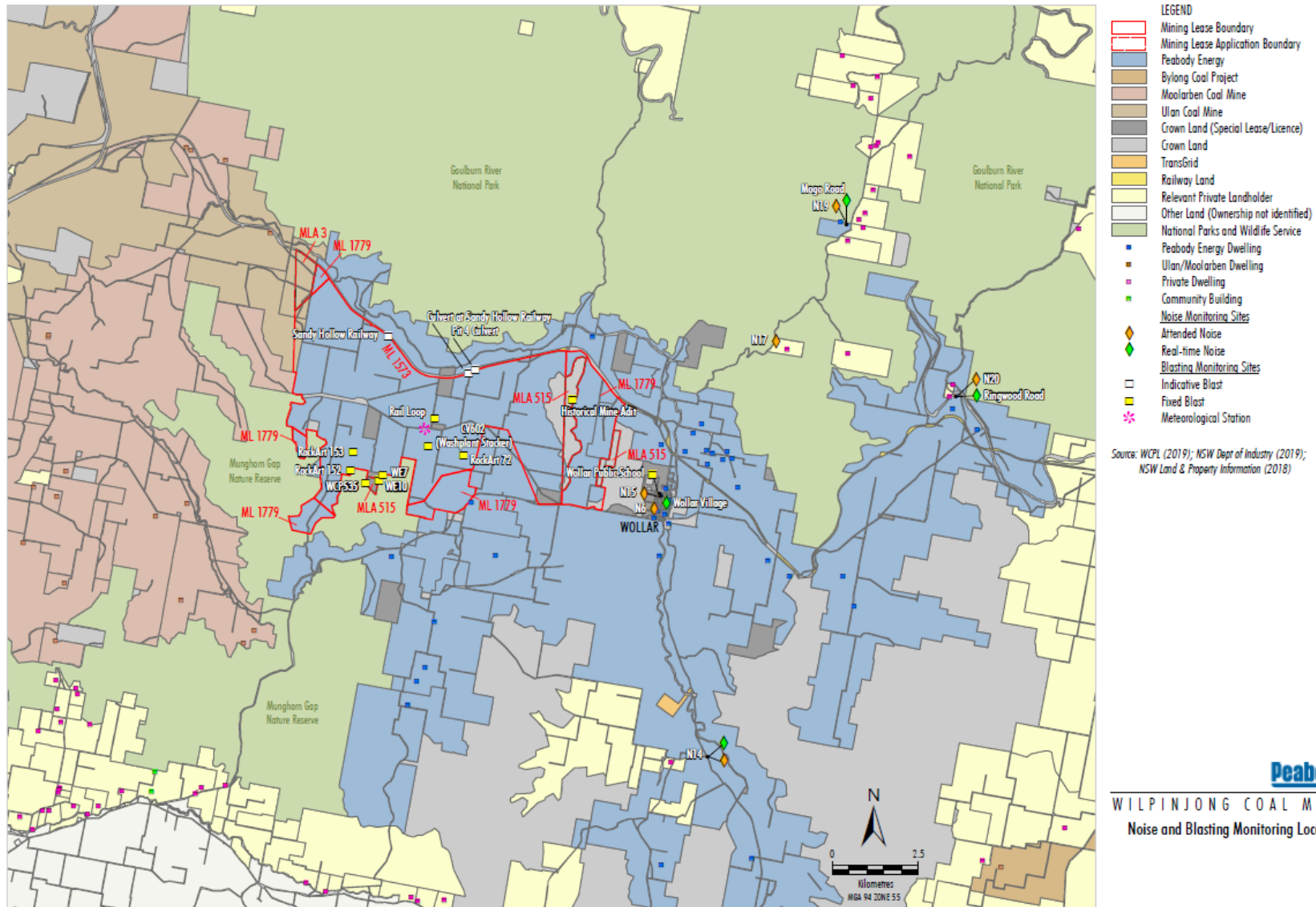


## **APPENDIX 3F – NOISE MONITORING DATA**

Noise Monitoring Locations





Source: WCPL (2019); NSW Land & Property Information (2019)

- |                                    |                              |
|------------------------------------|------------------------------|
| <b>LEGEND</b>                      |                              |
| Peabody Energy                     | Noise Monitoring Sites       |
| Crown Land (Special Lease/Licence) | Attended Noise               |
| Crown Land                         | Real-time Noise              |
| Railway Land                       | Blasting Monitoring Sites    |
| Relevant Private Landholder        | Fixed Blast                  |
| Landholder Reference Number        | Air Quality Monitoring Sites |
| Peabody Energy Dwelling            | Static Dust Gauge            |
| Community Building                 | High Volume Air Sampler      |
| Private Dwelling                   | Real-time PM <sub>2.5</sub>  |
| Special Lease/Licence Holder       | Real-time PM <sub>10</sub>   |

**Peabody**  
 WILPINJONG COAL MINE  
 Wollar Environmental Monitoring Sites

## Noise Monitoring Reports

# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
January 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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Noise and Vibration Analysis and Solutions

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## Wilpinjong Coal

### Environmental Noise Monitoring January 2019

Reference: 19021\_R01

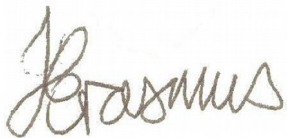
Report date: 14 February 2019

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## **EXECUTIVE SUMMARY**

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

The current WCP development consent was approved in April 2017. The environment protection licence (EPL) for WCP was issued in early 2006 with subsequent variations approved.

Attended monitoring was conducted in accordance with the documents detailed above, Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. The duration of each night measurement was 15 minutes.

Environmental noise monitoring described in this report was undertaken at seven locations during the night period of 21/22 January 2019. The purpose of attended noise monitoring was to quantify and describe the acoustic environment around WCP and compare results with specified limits.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the January 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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# 1 INTRODUCTION

## 1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken at seven locations during the night period of 21/22 January 2019. Figure 1 shows the monitoring locations.

Attended monitoring was not conducted at N13 ('Coonaroo') during the January 2019 survey period due to limited access, however this property is no longer privately owned.

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.

## 1.2 Monitoring Locations

There were seven monitoring locations during this survey as listed in Table 1.1 and shown on Figure 1. These monitoring locations are detailed in the site Noise Monitoring Program (NMP).

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 <sup>1</sup>	'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

Notes:

1. Attended monitoring was not conducted at N13 during the January 2019 survey period due to accessibility issues.

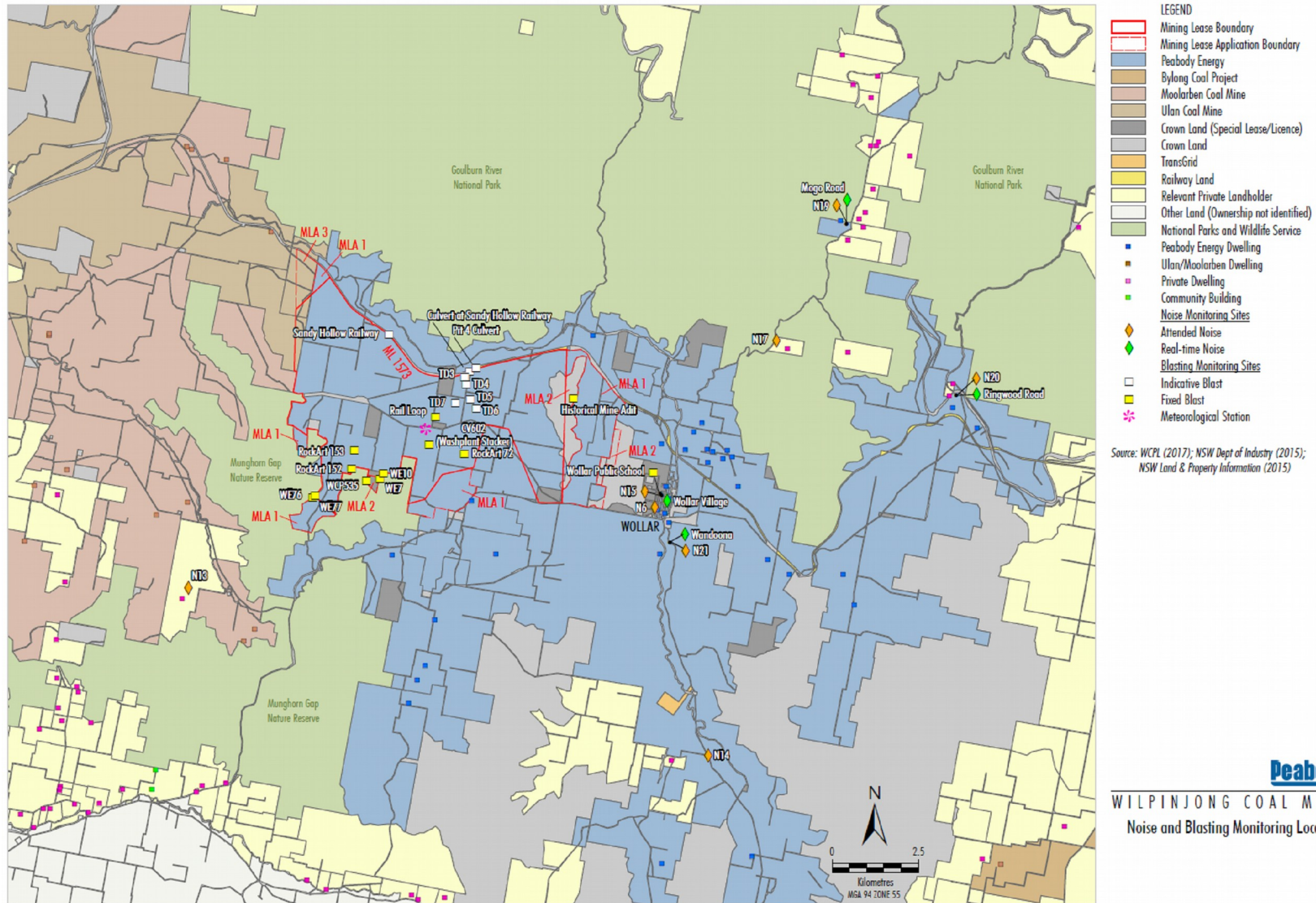


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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
L <sub>A</sub>	The A-weighted root mean squared (RMS) noise level at any instant
L <sub>Amax</sub>	The maximum A-weighted noise level over a time period or for an event
L <sub>A1</sub>	The noise level which is exceeded for 1 per cent of the time
L <sub>A1,1minute</sub>	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute
L <sub>A10</sub>	The noise level which is exceeded for 10 per cent of the time, which is approximately the average of the maximum noise levels
L <sub>A50</sub>	The noise level which is exceeded for 50 per cent of the time
L <sub>A90</sub>	The level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. The L <sub>A90</sub> level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes
L <sub>Amin</sub>	The minimum A-weighted noise level over a time period or for an event
L <sub>Aeq</sub>	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. From Wilpinjong Coal inversion tower data
SC	Stability Class. Based on Wilpinjong Coal inversion tower data
IA	Inaudible. When site-only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site-only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, 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

Approval was granted for the Wilpinjong Extension Project (SSD-6764) in 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

The EPL (No. 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent on 23 March 2018. Relevant noise sections of the licence are reproduced in Appendix A.

### 2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in June 2017. Chapter 6 of the NMP provides details on the noise monitoring program including locations and an attended monitoring methodology. The relevant sections are reproduced in Appendix A.

### 2.4 Project Specific Criteria

Criteria in the project approval and EPL are consistent as are the met exclusion rules determining when criteria apply. Criteria shown in Table 2.1 have been selected as the most appropriate for each monitoring location.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	St Laurence O'Toole Catholic Church	36	37	37/45
N13 <sup>2</sup>	'Coonaroo'	NA	NA	NA/NA
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	37	37/45
N17 <sup>3</sup>	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:

- 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;
- N13 'Coonaroo' is no longer privately owned, having been acquired by another mine, therefore criteria are not applicable; and

3. *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 Assessment Method

Attended monitoring was conducted in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. Atmospheric condition measurement was also undertaken during each fifteen minute measurement. Monitoring is undertaken once per month at each location.

Attended monitoring during this reporting period was undertaken by Jonathan Erasmus.

If the exact contribution from 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 levels, for example,  $L_{A10}$ ,  $L_{A50}$  or  $L_{A90}$ . 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 as per section 7.1 of the NPfI (e.g. measuring at an intermediate location and using relevant calculation) 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 or reasonable to employ NPfI methods such as using an intermediate location. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

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

As indicated in L5.5 (a) and (b) of the EPL, the  $L_{A1,1\text{minute}}$  measurement should be undertaken at one (1) metre from the dwelling façade and the  $L_{A\text{eq}}$  measurement within 30 metres of the dwelling. However, the direct measurement of noise at 1 metre from the façade is not practical during monitoring for this project. In

most cases, monitoring near the residence is impractical due to barking dogs or issues with obtaining access. In all cases, measurements for this survey were undertaken at a suitable and representative location.

### 3.2 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 analyser	1070590	25/06/2020
Rion NC-73 acoustic calibrator	11248306	25/06/2020

### 3.3 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 dominant low-frequency noise source.

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

### 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 3.2.

Attended and real-time monitor locations are shown in Figure 1.

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

<b>Report Descriptor for Attended monitoring location</b>	<b>Real-Time Monitor ID</b>	<b>Monitoring Location</b>
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 2019<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A50</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	21/01/2019 23:11	53	49	45	44	44	43	39	56
N14	22/01/2019 00:18	55	50	39	30	37	27	24	53
N15	21/01/2019 22:53	64	50	45	42	44	41	39	59
N17	21/01/2019 22:24	54	54	53	53	52	52	50	56
N19	21/01/2019 22:01	57	47	44	42	42	39	37	54
N20	21/01/2019 23:41	59	58	46	36	45	34	33	59
N21	22/01/2019 00:47	52	36	31	27	28	25	23	54

Note:

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

### 4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey. None of the measurements satisfied the conditions outlined in Section 3.3 when assessing low-frequency noise.

Therefore no further assessment of modifying factors was undertaken.

### 4.3 Attended Noise Monitoring

Table 4.2 and Table 4.3 detail  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  noise levels from WCP in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the project approval and EPL.

Table 4.2:  $L_{Aeq,15\text{minute}}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JANUARY 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{Aeq,15\text{min}}$ dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	21/01/2019 23:11	1.9	E	37	Yes	IA	Nil
N14	22/01/2019 00:18	2.0	E	35	Yes	<30	Nil
N15	21/01/2019 22:53	1.3	E	36	Yes	IA	Nil
N17	21/01/2019 22:24	0.9	E	35	Yes	IA	Nil
N19	21/01/2019 22:01	0.4	E	35	Yes	IA	Nil
N20	21/01/2019 23:41	1.5	E	35	Yes	IA	Nil
N21	22/01/2019 00:47	1.7	E	35	Yes	<20	Nil

Notes:

1. Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

Table 4.3: LA1,1minute GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JANUARY 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP LA1,1min dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	21/01/2019 23:11	1.9	E	45	Yes	IA	Nil
N14	22/01/2019 00:18	2.0	E	45	Yes	<30	Nil
N15	21/01/2019 22:53	1.3	E	45	Yes	IA	Nil
N17	21/01/2019 22:24	0.9	E	45	Yes	IA	Nil
N19	21/01/2019 22:01	0.4	E	45	Yes	IA	Nil
N20	21/01/2019 23:41	1.5	E	45	Yes	IA	Nil
N21	22/01/2019 00:47	1.7	E	45	Yes	<20	Nil

Notes:

1. Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

#### 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 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total $L_{Aeq}$ dB	Low pass (<630Hz) $L_{Aeq}$ dB	Low pass (<630Hz) $L_{A90}$ dB	WCP $L_{Aeq}$ dB
N15/SX33	21/01/2019 22:53	21/01/2019 23:00	49	38	24	IA
N19/SX32	21/01/2019 22:01	21/01/2019 22:00	42	21	NR	IA
N20/SX30	21/01/2019 23:41	21/01/2019 23:45	38	31	26	IA
N21/SX31	22/01/2019 00:47	22/01/2019 00:45	35	26	NR	<20

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 or hail.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – JANUARY 2019

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	21/01/2019 23:11	25	-	-	7
N14	22/01/2019 00:18	23	-	-	8
N15	21/01/2019 22:53	25	-	-	7
N17	21/01/2019 22:24	26	-	-	7
N19	21/01/2019 22:01	26	0.7	330	7
N20	21/01/2019 23:41	25	-	-	7
N21	22/01/2019 00:47	24	-	-	8

Notes:

1. Wind speed and direction measured at 1.8 metres; and
2. "-" denotes calm conditions at 1.8 metres.

Data obtained from the WCP meteorological station and tower is used to determine compliance with specified noise criteria and is provided in Table 4.6.



Table 4.6: WCP METEOROLOGICAL STATION DATA<sup>1</sup>

Date and End Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres <sup>2</sup>
21/01/2019 21:00	1.4	71	0.0
21/01/2019 21:15	1.4	71	0.0
21/01/2019 21:30	1.5	86	-0.6
21/01/2019 21:45	1.6	72	-0.8
21/01/2019 22:00	1.0	70	-0.4
21/01/2019 22:00	1.0	70	-0.4
21/01/2019 22:15	0.4	100	-0.2
21/01/2019 22:30	0.9	85	0.0
21/01/2019 22:45	0.9	353	0.6
21/01/2019 23:00	0.9	344	0.2
21/01/2019 23:15	1.3	296	0.2
21/01/2019 23:30	1.9	284	0.0
21/01/2019 23:45	0.5	230	0.0
22/01/2019 00:00	1.5	117	0.6
22/01/2019 00:15	2.0	102	0.8
22/01/2019 00:30	2.0	102	0.6
22/01/2019 00:45	1.8	87	0.2
22/01/2019 01:00	1.7	94	-0.4
22/01/2019 01:15	1.4	82	-0.2
22/01/2019 01:30	0.6	44	0.6
22/01/2019 01:45	0.5	0	0.4
22/01/2019 02:00	0.6	47	0.6
22/01/2019 02:15	0.5	60	0.4
22/01/2019 02:30	0.7	101	0.2
22/01/2019 02:45	1.1	101	0.6
22/01/2019 03:00	1.3	105	1.8

Notes:

1. Data supplied by WCP;
2. "-" indicates calm conditions and therefore no wind direction; and
3. Lapse rate calculated using data sourced from WCP inversion tower.

## 5 DISCUSSION

### 5.1 Noted Noise Sources

Data gathered during attended monitoring is shown in tables in Section 4. These noise levels 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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was, where possible, measured directly, or, determined by frequency analysis. Time variations of noise sources in each measurement, their temporal characteristics, are taken into account via statistical descriptors.

From these observations summaries have been derived for each location. The following chapter sections provide these summaries. Statistical 1/3 octave band analysis of environmental noise was undertaken, and Figure 3 to Figure 9 display the frequency ranges for various noise sources at each location for  $L_{A1}$ ,  $L_{A10}$ ,  $L_{A90}$  and  $L_{Aeq}$ . 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; mining noise is at frequencies less than 1000 Hz (this 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; this can be 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  $L_{Aeq}$ .

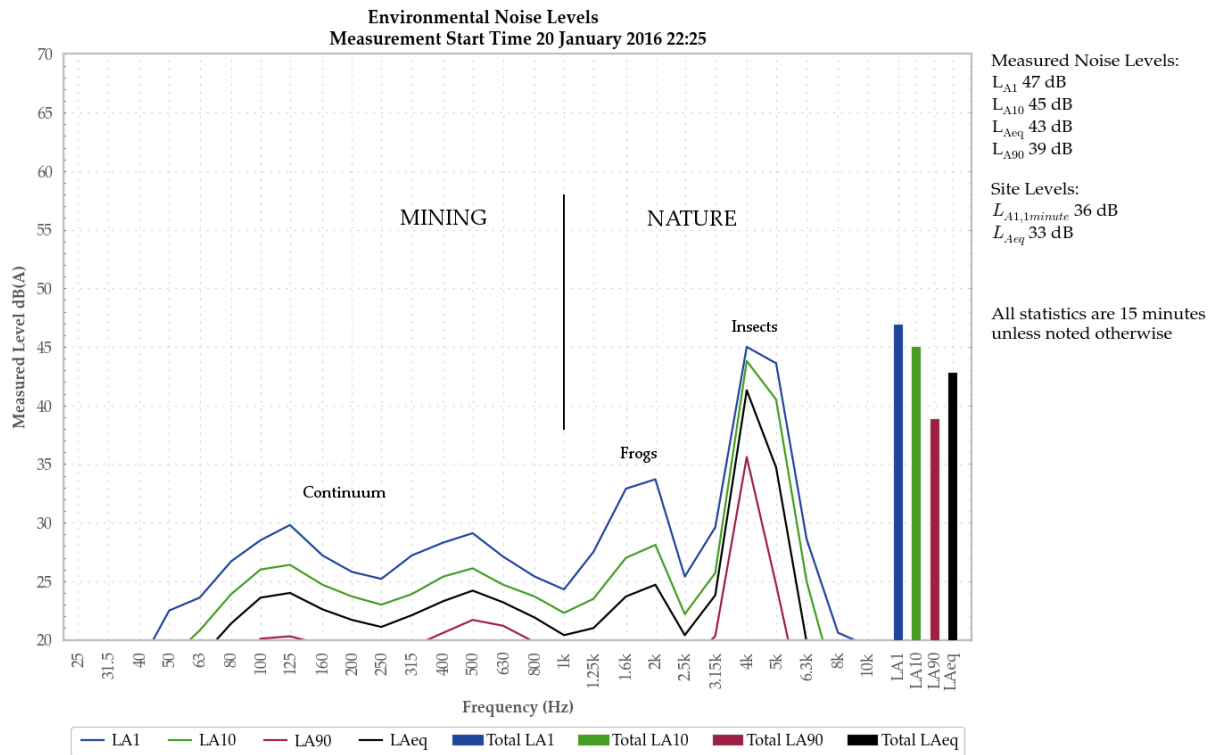
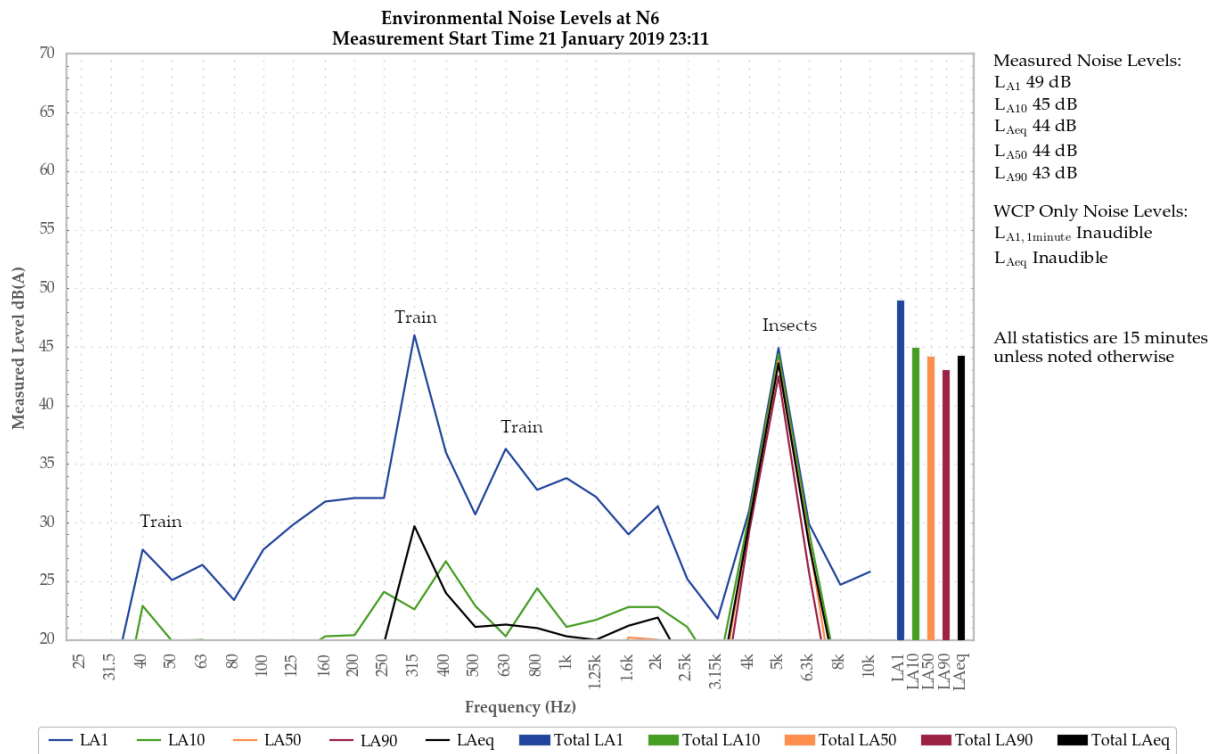


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6



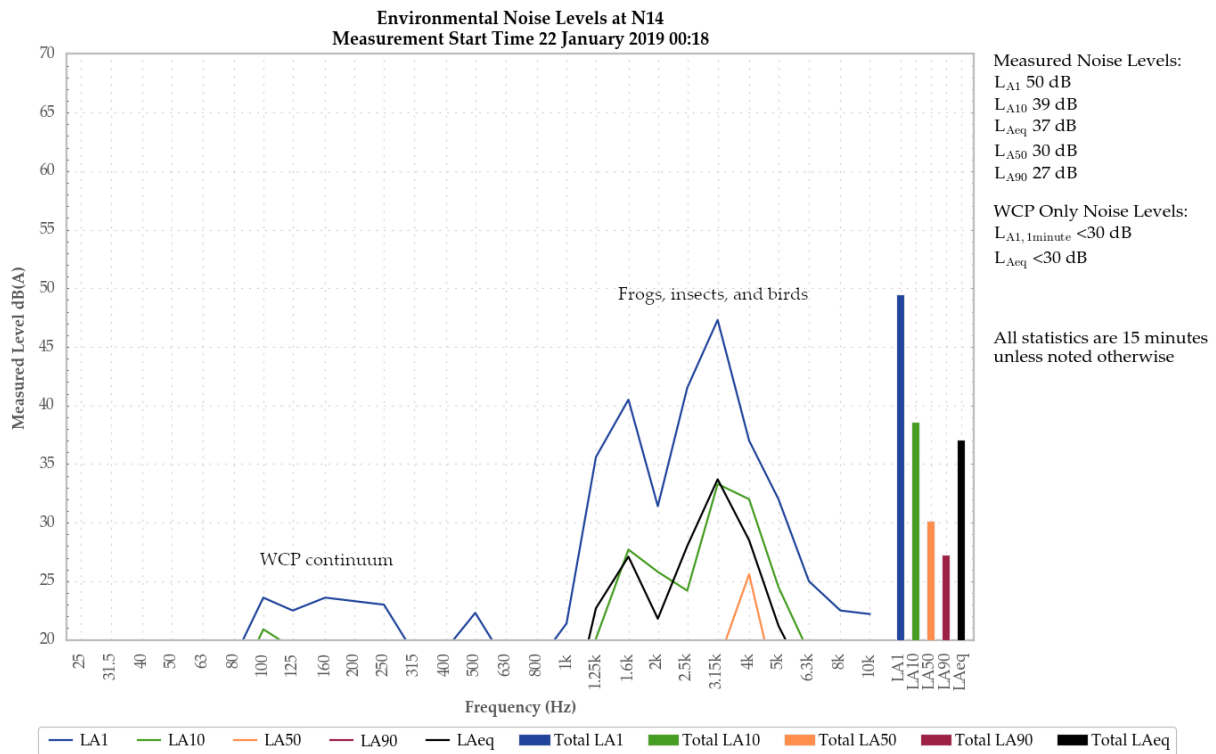
**Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village**

WCP was inaudible.

A train and insects generated the measured L<sub>A1</sub>. Insects generated the measured L<sub>A10</sub>, L<sub>Aeq</sub>, L<sub>A50</sub>, and L<sub>A90</sub>.

Road traffic, frogs, and insects were also noted.

5.1.2 N14

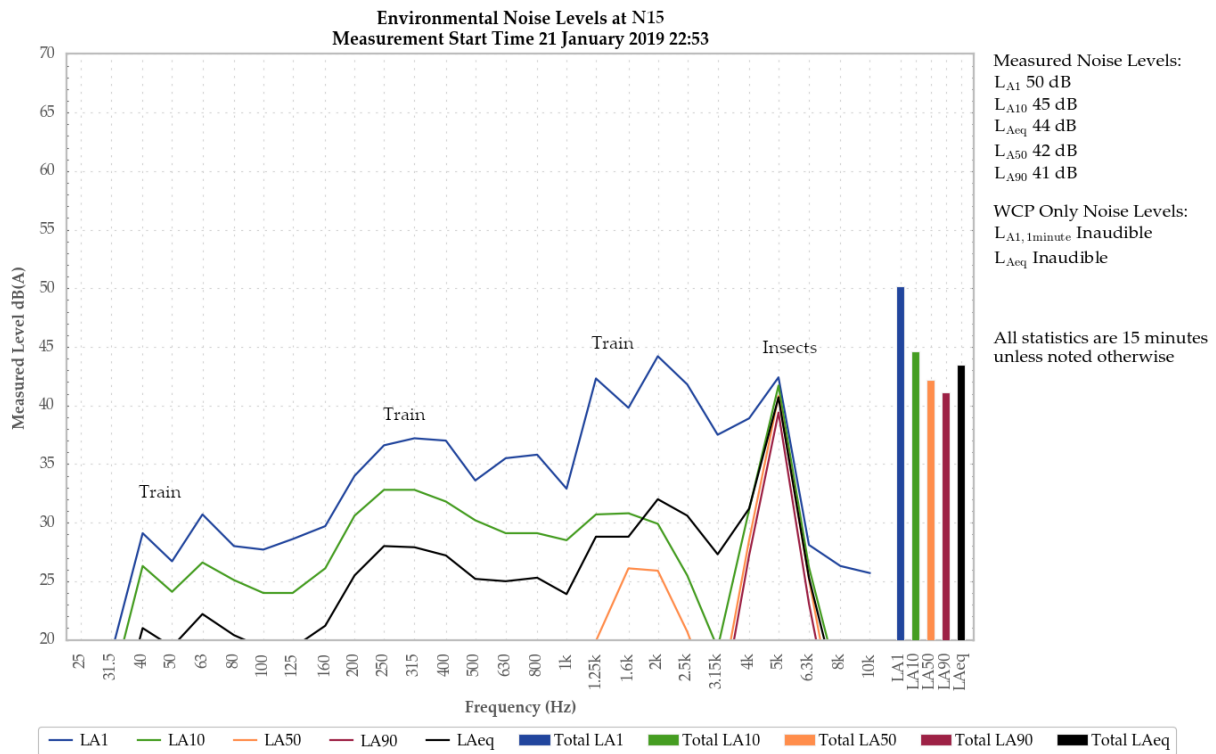


**Figure 4: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads**

A continuum from WCP was audible at low levels throughout the measurement generating the site-only LAeq and LA1,1minute of less than 30 dB.

Frogs, insects, and birds generated all measured noise levels.

### 5.1.3 N15



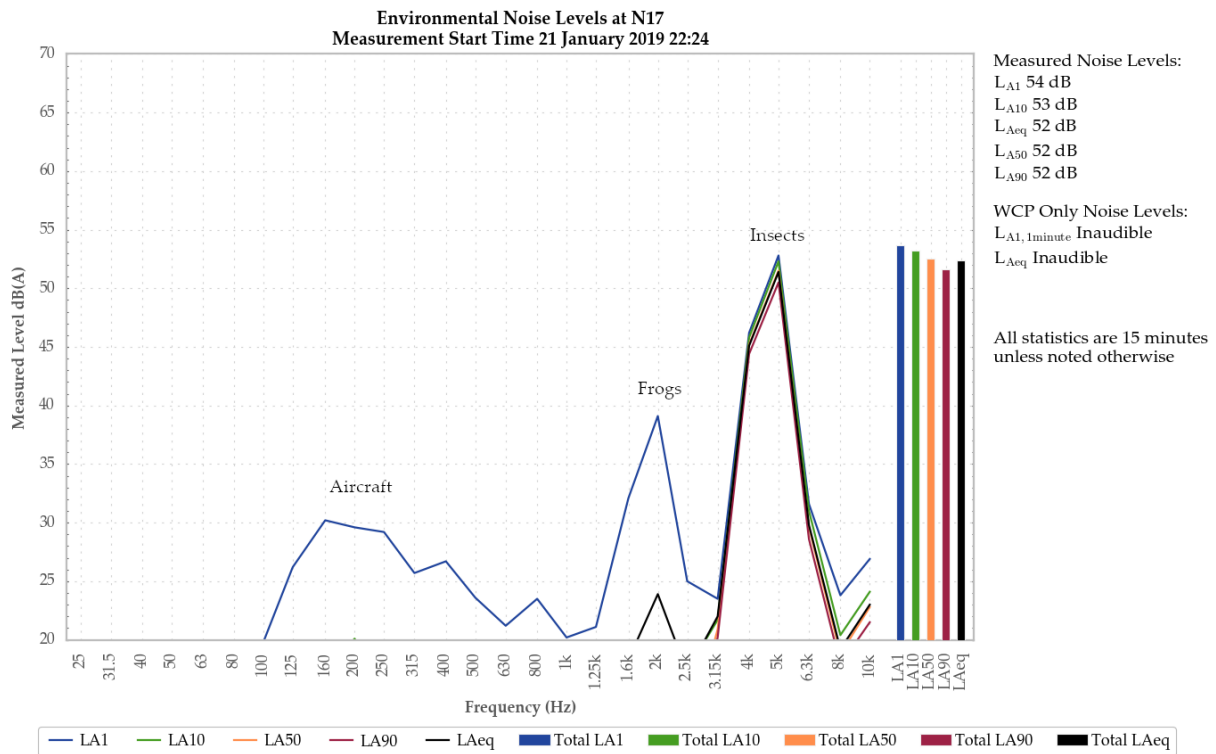
**Figure 5: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village**

WCP was inaudible.

Insects and a train generated the measured LA1. Insects generated the measured LA10, LAeq, LA50, and LA90.

Birds and frogs were also noted.

5.1.4 N17



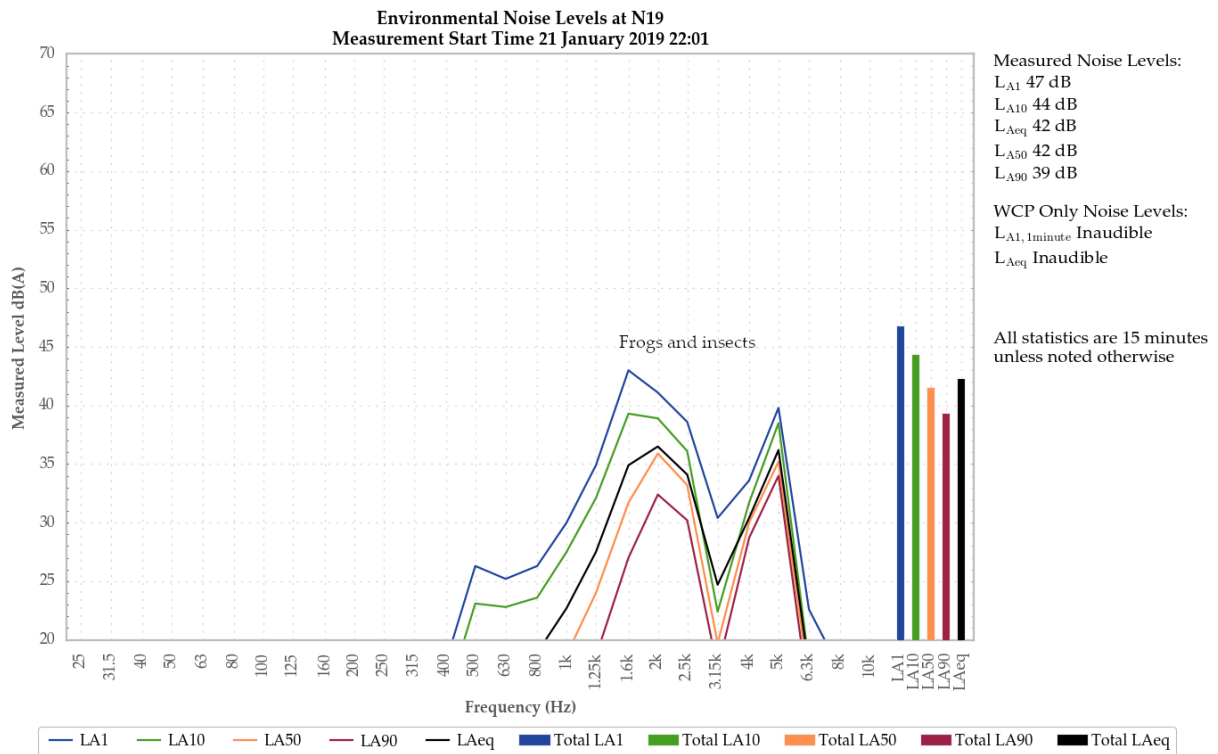
**Figure 6: Environmental Noise Levels – N17 Mogo Road, off Araluen Road**

WCP was inaudible.

Insects generated all measured noise levels.

Frogs and an aircraft were also noted.

