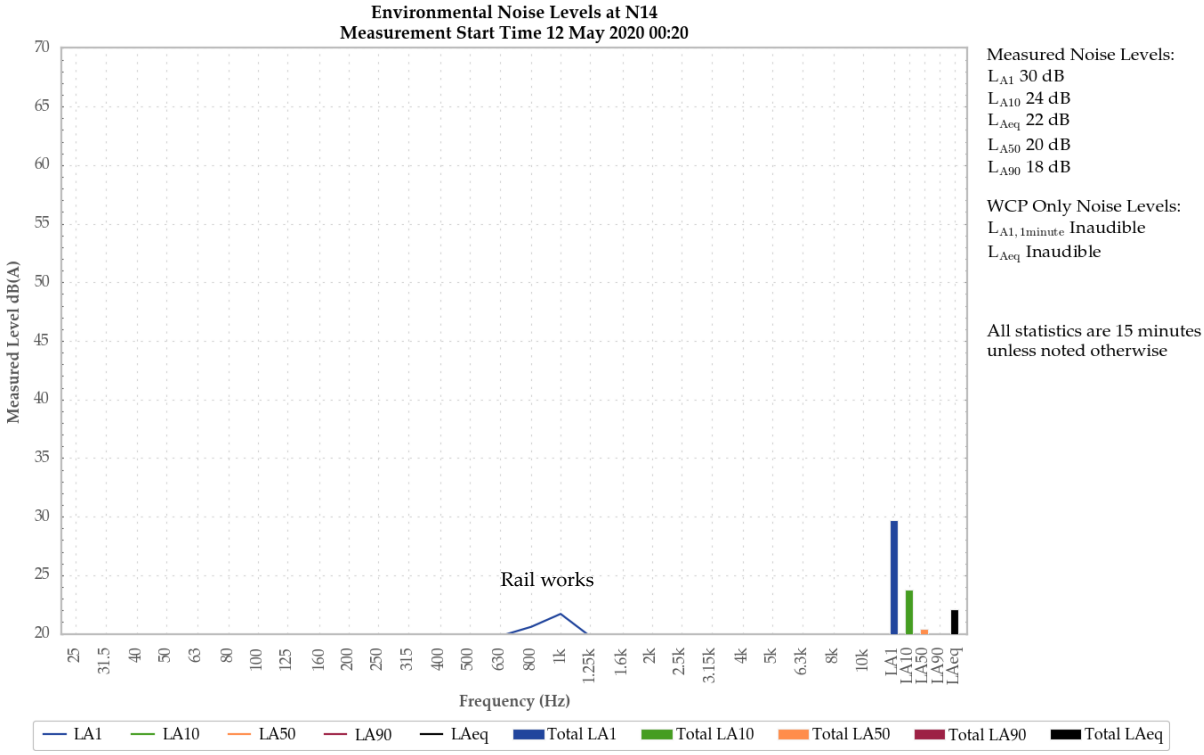


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Nearby rail works generated the measured levels.

Frogs and insects were also noted.

5.1.4 N15

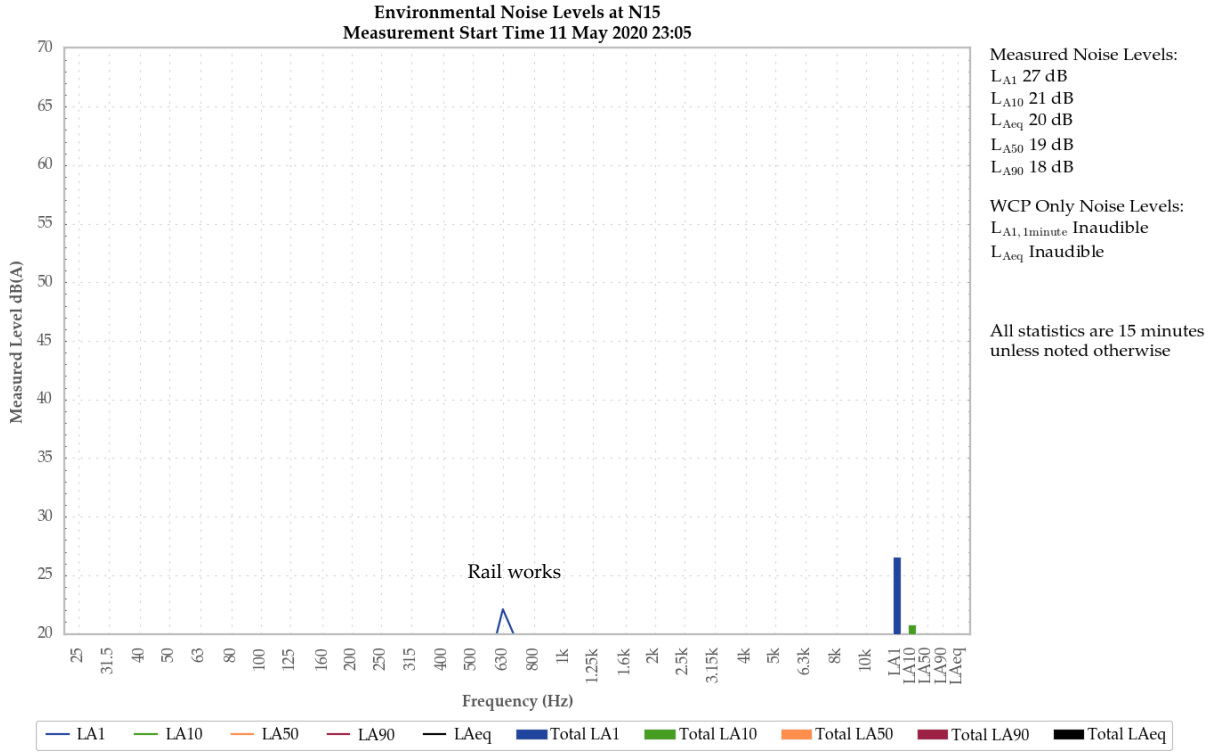


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Nearby rail works generated the measured levels.

Bats and insects were also noted.

5.1.5 N17

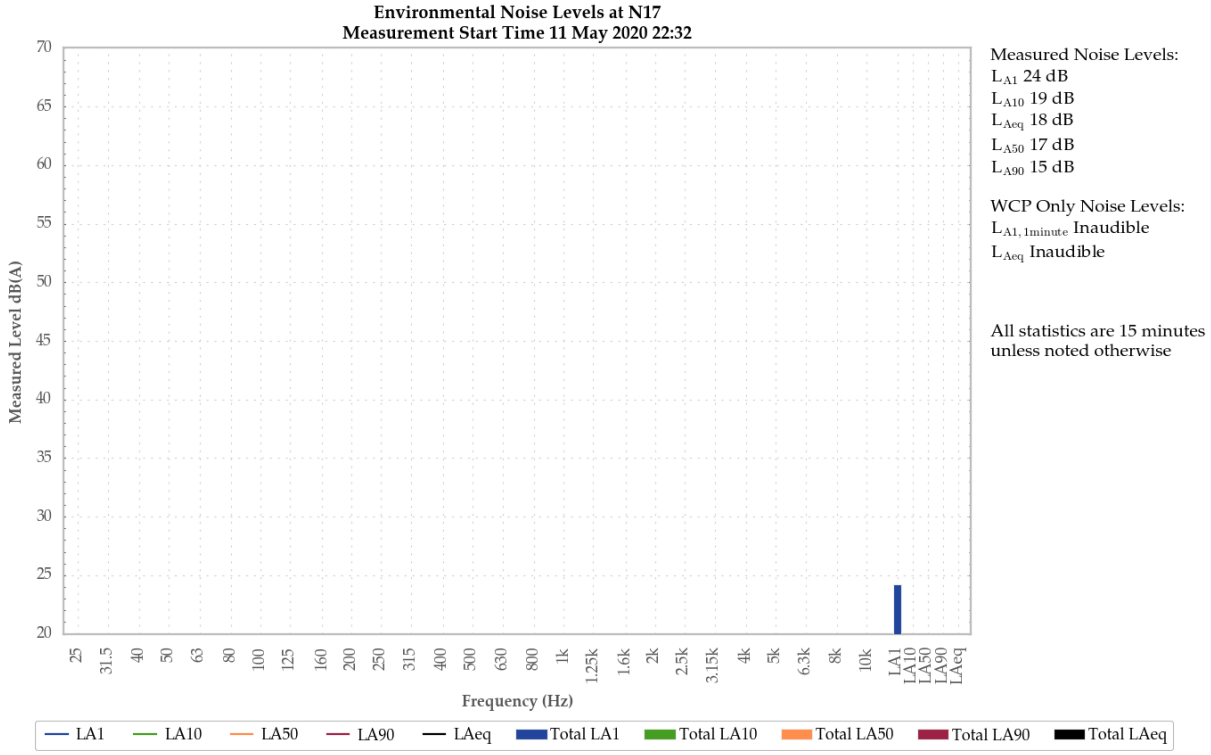


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

WCP was inaudible.

Birds generated measured levels.

Bats were also noted.

5.1.6 N19

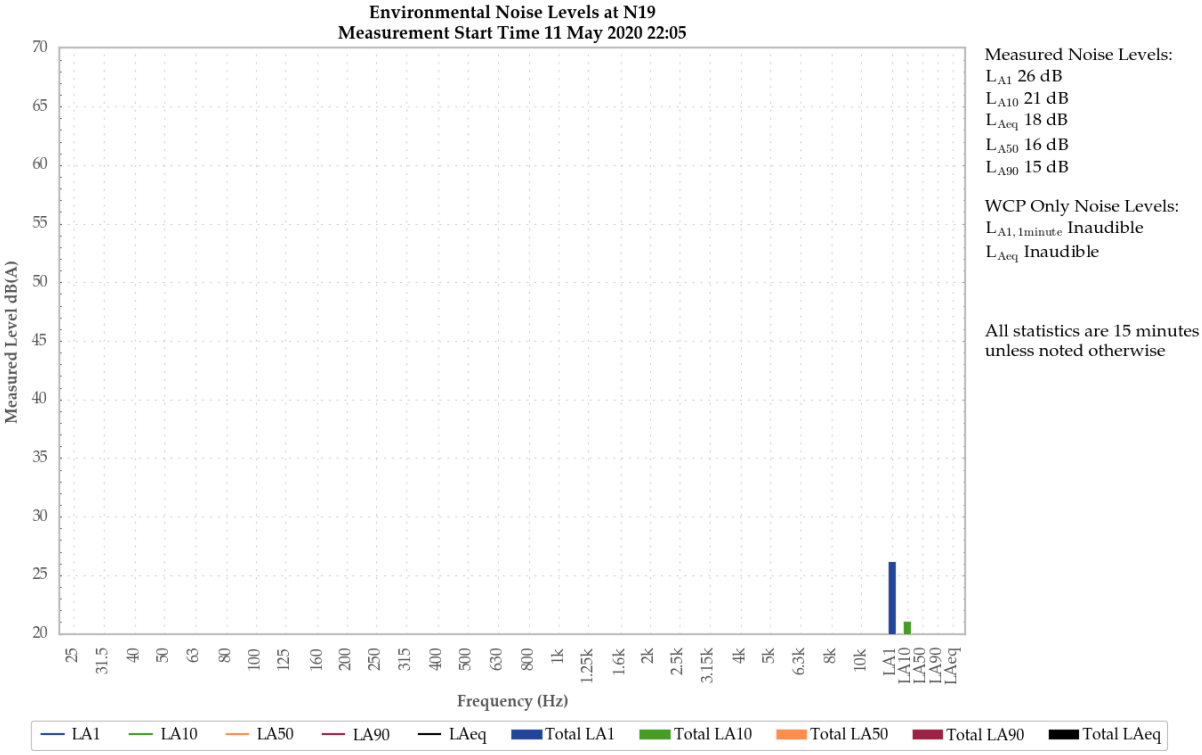


Figure 8: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible.

Aircraft noise and birds generated measured levels.

Bats and animals in foliage were also noted.

5.1.7 N20

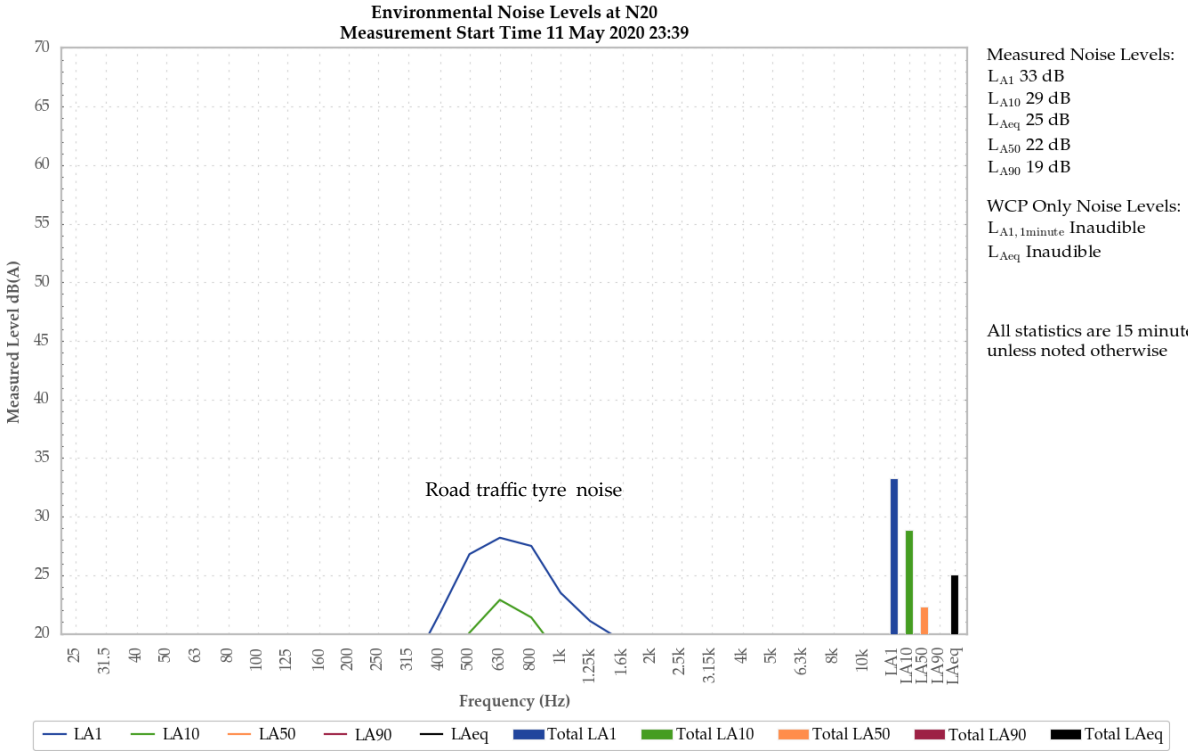


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible.

Road traffic noise generated measured levels.

Breeze in foliage and animals in foliage were also noted.

5.1.8 N21

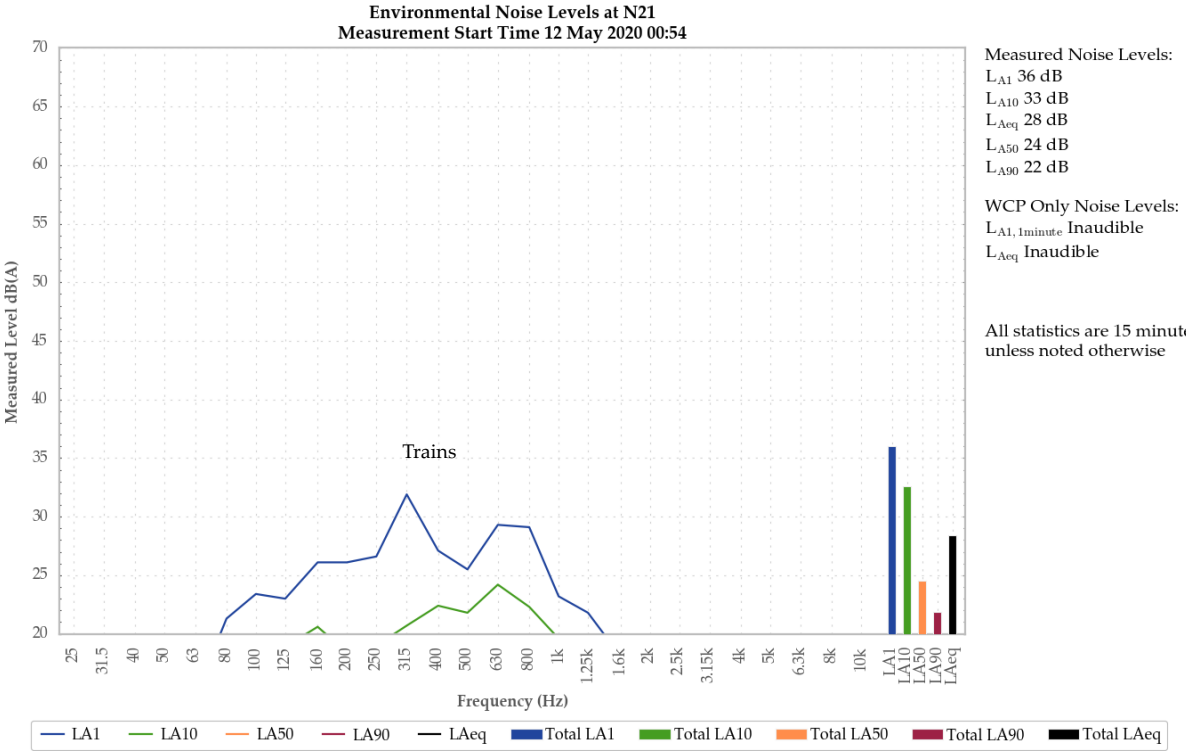


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

WCP was inaudible.

Trains generated measured levels.

Cows were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 11/12 May 2019 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the May 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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
Coonaroo	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West 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

Location	Site	Type	Easting[1]	Northing[1]	Justification
Ringwood Road	N20	Operator-attended Noise	785964.2	6419050.6	Location based near to community residence in discussions with DP&E and EPA on the 23 May 2017 to the East of the Mine.
Wandoona	N21	Operator-attended Noise	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP in May 2017.
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DP&E and EPA on the 23 May 2017 to the East of the Mine. N20 operator-attended Noise Monitoring (validation of real-time noise monitoring)
Wandoona[3]	-	Real-Time Noise - Mobile	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP. N21 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 DP&E and EPA of the results of this monitoring and advise if and when the monitoring at this location will be scaled back or discontinued.
3. The real-time noise monitor at Wandoona may be relocated in response to a complaint or identified noise issue at another location.
4. 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**.

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 DP&E and the EPA.

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.

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria (**Table 6**) has occurred, WCPL will, at the earliest opportunity:

- Report non-compliance to DP&E and EPA, immediately upon confirmation (**section 9.1**).
- Notify affected landowners (**section 9.1**).
- Take all feasible and reasonable and steps to ensure that the non-compliance ceases and does not recur;
- Consider all feasible and reasonable and options for remediation (where relevant) and submit a report to the DP&E describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Secretary; and
- Review and, if necessary, revise this NMP (**Section 10**), to the satisfaction of the Secretary.

6.3.3 Methodology

Operator-attended noise monitoring will be undertaken at the locations and frequency 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 attended noise monitoring program resumed.

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

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

WCPL will:

a) Take immediate action in accordance with the NMS;
b) Arrange for additional operator-attended noise monitoring to occur at that site within 1 week; and
c) 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

6.3.6 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.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C18363

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
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 :	21.3°C	**Ambient Temperature :**	22.7°C
Relative Humidity :	41.7%	**Relative Humidity :**	39.2%
Barometric Pressure :	100.95kPa	**Barometric Pressure :**	100.89kPa

Calibration Technician :	Lucky Jaiswal	**Secondary Check:**	Lewis Boorman
Calibration Date :	25 Jun 2018	**Report Issue Date :**	25 Jun 2018

Approved Signatory : Juan Aguero

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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.12dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.18dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.31dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

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.

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

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19344

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

Equipment Tested/ Model Number : Rion NC-73
Instrument Serial Number : 11248306

Atmospheric Conditions
Ambient Temperature : 24.6°C
Relative Humidity : 47.4%
Barometric Pressure : 100.85kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 17 Jun 2019
Secondary Check: Eloise Burrows
Report Issue Date : 17 Jun 2019
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
Measured Output	94.0	1000.0	94.3	989.75

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.

Least Uncertainties of Measurement -

Specific Tests

		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.3°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.3%*
Distortion	*±0.3%*	*Barometric Pressure*	*±0.017kPa*

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

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

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

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

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

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 Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19342

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thorton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	00701424
Microphone Serial Number :	01916
Pre-amplifier Serial Number :	01463

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	26°C	**Ambient Temperature :**	26°C
Relative Humidity :	40.2%	**Relative Humidity :**	40.7%
Barometric Pressure :	100.96kPa	**Barometric Pressure :**	100.32kPa

Calibration Technician :	Lucky Jaiswal	**Secondary Check:**	Eloise Burrows
Calibration Date :	14 Jun 2019	**Report Issue Date :**	18 Jun 2019

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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19124

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

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

Atmospheric Conditions
Ambient Temperature : 24°C
Relative Humidity : 50.4%
Barometric Pressure : 99.54kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 21 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 22 Feb 2019
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
Measured Output	94.0	1000.0	94.0	1000.33

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.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.48%*	*Barometric Pressure*	*±0.015kPa*

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 Australian/national standards.

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

Wilpinjong Coal

Environmental Noise Monitoring

June 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring
June 2020

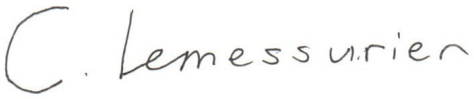
Reference: 20094_R01
Report date: 17 July 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Cam Le Messurier Consultant	QA Review:	Jesse Tribby Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 16/17 June 2020 at eight locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N13	'Coonaroo' off Moolarben Road, Moolarben
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar
N21	'Wandoona', Barigan Road, Wollar

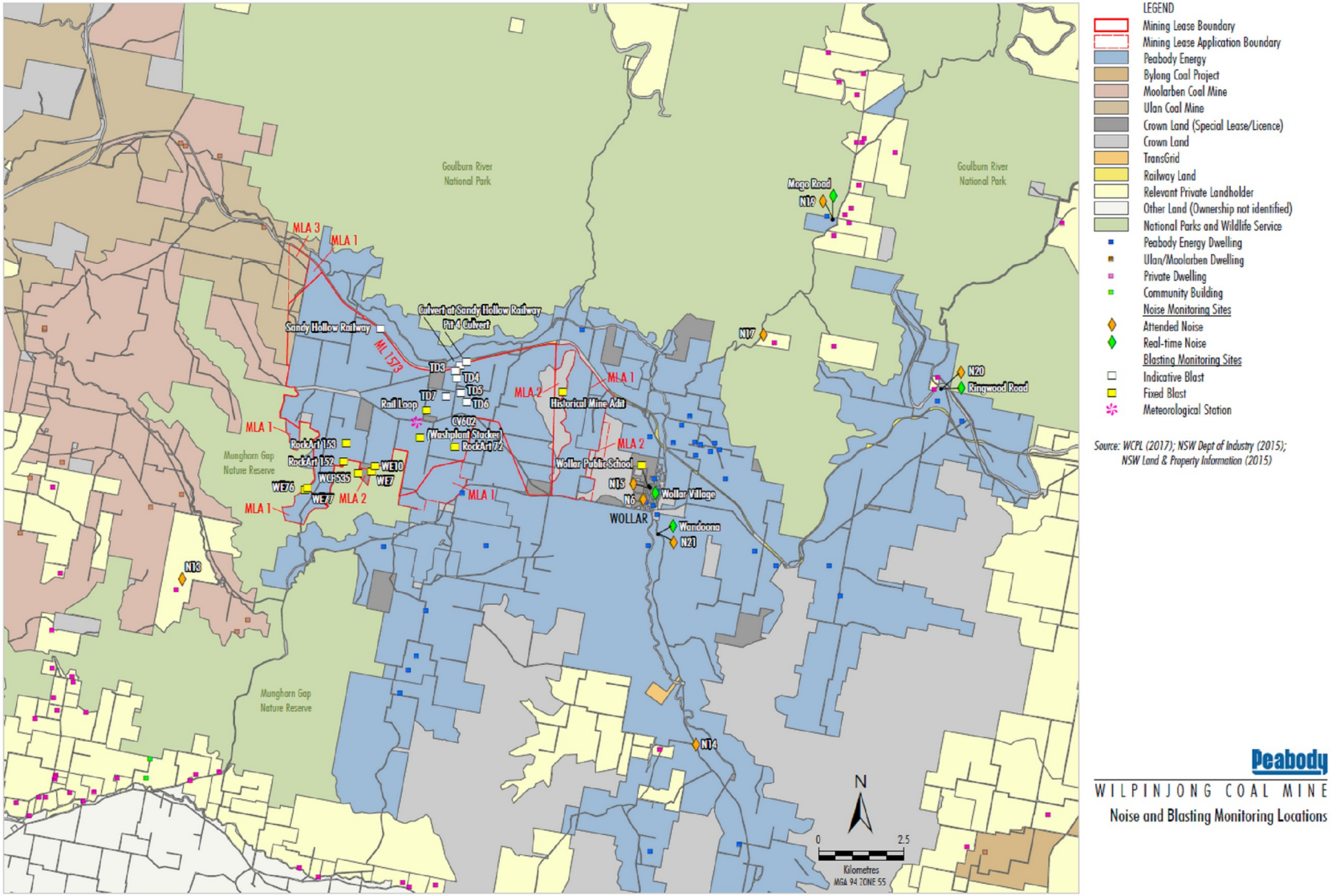


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in April 2019. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in June 2017. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45
N21	'Wandoona', Barigan Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 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', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Ryan Bruniges.

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 WCP) 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- 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 $L_{A1,1minute}$ 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 (i.e. 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 $L_{Aeq,15minute}$ level.

3.3 Noise Monitoring Equipment

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	00701424	14/06/2021
Rion NA-28 sound level meter	00370304	29/11/2020
Pulsar 105 acoustic calibrator	79631	13/05/2022
Pulsar 106 acoustic calibrator	81334	12/02/2022

3.4 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 (e.g. "<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 WCP was the only contributing low-frequency noise source.

3.5 Attended Real-Time Noise Monitor Comparison

WCP only noise levels from four attended monitoring locations are compared to results from nearby Sentinex units. Start times of attended and real-time measurements do not directly overlap. Real-time measurement with the most overlap with attended monitoring times are selected for comparison.

Attended monitoring locations and the real-time monitoring locations they represent are listed in Table 3.2 and shown in Figure 1.

Table 3.2: ATTENDED AND REAL-TIME MONITORING LOCATIONS FOR COMPARISON

Report Descriptor for Attended monitoring location	Real-Time Monitor ID	Monitoring Location
NA15	SX33-N1	Wollar Village
NA19	SX32-N1	North Mogo Road
NA20	SX30-N1	Ringwood Road, off Wollar Road
NA21	SX31-N1	'Wandoona', Barigan Road

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – JUNE 2020[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
N6	16/06/2020 23:57	44	36	31	29	27	26	24
N13	17/06/2020 00:33	44	34	27	24	20	18	16
N14	16/06/2020 23:42	40	28	23	22	21	20	18
N15	16/06/2020 23:33	50	34	31	28	27	25	22
N17	16/06/2020 22:25	40	34	32	29	27	23	20
N19	16/06/2020 22:00	36	24	20	18	18	17	16
N20	16/06/2020 23:05	36	28	25	23	23	21	20
N21	17/06/2020 00:07	55	51	48	42	33	30	28

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

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 3.4.

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

4.3 Attended Noise Monitoring

Table 4.2 to Table 4.3 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JUNE 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	16/06/2020 23:57	0.6	F	37	Yes	25	Nil
N13	17/06/2020 00:33	0.0	F	35	Yes	IA	Nil
N14	16/06/2020 23:42	0.9	F	35	Yes	IA	Nil
N15	16/06/2020 23:33	0.7	F	37	Yes	26	Nil
N17	16/06/2020 22:25	0.6	F	38	Yes	23	Nil
N19	16/06/2020 22:00	0.0	F	35	Yes	<20	Nil
N20	16/06/2020 23:05	0.0	F	35	Yes	IA	Nil
N21	17/06/2020 00:07	1.1	F	35	Yes	<25	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JUNE 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	16/06/2020 23:57	0.6	F	45	Yes	32	Nil
N13	17/06/2020 00:33	0.0	F	45	Yes	IA	Nil
N14	16/06/2020 23:42	0.9	F	45	Yes	IA	Nil
N15	16/06/2020 23:33	0.7	F	45	Yes	35	Nil
N17	16/06/2020 22:25	0.6	F	45	Yes	26	Nil
N19	16/06/2020 22:00	0.0	F	45	Yes	<20	Nil
N20	16/06/2020 23:05	0.0	F	45	Yes	IA	Nil
N21	17/06/2020 00:07	1.1	F	45	Yes	30	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.4. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.4: REAL-TIME AND ATTENDED NOISE LEVELS, JUNE 2020[1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data[1]			Attended measurement
			Total L_{Aeq} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	16/06/2020 23:33	16/06/2020 23:30	32	30	26	35
N19/SX32	16/06/2020 22:00	16/06/2020 22:00	21	19	16	<20
N20/SX30	16/06/2020 23:05	16/06/2020 23:00	27	19	18	IA
N21/SX31	17/06/2020 00:07	17/06/2020 00:00	43	40	25	<25

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.5. 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 4.5: MEASURED ATMOSPHERIC CONDITIONS – JUNE 2020

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	16/06/2020 23:57	2	-	-	0
N13	17/06/2020 00:33	6	-	-	0
N14	16/06/2020 23:42	3	0.9	100	0
N15	16/06/2020 23:33	3	-	-	0
N17	16/06/2020 22:25	8	-	-	0
N19	16/06/2020 22:00	10	-	-	0
N20	16/06/2020 23:05	6	0.8	250	0
N21	17/06/2020 00:07	5	-	-	0

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

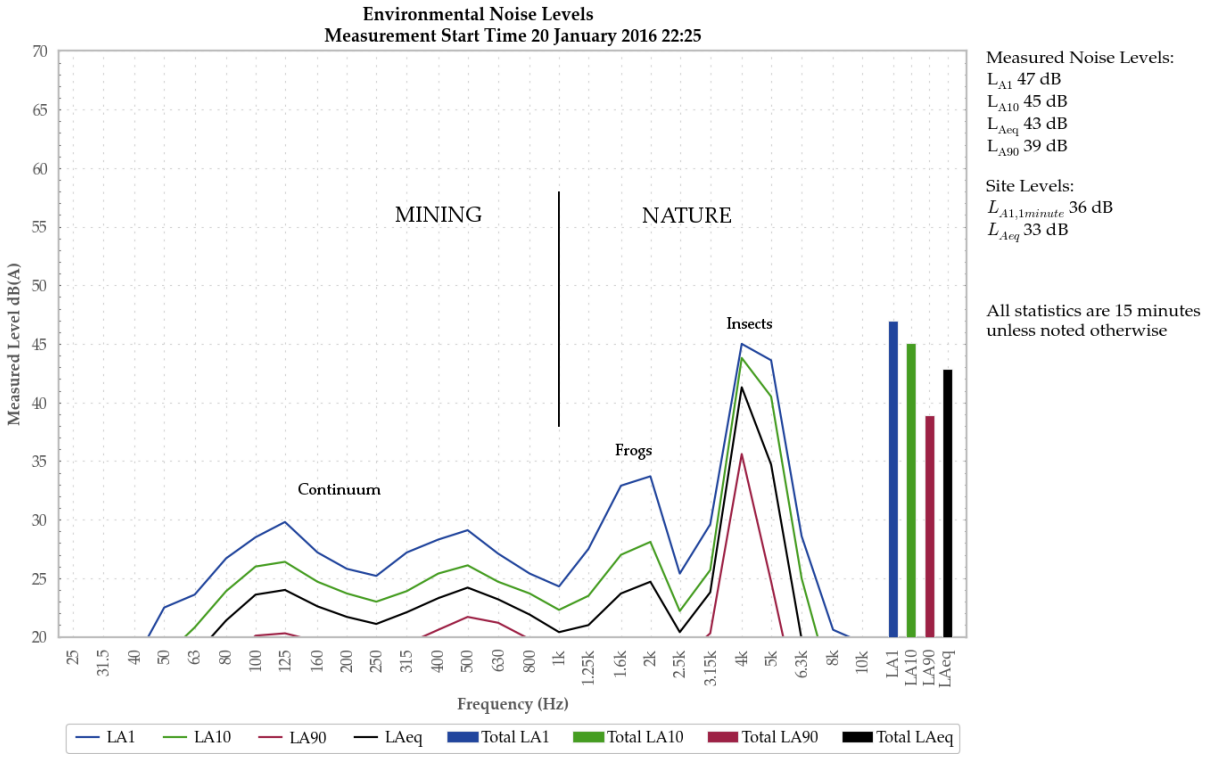


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

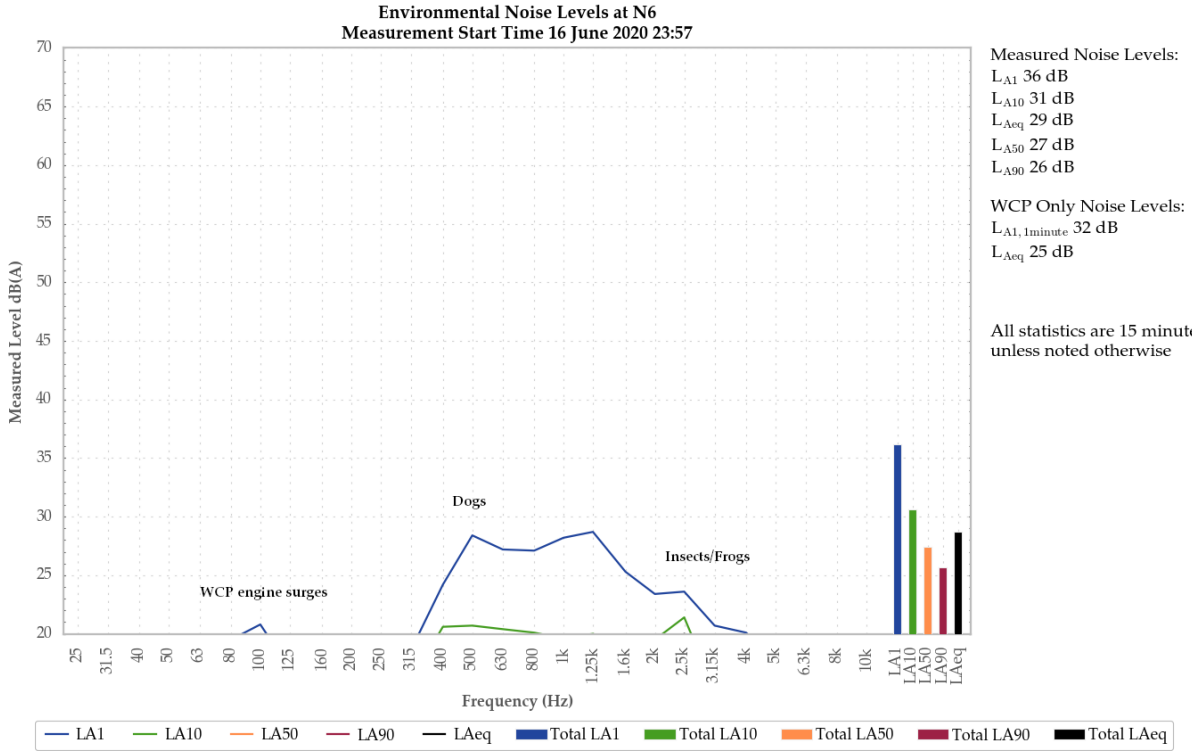


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

Mining continuum from WCP was audible throughout the measurement and generated the measured site-only L_{Aeq} of 25 dB. An engine and exhaust surge generated the measured $L_{A1,1minute}$ of 32 dB.

Dogs were responsible for the measured and contributed to the measured L_{A10} and L_{Aeq}. WCP continuum, frogs, and insects primarily generated the measured L_{A10}, L_{Aeq}, L_{A50}, L_{A90}.

5.1.2 N13

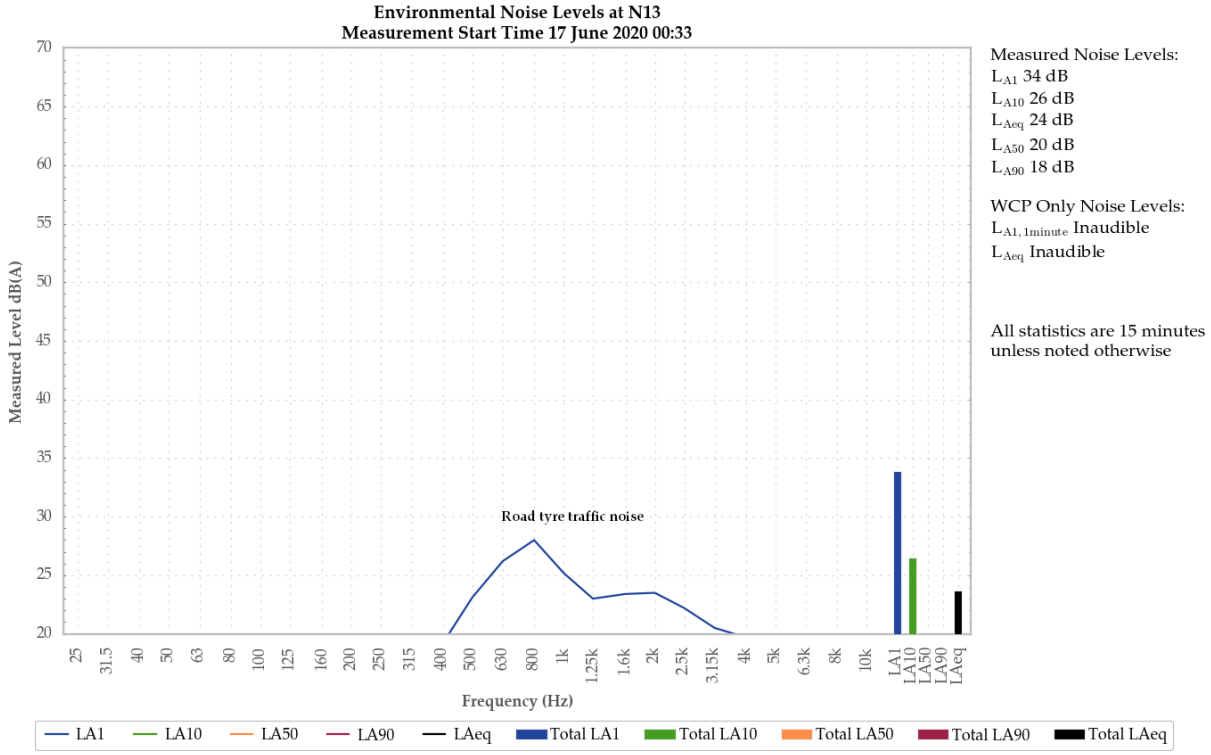


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible during the measurement.

Road tyre traffic noise was responsible for the measured L_{A1} and contributed to the measured L_{A10} and L_{Aeq} noise levels. Frogs and insects also contributed to the measured L_{A10} and L_{Aeq}, and generated the measured L_{A50} and L_{A90}.

5.1.3 N14

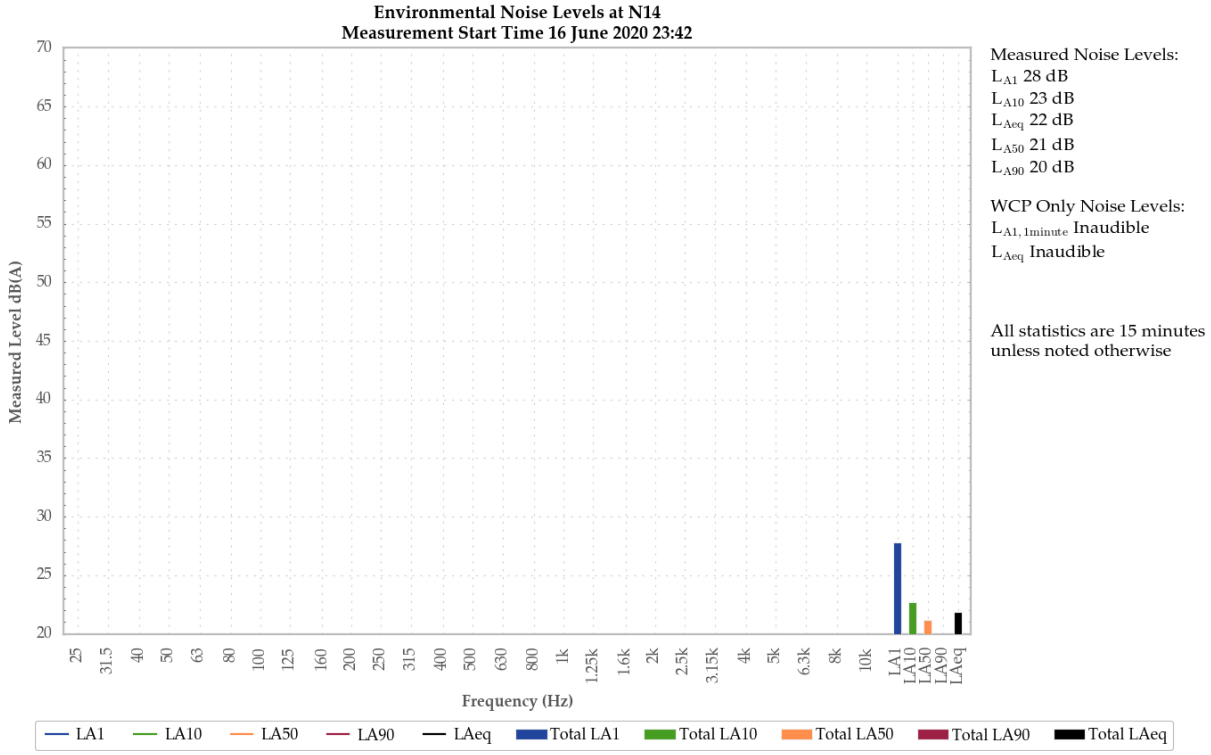


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible during the measurement.

Substation continuum and frogs were primarily responsible for the measured noise levels. Birds contributed to the measured L_{A1}.

5.1.4 N15

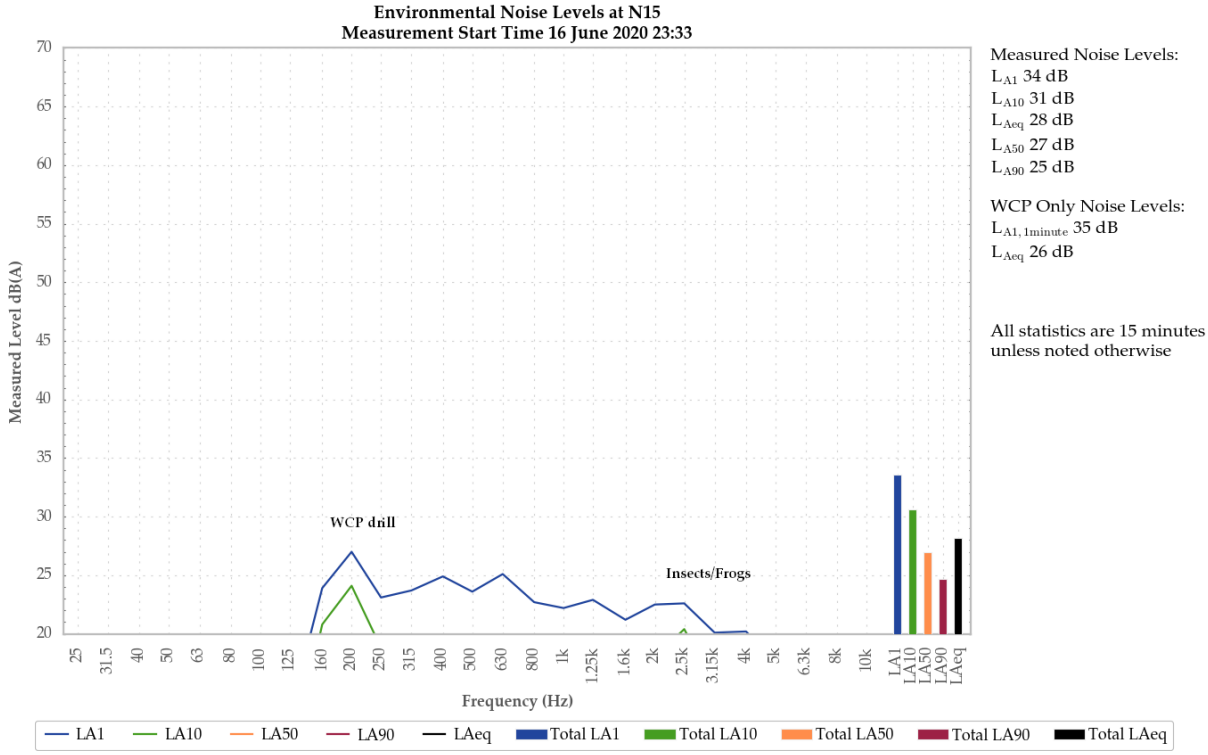


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A drill and mining continuum from WCP was audible throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of 26 dB. Movement alarms generated the measured site-only $L_{A1,1minute}$ of 35 dB. Engine surges were also noted.