5.1.5 N19



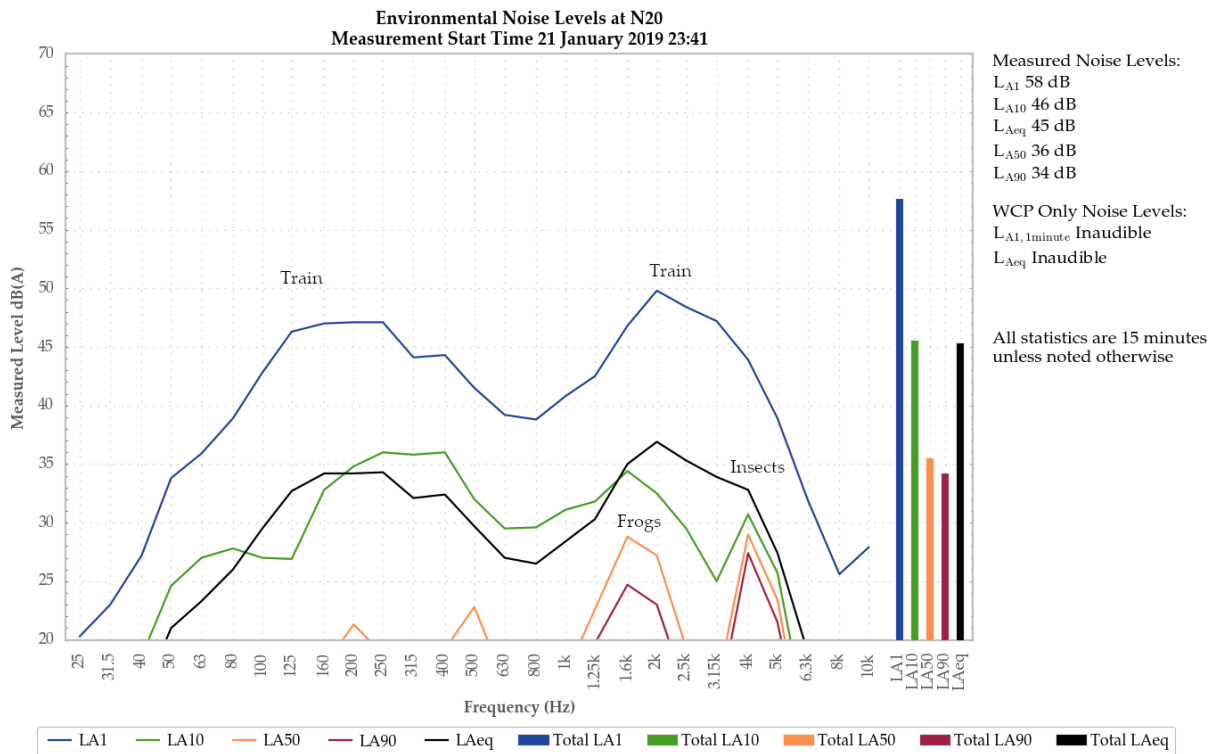
**Figure 7: Environmental Noise Levels – N19, Upper Mogo Road**

WCP was inaudible.

Frogs and insects generated all measured noise levels.



5.1.6 N20

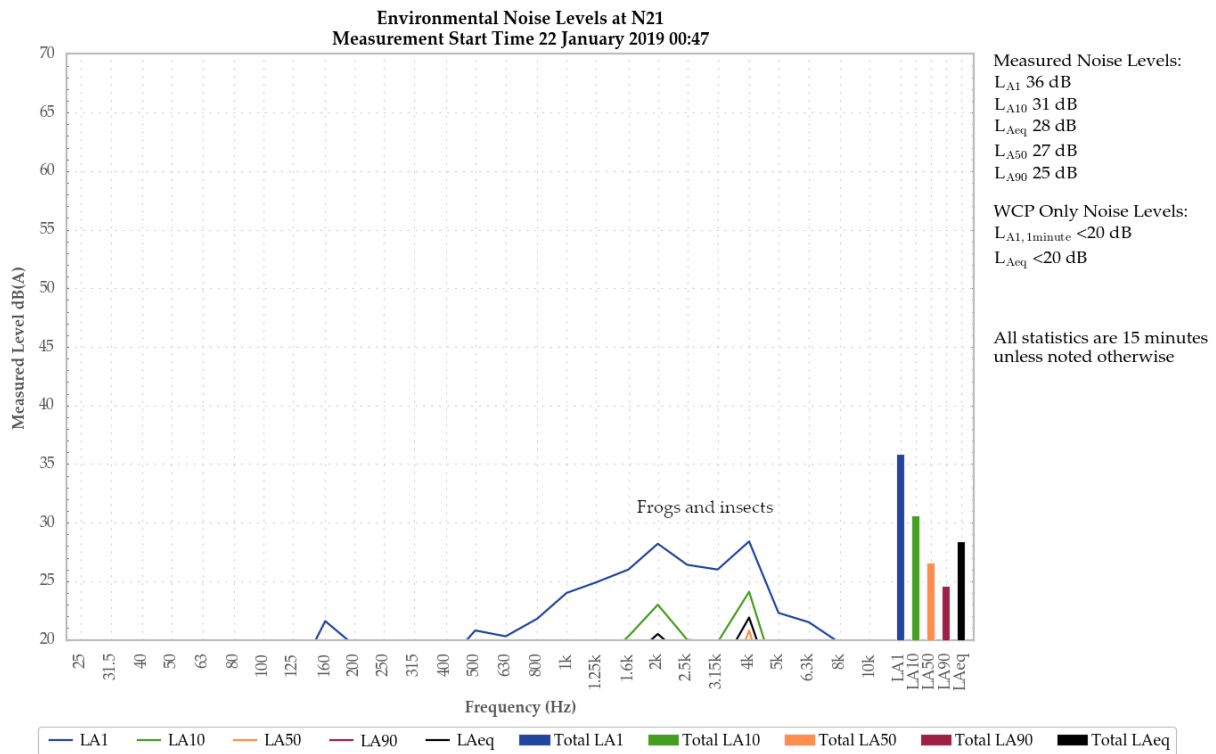


**Figure 8: Environmental Noise Levels, N20 – Ringwood Road**

WCP was inaudible.

A train generated the measured LA1, LA10, and LAeq. Frogs and insects generated the measured LA50 and LA90.

5.1.7 N21



**Figure 9: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road**

A continuum from WCP was audible at very low levels during the measurement generating the site-only LAeq,15minute and LA1,1minute of less than 20 dB.

Birds, frogs, and insects generated measured levels.

## 6 SUMMARY OF COMPLIANCE

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken during the night period of 21/22 January 2019. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the January 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### A STATUTORY REQUIREMENTS

Several documents specify noise criteria that apply to the Wilpinjong operation. The noise sections of the relevant consent, licence and NMP are reproduced below.

## 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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.

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

<b>Hz/dB(Z)</b>	<b>One-third octave <math>L_{Zeq,15minute}</math> threshold level</b>												
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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations. Relevant extracts are shown below.

### 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

The relevant sections of the WCP Noise Management Plan, dated June 2017 are reproduced below.

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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.

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## APPENDIX

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### ***B CALIBRATION CERTIFICATES***



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**  
**Ambient Temperature :** 21.3°C  
**Relative Humidity :** 41.7%  
**Barometric Pressure :** 100.95kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 22.7°C  
**Relative Humidity :** 39.2%  
**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.

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**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.

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# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
February 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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## Wilpinjong Coal

### Environmental Noise Monitoring February 2019

Reference: 19034\_R01

Report date: 5 March 2019

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## **EXECUTIVE SUMMARY**

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

The current WCP development consent was approved in April 2017. The environment protection licence (EPL) for WCP was issued in early 2006 with subsequent variations approved.

Attended monitoring was conducted in accordance with the documents detailed above, Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. The duration of each night measurement was 15 minutes.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 4/5 February 2019. The purpose of attended noise monitoring was to quantify and describe the acoustic environment around WCP and compare results with specified limits.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the February 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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# 1 INTRODUCTION

## 1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 4/5 February 2019. Figure 1 shows the monitoring locations.

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.

## 1.2 Monitoring Locations

There were eight monitoring locations during this survey as listed in Table 1.1 and shown on Figure 1. These monitoring locations are detailed in the site Noise Monitoring Program (NMP).

*Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS*

<b>NMP Descriptor</b>	<b>Monitoring Location</b>
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

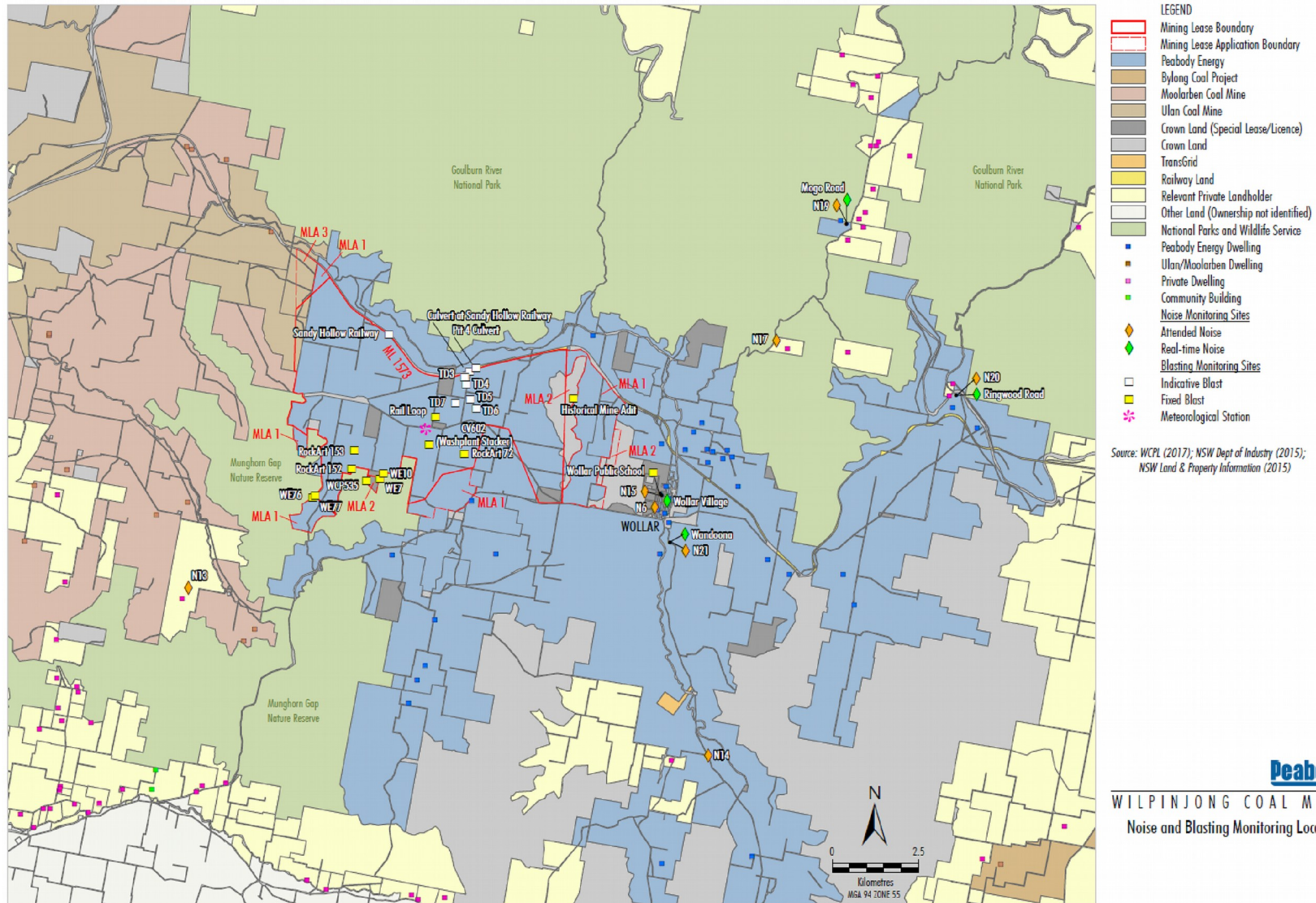


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)



### 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
$L_A$	The A-weighted root mean squared (RMS) noise level at any instant
$L_{Amax}$	The maximum A-weighted noise level over a time period or for an event
$L_{A1}$	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 per cent of the time, which is approximately the average of the maximum noise levels
$L_{A50}$	The noise level which is exceeded for 50 per cent of the time
$L_{A90}$	The level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. 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 or for an event
$L_{Aeq}$	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. From Wilpinjong Coal inversion tower data
SC	Stability Class. Based on Wilpinjong Coal inversion tower data
IA	Inaudible. When site-only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site-only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, 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

Approval was granted for the Wilpinjong Extension Project (SSD-6764) in 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

The EPL (No. 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent on 23 March 2018. Relevant noise sections of the licence are reproduced in Appendix A.

### 2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in June 2017. Chapter 6 of the NMP provides details on the noise monitoring program including locations and an attended monitoring methodology. The relevant sections are reproduced in Appendix A.

### 2.4 Project Specific Criteria

Criteria in the project approval and EPL are consistent as are the met exclusion rules determining when criteria apply. Criteria shown in Table 2.1 have been selected as the most appropriate for each monitoring location.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	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 <sup>2</sup>	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:

- 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
- 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 Assessment Method

Attended monitoring was conducted in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. Atmospheric condition measurement was also undertaken during each fifteen minute measurement. Monitoring is undertaken once per month at each location.

Attended monitoring during this reporting period was undertaken by Jason Cameron.

If the exact contribution from 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 levels, for example,  $L_{A10}$ ,  $L_{A50}$  or  $L_{A90}$ . 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 as per section 7.1 of the NPfI (e.g. measuring at an intermediate location and using relevant calculation) 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 or reasonable to employ NPfI methods such as using an intermediate location. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

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

As indicated in L5.5 (a) and (b) of the EPL, the  $L_{A1,1\text{minute}}$  measurement should be undertaken at one (1) metre from the dwelling façade and the  $L_{A\text{eq}}$  measurement within 30 metres of the dwelling. However, the direct measurement of noise at 1 metre from the façade is not practical during monitoring for this project. In

most cases, monitoring near the residence is impractical due to barking dogs or issues with obtaining access. In all cases, measurements for this survey were undertaken at a suitable and representative location.

Low-frequency noise has been assessed using the NPfI method, detailed in Section 2.5 of this report.

### 3.2 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 analyser	00701424	05/06/2019
Rion NA-28 sound level analyser	01070590	25/06/2020
Pulsar 106 acoustic calibrator	74813	05/06/2019
Rion NC-73 acoustic calibrator	11248306	25/06/2020

### 3.3 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.

### 3.4 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 3.2. Attended and real-time monitor locations are 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 2019<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A50</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	05/02/2019 01:04	59	38	36	35	36	34	31	45
N13	05/02/2019 01:52	45	38	36	35	35	34	33	53
N14	05/02/2019 00:11	56	44	40	34	36	32	27	54
N15	04/02/2019 22:58	58	48	46	46	45	44	40	55
N17	04/02/2019 22:28	55	54	54	53	53	52	50	56
N19	04/02/2019 22:01	47	45	45	44	44	43	40	55
N20	04/02/2019 23:31	57	44	42	39	40	37	34	54
N21	05/02/2019 00:43	44	37	32	31	31	30	24	54

Note:

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

### 4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey. None of the measurements satisfied the conditions outlined in Section 3.3 when assessing low-frequency noise.

Therefore no further assessment of modifying factors was undertaken.



### 4.3 Attended Noise Monitoring

Table 4.2 and Table 4.3 detail  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  noise levels from WCP in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the project approval and EPL.

Table 4.2:  $L_{Aeq,15\text{minute}}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – FEBRUARY 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{Aeq,15\text{min}}$ dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	05/02/2019 01:04	2.2	F	37	No	<20	NA
N13	05/02/2019 01:52	1.2	F	36	Yes	NM	Nil
N14	05/02/2019 00:11	2.1	E	35	Yes	IA	Nil
N15	04/02/2019 22:58	1.4	E	35	Yes	<20	Nil
N17	04/02/2019 22:28	3.0	E	35	Yes	<20	Nil
N19	04/02/2019 22:01	3.5	E	35	No	<20	NA
N20	04/02/2019 23:31	1.1	E	35	Yes	IA	Nil
N21	05/02/2019 00:43	2.1	F	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

Table 4.3: LA1,1minute GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – FEBRUARY 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP LA1,1min dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	05/02/2019 01:04	2.2	F	45	No	<20	NA
N13	05/02/2019 01:52	1.2	F	45	Yes	NM	Nil
N14	05/02/2019 00:11	2.1	E	45	Yes	IA	Nil
N15	04/02/2019 22:58	1.4	E	45	Yes	<20	Nil
N17	04/02/2019 22:28	3.0	E	45	Yes	28	Nil
N19	04/02/2019 22:01	3.5	E	45	No	<20	NA
N20	04/02/2019 23:31	1.1	E	45	Yes	IA	Nil
N21	05/02/2019 00:43	2.1	F	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

#### 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) LAeq and LA90 are typically good indicators of mining noise levels.

Table 4.4: REAL-TIME AND ATTENDED NOISE LEVELS, FEBRUARY 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total LAeq dB	Low pass (<630Hz) LAeq dB	Low pass (<630Hz) LA90 dB	WCP LAeq dB
N15/SX33	04/02/2019 22:58	04/02/2019 23:00	40	32	20	<20
N19/SX32	04/02/2019 22:01	04/02/2019 22:00	41	23	12	<20
N20/SX30	04/02/2019 23:31	04/02/2019 23:30	31	24	12	IA
N21/SX31	05/02/2019 00:43	05/02/2019 00:45	40	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.

## 4.5 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 or hail.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – FEBRUARY 2019

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	05/02/2019 01:04	24	1.2	230	6
N13	05/02/2019 01:52	27	1.0	210	8
N14	05/02/2019 00:11	24	0.7	175	7
N15	04/02/2019 22:58	25	0.0	-	5
N17	04/02/2019 22:28	26	0.6	60	4
N19	04/02/2019 22:01	27	0.6	255	2
N20	04/02/2019 23:31	24	0.9	245	5
N21	05/02/2019 00:43	23	0.8	230	7

Notes:

1. Wind speed and direction measured at 1.8 metres; and
2. "-" denotes calm conditions at 1.8 metres.

Data obtained from the WCP meteorological station and tower is used to determine compliance with specified noise criteria and is provided in Table 4.6.

Table 4.6: WCP METEOROLOGICAL STATION DATA<sup>1</sup>

Date and End Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres <sup>2</sup>
04/02/2019 22:00	3.6	149	-0.2
04/02/2019 22:15	3.5	136	-0.4
04/02/2019 22:30	3.2	136	-0.6
04/02/2019 22:45	3.0	144	-0.2
04/02/2019 23:00	2.1	144	-0.2
04/02/2019 23:15	1.4	89	0.6
04/02/2019 23:30	0.5	78	0.8
04/02/2019 23:45	1.1	84	1.4
05/02/2019 00:00	1.8	89	1.0
05/02/2019 00:15	1.8	90	1.8
05/02/2019 00:30	2.1	82	0.6
05/02/2019 00:45	2.3	96	0.8
05/02/2019 01:00	2.1	94	2.6
05/02/2019 01:15	2.2	91	2.0
05/02/2019 01:30	2.1	106	2.2
05/02/2019 01:45	1.1	96	2.2
05/02/2019 02:00	1.2	83	2.2
05/02/2019 02:15	1.6	83	2.4
05/02/2019 02:30	1.4	96	3.2
05/02/2019 02:45	1.1	120	3.2
05/02/2019 03:00	1.6	99	2.8
05/02/2019 03:15	1.6	104	2.4
05/02/2019 03:30	1.9	103	2.2
05/02/2019 03:45	2.2	55	2.6
05/02/2019 04:00	1.8	43	2.0
05/02/2019 04:15	1.5	85	2.4
05/02/2019 04:30	1.7	112	2.2

Notes:

1. Data supplied by WCP;
2. "-" indicates calm conditions and therefore no wind direction; and
3. Lapse rate calculated using data sourced from WCP inversion tower.

## 5 DISCUSSION

### 5.1 Noted Noise Sources

Data gathered during attended monitoring is shown in tables in Section 4. These noise levels 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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was, where possible, measured directly, or, determined by frequency analysis. Time variations of noise sources in each measurement, their temporal characteristics, are taken into account via statistical descriptors.

From these observations summaries have been derived for each location. The following chapter sections provide these summaries. Statistical 1/3 octave band analysis of environmental noise was undertaken, and Figure 3 to Figure 10 display the frequency ranges for various noise sources at each location for  $L_{A1}$ ,  $L_{A10}$ ,  $L_{A90}$  and  $L_{Aeq}$ . 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; mining noise is at frequencies less than 1000 Hz (this 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; this can be 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  $L_{Aeq}$ .

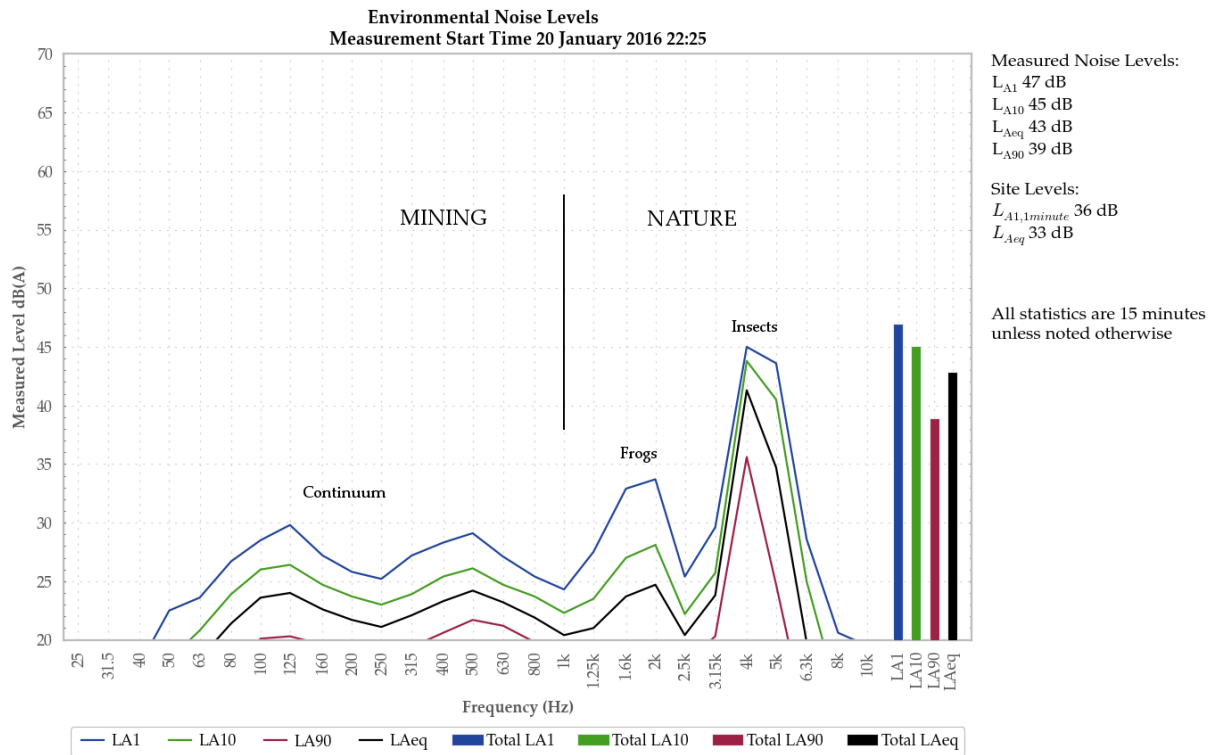
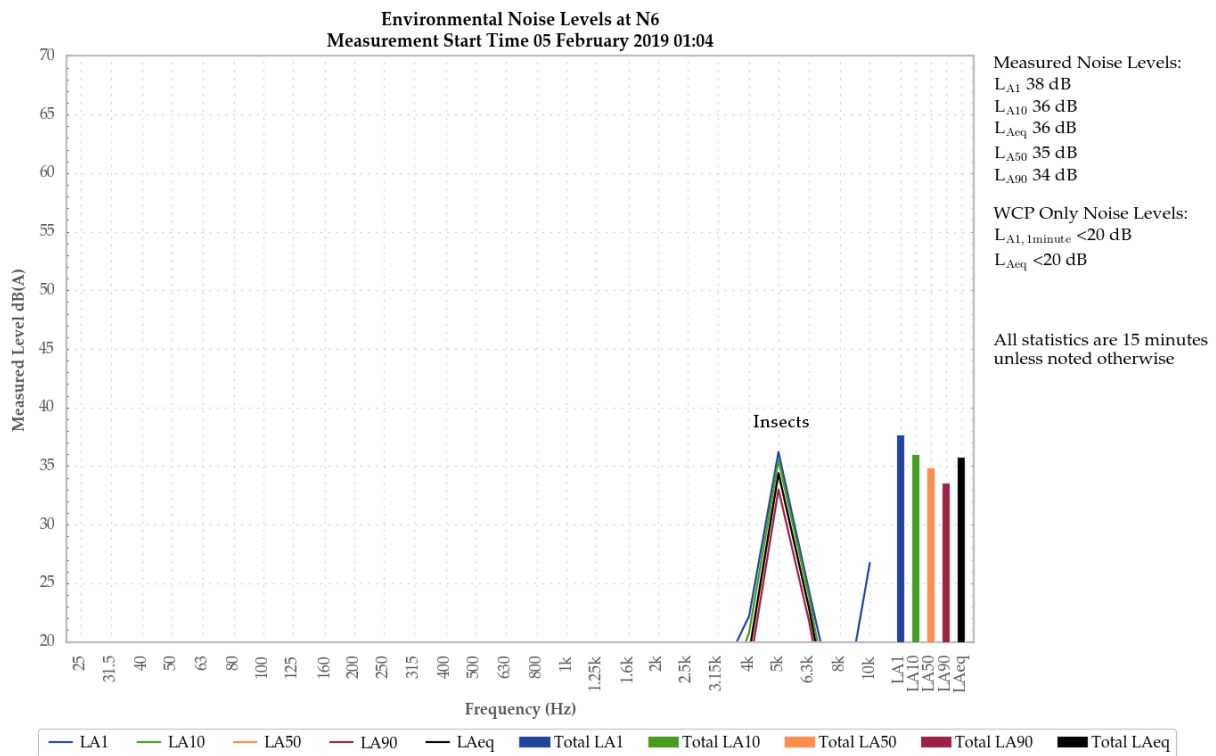


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

### 5.1.1 N6



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

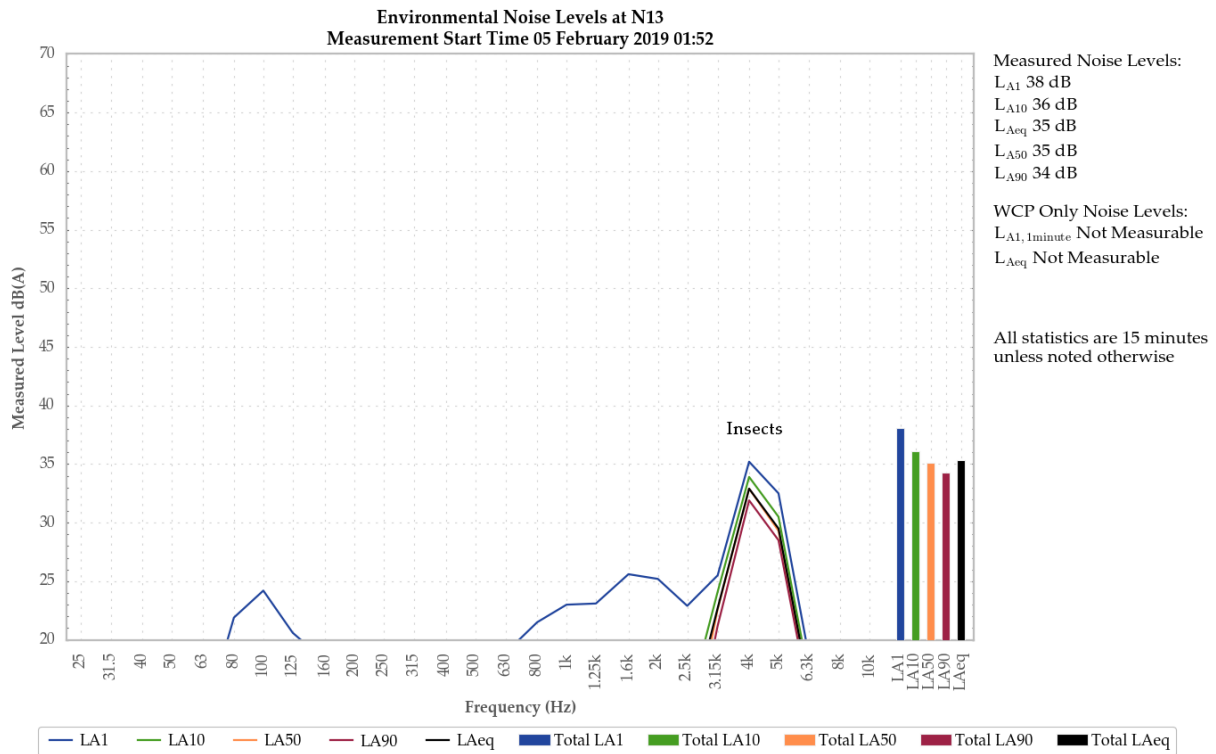
A low-level continuum was audible during the measurement, resulting in a site-only LAeq,15minute and LA1,1minute of less than 20 dB.

Insects generated all measured levels.

Dogs, birds, rabbits, bats and breeze in foliage were also noted.



### 5.1.2 N13



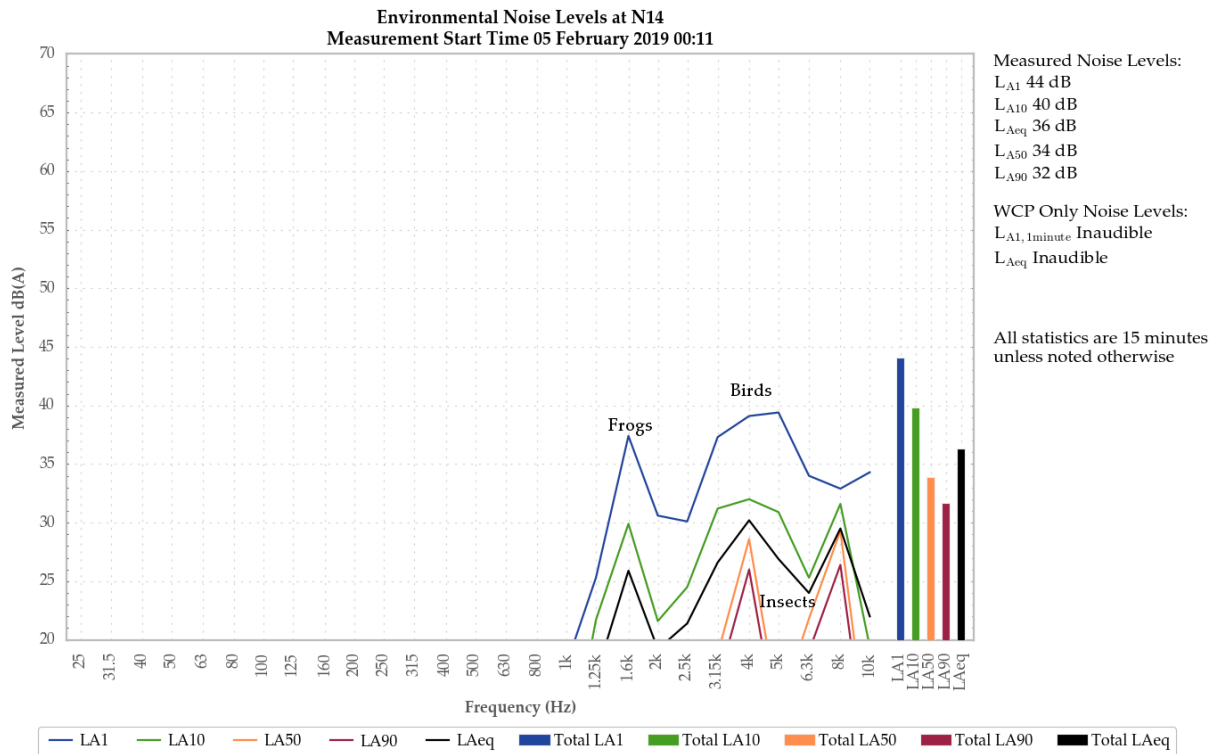
**Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road**

A low-level continuum from WCP was audible at times during the measurement, but was not measurable.

Insects generated measured levels.

Another mining continuum and livestock were also noted.

### 5.1.3 N14



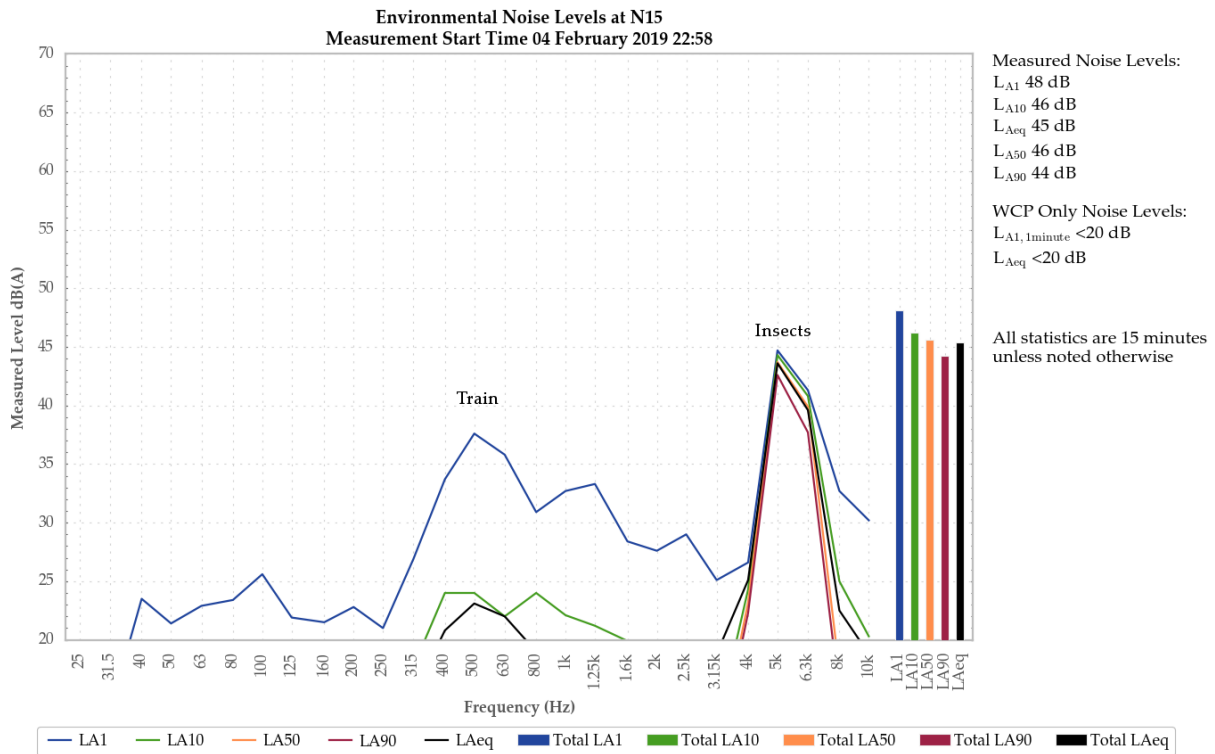
**Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads**

WCP was inaudible.

Birds and frogs generated the measured LA1, and contributed to the measured LA10 and LAeq. Insects generated the measured LA50 and LA90, and contributed to the measured LA10 and LAeq.

Bats and a train were also noted.

5.14 N15



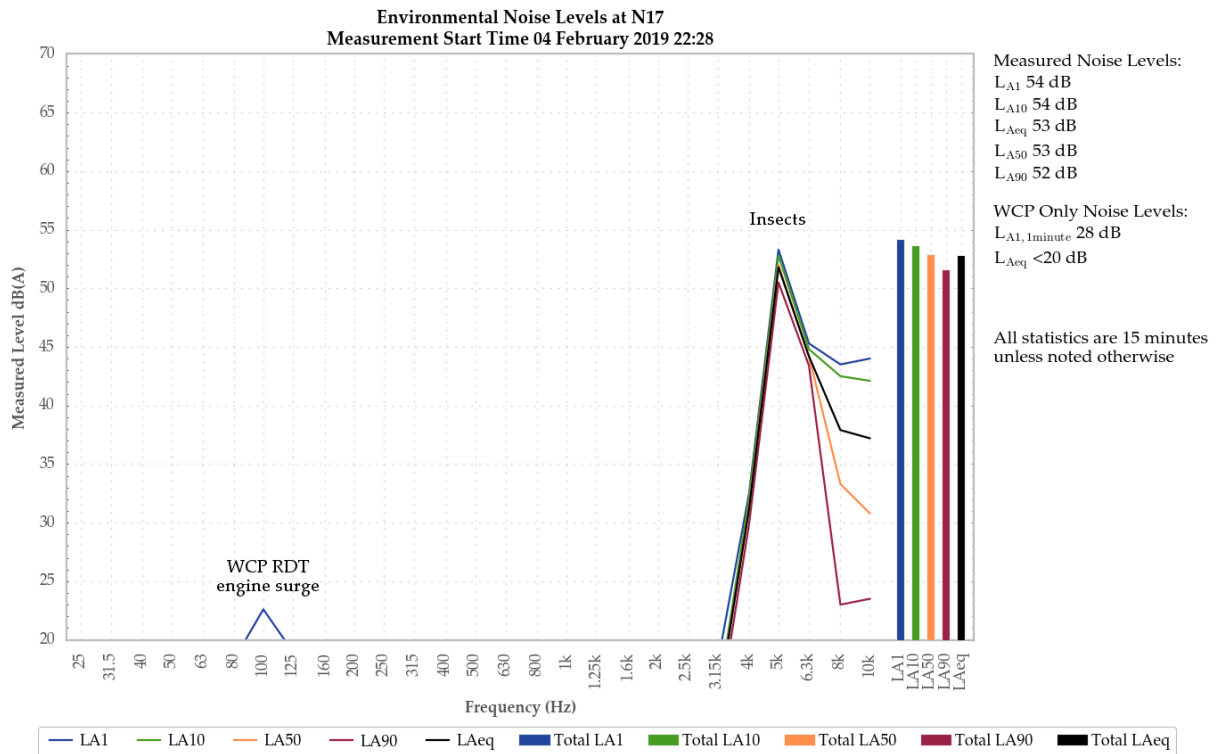
**Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village**

A low-level continuum from WCP was audible during the measurement generating the site-only LAeq,15minute and LA1,1minute of less than 20 dB.

Insects were primarily responsible for the measured LA1, and generated the measured LA10, LA50, LAeq, LA90. A train contributed to the measured LA1.

Birds, bats and dogs were also noted.

### 5.1.5 N17



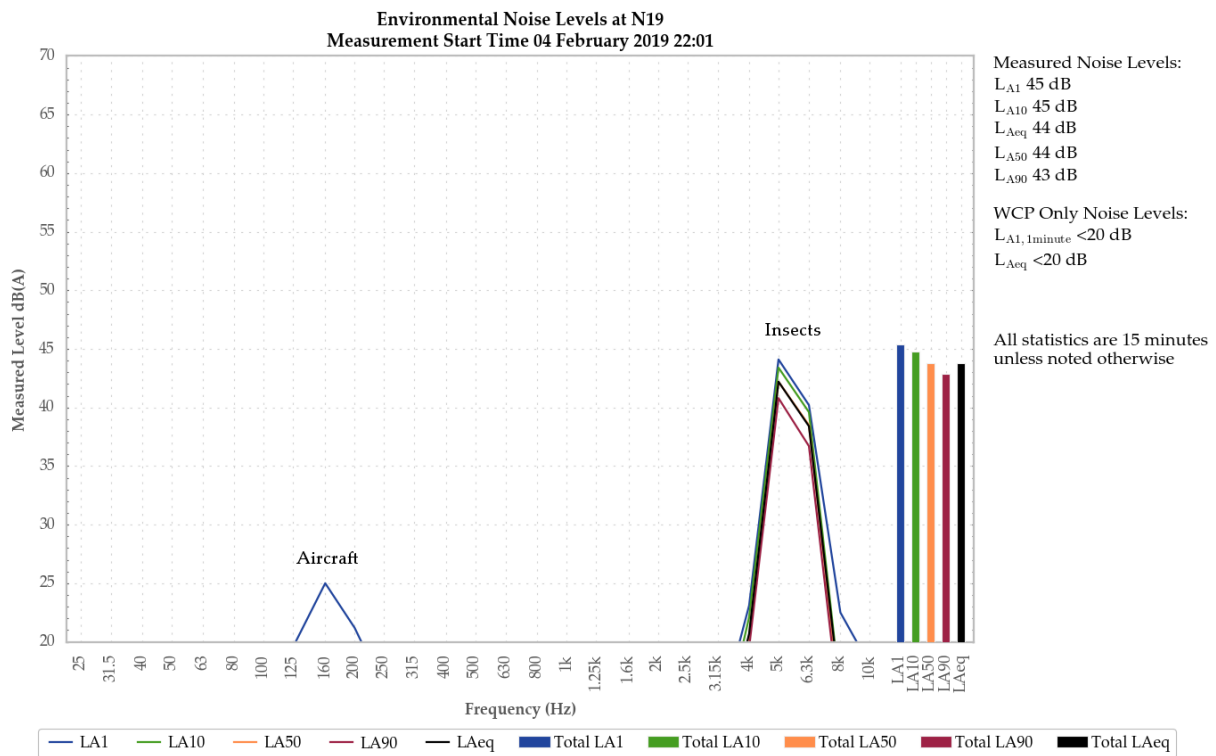
**Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road**

A low-level continuum from WCP was audible during the measurement, which resulted in a site-only LAeq,15minute of less than 20 dB. A rear dump truck engine surge generated a site-only LA1,1minute of 28 dB.

Insects generated measured levels.

A train was also noted.

### 5.1.6 N19



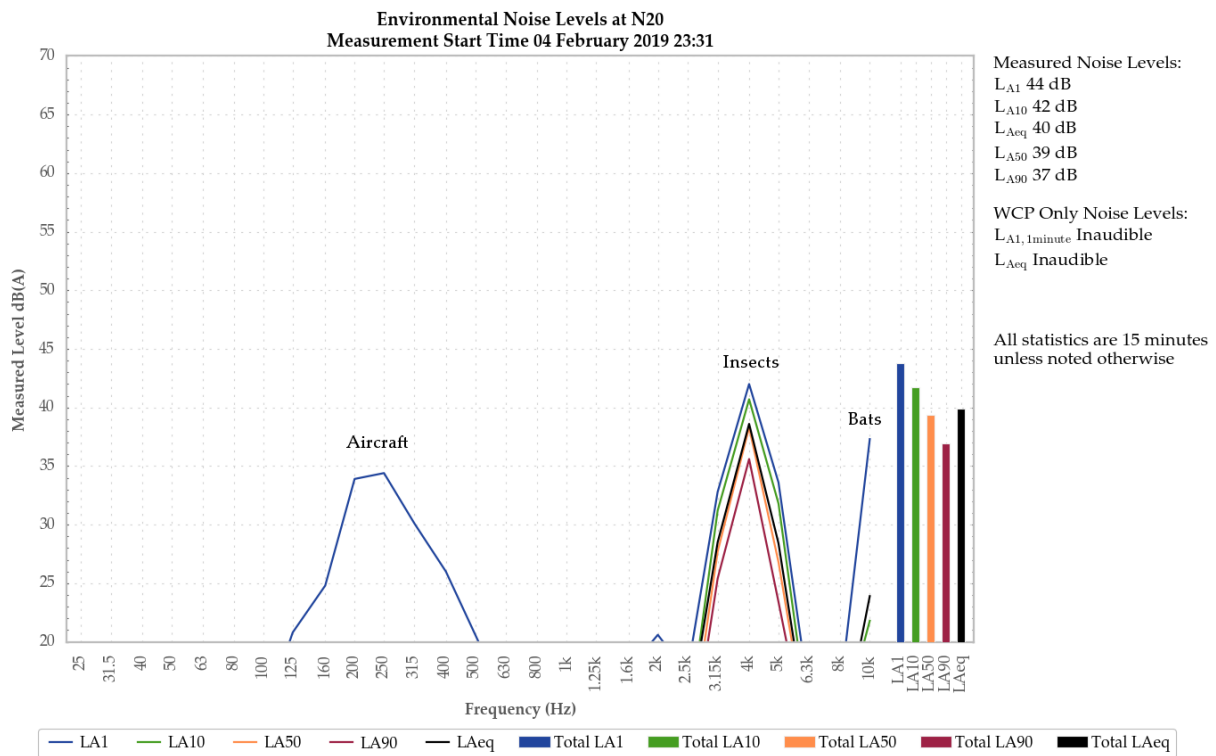
**Figure 8: Environmental Noise Levels – N19, Upper Mogo Road**

A low-level continuum was audible during the measurement, resulting in a site-only LAeq,15minute and LA1,1minute of less than 20 dB.

Insects generated measured levels.

An aircraft, a train and bats were also noted.

### 5.1.7 N20

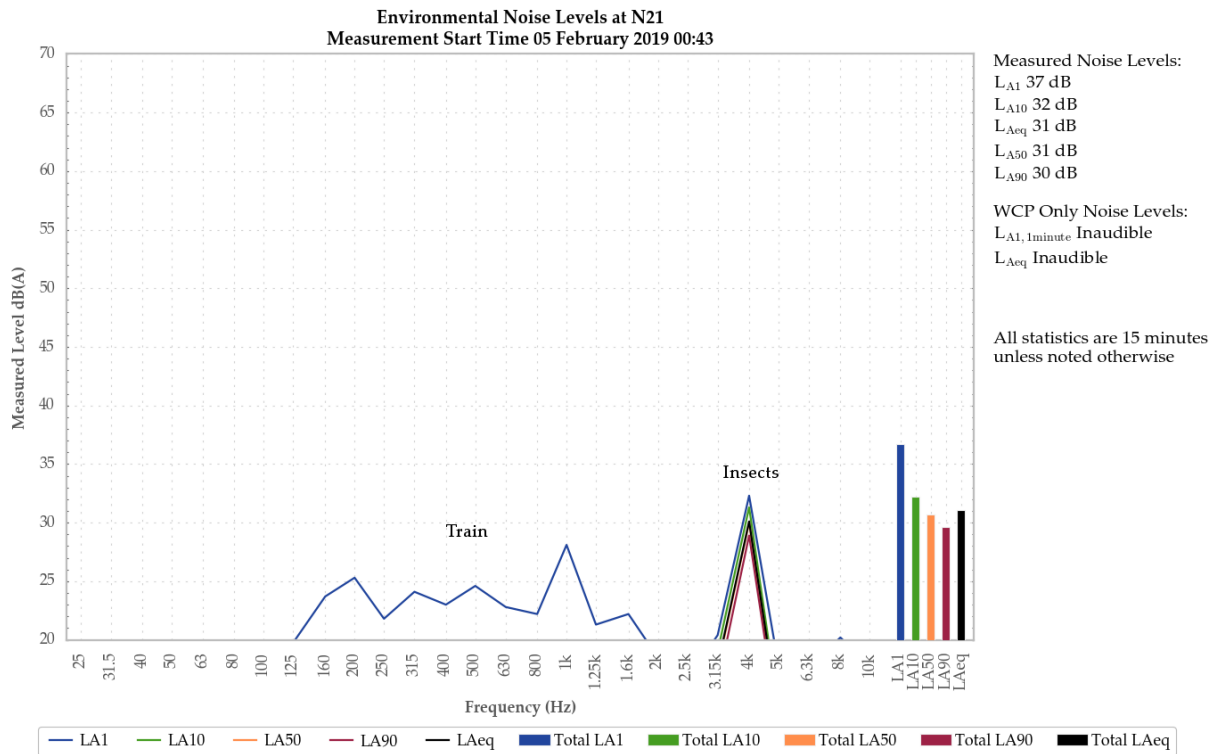


**Figure 9: Environmental Noise Levels, N20 – Ringwood Road**

WCP was inaudible.

Insects were primarily responsible for the measured LA1 and generated the measured LA10, LA50, LAeq and LA90. Bats and an aircraft were minor contributors to the measured LA1.

### 5.1.8 N21



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

WCP was inaudible.

Insects contributed to the measured LA1, and generated the measured LA10, LA50, LAeq and LA90. A train contributed to the measured LA1.

Frogs, bats and dogs were also noted.

## 6 SUMMARY OF COMPLIANCE

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken during the night period of 4/5 February 2019. Attended noise monitoring was conducted at eight sites. The duration of all measurements was 15 minutes.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the February 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**



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## APPENDIX

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### A STATUTORY REQUIREMENTS

Several documents specify noise criteria that apply to the Wilpinjong operation. The noise sections of the relevant consent, licence and NMP are reproduced below.

## 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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.

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

<b>Hz/dB(Z)</b>	<b>One-third octave <math>L_{Zeq,15minute}</math> threshold level</b>												
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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations. Relevant extracts are shown below.

### 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

The relevant sections of the WCP Noise Management Plan, dated June 2017 are reproduced below.

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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.

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## APPENDIX

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### ***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 C17248

**Client Details** Global Acoustics Pty Ltd  
12/16 Huntingdale Drive  
Thornton 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**  
**Ambient Temperature :** 24.3°C  
**Relative Humidity :** 40%  
**Barometric Pressure :** 100.05kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 24.4°C  
**Relative Humidity :** 39.5%  
**Barometric Pressure :** 100kPa

**Calibration Technician :** Vicky Jaiswal  
**Calibration Date :** 05/06/2017

**Secondary Check:** Nick Williams  
**Report Issue Date :** 06/06/2017

**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 61672-3:2006, 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 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Least Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.16dB	Temperature	±0.05°C
12.5kHz	±0.2dB	Relative Humidity	±0.46%
16kHz	±0.29dB	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.

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



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**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**  
**Ambient Temperature :** 21.3°C  
**Relative Humidity :** 41.7%  
**Barometric Pressure :** 100.95kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 22.7°C  
**Relative Humidity :** 39.2%  
**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 Agüero

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: Tonaburst 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	±0.15dB	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.



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

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**Sound Calibrator  
IEC 60942-2004**

**Calibration Certificate**

Calibration Number C17249


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

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

**Atmospheric Conditions**

Ambient Temperature : 24.3°C  
Relative Humidity : 38.9%  
Barometric Pressure : 99.96kPa

Calibration Technician : Vicky Jaiswal      Secondary Check: Nick Williams  
Calibration Date : 05/06/2017      Report Issue Date : 06/06/2017

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	93.8	1000.33

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 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	±0.05°C
Short Term Fluct.	±0.02dB	Relative Humidity	±0.46%
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.



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**Sound Calibrator**  
IEC 60942-2004

**Calibration Certificate**

Calibration Number C18364

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
-----------------------	--

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

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

<b>Calibration Technician :</b>	Lucky Jaiswal	<b>Secondary Check:</b>	Lewis Boorman
<b>Calibration Date :</b>	25 Jun 2018	<b>Report Issue Date :</b>	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.

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# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
March 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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Noise and Vibration Analysis and Solutions

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## Wilpinjong Coal

### Environmental Noise Monitoring March 2019

Reference: 19066\_R01

Report date: 30 April 2019

#### Prepared for

Wilpinjong Coal Pty Ltd  
Locked Bag 2005  
Mudgee NSW 2850

#### Prepared by

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Prepared: Tambalyn Durney  
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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 Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

The current WCP development consent was approved in April 2017. The environment protection licence (EPL) for WCP was issued in early 2006 with subsequent variations approved.

Attended monitoring was conducted in accordance with the documents detailed above, Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. The duration of each night measurement was 15 minutes.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 11/12 March 2019. The purpose of attended noise monitoring was to quantify and describe the acoustic environment around WCP and compare results with specified limits.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the March 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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# 1 INTRODUCTION

## 1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 11/12 March 2019. Figure 1 shows the monitoring locations.

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.

## 1.2 Monitoring Locations

There were eight monitoring locations during this survey as listed in Table 1.1 and shown on Figure 1. These monitoring locations are detailed in the site Noise Monitoring Program (NMP).

*Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS*

<b>NMP Descriptor</b>	<b>Monitoring Location</b>
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

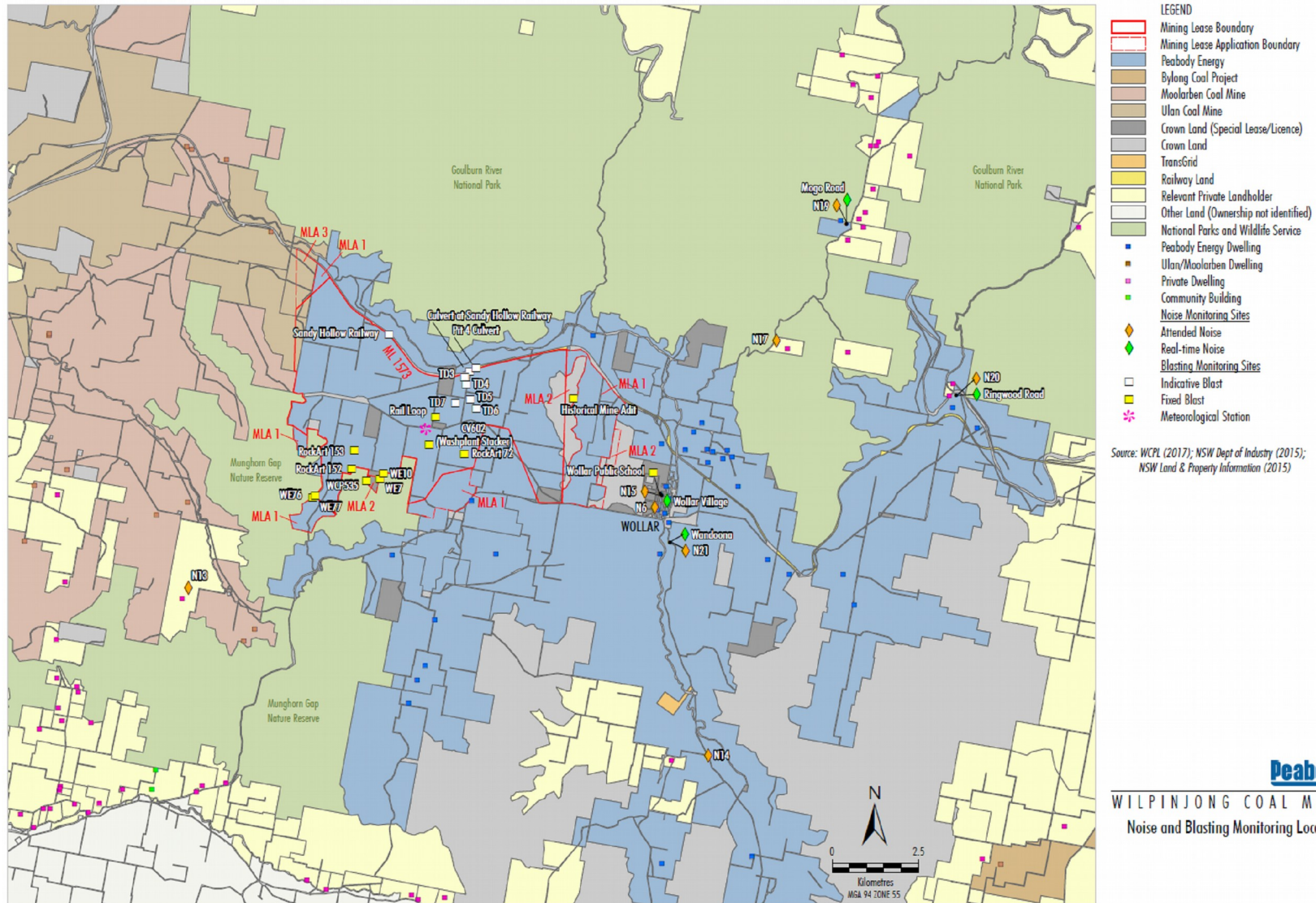


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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
L <sub>A</sub>	The A-weighted root mean squared (RMS) noise level at any instant
L <sub>Amax</sub>	The maximum A-weighted noise level over a time period or for an event
L <sub>A1</sub>	The noise level which is exceeded for 1 per cent of the time
L <sub>A1,1minute</sub>	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute
L <sub>A10</sub>	The noise level which is exceeded for 10 per cent of the time, which is approximately the average of the maximum noise levels
L <sub>A50</sub>	The noise level which is exceeded for 50 per cent of the time
L <sub>A90</sub>	The level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. The L <sub>A90</sub> level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes
L <sub>Amin</sub>	The minimum A-weighted noise level over a time period or for an event
L <sub>Aeq</sub>	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. From Wilpinjong Coal inversion tower data
SC	Stability Class. Based on Wilpinjong Coal inversion tower data
IA	Inaudible. When site-only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site-only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, 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

Approval was granted for the Wilpinjong Extension Project (SSD-6764) in 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

The EPL (No. 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent on 23 March 2018. Relevant noise sections of the licence are reproduced in Appendix A.

### 2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in June 2017. Chapter 6 of the NMP provides details on the noise monitoring program including locations and an attended monitoring methodology. The relevant sections are reproduced in Appendix A.

### 2.4 Project Specific Criteria

Criteria in the project approval and EPL are consistent as are the met exclusion rules determining when criteria apply. Criteria shown in Table 2.1 have been selected as the most appropriate for each monitoring location.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	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 <sup>2</sup>	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:

- 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
- 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 Assessment Method

Attended monitoring was conducted in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. Atmospheric condition measurement was also undertaken during each fifteen minute measurement. Monitoring is undertaken once per month at each location.

Attended monitoring during this reporting period was undertaken by Ryan Brunniges.

If the exact contribution from 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 levels, for example,  $L_{A10}$ ,  $L_{A50}$  or  $L_{A90}$ . 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 as per section 7.1 of the NPfI (e.g. measuring at an intermediate location and using relevant calculation) 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 or reasonable to employ NPfI methods such as using an intermediate location. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

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

As indicated in L5.5 (a) and (b) of the EPL, the  $L_{A1,1\text{minute}}$  measurement should be undertaken at one (1) metre from the dwelling façade and the  $L_{A\text{eq}}$  measurement within 30 metres of the dwelling. However, the direct measurement of noise at 1 metre from the façade is not practical during monitoring for this project. In

most cases, monitoring near the residence is impractical due to barking dogs or issues with obtaining access. In all cases, measurements for this survey were undertaken at a suitable and representative location.

Low-frequency noise has been assessed using the NPfI method, detailed in Section 2.5 of this report.

### 3.2 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 analyser	30131882	14/03/2019
Pulsar 105 acoustic calibrator	78226	14/03/2019
Rion NA-28 sound level analyser	370304	26/11/2020
Pulsar 106 acoustic calibrator	81334	22/11/2020

### 3.3 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.

### 3.4 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 3.2. Attended and real-time monitor locations are 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 – MARCH 2019<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A50</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	12/03/2019 01:41	40	34	24	21	23	19	18	54
N13	12/03/2019 00:43	54	36	28	25	28	24	22	54
N14	12/03/2019 00:48	47	43	42	38	39	36	32	54
N15	11/03/2019 23:33	45	43	36	27	33	24	22	49
N17	11/03/2019 22:43	49	34	32	30	30	28	24	54
N19	11/03/2019 22:16	42	28	27	26	26	24	20	54
N20	12/03/2019 00:11	44	41	40	39	39	38	35	54
N21	12/03/2019 01:20	55	37	35	28	31	26	24	54

Note:

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

### 4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey. None of the measurements satisfied the conditions outlined in Section 3.3 when assessing low-frequency noise.

Therefore no further assessment of modifying factors was undertaken.

### 4.3 Attended Noise Monitoring

Table 4.2 and Table 4.3 detail  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  noise levels from WCP in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the project approval and EPL.

Table 4.2:  $L_{Aeq,15\text{minute}}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MARCH 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{Aeq,15\text{min}}$ dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	12/03/2019 01:41	2.3	D	37	Yes	IA	Nil
N13	12/03/2019 00:43	0.5	F	36	Yes	IA	Nil
N14	12/03/2019 00:48	0.5	F	35	Yes	IA	Nil
N15	11/03/2019 23:33	0.6	G	35	No	<20	NA
N17	11/03/2019 22:43	1.1	G	35	No	<20	NA
N19	11/03/2019 22:16	2.0	E	35	Yes	IA	Nil
N20	12/03/2019 00:11	0.0	G	35	No	<20	NA
N21	12/03/2019 01:20	2.4	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.



Table 4.3: LA1,1minute GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MARCH 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP LA1,1min dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	12/03/2019 01:41	2.3	D	45	Yes	IA	Nil
N13	12/03/2019 00:43	0.5	F	45	Yes	IA	Nil
N14	12/03/2019 00:48	0.5	F	45	Yes	IA	Nil
N15	11/03/2019 23:33	0.6	G	45	No	<20	NA
N17	11/03/2019 22:43	1.1	G	45	No	<20	NA
N19	11/03/2019 22:16	2.0	E	45	Yes	IA	Nil
N20	12/03/2019 00:11	0.0	G	45	No	<20	NA
N21	12/03/2019 01:20	2.4	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

#### 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) LAeq and LA90 are typically good indicators of mining noise levels.

Table 4.4: REAL-TIME AND ATTENDED NOISE LEVELS, MARCH 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total LAeq dB	Low pass (<630Hz) LAeq dB	Low pass (<630Hz) LA90 dB	WCP LAeq dB
N15/SX33	11/03/2019 23:33	11/03/2019 23:30	42	31	23	<20
N19/SX32	11/03/2019 22:16	11/03/2019 22:15	23	10	NR <sup>2</sup>	IA
N20/SX30	12/03/2019 00:11	12/03/2019 00:15	40	35	25	<20
N21/SX31	12/03/2019 01:20	12/03/2019 01:15	30	25	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 4.5. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – MARCH 2019

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	12/03/2019 01:41	23	0.0	-	0
N13	12/03/2019 00:43	24	0.8	60	8
N14	12/03/2019 00:48	22	0.0	-	0
N15	11/03/2019 23:33	25	0.0	-	0
N17	11/03/2019 22:43	24	0.0	-	0
N19	11/03/2019 22:16	27	0.0	-	0
N20	12/03/2019 00:11	24	0.0	-	0
N21	12/03/2019 01:20	23	1.1	15	0

Notes:

1. Wind speed and direction measured at 1.8 metres; and
2. "-" denotes calm conditions at 1.8 metres.

Data obtained from the WCP meteorological station and tower is used to determine compliance with specified noise criteria and is provided in Table 4.6.

Table 4.6: WCP METEOROLOGICAL STATION DATA<sup>1</sup>

Date and End Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres <sup>2</sup>
11/03/2019 22:00	3.0	228	0.2
11/03/2019 22:15	2.4	228	0.6
11/03/2019 22:30	2.0	226	1.0
11/03/2019 22:45	1.9	237	1.2
11/03/2019 23:00	1.1	240	4.0
11/03/2019 23:15	0.5	1	7.8
11/03/2019 23:30	0.9	3	5.2
11/03/2019 23:45	0.6	10	4.2
12/03/2019 00:00	0.0	0	5.4
12/03/2019 00:15	0.7	292	5.8
12/03/2019 00:30	0.0	0	5.4
12/03/2019 00:45	0.5	23	3.4
12/03/2019 01:00	0.5	50	2.2
12/03/2019 01:15	2.3	46	-0.2
12/03/2019 01:30	2.4	47	-0.8
12/03/2019 01:45	2.4	45	-1.0
12/03/2019 02:00	2.3	49	-1.0
12/03/2019 02:15	2.1	55	-1.0
12/03/2019 02:30	2.4	48	-1.0
12/03/2019 02:45	1.7	52	-1.0
12/03/2019 03:00	1.5	59	-1.0
12/03/2019 03:15	0.9	8	-0.8
12/03/2019 03:30	1.0	35	-1.0
12/03/2019 03:45	1.3	49	-0.8
12/03/2019 04:00	0.9	33	-0.6
12/03/2019 04:15	0.9	42	-0.6
12/03/2019 04:30	1.1	58	-0.6

Notes:

1. Data supplied by WCP;
2. "-" indicates calm conditions and therefore no wind direction; and
3. Lapse rate calculated using data sourced from WCP inversion tower.

## 5 DISCUSSION

### 5.1 Noted Noise Sources

Data gathered during attended monitoring is shown in tables in Section 4. These noise levels 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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was, where possible, measured directly, or, determined by frequency analysis. Time variations of noise sources in each measurement, their temporal characteristics, are taken into account via statistical descriptors.

From these observations summaries have been derived for each location. The following chapter sections provide these summaries. Statistical 1/3 octave band analysis of environmental noise was undertaken, and Figure 3 to Figure 10 display the frequency ranges for various noise sources at each location for  $L_{A1}$ ,  $L_{A10}$ ,  $L_{A90}$  and  $L_{Aeq}$ . 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; mining noise is at frequencies less than 1000 Hz (this 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; this can be 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  $L_{Aeq}$ .

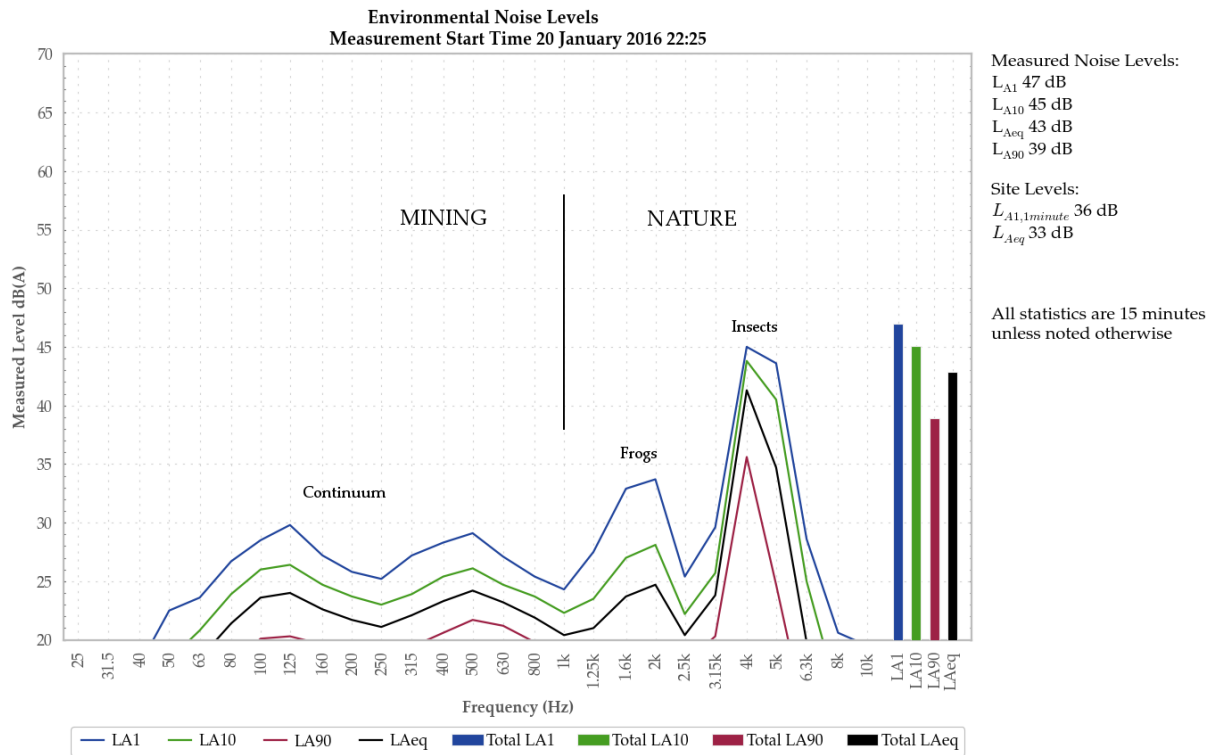


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 12 March 2019

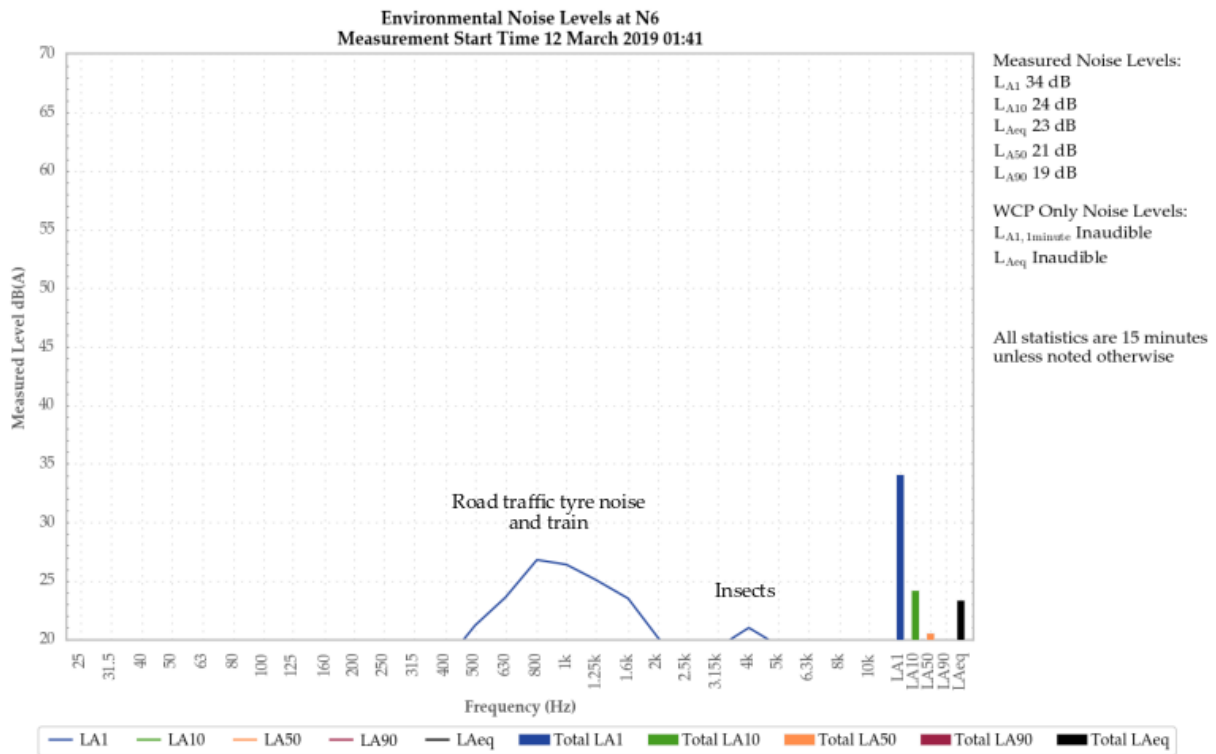


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was inaudible.

Road traffic tyre noise and a nearby train generated the measured LA1. Insects contributed to the measured LA1.

Bats were also noted.

5.1.2 N13, 12 March 2019

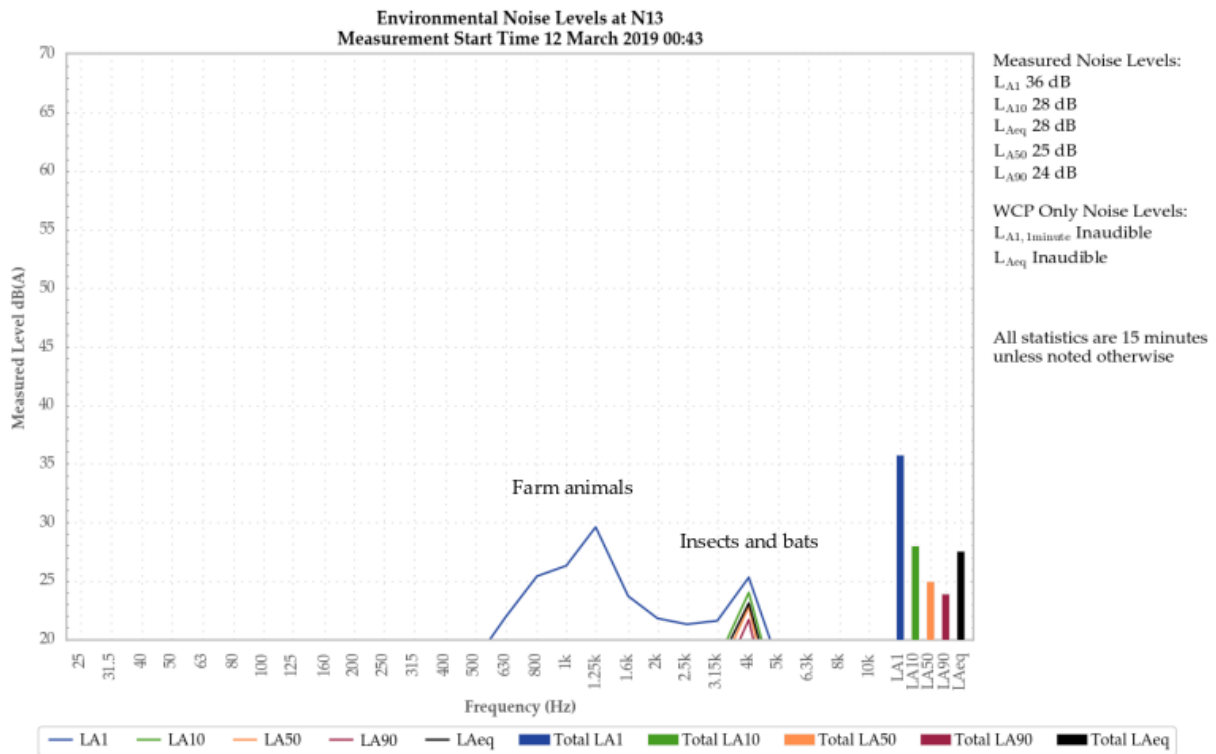


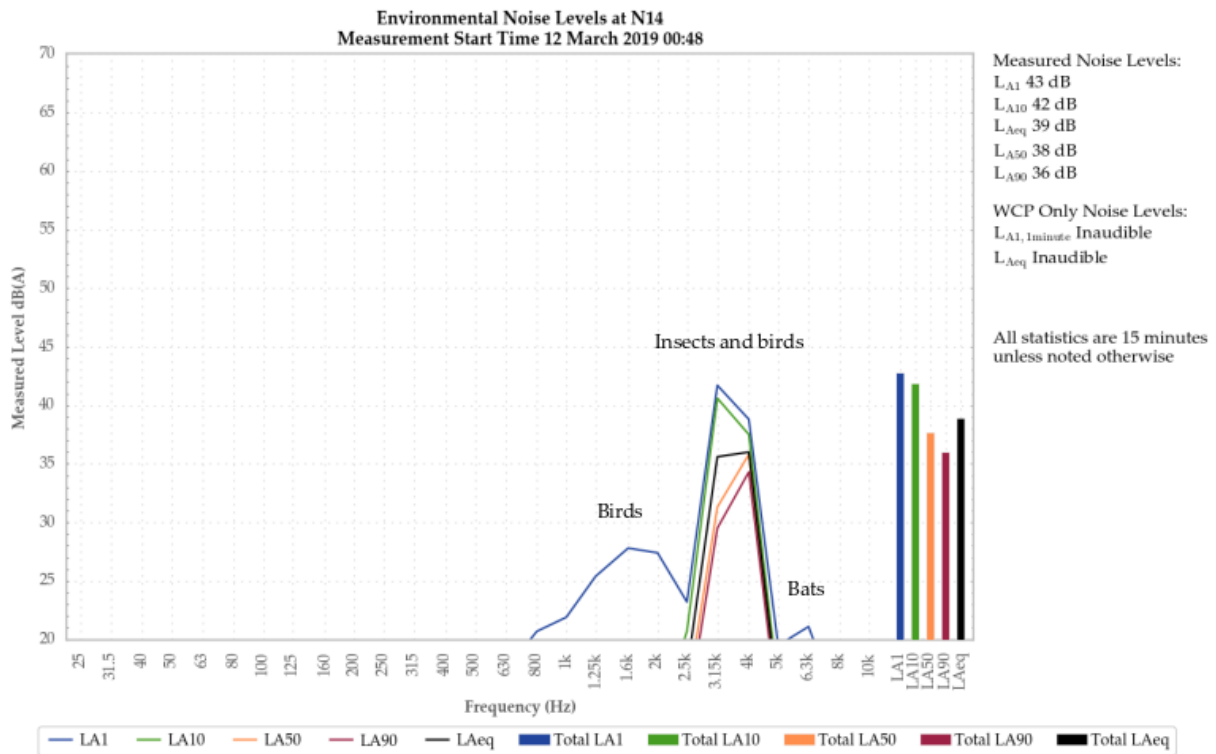
Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Insects generated the measured LA10, LA50, LA90, LAeq, and contributed to the LA1. Farm animals primarily generated the measured LA1.