WCP continuum, frogs, and insects were responsible for the measured noise levels.

Cows were also noted.

5.1.5 N17

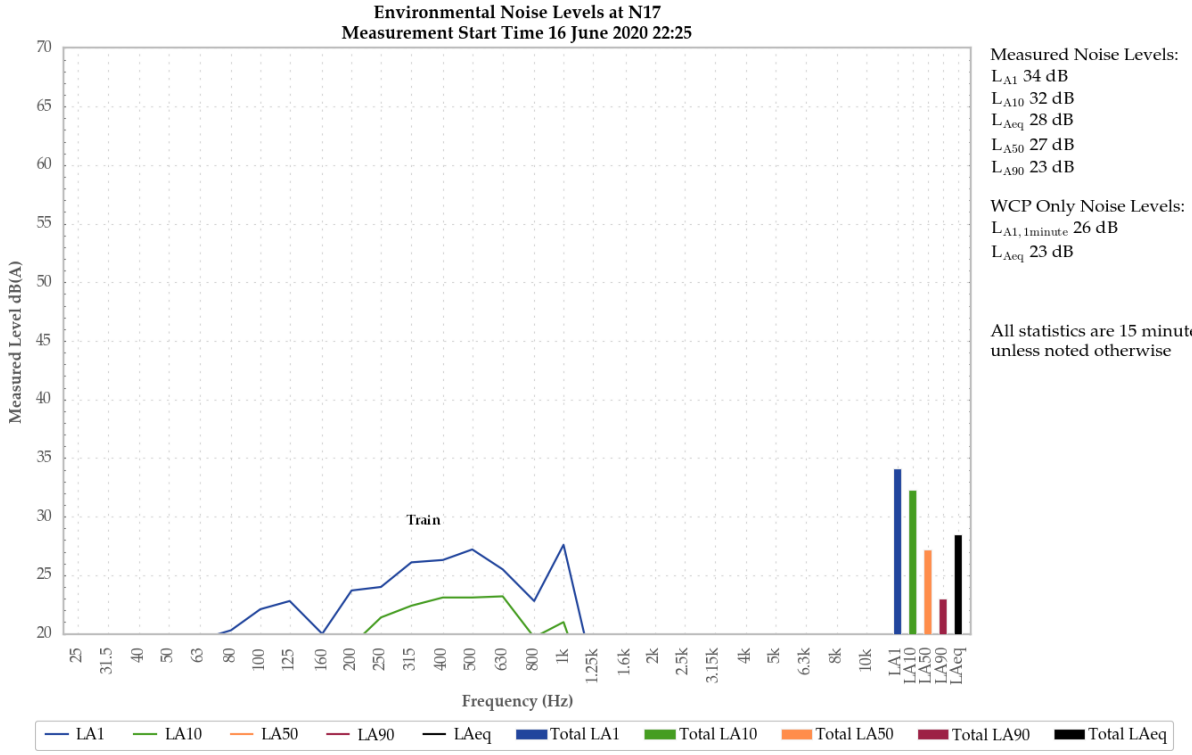


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

A mining continuum from WCP was audible throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of 23 dB. A surge in the continuum generated the measured site-only $L_{A1,1minute}$ of 26 dB.

Train engine noise and train horn noise were primarilyresponsible for the measured noise levels. WCP continuum contributed to the measured L_{A90}.

Insects were also noted.

5.1.6 N19

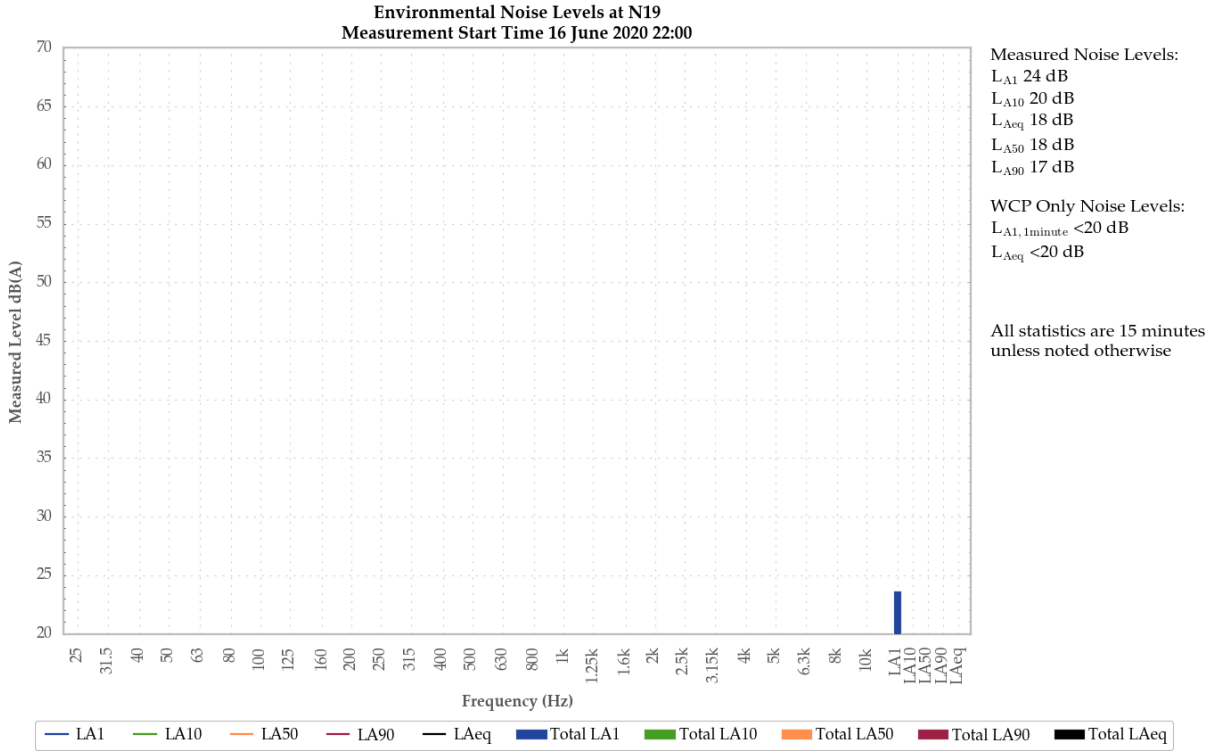


Figure 8: Environmental Noise Levels – N19, Upper Mogo Road

A mining continuum from WCP was audible at low levels during the measurement and generated the site-only $L_{Aeq,15minute}$ and $L_{A1,1minute}$ of less than 20 dB.

Continuum and mining noise sources from WCP were responsible for the measured L_{A10}, L_{A50}, L_{Aeq}, L_{A50}, and L_{A90} noise levels. Train horn and train engine noise were responsible for the measured L_{A1} noise level.

5.1.7 N20

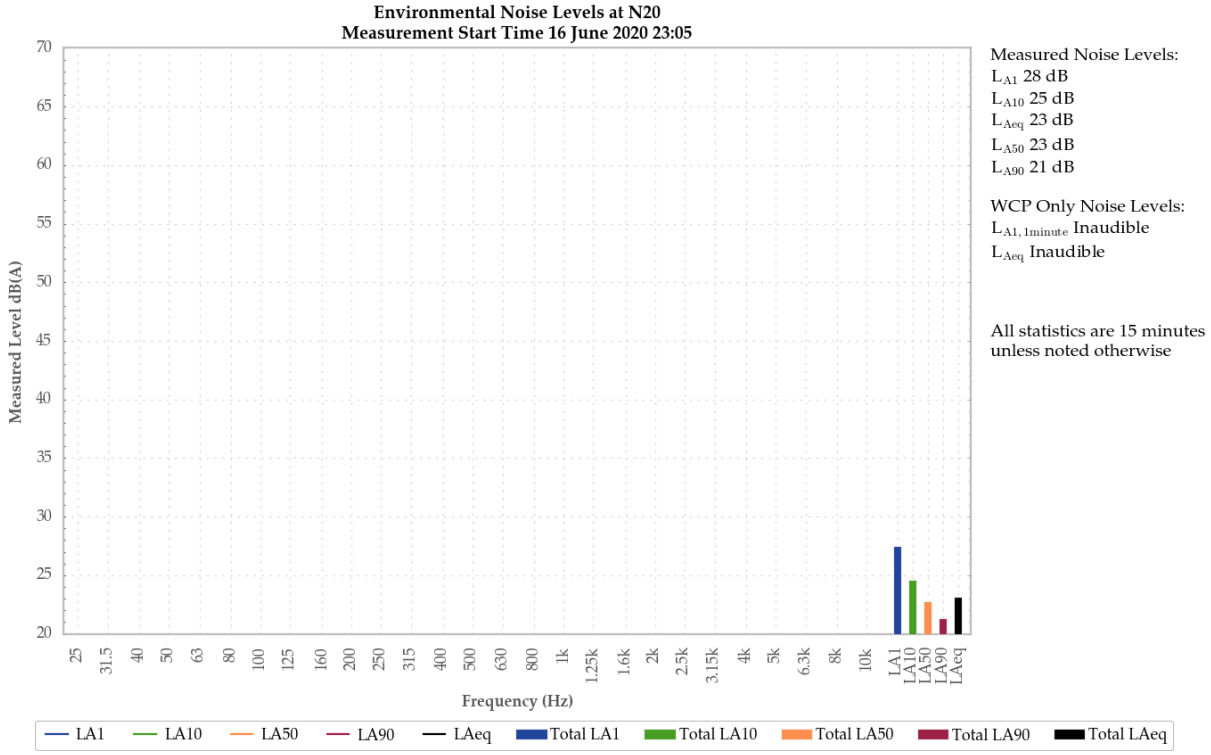


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible during the measurement.

Breeze in the foliage and livestock were responsible for the measured noise levels.

5.1.8 N21

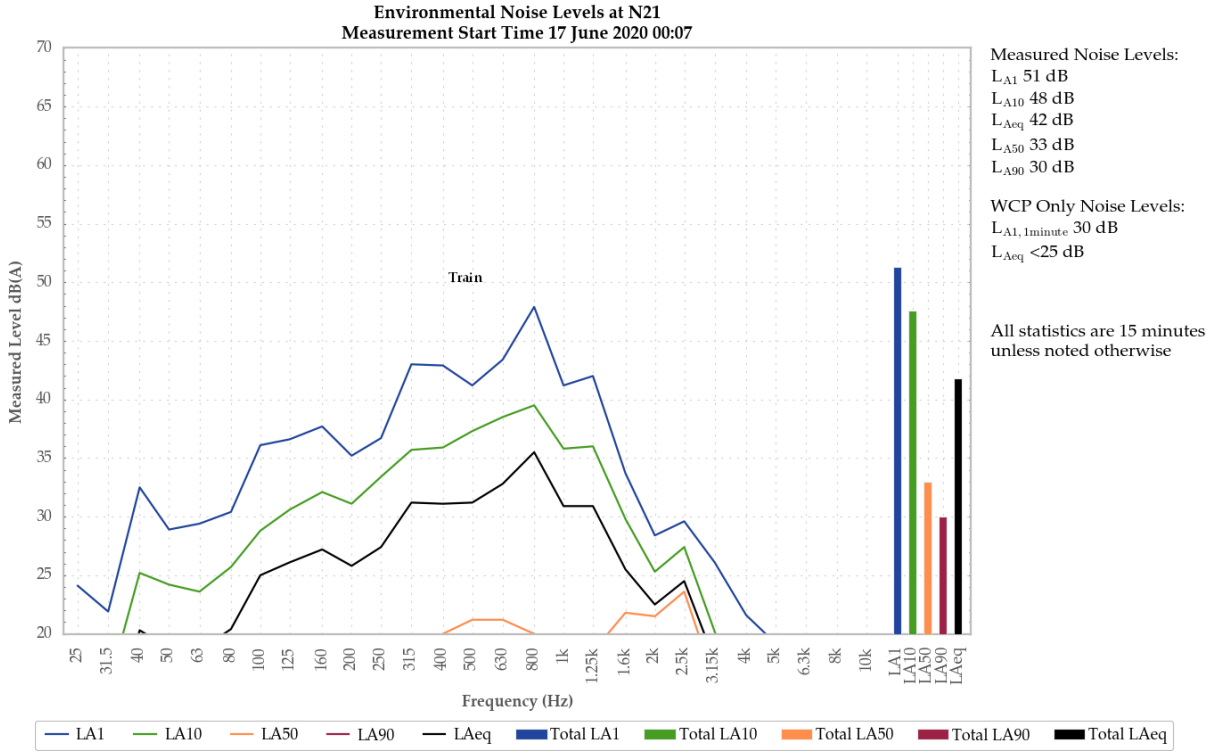


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

A mining continuum from WCP was audible at low levels throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of less than 25 dB. Engine surges and impact noise were responsible for the measured site-only $L_{A1,1minute}$ of 30 dB.

Train noise generated the measured L_{A1}, L_{A10}, and L_{Aeq}, and contributed to the measured L_{A50}. WCP continuum, frogs, and insects were primarily responsible for the measured L_{A50} and L_{A90}.

Livestock and road traffic noise were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 16/17 June 2020 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the June 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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
Coonaroo	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West 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

Location	Site	Type	Easting[1]	Northing[1]	Justification
Ringwood Road	N20	Operator-attended Noise	785964.2	6419050.6	Location based near to community residence in discussions with DP&E and EPA on the 23 May 2017 to the East of the Mine.
Wandoona	N21	Operator-attended Noise	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP in May 2017.
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DP&E and EPA on the 23 May 2017 to the East of the Mine. N20 operator-attended Noise Monitoring (validation of real-time noise monitoring)
Wandoona[3]	-	Real-Time Noise - Mobile	777684.4	6414786.2	Location based on recommendations from noise specialist (SLR) review of this NMP. N21 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 DP&E and EPA of the results of this monitoring and advise if and when the monitoring at this location will be scaled back or discontinued.
3. The real-time noise monitor at Wandoona may be relocated in response to a complaint or identified noise issue at another location.
4. 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**.

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 DP&E and the EPA.

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.

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria (**Table 6**) has occurred, WCPL will, at the earliest opportunity:

- Report non-compliance to DP&E and EPA, immediately upon confirmation (**section 9.1**).
- Notify affected landowners (**section 9.1**).
- Take all feasible and reasonable and steps to ensure that the non-compliance ceases and does not recur;
- Consider all feasible and reasonable and options for remediation (where relevant) and submit a report to the DP&E describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Secretary; and
- Review and, if necessary, revise this NMP (**Section 10**), to the satisfaction of the Secretary.

APPENDIX

B CALIBRATION CERTIFICATES

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 C19342

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thorton NSW 2322
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	00701424
Microphone Serial Number :	01916
Pre-amplifier Serial Number :	01463

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	26°C	**Ambient Temperature :**	26°C
Relative Humidity :	40.2%	**Relative Humidity :**	40.7%
Barometric Pressure :	100.96kPa	**Barometric Pressure :**	100.32kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 14 Jun 2019
Secondary Check: Eloise Burrows
Report Issue Date : 18 Jun 2019
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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.24B*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C18618

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
Ambient Temperature : 23.6°C
Relative Humidity : 42.6%
Barometric Pressure : 98.42kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 22.4°C
Relative Humidity : 42.4%
Barometric Pressure : 98.45kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 26 Nov 2018
Secondary Check: Lewis Boorman
Report Issue Date : 29 Nov 2018
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 -

Acoustic Tests
31.5 Hz to 8kHz ±0.12dB
12.5kHz ±0.18dB
16kHz ±0.51dB
Electrical Tests
31.5 Hz to 20 kHz ±0.12dB

Environmental Conditions
Temperature ±0.05°C
Relative Humidity ±0.46%
Barometric Pressure ±0.017kPa

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 Australian/national standards.

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 C20270

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

Equipment Tested/ Model Number : Pulsar Model 105
Instrument Serial Number : 79631

Atmospheric Conditions
Ambient Temperature : 21.9°C
Relative Humidity : 43.9%
Barometric Pressure : 101.2kPa

Calibration Technician : Lucky Jaiswal **Secondary Check:** Max Moore
Calibration Date : 13 May 2020 **Report Issue Date :** 19 May 2020

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	94.07	1000.40

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

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.09%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.09%*	*Barometric Pressure*	*±0.015kPa*

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

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

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

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

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

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

PAGE 1 OF 1

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 C20082

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

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 81334

Atmospheric Conditions
Ambient Temperature : 24.6°C
Relative Humidity : 48.9%
Barometric Pressure : 99.8kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 12 Feb 2020
Secondary Check: Max Moore
Report Issue Date : 13 Feb 2020
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
Measured Output	94.0	1000.0	94.1	1000.35

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..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.5%*	*Barometric Pressure*	*±0.015kPa*

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

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

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

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

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

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

PAGE 1 OF 1

Wilpinjong Coal

Environmental Noise Monitoring

July 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring
July 2020

Reference: 20189_R01
Report date: 27 August 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322

Prepared:	Jason Cameron Consultant	QA Review:	Jesse Tribby Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 15/16 July 2020 at six locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar

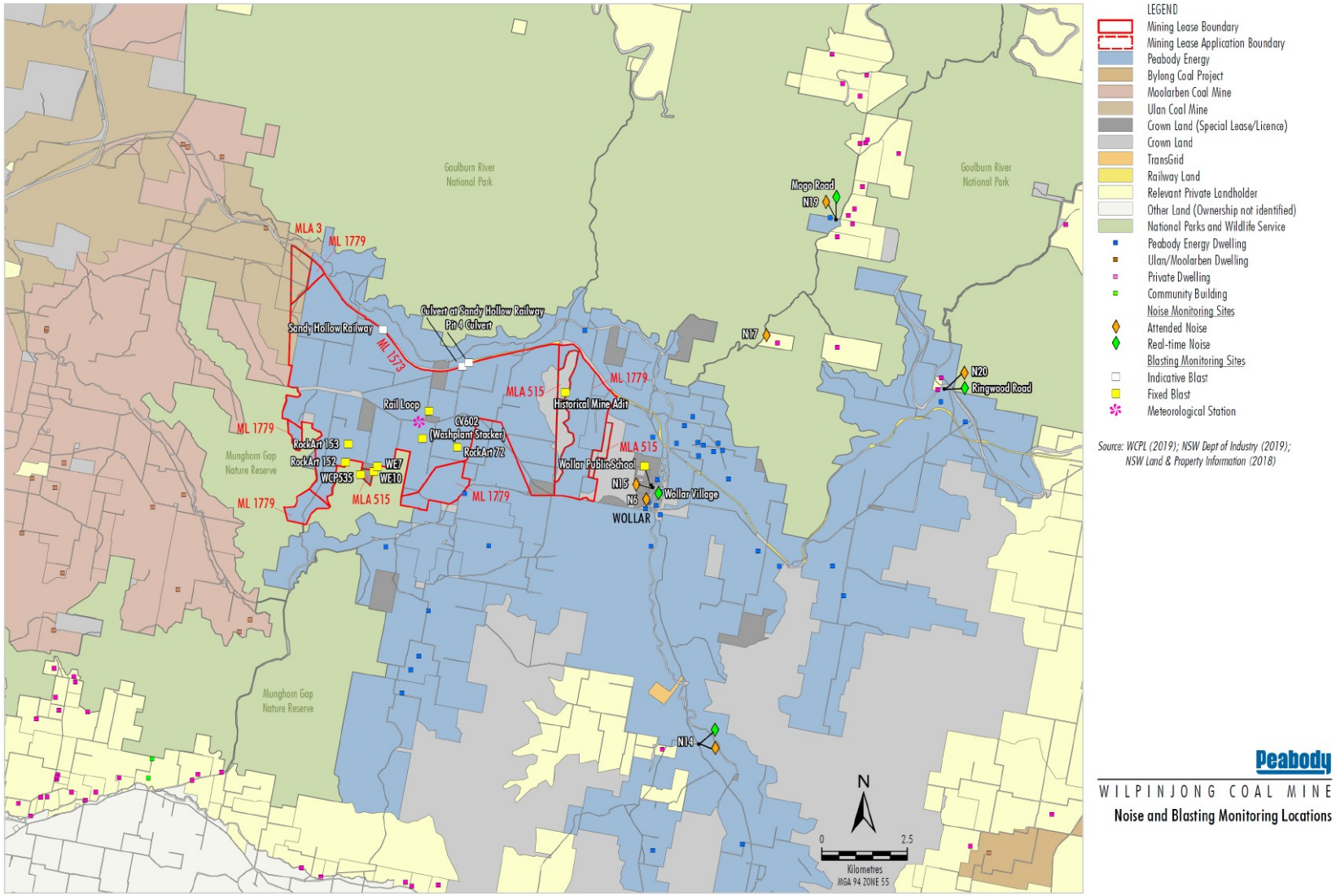


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2019)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in June 2020. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in September 2019. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 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', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Jason Cameron.

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 WCP) 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- 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 $L_{A1,1minute}$ 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 (i.e. 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 $L_{Aeq,15minute}$ level.

3.3 Noise Monitoring Equipment

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	00370304	29/11/2020
Pulsar 106 acoustic calibrator	81334	12/02/2022

3.4 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 (e.g. "<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 WCP was the only contributing low-frequency noise source.

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – JULY 2020[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
N6	16/07/2020 01:03	45	30	26	24	24	22	20
N14	16/07/2020 00:28	39	27	22	20	19	17	15
N15	15/07/2020 23:06	43	36	30	28	26	24	22
N17	15/07/2020 22:29	32	27	25	23	23	21	20
N19	15/07/2020 22:00	37	30	28	26	26	25	23
N20	15/07/2020 23:45	42	34	32	30	29	26	24

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

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 3.4.

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

4.3 Attended Noise Monitoring

Table 4.2 to Table 4.3 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JULY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	16/07/2020 01:03	2.3	E	37	Yes	<25	Nil
N14	16/07/2020 00:28	1.7	F	35	Yes	IA	Nil
N15	15/07/2020 23:06	1.5	F	37	Yes	<25	Nil
N17	15/07/2020 22:29	0.3	E	38	Yes	<25	Nil
N19	15/07/2020 22:00	1.6	E	35	Yes	IA	Nil
N20	15/07/2020 23:45	1.8	E	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JULY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	16/07/2020 01:03	2.3	E	45	Yes	30	Nil
N14	16/07/2020 00:28	1.7	F	45	Yes	IA	Nil
N15	15/07/2020 23:06	1.5	F	45	Yes	28	Nil
N17	15/07/2020 22:29	0.3	E	45	Yes	27	Nil
N19	15/07/2020 22:00	1.6	E	45	Yes	IA	Nil
N20	15/07/2020 23:45	1.8	E	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

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 – JULY 2020

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	16/07/2020 01:03	0	0.0	-	0
N14	16/07/2020 00:28	2	0.0	-	0
N15	15/07/2020 23:06	2	0.0	-	0
N17	15/07/2020 22:29	5	0.7	240	0
N19	15/07/2020 22:00	8	0.7	220	0
N20	15/07/2020 23:45	2	0.6	240	0

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

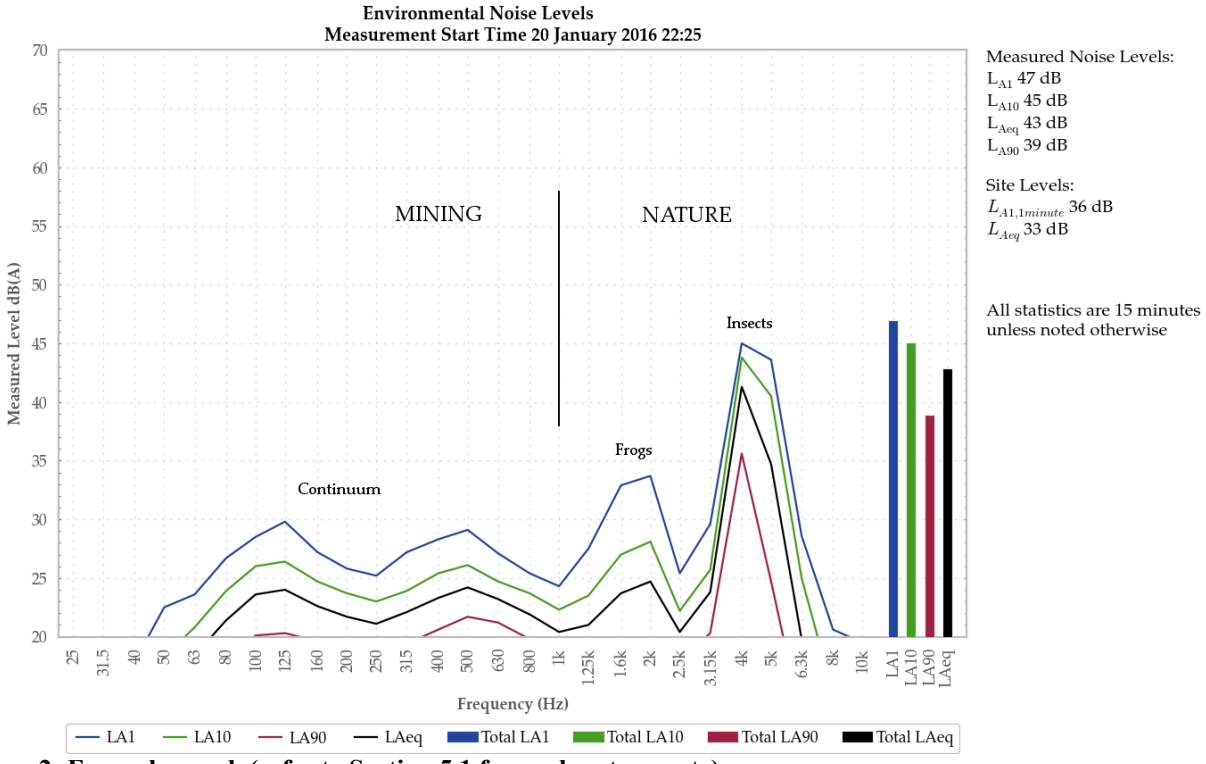


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

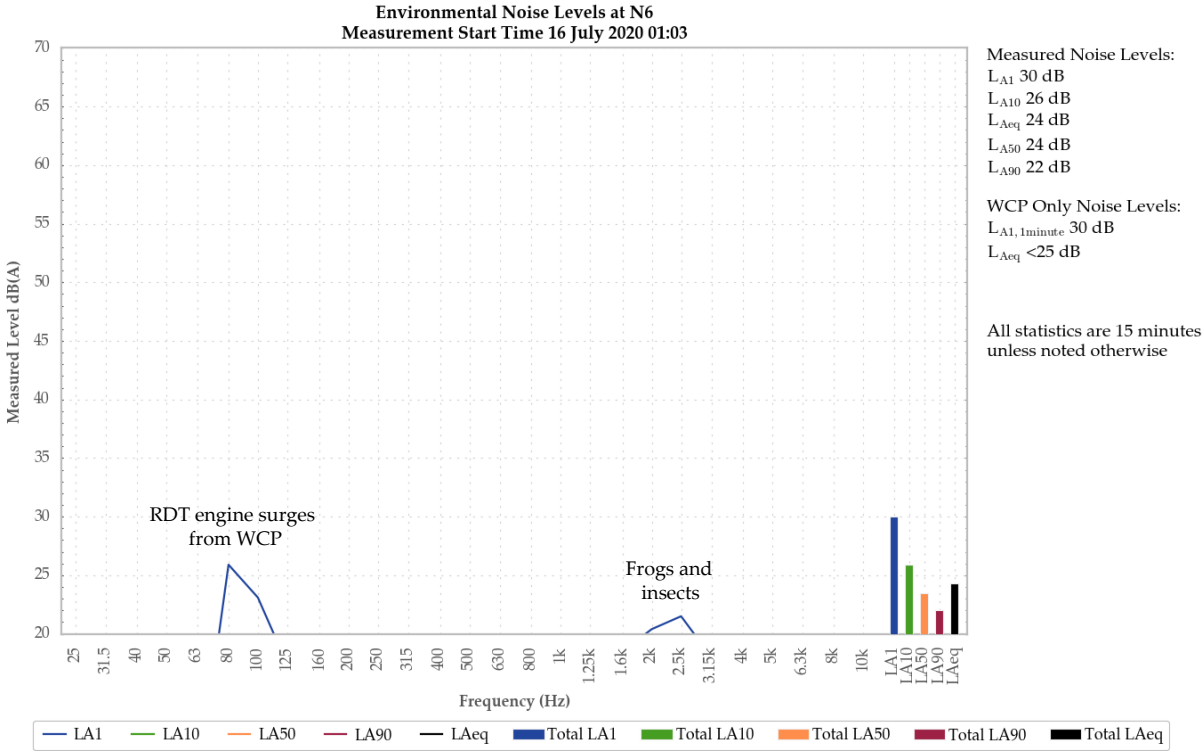


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

A mining continuum from WCP was audible at low levels throughout the measurement and generated the measured site-only $L_{Aeq,15minute}$ of less than 25 dB. An engine surge generated the measured $L_{A1,1minute}$ of 30 dB. Horns from WCP were also noted.

Continuum and mining noise sources from WCP were responsible for the measured L_{A1}, and contributed to the measured L_{A10} and L_{Aeq}. Frogs and insects contributed to the measured L_{A10} and L_{Aeq}, and were responsible for the measured L_{A50} and L_{A90}.

5.1.2 N14

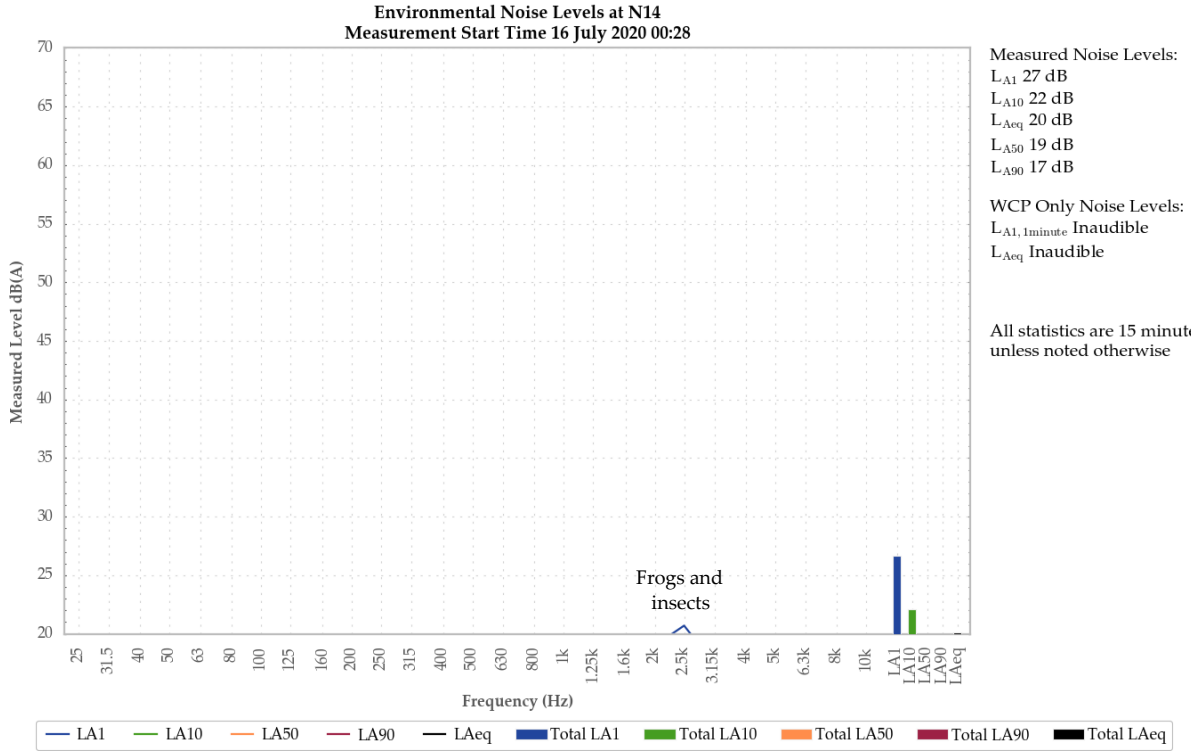


Figure 4: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible during the measurement.

Frogs and insects were primarily responsible for the measured noise levels. The noise floor of the measurement instrument also contributed to the measured L_{A50} and L_{A90}.

Dogs were also noted.

5.1.3 N15

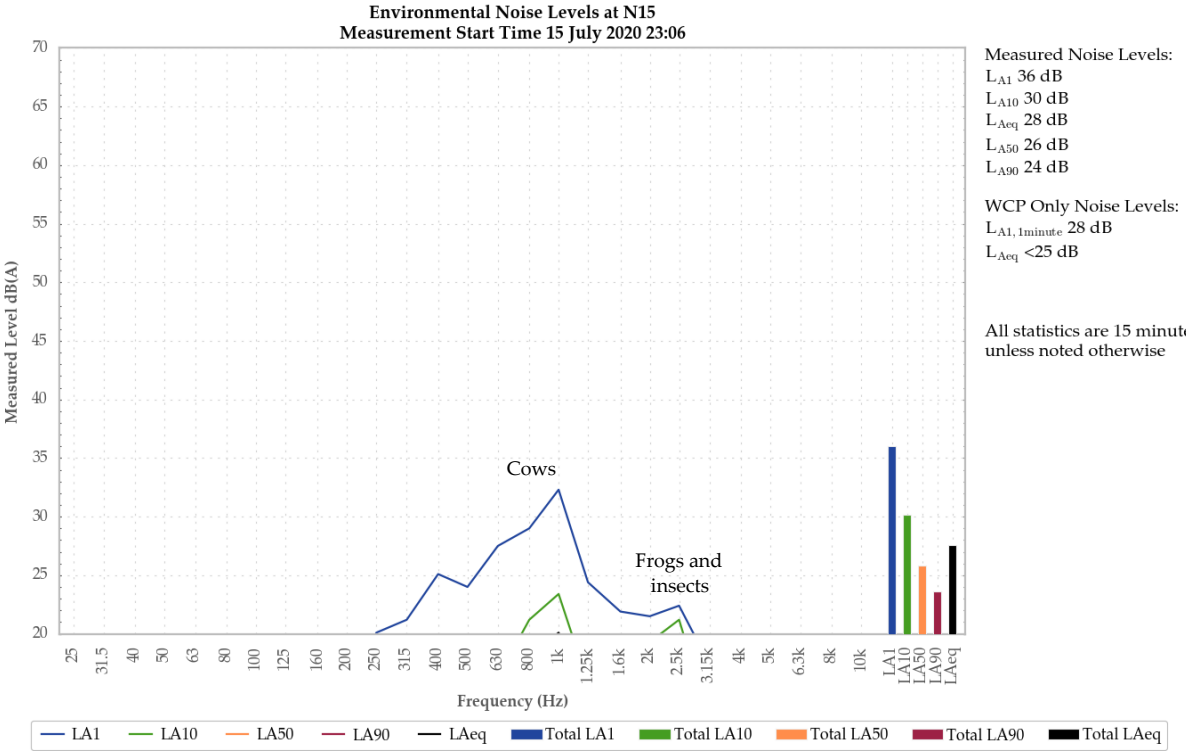


Figure 5: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A mining continuum from WCP was audible throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of less than 25 dB. An engine surge generated the measured site-only $L_{A1,1minute}$ of 28 dB.

Cows were responsible for the measured L_{A1}, and contributed to the measured L_{A10} and L_{Aeq}. Frogs and insects contributed to the measured L_{A10} and L_{Aeq}, and were responsible for the measured L_{A50}, and L_{A90}.

Birds were also noted.

5.1.4 N17

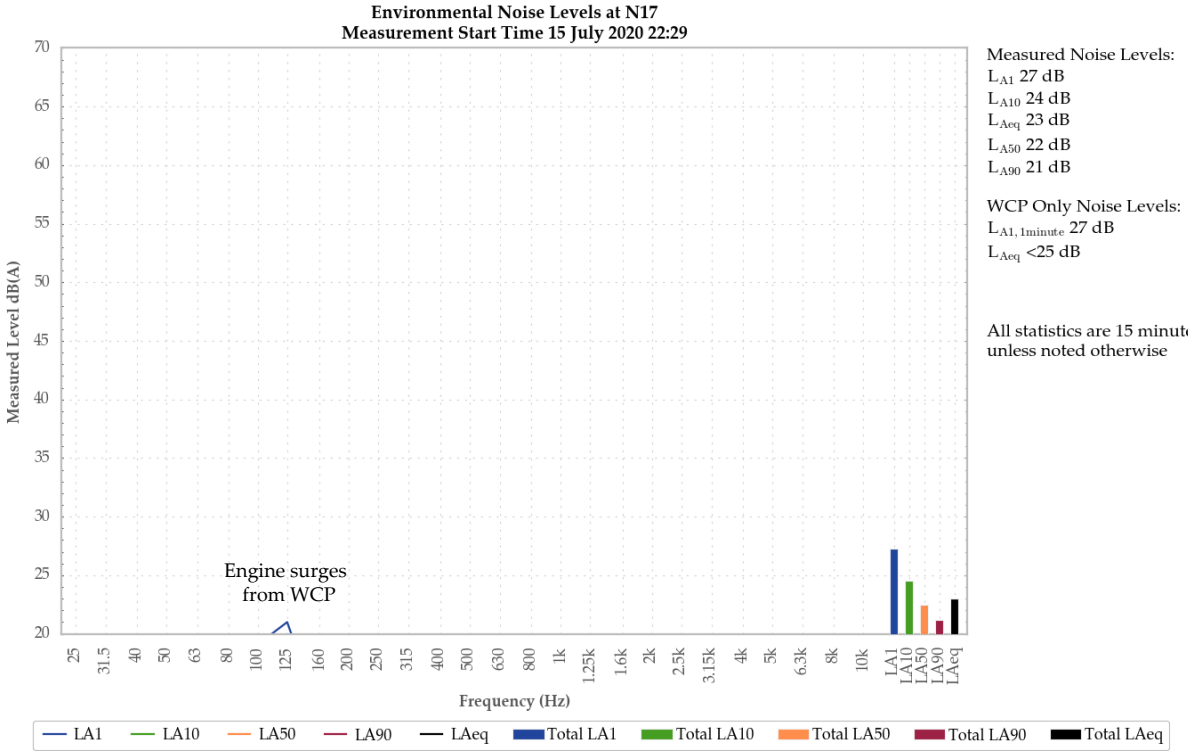


Figure 6: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

An engine and mining continuum from WCP was audible throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of less than 25 dB. A surge in engine noise generated the measured site-only $L_{A1,1minute}$ of 27 dB.

Continuum and mining noise sources from WCP were primarily responsible for the measured L_{A1}, and contributed to the measured L_{A10}, L_{Aeq}, L_{A50} and L_{A90}. Frogs and insects contributed to all measured noise levels.

5.1.5 N19

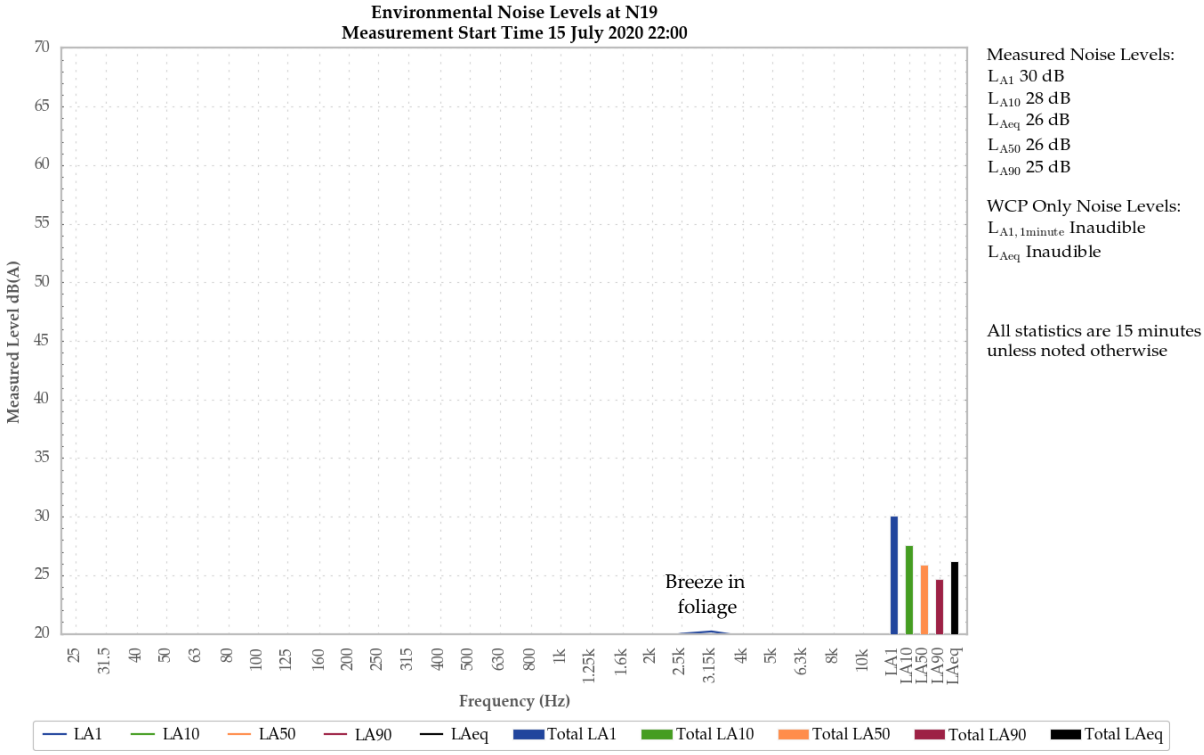


Figure 7: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible during the measurement.

Breeze in foliage and a pump were responsible for all measured noise levels.

An aircraft was also noted.

5.1.6 N20

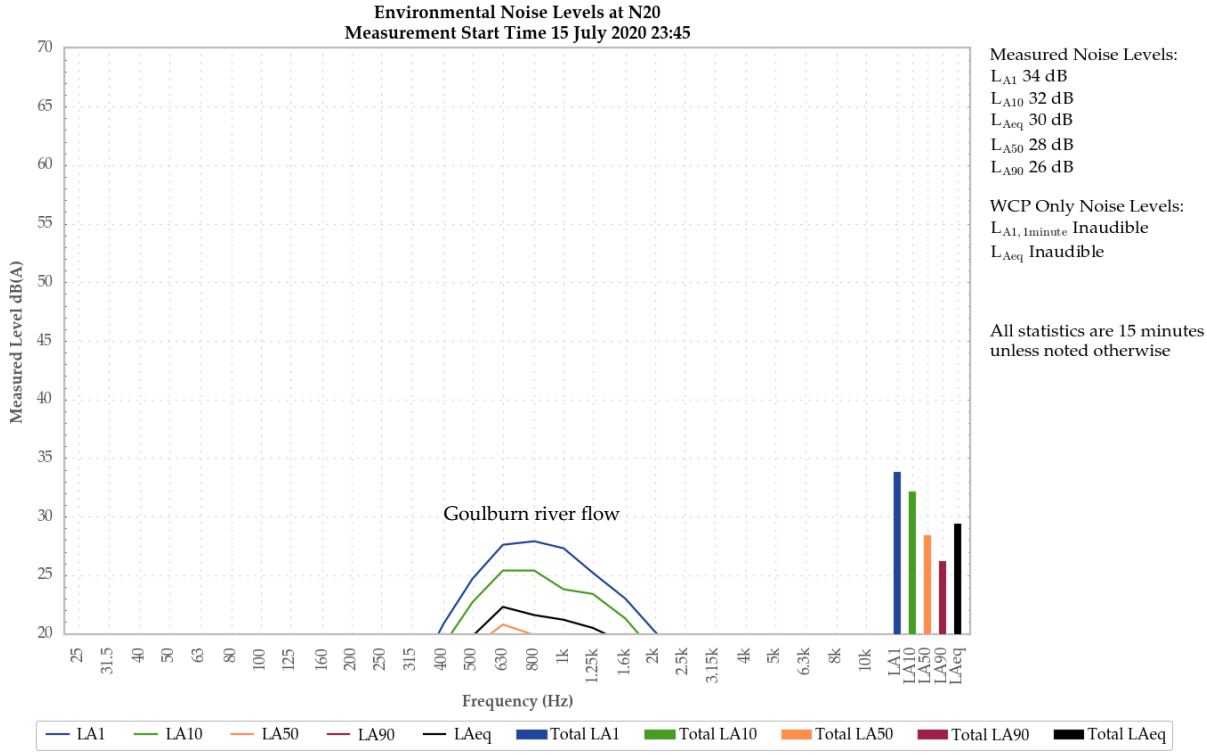


Figure 8: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible during the measurement .