5.1.3 N14, 12 March 2019



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

WCP was inaudible.

Insects primarily generated the measured levels. Birds were a major contributor to the measured L<sub>A1</sub>, and bats were also a minor contributor.

Farm animals were also noted.

5.1.4 N15, 11 March 2019

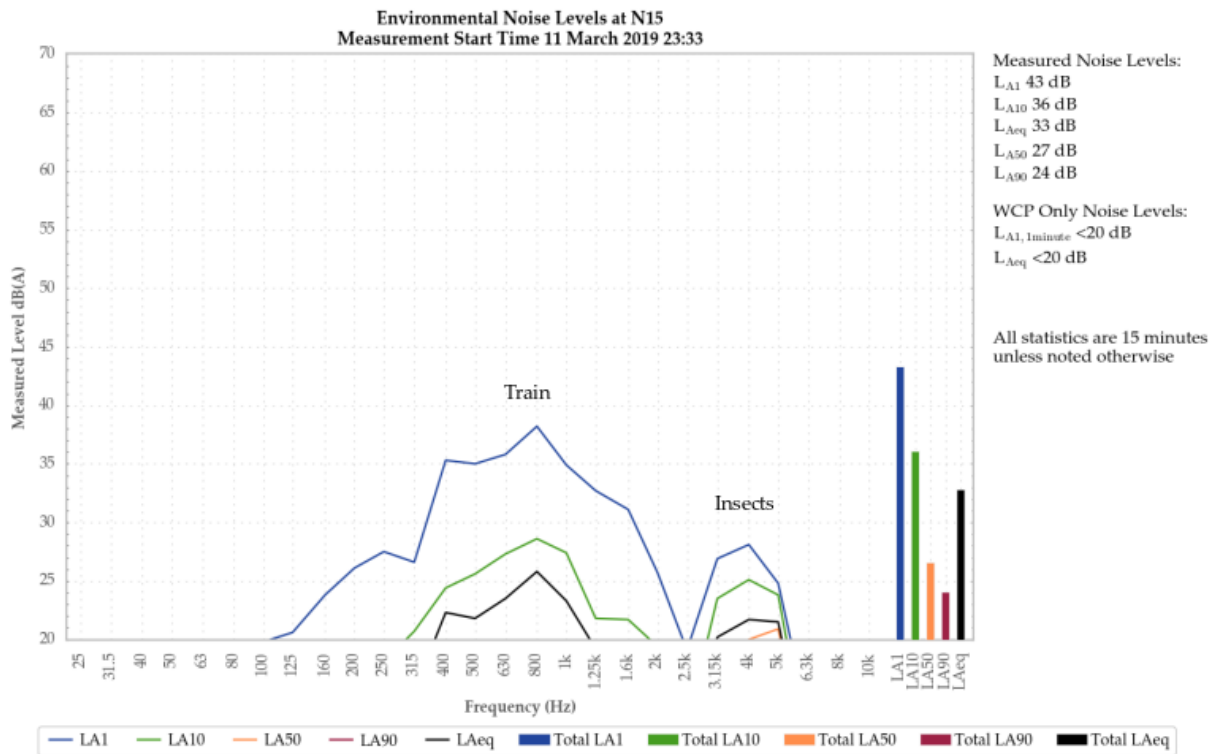


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was audible at times during the measurement generating a site-only LAeq,15minute and LA1,1minute of less than 20 dB.

A nearby train primarily generated the measured LA1, LA10 and LAeq. Insects generated the measured LA50 and contributed to the measured LA1, LA10 and LAeq.

Music from nearby residents was also noted.

5.1.5 N17, 11 March 2019

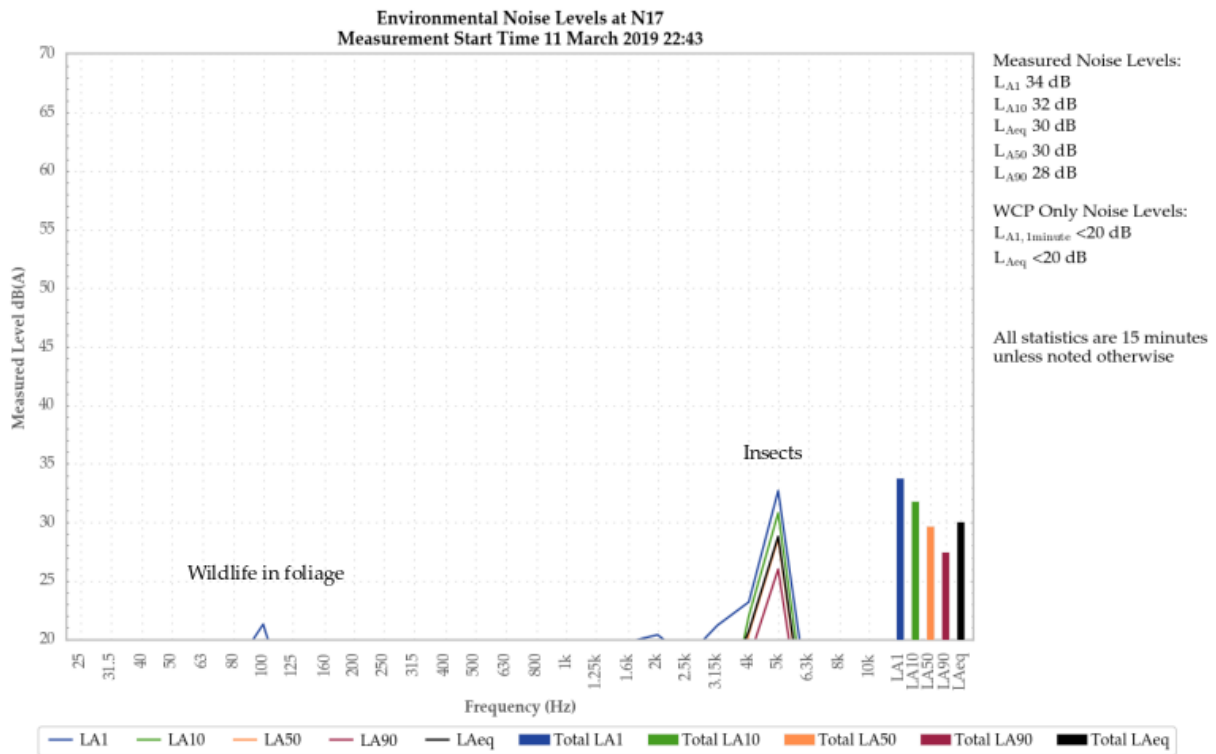


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

WCP was inaudible.

Insects primarily generated measured levels, animals in foliage were a minor contributor to the measured LA1.

Breeze in foliage were also noted.

5.1.6 N19, 11 March 2019

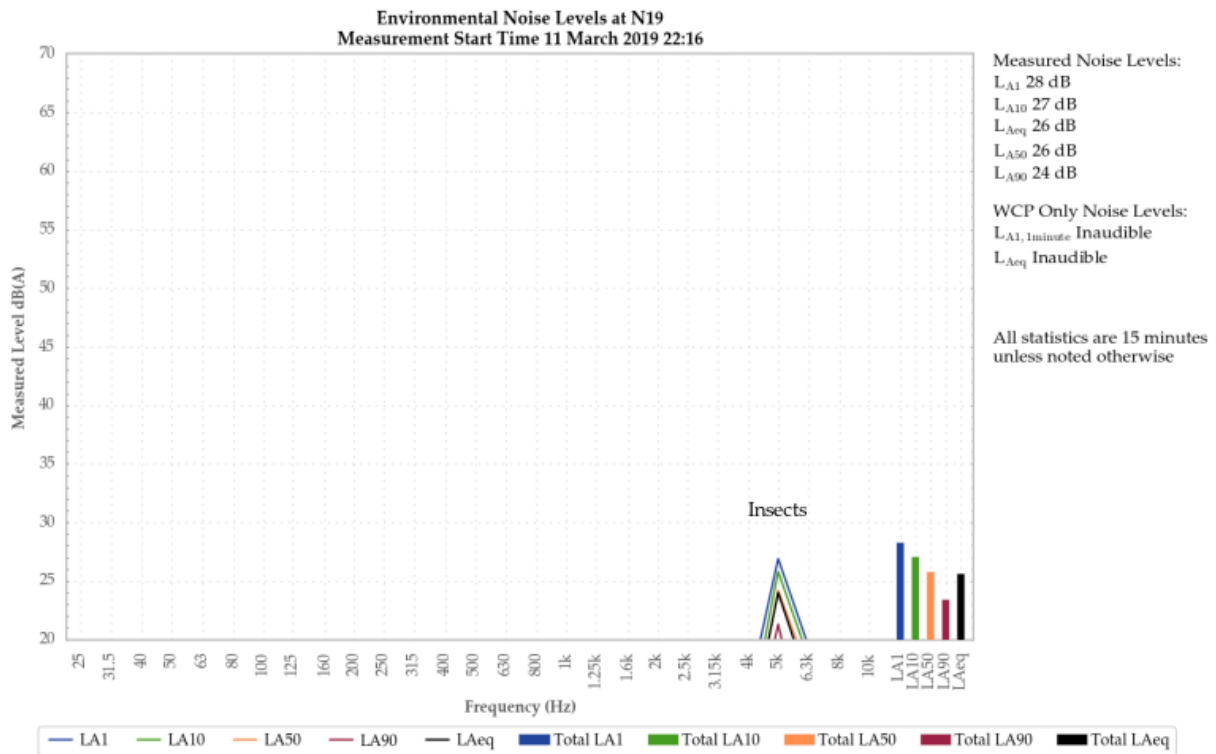


Figure 8: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible.

Insects generated measured levels.

Wildlife in foliage and breeze in foliage were also noted.

5.1.7 N20, 12 March 2019

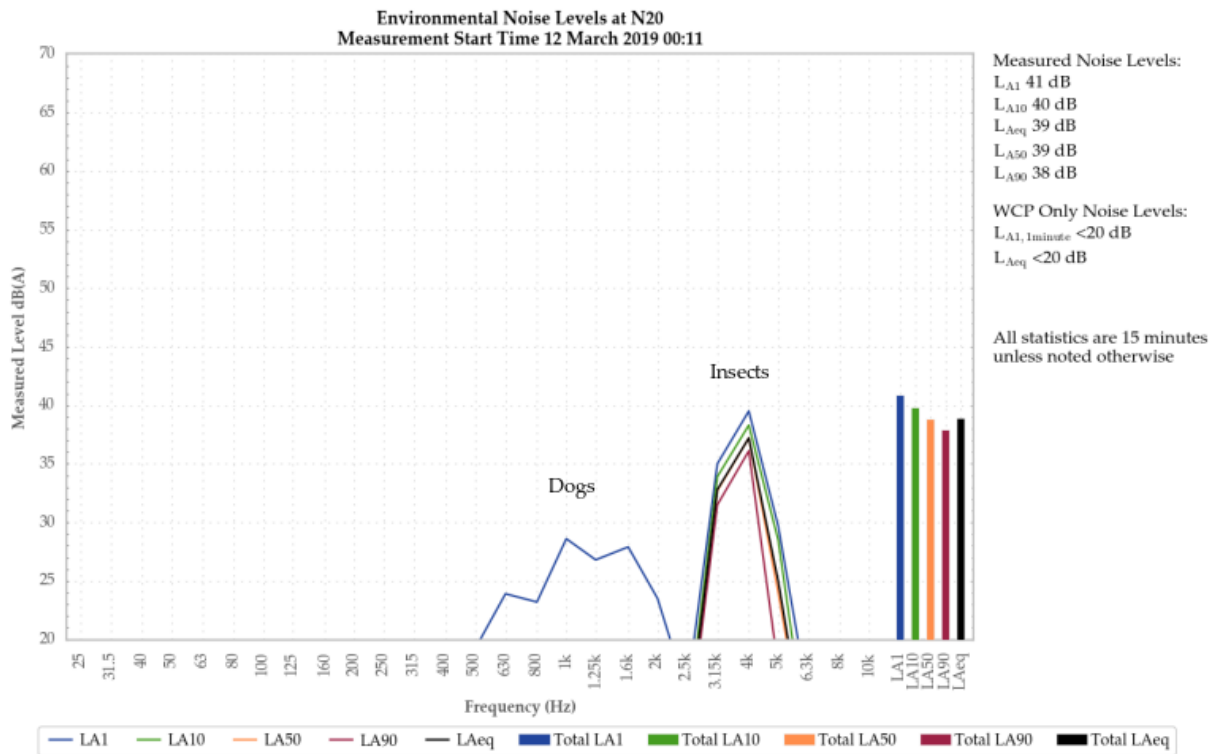


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was audible at times during the measurement generating a site-only L<sub>Aeq,15minute</sub> and L<sub>A1,1minute</sub> of less than 20 dB.

Insects primarily generated all measured levels. Dogs contributed to the measured L<sub>A1</sub>.

5.1.8 N21, 12 March 2019

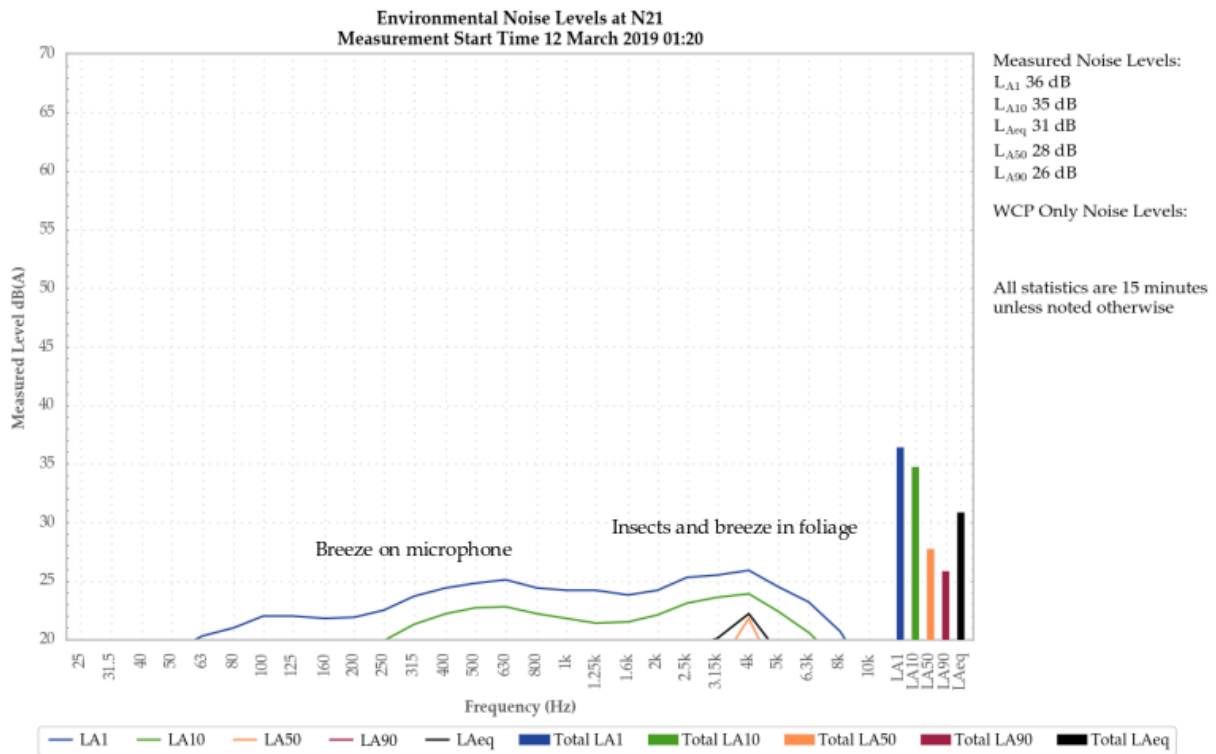


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

WCP was inaudible.

Insects generated the measured LA50, LAeq and contributed to the measured LA1 and LA10. Breeze in foliage and on microphone primarily generated the measured LA1 and LA10.

## 6 SUMMARY OF COMPLIANCE

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken during the night period of 11/12 March 2019. Attended noise monitoring was conducted at eight sites. The duration of all measurements was 15 minutes.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the March 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### A STATUTORY REQUIREMENTS



Several documents specify noise criteria that apply to the Wilpinjong operation. The noise sections of the relevant consent, licence and NMP are reproduced below.

## 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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.

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

<b>Hz/dB(Z)</b>	<b>One-third octave <math>L_{Zeq,15minute}</math> threshold level</b>												
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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations. Relevant extracts are shown below.

### 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

The relevant sections of the WCP Noise Management Plan, dated June 2017 are reproduced below.

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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.

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## APPENDIX

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### ***B CALIBRATION CERTIFICATES***



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 C17126

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

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

**Pre-Test Atmospheric Conditions**  
**Ambient Temperature :** 22.4°C  
**Relative Humidity :** 55.6%  
**Barometric Pressure :** 99.91kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 22.6°C  
**Relative Humidity :** 58.1%  
**Barometric Pressure :** 99.85kPa

**Calibration Technician :** Vicky Jaiswal  
**Calibration Date :** 14/03/2017

**Secondary Check:** Riley Cooper  
**Report Issue Date :** 15/03/2017

**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 61672-3:2006, 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 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Least Uncertainties of Measurement - Environmental Conditions			
Acoustic Tests		Temperature	±0.05°C
31.5 Hz to 8kHz	±0.16dB	Relative Humidity	±0.46%
12.5kHz	±0.2dB	Barometric Pressure	±0.017kPa
16kHz	±0.29dB		
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.

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.





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### Sound Calibrator

IEC 60942-2004

## Calibration Certificate

Calibration Number C17127

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

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

#### Atmospheric Conditions

**Ambient Temperature :** 22.3°C  
**Relative Humidity :** 55.6%  
**Barometric Pressure :** 99.9kPa

**Calibration Technician :** Vicky Jaiswal  
**Calibration Date :** 14/03/2017

**Secondary Check:** Riley Cooper  
**Report Issue Date :** 15/03/2017

**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	94.1	1000.32

The sound calibrator has been shown to conform to the class 1 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

Generated SPL ±0.11dB  
Short Term Fluct. ±0.02dB  
Frequency ±0.01%  
Distortion ±0.5%

#### 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.

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**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		Environmental Conditions	
31.5 Hz to 8kHz	±0.12dB	Temperature	±0.03°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.

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**Sound Calibrator  
IEC 60942-2017**

**Calibration Certificate**

Calibration Number C18619

**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 :** 24.2°C  
**Relative Humidity :** 42.9%  
**Barometric Pressure :** 97.69kPa

**Calibration Technician :** Lucky Jaiswal  
**Calibration Date :** 22 Nov 2018  
**Secondary Check:** Lewis Boorman  
**Report Issue Date :** 29 Nov 2018

**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-	94.2	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	±0.11dB	Temperature	±0.2°C
Frequency	±0.01%	Relative Humidity	±2.4%
Distortion	±0.48%	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.

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# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
April 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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Noise and Vibration Analysis and Solutions

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## Wilpinjong Coal

### Environmental Noise Monitoring April 2019

Reference: 19093\_R01  
Report date: 15 May 2019

#### 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: Jonathan Erasmus  
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 Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

The current WCP development consent was approved in April 2017. The environment protection licence (EPL) for WCP was issued in early 2006 with subsequent variations approved.

Attended monitoring was conducted in accordance with the documents detailed above, Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. The duration of each night measurement was 15 minutes.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 1/2 April 2019. The purpose of attended noise monitoring was to quantify and describe the acoustic environment around WCP and compare results with specified limits.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the April 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

### **Global Acoustics Pty Ltd**

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# 1 INTRODUCTION

## 1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 1/2 April 2019. Figure 1 shows the monitoring locations.

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.

## 1.2 Monitoring Locations

There were eight monitoring locations during this survey as listed in Table 1.1 and shown on Figure 1. These monitoring locations are detailed in the site Noise Monitoring Program (NMP).

*Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS*

<b>NMP Descriptor</b>	<b>Monitoring Location</b>
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

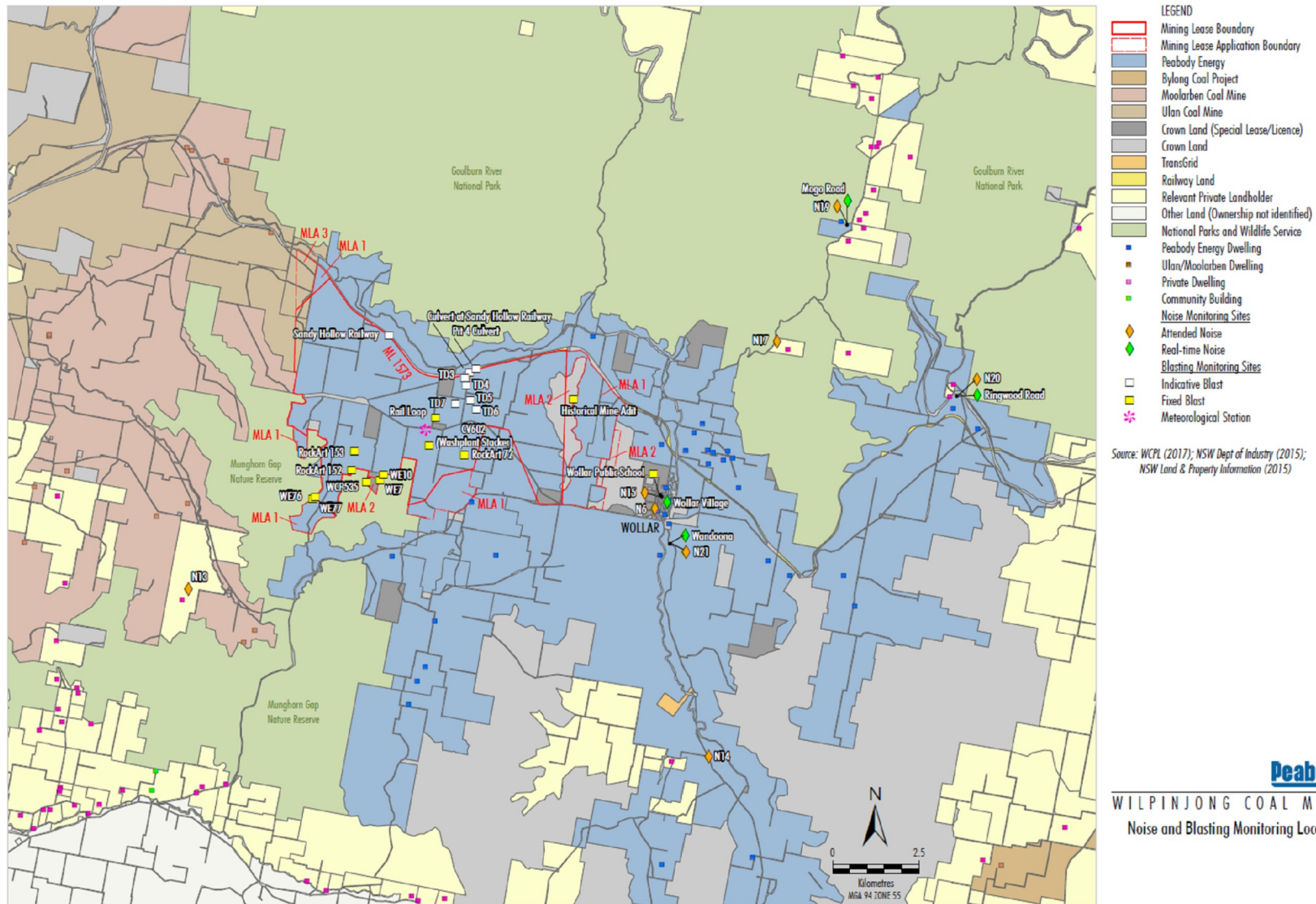


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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
L <sub>A</sub>	The A-weighted root mean squared (RMS) noise level at any instant
L <sub>Amax</sub>	The maximum A-weighted noise level over a time period or for an event
L <sub>A1</sub>	The noise level which is exceeded for 1 per cent of the time
L <sub>A1,1minute</sub>	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute
L <sub>A10</sub>	The noise level which is exceeded for 10 per cent of the time, which is approximately the average of the maximum noise levels
L <sub>A50</sub>	The noise level which is exceeded for 50 per cent of the time
L <sub>A90</sub>	The level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. The L <sub>A90</sub> level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes
L <sub>Amin</sub>	The minimum A-weighted noise level over a time period or for an event
L <sub>Aeq</sub>	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. From Wilpinjong Coal inversion tower data
SC	Stability Class. Based on Wilpinjong Coal inversion tower data
IA	Inaudible. When site-only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site-only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, 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

Approval was granted for the Wilpinjong Extension Project (SSD-6764) in 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

The EPL (No. 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent on 23 March 2018. Relevant noise sections of the licence are reproduced in Appendix A.

### 2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in June 2017. Chapter 6 of the NMP provides details on the noise monitoring program including locations and an attended monitoring methodology. The relevant sections are reproduced in Appendix A.

### 2.4 Project Specific Criteria

Criteria in the project approval and EPL are consistent as are the met exclusion rules determining when criteria apply. Criteria shown in Table 2.1 have been selected as the most appropriate for each monitoring location.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	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 <sup>2</sup>	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:

- 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
- 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 Assessment Method

Attended monitoring was conducted in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. Atmospheric condition measurement was also undertaken during each fifteen minute measurement. Monitoring is undertaken once per month at each location.

Attended monitoring during this reporting period was undertaken by Jonathan Erasmus.

If the exact contribution from 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 levels, for example,  $L_{A10}$ ,  $L_{A50}$  or  $L_{A90}$ . 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 as per section 7.1 of the NPfI (e.g. measuring at an intermediate location and using relevant calculation) 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 or reasonable to employ NPfI methods such as using an intermediate location. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

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

As indicated in L5.5 (a) and (b) of the EPL, the  $L_{A1,1\text{minute}}$  measurement should be undertaken at one (1) metre from the dwelling façade and the  $L_{A\text{eq}}$  measurement within 30 metres of the dwelling. However, the direct measurement of noise at 1 metre from the façade is not practical during monitoring for this project. In most cases, monitoring near the residence is impractical due to barking dogs or issues with obtaining access. In all cases, measurements for this survey were undertaken at a suitable and representative location.

Low-frequency noise has been assessed using the NPfI method, detailed in Section 2.5 of this report.

### 3.2 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 analyser	30131882	05/02/2021
Pulsar 105 acoustic calibrator	78226	01/02/2021
Rion NA-28 sound level analyser	01070590	25/06/2020
Pulsar 106 acoustic calibrator	79631	22/01/2021

### 3.3 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.

### 3.4 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 3.2. Attended and real-time monitor locations are shown in Figure 1.

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

<b>Report Descriptor for Attended monitoring location</b>	<b>Real-Time Monitor ID</b>	<b>Monitoring Location</b>
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 2019<sup>1</sup>*

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A50</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	01/04/2019 23:19	51	37	34	32	32	30	28	48
N13	02/04/2019 00:59	47	31	29	27	28	26	24	47
N14	02/04/2019 00:24	46	32	29	27	28	25	21	54
N15	01/04/2019 23:01	48	35	31	29	29	26	24	54
N17	01/04/2019 22:31	41	35	30	25	27	22	20	54
N19	01/04/2019 22:06	47	35	31	26	28	21	19	54
N20	01/04/2019 23:50	45	40	38	33	35	31	28	46
N21	02/04/2019 00:49	54	34	27	22	26	21	20	54

Note:

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

### 4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey. None of the measurements satisfied the conditions outlined in Section 3.3 when assessing low-frequency noise.

Therefore no further assessment of modifying factors was undertaken.

### 4.3 Attended Noise Monitoring

Table 4.2 and Table 4.3 detail  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  noise levels from WCP in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the project approval and EPL.

**Table 4.2:  $L_{Aeq,15\text{minute}}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – APRIL 2019**

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{Aeq,15\text{min}}$ dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	01/04/2019 23:19	3.2	D	37	No	IA	NA
N13	02/04/2019 00:59	2.4	D	36	Yes	<30	Nil
N14	02/04/2019 00:24	3.3	D	35	No	IA	NA
N15	01/04/2019 23:01	3.4	D	35	No	IA	NA
N17	01/04/2019 22:31	3.4	D	35	No	IA	NA
N19	01/04/2019 22:06	3.8	D	35	No	IA	NA
N20	01/04/2019 23:50	2.7	D	35	Yes	IA	Nil
N21	02/04/2019 00:49	2.6	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

Table 4.3:  $L_{A1,1minute}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – APRIL 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{A1,1min}$ dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	01/04/2019 23:19	3.2	D	45	No	IA	NA
N13	02/04/2019 00:59	2.4	D	45	Yes	<30	Nil
N14	02/04/2019 00:24	3.3	D	45	No	IA	NA
N15	01/04/2019 23:01	3.4	D	45	No	IA	NA
N17	01/04/2019 22:31	3.4	D	45	No	IA	NA
N19	01/04/2019 22:06	3.8	D	45	No	IA	NA
N20	01/04/2019 23:50	2.7	D	45	Yes	IA	Nil
N21	02/04/2019 00:49	2.6	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.



#### 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, APRIL 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total $L_{Aeq}$ dB	Low pass (<630Hz) $L_{Aeq}$ dB	Low pass (<630Hz) $L_{A90}$ dB	WCP $L_{Aeq}$ dB
N15/SX33	01/04/2019 23:01	01/04/2019 23:00	51	33	31	IA
N19/SX32	01/04/2019 22:06	01/04/2019 22:00	22	18	NR	IA
N20/SX30	01/04/2019 23:50	01/04/2019 23:45	37	33	17	IA
N21/SX31	02/04/2019 00:49	02/04/2019 00:45	30	25	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 4.5. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – APRIL 2019

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction ° MN	Cloud Cover eighths
N6	01/04/2019 23:19	18	2.0	80	7
N13	02/04/2019 00:59	16	0.3	90	3
N14	02/04/2019 00:24	17	0.5	130	2
N15	01/04/2019 23:01	18	0.6	155	6
N17	01/04/2019 22:31	20	0.4	30	4
N19	01/04/2019 22:06	18	0.9	360	4
N20	01/04/2019 23:50	18	0.8	15	2
N21	02/04/2019 00:49	19	0.0	-	2

Notes:

1. Wind speed and direction measured at 1.8 metres; and
2. "-" denotes calm conditions at 1.8 metres.

Data obtained from the WCP meteorological station and tower is used to determine compliance with specified noise criteria and is provided in Table 4.6.

Table 4.6: WCP METEOROLOGICAL STATION DATA<sup>1</sup>

Date and End Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres <sup>2</sup>
01/04/2019 22:00	3.6	86	-0.8
01/04/2019 22:15	3.8	79	-0.8
01/04/2019 22:30	3.3	81	-0.8
01/04/2019 22:45	3.4	82	-1.0
01/04/2019 23:00	3.2	74	-1.0
01/04/2019 23:15	3.4	74	-1.0
01/04/2019 23:30	3.2	73	-1.0
01/04/2019 23:45	3.1	74	-1.2
02/04/2019 00:00	2.7	83	-1.2
02/04/2019 00:15	2.9	79	-1.2
02/04/2019 00:30	2.9	82	-1.0
02/04/2019 00:45	3.3	77	-0.8
02/04/2019 01:00	2.6	83	-1.0
02/04/2019 01:15	2.4	84	-1.0
02/04/2019 01:30	2.3	84	-1.0
02/04/2019 01:45	2.7	91	-1.2
02/04/2019 02:00	2.7	84	-1.2
02/04/2019 02:15	2.9	84	-1.2
02/04/2019 02:30	2.4	81	-1.2
02/04/2019 02:45	2.8	81	-1.0
02/04/2019 03:00	2.8	83	-1.2
02/04/2019 03:15	2.6	89	-1.2
02/04/2019 03:30	2.8	97	-1.4
02/04/2019 03:45	2.5	110	-1.2
02/04/2019 04:00	2.4	103	-1.2
02/04/2019 04:15	2.7	109	-1.0
02/04/2019 04:30	3.4	109	-1.0

Notes:

1. Data supplied by WCP;
2. "-" indicates calm conditions and therefore no wind direction; and
3. Lapse rate calculated using data sourced from WCP inversion tower.

## 5 DISCUSSION

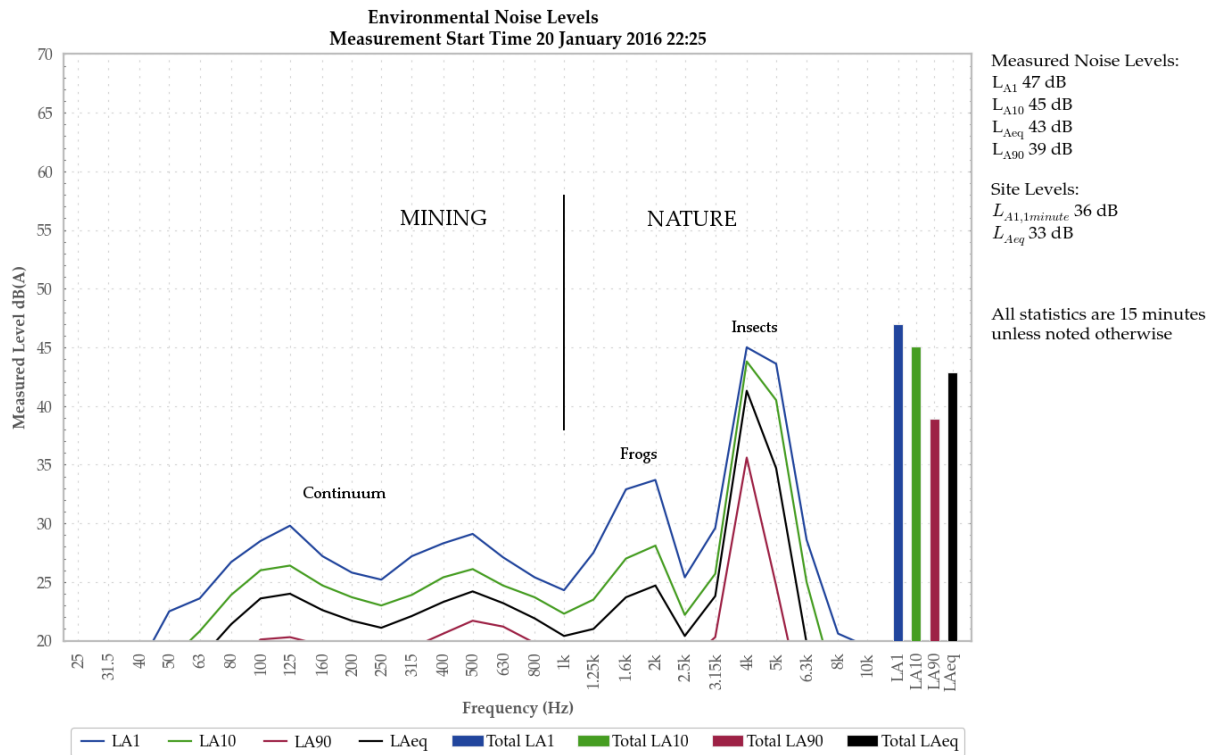
### 5.1 Noted Noise Sources

Data gathered during attended monitoring is shown in tables in Section 4. These noise levels 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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was, where possible, measured directly, or, determined by frequency analysis. Time variations of noise sources in each measurement, their temporal characteristics, are taken into account via statistical descriptors.