Water flowing down the Goulburn river was responsible for all measured noise levels.

Dogs were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 15/16 July 2020 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the July 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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 DPIE and EPA on the 23 May 2017 to the East of the Mine.

Location	Site	Type	Easting[1]	Northing[1]	Justification
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DPIE 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 DPIE 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 Wandoona 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**.

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 DPIE and the EPA.

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.

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria (**Table 6**) has occurred, WCPL will, at the earliest opportunity:

- Take all feasible and reasonable and steps to ensure that the non-compliance ceases and does not recur;
- Consider all feasible and reasonable and options for remediation (where relevant) and submit a report to the DPIE describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Secretary; and
- Review and, if necessary, revise this NMP (**Section 10**), to the satisfaction of the Secretary.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C18618

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 :	23.6°C	**Ambient Temperature :**	22.4°C
Relative Humidity :	42.6%	**Relative Humidity :**	42.4%
Barometric Pressure :	98.42kPa	**Barometric Pressure :**	98.45kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 26 Nov 2018
Secondary Check: Lewis Boorman
Report Issue Date : 29 Nov 2018
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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.12dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.18dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.31dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

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 Australian/national standards.

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 C20082

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

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 81334

Atmospheric Conditions
Ambient Temperature : 24.6°C
Relative Humidity : 48.9%
Barometric Pressure : 99.8kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 12 Feb 2020
Secondary Check: Max Moore
Report Issue Date : 13 Feb 2020
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
Measured Output	94.0	1000.0	94.1	1000.35

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..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.5%*	*Barometric Pressure*	*±0.015kPa*

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

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

NATA
WORLD RECOGNISED ACCREDITATION

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

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

Wilpinjong Coal

Environmental Noise Monitoring

August 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring
August 2020

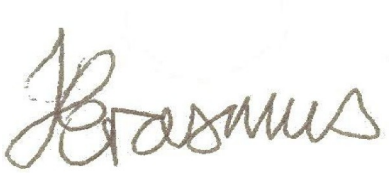
Reference: 20201_R01
Report date: 11 September 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Jonathan Erasmus Consultant	QA Review:	Jesse Tribby Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 18/19 August 2020 at six locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar

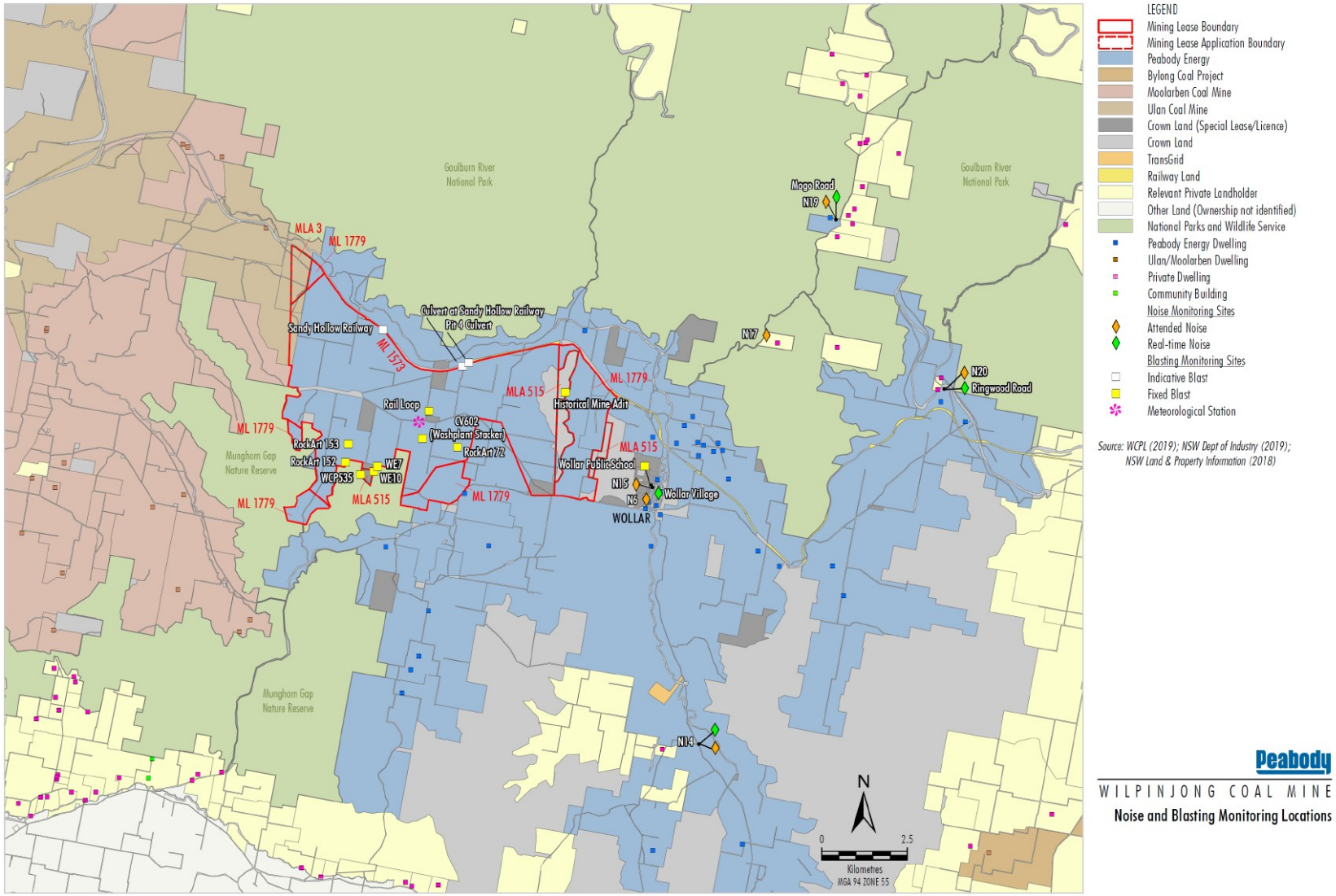


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2019)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in June 2020. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in September 2019. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 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', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Jonathan Erasmus.

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 WCP) 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- 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 $L_{A1,1minute}$ 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 (i.e. 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 $L_{Aeq,15minute}$ level.

3.3 Noise Monitoring Equipment

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	30131882	05/02/2021
Pulsar 105 acoustic calibrator	78226	01/02/2021

3.4 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 (e.g. "<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 WCP was the only contributing low-frequency noise source.

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – AUGUST 2020[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
N6	18/08/2020 23:15	46	44	42	40	39	37	34
N6[1]	18/08/2020 23:39	48	44	41	39	39	36	33
N14	19/08/2020 00:54	36	31	29	26	24	23	21
N15	18/08/2020 22:55	44	41	39	37	36	34	31
N17	18/08/2020 22:24	40	36	34	32	32	30	26
N19	18/08/2020 22:00	42	32	29	28	27	25	22
N20	19/08/2020 00:17	75	68	47	53	34	26	24

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP; and*
2. *Remeasure.*

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 3.4.

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

4.3 Attended Noise Monitoring

Table 4.2 to Table 4.3 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – AUGUST 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	18/08/2020 23:15	0.0	G	37	No	40	NA
N6[5]	18/08/2020 23:39	0.0	G	37	No	39	NA
N14	19/08/2020 00:54	0.0	G	35	No	IA	NA
N15	18/08/2020 22:55	0.0	G	37	No	37	NA
N17	18/08/2020 22:24	0.0	G	38	No	32	NA
N19	18/08/2020 22:00	0.0	F	35	Yes	<25	Nil
N20	19/08/2020 00:17	0.0	G	35	No	<25	NA

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable;*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL; and*
5. *Remeasure.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – AUGUST 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	18/08/2020 23:15	0.0	G	45	No	46	NA
N6[5]	18/08/2020 23:39	0.0	G	45	No	48	NA
N14	19/08/2020 00:54	0.0	G	45	No	IA	NA
N15	18/08/2020 22:55	0.0	G	45	No	43	NA
N17	18/08/2020 22:24	0.0	G	45	No	36	NA
N19	18/08/2020 22:00	0.0	F	45	Yes	30	Nil
N20	19/08/2020 00:17	0.0	G	45	No	<25	NA

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL; and*
5. *Remeasure*

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 2020

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	18/08/2020 23:15	7	0.8	220	0
N6[2]	18/08/2020 23:39	8	-	-	0
N14	19/08/2020 00:54	6	-	-	0
N15	18/08/2020 22:55	9	-	-	0
N17	18/08/2020 22:24	11	-	-	0
N19	18/08/2020 22:00	13	0.7	340	0
N20	19/08/2020 00:17	6	0.8	240	0

Notes:

1. *"-" indicates calm conditions at monitoring location; and*
2. *Remeasure*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

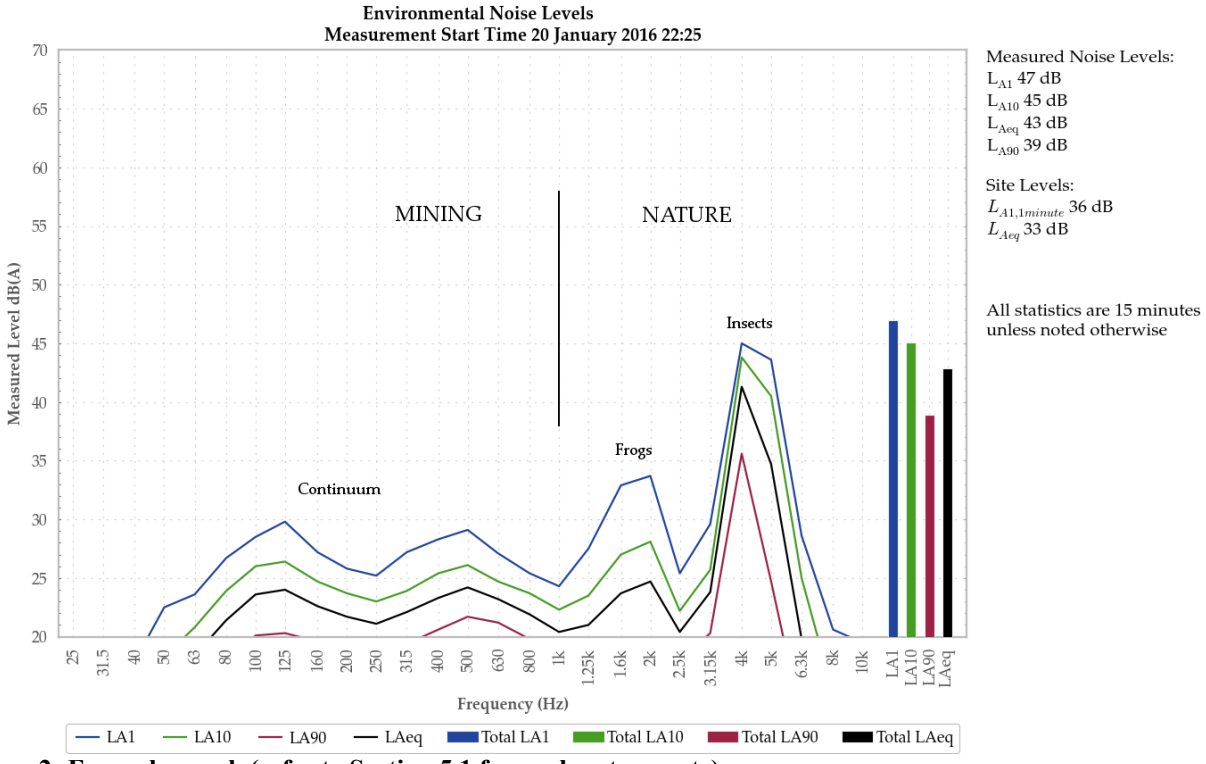


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

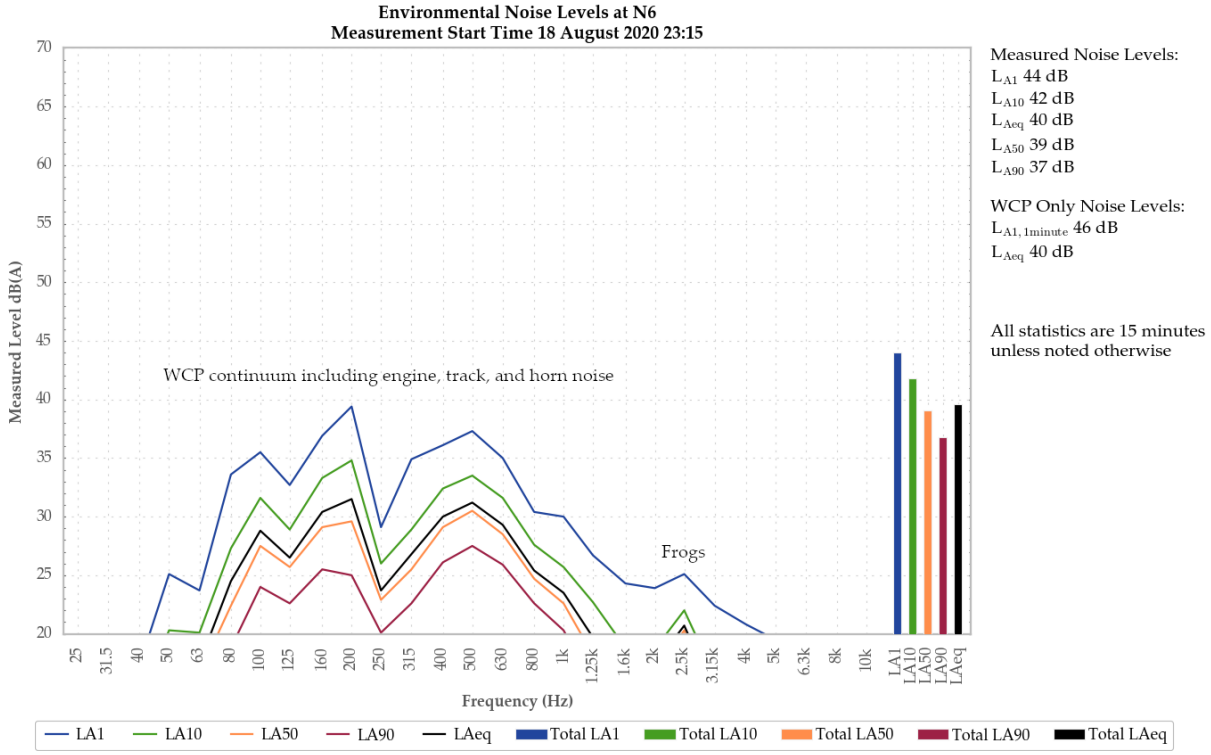


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

A mining and engine continuum from WCP was audible throughout the measurement generating the site-only L_{Aeq} of 40 dB. Continuum surges generated the site-only $L_{A1,1minute}$ of 46 dB. Track and horn noise was also noted.

WCP continuum generated the measured noise levels.

Frogs and road traffic were also noted.

5.1.2 N6 – Remeasure

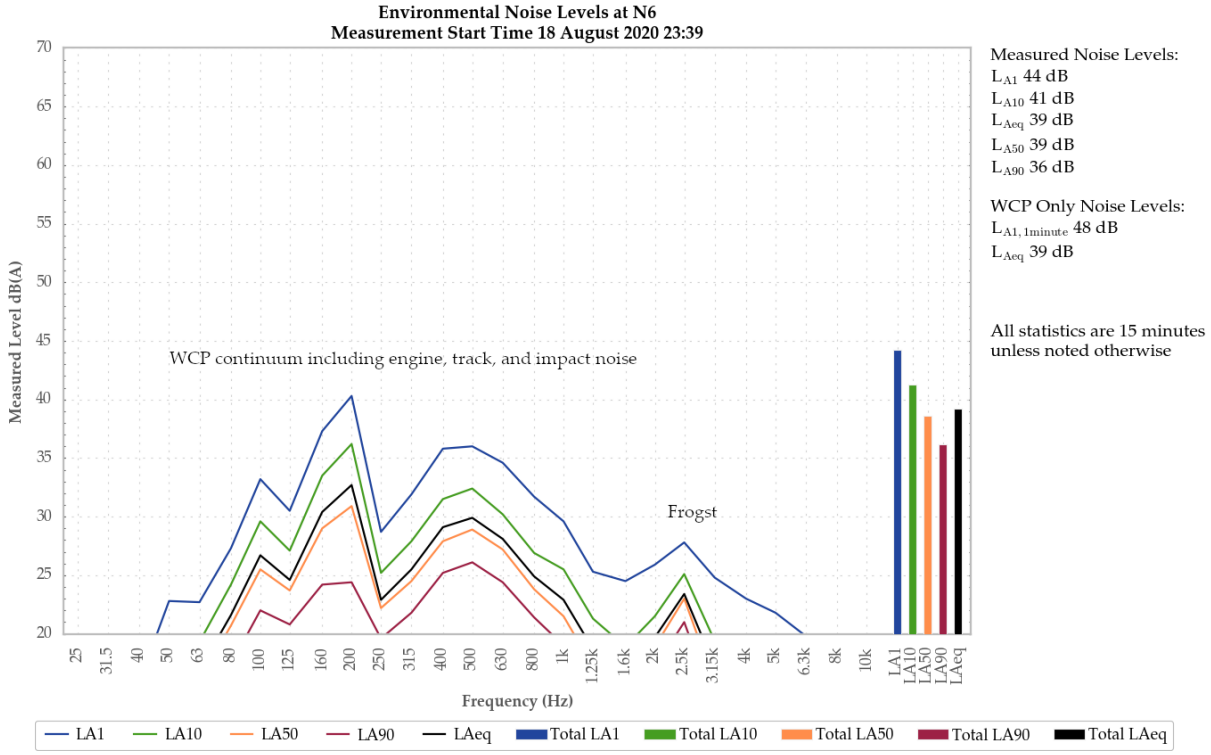


Figure 4: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

A mining and engine continuum from WCP was audible throughout the measurement generating the site-only L_{Aeq} of 39 dB. Impact noise generated the site-only $L_{A1,1minute}$ of 48 dB. Track noise was also noted.

WCP continuum generated the measured noise levels.

Frogs and road traffic were also noted.

5.1.3 N14

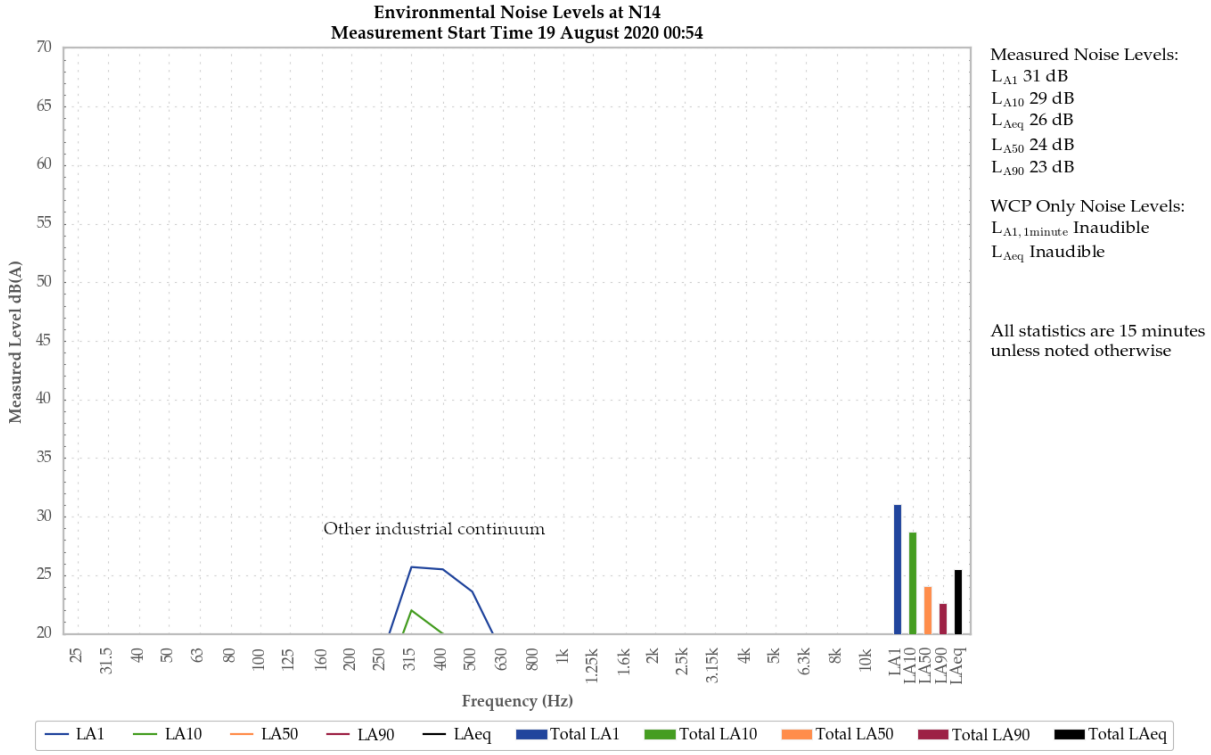


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible during the measurement.

Substation continuum generated the measured noise levels.

Frogs and insects were also noted.

5.1.4 N15

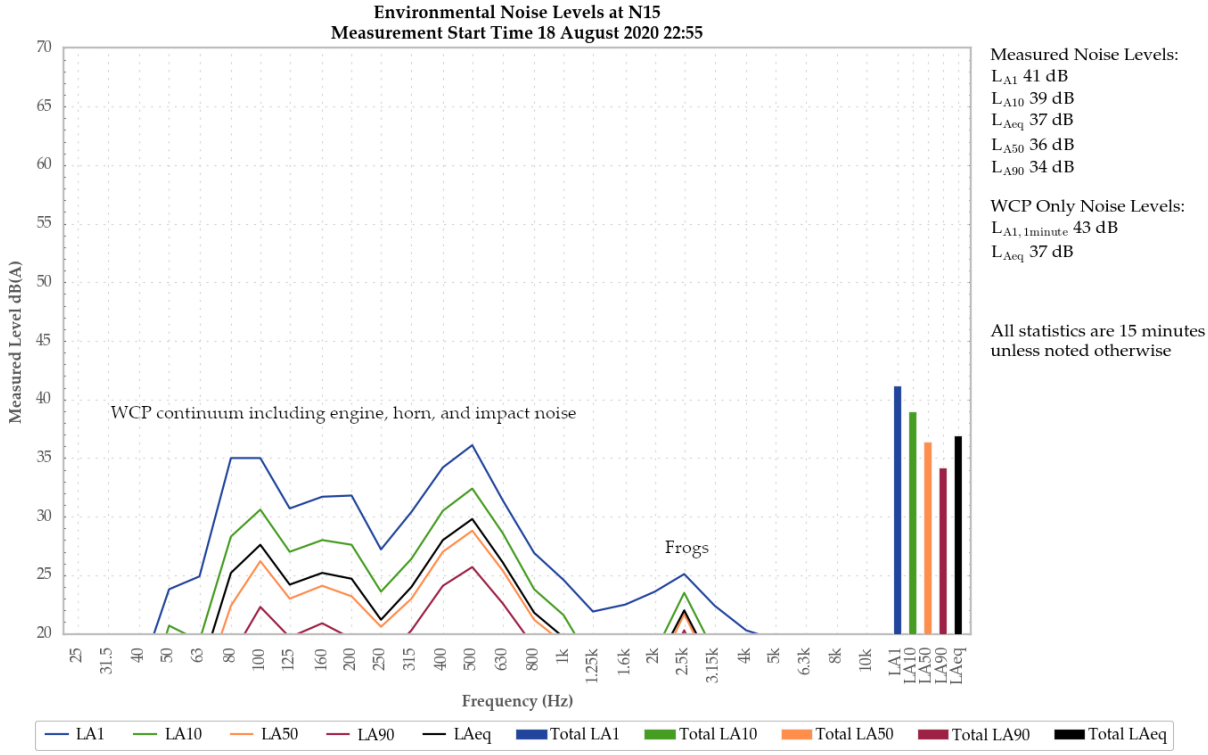


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A mining and engine continuum and track noise from WCP were audible throughout the measurement generating the site-only L_{Aeq} of 37 dB. Engine surges generated the site-only $L_{A1,1minute}$ of 43 dB. Impact and horn noise was also noted.

WCP continuum generated the measured noise levels.

Frogs and livestock were also noted.

5.1.5 N17

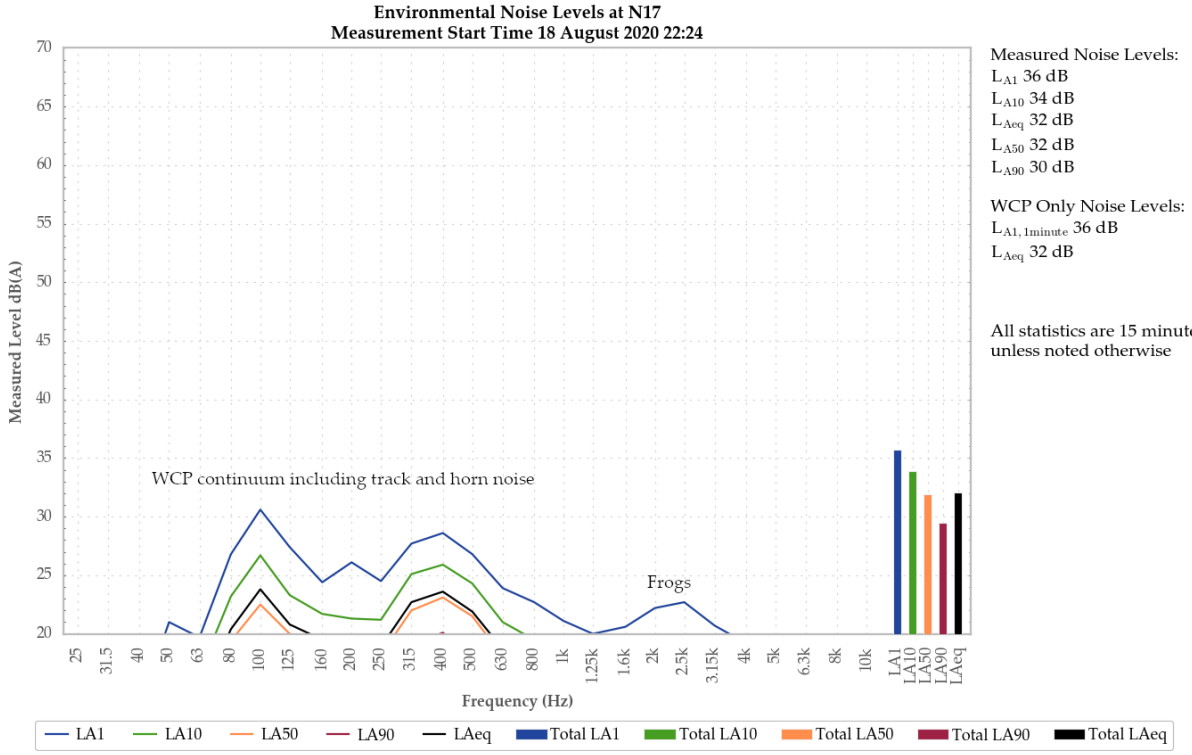


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

A mining continuum from WCP was audible throughout the measurement generating the site-only L_{Aeq} of 32 dB. Surges in the continuum were responsible for the site-only $L_{A1,1minute}$ of 36. Track noise and horn noise were also noted.

WCP continuum generated the measured noise levels.

Frogs were also noted.

5.1.6 N19

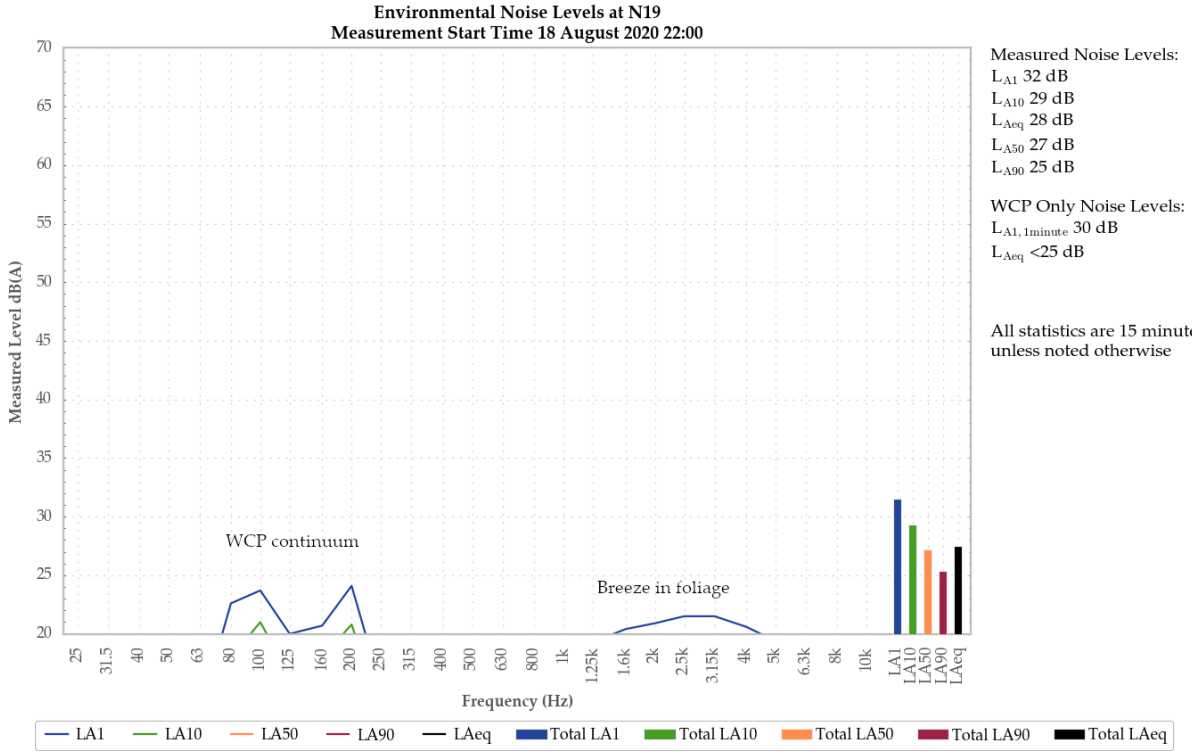


Figure 8: Environmental Noise Levels – N19, Upper Mogo Road

A low-level mining continuum from WCP was audible throughout the measurement generating the site-only L_{Aeq} of less than 25 dB. Impact noise generated the site-only $L_{A1,1minute}$ of 30 dB. Engine surges were also noted.

WCP continuum and breeze in foliage were responsible for the measured noise levels.

Frogs and insects were also noted.

5.1.7 N20

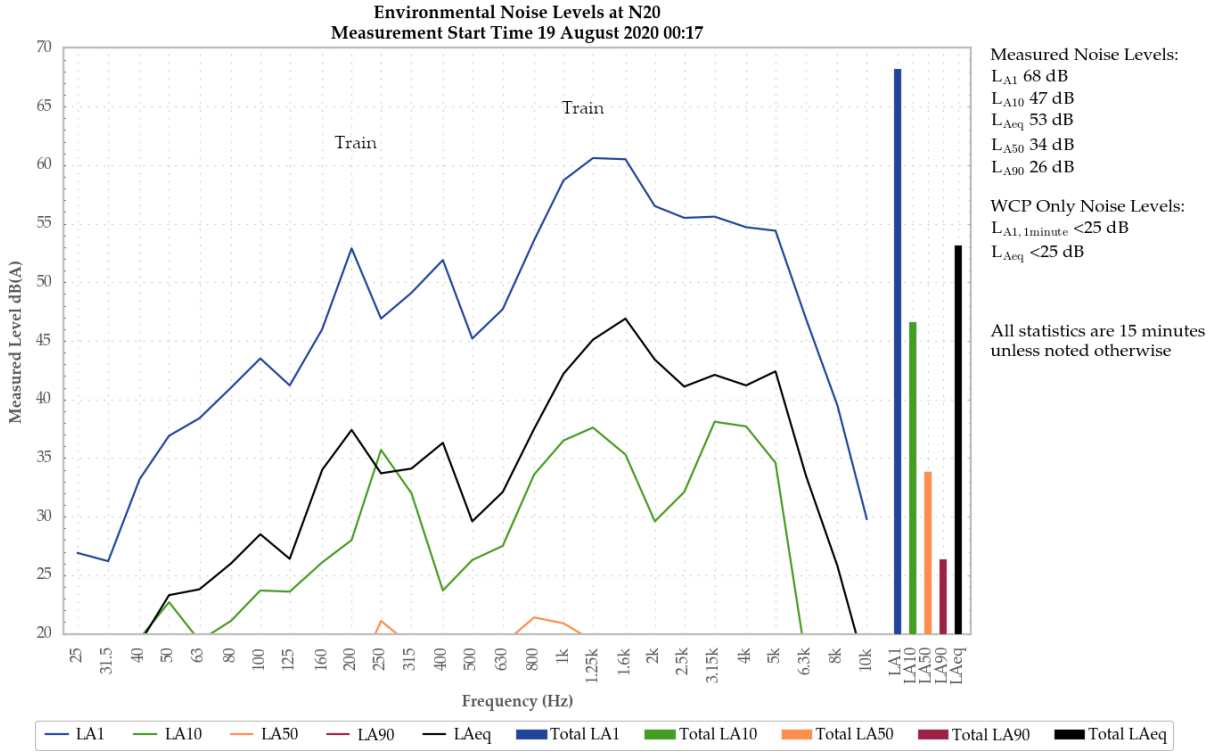


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

A low-level mining continuum from WCP was audible throughout the measurement generating the site-only L_{Aeq} and $L_{A1,1minute}$ of less than 25 dB.

A train generated the measured noise levels.

Birds, frogs, and insects were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 18/19 August 2020 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the August 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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 DPIE and EPA on the 23 May 2017 to the East of the Mine.

Location	Site	Type	Easting[1]	Northing[1]	Justification
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DPIE 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 DPIE 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 Wandoona 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**.

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 DPIE and the EPA.

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.

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria (**Table 6**) has occurred, WCPL will, at the earliest opportunity:

- Take all feasible and reasonable and steps to ensure that the non-compliance ceases and does not recur;
- Consider all feasible and reasonable and options for remediation (where relevant) and submit a report to the DPIE describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Secretary; and
- Review and, if necessary, revise this NMP (**Section 10**), to the satisfaction of the Secretary.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19073

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

Equipment Tested/ Model Number : NA-28
Instrument Serial Number : 30131882
Microphone Serial Number : 04739
Pre-amplifier Serial Number : 11942

Pre-Test Atmospheric Conditions
Ambient Temperature : 24.5°C
Relative Humidity : 54.5%
Barometric Pressure : 99.39kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 23.6°C
Relative Humidity : 51%
Barometric Pressure : 99.36kPa

Calibration Technician : Charlie Neil
Calibration Date : 5 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019

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 -

Acoustic Tests
31.5 Hz to 8kHz ±0.15dB
12.5kHz ±0.2dB
16kHz ±0.29dB
Electrical Tests
31.5 Hz to 20 kHz ±0.11dB

Environmental Conditions
Temperature ±0.2°C
Relative Humidity ±2.4%
Barometric Pressure ±0.015kPa

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.

Accredited for compliance with ISO/IEC 17025 - calibration.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19074

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

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

Atmospheric Conditions
Ambient Temperature : 23.8°C
Relative Humidity : 53.7%
Barometric Pressure : 100.09kPa

Calibration Technician : Charlie Neil
Calibration Date : 1 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019
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
Pre Adjustment	94.0	1000.0	94.4	1000.38
Post Adjustment	94.0	1000.0	94.1	1000.39

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.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.48%*	*Barometric Pressure*	*±0.015kPa*

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 Australian/national standards.

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

Wilpinjong Coal

Environmental Noise Monitoring

September 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring September 2020

Reference: 20213_R01
Report date: 16 October 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322

Prepared:	Robert Kirwan Consultant	QA Review:	Jesse Tribby Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 1/2 September 2020 at six locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar

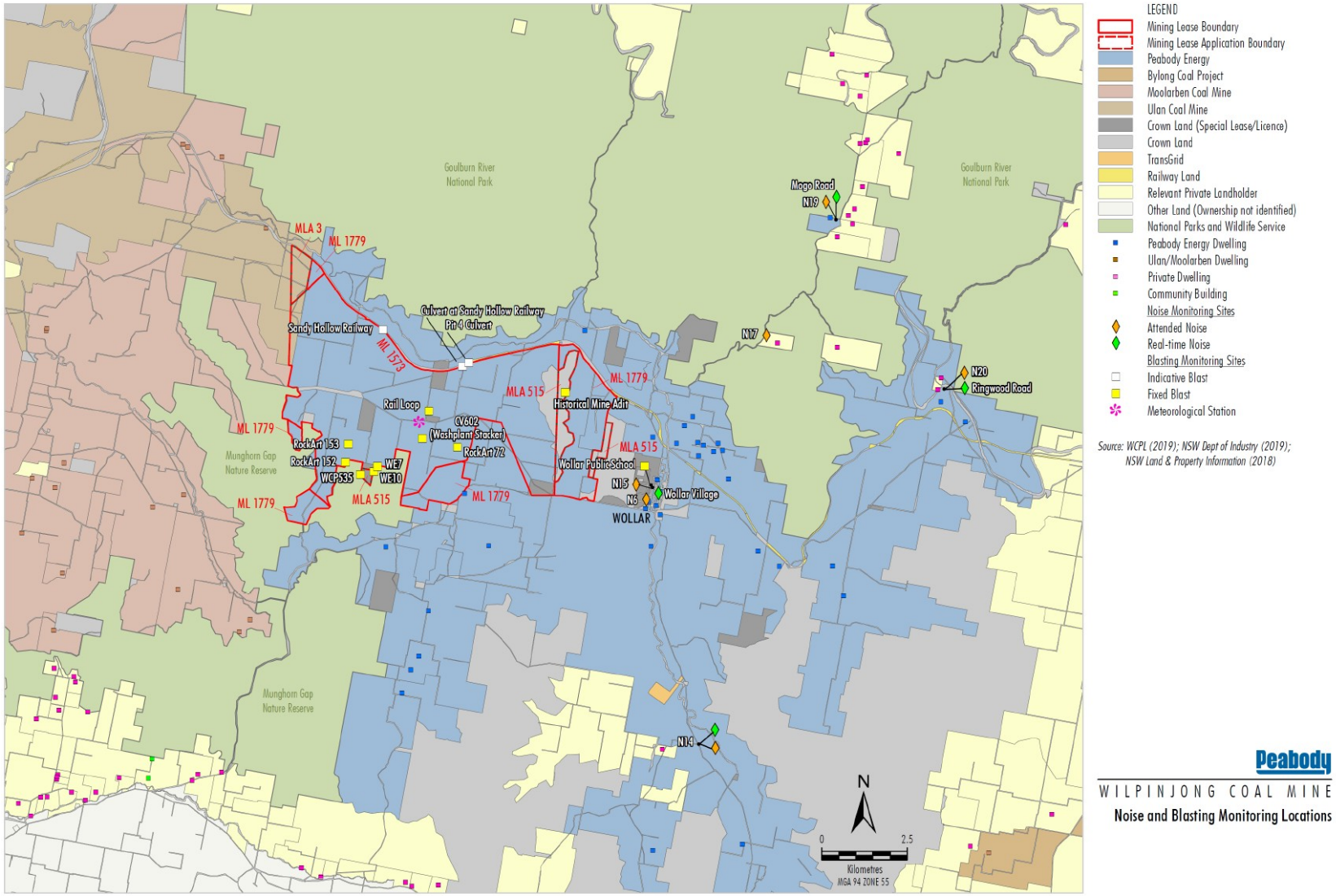


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2019)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in June 2020. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in September 2019. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 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', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Ryan Bruniges.

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 WCP) 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- 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 $L_{A1,1minute}$ 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 (i.e. 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 $L_{Aeq,15minute}$ level.

3.3 Noise Monitoring Equipment

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	00701424	14/06/2021
Pulsar 105 acoustic calibrator	79631	13/05/2022

3.4 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 (e.g. "<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 WCP was the only contributing low-frequency noise source.

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – SEPTEMBER 2020[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
N6	02/09/2020 00:45	37	29	27	26	26	25	23
N14	02/09/2020 00:18	45	30	28	27	26	25	23
N15	01/09/2020 23:05	45	31	29	27	27	24	22
N17	01/09/2020 22:32	30	26	22	21	20	18	16
N19	01/09/2020 22:04	39	32	27	25	23	21	19
N20	01/09/2020 23:40	52	47	38	35	25	22	19

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

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 3.4.

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

4.3 Attended Noise Monitoring

Table 4.2 to Table 4.3 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – SEPTEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	02/09/2020 00:45	0.0	G	37	No	<25	NA
N14	02/09/2020 00:18	0.0	G	35	No	25	NA
N15	01/09/2020 23:05	0.0	G	37	No	27	NA
N17	01/09/2020 22:32	0.0	F	38	Yes	<20	Nil
N19	01/09/2020 22:04	0.0	G	35	No	<20	NA
N20	01/09/2020 23:40	0.0	F	35	Yes	<25	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – SEPTEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	02/09/2020 00:45	0.0	G	45	No	<25	NA
N14	02/09/2020 00:18	0.0	G	45	No	29	NA
N15	01/09/2020 23:05	0.0	G	45	No	45	NA
N17	01/09/2020 22:32	0.0	F	45	Yes	<25	Nil
N19	01/09/2020 22:04	0.0	G	45	No	<25	NA
N20	01/09/2020 23:40	0.0	F	45	Yes	28	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

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 – SEPTEMBER 2020

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	02/09/2020 00:45	3	0.0	-	0
N14	02/09/2020 00:18	6	0.0	-	0
N15	01/09/2020 23:05	8	0.0	-	0
N17	01/09/2020 22:32	11	0.0	-	0
N19	01/09/2020 22:04	14	0.0	-	0
N20	01/09/2020 23:40	5	0.0	-	0

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

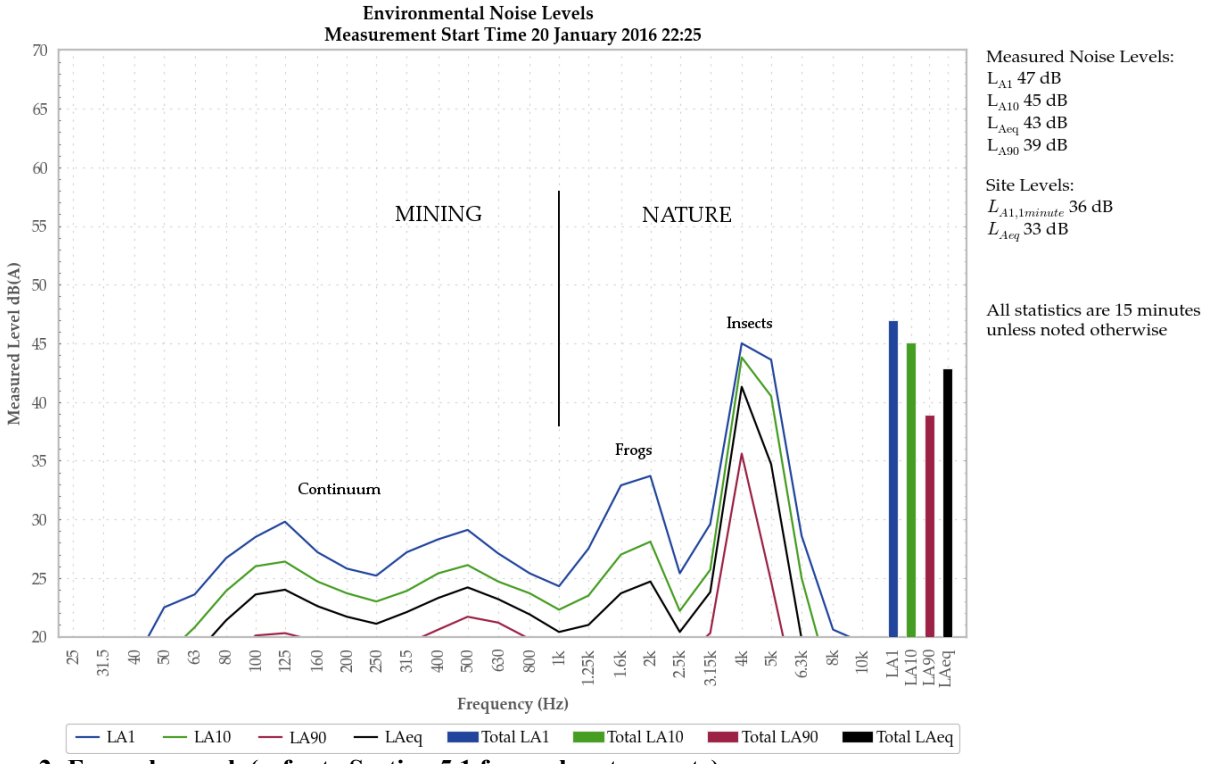


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

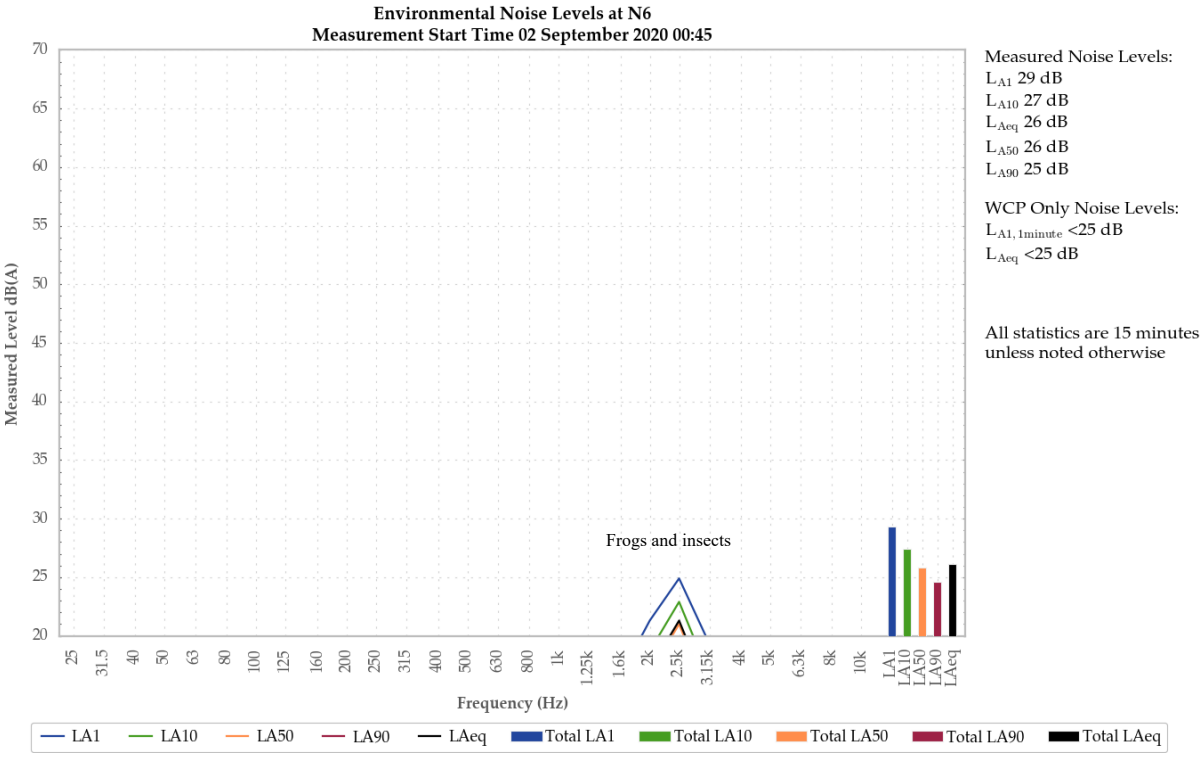


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

A mining continuum from WCP was audible at low levels throughout the measurement and generated the measured site-only L_{Aeq} and $L_{A1,1minute}$ of less than 25 dB.

Frogs and insects were primarily responsible for the measured levels. WCP was a minor contributor to the measured levels.

Dogs were also noted.

5.1.2 N14

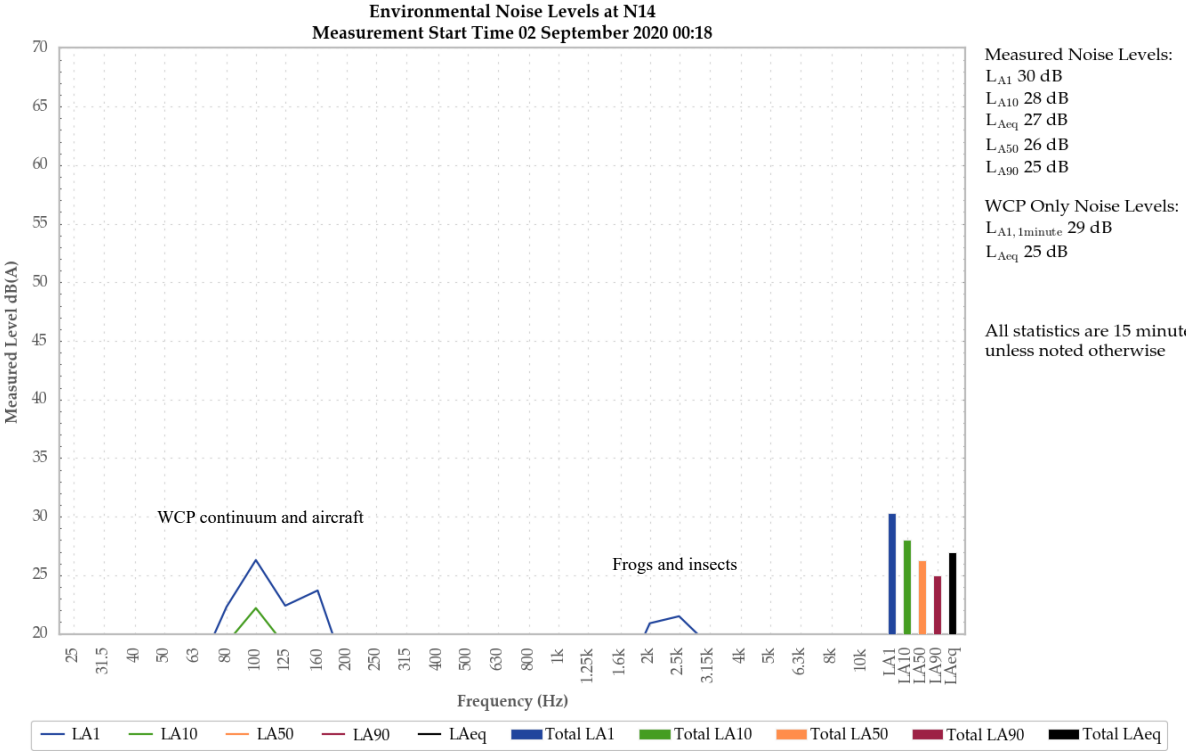


Figure 4: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

A mining continuum from WCP was audible at low levels throughout the measurement and generated the measured site-only L_{Aeq} of 25 dB and site-only $L_{A1,1minute}$ of 29 dB.

WCP continuum and an aircraft combined to generate the measured L_{A1}. WCP continuum, frogs and insects generated the measured L_{A10}, L_{A50}, L_{Aeq} and L_{A90}.

Cows and birds were also noted.

5.1.3 N15

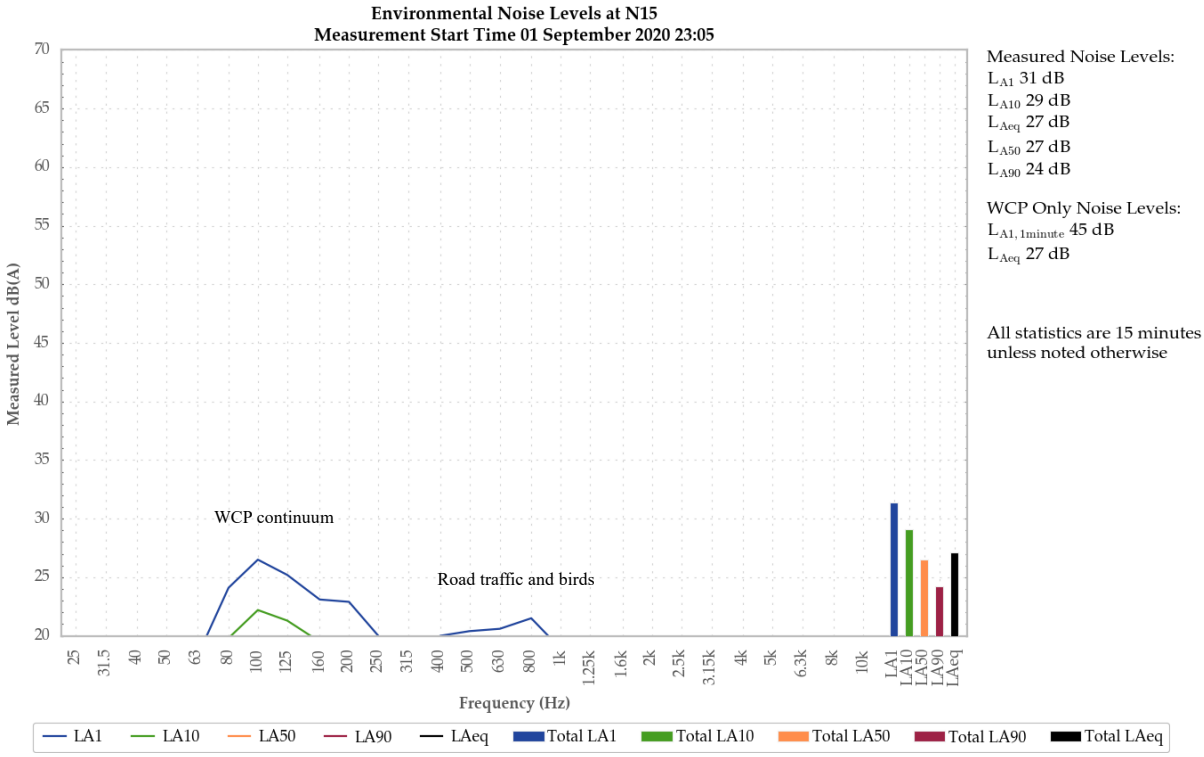


Figure 5: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A mining continuum and rear dump truck engine noise from WCP was audible throughout the measurement and generated the measured site-only L_{Aeq} of 27 dB. An impact noise generated the measured site-only $L_{A1,1minute}$ of 45 dB.

WCP continuum and mining noise generated the measured noise levels.

Distance road traffic, birds, frogs, and insects were also noted.

5.1.4 N17

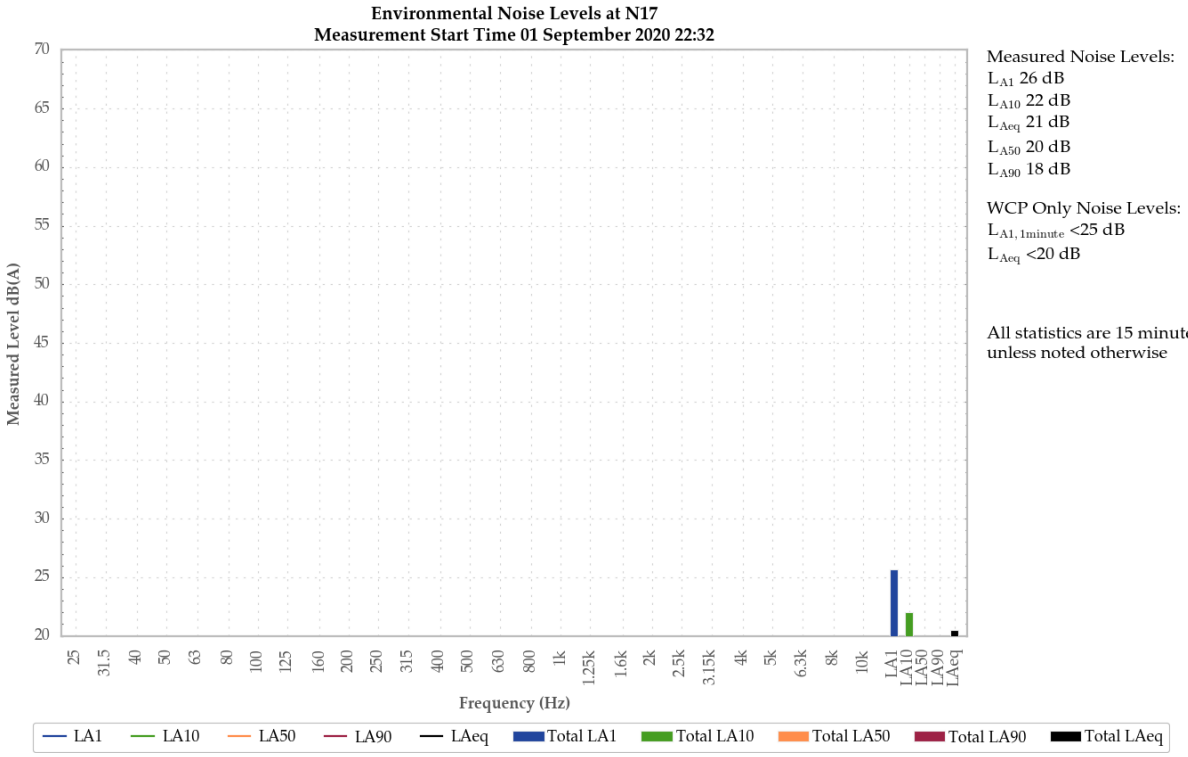


Figure 6: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

A mining continuum from WCP was audible at low levels throughout the measurement, which generated the site-only L_{Aeq} of less than 20 dB and site-only $L_{A1,1minute}$ of less than 25 dB.

WCP continuum was primarily responsible for the measured noise levels. A distant train contributed to the measured L_{A1}, L_{A10}, and L_{Aeq}. The noise floor of the measurement contributed to the measured L_{A90}.

Insects and distant road traffic were also noted.

5.1.5 N19

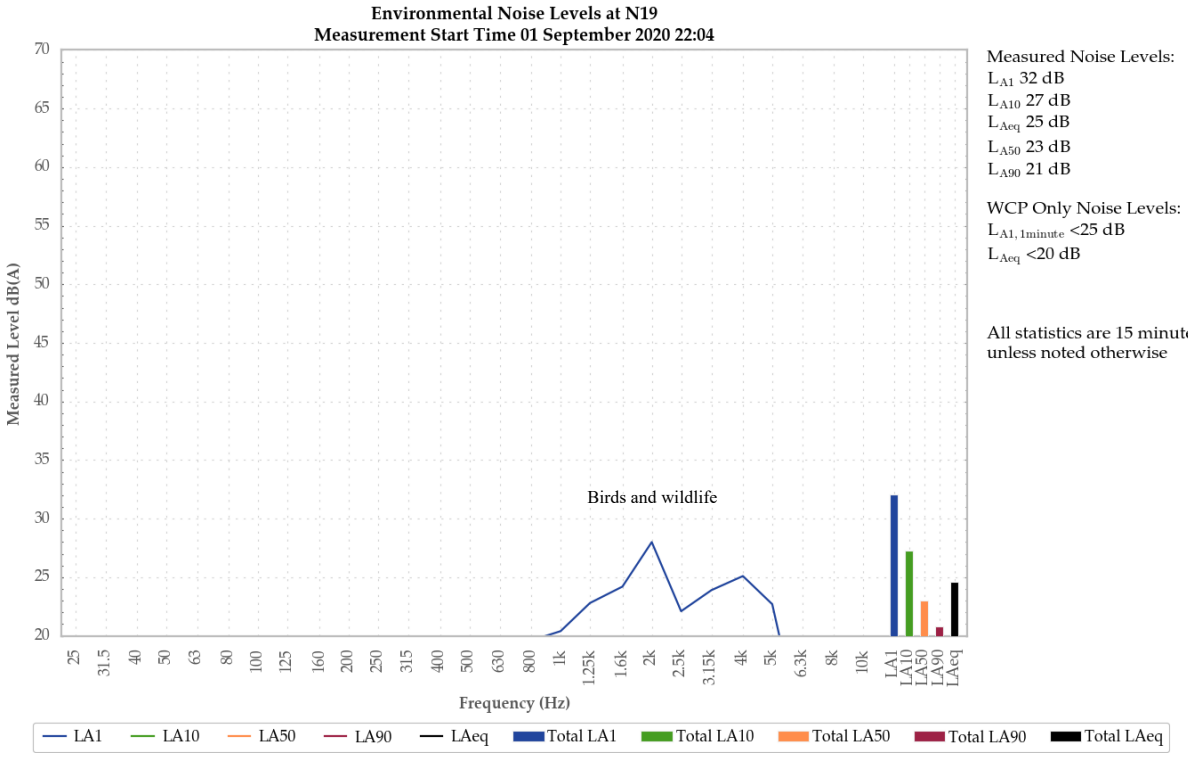


Figure 7: Environmental Noise Levels – N19, Upper Mogo Road

A mining continuum from WCP was audible at low levels throughout the measurement, which generated the site-only L_{Aeq} of less than 20 dB and site-only $L_{A1,1minute}$ of less than 25 dB.

Birds and local wildlife were primarily responsible for the measured L_{A1}, L_{A10}, L_{Aeq}, and L_{A50}. Frogs, insects and WCP continuum contributed to the measured L_{Aeq} and L_{A50}, and were responsible for the measured L_{A90}.

Breeze in foliage was also noted.

5.1.6 N20

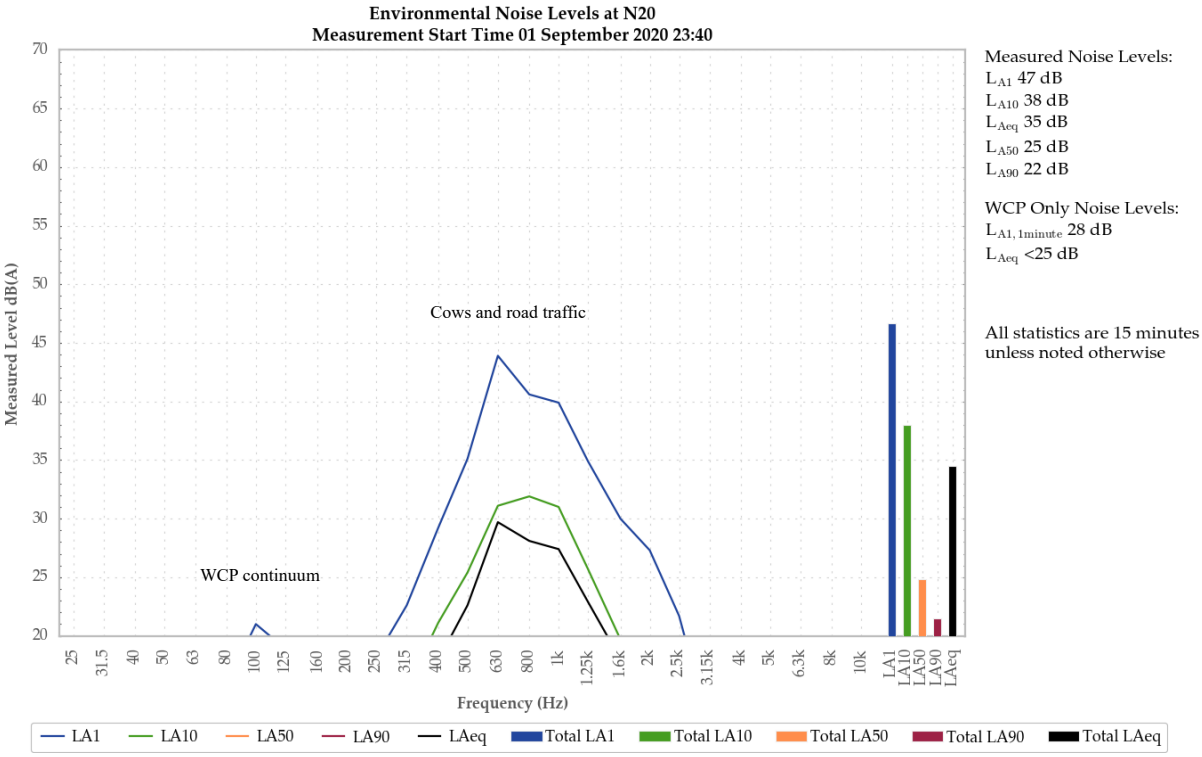


Figure 8: Environmental Noise Levels, N20 – Ringwood Road

A mining continuum from WCP was audible at low levels throughout the measurement, which generated the measured site-only $L_{Aeq,15minute}$ of less than 25 dB and site-only $L_{A1,1minute}$ of 28 dB.

Cows and road traffic tyre noise generated the measured L_{A1}, L_{A10}, and L_{Aeq}. WCP continuum and nearby running water generated the measured L_{A50} and L_{A90}.

Birds and frogs were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 1/2 September 2020 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the September 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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 DPIE and EPA on the 23 May 2017 to the East of the Mine.

Location	Site	Type	Easting[1]	Northing[1]	Justification
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DPIE 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 DPIE 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 Wandoona 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**.

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 DPIE and the EPA.

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.

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria (**Table 6**) has occurred, WCPL will, at the earliest opportunity:

- Take all feasible and reasonable and steps to ensure that the non-compliance ceases and does not recur;
- Consider all feasible and reasonable and options for remediation (where relevant) and submit a report to the DPIE describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Secretary; and
- Review and, if necessary, revise this NMP (**Section 10**), to the satisfaction of the Secretary.

APPENDIX

B CALIBRATION CERTIFICATES

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 C19342

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

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

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	26°C	**Ambient Temperature :**	26°C
Relative Humidity :	40.2%	**Relative Humidity :**	40.7%
Barometric Pressure :	100.96kPa	**Barometric Pressure :**	100.32kPa

Calibration Technician : Lucky Jaiswal **Secondary Check:** Eloise Burrows
Calibration Date : 14 Jun 2019 **Report Issue Date :** 18 Jun 2019

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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

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 Australian/national standards.

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 C20270

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

Equipment Tested/ Model Number : Pulsar Model 105
Instrument Serial Number : 79631

Atmospheric Conditions
Ambient Temperature : 21.9°C
Relative Humidity : 43.9%
Barometric Pressure : 101.2kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 13 May 2020
Secondary Check: Max Moore
Report Issue Date : 19 May 2020

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	94.07	1000.40

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

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.09%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.09%*	*Barometric Pressure*	*±0.015kPa*

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

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

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

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

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

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

PAGE 1 OF 1

Wilpinjong Coal

Environmental Noise Monitoring

October 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring
October 2020

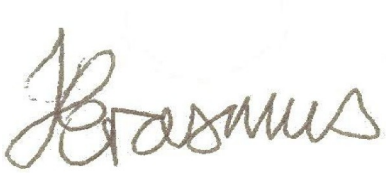
Reference: 20263_R01
Report date: 10 November 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Jonathan Erasmus Consultant	QA Review:	Jesse Tribby Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 6/7 October 2020 at six locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar

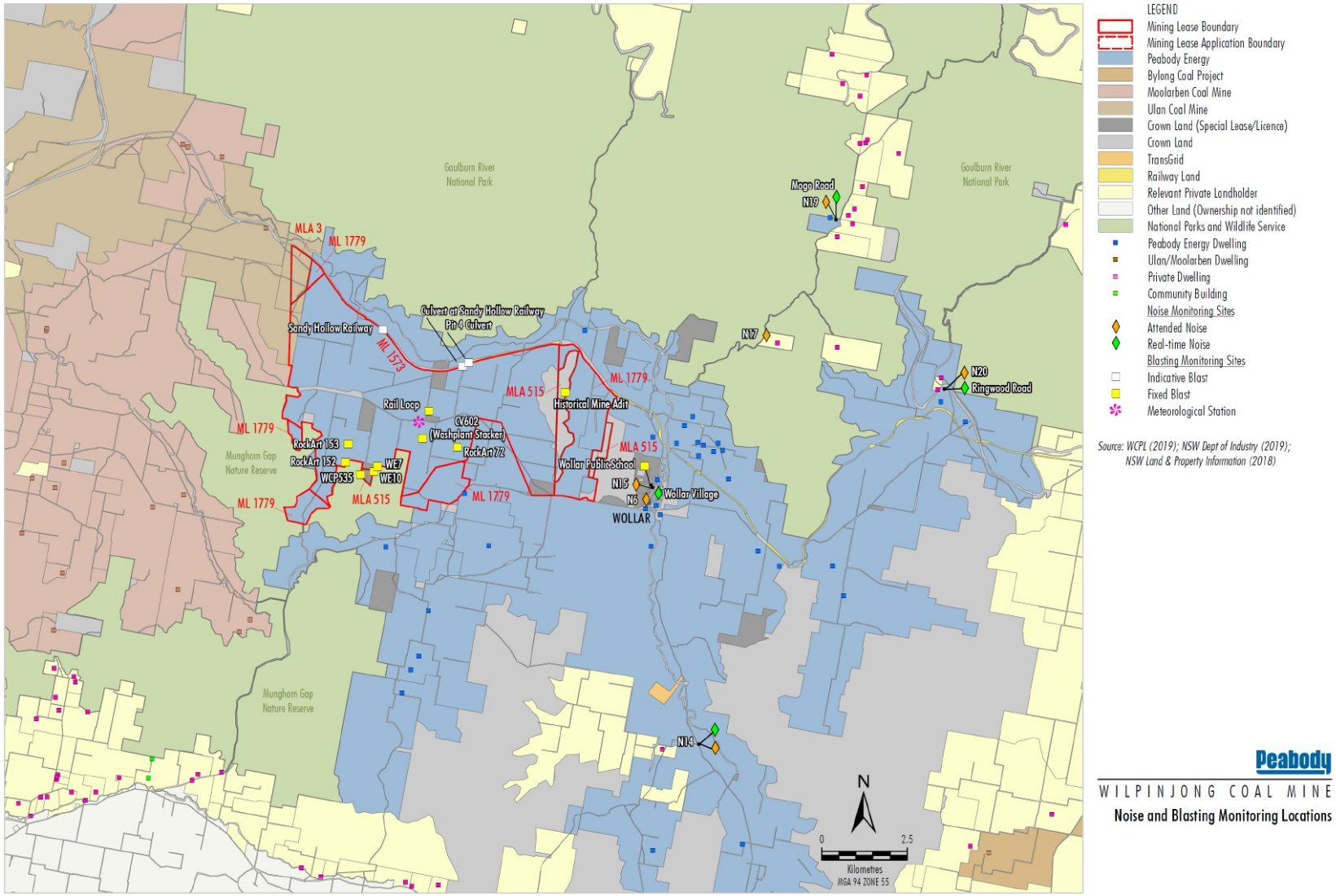


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2019)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in June 2020. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in September 2019. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 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', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Jonathan Erasmus.

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 WCP) 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- 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 $L_{A1,1minute}$ 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 (i.e. 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 $L_{Aeq,15minute}$ level.

3.3 Noise Monitoring Equipment

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	01070590	11/06/2022
Rion NA-28 sound level meter	30131882	05/02/2021
Pulsar 106 acoustic calibrator	74813	21/02/2021
Pulsar 105 acoustic calibrator	78226	01/02/2021

3.4 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 (e.g. "<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 WCP was the only contributing low-frequency noise source.

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – OCTOBER 2020[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
N6	06/10/2020 23:20	50	43	41	39	39	35	25
N14	06/10/2020 22:35	57	53	49	45	42	34	25
N15	06/10/2020 23:01	51	42	36	33	30	27	23
N17	06/10/2020 22:27	45	39	36	34	34	32	30
N19	06/10/2020 22:00	49	45	42	39	38	36	33
N20	06/10/2020 22:00	51	40	37	33	29	24	22

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

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 3.4.

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

4.3 Attended Noise Monitoring

Table 4.2 to Table 4.3 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – OCTOBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	06/10/2020 23:20	3.0	D	37	Yes	IA	Nil
N14	06/10/2020 22:35	2.7	D	35	Yes	IA	Nil
N15	06/10/2020 23:01	2.4	D	37	Yes	IA	Nil
N17	06/10/2020 22:27	2.7	D	38	Yes	IA	Nil
N19	06/10/2020 22:00	3.0	D	35	Yes	IA	Nil
N20	06/10/2020 22:00	3.0	D	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – OCTOBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	06/10/2020 23:20	3.0	D	45	Yes	IA	Nil
N14	06/10/2020 22:35	2.7	D	45	Yes	IA	Nil
N15	06/10/2020 23:01	2.4	D	45	Yes	IA	Nil
N17	06/10/2020 22:27	2.7	D	45	Yes	IA	Nil
N19	06/10/2020 22:00	3.0	D	45	Yes	IA	Nil
N20	06/10/2020 22:00	3.0	D	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

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 – OCTOBER 2020

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	06/10/2020 23:20	22	-	-	4
N14	06/10/2020 22:35	20	0.6	220	6
N15	06/10/2020 23:01	21	-	-	7
N17	06/10/2020 22:27	19	-	-	6
N19	06/10/2020 22:00	18	1.5	30	6
N20	06/10/2020 22:00	20	1.2	120	4

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

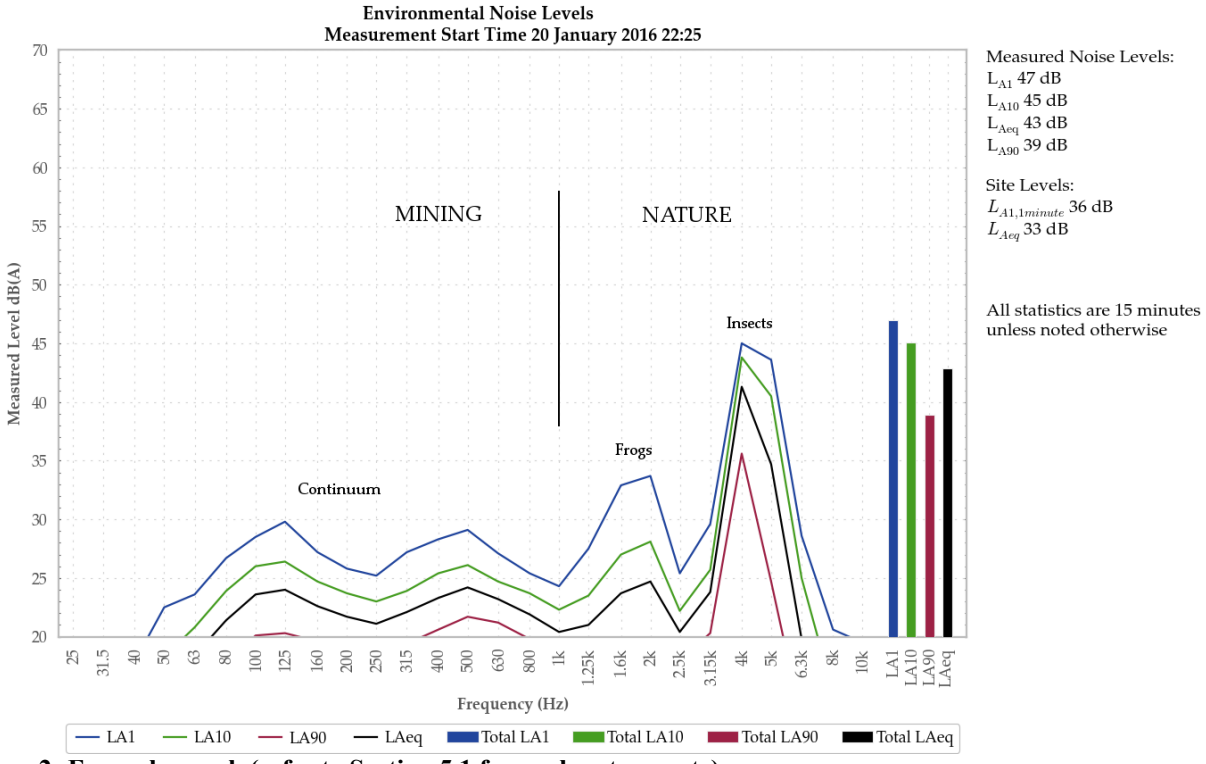


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

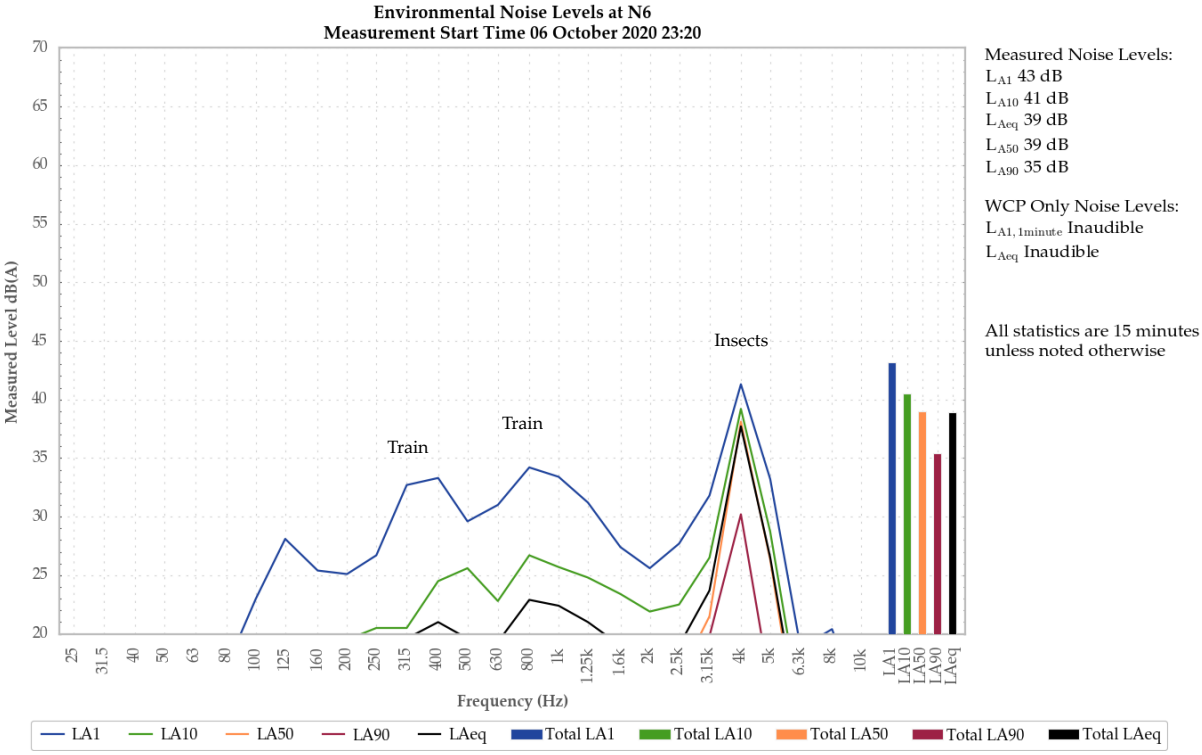


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible during the measurement.

Insects generated the measured noise levels.

A train, dogs and birds were also noted.

5.1.2 N14

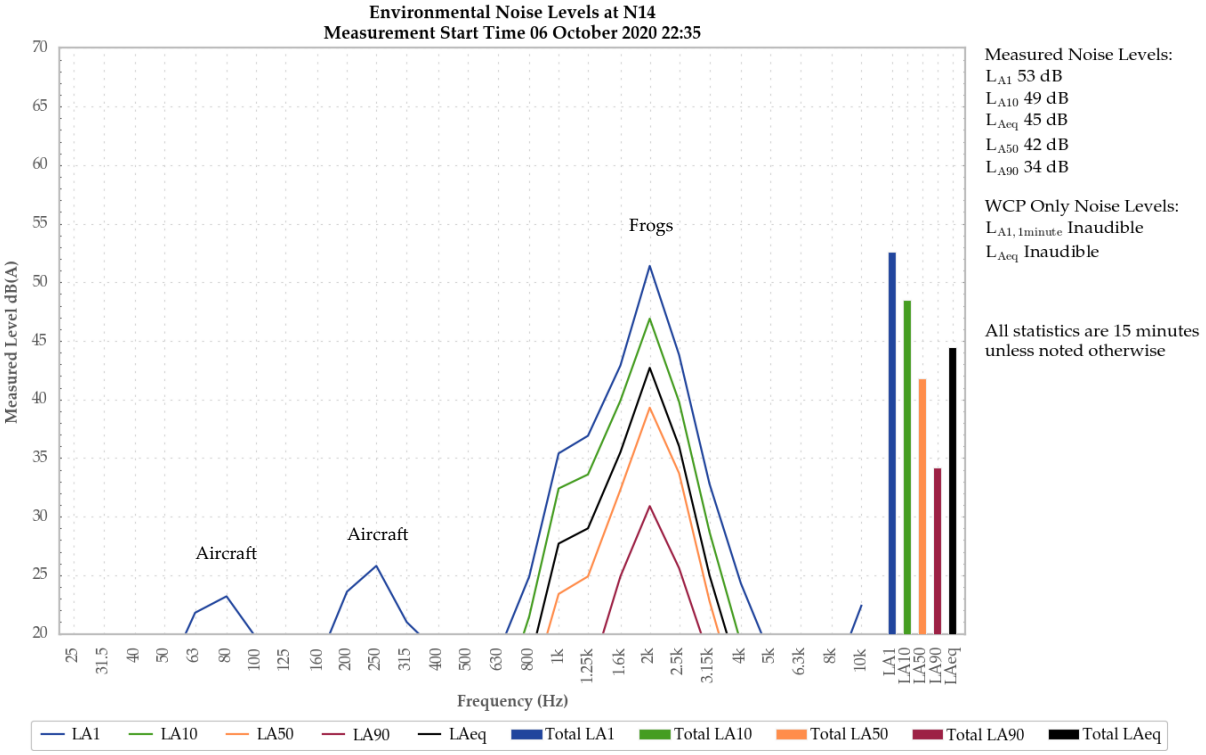


Figure 4: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible during the measurement.

Frogs generated the measured noise levels.

Aircraft were also noted.

5.1.3 N15

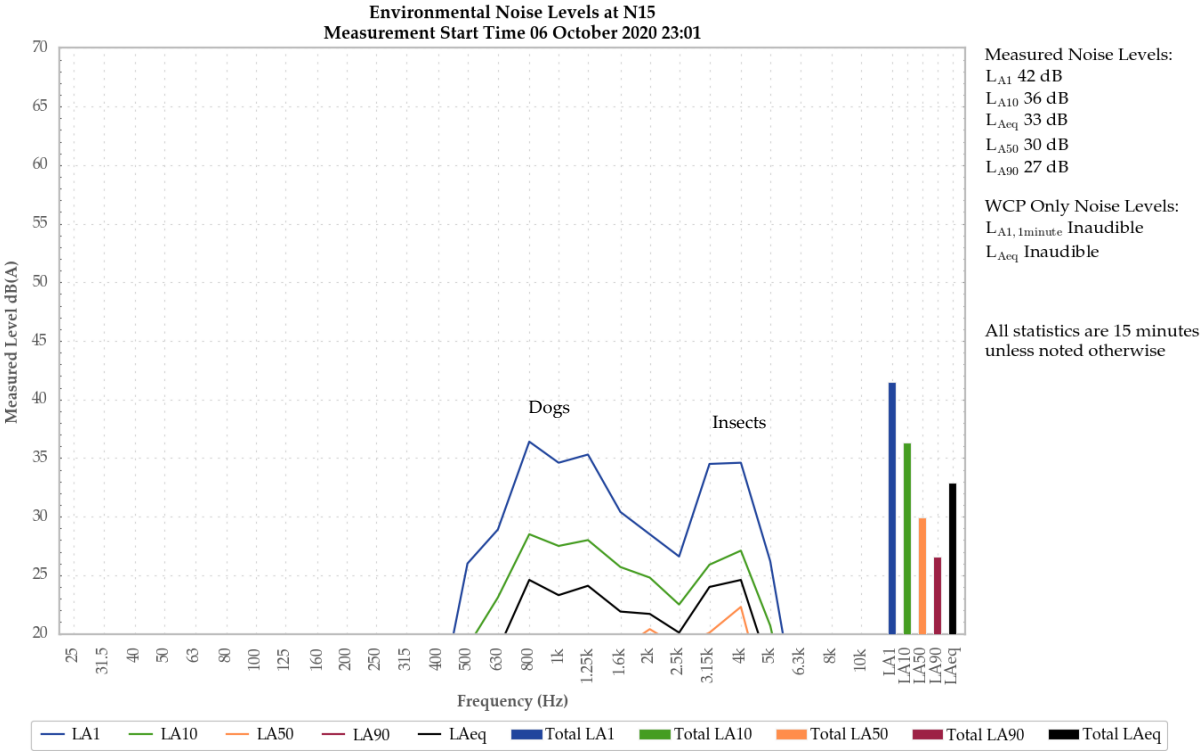


Figure 5: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible during the measurement.

Dogs and insects generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Insects generated the measured L_{A50} and L_{A90}.

Aircraft and birds were also noted.

5.1.4 N17

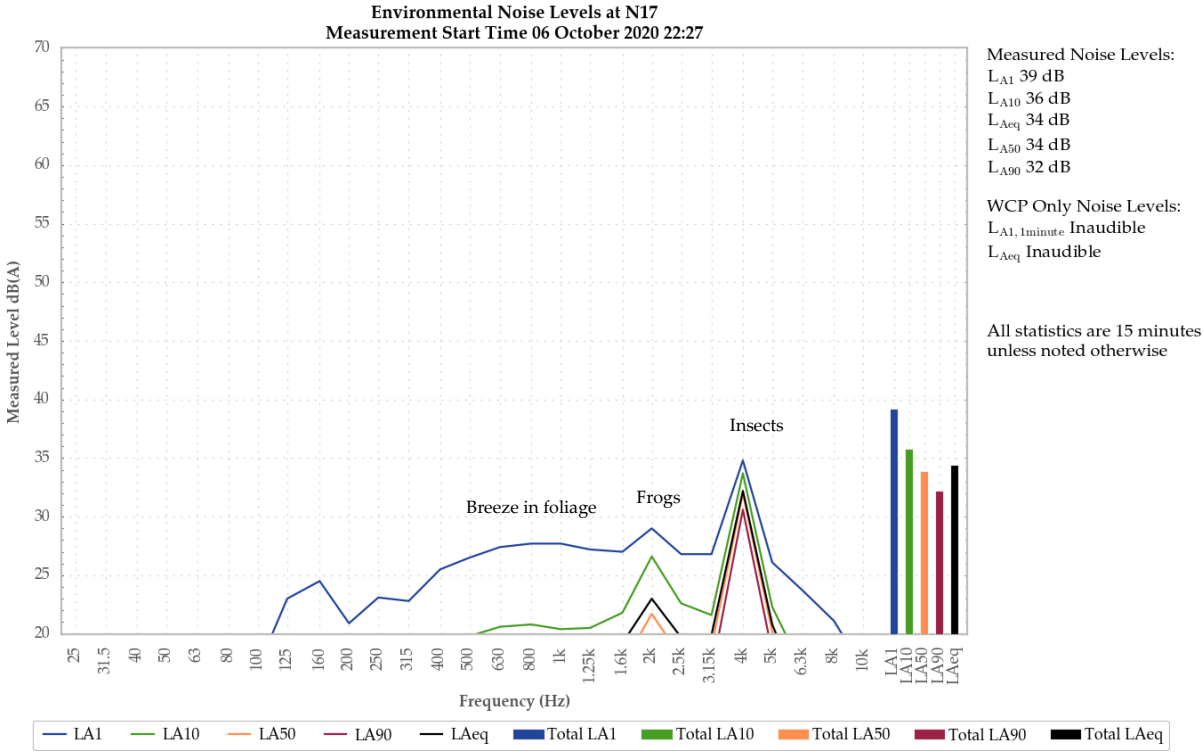


Figure 6: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

WCP was inaudible during the measurement.

Frogs and insects generated the measured noise levels.

Breeze in foliage, an aircraft, and birds were also noted.

5.1.5 N19

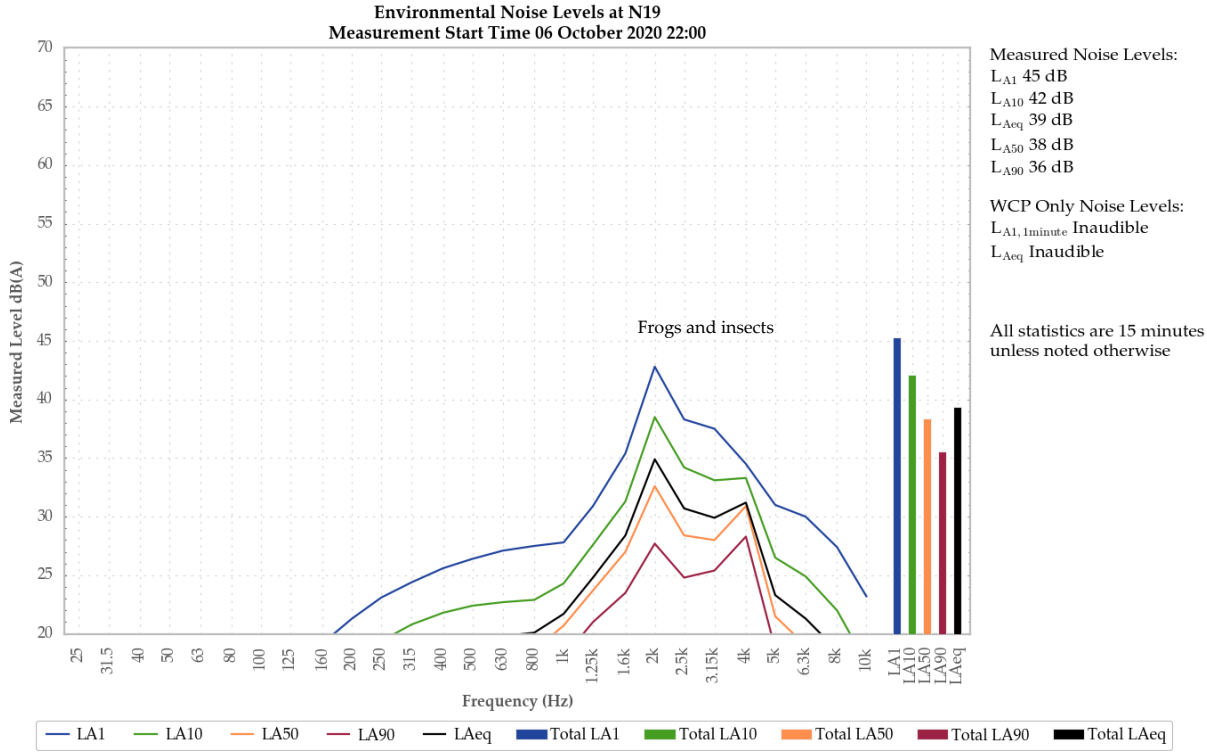


Figure 7: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible during the measurement.