From these observations summaries have been derived for each location. The following chapter sections provide these summaries. Statistical 1/3 octave band analysis of environmental noise was undertaken, and Figure 3 to Figure 10 display the frequency ranges for various noise sources at each location for  $L_{A1}$ ,  $L_{A10}$ ,  $L_{A90}$  and  $L_{Aeq}$ . 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; mining noise is at frequencies less than 1000 Hz (this 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; this can be 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, 1 April 2019

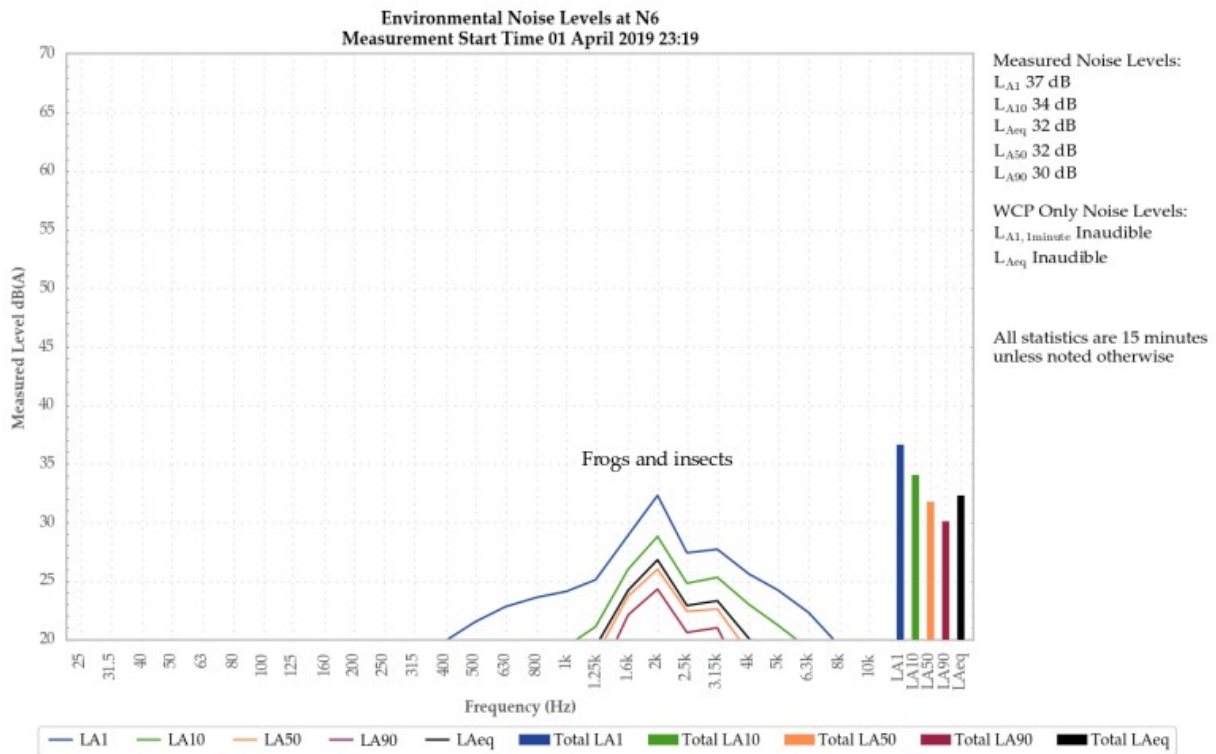


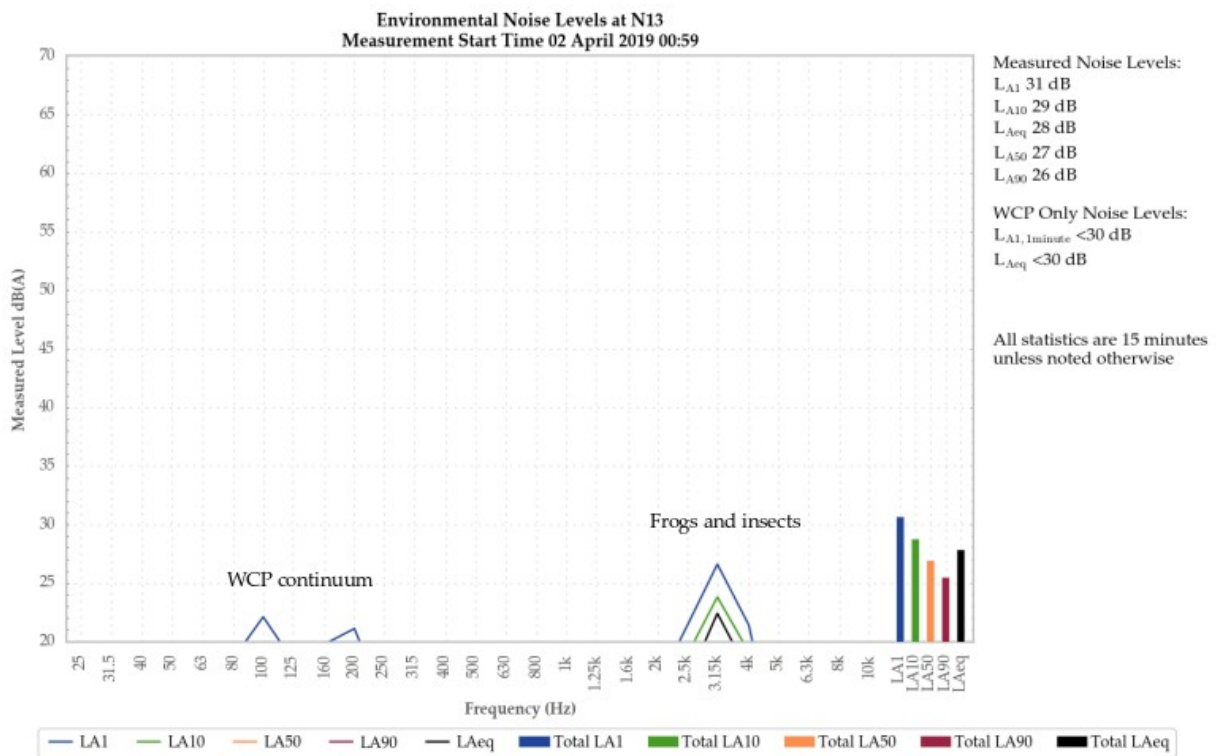
Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was inaudible.

Frogs and insects generated all measured levels.

Breeze in foliage was also noted.

5.1.2 N13, 2 April 2019



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

WCP was audible at low levels throughout the measurement, generating a site only LAeq,15minute and LA1,1minute of less than 30 dB.

WCP was a minor contributor the measured LA1. Frogs and insects primarily generated all other measured levels.

Breeze in foliage and bats were also noted.

5.1.3 N14, 2 April 2019

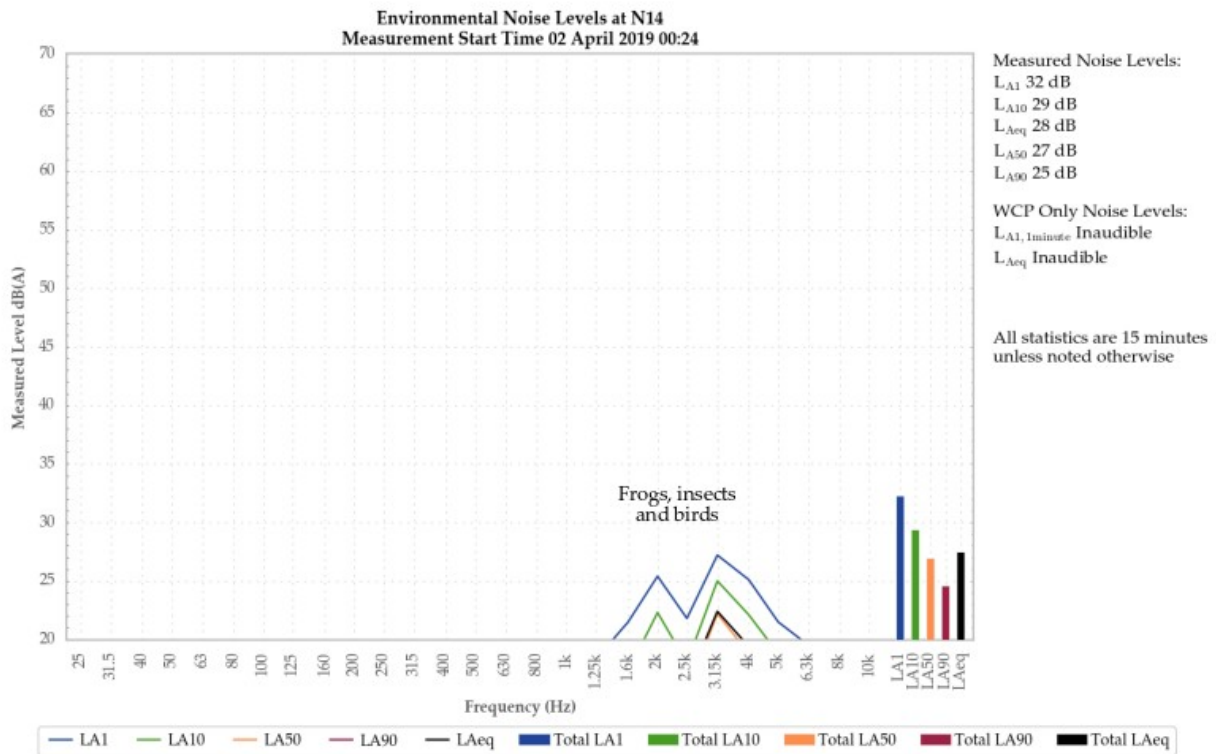


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

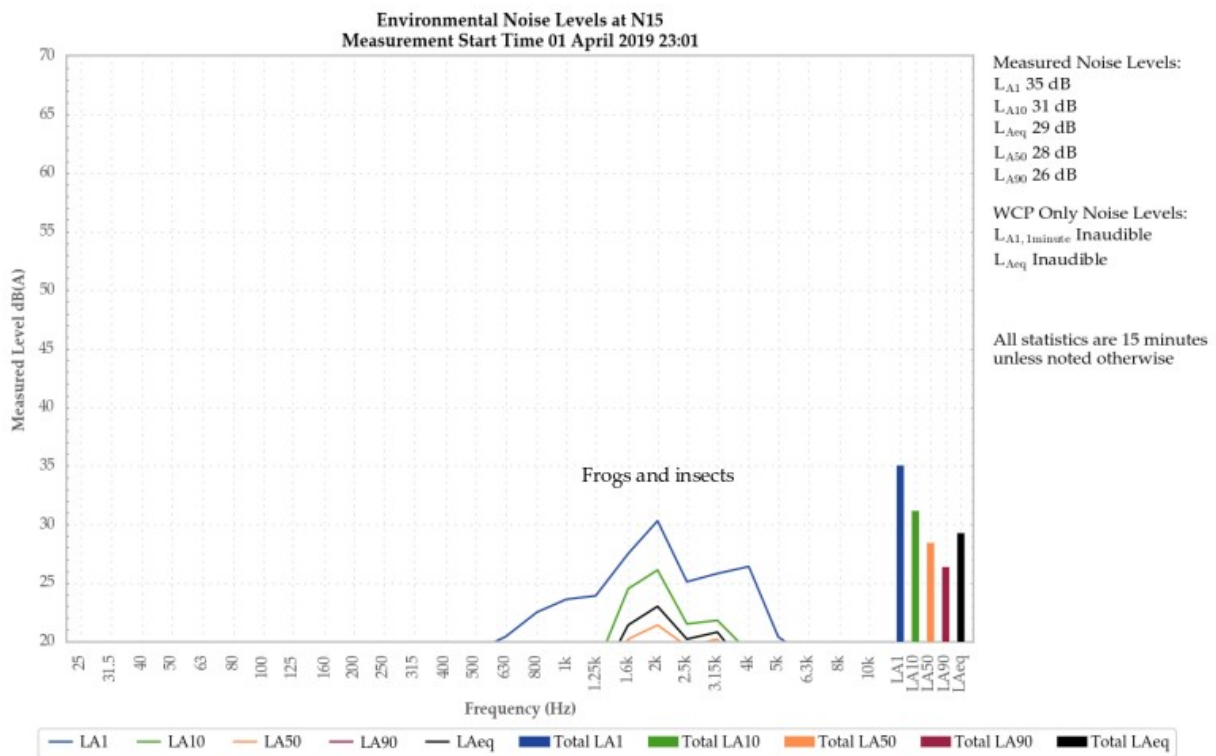
WCP was inaudible.

Frogs, insects and birds generated all measured levels.

A train was also noted.



### 5.1.4 N15, 1 April 2019



WCP was inaudible.

Frogs, insects generated all measured levels.

A dog was also noted.

5.1.5 N17, 1 April 2019

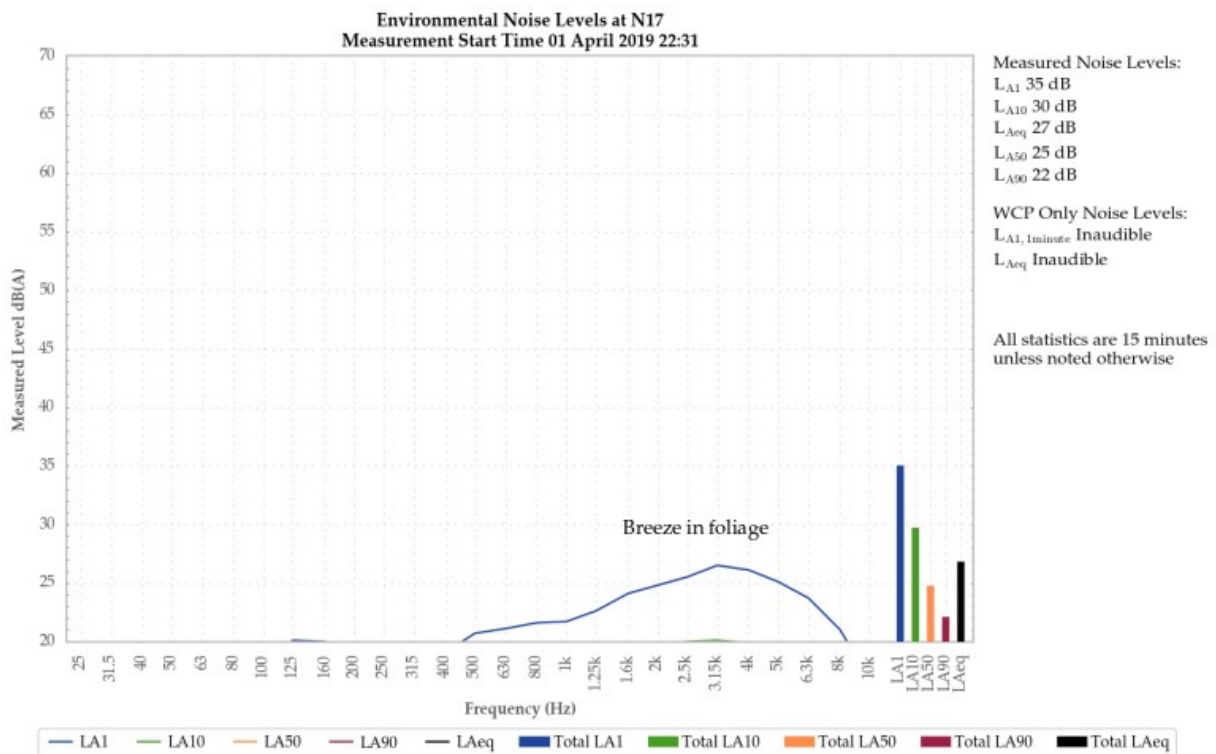


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

WCP was inaudible.

Breeze in foliage generated all measured levels.

Insects and a distant train was also noted.

5.1.6 N19, 1 April 2019

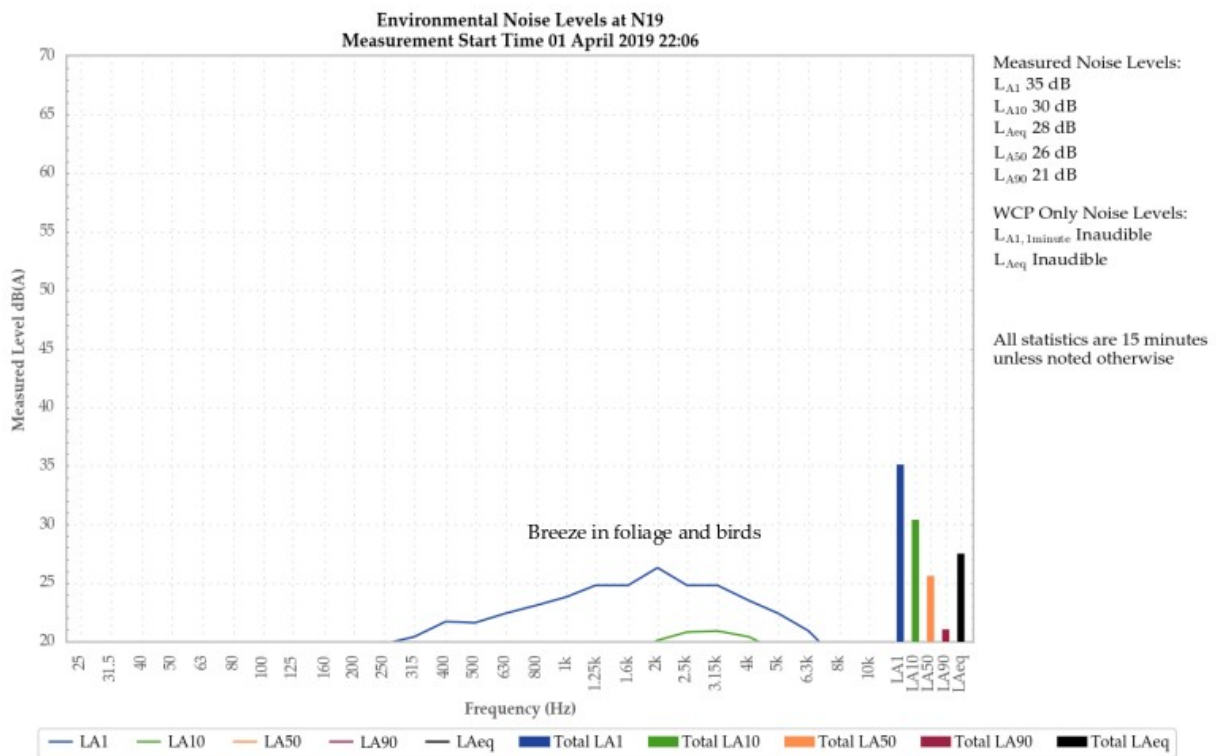


Figure 8: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible.

Breeze in foliage primarily generated the measured levels. Birds contributed to the measured LA1.

Insects were also noted.

5.1.7 N20, 1 April 2019

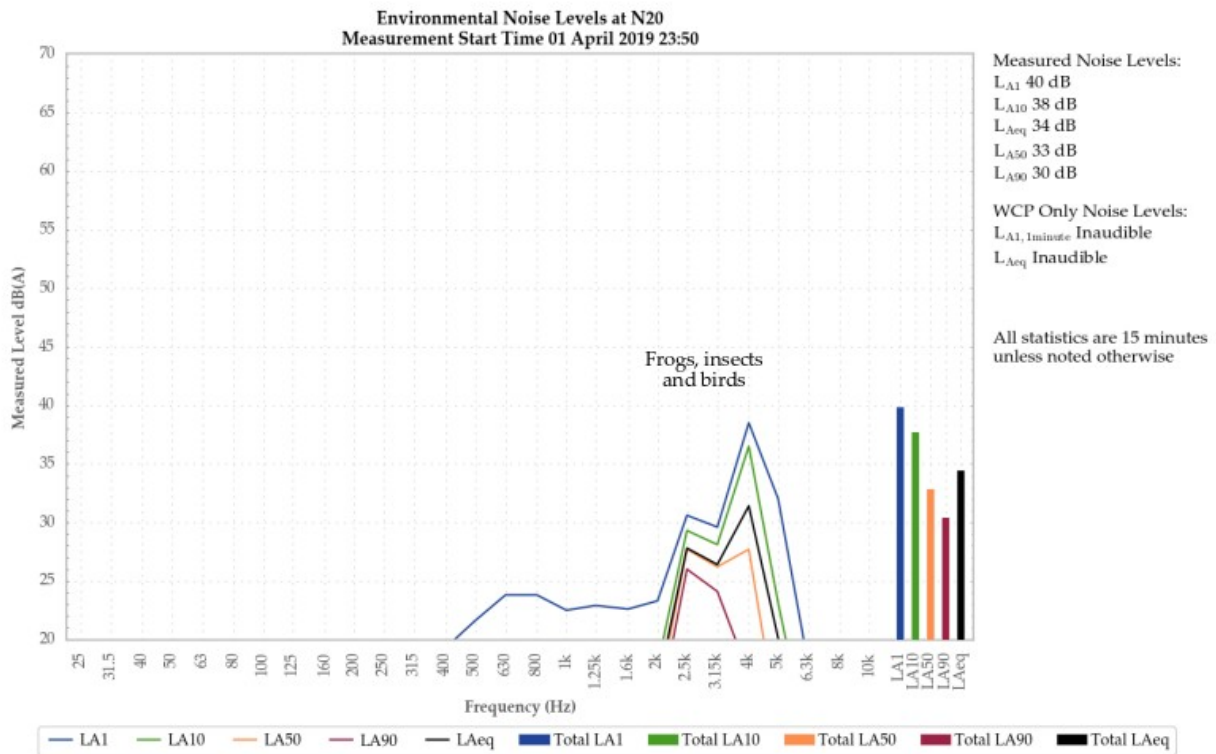


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible.

Frogs and insects primarily generated all measured levels. Birds contributed to the measured LA1.

5.1.8 N21, 1 April 2019

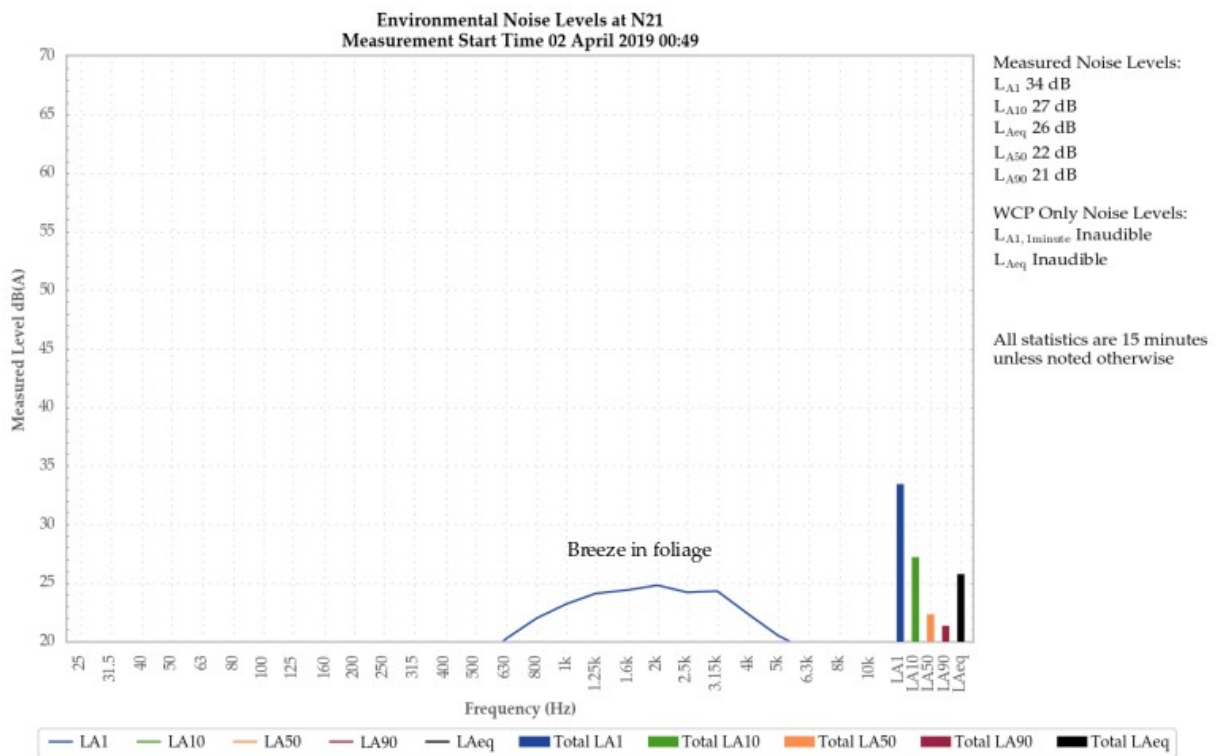


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

WCP was inaudible.

Breeze in foliage generated the measured levels.

Frogs and insects were also noted.

## 6 SUMMARY OF COMPLIANCE

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken during the night period of 1/2 April 2019. Attended noise monitoring was conducted at eight sites. The duration of all measurements was 15 minutes.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the April 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### A STATUTORY REQUIREMENTS

Several documents specify noise criteria that apply to the Wilpinjong operation. The noise sections of the relevant consent, licence and NMP are reproduced below.

## 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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.

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

<b>Hz/dB(Z)</b>	<b>One-third octave <math>L_{Zeq,15minute}</math> threshold level</b>												
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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations. Relevant extracts are shown below.

### L5 Noise limits

L5.1 Noise generated at the premises must not exceed the noise limits presented in the table below. The locations referred to in the table below are indicated in Appendix 5 - Figures 1 and 2 of Development

Consent number SSD-6764 dated 24 April 2017.

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

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

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

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

L5.3 The noise limits set out in condition L5.1 apply under all meteorological conditions except for the following:

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

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

The relevant sections of the WCP Noise Management Plan, dated June 2017 are reproduced below.

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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.

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## APPENDIX

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### **B CALIBRATION CERTIFICATES**



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



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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.

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## 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**  
**Ambient Temperature :** 21.3°C  
**Relative Humidity :** 41.7%  
**Barometric Pressure :** 100.95kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 22.7°C  
**Relative Humidity :** 39.2%  
**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 Agüero

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

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Least Uncertainties of Measurement - Environmental Conditions			
Acoustic Tests		Temperature	±0.05°C
51.5 Hz to 9kHz	±0.12dB	Relative Humidity	±0.46%
12.5kHz	±0.15dB	Barometric Pressure	±0.017kPa
16kHz	±0.31dB		
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.

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**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 H 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	Temperature
Frequency	Relative Humidity
Distortion	Barometric Pressure

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

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# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
May 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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Noise and Vibration Analysis and Solutions

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## Wilpinjong Coal

### Environmental Noise Monitoring May 2019

Reference: 19127\_R01

Report date: 18 June 2019

#### 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*



## **EXECUTIVE SUMMARY**

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

The current WCP development consent was approved in April 2017. The environment protection licence (EPL) for WCP was issued in early 2006 with subsequent variations approved.

Attended monitoring was conducted in accordance with the documents detailed above, Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. The duration of each night measurement was 15 minutes.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 13/14 May 2019. The purpose of attended noise monitoring was to quantify and describe the acoustic environment around WCP and compare results with specified limits.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the May 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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# 1 INTRODUCTION

## 1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 13/14 May 2019. Figure 1 shows the monitoring locations.

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.

## 1.2 Monitoring Locations

There were eight monitoring locations during this survey as listed in Table 1.1 and shown on Figure 1. These monitoring locations are detailed in the site Noise Monitoring Program (NMP).

*Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS*

<b>NMP Descriptor</b>	<b>Monitoring Location</b>
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

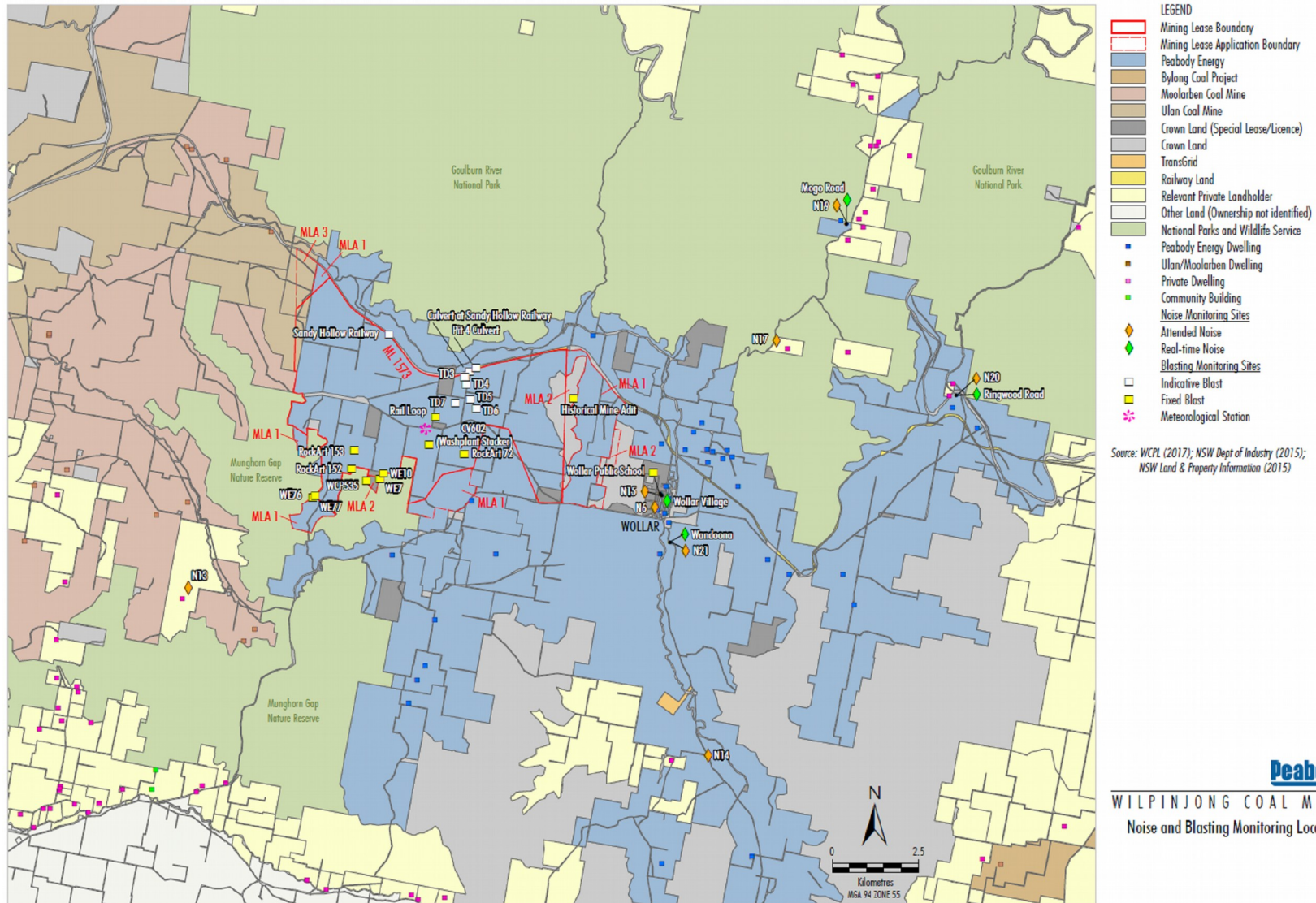


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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
L <sub>A</sub>	The A-weighted root mean squared (RMS) noise level at any instant
L <sub>Amax</sub>	The maximum A-weighted noise level over a time period or for an event
L <sub>A1</sub>	The noise level which is exceeded for 1 per cent of the time
L <sub>A1,1minute</sub>	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute
L <sub>A10</sub>	The noise level which is exceeded for 10 per cent of the time, which is approximately the average of the maximum noise levels
L <sub>A50</sub>	The noise level which is exceeded for 50 per cent of the time
L <sub>A90</sub>	The level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. The L <sub>A90</sub> level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes
L <sub>Amin</sub>	The minimum A-weighted noise level over a time period or for an event
L <sub>Aeq</sub>	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. From Wilpinjong Coal inversion tower data
SC	Stability Class. Based on Wilpinjong Coal inversion tower data
IA	Inaudible. When site-only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site-only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, 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

Approval was granted for the Wilpinjong Extension Project (SSD-6764) in 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

The EPL (No. 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent on 23 March 2018. Relevant noise sections of the licence are reproduced in Appendix A.

### 2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in June 2017. Chapter 6 of the NMP provides details on the noise monitoring program including locations and an attended monitoring methodology. The relevant sections are reproduced in Appendix A.

### 2.4 Project Specific Criteria

Criteria in the project approval and EPL are consistent as are the met exclusion rules determining when criteria apply. Criteria shown in Table 2.1 have been selected as the most appropriate for each monitoring location.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	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 <sup>2</sup>	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:

- 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
- 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 Assessment Method

Attended monitoring was conducted in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. Atmospheric condition measurement was also undertaken during each fifteen minute measurement. Monitoring is undertaken once per month at each location.

Attended monitoring during this reporting period was undertaken by Jonathan Erasmus.

If the exact contribution from 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 levels, for example,  $L_{A10}$ ,  $L_{A50}$  or  $L_{A90}$ . 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 as per section 7.1 of the NPfI (e.g. measuring at an intermediate location and using relevant calculation) 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 or reasonable to employ NPfI methods such as using an intermediate location. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

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

As indicated in L5.5 (a) and (b) of the EPL, the  $L_{A1,1\text{minute}}$  measurement should be undertaken at one (1) metre from the dwelling façade and the  $L_{A\text{eq}}$  measurement within 30 metres of the dwelling. However, the direct measurement of noise at 1 metre from the façade is not practical during monitoring for this project. In

most cases, monitoring near the residence is impractical due to barking dogs or issues with obtaining access. In all cases, measurements for this survey were undertaken at a suitable and representative location.

Low-frequency noise has been assessed using the NPfI method, detailed in Section 2.5 of this report.

### 3.2 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 analyser	1070590	25/06/2020
Pulsar 106 acoustic calibrator	79631	22/01/2021
Rion NA-28 sound level analyser	370304	26/11/2020
Pulsar 106 acoustic calibrator	81334	05/03/2020

### 3.3 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.

### 3.4 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 3.2. Attended and real-time monitor locations are 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 – MAY 2019<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A50</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	13/05/2019 23:13	48	40	26	18	27	17	16	54
N13	14/05/2019 01:19	50	37	27	22	26	19	17	54
N14	14/05/2019 00:35	43	28	23	21	22	19	18	53
N15	13/05/2019 22:54	44	26	20	17	19	16	15	54
N17	13/05/2019 22:24	41	27	22	17	19	15	14	54
N19	13/05/2019 22:00	41	23	17	15	16	14	14	54
N20	13/05/2019 23:42	45	39	35	23	30	16	15	53
N21	14/05/2019 01:00	40	31	24	21	23	20	18	53

Note:

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

### 4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey. None of the measurements satisfied the conditions outlined in Section 3.3 when assessing low-frequency noise.

Therefore no further assessment of modifying factors was undertaken.

### 4.3 Attended Noise Monitoring

Table 4.2 and Table 4.3 detail  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  noise levels from WCP in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the project approval and EPL.

**Table 4.2:  $L_{Aeq,15\text{minute}}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MAY 2019**

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{Aeq,15\text{min}}$ dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	13/05/2019 23:13	0.0	F	37	Yes	IA	Nil
N13	14/05/2019 01:19	0.0	F	36	Yes	<25	Nil
N14	14/05/2019 00:35	0.0	F	35	Yes	IA	Nil
N15	13/05/2019 22:54	0.7	F	35	Yes	IA	Nil
N17	13/05/2019 22:24	0.0	G	35	No	IA	NA
N19	13/05/2019 22:00	0.0	F	35	Yes	IA	Nil
N20	13/05/2019 23:42	0.7	F	35	Yes	IA	Nil
N21	14/05/2019 01:00	0.6	G	35	No	<20	NA

**Notes:**

1. Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

Table 4.3: LA1,1minute GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – MAY 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP LA1,1min dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	13/05/2019 23:13	0.0	F	45	Yes	IA	Nil
N13	14/05/2019 01:19	0.0	F	45	Yes	27	Nil
N14	14/05/2019 00:35	0.0	F	45	Yes	IA	Nil
N15	13/05/2019 22:54	0.7	F	45	Yes	IA	Nil
N17	13/05/2019 22:24	0.0	G	45	No	IA	NA
N19	13/05/2019 22:00	0.0	F	45	Yes	IA	Nil
N20	13/05/2019 23:42	0.7	F	45	Yes	IA	Nil
N21	14/05/2019 01:00	0.6	G	45	No	<20	NA

Notes:

1. Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

#### 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<sub>Aeq</sub> and L<sub>A90</sub> are typically good indicators of mining noise levels.

Table 4.4: REAL-TIME AND ATTENDED NOISE LEVELS, MAY 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total L <sub>Aeq</sub> dB	Low pass (<630Hz) L <sub>Aeq</sub> dB	Low pass (<630Hz) L <sub>A90</sub> dB	WCP L <sub>Aeq</sub> dB
N15/SX33	13/05/2019 22:54	13/05/2019 23:00	31	26	38	IA
N19/SX32	13/05/2019 22:00	13/05/2019 22:00	18	23	18	IA
N20/SX30	13/05/2019 23:42	13/05/2019 23:45	38	38	26	IA
N21/SX31	14/05/2019 01:00	14/05/2019 01:00	24	23	22	<20

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 or hail.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – MAY 2019

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	13/05/2019 23:13	13	0.0	-	4
N13	14/05/2019 01:19	12	0.0	-	1
N14	14/05/2019 00:35	12	1.2	120	6
N15	13/05/2019 22:54	13	0.0	-	6
N17	13/05/2019 22:24	19	0.0	-	4
N19	13/05/2019 22:00	16	0.0	-	4
N20	13/05/2019 23:42	14	0.0	-	6
N21	14/05/2019 01:00	12	0.0	-	6

Notes:

1. Wind speed and direction measured at 1.8 metres; and
2. "-" denotes calm conditions at 1.8 metres.

Data obtained from the WCP meteorological station and tower is used to determine compliance with specified noise criteria and is provided in Table 4.6.

Table 4.6: WCP METEOROLOGICAL STATION DATA<sup>1</sup>

Date and End Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres <sup>2</sup>
13/05/2019 22:00	0.0	-	1.8
13/05/2019 22:15	0.0	-	2.4
13/05/2019 22:30	0.0	-	4.2
13/05/2019 22:45	0.0	-	4.8
13/05/2019 23:00	0.0	-	4.4
13/05/2019 23:15	0.7	295	3.4
13/05/2019 23:30	0.0	-	3.2
13/05/2019 23:45	0.0	-	3.2
14/05/2019 00:00	0.7	284	2.4
14/05/2019 00:15	0.0	-	3.2
14/05/2019 00:30	0.0	-	3.6
14/05/2019 00:45	0.0	-	3.4
14/05/2019 01:00	1.0	338	3.6
14/05/2019 01:15	0.6	331	4.2
14/05/2019 01:30	0.0	-	3
14/05/2019 01:45	0.0	-	3.6
14/05/2019 02:00	0.0	-	4.4
14/05/2019 02:15	0.0	-	3.8
14/05/2019 02:30	0.0	-	3.6
14/05/2019 02:45	0.0	-	3.6
14/05/2019 03:00	0.0	-	3.4
14/05/2019 03:15	0.0	-	4.2
14/05/2019 03:30	0.0	-	4.8
14/05/2019 03:45	0.0	-	4
14/05/2019 04:00	0.0	-	4
14/05/2019 04:15	0.0	-	3.6
14/05/2019 04:30	0.0	-	3.4

Notes:

1. Data supplied by WCP;
2. "-" indicates calm conditions and therefore no wind direction; and
3. Lapse rate calculated using data sourced from WCP inversion tower.