Frogs and insects generated the measured noise levels.

Breeze in foliage and a distant train were also noted.

5.1.6 N20

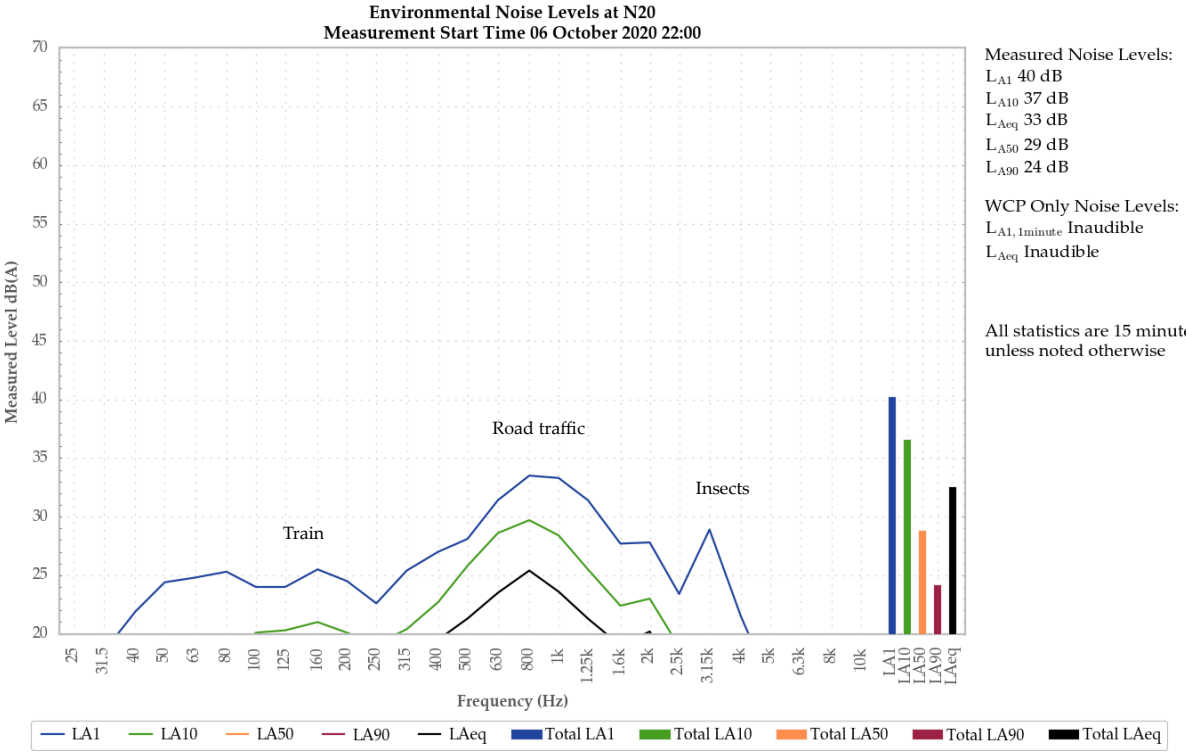


Figure 8: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible during the measurement.

Road traffic generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Frogs and insects generated the measured L_{A50} and L_{A90}.

Breeze in foliage, livestock, birds, and a train were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 6/7 October 2020 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the October 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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 DPIE and EPA on the 23 May 2017 to the East of the Mine.

Location	Site	Type	Easting[1]	Northing[1]	Justification
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DPIE 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 DPIE 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 Wandoona 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**.

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 DPIE and the EPA.

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.

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria (**Table 6**) has occurred, WCPL will, at the earliest opportunity:

- Take all feasible and reasonable and steps to ensure that the non-compliance ceases and does not recur;
- Consider all feasible and reasonable and options for remediation (where relevant) and submit a report to the DPIE describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Secretary; and
- Review and, if necessary, revise this NMP (**Section 10**), to the satisfaction of the Secretary.

APPENDIX

B CALIBRATION CERTIFICATES

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 C20331

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
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 :	21.1°C	**Ambient Temperature :**	21.8°C
Relative Humidity :	57.8%	**Relative Humidity :**	56.5%
Barometric Pressure :	101.27kPa	**Barometric Pressure :**	101.17kPa

Calibration Technician : Jeff Yu
Calibration Date : 11 Jun 2020
Secondary Check: Max Moore
Report Issue Date : 15 Jun 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 -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13dB*	*Temperature*	*±0.2°C*
1kHz	*±0.13dB*	*Relative Humidity*	*±2.4%*
8kHz	*±0.14dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests	*±0.10dB*		

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

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

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

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

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

Page 1 of 1

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19073

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	NA-28
Instrument Serial Number :	30131882
Microphone Serial Number :	04739
Pre-amplifier Serial Number :	11942

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	24.5°C	**Ambient Temperature :**	23.6°C
Relative Humidity :	54.5%	**Relative Humidity :**	51%
Barometric Pressure :	99.39kPa	**Barometric Pressure :**	99.36kPa

Calibration Technician : Charlie Neil
Calibration Date : 5 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019

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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

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.

Accredited for compliance with ISO/IEC 17025 - calibration.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19124

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

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

Atmospheric Conditions
Ambient Temperature : 24°C
Relative Humidity : 50.4%
Barometric Pressure : 99.54kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 21 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 22 Feb 2019

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
Measured Output	94.0	1000.0	94.0	1000.33

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.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.48%*	*Barometric Pressure*	*±0.015kPa*

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 Australian/national standards.

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
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2017

Calibration Certificate

Calibration Number C19074

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

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

Atmospheric Conditions
Ambient Temperature : 23.8°C
Relative Humidity : 53.7%
Barometric Pressure : 100.09kPa

Calibration Technician : Charlie Neil
Calibration Date : 1 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019
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
Pre Adjustment	94.0	1000.0	94.4	1000.38
Post Adjustment	94.0	1000.0	94.1	1000.39

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.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.2°C*
Frequency	*±0.01%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.48%*	*Barometric Pressure*	*±0.015kPa*

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.

NATA

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 Australian/national standards.

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

Wilpinjong Coal

Environmental Noise Monitoring

November 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring November 2020

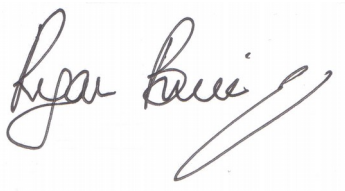
Reference: 20288_R01
Report date: 14 December 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Jesse Tribby Consultant	QA Review:	Ryan Bruniges Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 11/12 November 2020 at six locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar

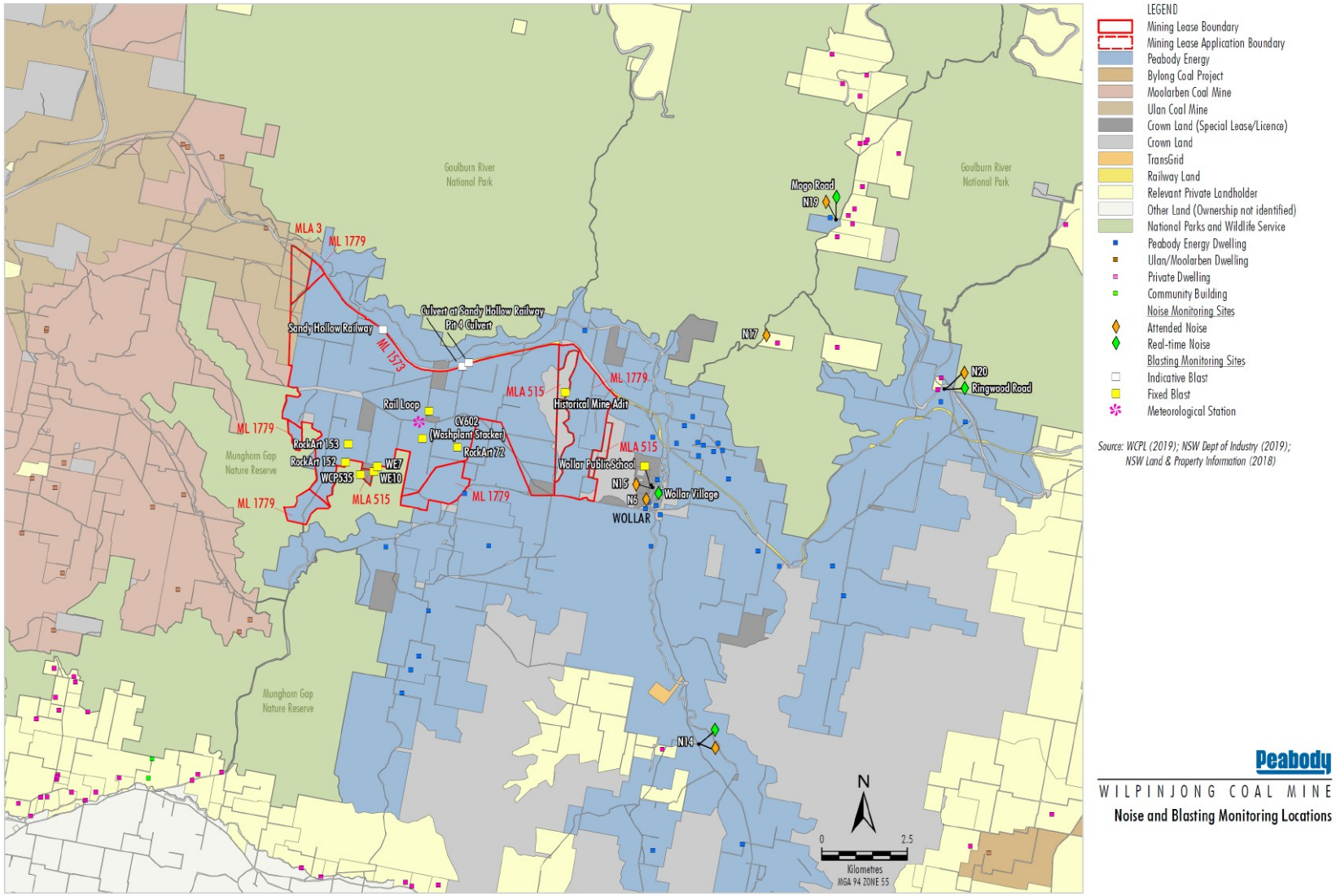


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2019)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in June 2020. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in September 2019. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 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', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Tambalyn Durney.

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 WCP) 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- 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 $L_{A1,1minute}$ 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 (i.e. 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 $L_{Aeq,15minute}$ level.

3.3 Noise Monitoring Equipment

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	30131882	05/02/2021
Pulsar 105 acoustic calibrator	78226	11/03/2022

3.4 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 (e.g. "<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 WCP was the only contributing low-frequency noise source.

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – NOVEMBER 2020[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
N6	11/11/2020 23:27	56	51	44	41	37	35	33
N14	12/11/2020 00:50	52	42	38	34	31	27	23
N15	11/11/2020 23:04	55	53	40	39	30	29	28
N17	11/11/2020 22:27	57	46	43	42	42	41	39
N19	11/11/2020 22:00	56	53	52	50	50	48	44
N20	12/11/2020 00:01	46	42	38	33	28	26	24

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

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 3.4.

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

4.3 Attended Noise Monitoring

Table 4.2 to Table 4.3 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – NOVEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	11/11/2020 23:27	0.9	G	37	No	<25	NA
N14	12/11/2020 00:50	1.3	F	35	Yes	23	Nil
N15	11/11/2020 23:04	1.0	G	37	No	27	NA
N17	11/11/2020 22:27	0.8	F	38	Yes	<20	Nil
N19	11/11/2020 22:00	0.5	F	35	Yes	IA	Nil
N20	12/11/2020 00:01	1.0	E	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – NOVEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	11/11/2020 23:27	0.9	G	45	No	<25	NA
N14	12/11/2020 00:50	1.3	F	45	Yes	26	Nil
N15	11/11/2020 23:04	1.0	G	45	No	30	NA
N17	11/11/2020 22:27	0.8	F	45	Yes	<25	Nil
N19	11/11/2020 22:00	0.5	F	45	Yes	IA	Nil
N20	12/11/2020 00:01	1.0	E	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

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 – NOVEMBER 2020

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	11/11/2020 23:27	19	0.0	-	0
N14	12/11/2020 00:50	20	0.0	-	1
N15	11/11/2020 23:04	18	0.0	-	0
N17	11/11/2020 22:27	20	0.0	-	0
N19	11/11/2020 22:00	23	0.0	-	0
N20	12/11/2020 00:01	18	0.0	-	0

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

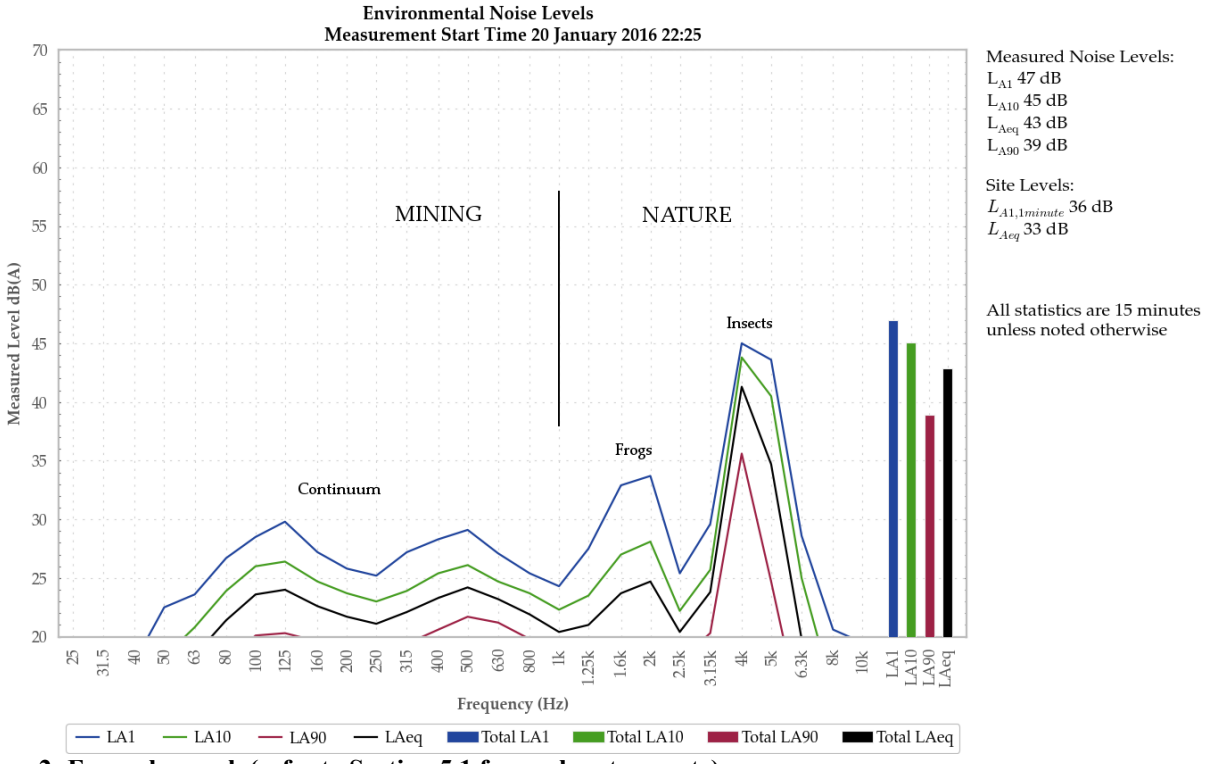


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

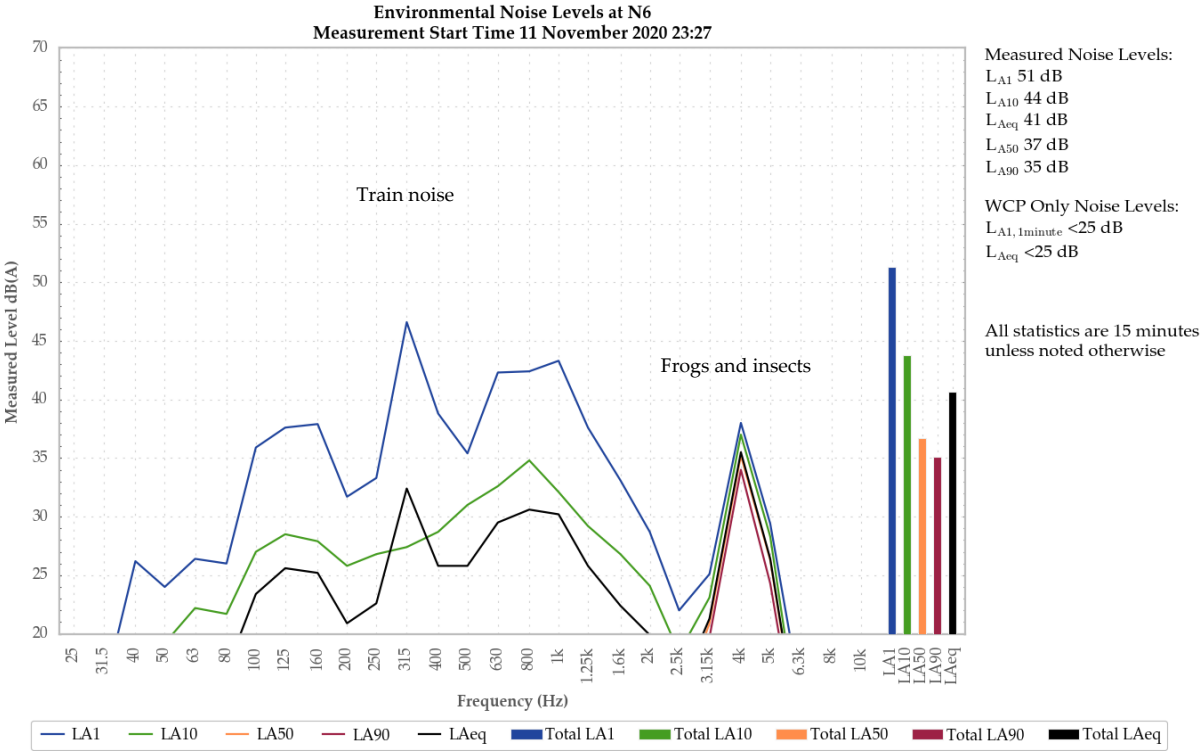


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

A mining continuum from WCP was audible at low levels throughout the measurement, which generated the measured site-only $L_{Aeq,15minute}$ and $L_{A1,1minute}$ of less than 25 dB.

A train passby generated the measured L_{A1} and contributed to the measured L_{A10} and L_{Aeq}. Frogs and insects also contributed to the measured L_{A10} and L_{Aeq}, and were responsible for the measured L_{A50} and L_{A90}.

5.1.2 N14

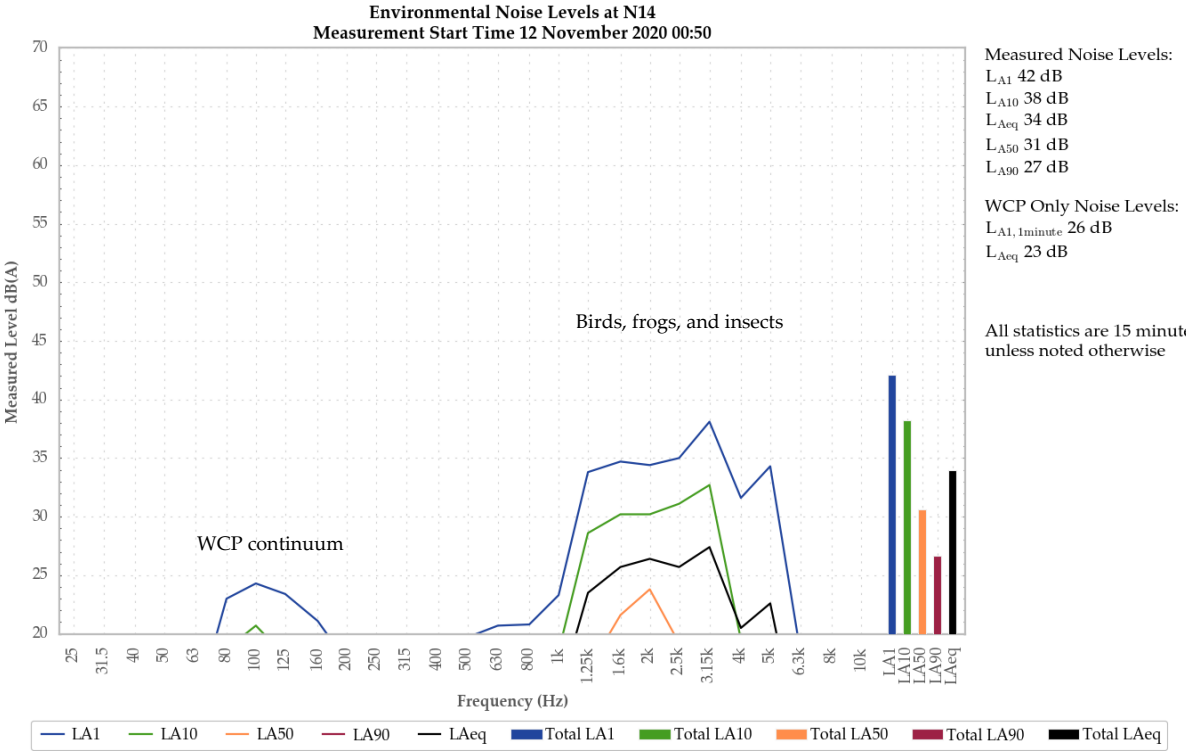


Figure 4: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

A mining continuum from WCP was audible at low levels throughout the measurement, which generated the site-only $L_{Aeq,15minute}$ of 23 dB. An engine surge was responsible for the measured site-only $L_{A1,1minute}$ of 26 dB.

Birds, frogs, and insects generated the measured noise levels.

Bats were also noted.

5.1.3 N15

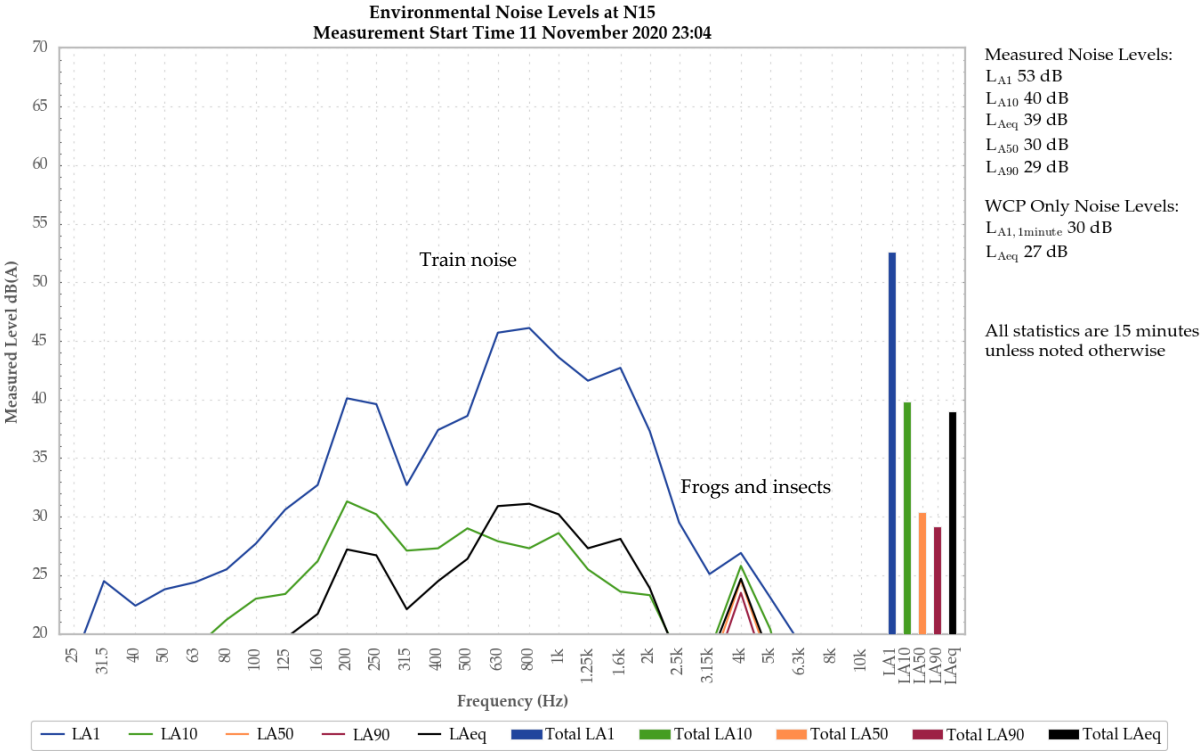


Figure 5: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A mining continuum from WCP was audible at low levels throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of 27 dB. Surges in this continuum generated the measured site-only $L_{A1,1minute}$ of 30 dB.

A train passby generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Frogs, insects, and WCP continuum were responsible for the measured L_{A50} and L_{A90}.

Birds were also noted.

5.1.4 N17

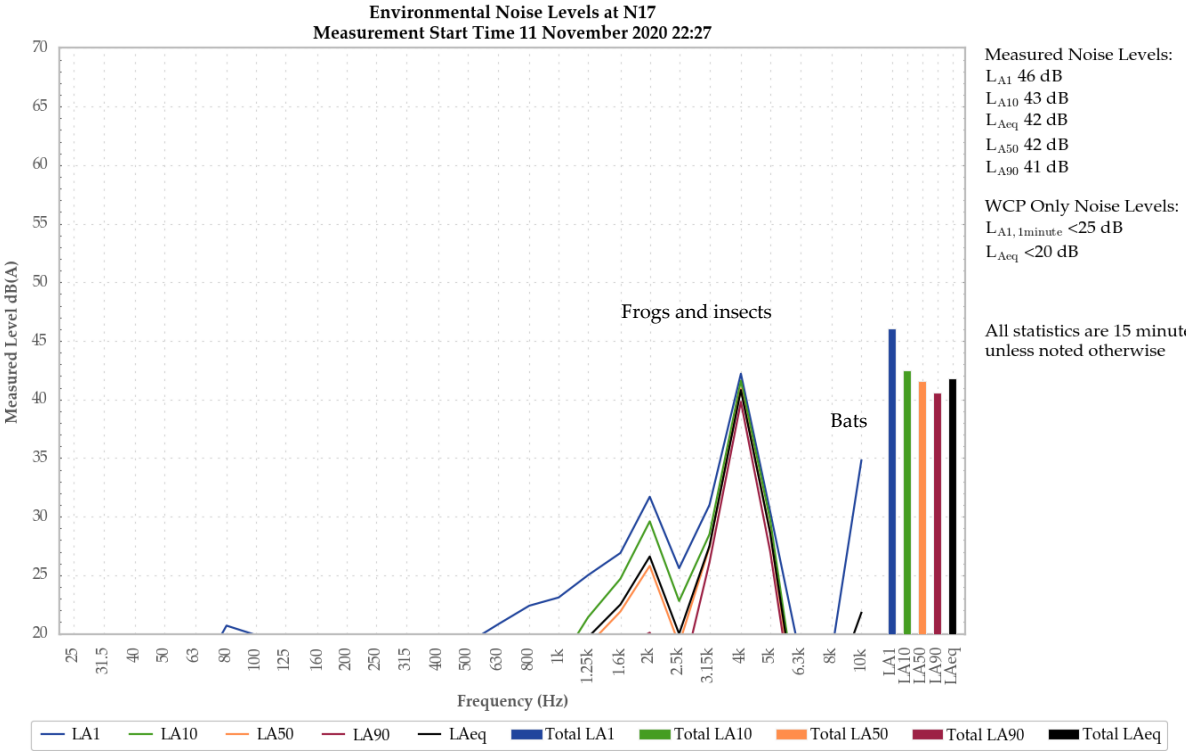


Figure 6: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

A mining continuum from WCP was audible at very low levels throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of less than 20 dB. Track noise generated the measured site-only $L_{A1,1minute}$ of less than 25 dB.

Frogs and insects were primarily responsible for the measured noise levels. Bats also contributed to the measured L_{A1}.

5.1.5 N19

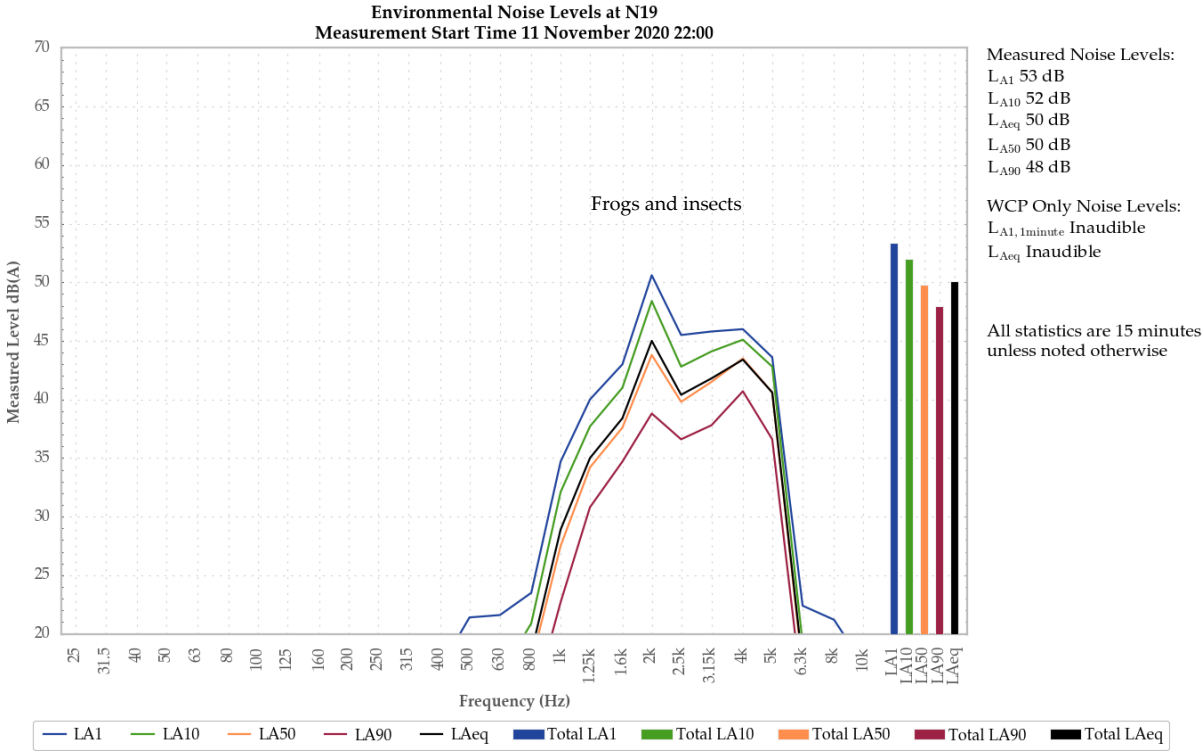


Figure 7: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible during the measurement.

Frogs and insects were responsible for the measured noise levels.

Bats were also noted.

5.1.6 N20

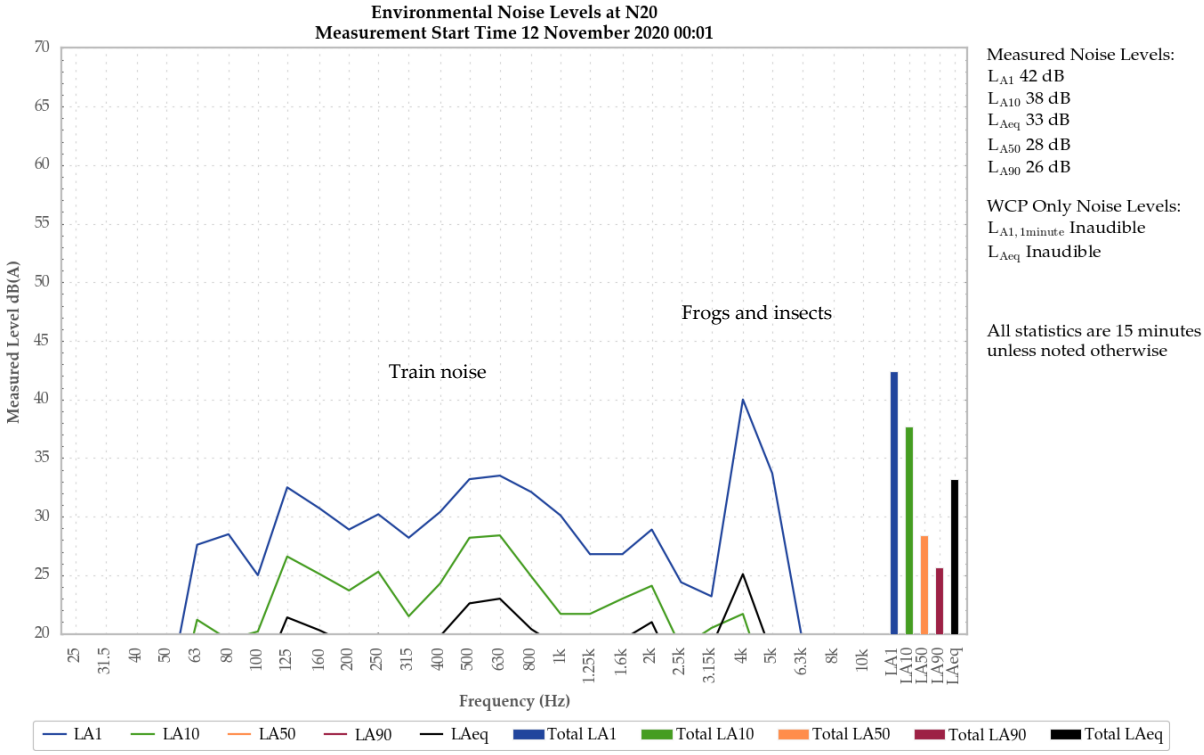


Figure 8: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible during the measurement.

Frogs and insects primarily generated the measured noise levels. A train passby contributed to the measured L_{A10} and L_{Aeq}.

Bats and nearby running water were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 11/12 November 2020 at six monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the November 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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 DPIE and EPA on the 23 May 2017 to the East of the Mine.

Location	Site	Type	Easting[1]	Northing[1]	Justification
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DPIE 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 DPIE 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 Wandoona 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**.

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 DPIE and the EPA.

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

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria (**Table 6**) has occurred, WCPL will, at the earliest opportunity:

- Take all feasible and reasonable and steps to ensure that the non-compliance ceases and does not recur;
- Consider all feasible and reasonable and options for remediation (where relevant) and submit a report to the DPIE describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Secretary; and
- Review and, if necessary, revise this NMP (**Section 10**), to the satisfaction of the Secretary.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19073

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	NA-28
Instrument Serial Number :	30131882
Microphone Serial Number :	04739
Pre-amplifier Serial Number :	11942

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	24.5°C	**Ambient Temperature :**	23.6°C
Relative Humidity :	54.5%	**Relative Humidity :**	51%
Barometric Pressure :	99.39kPa	**Barometric Pressure :**	99.36kPa

Calibration Technician : Charlie Neil
Calibration Date : 5 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019

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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

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.

Accoustic 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 Australian/national standards.

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 C20155

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

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

Atmospheric Conditions
Ambient Temperature : 23.4°C
Relative Humidity : 53.8%
Barometric Pressure : 101.2kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 11 Mar 2020
Secondary Check: Alannah Squires
Report Issue Date : 12 Mar 2020

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	94.13	1000.37

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..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.09%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.09%*	*Barometric Pressure*	*±0.015kPa*

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

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

NATA
WORLD RECOGNISED ACCREDITATION

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

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

Wilpinjong Coal

Environmental Noise Monitoring

November 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring November 2020

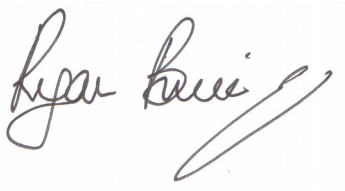
Reference: 20288_R01
Report date: 14 December 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Jesse Tribby Consultant	QA Review:	Ryan Bruniges Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 11/12 November 2020 at six locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar

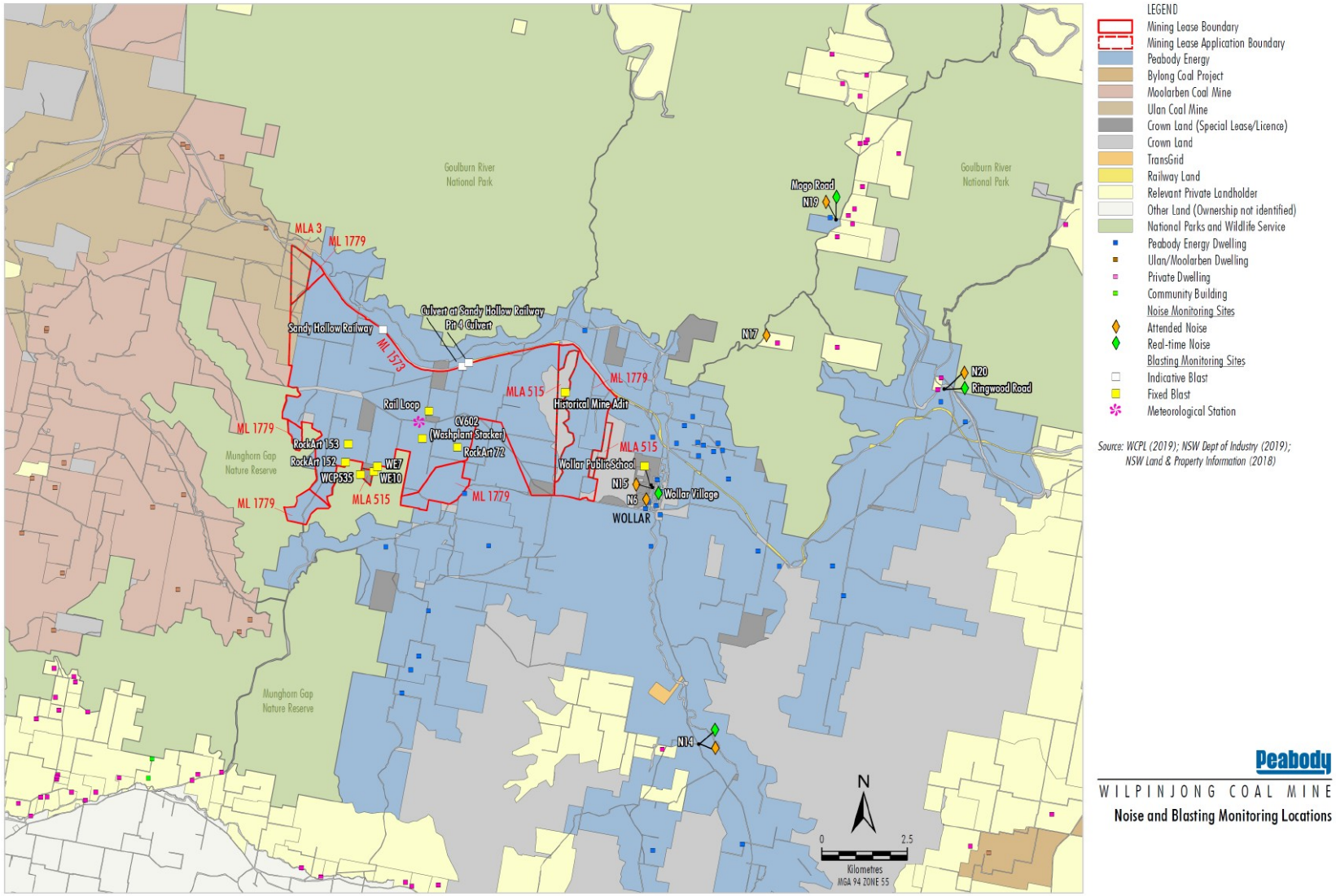


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2019)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in June 2020. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in September 2019. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 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', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Tambalyn Durney.

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 WCP) 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- 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 $L_{A1,1minute}$ 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 (i.e. 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 $L_{Aeq,15minute}$ level.

3.3 Noise Monitoring Equipment

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	30131882	05/02/2021
Pulsar 105 acoustic calibrator	78226	11/03/2022

3.4 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 (e.g. "<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 WCP was the only contributing low-frequency noise source.

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – NOVEMBER 2020[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
N6	11/11/2020 23:27	56	51	44	41	37	35	33
N14	12/11/2020 00:50	52	42	38	34	31	27	23
N15	11/11/2020 23:04	55	53	40	39	30	29	28
N17	11/11/2020 22:27	57	46	43	42	42	41	39
N19	11/11/2020 22:00	56	53	52	50	50	48	44
N20	12/11/2020 00:01	46	42	38	33	28	26	24

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

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 3.4.