## 5 DISCUSSION

### 5.1 Noted Noise Sources

Data gathered during attended monitoring is shown in tables in Section 4. These noise levels 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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was, where possible, measured directly, or, determined by frequency analysis. Time variations of noise sources in each measurement, their temporal characteristics, are taken into account via statistical descriptors.

From these observations summaries have been derived for each location. The following chapter sections provide these summaries. Statistical 1/3 octave band analysis of environmental noise was undertaken, and Figure 3 to Figure 10 display the frequency ranges for various noise sources at each location for  $L_{A1}$ ,  $L_{A10}$ ,  $L_{A90}$  and  $L_{Aeq}$ . 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; mining noise is at frequencies less than 1000 Hz (this 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; this can be 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  $L_{Aeq}$ .

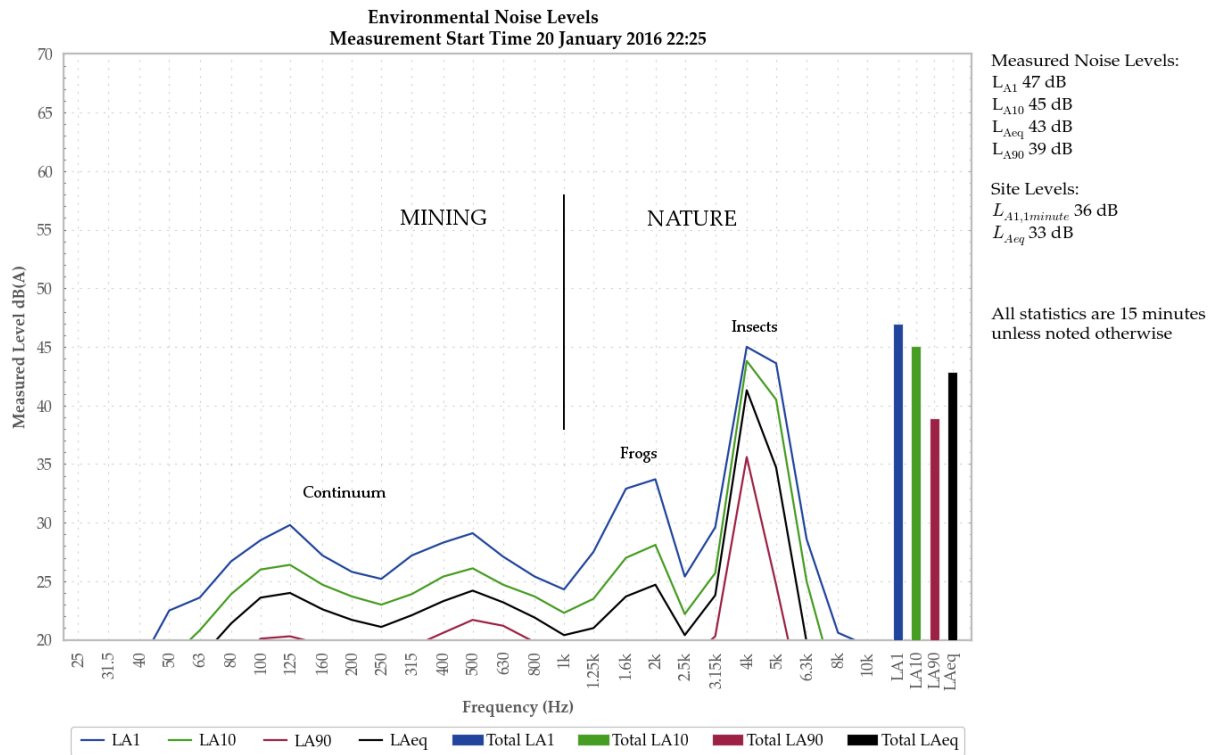


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 13 May 2019

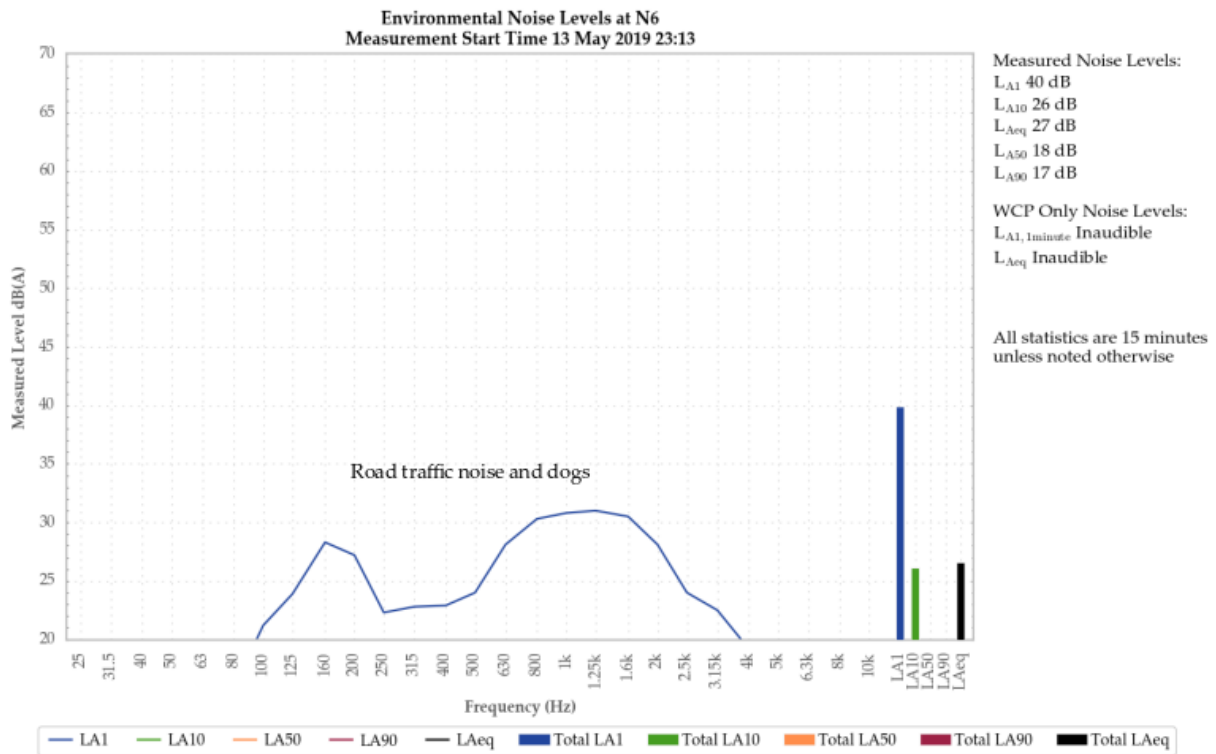


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Road traffic noise and dogs generated the measured levels.

A distant train was also noted.

5.1.2 N13, 13 May 2019

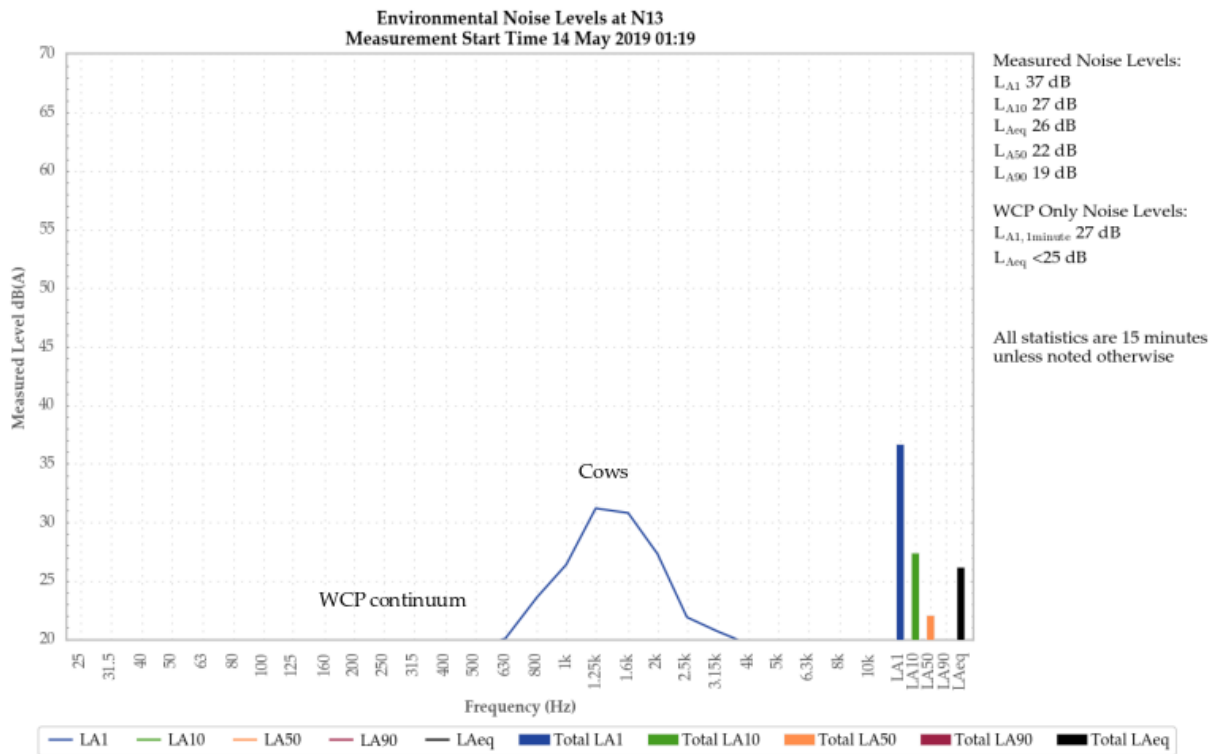


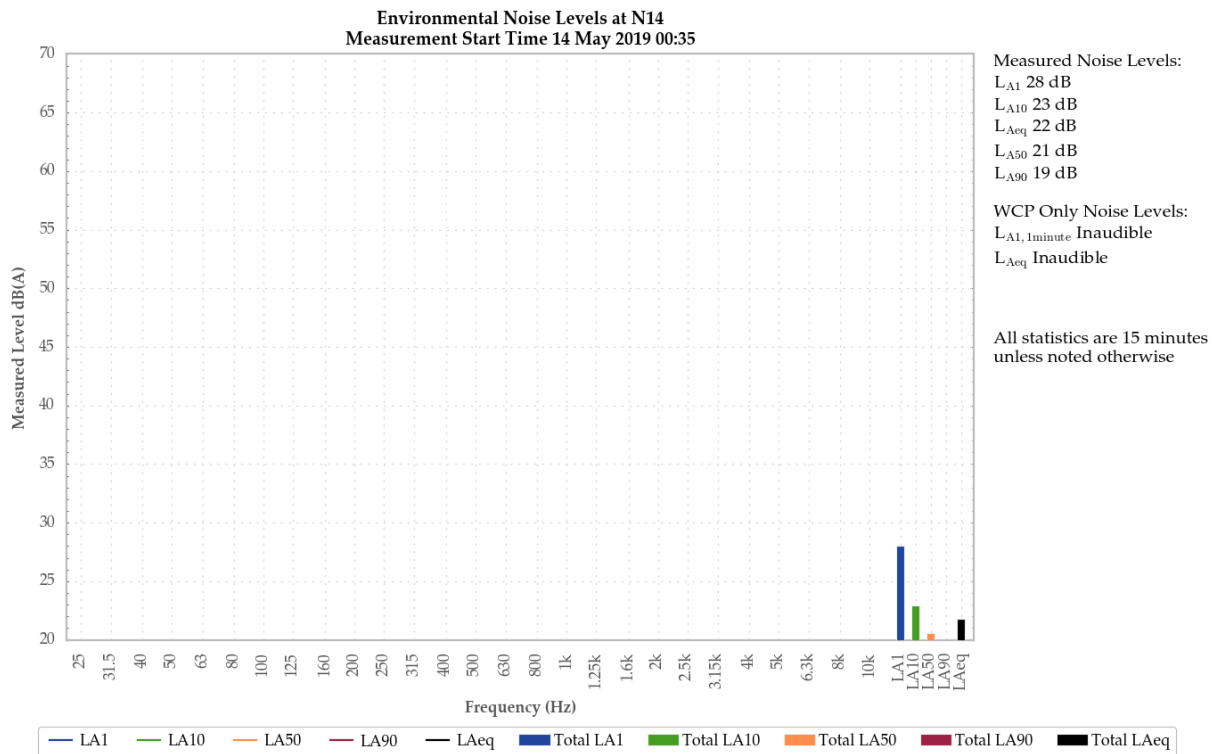
Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was audible at low levels throughout the measurement. General mine continuum generated a site-only LAeq,15minute of less than 25 dB and a LA1,1minute of 27 dB.

Cows generated the measured LA1.

Frogs and insects were also noted.

### 5.1.3 N14, 14 May 2019

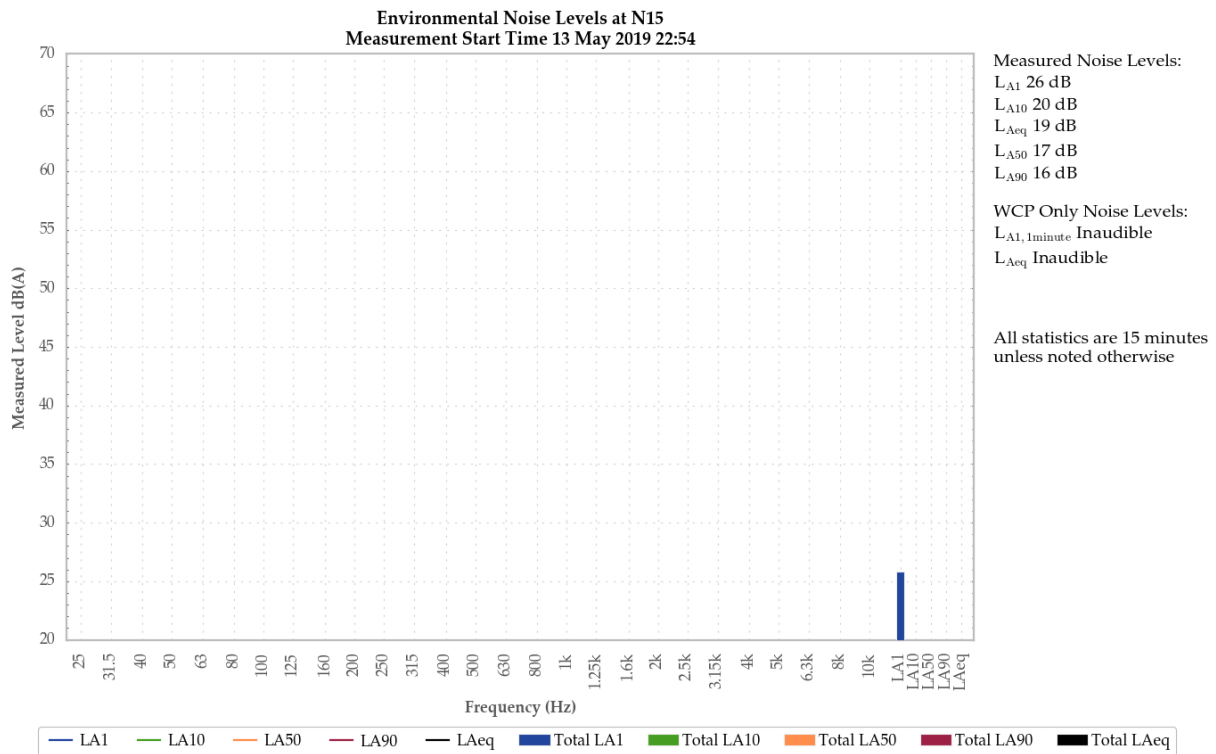


**Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads**

WCP was inaudible.

Frogs, insects and a local continuum were noted.

### 5.1.4 N15, 13 May 2019



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

WCP was inaudible.

Birds and insects were noted.



5.1.5 N17, 13 May 2019

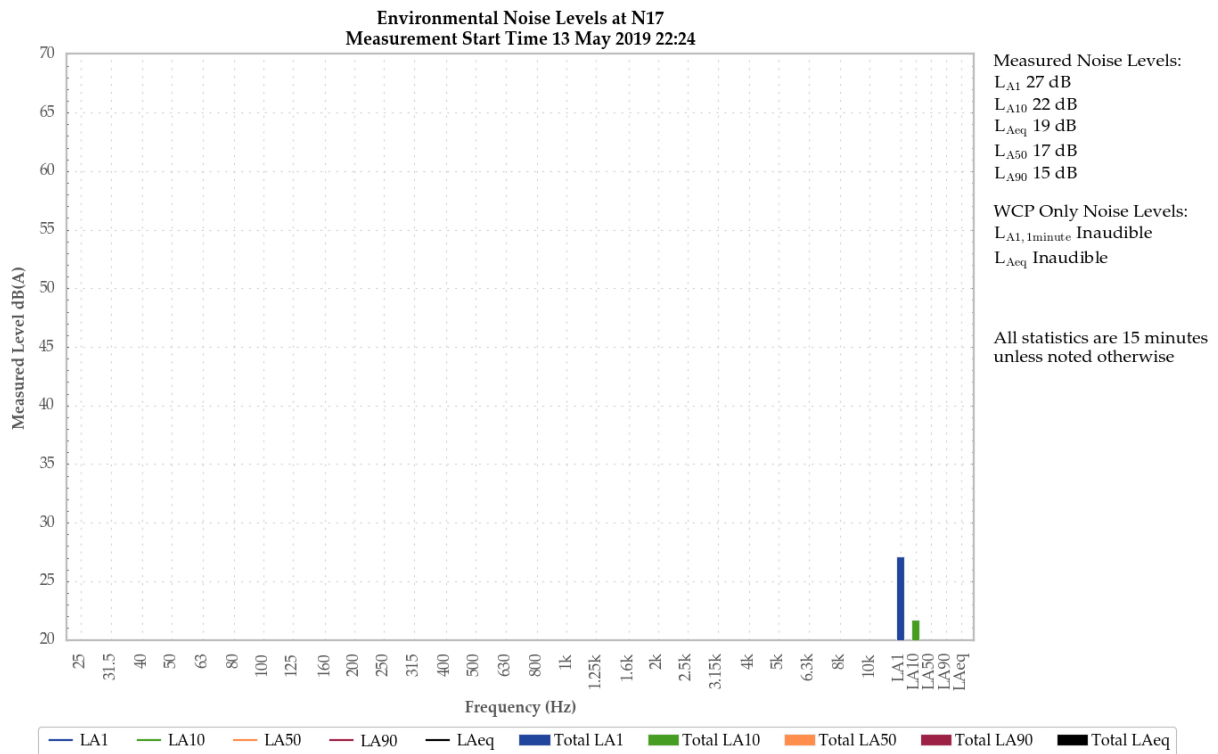
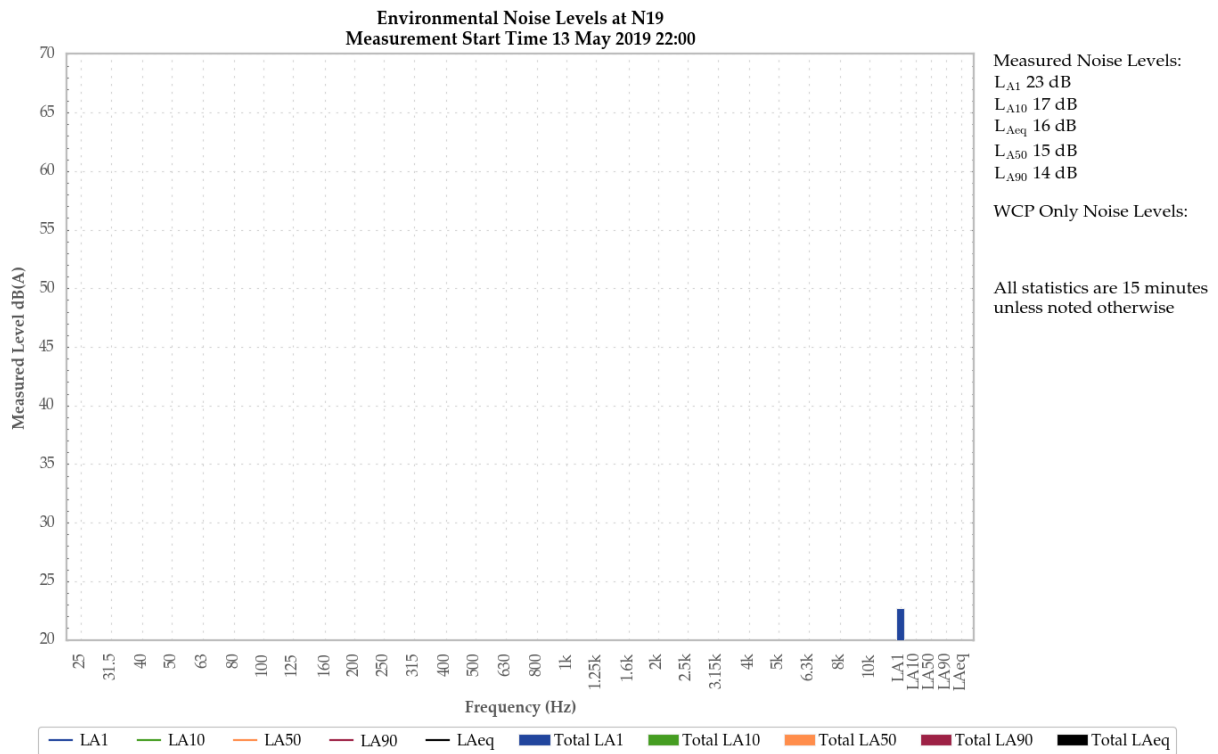


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

WCP was inaudible.

Aircraft, trains, birds and insects were noted.

5.1.6 N19, 13 May 2019



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

WCP was inaudible.

Bats were noted.

5.1.7 N20, 13 May 2019

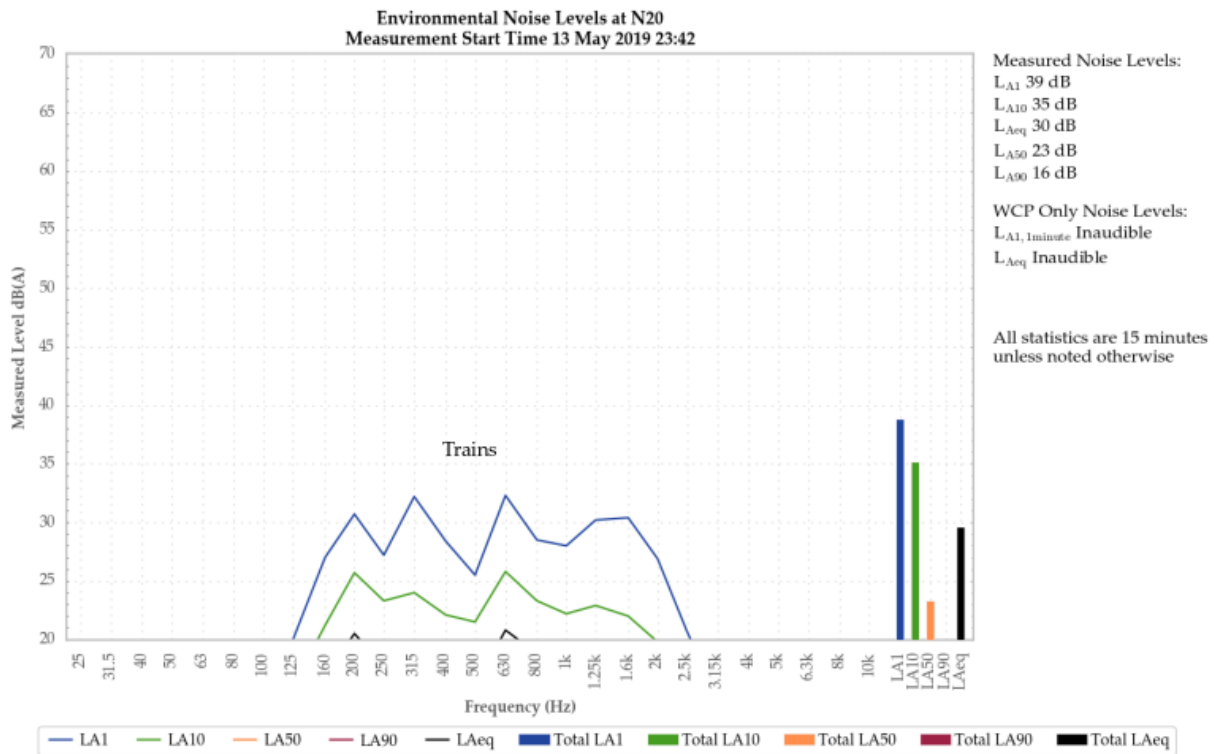


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible.

Trains generated the measured levels.

Frogs, insects and birds were also noted.

5.1.8 N21, 13 May 2019

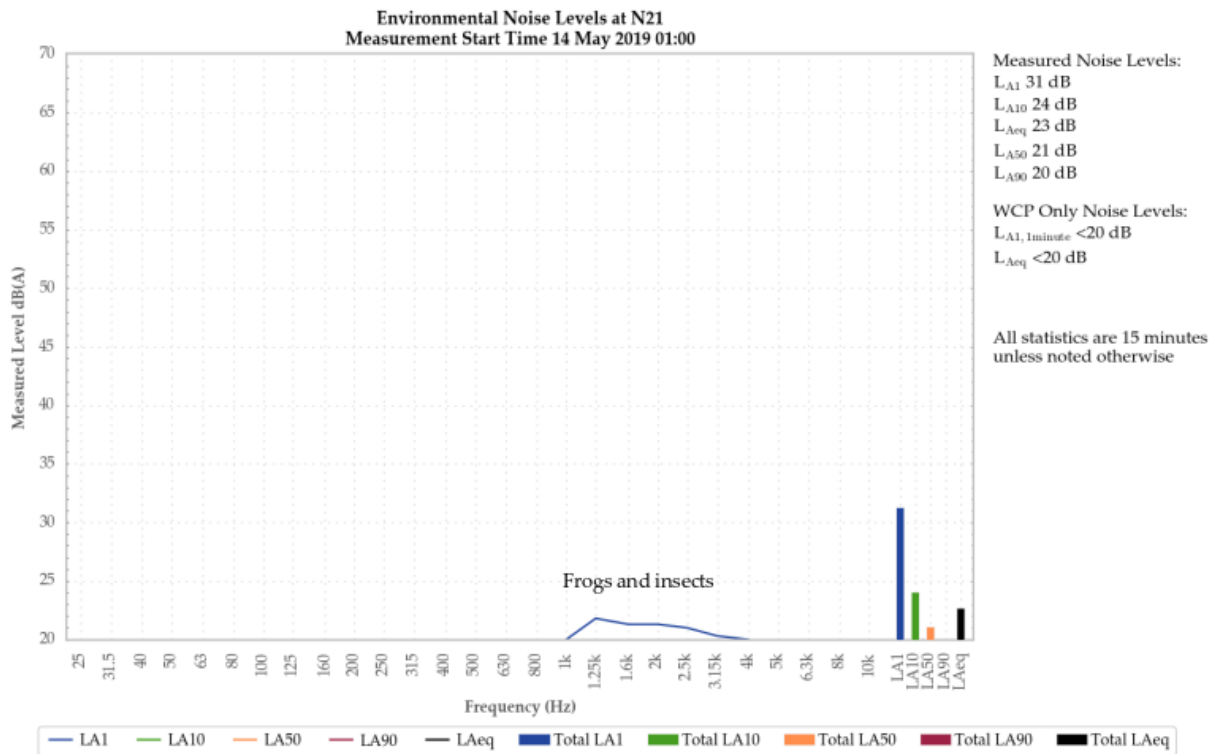


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

A low-level continuum from WCP was audible during the measurement generating the site-only LAeq,15minute and LA1,1minute of less than 20 dB.

Frogs and insects contributed to measured levels.

## 6 SUMMARY OF COMPLIANCE

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken during the night period of 13/14 May 2019. Attended noise monitoring was conducted at eight sites. The duration of all measurements was 15 minutes.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the May 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### A STATUTORY REQUIREMENTS

Several documents specify noise criteria that apply to the Wilpinjong operation. The noise sections of the relevant consent, licence and NMP are reproduced below.

## 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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.



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

<b>Hz/dB(Z)</b>	<b>One-third octave <math>L_{Zeq,15minute}</math> threshold level</b>												
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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations. Relevant extracts are shown below.

### 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

The relevant sections of the WCP Noise Management Plan, dated June 2017 are reproduced below.

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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.



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## APPENDIX

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### ***B CALIBRATION CERTIFICATES***



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**  
**Ambient Temperature :** 21.3°C  
**Relative Humidity :** 41.7%  
**Barometric Pressure :** 100.95kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 22.7°C  
**Relative Humidity :** 39.2%  
**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: Tonaburst 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.

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Labs Pty Ltd**

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**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 H 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	Temperature
Frequency	Relative Humidity
Distortion	Barometric Pressure

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.



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**Sound Level Meter**  
IEC 61672-3:2013  
**Calibration Certificate**  
Calibration Number C18618

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b>	Rion NA-28
<b>Instrument Serial Number :</b>	00370304
<b>Microphone Serial Number :</b>	10421
<b>Pre-amplifier Serial Number :</b>	60313
<b>Pre-Test Atmospheric Conditions</b>	<b>Post-Test Atmospheric Conditions</b>
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
<b>Calibration Technician :</b> Lucky Jaiswal	<b>Secondary Check:</b> Lewis Boorman
<b>Calibration Date :</b> 26 Nov 2018	<b>Report Issue Date :</b> 29 Nov 2018
<b>Approved Signatory :</b>	Ken Williams

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

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Least Uncertainties of Measurement - Environmental Conditions			
Acoustic Tests		Temperature	±0.05°C
31.5 Hz to 8kHz	±0.12dB	Relative Humidity	±0.46%
12.5kHz	±0.18dB	Barometric Pressure	±0.017kPa
16kHz	±0.31dB		
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.

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**Sound Calibrator**  
IEC 60942-2004

## Calibration Certificate

Calibration Number C18114\_Reissued

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

**Equipment Tested/ Model Number :** Pulsar 106  
**Instrument Serial Number :** 81333

### Atmospheric Conditions

**Ambient Temperature :** 22°C  
**Relative Humidity :** 53.1%  
**Barometric Pressure :** 99.41kPa

**Calibration Technician :** Vicky Jaiswal  
**Calibration Date :** 5 Mar 2018  
**Secondary Check:** Riley Cooper  
**Report Issue Date :** 20 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	94.2	1000.40

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 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

*Generated SPL* ±0.11dB  
*Short Term Fluct.* ±0.06dB  
*Frequency* ±0.01%  
*Distortion* ±0.5%

#### Environmental Conditions

*Temperature* ±0.3°C  
*Relative Humidity* ±2.5%  
*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.



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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.

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# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
June 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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Noise and Vibration Analysis and Solutions

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## Wilpinjong Coal

### Environmental Noise Monitoring June 2019

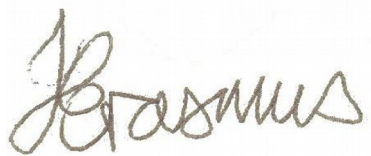
Reference: 19160\_R01  
Report date: 3 July 2019

#### 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: Jonoathan 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*

## **EXECUTIVE SUMMARY**

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

The current WCP development consent was approved in April 2017. The environment protection licence (EPL) for WCP was issued in early 2006 with subsequent variations approved.

Attended monitoring was conducted in accordance with the documents detailed above, Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. The duration of each night measurement was 15 minutes.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 17/18 June 2019. The purpose of attended noise monitoring was to quantify and describe the acoustic environment around WCP and compare results with specified limits.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the June 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**



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# 1 INTRODUCTION

## 1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 17/18 June 2019. Figure 1 shows the monitoring locations.

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.

## 1.2 Monitoring Locations

There were eight monitoring locations during this survey as listed in Table 1.1 and shown on Figure 1. These monitoring locations are detailed in the site Noise Monitoring Program (NMP).

*Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS*

<b>NMP Descriptor</b>	<b>Monitoring Location</b>
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

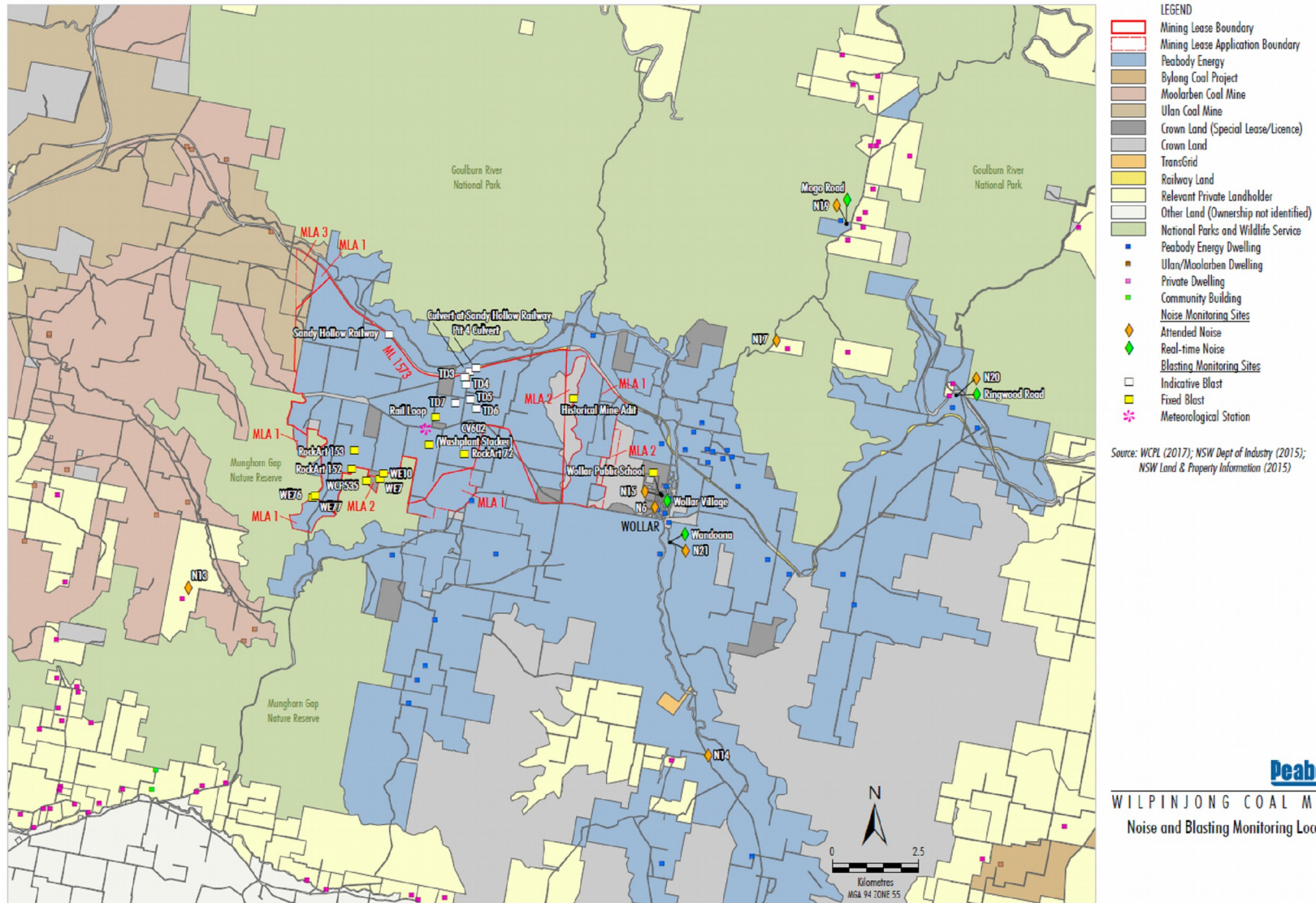


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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
$L_A$	The A-weighted root mean squared (RMS) noise level at any instant
$L_{Amax}$	The maximum A-weighted noise level over a time period or for an event
$L_{A1}$	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 per cent of the time, which is approximately the average of the maximum noise levels
$L_{A50}$	The noise level which is exceeded for 50 per cent of the time
$L_{A90}$	The level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. 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 or for an event
$L_{Aeq}$	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. From Wilpinjong Coal inversion tower data
SC	Stability Class. Based on Wilpinjong Coal inversion tower data
IA	Inaudible. When site-only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site-only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, 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

Approval was granted for the Wilpinjong Extension Project (SSD-6764) in 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

The EPL (No. 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent on 23 March 2018. Relevant noise sections of the licence are reproduced in Appendix A.

### 2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in June 2017. Chapter 6 of the NMP provides details on the noise monitoring program including locations and an attended monitoring methodology. The relevant sections are reproduced in Appendix A.

### 2.4 Project Specific Criteria

Criteria in the project approval and EPL are consistent as are the met exclusion rules determining when criteria apply. Criteria shown in Table 2.1 have been selected as the most appropriate for each monitoring location.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	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 <sup>2</sup>	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:

- 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
- 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 Assessment Method

Attended monitoring was conducted in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. Atmospheric condition measurement was also undertaken during each fifteen minute measurement. Monitoring is undertaken once per month at each location.

Attended monitoring during this reporting period was undertaken by Jonathan Erasmus.

If the exact contribution from 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 levels, for example,  $L_{A10}$ ,  $L_{A50}$  or  $L_{A90}$ . 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 as per section 7.1 of the NPfI (e.g. measuring at an intermediate location and using relevant calculation) 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 or reasonable to employ NPfI methods such as using an intermediate location. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

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

As indicated in L5.5 (a) and (b) of the EPL, the  $L_{A1,1\text{minute}}$  measurement should be undertaken at one (1) metre from the dwelling façade and the  $L_{A\text{eq}}$  measurement within 30 metres of the dwelling. However, the direct measurement of noise at 1 metre from the façade is not practical during monitoring for this project. In

most cases, monitoring near the residence is impractical due to barking dogs or issues with obtaining access. In all cases, measurements for this survey were undertaken at a suitable and representative location.