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

4.3 Attended Noise Monitoring

Table 4.2 to Table 4.3 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – NOVEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	11/11/2020 23:27	0.9	G	37	No	<25	NA
N14	12/11/2020 00:50	1.3	F	35	Yes	23	Nil
N15	11/11/2020 23:04	1.0	G	37	No	27	NA
N17	11/11/2020 22:27	0.8	F	38	Yes	<20	Nil
N19	11/11/2020 22:00	0.5	F	35	Yes	IA	Nil
N20	12/11/2020 00:01	1.0	E	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – NOVEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	11/11/2020 23:27	0.9	G	45	No	<25	NA
N14	12/11/2020 00:50	1.3	F	45	Yes	26	Nil
N15	11/11/2020 23:04	1.0	G	45	No	30	NA
N17	11/11/2020 22:27	0.8	F	45	Yes	<25	Nil
N19	11/11/2020 22:00	0.5	F	45	Yes	IA	Nil
N20	12/11/2020 00:01	1.0	E	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

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 – NOVEMBER 2020

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	11/11/2020 23:27	19	0.0	-	0
N14	12/11/2020 00:50	20	0.0	-	1
N15	11/11/2020 23:04	18	0.0	-	0
N17	11/11/2020 22:27	20	0.0	-	0
N19	11/11/2020 22:00	23	0.0	-	0
N20	12/11/2020 00:01	18	0.0	-	0

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

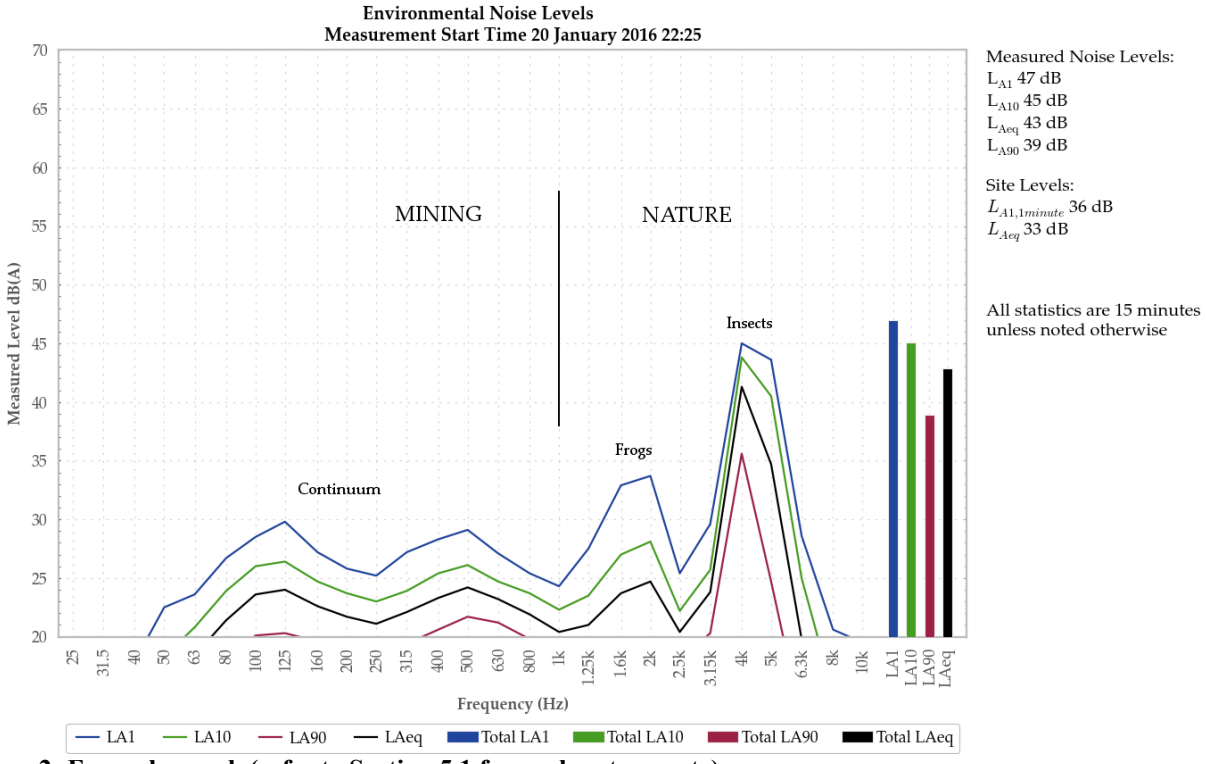


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

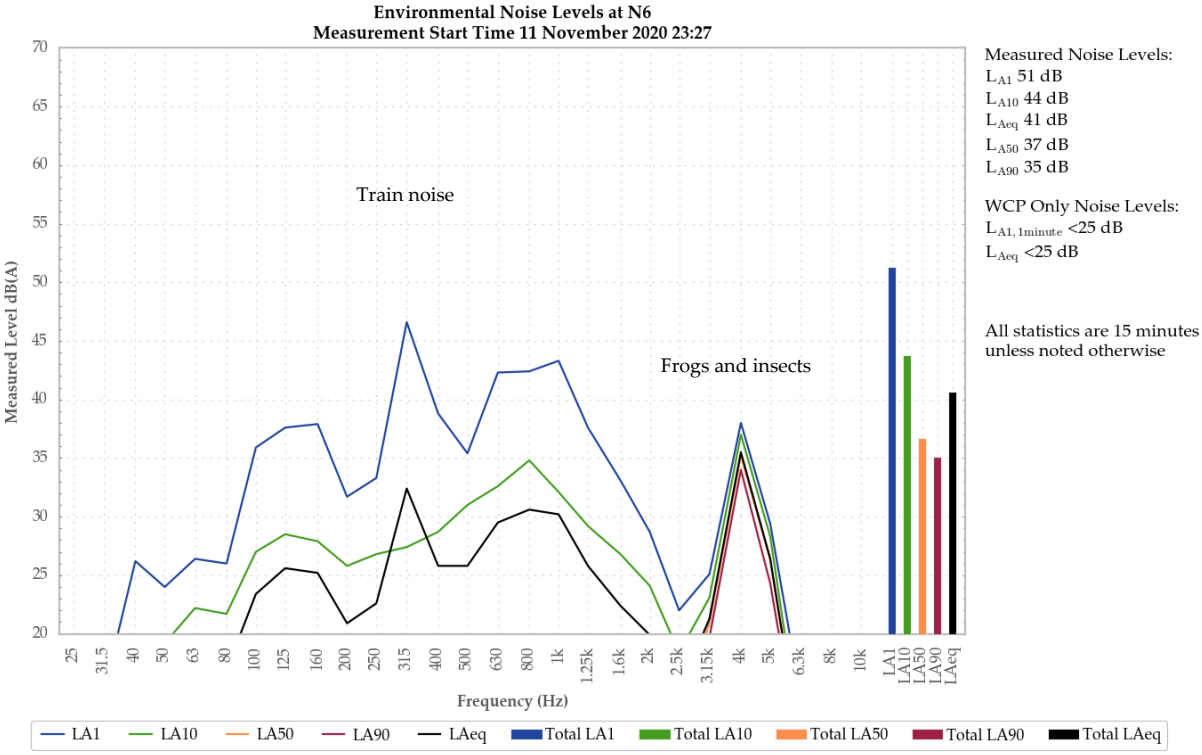


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

A mining continuum from WCP was audible at low levels throughout the measurement, which generated the measured site-only $L_{Aeq,15minute}$ and $L_{A1,1minute}$ of less than 25 dB.

A train passby generated the measured L_{A1} and contributed to the measured L_{A10} and L_{Aeq}. Frogs and insects also contributed to the measured L_{A10} and L_{Aeq}, and were responsible for the measured L_{A50} and L_{A90}.

5.1.2 N14

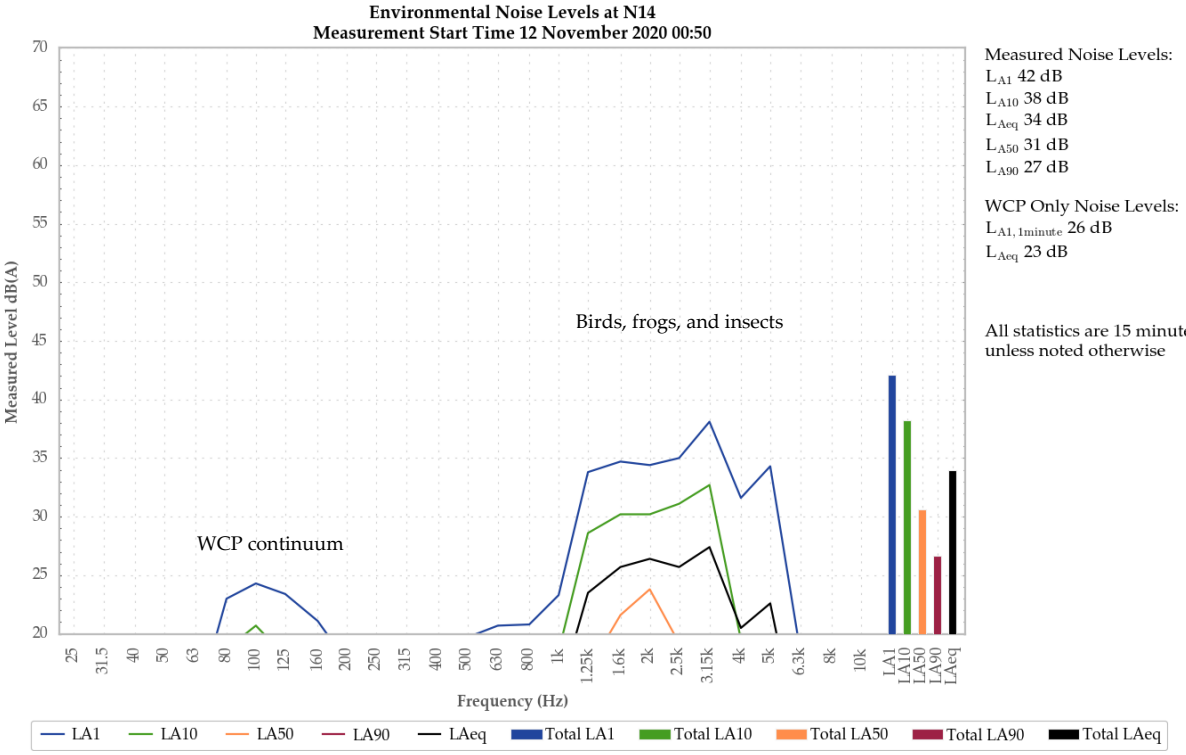


Figure 4: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

A mining continuum from WCP was audible at low levels throughout the measurement, which generated the site-only $L_{Aeq,15minute}$ of 23 dB. An engine surge was responsible for the measured site-only $L_{A1,1minute}$ of 26 dB.

Birds, frogs, and insects generated the measured noise levels.

Bats were also noted.

5.1.3 N15

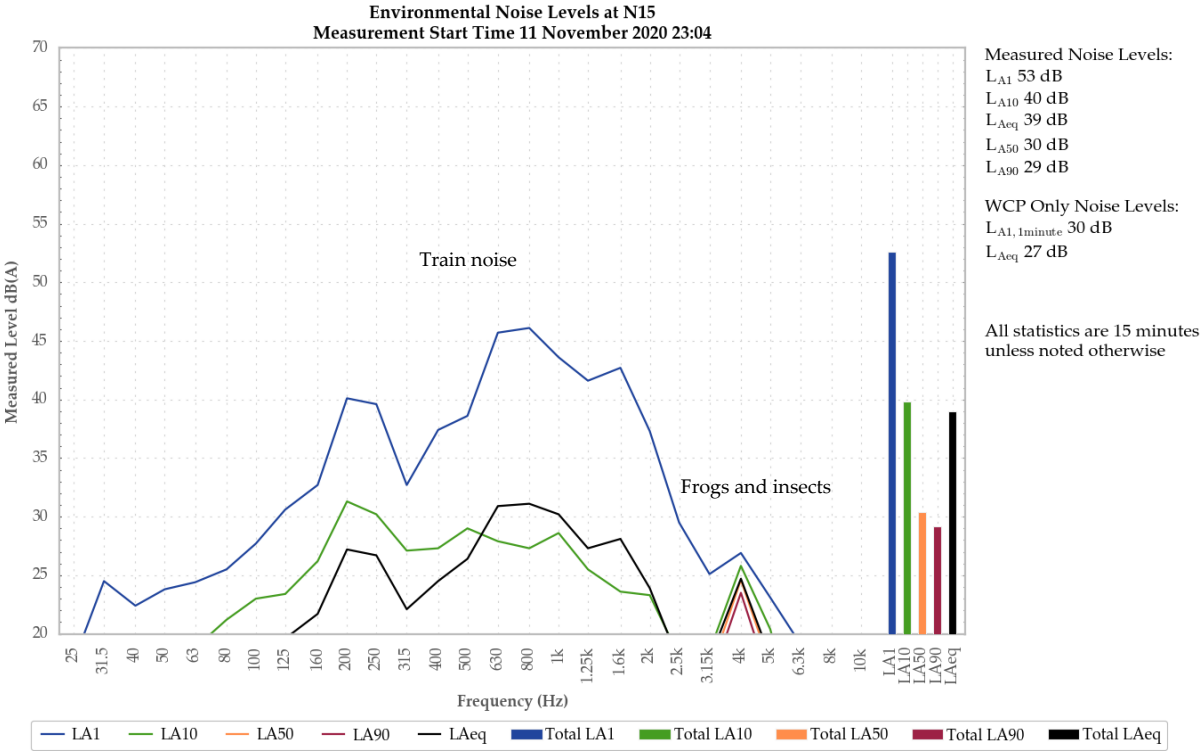


Figure 5: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A mining continuum from WCP was audible at low levels throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of 27 dB. Surges in this continuum generated the measured site-only $L_{A1,1minute}$ of 30 dB.

A train passby generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Frogs, insects, and WCP continuum were responsible for the measured L_{A50} and L_{A90}.

Birds were also noted.

5.1.4 N17

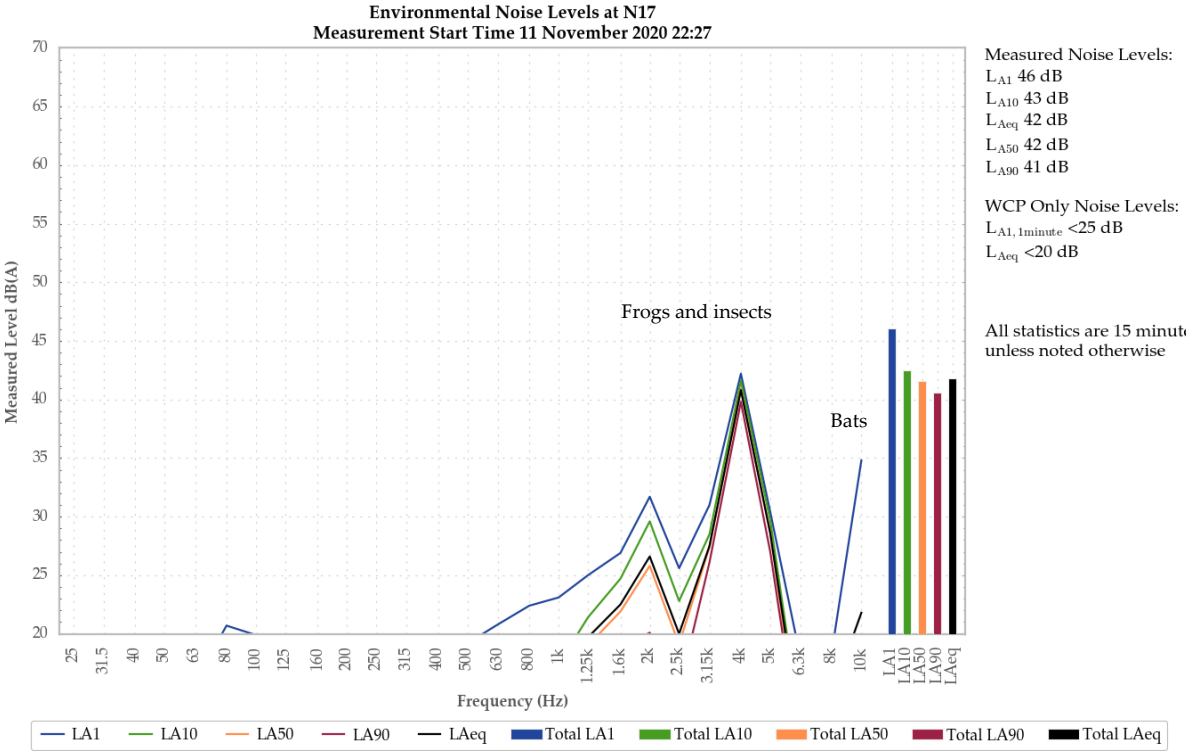


Figure 6: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

A mining continuum from WCP was audible at very low levels throughout the measurement and generated the site-only $L_{Aeq,15minute}$ of less than 20 dB. Track noise generated the measured site-only $L_{A1,1minute}$ of less than 25 dB.

Frogs and insects were primarily responsible for the measured noise levels. Bats also contributed to the measured L_{A1}.

5.1.5 N19

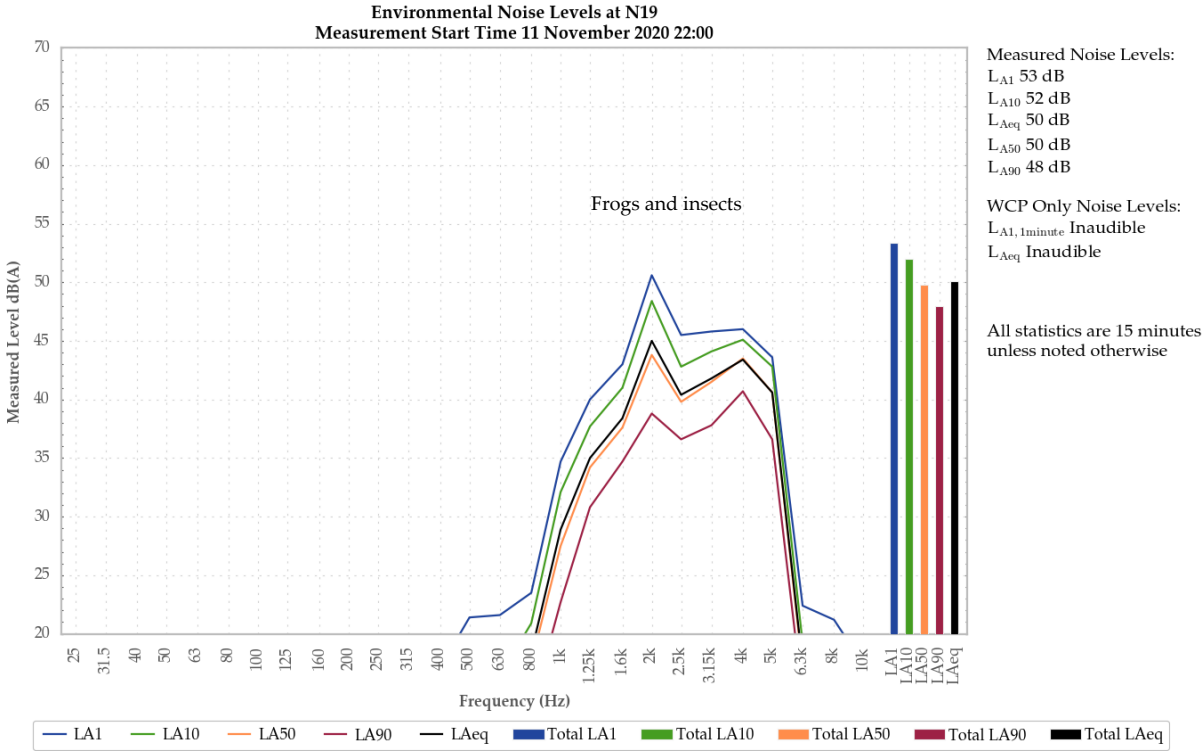


Figure 7: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible during the measurement.

Frogs and insects were responsible for the measured noise levels.

Bats were also noted.

5.1.6 N20

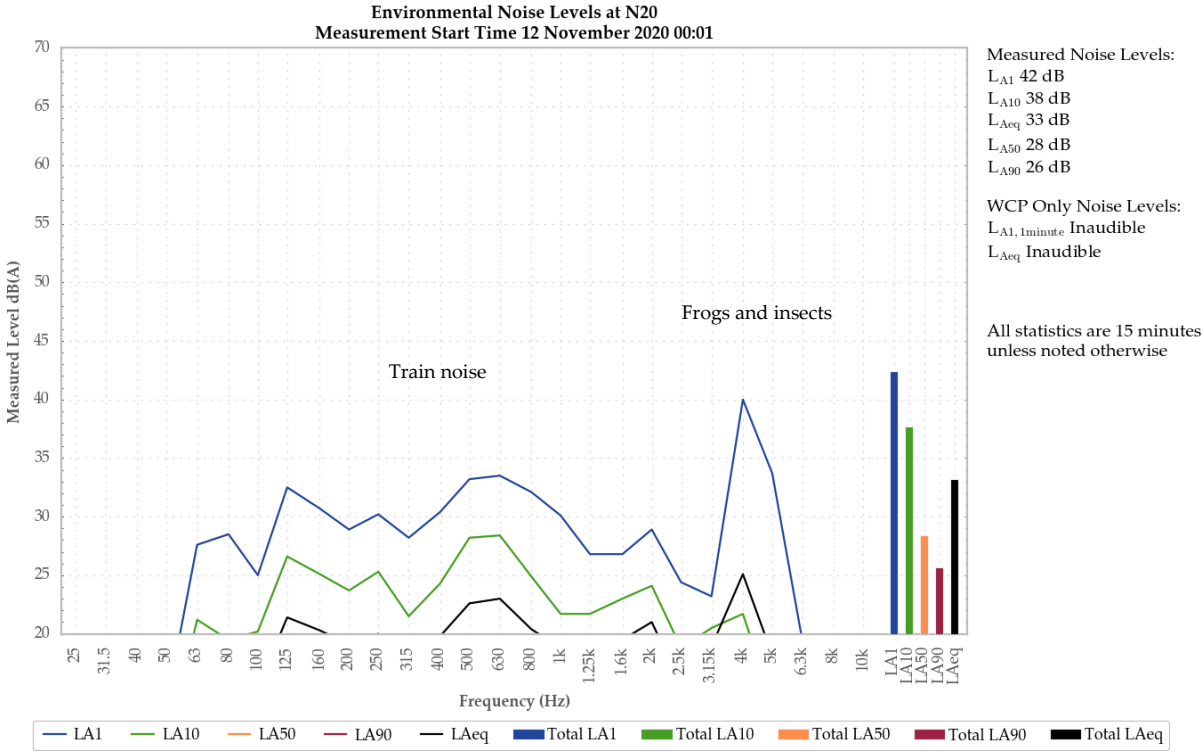


Figure 8: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible during the measurement.

Frogs and insects primarily generated the measured noise levels. A train passby contributed to the measured L_{A10} and L_{Aeq}.

Bats and nearby running water were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 11/12 November 2020 at six monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the November 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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 DPIE and EPA on the 23 May 2017 to the East of the Mine.

Location	Site	Type	Easting[1]	Northing[1]	Justification
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DPIE 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 DPIE 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 Wandoona 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**.

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 DPIE and the EPA.

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

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria (**Table 6**) has occurred, WCPL will, at the earliest opportunity:

- Take all feasible and reasonable and steps to ensure that the non-compliance ceases and does not recur;
- Consider all feasible and reasonable and options for remediation (where relevant) and submit a report to the DPIE describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Secretary; and
- Review and, if necessary, revise this NMP (**Section 10**), to the satisfaction of the Secretary.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19073

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Equipment Tested/ Model Number :	NA-28
Instrument Serial Number :	30131882
Microphone Serial Number :	04739
Pre-amplifier Serial Number :	11942

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	24.5°C	**Ambient Temperature :**	23.6°C
Relative Humidity :	54.5%	**Relative Humidity :**	51%
Barometric Pressure :	99.39kPa	**Barometric Pressure :**	99.36kPa

Calibration Technician : Charlie Neil
Calibration Date : 5 Feb 2019
Secondary Check: Lewis Boorman
Report Issue Date : 6 Feb 2019

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 -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

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.

Accoustic 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 Australian/national standards.

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 C20155

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

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

Atmospheric Conditions
Ambient Temperature : 23.4°C
Relative Humidity : 53.8%
Barometric Pressure : 101.2kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 11 Mar 2020
Secondary Check: Alannah Squires
Report Issue Date : 12 Mar 2020

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	94.13	1000.37

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..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.09%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.09%*	*Barometric Pressure*	*±0.015kPa*

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

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

NATA
WORLD RECOGNISED ACCREDITATION

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

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

Wilpinjong Coal

Environmental Noise Monitoring

December 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Environmental Noise Monitoring
December 2020

Reference: 20309_R01
Report date: 30 December 2020

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322

Prepared:	Jason Cameron Consultant	QA Review:	Jesse Tribby Consultant

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

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 9/10 December 2020 at six locations.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar

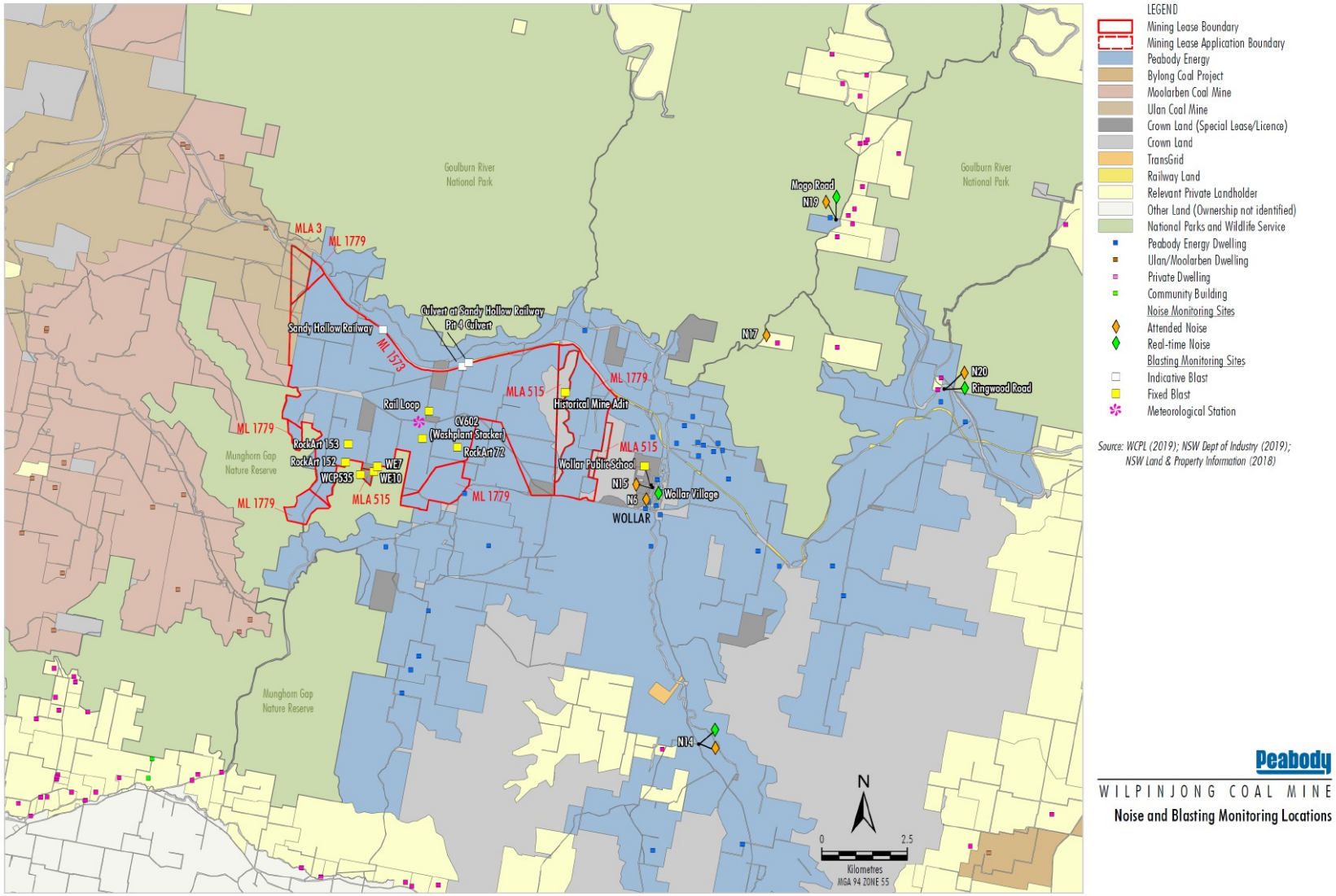


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2019)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 REGULATOR REQUIREMENTS AND NOISE CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). The relevant noise conditions from the current project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in June 2020. Relevant noise sections of the EPL are reproduced in Appendix A.

2.3 Noise Monitoring Program

Noise monitoring requirements are detailed in the WCP Noise Management Plan (NMP). The most recent version of the NMP was approved in September 2019. The relevant sections are reproduced in Appendix A.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 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', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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. Attended monitoring during this reporting period was undertaken by Jason Cameron.

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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 WCP) 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- 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 $L_{A1,1minute}$ 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 (i.e. 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 $L_{Aeq,15minute}$ level.

3.3 Noise Monitoring Equipment

The equipment used to measure environmental noise levels are listed in Table 3.1. Calibration certificates are included as Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level meter	00370304	24/11/2022
Pulsar 106 acoustic calibrator	81334	24/11/2022

3.4 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 (e.g. "<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 WCP was the only contributing low-frequency noise source.

4 RESULTS

4.1 Total Measured Noise Levels

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

Table 4.1: MEASURED NOISE LEVELS – DECEMBER 2020[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
N6	10/12/2020 00:43	53	49	46	40	30	20	17
N14	10/12/2020 00:15	51	43	38	34	27	22	18
N15	09/12/2020 23:00	52	47	45	43	43	40	28
N17	09/12/2020 22:27	51	50	50	48	48	46	44
N19	09/12/2020 22:00	53	51	49	47	47	45	41
N20	09/12/2020 23:30	52	47	45	42	42	32	26

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

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 3.4.

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

4.3 Attended Noise Monitoring

Table 4.2 to Table 4.3 detail noise levels from WCP in the absence of other noise sources. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – DECEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	10/12/2020 00:43	0.9	D	37	Yes	IA	Nil
N14	10/12/2020 00:15	1.1	E	35	Yes	IA	Nil
N15	09/12/2020 23:00	0.8	F	37	Yes	IA	Nil
N17	09/12/2020 22:27	1.4	F	38	Yes	<25	Nil
N19	09/12/2020 22:00	0.0	G	35	No	IA	NA
N20	09/12/2020 23:30	0.7	E	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – DECEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	10/12/2020 00:43	0.9	D	45	Yes	IA	Nil
N14	10/12/2020 00:15	1.1	E	45	Yes	IA	Nil
N15	09/12/2020 23:00	0.8	F	45	Yes	IA	Nil
N17	09/12/2020 22:27	1.4	F	45	Yes	28	Nil
N19	09/12/2020 22:00	0.0	G	45	No	IA	NA
N20	09/12/2020 23:30	0.7	E	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

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 – DECEMBER 2020

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	10/12/2020 00:43	13	0.0	-	0
N14	10/12/2020 00:15	14	0.8	90	0
N15	09/12/2020 23:00	20	0.0	-	0
N17	09/12/2020 22:27	19	0.0	-	0
N19	09/12/2020 22:00	21	1.3	30	0
N20	09/12/2020 23:30	16	0.0	-	0

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the WCP AWS and inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are taken into account in each measurement via statistical descriptors. From these observations, summaries have been derived for each location 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 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 2 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 L_{A1} result by a small margin but is entirely accurate for L_{Aeq}.

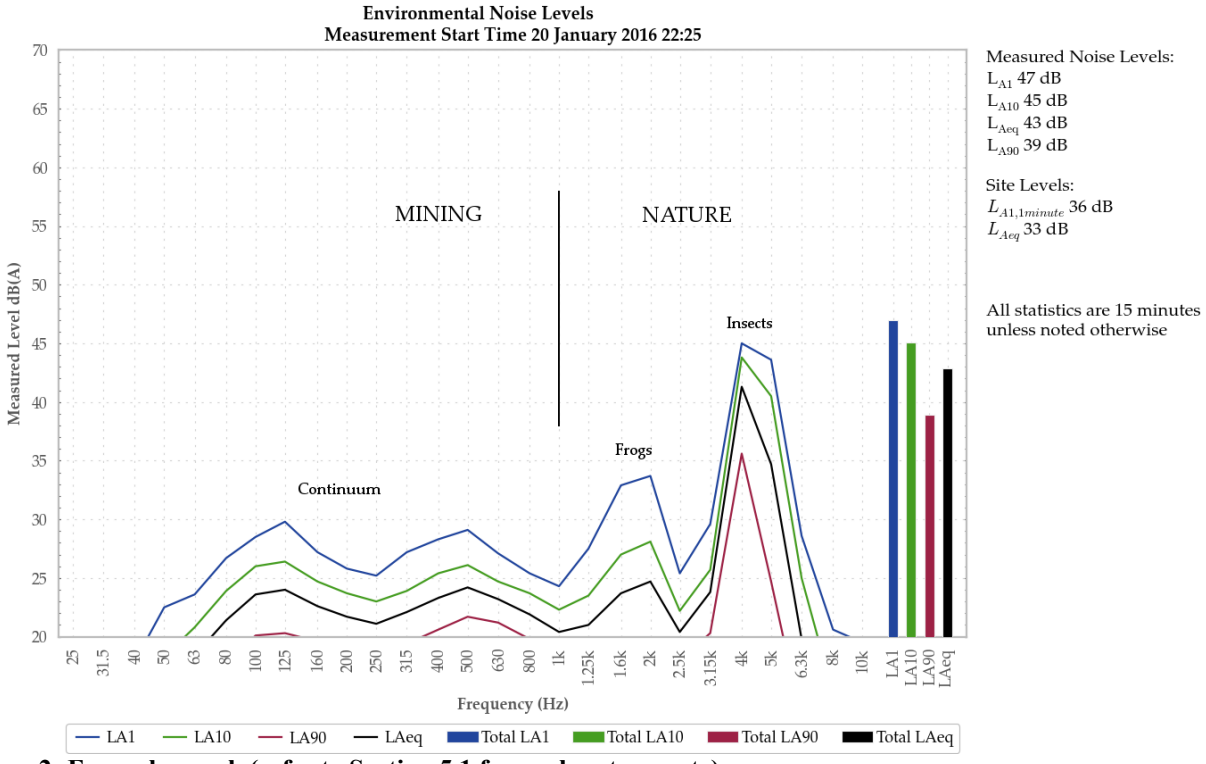


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

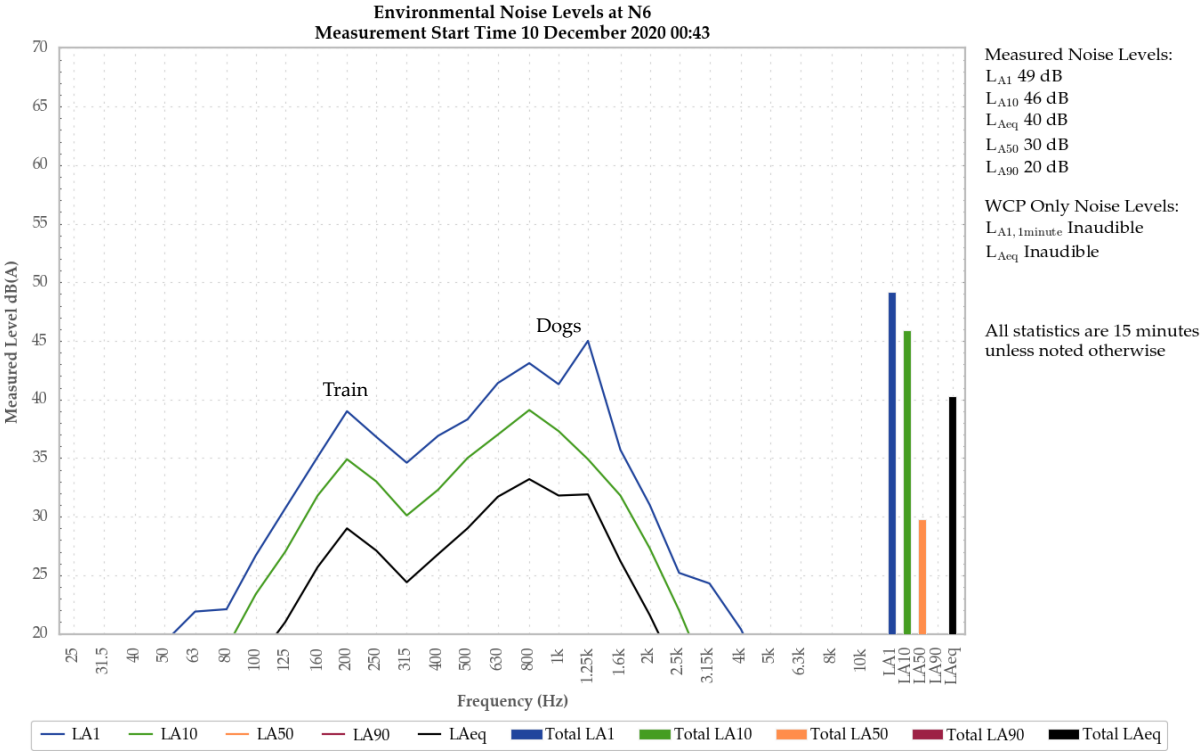


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible during the measurement.

Dogs and trains generated the measured L_{A1}, L_{A10} and L_{Aeq}. Birds were primarily responsible for the measured L_{A50}. Insects contributed to the measured L_{A50} and generated the measured L_{A90}.

Frogs were also noted.

5.1.2 N14

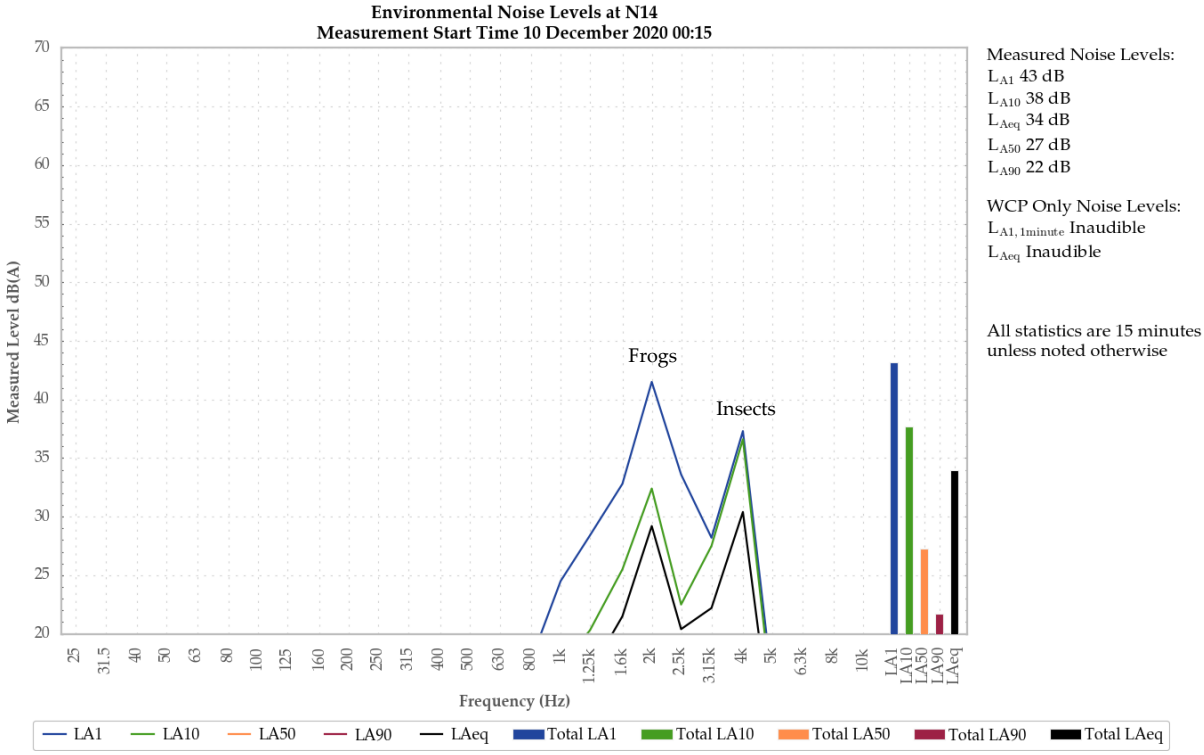


Figure 4: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible during the measurement.

Frogs and insects were responsible for the measured noise levels.

Birds, bats and a substation continuum were also noted..

5.1.3 N15

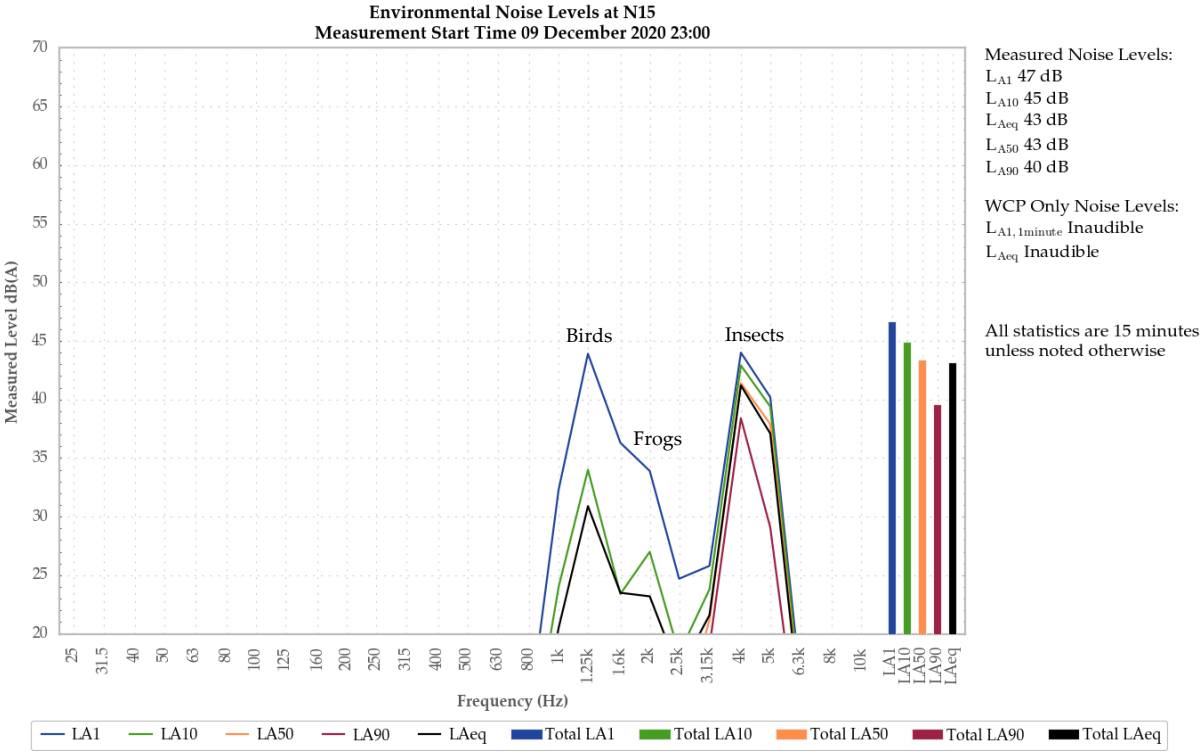


Figure 5: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible during the measurement.

Insects were primarily responsible for the measured noise levels. Birds contributed to the measured L_{A1}.

Frogs were also noted.

5.1.4 N17

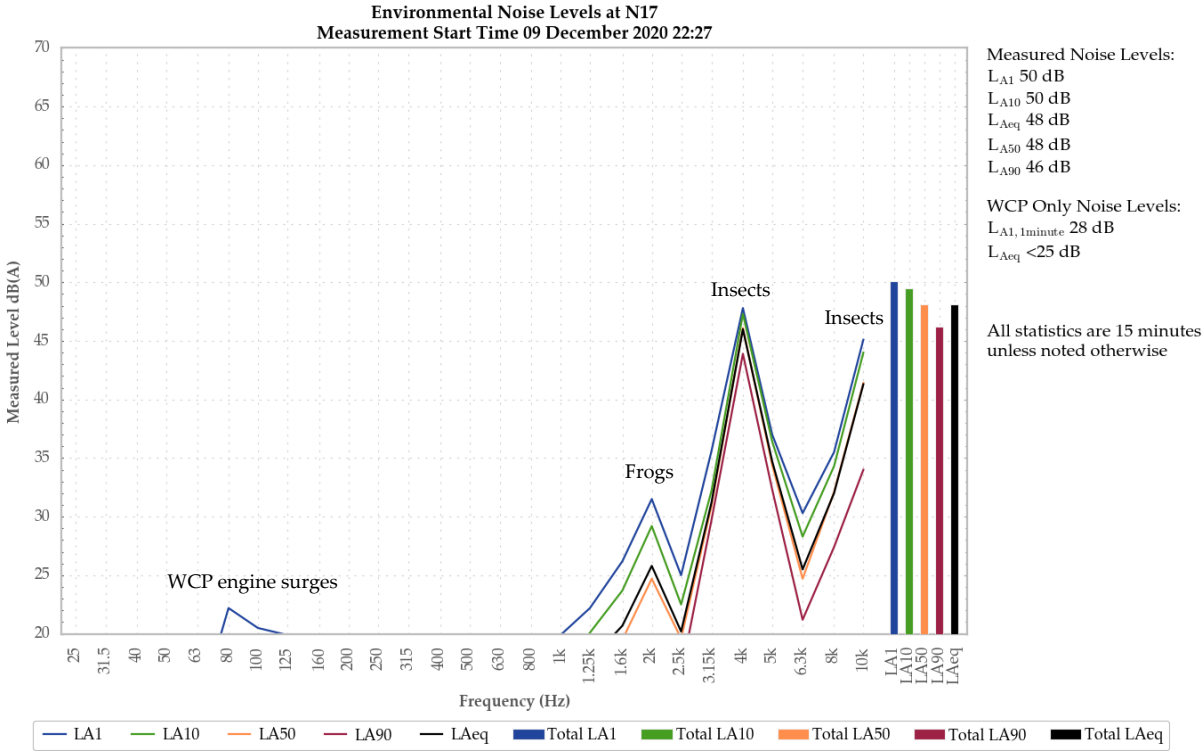


Figure 6: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

An engine continuum from WCP was audible throughout the measurement and generated the site-only L_{Aeq} of less than 25 dB. A surge in engine noise generated the measured site-only $L_{A1,1minute}$ of 28 dB.

Insects were responsible for the measured noise levels.

Frogs and a train were also noted.

5.1.5 N19

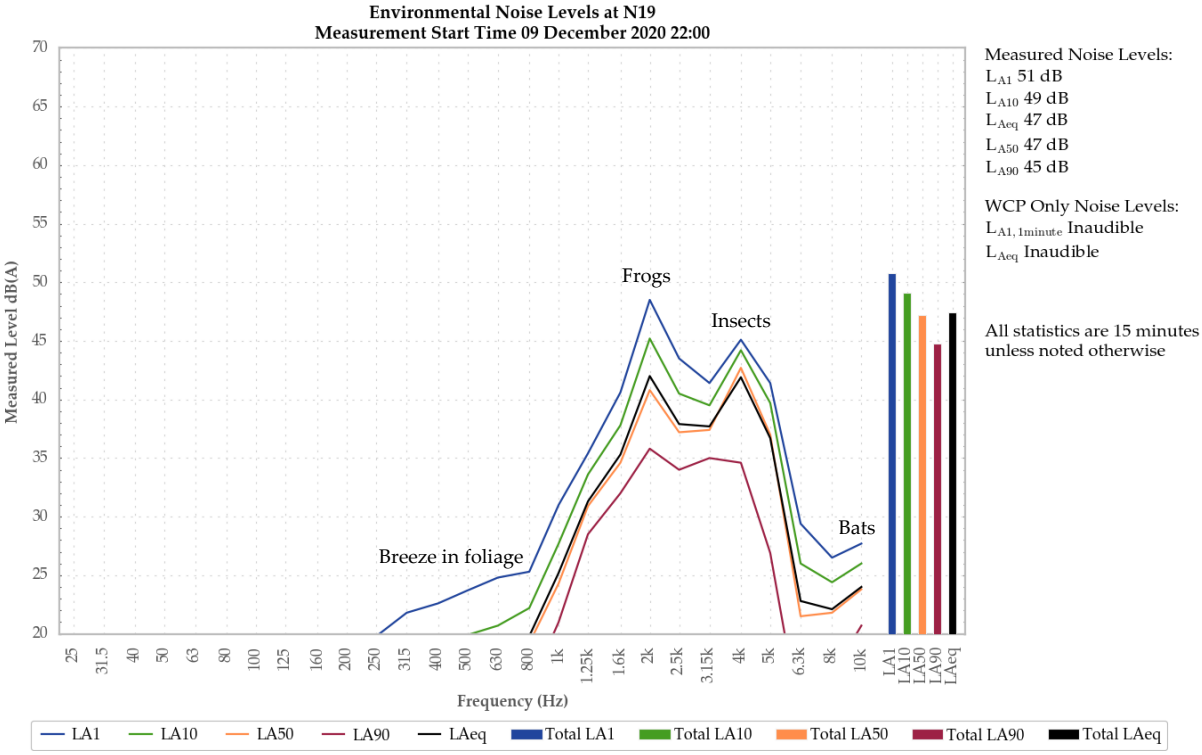


Figure 7: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible during the measurement.

Frogs and insects were responsible for the measured noise levels.

Bats and breeze in foliage were also noted.

5.1.6 N20

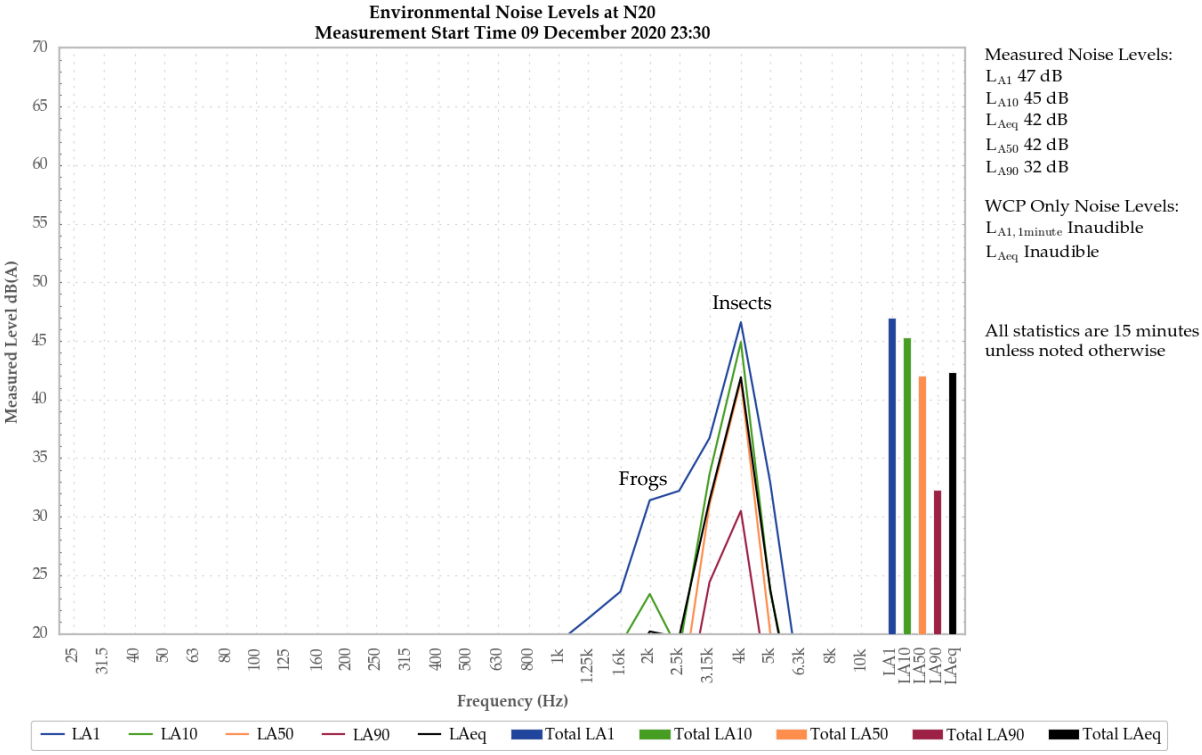


Figure 8: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible during the measurement.

Insects were responsible for the measured noise levels.

Frogs, birds, livestock and flowing water were also noted.

6 SUMMARY

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a monthly noise survey of operations at WCP, an open cut coal mine located approximately 40 kilometres north east of Mudgee. The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

Attended environmental noise monitoring described in this report was undertaken during the night period of 9/10 December 2020 at six monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the December 2020 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A REGULATOR DOCUMENTS

A.1 Wilpinjong Coal Extension Project Approval (SSD-6764)

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.

Operating Conditions

4. The Applicant must:
   (a) implement all reasonable and feasible measures to minimise the construction, operational, low frequency, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions when the noise limits in this consent do not apply (see Appendix 6);
   (d) 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;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent.

Noise Management Plan

5. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this consent; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this consent and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

6. The Applicant must implement the approved Noise Management Plan for the development.

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

A.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:

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

L5.4 For the purpose of condition L5.3:
a) 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
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

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.

A.3 Noise Management Plan

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.

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 DPIE and EPA on the 23 May 2017 to the East of the Mine.

Location	Site	Type	Easting[1]	Northing[1]	Justification
WCPL Rail Loop	-	Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village[4]	-	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[4]	-	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 DPIE 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 DPIE 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 Wandoona 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**.

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 DPIE and the EPA.

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.

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria (**Table 6**) has occurred, WCPL will, at the earliest opportunity:

- Take all feasible and reasonable and steps to ensure that the non-compliance ceases and does not recur;
- Consider all feasible and reasonable and options for remediation (where relevant) and submit a report to the DPIE describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Secretary; and
- Review and, if necessary, revise this NMP (**Section 10**), to the satisfaction of the Secretary.

APPENDIX

B CALIBRATION CERTIFICATES

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
Calibration Date : 24 Nov 2020
Secondary Check: Max Moore
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 -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.12dB*	*Temperature*	*±0.2°C*
1kHz	*±0.11dB*	*Relative Humidity*	*±2.4%*
8kHz	*±0.13dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests	*±0.10dB*		

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

NATA WORLD RECOGNISED ACCREDITATION

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

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - 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 C20676

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

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 81334

Atmospheric Conditions
Ambient Temperature : 22.1°C
Relative Humidity : 50.6%
Barometric Pressure : 100.09kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 24 Nov 2020
Secondary Check: Max Moore
Report Issue Date : 25 Nov 2020

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	94.13	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..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.14dB*	*Temperature*	*±0.2°C*
Frequency	*±0.09%*	*Relative Humidity*	*±2.4%*
Distortion	*±0.09%*	*Barometric Pressure*	*±0.015kPa*

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

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

NATA
WORLD RECOGNISED ACCREDITATION

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

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

Wilpinjong Coal

Annual Environmental Monitoring Report 2020

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
PO Box 3115 | Thornton NSW 2322
Telephone +61 2 4966 4333
Email global@globalacoustics.com.au
ABN 94 094 985 734

Wilpinjong Coal

Annual Environmental Monitoring Report 2020

Reference: 20319_R01
Report date: 1 April 2021

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322

Prepared:	Jesse Tribby Consultant	QA Review:	Robert Kirwan Consultant

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

EXECUTIVE SUMMARY

Global Acoustics was engaged by Wilpinjong Coal (WCP) Pty Ltd to provide an Annual Environmental Monitoring Report for 2020, in order to compare noise monitoring results against both relevant criteria and predictions in the most recently approved Environmental Impact Statement (EIS) for the Wilpinjong Extension Project.

This report summarises monthly attended noise monitoring surveys conducted around WCP during the reporting period 1 January to 31 December 2020. The purpose of the surveys was to quantify and describe the acoustic environment around the site and compare results with specified limits. The duration of each measurement was 15 minutes.

Attended noise monitoring described in this report was conducted on a monthly basis in accordance with Project Approval SSD-6764, the WCP Noise Management Plan, and Environment Protection Licence No. 12425.

January to December 2020 Compliance

During 2020 attended noise monitoring, noise levels from WCP complied with relevant noise limits at all monitoring locations. Site-only L_{Aeq} noise levels were IA, NM, or less than 30 dB at all monitoring locations during 2020. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Long-Term Noise Trends

Site-only L_{Aeq} noise levels were low (either IA, NM, or less than 30 dB) for a large majority of measurements at all monitoring locations. Additional discussion of individual monitoring locations is provided below:

- At North Mogo Road (N19) and Ringwood Road (N20), site-only L_{Aeq} noise levels were inaudible or less than 25 dB during all attended noise monitoring measurements;
- At Tichular (N14), site-only L_{Aeq} noise levels were less than 30 dB during all attended noise monitoring measurements; and
- At all other monitoring locations, site-only L_{Aeq} noise levels were occasionally above 30 dB during attended noise monitoring, but always below the relevant impact assessment criterion.

Long-term noise trend lines were typically constant or increased slightly. Long-term noise trend lines at Coonaroo (N13) decreased slightly.

EIS Comparison

WCP noise levels measured during attended monitoring were generally lower than predicted noise levels in the EIS when site contributions were directly quantifiable and meteorological conditions corresponded with modelled meteorological conditions. There were four occasions where measured noise levels were higher than predicted in the EIS when site contributions were quantifiable and meteorological conditions corresponded with modelled meteorological conditions.

Global Acoustics Pty Ltd

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by WCP to provide an Annual Environmental Monitoring Report (AEMR) for 2020, in order to compare noise monitoring results against both relevant criteria and predictions in the most recently approved EIS for the Wilpinjong Extension Project (WEP).

This report summarises monthly attended noise monitoring surveys conducted around WCP during the reporting period 1 January to 31 December 2020. The purpose of the surveys was to quantify and describe the acoustic environment around the site and compare results with specified limits.

1.2 Monitoring Locations

Monitoring locations are detailed in Table 1.1 and shown on Figure 1. It should be noted that Figure 1 shows the actual monitoring position, not the location of residences.

Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS

NMP Descriptor	Monitoring Location
N6	St Laurence O'Toole Catholic Church, representative of Wollar Village south
N13	'Coonaroo' off Moolarben Road, Moolarben
N14	'Tichular', intersection of Tichular and Barigan Roads, Tichular
N15	Track off Barigan Street near Wollar Public School, Wollar Village
N17	Mogo Road, off Araluen Road, Wollar
N19	North Mogo Road, Mogo
N20	Ringwood Road, off Wollar Road, Wollar
N21	'Wandoona', Barigan Road, Wollar

Requirements to monitor at N13 and N21 were removed from the Noise Management Plan (NMP) in September 2019, but monitoring continued at these locations until July 2020. The property at N13 was acquired by another mining operation. The monitoring location at N21 was initially introduced to validate real-time noise monitoring results, however the corresponding real-time noise monitor at N21 was relocated to N14 to better represent receivers to the south of Wollar.

All available monitoring results, including attended and real-time data, have been provided in this report.

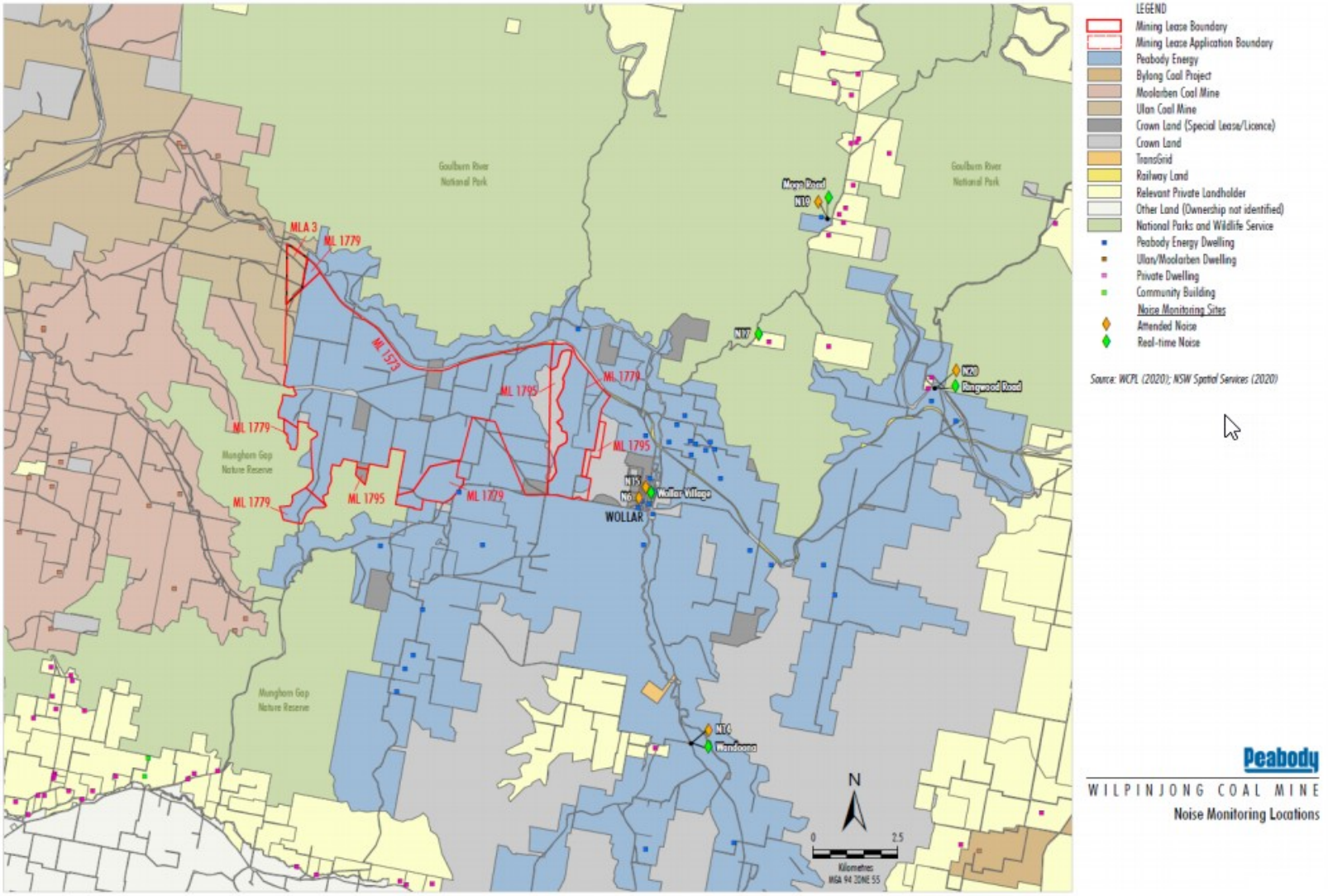


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2020)

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
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.
$L_{A1,1minute}$	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.

2 STATUTORY REQUIREMENTS AND CRITERIA

2.1 Project Approval

The most current approval associated with activities at WCP is the 'Wilpinjong Extension Project' (SSD-6764, April 2017), which covers all current operations and has now replaced the previous consent (05-0021). A noise and blasting assessment was prepared in November 2015 as part of an EIS to support project approval of the WEP.

2.2 Environment Protection Licence

WCP currently holds Environment Protection Licence (EPL) No. 12425 issued by the Environment Protection Authority (EPA), most recently issued in June 2020.

2.3 Noise Management Plan

Noise monitoring requirements are detailed in the WCP NMP. The most recent version of the NMP was approved in August 2020.

2.4 Project Specific Criteria

Noise criteria and meteorological conditions required for noise criteria to apply are consistent in the project approval and EPL. The applicable noise criteria for each monitoring location are shown in Table 2.1.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor	Monitoring Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$
N6[1]	St Laurence O'Toole Catholic Church	36	37	37/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17[2]	Mogo Road, off Araluen Road	36	36	38/45
N19	North Mogo Road	35	35	35/45
N20	Ringwood Road, off Wollar Road	35	35	35/45
N21	'Wandoona', Barigan Road	35	35	35/45

Notes:

1. *N6 noise limits have been assumed to be as detailed for 'Wollar Village – Residential' in the PA, as the church is no longer a place of worship; and*
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 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', relevant NSW EPA requirements, and the WCP NMP. Meteorological data was obtained from the WCP 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 WCP's contribution, if any, to measured levels. At each receptor location, WCP's $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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 WCP) 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 NPfI. 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 (e.g. 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 (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or
- 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 $L_{A1,1minute}$ 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 (i.e. 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 $L_{Aeq,15minute}$ level.

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 (e.g. "<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 WCP was the only contributing low-frequency noise source.

3.4 Attended Real-Time Noise Monitor Comparison

WCP-only noise levels from four attended monitoring locations are compared to results from nearby Sentinex units. Start times of attended and real-time measurements do not directly overlap. Real-time measurement with the most overlap with attended monitoring times are selected for comparison.

Attended monitoring locations and the real-time monitoring locations they represent are listed in Table 3.1.

Table 3.1: ATTENDED AND REAL-TIME MONITORING LOCATIONS FOR COMPARISON

NMP Descriptor	Real-Time Monitor ID	Monitoring Location
N15	SX33-N1	Wollar Village
N19	SX32-N1	North Mogo Road
N20	SX30-N1	Ringwood Road, off Wollar Road
N21 N14	SX31-N1 [1]	'Wandoona', Barigan Road 'Tichular', intersection of Tichular and Barigan Roads, Tichular

Notes:

1. *Real-time monitoring unit SX31-N1 was relocated from N21 to N14 in September 2020.*

3.5 Comparison with WEP EIS Model Predictions

A noise and blasting assessment was prepared in November 2015 as part of the EIS to support project approval for the WEP. The report assessed noise and blasting impacts associated with ongoing operations. As part of the modelling assessment, noise levels from WCP were predicted for representative operating scenarios, time periods and weather conditions. Noise predictions for Year 2020, during specific meteorological conditions identified as 'prevailing' in accordance with the INP, were compared with measured levels from attended compliance monitoring for corresponding meteorological conditions.

Table 11 of the noise and blasting assessment lists modelled meteorological conditions and is reproduced below.

Table 11 INP Assessable Meteorological Noise Modelling Parameters

Period	Meteorological Parameter	Air Temperature	Relative Humidity	Wind Speed and Direction	Temperature Gradient
Daytime	Calm	20°C	50%	0 m/s	0°C/100 m
	Autumn Wind 30% (occurrence)	19°C	55%	E 3 m/s	0°C/100 m
Evening	Calm	19°C	56%	0 m/s	0°C/100 m
	Autumn Wind 30% (occurrence)	18°C	63%	ESE 3 m/s	0°C/100 m
	Winter Wind 30% (occurrence)	10°C	71%	WNW, NW 3 m/s	0°C/100 m
Night-time	Calm	14°C	76%	0 m/s	0°C/100 m
	Summer Wind > 30% (occurrence)	19°C	68%	ESE, SE, E 3 m/s	0°C/100 m
	Strong Inversion (10% exceedance)[1]	6°C	86%	0 m/s	5.2°C/100 m

Note 1: Winter evening/night-time 10% exceedance temperature gradient in accordance with INP Appendix E Table 4.
Note 2: m/s = metres per second.

The following rules were used to allocate meteorological parameter bounds for each condition:

1. For night-time "calm" atmospheric conditions, wind speeds less than 0.5 metres per second (m/s), all wind directions, and temperature gradients in the range -1.5° and 1.5° C/100m were included. This vertical temperature gradient range corresponds with Stability Categories D and E according to Table D2 of the NPfI;

2. For night "summer wind" atmospheric conditions, wind speeds in the range 0.5 to 3.0 m/s and vertical temperature gradients in the range -1.5° and 1.5° C/100m were included. This vertical temperature gradient range corresponds with Stability Categories D and E according to Table D2 of the NPfI. The modelled wind

directions were E (90 degrees), ESE (112.5 degrees), and SE (135 degrees). Wind directions 22.5 degrees either side of the modelled directions were included; and

3. For "strong inversion" atmospheric conditions with no wind, wind speeds up to 0.5 m/s and vertical temperature gradients in the range 3.0° to 5.2° C/100m were included. This vertical temperature gradient range corresponds with Stability Category F according to Table D2 of the NPfI.

Meteorological parameter bounds used to identify corresponding meteorological conditions during attended monitoring are outlined in Table 3.2.

Table 3.2: APPLICABLE METEOROLOGICAL CONDITION DEFINITIONS

Parameter	Night		
	Calm	**Summer Wind**	**Strong Inversion**
Wind speed (m/s)	0.0 – 0.5	0.5 – 3.0	0.0 – 0.5
Wind direction (°)	all	67.5°-157.5°	all
Stability category	D and E	D and E	F and G

4 RESULTS

4.1 January 2020

4.1.1 Total Measured Noise levels

Table 4.1: MEASURED NOISE LEVELS – JANUARY 2020[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
N6	15/01/2020 23:18	52	49	49	48	48	47	44
N13	16/01/2020 00:50	49	35	31	29	28	26	24
N14	16/01/2020 00:25	52	38	33	32	31	29	17
N15	15/01/2020 22:59	48	46	45	42	41	40	38
N17	15/01/2020 22:29	56	55	54	53	52	51	49
N19	15/01/2020 22:04	49	44	42	41	40	37	33
N20	15/01/2020 23:47	79	69	58	55	35	26	22
N21	16/01/2020 00:51	54	49	41	37	28	22	19

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.1.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.1.3 Attended Noise Monitoring

Table 4.2 to Table 4.3 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JANUARY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	15/01/2020 23:18	1.6	E	37	Yes	IA	Nil
N13	16/01/2020 00:50	0.9	E	35	Yes	25	Nil
N14	16/01/2020 00:25	1.3	E	35	Yes	IA	Nil
N15	15/01/2020 22:59	1.3	F	37	Yes	IA	Nil
N17	15/01/2020 22:29	1.6	F	38	Yes	IA	Nil
N19	15/01/2020 22:04	0.0	F	35	Yes	IA	Nil
N20	15/01/2020 23:47	0.5	E	35	Yes	IA	Nil
N21	16/01/2020 00:51	0.9	E	35	Yes	<25	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JANUARY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	15/01/2020 23:18	1.6	E	45	Yes	IA	Nil
N13	16/01/2020 00:50	0.9	E	45	Yes	28	Nil
N14	16/01/2020 00:25	1.3	E	45	Yes	IA	Nil
N15	15/01/2020 22:59	1.3	F	45	Yes	IA	Nil
N17	15/01/2020 22:29	1.6	F	45	Yes	IA	Nil
N19	15/01/2020 22:04	0.0	F	45	Yes	IA	Nil
N20	15/01/2020 23:47	0.5	E	45	Yes	IA	Nil
N21	16/01/2020 00:51	0.9	E	45	Yes	<25	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.1.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.4. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.4: REAL-TIME AND ATTENDED NOISE LEVELS, JANUARY 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	15/01/2020 22:59	15/01/2020 23:00	36	26	34	19	40	IA
N19/SX32	15/01/2020 22:04	15/01/2020 22:00	37	36	22	7	37	IA
N20/SX30	15/01/2020 23:47	15/01/2020 23:45	37	28	34	19	26	IA
N21/SX31	16/01/2020 00:51	16/01/2020 00:45	37	25	35	NR	22	<25

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.2 February 2020

4.2.1 Total Measured Noise levels

Table 4.5: MEASURED NOISE LEVELS – FEBRUARY 2020[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
N6	06/02/2020 01:06	53	45	41	38	36	31	28
N13	06/02/2020 01:19	41	36	31	29	27	25	23
N14	06/02/2020 00:18	50	43	32	31	25	22	20
N15	05/02/2020 23:04	56	49	46	44	44	33	27
N17	05/02/2020 22:30	46	45	44	43	43	42	40
N19	05/02/2020 22:02	50	38	35	32	31	27	25
N20	05/02/2020 23:36	76	68	42	53	29	25	23
N21	06/02/2020 00:45	58	55	48	44	39	28	26

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.2.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.2.3 Attended Noise Monitoring

Table 4.6 to Table 4.7 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.6: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – FEBRUARY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	06/02/2020 01:06	5.4	E	37	No	IA	NA
N13	06/02/2020 01:19	5.0	E	35	No	IA	NA
N14	06/02/2020 00:18	4.2	E	35	No	IA	NA
N15	05/02/2020 23:04	1.1	E	37	Yes	IA	Nil
N17	05/02/2020 22:30	1.0	E	38	Yes	IA	Nil
N19	05/02/2020 22:02	0.9	E	35	Yes	IA	Nil
N20	05/02/2020 23:36	3.5	F	35	No	IA	NA
N21	06/02/2020 00:45	5.5	D	35	No	IA	NA

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.7: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – FEBRUARY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	06/02/2020 01:06	5.4	E	45	No	IA	NA
N13	06/02/2020 01:19	5.0	E	45	No	IA	NA
N14	06/02/2020 00:18	4.2	E	45	No	IA	NA
N15	05/02/2020 23:04	1.1	E	45	Yes	IA	Nil
N17	05/02/2020 22:30	1.0	E	45	Yes	IA	Nil
N19	05/02/2020 22:02	0.9	E	45	Yes	IA	Nil
N20	05/02/2020 23:36	3.5	F	45	No	IA	NA
N21	06/02/2020 00:45	5.5	D	45	No	IA	NA

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.2.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.8. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.8: REAL-TIME AND ATTENDED NOISE LEVELS, FEBRUARY 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	05/02/2020 23:04	05/02/2020 23:00	41	26	39	23	33	IA
N19/SX32	05/02/2020 22:02	05/02/2020 22:00	30	29	25	NR	27	IA
N20/SX30	05/02/2020 23:36	05/02/2020 23:30	42	32	37	30	25	IA
N21/SX31	06/02/2020 00:45	06/02/2020 00:45	46	31	44	NR	28	IA

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.3 March 2020

4.3.1 Total Measured Noise levels

Table 4.9: MEASURED NOISE LEVELS – MARCH 2020[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
N6	11/03/2020 23:11	44	38	34	30	28	25	23
N13	12/03/2020 00:53	46	35	32	31	30	29	27
N14	12/03/2020 00:16	50	32	23	24	20	18	16
N15	11/03/2020 22:52	48	38	35	31	29	27	25
N17	11/03/2020 22:24	48	34	31	29	28	26	23
N19	11/03/2020 22:00	50	47	44	40	36	33	30
N20	11/03/2020 23:40	36	34	33	28	25	22	20
N21	12/03/2020 00:40	46	32	26	25	24	23	21

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.3.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.3.3 Attended Noise Monitoring

Table 4.10 to Table 4.11 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.10: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MARCH 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	11/03/2020 23:11	3.3	E	37	No	IA	NA
N13	12/03/2020 00:53	2.6	E	35	Yes	28	Nil
N14	12/03/2020 00:16	3.1	E	35	No	IA	NA
N15	11/03/2020 22:52	3.5	E	37	No	IA	NA
N17	11/03/2020 22:24	3.5	E	38	No	IA	NA
N19	11/03/2020 22:00	3.8	E	35	No	IA	NA
N20	11/03/2020 23:40	3.2	E	35	No	IA	NA
N21	12/03/2020 00:40	2.9	E	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.11: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MARCH 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	11/03/2020 23:11	3.3	E	45	No	IA	NA
N13	12/03/2020 00:53	2.6	E	45	Yes	31	Nil
N14	12/03/2020 00:16	3.1	E	45	No	IA	NA
N15	11/03/2020 22:52	3.5	E	45	No	IA	NA
N17	11/03/2020 22:24	3.5	E	45	No	IA	NA
N19	11/03/2020 22:00	3.8	E	45	No	IA	NA
N20	11/03/2020 23:40	3.2	E	45	No	IA	NA
N21	12/03/2020 00:40	2.9	E	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.3.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.12. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.12: REAL-TIME AND ATTENDED NOISE LEVELS, MARCH 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	11/03/2020 22:52	11/03/2020 22:45	45	30	27	26	27	IA
N19/SX32	11/03/2020 22:00	11/03/2020 22:00	37	33	35	30	33	IA
N20/SX30	11/03/2020 23:40	11/03/2020 23:45	31	27	24	20	22	IA
N21/SX31	12/03/2020 00:40	12/03/2020 00:45	28	27	24	26	23	IA

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.4 April 2020

4.4.1 Total Measured Noise levels

Table 4.13: MEASURED NOISE LEVELS – APRIL 2020 [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
N6	21/04/2020 01:57	45	36	33	30	29	27	24
N13	21/04/2020 01:09	46	30	23	22	20	18	17
N14	21/04/2020 00:58	37	28	25	24	23	22	20
N15	20/04/2020 23:36	46	37	34	32	31	28	26
N17	20/04/2020 22:55	47	39	34	32	30	29	26
N19	20/04/2020 22:26	52	30	24	23	21	20	18
N20	21/04/2020 00:15	53	32	27	26	23	19	18
N21	21/04/2020 01:27	50	40	36	34	33	31	28

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.4.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.4.3 Attended Noise Monitoring

Table 4.14 to Table 4.15 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.14: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – APRIL 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	21/04/2020 01:57	0.7	F	37	Yes	30	Nil
N13	21/04/2020 01:09	1.0	F	35	Yes	IA	Nil
N14	21/04/2020 00:58	0.7	F	35	Yes	<20	Nil
N15	20/04/2020 23:36	0.0	F	37	Yes	31	Nil
N17	20/04/2020 22:55	0.0	F	38	Yes	31	Nil
N19	20/04/2020 22:26	0.0	F	35	Yes	<25	Nil
N20	21/04/2020 00:15	0.0	F	35	Yes	<25	Nil
N21	21/04/2020 01:27	0.8	F	35	Yes	34	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.15: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – APRIL 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	21/04/2020 01:57	0.7	F	45	Yes	37	Nil
N13	21/04/2020 01:09	1.0	F	45	Yes	IA	Nil
N14	21/04/2020 00:58	0.7	F	45	Yes	<20	Nil
N15	20/04/2020 23:36	0.0	F	45	Yes	39	Nil
N17	20/04/2020 22:55	0.0	F	45	Yes	38	Nil
N19	20/04/2020 22:26	0.0	F	45	Yes	<25	Nil
N20	21/04/2020 00:15	0.0	F	45	Yes	<25	Nil
N21	21/04/2020 01:27	0.8	F	45	Yes	41	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.4.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.16. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.16: REAL-TIME AND ATTENDED NOISE LEVELS, APRIL 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	20/04/2020 23:36	20/04/2020 23:30	37	30	36	NR	28	31
N19/SX32	20/04/2020 22:26	20/04/2020 22:30	23	21	20	18	20	<25
N20/SX30	21/04/2020 00:15	21/04/2020 00:15	29	27	24	20	19	<25
N21/SX31	21/04/2020 01:27	21/04/2020 01:30	NR	NR	NR	NR	31	34

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.5 May 2020

4.5.1 Total Measured Noise levels

Table 4.17: MEASURED NOISE LEVELS – MAY 2020[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
N6	12/05/2020 01:16	53	47	41	37	30	23	19
N13	12/05/2020 01:24	47	44	35	32	27	24	21
N14	12/05/2020 00:20	47	30	24	22	20	19	17
N15	11/05/2020 23:05	39	27	21	20	19	18	17
N17	11/05/2020 22:32	38	24	19	18	17	15	14
N19	11/05/2020 22:05	36	26	21	19	16	15	14
N20	11/05/2020 23:39	39	33	29	25	22	19	17
N21	12/05/2020 00:54	42	36	33	28	25	22	19

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.5.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.5.3 Attended Noise Monitoring

Table 4.18 to Table 4.19 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.18: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MAY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	12/05/2020 01:16	0.0	F	37	Yes	IA	Nil
N13	12/05/2020 01:24	0.0	G	35	No	27	NA
N14	12/05/2020 00:20	0.8	F	35	Yes	IA	Nil
N15	11/05/2020 23:05	0.8	F	37	Yes	IA	Nil
N17	11/05/2020 22:32	0.0	G	38	No	IA	NA
N19	11/05/2020 22:05	0.7	G	35	No	IA	NA
N20	11/05/2020 23:39	0.0	G	35	No	IA	NA
N21	12/05/2020 00:54	0.0	F	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.19: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MAY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	12/05/2020 01:16	0.0	F	45	Yes	IA	Nil
N13	12/05/2020 01:24	0.0	G	45	No	36	NA
N14	12/05/2020 00:20	0.8	F	45	Yes	IA	Nil
N15	11/05/2020 23:05	0.8	F	45	Yes	IA	Nil
N17	11/05/2020 22:32	0.0	G	45	No	IA	NA
N19	11/05/2020 22:05	0.7	G	45	No	IA	NA
N20	11/05/2020 23:39	0.0	G	45	No	IA	NA
N21	12/05/2020 00:54	0.0	F	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.5.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.20. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.20: REAL-TIME AND ATTENDED NOISE LEVELS, MAY 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	11/05/2020 23:05	11/05/2020 23:00	26	18	22	19	18	IA
N19/SX32	11/05/2020 22:05	11/05/2020 22:00	19	17	10	7	15	IA
N20/SX30	11/05/2020 23:39	11/05/2020 23:30	26	24	21	16	19	IA
N21/SX31	12/05/2020 00:54	12/05/2020 01:00	42	24	41	24	22	IA

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.6 June 2020

4.6.1 Total Measured Noise levels

Table 4.21: MEASURED NOISE LEVELS – JUNE 2020 [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
N6	16/06/2020 23:57	44	36	31	29	27	26	24
N13	17/06/2020 00:33	44	34	27	24	20	18	16
N14	16/06/2020 23:42	40	28	23	22	21	20	18
N15	16/06/2020 23:33	50	34	31	28	27	25	22
N17	16/06/2020 22:25	40	34	32	29	27	23	20
N19	16/06/2020 22:00	36	24	20	18	18	17	16
N20	16/06/2020 23:05	36	28	25	23	23	21	20
N21	17/06/2020 00:07	55	51	48	42	33	30	28

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.6.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.6.3 Attended Noise Monitoring

Table 4.22 to Table 4.23 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.22: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JUNE 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	16/06/2020 23:57	0.6	F	37	Yes	25	Nil
N13	17/06/2020 00:33	0.0	F	35	Yes	IA	Nil
N14	16/06/2020 23:42	0.9	F	35	Yes	IA	Nil
N15	16/06/2020 23:33	0.7	F	37	Yes	26	Nil
N17	16/06/2020 22:25	0.6	F	38	Yes	23	Nil
N19	16/06/2020 22:00	0.0	F	35	Yes	<20	Nil
N20	16/06/2020 23:05	0.0	F	35	Yes	IA	Nil
N21	17/06/2020 00:07	1.1	F	35	Yes	<25	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.23: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JUNE 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	16/06/2020 23:57	0.6	F	45	Yes	32	Nil
N13	17/06/2020 00:33	0.0	F	45	Yes	IA	Nil
N14	16/06/2020 23:42	0.9	F	45	Yes	IA	Nil
N15	16/06/2020 23:33	0.7	F	45	Yes	35	Nil
N17	16/06/2020 22:25	0.6	F	45	Yes	26	Nil
N19	16/06/2020 22:00	0.0	F	45	Yes	<20	Nil
N20	16/06/2020 23:05	0.0	F	45	Yes	IA	Nil
N21	17/06/2020 00:07	1.1	F	45	Yes	30	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.6.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.24. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.24: REAL-TIME AND ATTENDED NOISE LEVELS, JUNE 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	16/06/2020 23:33	16/06/2020 23:30	32	28	30	26	25	35
N19/SX32	16/06/2020 22:00	16/06/2020 22:00	21	20	19	16	17	<20
N20/SX30	16/06/2020 23:05	16/06/2020 23:00	27	26	19	18	21	IA
N21/SX31	17/06/2020 00:07	17/06/2020 00:00	43	28	40	25	30	<25

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.7 July 2020

4.7.1 Total Measured Noise levels

Table 4.25: MEASURED NOISE LEVELS – JULY 2020 [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
N6	16/07/2020 01:03	45	30	26	24	24	22	20
N14	16/07/2020 00:28	39	27	22	20	19	17	15
N15	15/07/2020 23:06	43	36	30	28	26	24	22
N17	15/07/2020 22:29	32	27	25	23	23	21	20
N19	15/07/2020 22:00	37	30	28	26	26	25	23
N20	15/07/2020 23:45	42	34	32	30	29	26	24

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.7.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.7.3 Attended Noise Monitoring

Table 4.26 to Table 4.27 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.26: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JULY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	16/07/2020 01:03	2.3	E	37	Yes	<25	Nil
N14	16/07/2020 00:28	1.7	F	35	Yes	IA	Nil
N15	15/07/2020 23:06	1.5	F	37	Yes	<25	Nil
N17	15/07/2020 22:29	0.3	E	38	Yes	<25	Nil
N19	15/07/2020 22:00	1.6	E	35	Yes	IA	Nil
N20	15/07/2020 23:45	1.8	E	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.27: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JULY 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	16/07/2020 01:03	2.3	E	45	Yes	30	Nil
N14	16/07/2020 00:28	1.7	F	45	Yes	IA	Nil
N15	15/07/2020 23:06	1.5	F	45	Yes	28	Nil
N17	15/07/2020 22:29	0.3	E	45	Yes	27	Nil
N19	15/07/2020 22:00	1.6	E	45	Yes	IA	Nil
N20	15/07/2020 23:45	1.8	E	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.7.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.28. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.28: REAL-TIME AND ATTENDED NOISE LEVELS, JULY 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	15/07/2020 23:06	15/07/2020 23:00	43	26	40	22	24	<25
N19/SX32	15/07/2020 22:00	15/07/2020 22:00	26	22	23	18	25	IA
N20/SX30	15/07/2020 23:45	15/07/2020 23:45	35	27	33	20	26	IA

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.8 August 2020

4.8.1 Total Measured Noise levels

Table 4.29: MEASURED NOISE LEVELS – AUGUST 2020 [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
N6	18/08/2020 23:15	46	44	42	40	39	37	34
N6[1]	18/08/2020 23:39	48	44	41	39	39	36	33
N14	19/08/2020 00:54	36	31	29	26	24	23	21
N15	18/08/2020 22:55	44	41	39	37	36	34	31
N17	18/08/2020 22:24	40	36	34	32	32	30	26
N19	18/08/2020 22:00	42	32	29	28	27	25	22
N20	19/08/2020 00:17	75	68	47	53	34	26	24

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP; and*
2. *Remeasure.*

4.8.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.8.3 Attended Noise Monitoring

Table 4.30 to Table 4.31 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.30: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – AUGUST 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	18/08/2020 23:15	0.0	G	37	No	40	NA
N6[5]	18/08/2020 23:39	0.0	G	37	No	39	NA
N14	19/08/2020 00:54	0.0	G	35	No	IA	NA
N15	18/08/2020 22:55	0.0	G	37	No	37	NA
N17	18/08/2020 22:24	0.0	G	38	No	32	NA
N19	18/08/2020 22:00	0.0	F	35	Yes	<25	Nil
N20	19/08/2020 00:17	0.0	G	35	No	<25	NA

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable;*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL; and*
5. *Remeasure.*

Table 4.31: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – AUGUST 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	18/08/2020 23:15	0.0	G	45	No	46	NA
N6[5]	18/08/2020 23:39	0.0	G	45	No	48	NA
N14	19/08/2020 00:54	0.0	G	45	No	IA	NA
N15	18/08/2020 22:55	0.0	G	45	No	43	NA
N17	18/08/2020 22:24	0.0	G	45	No	36	NA
N19	18/08/2020 22:00	0.0	F	45	Yes	30	Nil
N20	19/08/2020 00:17	0.0	G	45	No	<25	NA

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP;*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL; and*
5. *Remeasure.*

4.8.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.32. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.32: REAL-TIME AND ATTENDED NOISE LEVELS, AUGUST 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	18/08/2020 22:55	18/08/2020 23:00	39	35	38	35	34	37
N19/SX32	18/08/2020 22:00	18/08/2020 22:00	31	28	29	28	25	<25
N20/SX30	19/08/2020 00:17	19/08/2020 00:15	39	29	36	23	26	<25

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.9 September 2020

4.9.1 Total Measured Noise levels

Table 4.33: MEASURED NOISE LEVELS – SEPTEMBER 2020 [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
N6	02/09/2020 00:45	37	29	27	26	26	25	23
N14	02/09/2020 00:18	45	30	28	27	26	25	23
N15	01/09/2020 23:05	45	31	29	27	27	24	22
N17	01/09/2020 22:32	30	26	22	21	20	18	16
N19	01/09/2020 22:04	39	32	27	25	23	21	19
N20	01/09/2020 23:40	52	47	38	35	25	22	19

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.9.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.9.3 Attended Noise Monitoring

Table 4.34 to Table 4.35 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.34: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – SEPTEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	02/09/2020 00:45	0.0	G	37	No	<25	NA
N14	02/09/2020 00:18	0.0	G	35	No	25	NA
N15	01/09/2020 23:05	0.0	G	37	No	27	NA
N17	01/09/2020 22:32	0.0	F	38	Yes	<20	Nil
N19	01/09/2020 22:04	0.0	G	35	No	<20	NA
N20	01/09/2020 23:40	0.0	F	35	Yes	<25	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.35: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – SEPTEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	02/09/2020 00:45	0.0	G	45	No	<25	NA
N14	02/09/2020 00:18	0.0	G	45	No	29	NA
N15	01/09/2020 23:05	0.0	G	45	No	45	NA
N17	01/09/2020 22:32	0.0	F	45	Yes	<25	Nil
N19	01/09/2020 22:04	0.0	G	45	No	<25	NA
N20	01/09/2020 23:40	0.0	F	45	Yes	28	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.9.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.36. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.36: REAL-TIME AND ATTENDED NOISE LEVELS, SEPTEMBER 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N15/SX33	01/09/2020 23:05	01/09/2020 23:00	35	27	31	24	24	27
N19/SX32	01/09/2020 22:04	01/09/2020 22:00	26	24	23	21	21	<20
N20/SX30	01/09/2020 23:40	01/09/2020 23:45	29	26	25	22	22	<25

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.10 October 2020

4.10.1 Total Measured Noise levels

Table 4.37: MEASURED NOISE LEVELS – OCTOBER 2020 [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
N6	06/10/2020 23:20	50	43	41	39	39	35	25
N14	06/10/2020 22:35	57	53	49	45	42	34	25
N15	06/10/2020 23:01	51	42	36	33	30	27	23
N17	06/10/2020 22:27	45	39	36	34	34	32	30
N19	06/10/2020 22:00	49	45	42	39	38	36	33
N20	06/10/2020 22:00	51	40	37	33	29	24	22

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.10.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.10.3 Attended Noise Monitoring

Table 4.38 to Table 4.39 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.38: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – OCTOBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	06/10/2020 23:20	3.0	D	37	Yes	IA	Nil
N14	06/10/2020 22:35	2.7	D	35	Yes	IA	Nil
N15	06/10/2020 23:01	2.4	D	37	Yes	IA	Nil
N17	06/10/2020 22:27	2.7	D	38	Yes	IA	Nil
N19	06/10/2020 22:00	3.0	D	35	Yes	IA	Nil
N20	06/10/2020 22:00	3.0	D	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.39: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – OCTOBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	06/10/2020 23:20	3.0	D	45	Yes	IA	Nil
N14	06/10/2020 22:35	2.7	D	45	Yes	IA	Nil
N15	06/10/2020 23:01	2.4	D	45	Yes	IA	Nil
N17	06/10/2020 22:27	2.7	D	45	Yes	IA	Nil
N19	06/10/2020 22:00	3.0	D	45	Yes	IA	Nil
N20	06/10/2020 22:00	3.0	D	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.10.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.40. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.40: REAL-TIME AND ATTENDED NOISE LEVELS, OCTOBER 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N14/SX31	06/10/2020 22:35	06/10/2020 22:30	40	35	24	18	34	IA
N15/SX33	06/10/2020 23:01	06/10/2020 23:00	49	34	28	22	27	IA
N19/SX32	06/10/2020 22:00	06/10/2020 22:00	43	39	28	25	36	IA
N20/SX30	06/10/2020 22:00	06/10/2020 22:00	43	25	38	20	24	IA

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.11 November 2020

4.11.1 Total Measured Noise levels

Table 4.41: MEASURED NOISE LEVELS – NOVEMBER 2020 [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
N6	11/11/2020 23:27	56	51	44	41	37	35	33
N14	12/11/2020 00:50	52	42	38	34	31	27	23
N15	11/11/2020 23:04	55	53	40	39	30	29	28
N17	11/11/2020 22:27	57	46	43	42	42	41	39
N19	11/11/2020 22:00	56	53	52	50	50	48	44
N20	12/11/2020 00:01	46	42	38	33	28	26	24

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.11.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.11.3 Attended Noise Monitoring

Table 4.42 to Table 4.43 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.42: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – NOVEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	11/11/2020 23:27	0.9	G	37	No	<25	NA
N14	12/11/2020 00:50	1.3	F	35	Yes	23	Nil
N15	11/11/2020 23:04	1.0	G	37	No	27	NA
N17	11/11/2020 22:27	0.8	F	38	Yes	<20	Nil
N19	11/11/2020 22:00	0.5	F	35	Yes	IA	Nil
N20	12/11/2020 00:01	1.0	E	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.43: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – NOVEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	11/11/2020 23:27	0.9	G	45	No	<25	NA
N14	12/11/2020 00:50	1.3	F	45	Yes	26	Nil
N15	11/11/2020 23:04	1.0	G	45	No	30	NA
N17	11/11/2020 22:27	0.8	F	45	Yes	<25	Nil
N19	11/11/2020 22:00	0.5	F	45	Yes	IA	Nil
N20	12/11/2020 00:01	1.0	E	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.11.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.44. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.44: REAL-TIME AND ATTENDED NOISE LEVELS, NOVEMBER 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N14/SX31	12/11/2020 00:50	12/11/2020 00:45	32	25	23	20	27	23
N15/SX33	11/11/2020 23:04	11/11/2020 23:00	47	30	31	28	29	27
N19/SX32	11/11/2020 22:00	11/11/2020 22:00	42	40	24	NR	48	IA
N20/SX30	12/11/2020 00:01	12/11/2020 00:00	40	33	21	19	26	IA

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

4.12 December 2020

4.12.1 Total Measured Noise levels

Table 4.45: MEASURED NOISE LEVELS – DECEMBER 2020 [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
N6	10/12/2020 00:43	53	49	46	40	30	20	17
N14	10/12/2020 00:15	51	43	38	34	27	22	18
N15	09/12/2020 23:00	52	47	45	43	43	40	28
N17	09/12/2020 22:27	51	50	50	48	48	46	44
N19	09/12/2020 22:00	53	51	49	47	47	45	41
N20	09/12/2020 23:30	52	47	45	42	42	32	26

Note:

1. *Noise levels in this table are not necessarily the result of activities at WCP.*

4.12.2 Modifying Factors

Measured site-only levels were assessed for the applicability of modifying factors in accordance with the NPfI and methodology described in Section 3.3.

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

4.12.3 Attended Noise Monitoring

Table 4.46 to Table 4.47 detail noise levels from WCP in the absence of other noise source. Noise criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.46: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – DECEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{Aeq,15min}$ dB [3]	Exceedance [4]
N6	10/12/2020 00:43	0.9	D	37	Yes	IA	Nil
N14	10/12/2020 00:15	1.1	E	35	Yes	IA	Nil
N15	09/12/2020 23:00	0.8	F	37	Yes	IA	Nil
N17	09/12/2020 22:27	1.4	F	38	Yes	<25	Nil
N19	09/12/2020 22:00	0.0	G	35	No	IA	NA
N20	09/12/2020 23:30	0.7	E	35	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{Aeq,15minute}$ attributed to WCP, including modifying factors if applicable; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

Table 4.47: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – DECEMBER 2020

Location	Start Date and Time	Wind Speed m/s [1]	Stability Class [1]	Criterion dB	Criterion Applies? [2]	WCP $L_{A1,1min}$ dB [3]	Exceedance [4]
N6	10/12/2020 00:43	0.9	D	45	Yes	IA	Nil
N14	10/12/2020 00:15	1.1	E	45	Yes	IA	Nil
N15	09/12/2020 23:00	0.8	F	45	Yes	IA	Nil
N17	09/12/2020 22:27	1.4	F	45	Yes	28	Nil
N19	09/12/2020 22:00	0.0	G	45	No	IA	NA
N20	09/12/2020 23:30	0.7	E	45	Yes	IA	Nil

Notes:

1. *Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;*
2. *Noise emission limits apply for all meteorological conditions, except for the following: wind speeds greater than 3 m/s above ground level; or stability category F temperature inversions and wind speeds greater than 2 m/s at 10m above ground level; or stability category G temperature inversion conditions;*
3. *Site-only $L_{A1,1minute}$ attributed to WCP; and*
4. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.12.4 Comparison of Real-Time and Attended Noise Results

A summary of attended monitoring data and that measured by the four real-time Sentinex units (omni-directional) is shown in Table 4.48. Low pass (<630 Hz) L_{Aeq} and L_{A90} are typically good indicators of mining noise levels.

Table 4.48: REAL-TIME AND ATTENDED NOISE LEVELS, DECEMBER 2020 [1]

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data [2]				Attended Measurement	
			Total L_{Aeq} dB	Total L_{A90} dB	Low pass (<630Hz) L_{Aeq} dB	Low pass (<630Hz) L_{A90} dB	Total L_{A90} dB	WCP L_{Aeq} dB
N14/SX31	10/12/2020 00:15	10/12/2020 00:15	27	20	21	19	22	IA
N15/SX33	09/12/2020 23:00	09/12/2020 23:00	46	24	19	18	40	IA
N19/SX32	09/12/2020 22:00	09/12/2020 22:00	44	43	28	25	45	IA
N20/SX30	09/12/2020 23:30	09/12/2020 23:30	36	32	17	15	32	IA

Notes:

1. *Levels in this table are not necessarily the result of activity at WCP; and*
2. *NR – no Sentinex data recorded for this period.*

5 LONG TERM NOISE TRENDS

Site-only L_{Aeq} noise levels measured during monthly attended environmental noise monitoring over a 5-year period from January 2016 to December 2020 have been collated and graphed to summarise WCP long-term noise performance. Less than five years of data was available at three locations due to monitoring commencing at those locations during the 5-year period.

Due to the qualitative nature of some attended noise monitoring descriptors, calculation of site noise statistics such as mean, median, and standard deviation is not always possible. Subsequently, site-only L_{Aeq} noise levels for each monitoring event have been grouped into one of three categories:

1. WCP-only L_{Aeq} was either inaudible (IA), not measurable (NM), or less than 30 dB, which together are represented by green bars;
2. WCP-only L_{Aeq} was between 30 dB and the relevant impact assessment criterion (inclusive), represented by blue bars; or
3. WCP-only L_{Aeq} was greater than the impact assessment criterion for that location, represented by red bars.

For each calendar year, the percentage of occurrence for each of these categories is shown, as well as annual trend lines over the entire five-year period. Figures show site-only L_{Aeq} noise levels, including adjustments due to modifying factors, as defined by the Environment Protection Authority (EPA) 'Noise Policy for Industry' (NPfI, current as of October 2017). Meteorological conditions and applicability of noise criteria have not been considered.

5.1 Noise Trend Graphs

Site-only L_{Aeq} noise levels measured during attended environmental noise monitoring over a 5-year period have been collated and graphed to summarise long-term noise trends. Figure 2 to Figure 9 provide percentage occurrence information for WCP noise levels at eight monitoring locations.

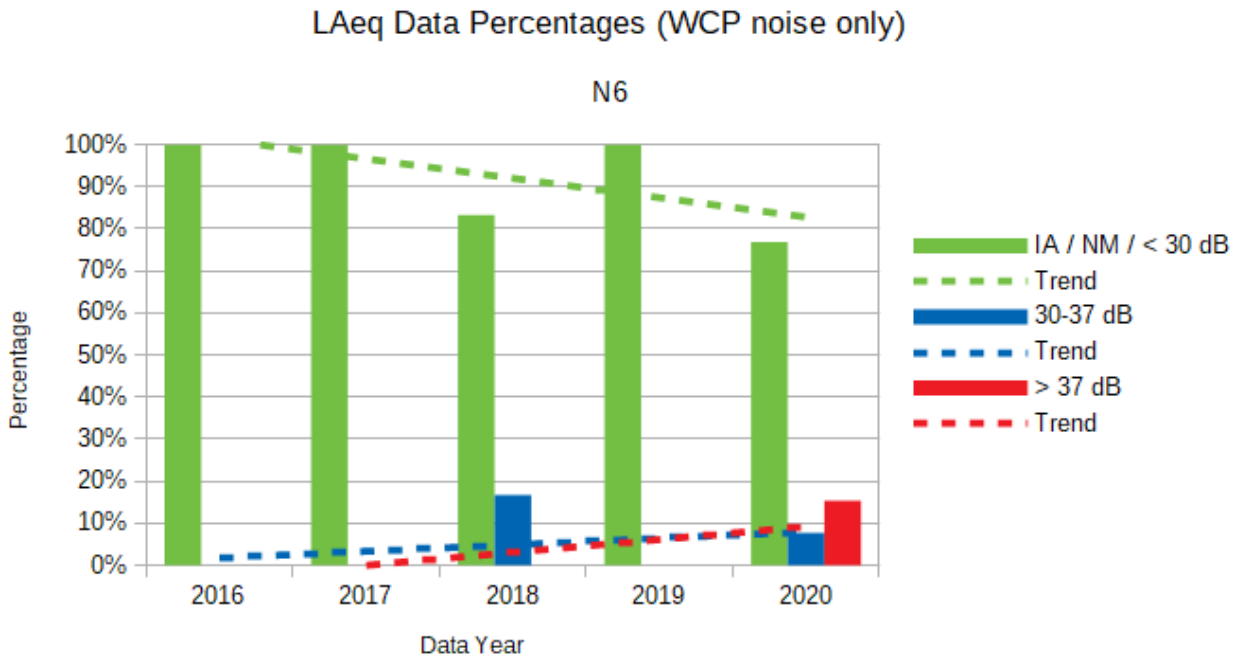


Figure 2: Attended noise monitoring data, N6

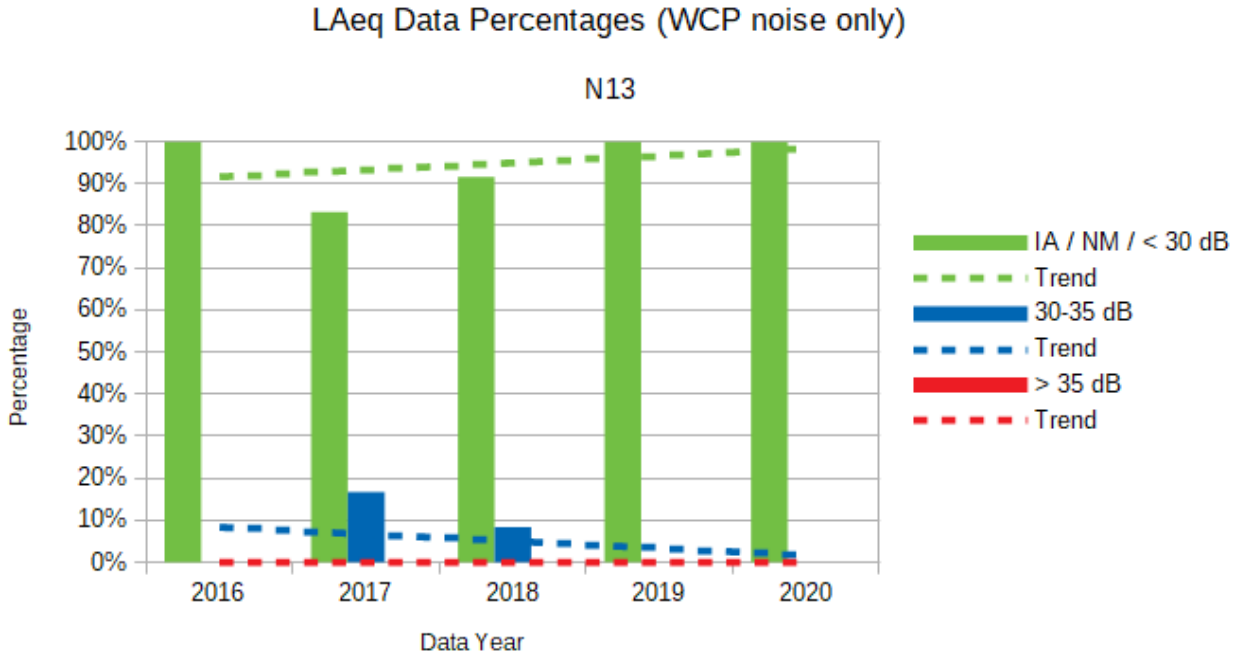


Figure 3: Attended noise monitoring data, N13

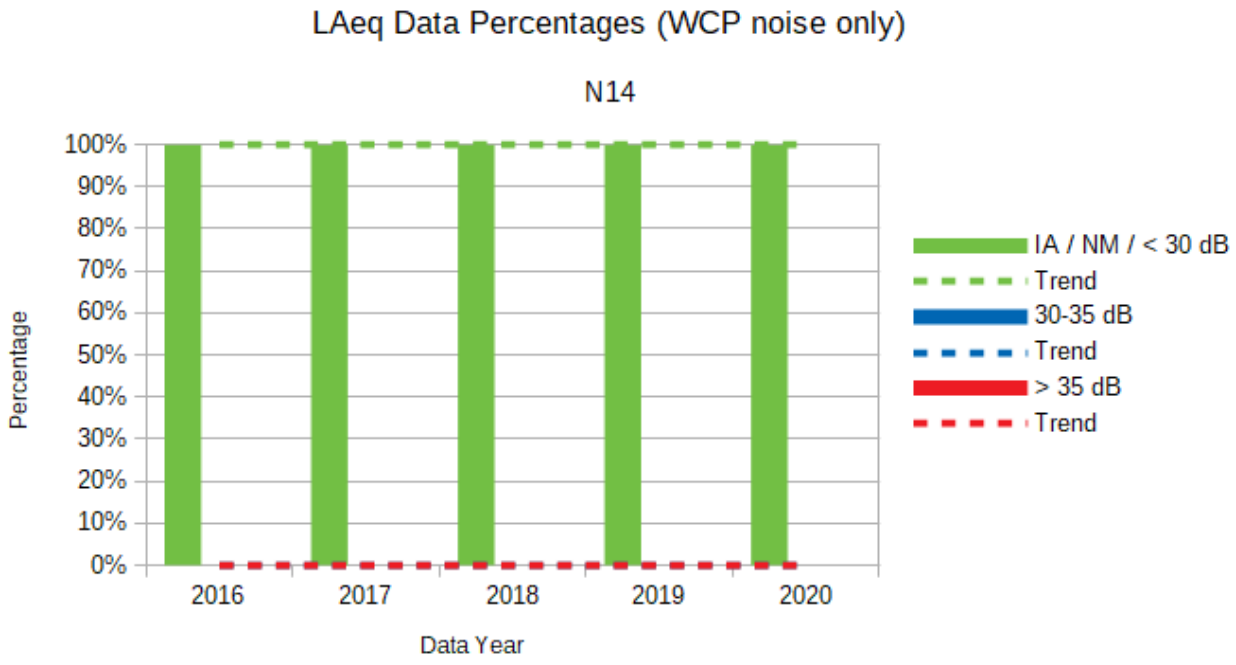


Figure 4: Attended noise monitoring data, N14

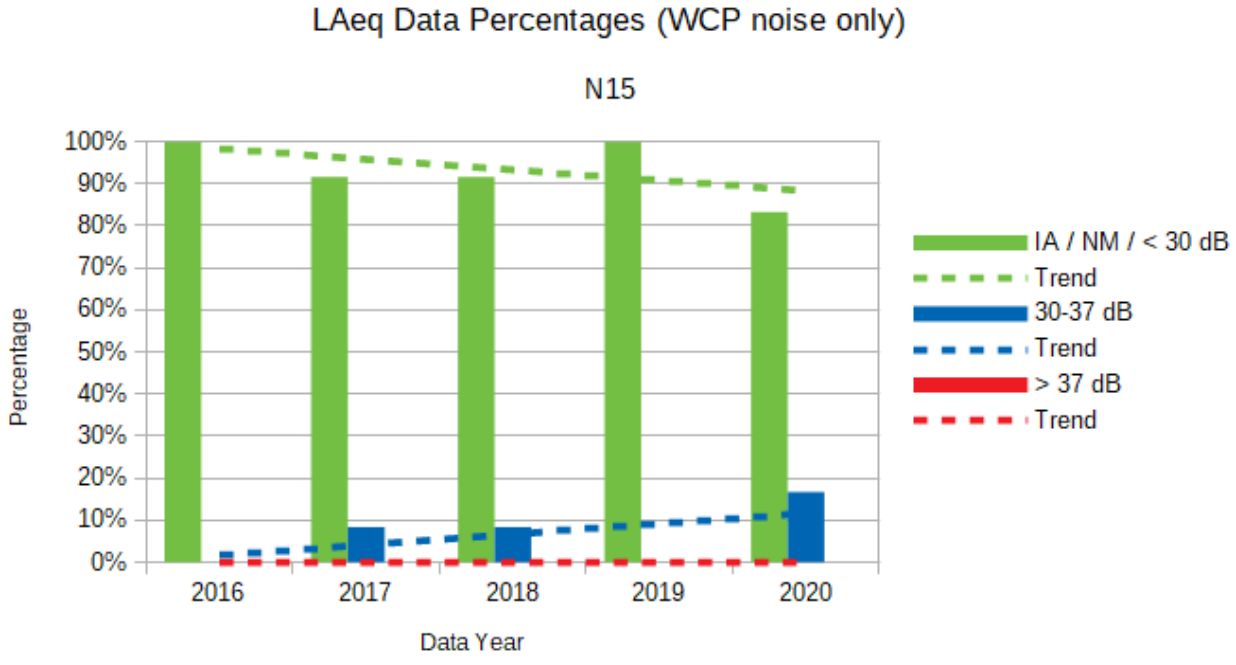


Figure 5: Attended noise monitoring data, N15

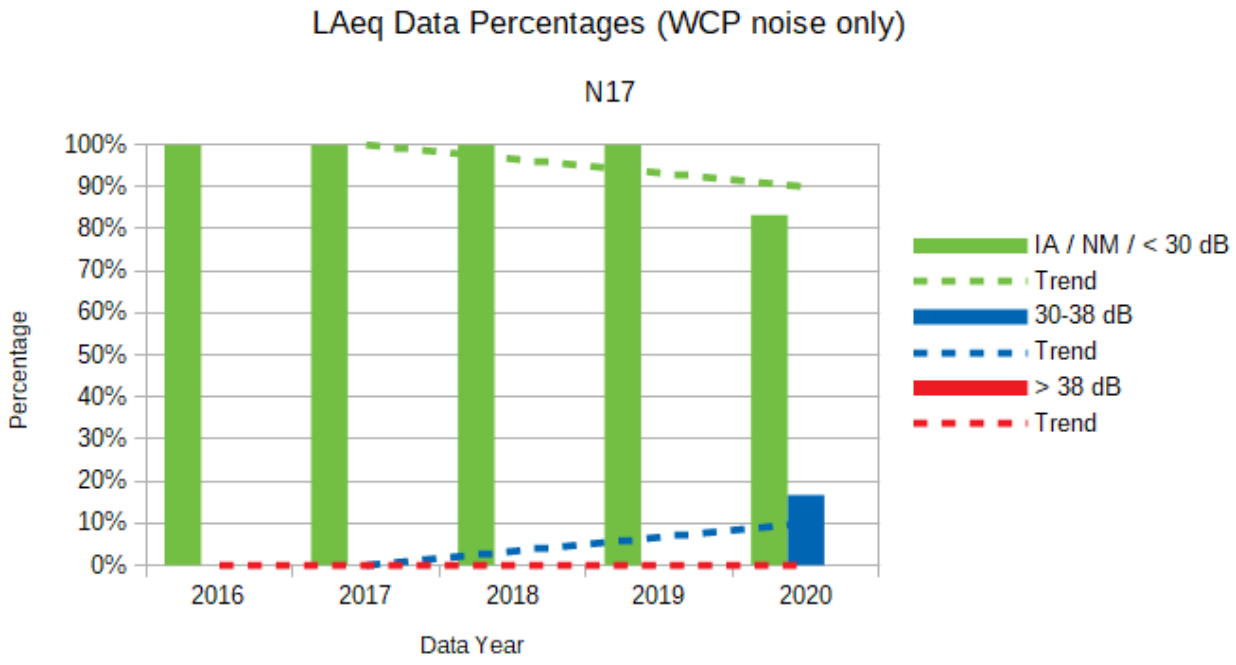


Figure 6: Attended noise monitoring data, N17

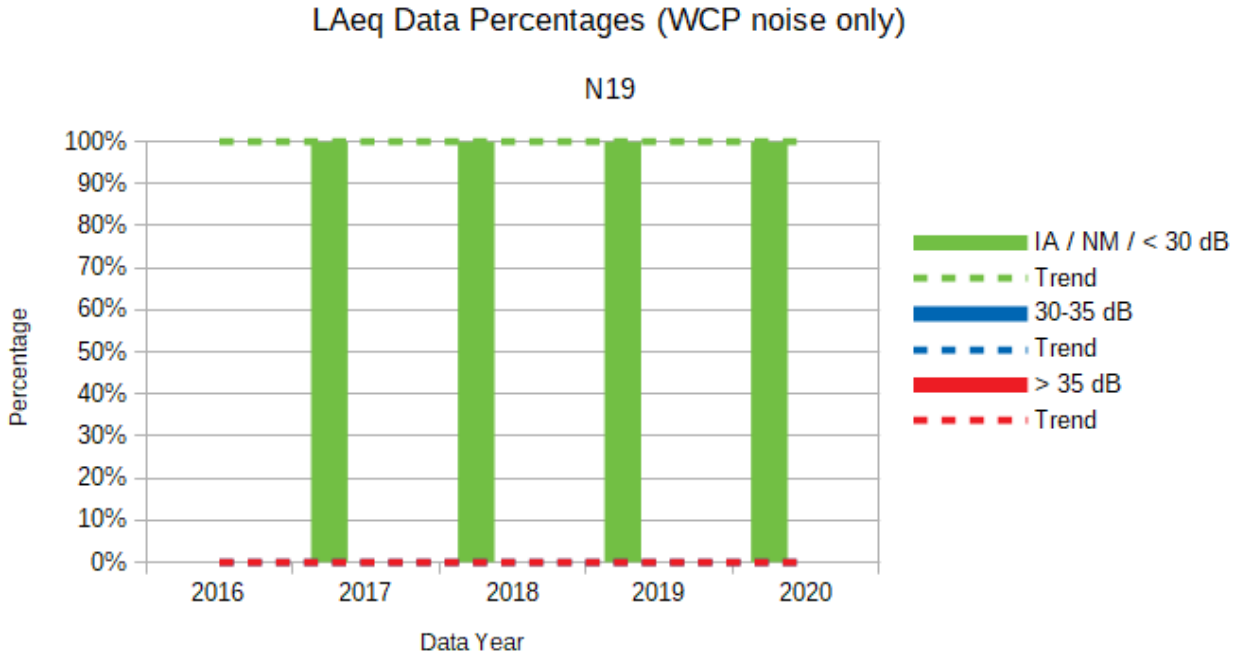


Figure 7: Attended noise monitoring data, N19

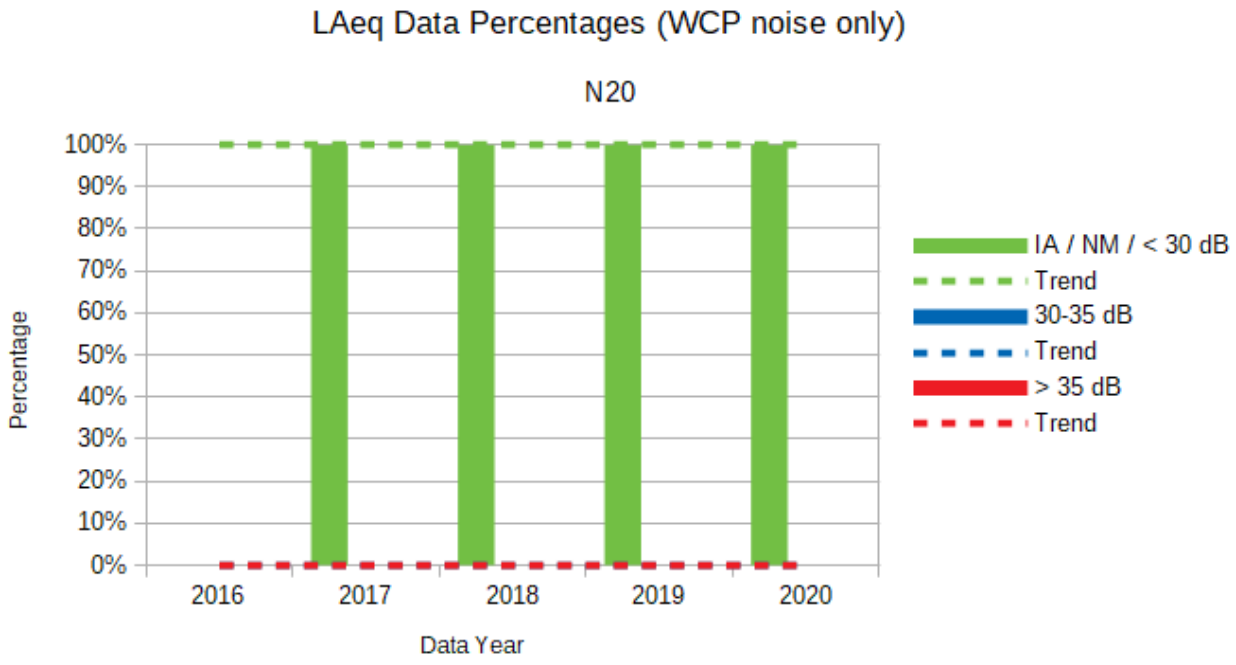


Figure 8: Attended noise monitoring data, N20

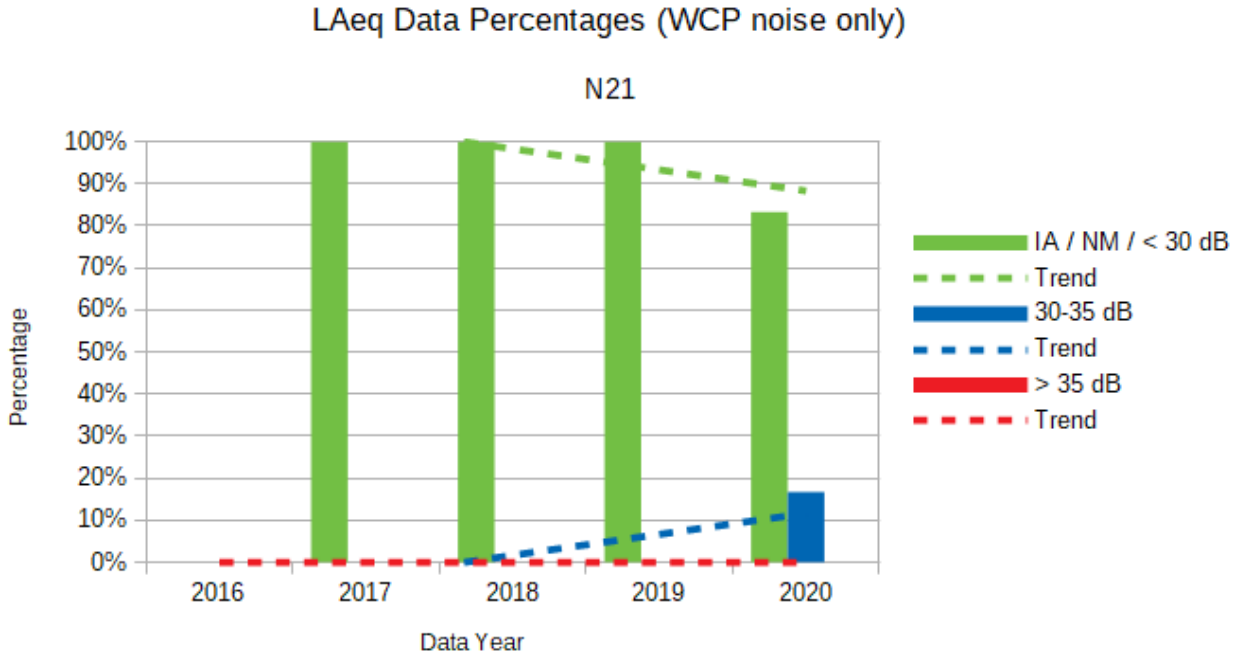


Figure 9: Attended noise monitoring data, N21

5.2 Discussion

There were no exceedances of WCP impact assessment L_{Aeq} noise criteria at any monitoring location during the 5-year period assessed. A single potential exceedance was measured at N6 in August 2020, but noise criteria were determined to be not applicable due to meteorological conditions during the measurement.

Site-only L_{Aeq} noise levels were low (either IA, NM, or less than 30 dB) for a large majority of measurements at all monitoring locations. Additional discussion of individual monitoring locations is provided below:

- At North Mogo Road (N19) and Ringwood Road (N20), site-only L_{Aeq} noise levels were inaudible or less than 25 dB during all attended noise monitoring measurements;
- At Tichular (N14), site-only L_{Aeq} noise levels were less than 30 dB during all attended noise monitoring measurements; and
- At all other monitoring locations, site-only L_{Aeq} noise levels were occasionally above 30 dB during attended noise monitoring, but always below the relevant impact assessment criterion.

Long-term noise trend lines were largely constant or increased slightly. Long-term noise trend lines at Coonaroo (N13) decreased slightly.

6 COMPARISON WITH EIS MODELLED PREDICTIONS

A noise and blasting assessment was prepared in November 2015 as part of an EIS to support application of the WEP. As part of the modelling assessment, noise levels from WCP were predicted for representative operating scenarios, time periods and weather conditions.

Predicted noise levels for "Year 2020" have been used for comparison to measured noise levels. Table 6.1 summarises predicted noise levels for specific monitoring locations detailed in Table 26 and 27 of the noise and blasting assessment, under certain meteorological condition defined in Section 3.5 of this report.

Table 6.1: WCP OPERATIONAL PREDICTIONS, YEAR 2020 – dB

Monitoring Location ID	Location	Nearest Property ID	Night $L_{Aeq,15minute}$ Calm	Night $L_{Aeq,15minute}$ Wind or Inversion	Night $L_{A1,1minute}$ Wind or Inversion
N6	St Laurence O'Toole Catholic Church	(903)[1]	19	33	40
N13	Coonaroo	69[2]	14	34	40
N14	Tichular	(153)[1]	13	31	38
N15	Wollar Village	(933)[1]	18	35	42
N17	Mogo Road	102	21	35	42
N19	North Mogo Road	104	19	31	37
N20	Ringwood Road	160	9	27	34
N21	Wandoona	-	-	-	-

Notes:

1. *Monitoring location is not at residence in brackets. Noise predictions for the nearest residence have been use for comparison; and*
2. *This property is now mine owned. Comparisons to predicted levels have been provided for informational purposes only.*

Monitoring location N21, Wandoona, is not near any private-owned receptors and there are no predicted noise levels for this location in the noise and blasting assessment. This monitoring location is only used for validation of a real-time noise monitoring unit. Therefore, no comparison with EIS modelled predictions has been undertaken for this location.

Table 6.2 to Table 6.8 of this report compare the measured operational levels to predicted noise levels in the EIS for Year 2020. A positive difference indicates the measured level is greater than the predicted level and a negative difference indicates the measured levels are less than predicted in the EIS.

When meteorological conditions during the attended monitoring measurement do not correspond with those that are modelled, the meteorological conditions are considered "not applicable" (NA) and no further analysis is undertaken. When meteorological conditions during the measurement correspond with modelled conditions, but measured WCP noise levels were not directly quantifiable, measured and modelled noise levels are "not comparable" (NC) and no further analysis is required.

6.1.1 N6, St Laurence O'Toole Catholic Church

Table 6.2: MEASURED WCP $L_{Aeq,15minute}$ COMPARED TO YEAR 2020 PREDICTED $L_{Aeq,15minute}$ AT N6, dB(A)

Month	Applicable Meteorological Condition[1,2]	Measured WCP $L_{Aeq,15minute}$	Predicted WCP $L_{Aeq,15minute}$	Difference[2,3]	Measured WCP $L_{A1,1minute}$	Predicted WCP $L_{A1,1minute}$	Difference[2,3]
January	Summer Wind	IA	33	NC	IA	40	NC
February	NA	IA	-	NC	IA	-	NC
March	NA	IA	-	NC	IA	-	NC
April	NA	30	-	NC	37	-	NC
May	Strong Inversion	IA	33	NC	IA	40	NC
June	NA	25	-	NC	32	-	NC
July	NA	<25	-	NC	30	-	NC
August	Strong Inversion	40	33	+7	46	40	+6
September	Strong Inversion	<25	33	NC	<25	40	NC
October	Summer Wind	IA	33	NC	IA	40	NC
November	NA	<25	-	NC	<25	-	NC
December	Summer Wind	IA	33	NC	IA	40	NC

Notes:

1. *Refer to Table 3.1 for applicable meteorological conditions;*
2. *NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison; and*
3. *NC indicates measured WCP noise levels were inaudible (IA), not measurable (NM), or expressed as a "less than" quantity (e.g. less than 30 dB), therefore measured and predicted noise levels were not comparable.*

When comparable, noise levels measured at NA6 in 2020 were lower than noise levels predicted for Year 2020 in the EIS on five occasions and higher than predicted on one occasion.

6.1.2 N13, Coonaroo

Table 6.3: MEASURED WCP $L_{Aeq,15minute}$ COMPARED TO YEAR 2020 PREDICTED $L_{Aeq,15minute}$ AT N13, dB(A)

Month	Applicable Meteorological Condition[1,2]	Measured WCP $L_{Aeq,15minute}$	Predicted WCP $L_{Aeq,15minute}$	Difference[2,3]	Measured WCP $L_{A1,1minute}$	Predicted WCP $L_{A1,1minute}$	Difference[2,3]
January	Summer Wind	25	34	-9	28	40	-12
February	NA	IA	-	NC	IA	-	NC
March	Summer Wind	28	34	-6	31	40	-9
April	NA	IA	-	NC	IA	-	NC
May	Strong Inversion	27	34	-7	36	40	-4
June	Strong Inversion	IA	34	NC	IA	40	NC

Notes:

1. *Refer to Table 3.1 for applicable meteorological conditions;*
2. *NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison;*
3. *NC indicates measured WCP noise levels were inaudible (IA), not measurable (NM), or expressed as a "less than" quantity (e.g. less than 30 dB), therefore measured and predicted noise levels were not comparable; and*
4. *No predicted $L_{A1,1minute}$ has been provided for calm conditions, so measured noise levels have been compared to the worst-case predicted $L_{A1,1minute}$.*

When comparable to modelled noise levels, noise levels measured at NA13 were lower than noise levels predicted for Year 2020 in the EIS. The property at N13 was acquired by another mining operation and monitoring ceased from July 2020.

6.1.3 N14, Tichular

Table 6.4: MEASURED WCP $L_{Aeq,15minute}$ COMPARED TO YEAR 2020 PREDICTED $L_{Aeq,15minute}$ AT N14, dB(A)

Month	Applicable Meteorological Condition[1,2]	Measured WCP $L_{Aeq,15minute}$	Predicted WCP $L_{Aeq,15minute}$	Difference[2,3]	Measured WCP $L_{A1,1minute}$	Predicted WCP $L_{A1,1minute}$	Difference[2,3]
January	Summer Wind	IA	31	NC	IA	38	NC
February	NA	IA	-	NC	IA	-	NC
March	NA	IA	-	NC	IA	-	NC
April	NA	<20	-	NC	<20	-	NC
May	NA	IA	-	NC	IA	-	NC
June	NA	IA	-	NC	IA	-	NC
July	NA	IA	-	NC	IA	-	NC
August	Strong Inversion	IA	31	NC	IA	38	NC
September	Strong Inversion	25	31	-6	29	38	-9
October	Summer Wind	IA	31	NC	IA	38	NC
November	NA	23	-	NC	26	-	NC
December	Summer Wind	IA	31	NC	IA	38	NC

Notes:

1. *Refer to Table 3.1 for applicable meteorological conditions;*
2. *NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison;*
3. *NC indicates measured WCP noise levels were inaudible (IA), not measurable (NM), or expressed as a "less than" quantity (e.g. less than 30 dB), therefore measured and predicted noise levels were not comparable; and*
4. *No predicted $L_{A1,1minute}$ has been provided for calm conditions, so measured noise levels have been compared to the worst-case predicted $L_{A1,1minute}$.*

When comparable to modelled noise levels, noise levels measured at NA14 in 2020 were lower than noise levels predicted for Year 2020 in the EIS.

6.1.4 N15, Wollar Village

Table 6.5: MEASURED WCP $L_{Aeq,15minute}$ COMPARED TO YEAR 2020 PREDICTED $L_{Aeq,15minute}$ AT N15, dB(A)

Month	Applicable Meteorological Condition[1,2]	Measured WCP $L_{Aeq,15minute}$	Predicted WCP $L_{Aeq,15minute}$	Difference[2,3]	Measured WCP $L_{A1,1minute}$	Predicted WCP $L_{A1,1minute}$	Difference[2,3]
January	NA	IA	-	NC	IA	-	NC
February	NA	IA	-	NC	IA	-	NC
March	NA	IA	-	NC	IA	-	NC
April	Strong Inversion	31	35	-4	39	42	-3
May	NA	IA	-	NC	IA	-	NC
June	NA	26	-	NC	35	-	NC
July	NA	<25	-	NC	28	-	NC
August	Strong Inversion	37	35	+2	43	42	+1
September	Strong Inversion	27	35	-7	45	42	+3
October	Summer Wind	IA	35	NC	IA	42	NC
November	NA	27	-	NC	30	-	NC
December	NA	IA	-	NC	IA	-	NC

Notes:

1. *Refer to Table 3.1 for applicable meteorological conditions;*
2. *NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison; and*
3. *NC indicates measured WCP noise levels were inaudible (IA), not measurable (NM), or expressed as a "less than" quantity (e.g. less than 30 dB), therefore measured and predicted noise levels were not comparable.*

When comparable to modelled noise levels, noise levels measured at N15 in 2020 were generally similar to noise levels predicted for Year 2020 in the EIS. Measured L_{Aeq} noise levels were higher than predicted in the EIS on one occasion and lower than predicted on three occasions. $L_{A1,1minute}$ noise levels were higher than predicted in the EIS on two occasions and lower than predicted on two occasions.

6.1.5 N17, Mogo Road

Table 6.6: MEASURED WCP $L_{Aeq,15minute}$ COMPARED TO YEAR 2020 PREDICTED $L_{Aeq,15minute}$ AT N17, dB(A)

Month	Applicable Meteorological Condition[1,2]	Measured WCP $L_{Aeq,15minute}$	Predicted WCP $L_{Aeq,15minute}$	Difference[2,3]	Measured WCP $L_{A1,1minute}$	Predicted WCP $L_{A1,1minute}$	Difference[2,3]
January	NA	IA	-	NC	IA	-	NC
February	NA	IA	-	NC	IA	-	NC
March	NA	IA	-	NC	IA	-	NC
April	Strong Inversion	31	35	-4	38	42	-4
May	Strong Inversion	IA	35	NC	IA	42	NC
June	NA	23	-	NC	26	-	NC
July	Calm	<25	21	NC	27	-	NC
August	Strong Inversion	32	35	-3	36	42	-6
September	Strong Inversion	<20	35	NC	<25	42	NC
October	Summer Wind	IA	35	NC	IA	42	NC
November	NA	<20	-	NC	<25	-	NC
December	NA	<25	-	NC	28	-	NC

Notes:

1. *Refer to Table 3.1 for applicable meteorological conditions;*
2. *NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison; and*
3. *NC indicates measured WCP noise levels were inaudible (IA), not measurable (NM), or expressed as a "less than" quantity (e.g. less than 30 dB), therefore measured and predicted noise levels were not comparable.*

When comparable to modelled noise levels, noise levels measured at NA17 in 2020 were lower than noise levels predicted for Year 2020 in the EIS.

6.1.6 N19, North Mogo Road

Table 6.7: MEASURED WCP $L_{Aeq,15minute}$ COMPARED TO YEAR 2020 PREDICTED $L_{Aeq,15minute}$ AT N19, dB(A)

Month	Applicable Meteorological Condition[1,2]	Measured WCP $L_{Aeq,15minute}$	Predicted WCP $L_{Aeq,15minute}$	Difference[2,3]	Measured WCP $L_{A1,1minute}$	Predicted WCP $L_{A1,1minute}$	Difference[2,3]
January	Strong Inversion	IA	31	NC	IA	37	NC
February	NA	IA	-	NC	IA	-	NC
March	NA	IA	-	NC	IA	-	NC
April	Strong Inversion	<25	31	NC	<25	37	NC
May	NA	IA	-	NC	IA	-	NC
June	Strong Inversion	<20	31	NC	<20	37	NC
July	NA	IA	-	NC	IA	-	NC
August	Strong Inversion	<25	31	NC	30	37	-7
September	Strong Inversion	<20	31	NC	<25	37	NC
October	NA	IA	-	NC	IA	-	NC
November	Strong Inversion	IA	31	NC	IA	37	NC
December	Strong Inversion	IA	31	NC	IA	37	NC

Notes:

1. *Refer to Table 3.1 for applicable meteorological conditions;*
2. *NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison;*
3. *NC indicates measured WCP noise levels were inaudible (IA), not measurable (NM), or expressed as a "less than" quantity (e.g. less than 30 dB), therefore measured and predicted noise levels were not comparable; and*
4. *No predicted $L_{A1,1minute}$ has been provided for calm conditions, so measured noise levels have been compared to the worst-case predicted $L_{A1,1minute}$.*

When comparable to modelled noise levels, noise levels measured at NA19 in 2020 were lower than noise levels predicted for Year 2020 in the EIS.

6.1.7 N20, Ringwood Road

Table 6.8: MEASURED WCP $L_{Aeq,15minute}$ COMPARED TO YEAR 2020 PREDICTED $L_{Aeq,15minute}$ AT N20, dB(A)

Month	Applicable Meteorological Condition[1,2]	Measured WCP $L_{Aeq,15minute}$	Predicted WCP $L_{Aeq,15minute}$	Difference[2,3]	Measured WCP $L_{A1,1minute}$	Predicted WCP $L_{A1,1minute}$	Difference[2,3]
January	Calm	IA	9	NC	IA	-	NC
February	NA	IA	-	NC	IA	-	NC
March	NA	IA	-	NC	IA	-	NC
April	Strong Inversion	<25	27	NC	<25	34	NC
May	Strong Inversion	IA	27	NC	IA	34	NC
June	Strong Inversion	IA	27	NC	IA	34	NC
July	NA	IA	-	NC	IA	-	NC
August	Strong Inversion	<25	27	NC	<25	34	NC
September	Strong Inversion	<25	27	NC	28	34	-6
October	NA	IA	-	NC	IA	-	NC
November	Summer Wind	IA	27	NC	IA	34	NC
December	NA	IA	-	NC	IA	-	NC

Notes:

1. *Refer to Table 3.1 for applicable meteorological conditions;*
2. *NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison;*
3. *NC indicates measured WCP noise levels were inaudible (IA), not measurable (NM), or expressed as a "less than" quantity (e.g. less than 30 dB), therefore measured and predicted noise levels were not comparable; and*
4. *No predicted $L_{A1,1minute}$ has been provided for calm conditions, so measured noise levels have been compared to the worst-case predicted $L_{A1,1minute}$.*

When comparable to modelled noise levels, noise levels measured at NA20 in 2020 were lower than noise levels predicted for Year 2020 in the EIS.

7 SUMMARY

Global Acoustics was engaged by WCP to provide an Annual Environmental Monitoring Report for 2020, in order to compare noise monitoring results against both relevant criteria and predictions in the most recently approved EIS for the WEP.

This report summarises monthly attended noise monitoring surveys conducted around WCP during the reporting period 1 January to 31 December 2020. The purpose of the surveys was to quantify and describe the acoustic environment around the site and compare results with specified limits. The duration of each measurement was 15 minutes.

Attended noise monitoring described in this report was conducted on a monthly basis in accordance with Project Approval SSD-6764, the WCP NMP, and EPL No. 12425.

7.1 January to December 2020 Compliance

During 2020 attended noise monitoring, noise levels from WCP complied with relevant noise limits at all monitoring locations. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

7.2 Long-Term Noise Trends

Site-only L_{Aeq} noise levels were low (either IA, NM, or less than 30 dB) for a large majority of measurements at all monitoring locations. Additional discussion of individual monitoring locations is provided below:

- At North Mogo Road (N19) and Ringwood Road (N20), site-only L_{Aeq} noise levels were inaudible or less than 25 dB during all attended noise monitoring measurements;
- At Tichular (N14), site-only L_{Aeq} noise levels were less than 30 dB during all attended noise monitoring measurements; and
- At all other monitoring locations, site-only L_{Aeq} noise levels were occasionally above 30 dB during attended noise monitoring, but always below the relevant impact assessment criterion.

Long-term noise trend lines were typically constant or increased slightly. Long-term noise trend lines at Coonaroo (N13) decreased slightly.

7.3 EIS Comparison

WCP noise levels measured during attended monitoring were generally lower than predicted noise levels in the EIS when site contributions were directly quantifiable and meteorological conditions corresponded with modelled meteorological conditions. There were four occasions where measured noise levels were higher than predicted in the EIS when site contributions were quantifiable and meteorological conditions corresponded with modelled meteorological conditions.

Global Acoustics Pty Ltd