Low-frequency noise has been assessed using the NPfI method, detailed in Section 2.5 of this report.

### 3.2 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 analyser	1070590	25/06/2020
Pulsar 106 acoustic calibrator	79631	22/01/2021
Rion NA-28 sound level analyser	30131882	05/02/2021
Pulsar 106 acoustic calibrator	78226	01/02/2021

### 3.3 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.

### 3.4 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 3.2. Attended and real-time monitor locations are 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 2019<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A50</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	17/06/2019 23:28	43	32	23	19	22	17	16	54
N13	18/06/2019 00:35	42	31	27	24	25	22	20	48
N14	18/06/2019 00:32	46	33	26	21	24	17	16	54
N15	17/06/2019 23:09	45	41	37	28	33	19	18	55
N17	17/06/2019 22:40	42	30	22	16	20	15	14	54
N19	17/06/2019 22:16	49	35	25	17	23	15	14	54
N20	17/06/2019 23:57	43	37	33	23	28	19	16	54
N21	18/06/2019 00:57	52	38	32	22	28	20	18	54

Note:

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

### 4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey. None of the measurements satisfied the conditions outlined in Section 3.3 when assessing low-frequency noise.

Therefore no further assessment of modifying factors was undertaken.

### 4.3 Attended Noise Monitoring

Table 4.2 and Table 4.3 detail  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  noise levels from WCP in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the project approval and EPL.

Table 4.2:  $L_{Aeq,15\text{minute}}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JUNE 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{Aeq,15\text{min}}$ dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	17/06/2019 23:28	1.6	E	37	Yes	IA	Nil
N13	18/06/2019 00:35	0.0	E	36	Yes	<25	Nil
N14	18/06/2019 00:32	0.0	E	35	Yes	IA	Nil
N15	17/06/2019 23:09	1.4	E	35	Yes	IA	Nil
N17	17/06/2019 22:40	0.9	E	35	Yes	IA	Nil
N19	17/06/2019 22:16	1.6	E	35	Yes	IA	Nil
N20	17/06/2019 23:57	1.2	E	35	Yes	IA	Nil
N21	18/06/2019 00:57	1.1	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

Table 4.3: LA1,1minute GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JUNE 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP LA1,1min dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	17/06/2019 23:28	1.6	E	45	Yes	IA	Nil
N13	18/06/2019 00:35	0.0	E	45	Yes	<25	Nil
N14	18/06/2019 00:32	0.0	E	45	Yes	IA	Nil
N15	17/06/2019 23:09	1.4	E	45	Yes	IA	Nil
N17	17/06/2019 22:40	0.9	E	45	Yes	IA	Nil
N19	17/06/2019 22:16	1.6	E	45	Yes	IA	Nil
N20	17/06/2019 23:57	1.2	E	45	Yes	IA	Nil
N21	18/06/2019 00:57	1.1	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

#### 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<sub>Aeq</sub> and L<sub>A90</sub> are typically good indicators of mining noise levels.

Table 4.4: REAL-TIME AND ATTENDED NOISE LEVELS, JUNE 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total L <sub>Aeq</sub> dB	Low pass (<630Hz) L <sub>Aeq</sub> dB	Low pass (<630Hz) L <sub>A90</sub> dB	WCP L <sub>Aeq</sub> dB
N15/SX33	17/06/2019 23:09	30/12/1899 00:00	NR	NR	NR	NR
N19/SX32	17/06/2019 22:16	17/06/2019 22:15	18	9	NR	IA
N20/SX30	17/06/2019 23:57	NR	NR	NR	NR	IA
N21/SX31	18/06/2019 00:57	18/06/2019 01:00	26	21	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 4.5. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – JUNE 2019

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	17/06/2019 23:28	10	-	-	7
N13	18/06/2019 00:35	11	0.5	200	7
N14	18/06/2019 00:32	8	1.2	130	7
N15	17/06/2019 23:09	10	-	-	7
N17	17/06/2019 22:40	12	-	-	7
N19	17/06/2019 22:16	13	-	-	7
N20	17/06/2019 23:57	13	-	-	7
N21	18/06/2019 00:57	8	-	-	6

Notes:

1. Wind speed and direction measured at 1.8 metres; and
2. "-" denotes calm conditions at 1.8 metres.

Data obtained from the WCP meteorological station and tower is used to determine compliance with specified noise criteria and is provided in Table 4.6.



Table 4.6: WCP METEOROLOGICAL STATION DATA<sup>1</sup>

Date and End Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres <sup>2</sup>
17/06/2019 22:00	1.4	180	0.3
17/06/2019 22:15	0.9	309	0.4
17/06/2019 22:30	1.6	296	0.6
17/06/2019 22:45	0.9	348	0.6
17/06/2019 23:00	0.9	-	0.9
17/06/2019 23:15	1.4	282	0.8
17/06/2019 23:30	1.4	-	0.8
17/06/2019 23:45	1.6	343	0.6
18/06/2019 00:00	0.9	-	0.8
18/06/2019 00:15	1.2	312	0.7
18/06/2019 00:30	1.4	-	0.7
18/06/2019 00:45	0.0	-	0.8
18/06/2019 01:00	1.4	281	0.8
18/06/2019 01:15	1.1	358	0.7
18/06/2019 01:30	1.1	-	0.8
18/06/2019 01:45	1.2	-	0.6
18/06/2019 02:00	1.1	318	0.3
18/06/2019 02:15	1.4	324	0.2
18/06/2019 02:30	1.4	322	0.5
18/06/2019 02:45	1.4	338	0.7
18/06/2019 03:00	1.1	323	0.6
18/06/2019 03:15	1.6	357	0.5
18/06/2019 03:30	1.4	345	0.6
18/06/2019 03:45	0.9	303	0.9
18/06/2019 04:00	1.4	296	0.5
18/06/2019 04:15	1.4	270	0.4
18/06/2019 04:30	1.4	24	0.3

Notes:

1. Data supplied by WCP;
2. "-" indicates calm conditions and therefore no wind direction; and
3. Lapse rate calculated using data sourced from WCP inversion tower.

## 5 DISCUSSION

### 5.1 Noted Noise Sources

Data gathered during attended monitoring is shown in tables in Section 4. These noise levels 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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was, where possible, measured directly, or, determined by frequency analysis. Time variations of noise sources in each measurement, their temporal characteristics, are taken into account via statistical descriptors.

From these observations summaries have been derived for each location. The following chapter sections provide these summaries. Statistical 1/3 octave band analysis of environmental noise was undertaken, and Figure 3 to Figure 10 display the frequency ranges for various noise sources at each location for  $L_{A1}$ ,  $L_{A10}$ ,  $L_{A90}$  and  $L_{Aeq}$ . 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; mining noise is at frequencies less than 1000 Hz (this 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; this can be 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  $L_{Aeq}$ .

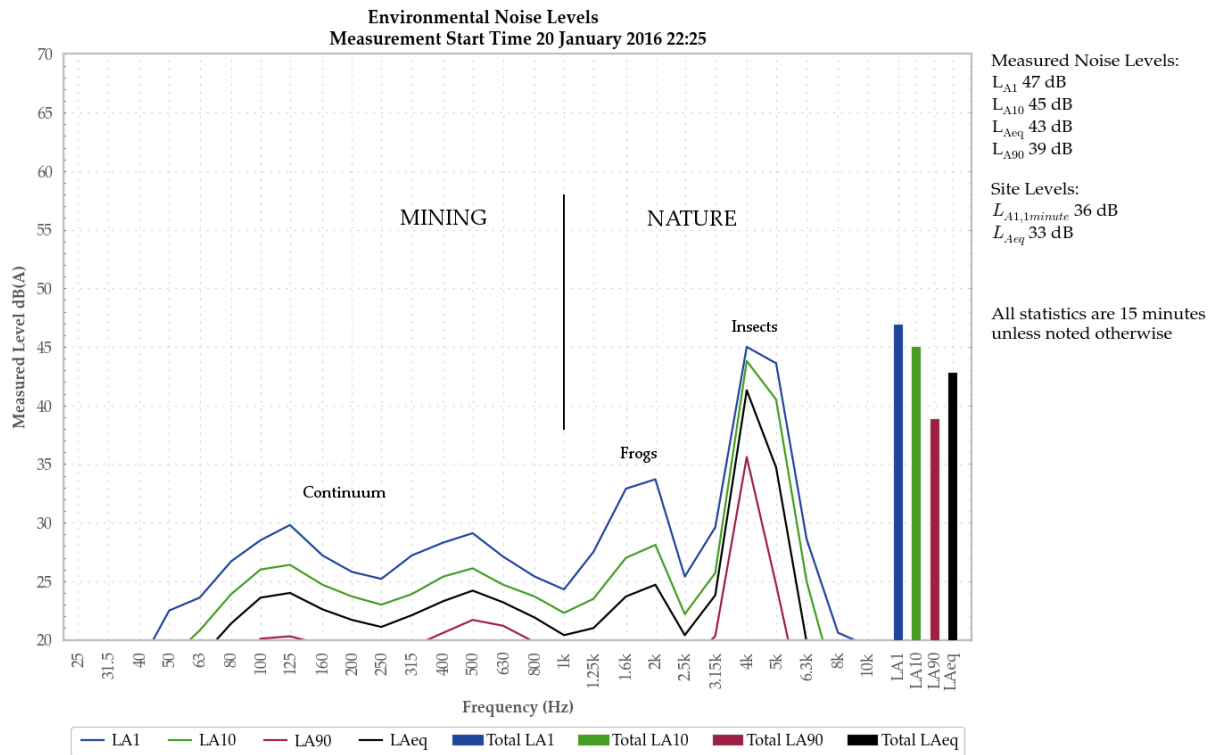
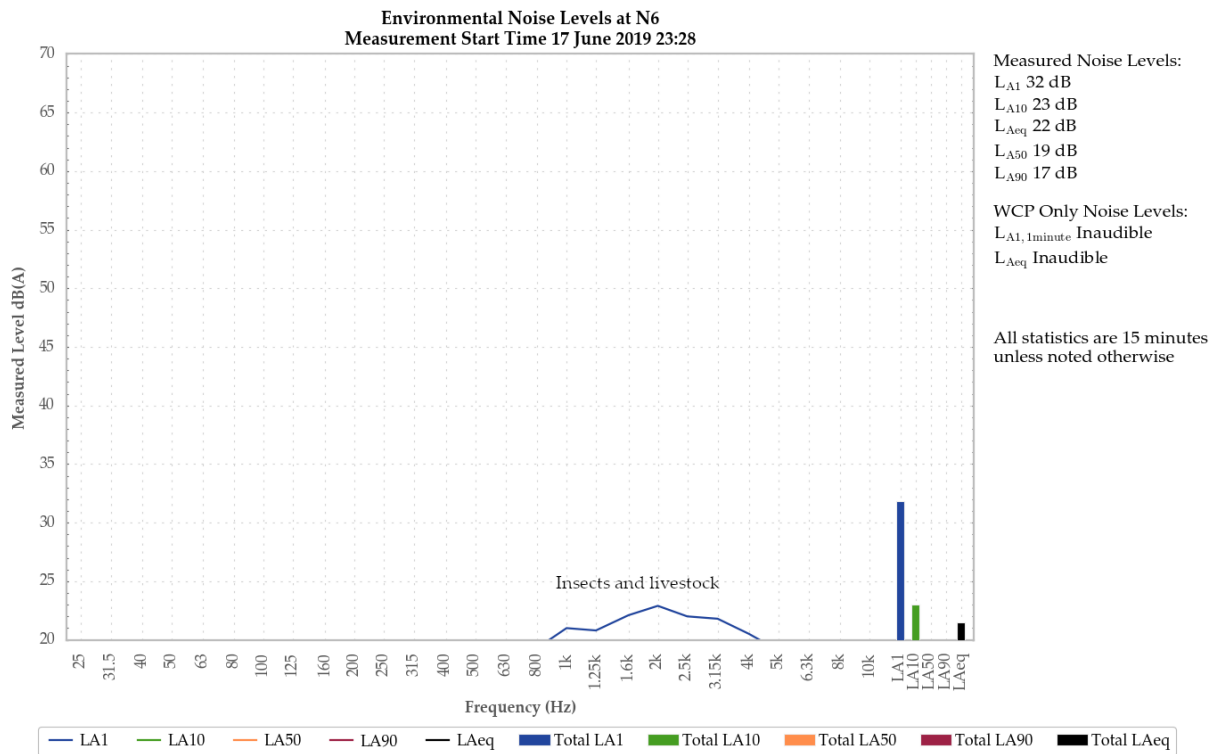


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

### 5.1.1 N6

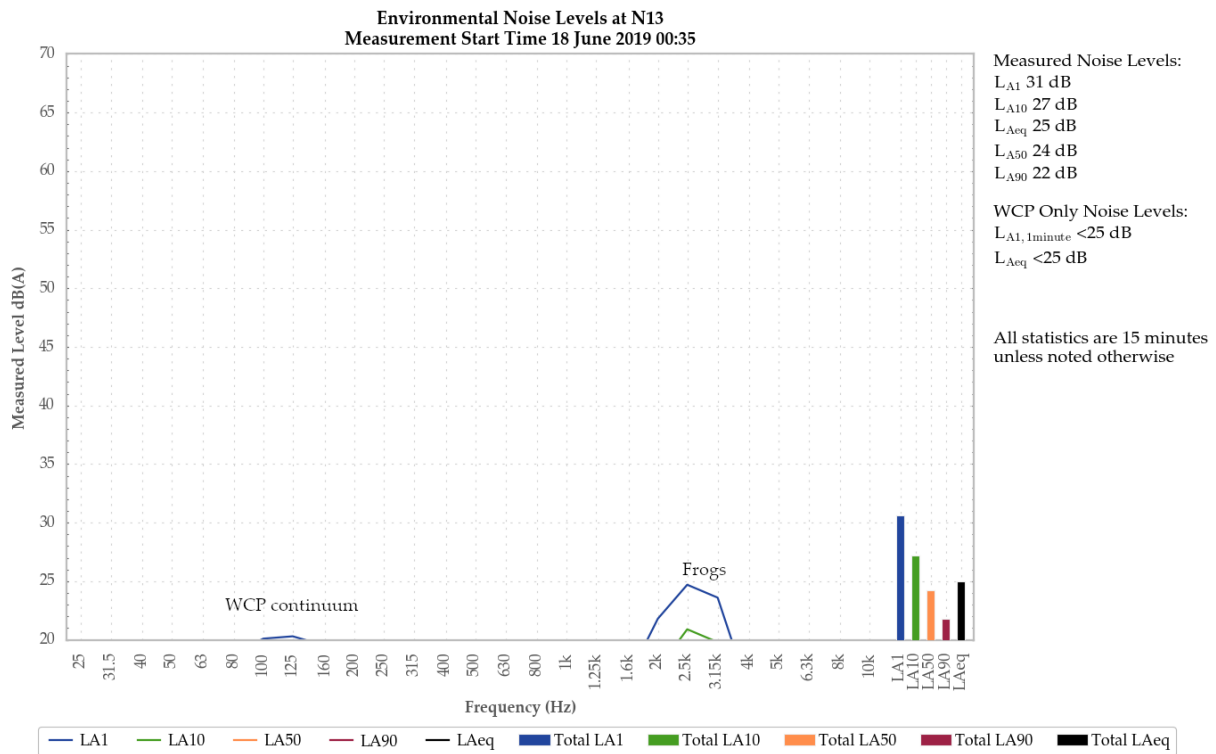


**Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village**

WCP was inaudible.

Insects and livestock generated the measured LA1. A train generated the measured LA10, LAeq, and with the sound level meter noise floor the LA50 and LA90.

### 5.1.2 N13



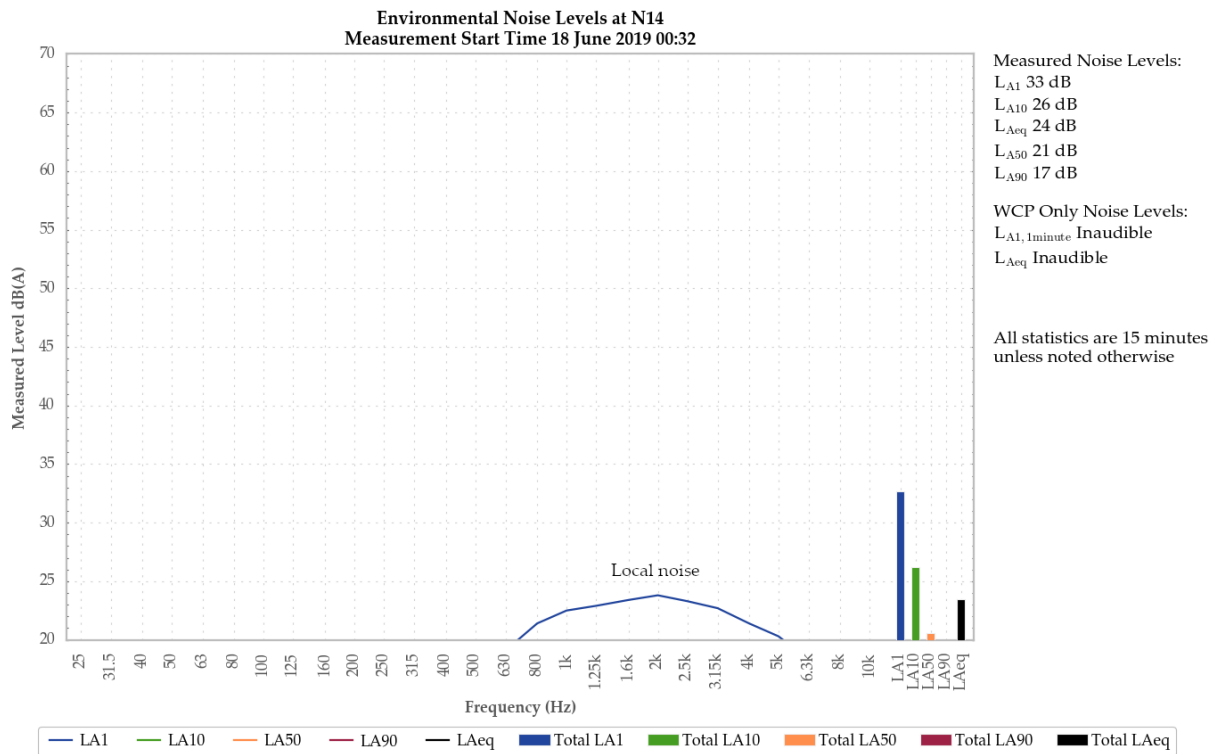
**Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road**

A low-level continuum from WCP was audible throughout the measurement generating a site only LAeq and LA1,1minute of less than 25 dB.

Frogs primarily generated measured levels. A continuum from WCP contributed to measured levels.

Breeze on the microphone was also noted.

### 5.1.3 N14



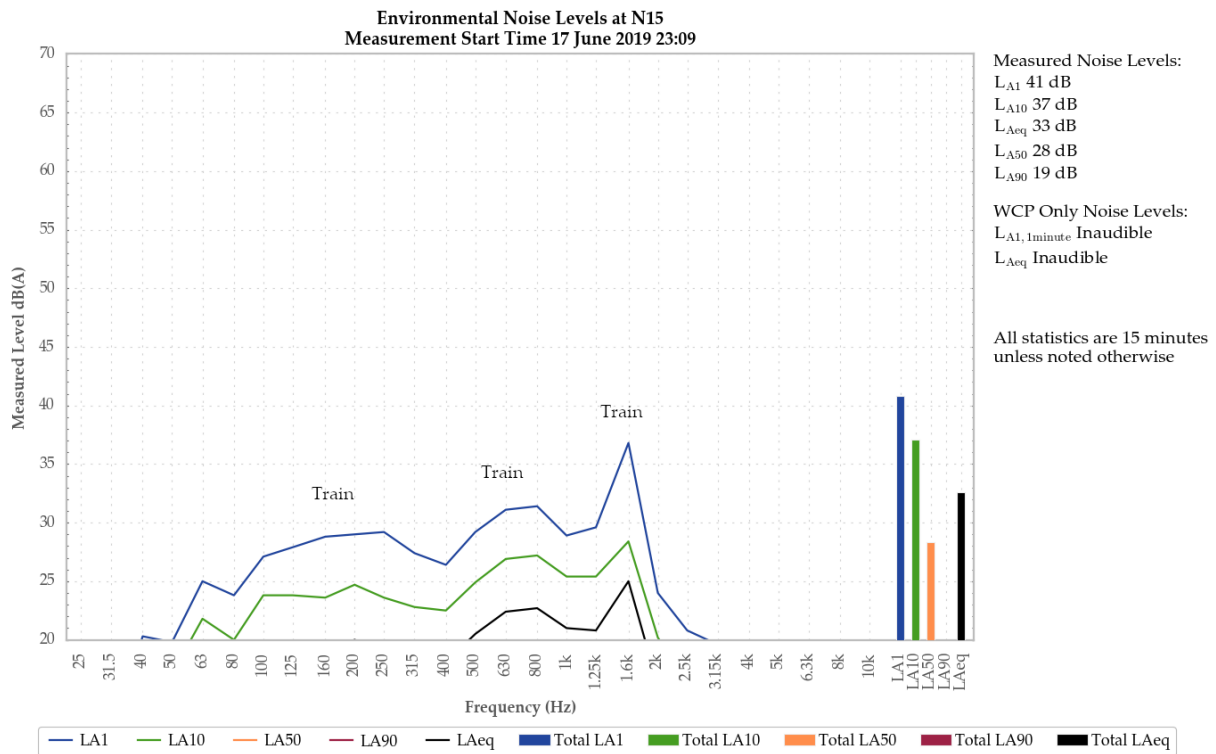
**Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads**

WCP was inaudible.

Local noise generated measured levels.

Insects were also noted.

### 5.1.4 N15

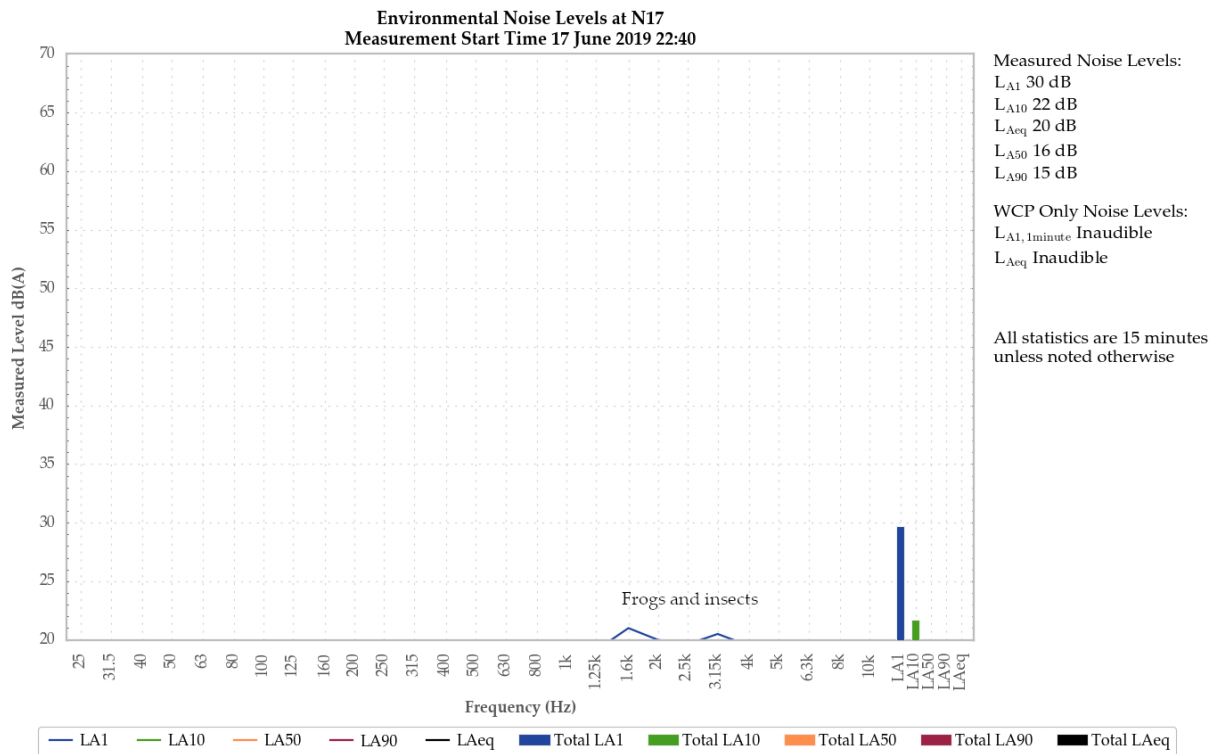


**Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village**

WCP was inaudible.

A train generated the measured LA1, LA10, LA50, LAeq, and with insects and the noise floor of the sound level meter the measured LA90.

### 5.1.5 N17



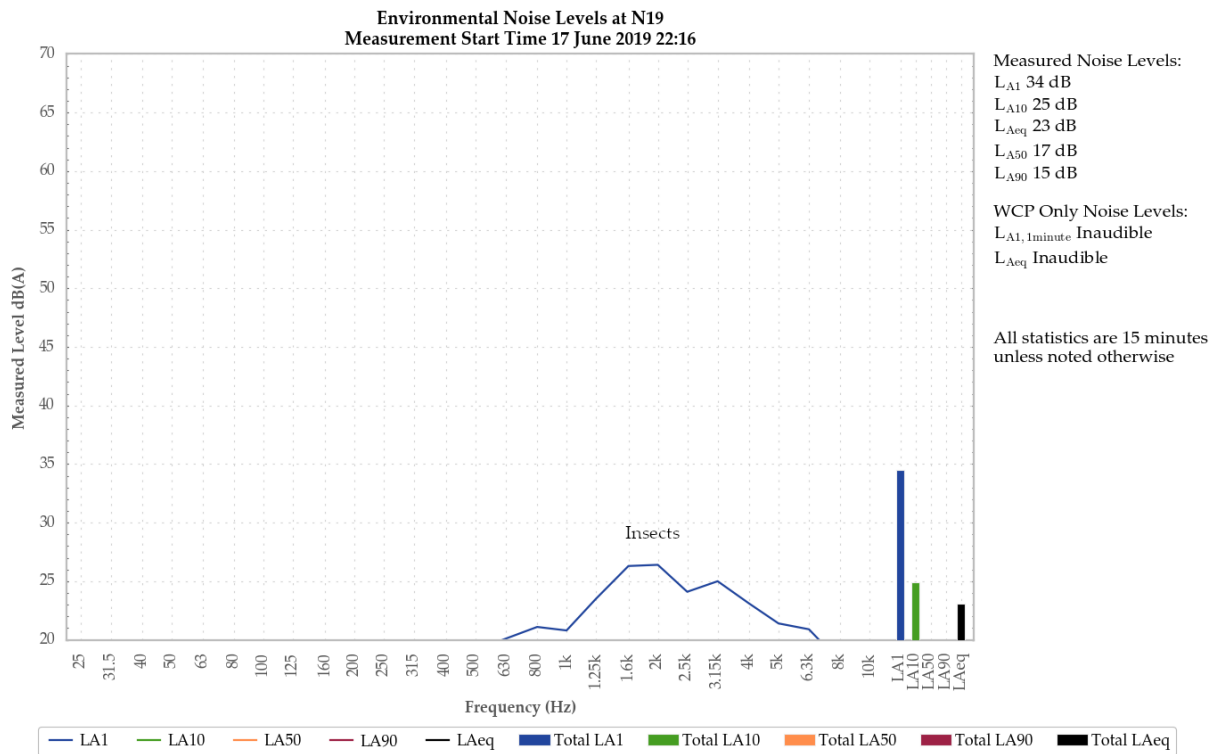
**Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road**

WCP was inaudible.

Frogs, insects and a train were noted



### 5.1.6 N19

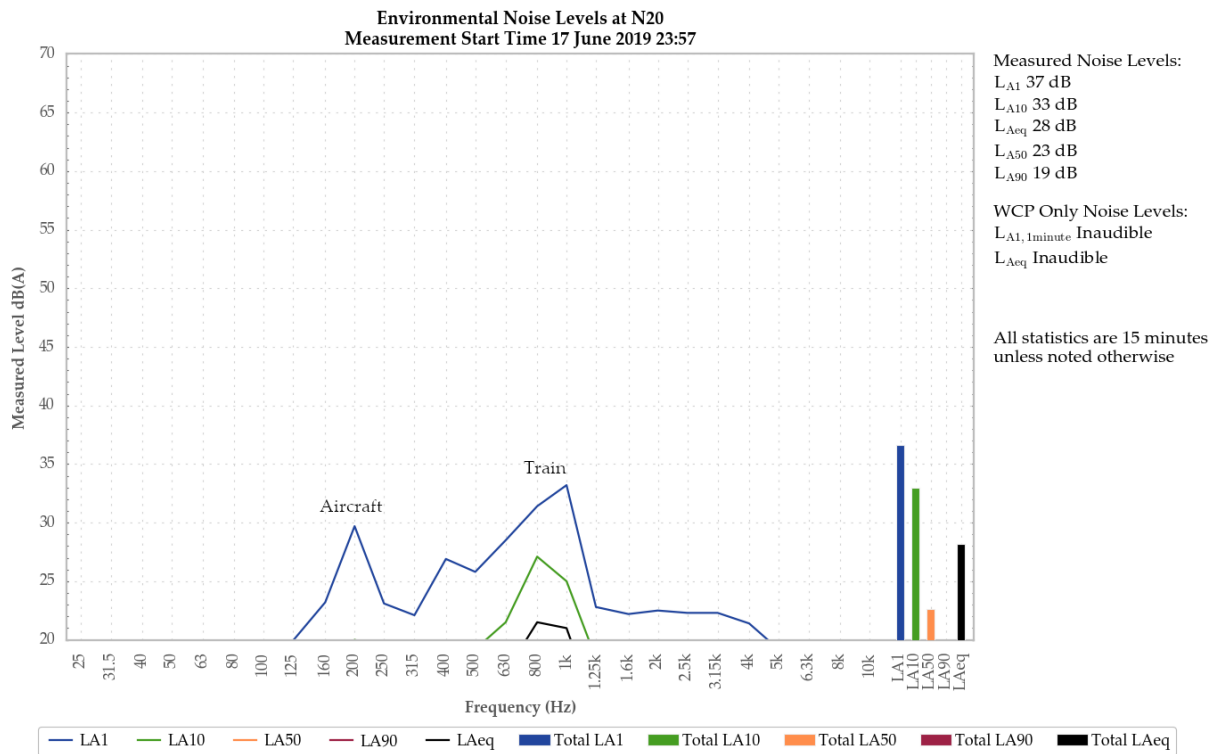


**Figure 8: Environmental Noise Levels – N19, Upper Mogo Road**

WCP was inaudible.

Insects and local noise were noted.

### 5.1.7 N20



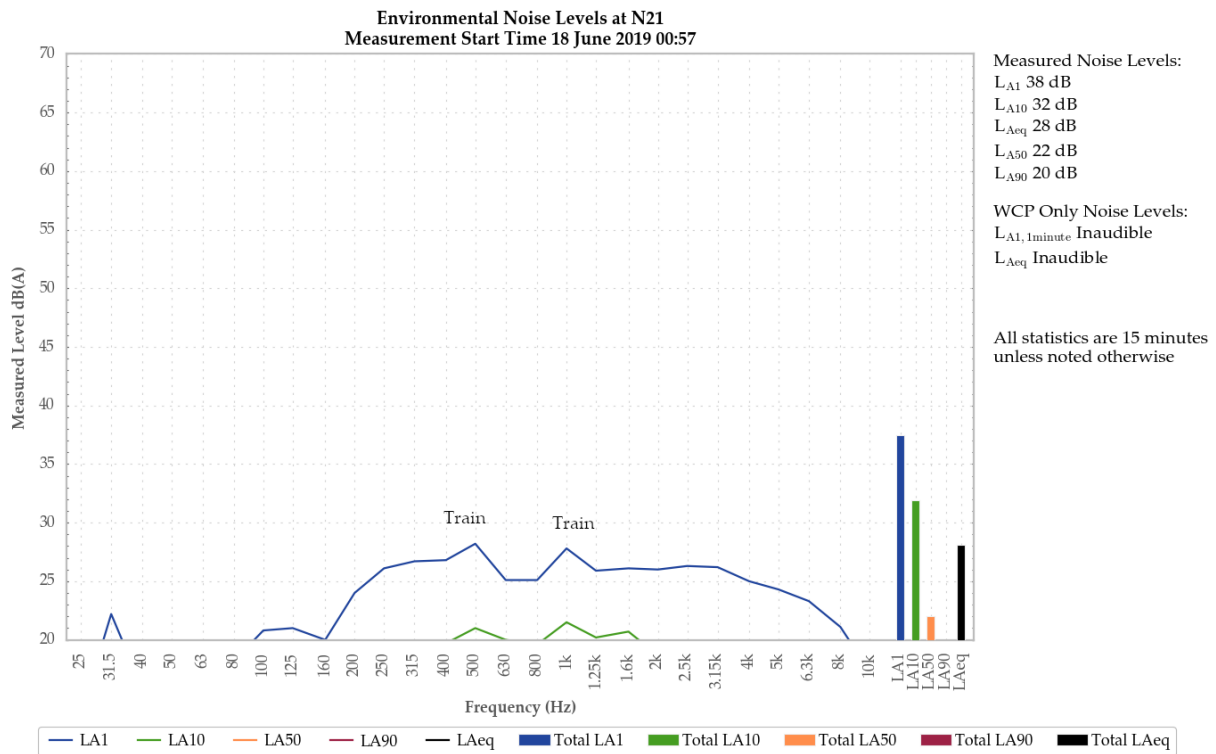
**Figure 9: Environmental Noise Levels, N20 – Ringwood Road**

WCP was inaudible.

An aircraft and train generated the measured LA1. Trains generated the measured LA10, LA50, and LAeq. The noise floor of the sound level meter and insects generated the measured LA90.

Birds were also noted.

### 5.1.8 N21



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

WCP was inaudible.

A train generated the measured LA1, LA10, LA50, and LAeq. The noise floor of the sound level meter generated the measured LA90.

Insects were also noted.

## 6 SUMMARY OF COMPLIANCE

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken during the night period of 17/18 June 2019. Attended noise monitoring was conducted at eight sites. The duration of all measurements was 15 minutes.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the June 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### A STATUTORY REQUIREMENTS

Several documents specify noise criteria that apply to the Wilpinjong operation. The noise sections of the relevant consent, licence and NMP are reproduced below.

## 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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.

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

<b>Hz/dB(Z)</b>	<b>One-third octave <math>L_{Zeq,15minute}</math> threshold level</b>												
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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations. Relevant extracts are shown below.

### 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

The relevant sections of the WCP Noise Management Plan, dated June 2017 are reproduced below.

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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.

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## APPENDIX

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### ***B CALIBRATION CERTIFICATES***





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  
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## 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**  
**Ambient Temperature :** 21.3°C  
**Relative Humidity :** 41.7%  
**Barometric Pressure :** 100.95kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 22.7°C  
**Relative Humidity :** 39.2%  
**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: Tonaburst 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.

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**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 H 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

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## 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 - Environmental Conditions			
Acoustic Tests		Temperature	±0.2°C
31.5 Hz to 8kHz	±0.15dB	Relative Humidity	±2.4%
12.5kHz	±0.2dB	Barometric Pressure	±0.015kPa
16kHz	±0.29dB		
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.



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**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	Least Uncertainties of Measurement	Environmental Conditions
Generated SPL	±0.11dB	Temperature
Frequency	±0.01%	Relative Humidity
Distortion	±0.45%	Barometric Pressure

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.

# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
July 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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## Wilpinjong Coal

### Environmental Noise Monitoring July 2019

Reference: 19182\_R01

Report date: 21 August 2019

#### Prepared for

Wilpinjong Coal Pty Ltd

Locked Bag 2005

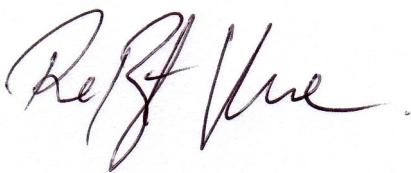
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# 1 INTRODUCTION

## 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 July 2019 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*

<b>NMP Descriptor</b>	<b>Monitoring Location</b>
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

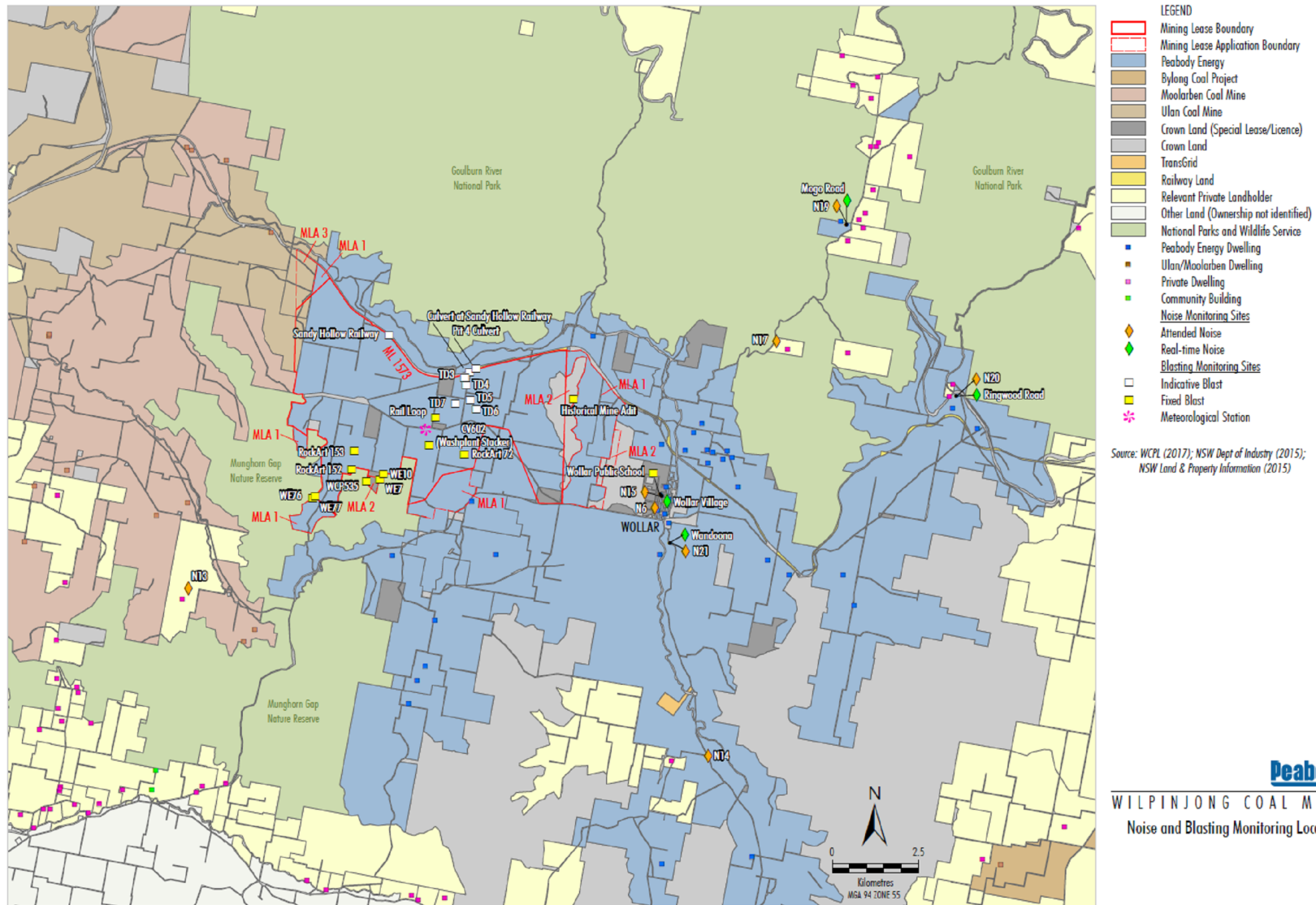


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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
L <sub>A</sub>	The A-weighted root mean squared (RMS) noise level at any instant
L <sub>Amax</sub>	The maximum A-weighted noise level over a time period or for an event
L <sub>A1</sub>	The noise level which is exceeded for 1 per cent of the time
L <sub>A1,1minute</sub>	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute
L <sub>A10</sub>	The noise level which is exceeded for 10 per cent of the time, which is approximately the average of the maximum noise levels
L <sub>A50</sub>	The noise level which is exceeded for 50 per cent of the time
L <sub>A90</sub>	The level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. The L <sub>A90</sub> level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes
L <sub>Amin</sub>	The minimum A-weighted noise level over a time period or for an event
L <sub>Aeq</sub>	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. From Wilpinjong Coal inversion tower data
Stability class	Stability class (or category) is determined from measured wind speed and VTG
IA	Inaudible. When site-only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site-only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, 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). 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 LAeq,15minute	Evening LAeq,15minute	Night LAeq,15minute / LA1,1minute
N6 <sup>1</sup>	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 <sup>2</sup>	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 Tambalyn Durney.

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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was measured directly, where possible, or, determined by frequency analysis.

If the exact contribution of the source of interest 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  $L_{A1,1\text{minute}}$  corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms this is the highest noise level, or  $L_{A\text{max}}$ , 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
Pulsar 106 acoustic calibrator	74813	21/02/2021
Rion NA-28 sound level meter	00701424	14/06/2021
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  $L_{A\text{eq}}$  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  $L_{A\text{eq}}$  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  $L_{A\text{eq}}$  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*

<b>Report Descriptor for Attended monitoring location</b>	<b>Real-Time Monitor ID</b>	<b>Monitoring Location</b>
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 – JULY 2019<sup>1</sup>*

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A50</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	02/07/2019 01:18	50	36	32	28	29	25	22	53
N13	02/07/2019 00:41	36	29	27	25	26	24	21	49
N14	02/07/2019 00:29	45	36	29	26	27	24	22	48
N15	01/07/2019 23:10	56	53	50	31	43	26	23	60
N17	01/07/2019 22:34	50	32	28	26	27	25	22	54
N19	01/07/2019 22:07	42	28	25	22	23	20	18	49
N20	01/07/2019 23:43	51	47	37	27	35	20	17	54
N21	02/07/2019 00:56	52	44	40	28	34	26	23	58

Note:

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

### 4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey. 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 and Table 4.3 detail  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  noise levels from WCP in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the project approval and EPL.

Table 4.2:  $L_{Aeq,15\text{minute}}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JULY 2019

Location	Start Date and Time	Wind Speed m/s <sup>1</sup>	Stability Class <sup>1</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{Aeq,15\text{min}}$ dB <sup>4</sup>	Exceedance <sup>5</sup>
N6	02/07/2019 01:18	0.6	F	37	Yes	<30	Nil
N13	02/07/2019 00:41	0.0	F	36	Yes	<25	Nil
N14	02/07/2019 00:29	0.0	F	35	Yes	<30	Nil
N15	01/07/2019 23:10	0.0	G	35	No	<30	NA
N17	01/07/2019 22:34	0.8	F	35	Yes	27	Nil
N19	01/07/2019 22:07	0.5	F	35	Yes	<20	Nil
N20	01/07/2019 23:43	0.0	F	35	Yes	1A	Nil
N21	02/07/2019 00:56	0.8	G	35	No	<30	NA

Notes:

1. Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. Site-only  $L_{Aeq,15\text{minute}}$  attributed to WCP, including modifying factors if applicable; and
5. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

Table 4.3:  $L_{A1,1\text{minute}}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – JULY 2019

Location	Start Date and Time	Wind Speed m/s <sup>1</sup>	Stability Class <sup>1</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{A1,1\text{min}}$ dB <sup>4</sup>	Exceedance <sup>5</sup>
N6	02/07/2019 01:18	0.6	F	45	Yes	34	Nil
N13	02/07/2019 00:41	0.0	F	45	Yes	<25	Nil
N14	02/07/2019 00:29	0.0	F	45	Yes	<30	Nil
N15	01/07/2019 23:10	0.0	G	45	No	30	NA
N17	01/07/2019 22:34	0.8	F	45	Yes	33	Nil
N19	01/07/2019 22:07	0.5	F	45	Yes	<25	Nil
N20	01/07/2019 23:43	0.0	F	45	Yes	IA	Nil
N21	02/07/2019 00:56	0.8	G	45	No	<30	NA

Notes:

1. Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. Site-only  $L_{A1,1\text{minute}}$  attributed to WCP; and
5. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

#### 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, JULY 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total $L_{Aeq}$ dB	Low pass (<630Hz) $L_{Aeq}$ dB	Low pass (<630Hz) $L_{A90}$ dB	WCP $L_{Aeq}$ dB
N15/SX33	01/07/2019 23:10	01/07/2019 23:15	NR	NR	NR	<30
N19/SX32	01/07/2019 22:07	01/07/2019 22:00	25	24	NR	<20
N20/SX30	01/07/2019 23:43	01/07/2019 23:45	NR	NR	NR	IA
N21/SX31	02/07/2019 00:56	02/07/2019 01:00	40	39	NR	<30

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 measurement level.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – JULY 2019

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction ° MN	Cloud Cover eighths
N6	02/07/2019 01:18	1	0.0	-	0
N13	02/07/2019 00:41	6	1.0	200	0
N14	02/07/2019 00:29	3	1.7	200	0
N15	01/07/2019 23:10	4	0.0	-	0
N17	01/07/2019 22:34	5	0.0	-	0
N19	01/07/2019 22:07	7	0.0	-	0
N20	01/07/2019 23:43	3	0.0	-	0
N21	02/07/2019 00:56	5	0.0	-	0

Notes:

1. Wind speed and direction measured at 1.8 metres; and
2. "-" denotes calm conditions at 1.8 metres.

Data obtained from the WCP meteorological station and tower is used to determine compliance with specified noise criteria.

## 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 LA1, LA10, LAeq, LA50 and LA90 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 LA1 result by a small margin but is entirely accurate for LAeq.

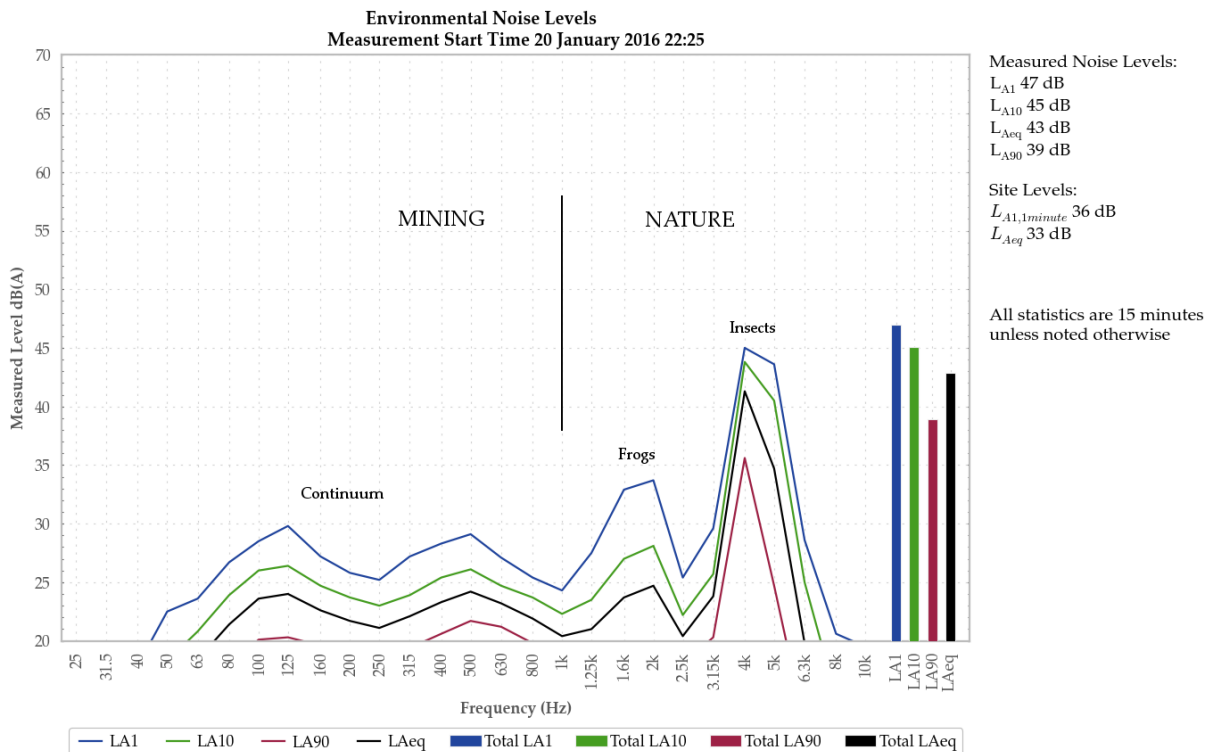
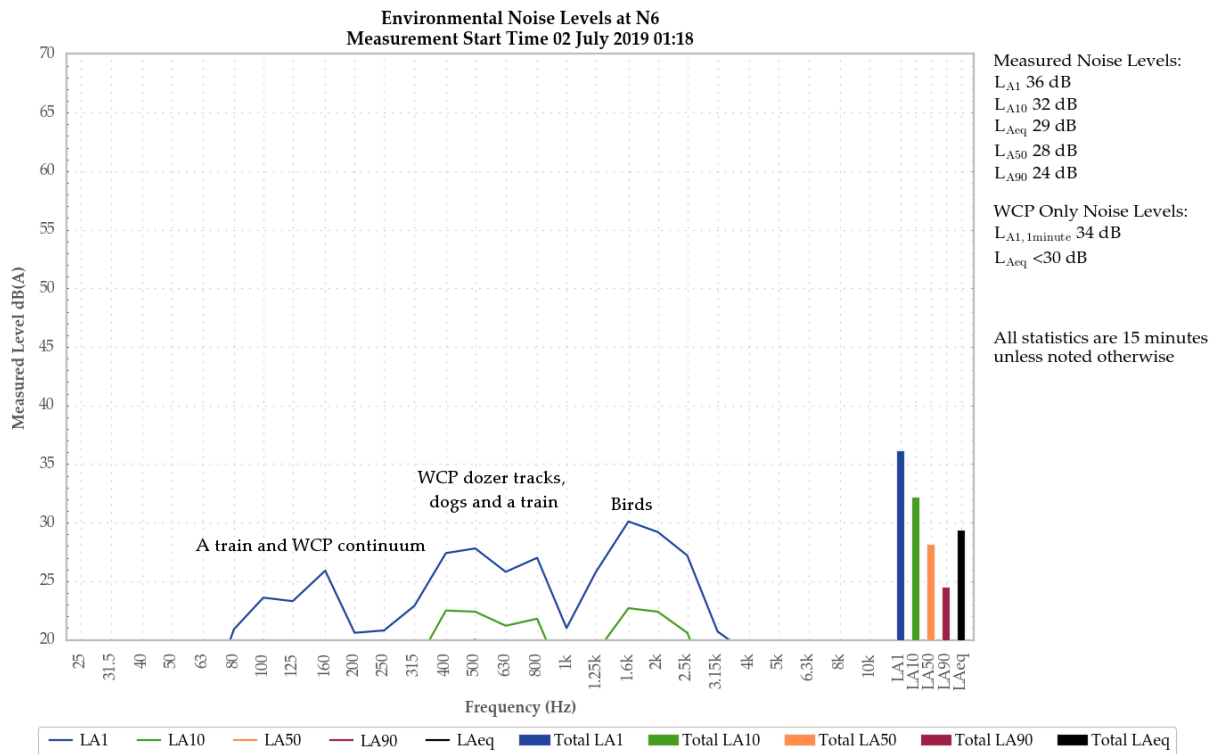


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6

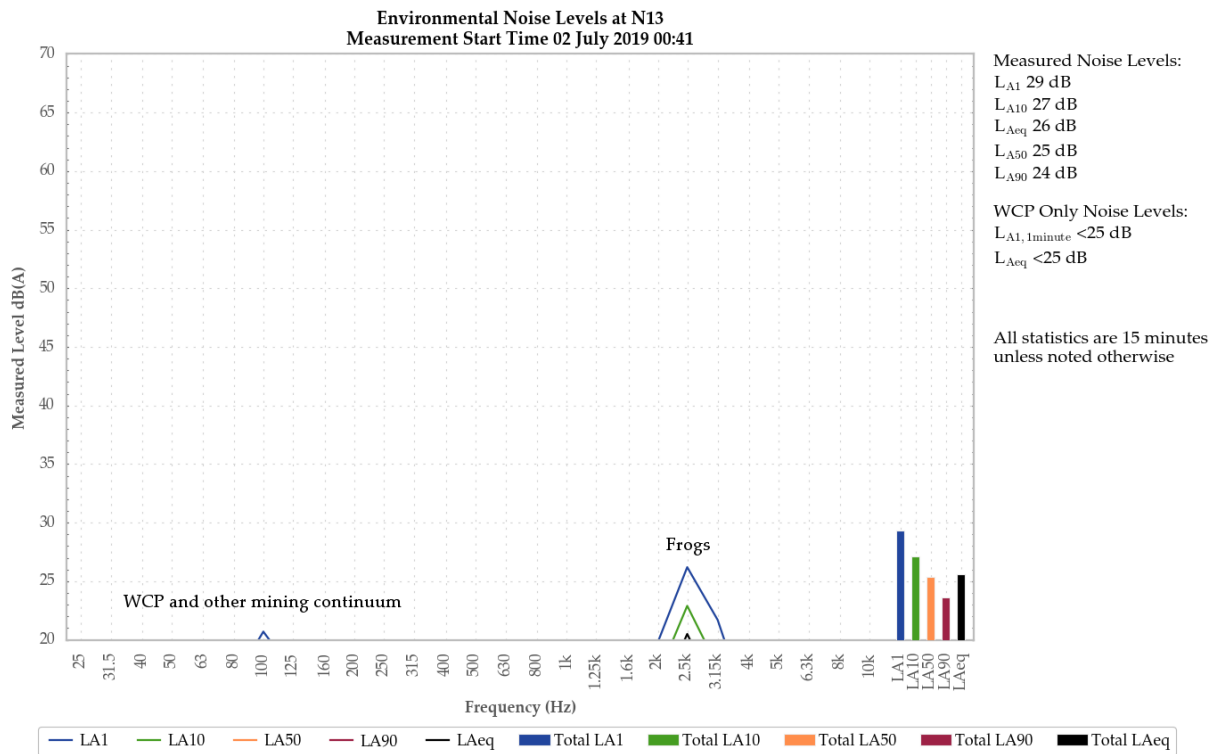


**Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village**

Mining continuum and track noise were audible from WCP throughout the measurement, resulting in a site only LAeq of less than 30 dB. Track noise generated the site only LA1,1minute of 34 dB.

Birds, dogs, a train and WCP continuum were responsible for the measured LA1, LA10 and LAeq. WCP continuum generated the measured LA50 and LA90.

5.1.2 N13



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

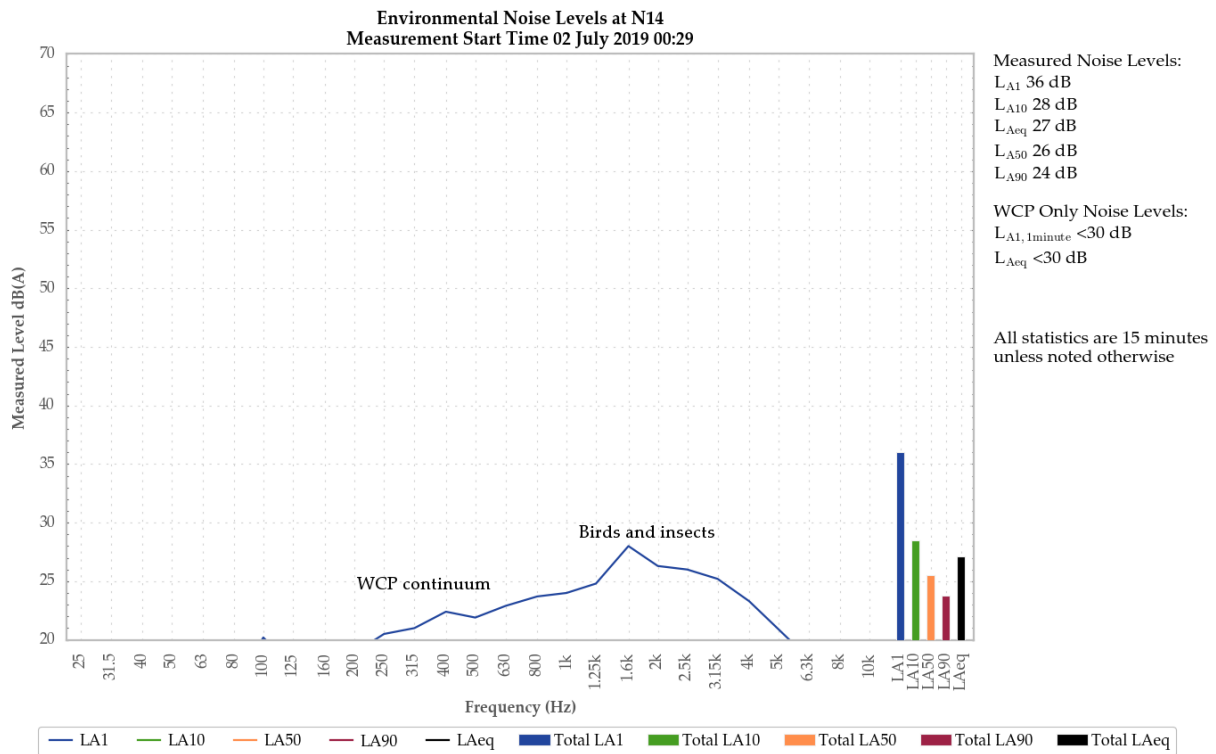
A low-level continuum from WCP was audible throughout the measurement, resulting in a site only LAeq and LA1,1minute of less than 25 dB.

Frogs were responsible for all measured noise levels.

Continuum from another mining operation was also noted.



### 5.1.3 N14

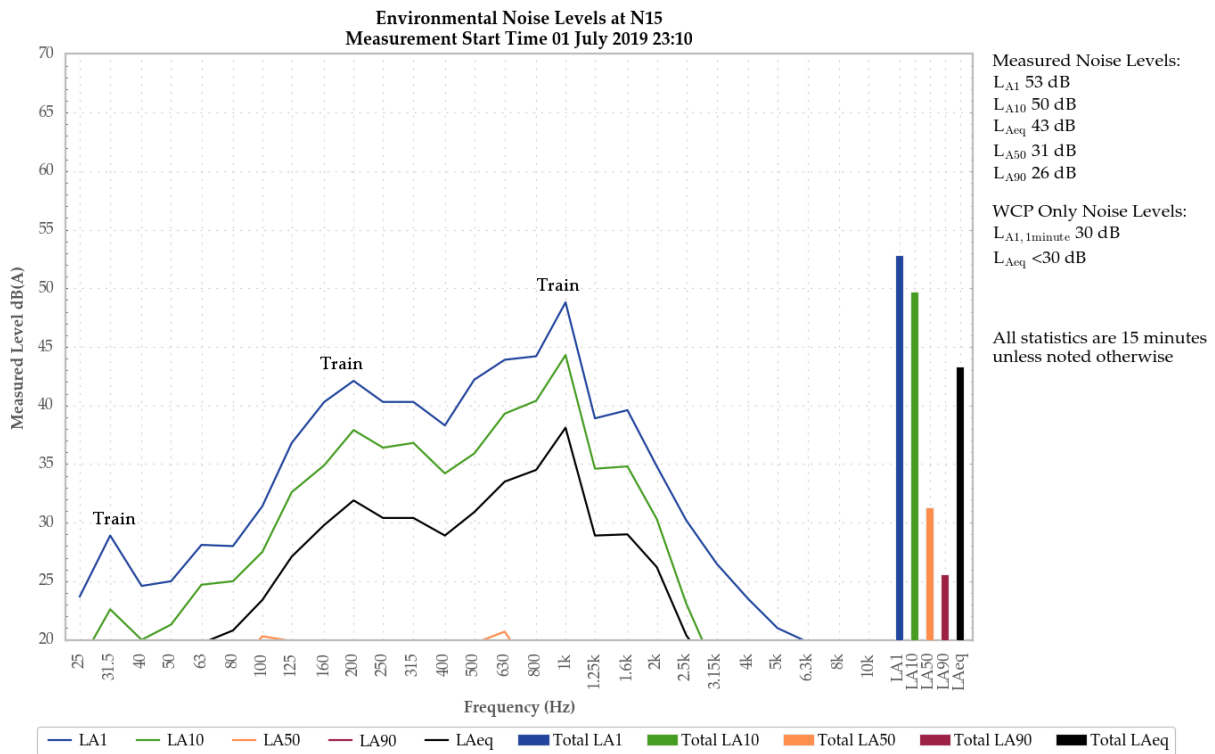


**Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads**

A low-level continuum from WCP was audible throughout the measurement generating a site-only LAeq,15minute and LA1,1minute of less than 30 dB.

Birds generated the measured LA1 and contributed to the measured LA10 and LAeq. WCP continuum and insects contributed to the measured LA10 and LAeq, and were responsible for the measured LA50 and LA90.

5.14 N15



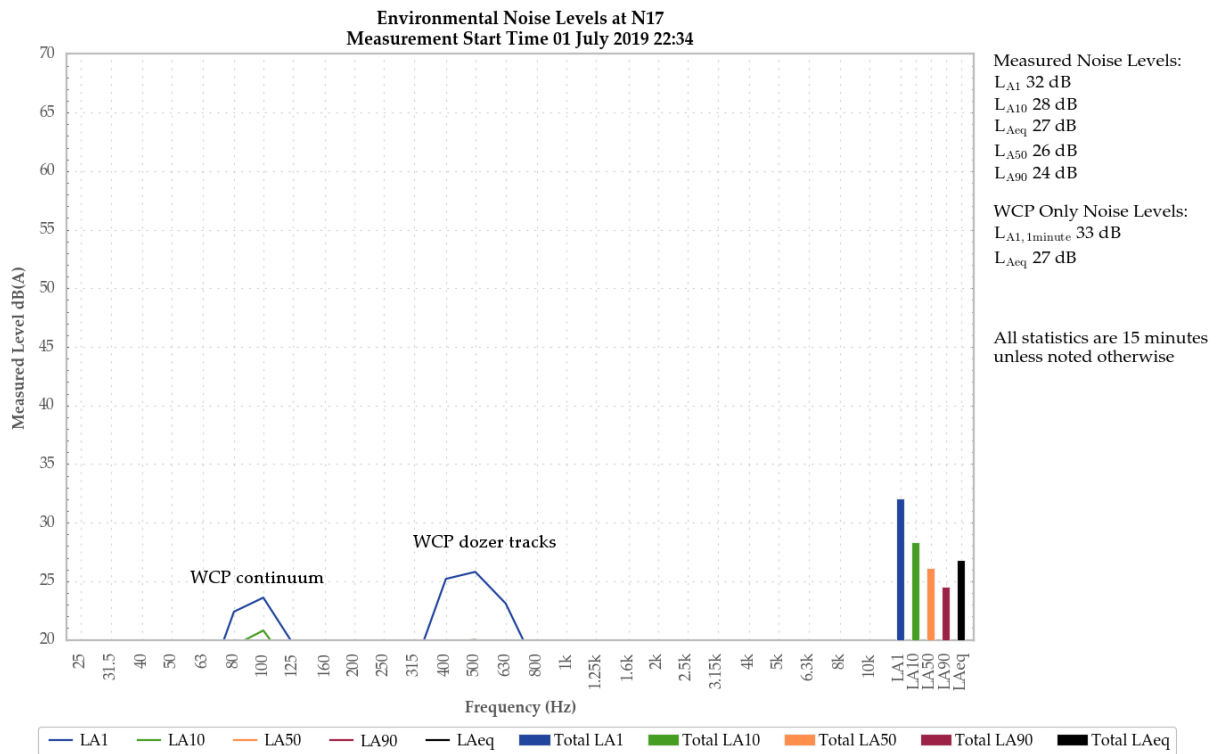
**Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village**

A low-level continuum from WCP was audible during the measurement generating the site-only LAeq,15minute of less than 30 dB. An impact noise generated the site only LA1,1minute of 30 dB. Track noise was also noted.

A train generated the measured LA1, LA10 and LAeq, and contributed to the LA50. WCP was responsible for the measured LA90 and contributed to the LA50.

Birds and bats were also noted.

5.1.5 N17

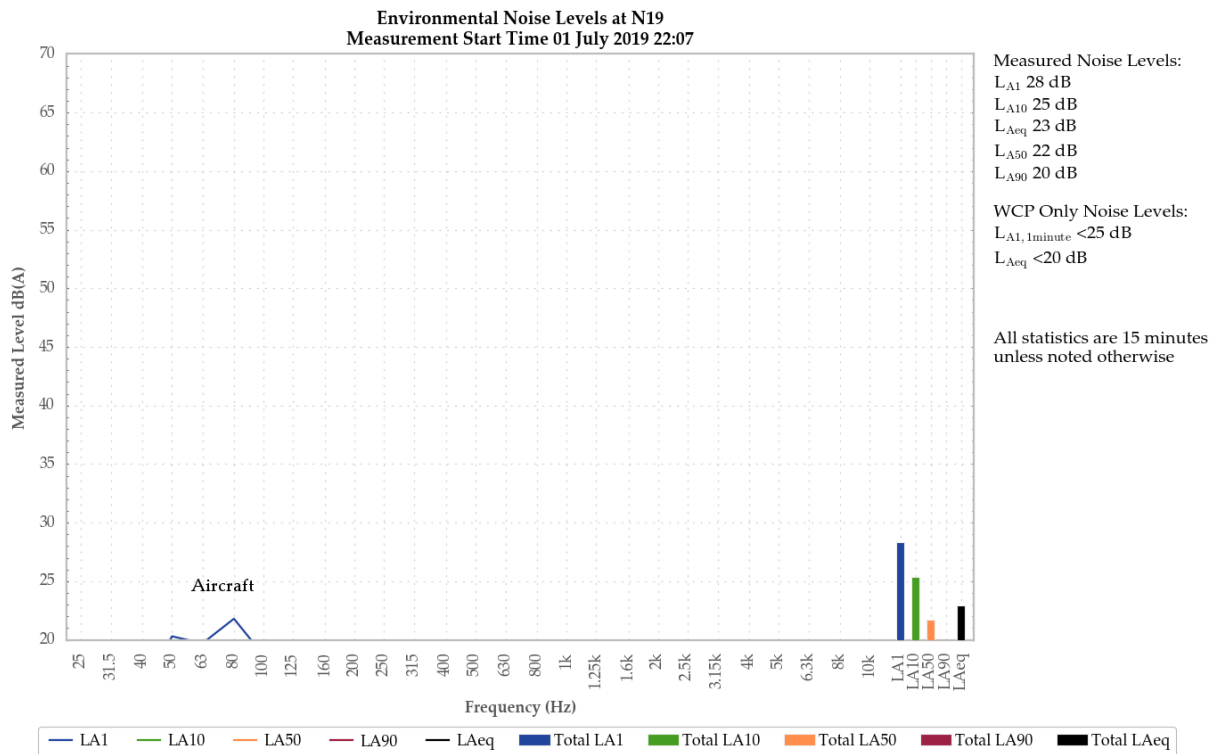


**Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road**

A mining continuum from WCP was audible during the measurement and generated the site-only LAeq,15minute of 27 dB. Track noise generated the site only LA1,1minute of 33 dB.

WCP continuum and track noise were responsible for all measured noise levels.

### 5.1.6 N19



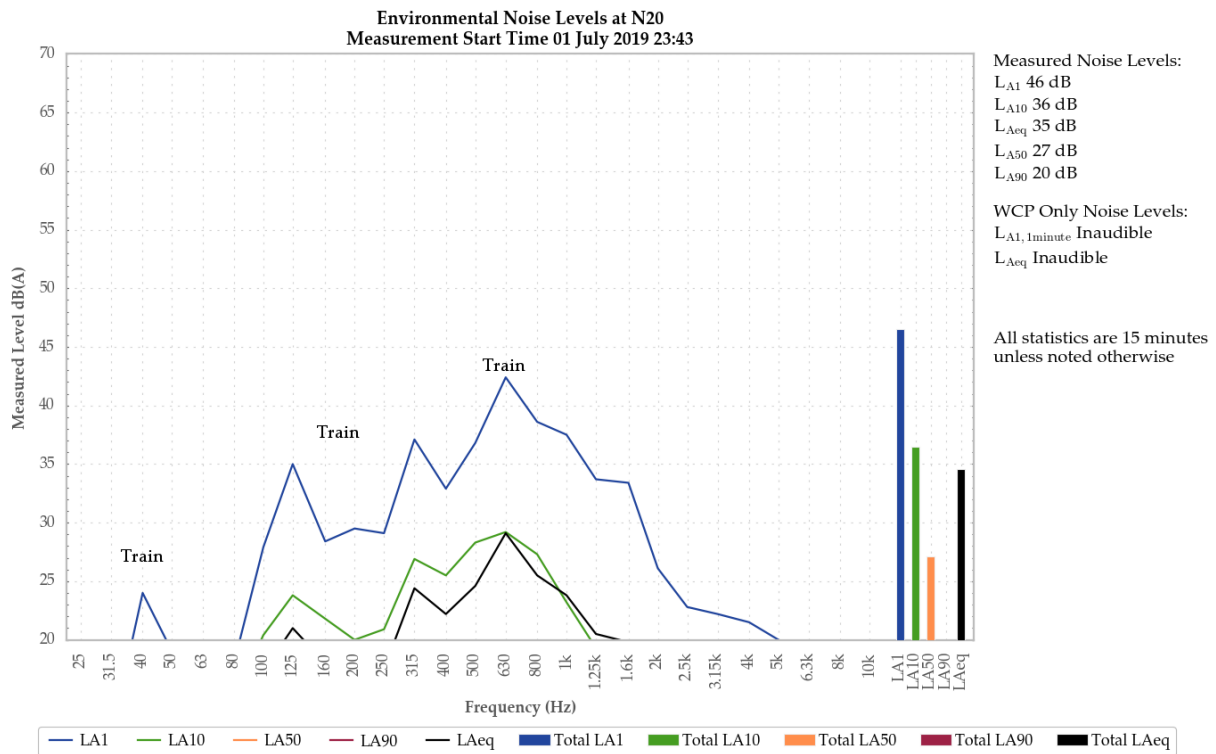
**Figure 8: Environmental Noise Levels – N19, Upper Mogo Road**

Track noise was briefly audible from WCP during the measurement, resulting in a site only LAeq of less than 20 dB and a site only LA1,1minute of less than 25 dB.

Aircraft noise and animals in foliage were responsible for the measured levels.

Bats were also noted.

5.1.7 N20



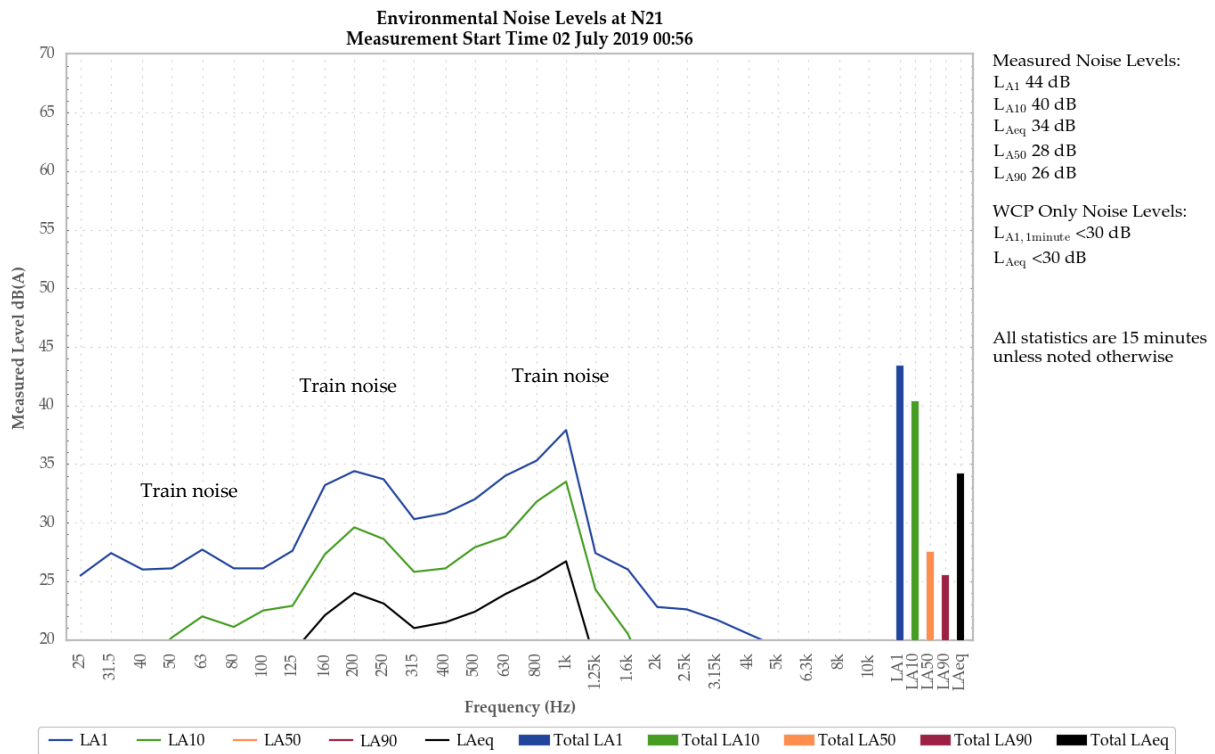
**Figure 9: Environmental Noise Levels, N20 – Ringwood Road**

WCP was inaudible during the measurement.

A train was responsible for all measured noise levels.

Bats and cows were also noted.

5.1.8 N21



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

A low-level general continuum from WCP was audible during the measurement generating the site-only LAeq,15minute and LA1,1minute of less than 30 dB. A horn and track noise were also noted.

A train generated the measured LA1, LA10 and LAeq. WCP was responsible for the measured LA50 and LA90.

Road traffic, birds and a train horn were also noted.

## 6 SUMMARY OF COMPLIANCE

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 July 2019 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the July 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### A STATUTORY REQUIREMENTS



Several documents specify noise criteria that apply to the Wilpinjong operation. The noise sections of the relevant consent, licence and NMP are reproduced below.

## 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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.

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

<b>Hz/dB(Z)</b>	<b>One-third octave <math>L_{Zeq,15minute}</math> threshold level</b>												
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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations. Relevant extracts are shown below.

### 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

The relevant sections of the WCP Noise Management Plan, dated June 2017 are reproduced below.

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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.

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## APPENDIX

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### ***B CALIBRATION CERTIFICATES***



Level 7 Building 2 423 Pennant Hills Rd  
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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

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b>	NA-28
<b>Instrument Serial Number :</b>	30131882
<b>Microphone Serial Number :</b>	04739
<b>Pre-amplifier Serial Number :</b>	11942
<b>Pre-Test Atmospheric Conditions</b>	<b>Post-Test Atmospheric Conditions</b>
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
<b>Calibration Technician :</b> Charlie Neil	<b>Secondary Check:</b> Lewis Boorman
<b>Calibration Date :</b> 5 Feb 2019	<b>Report Issue Date :</b> 6 Feb 2019
<b>Approved Signatory :</b>	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.



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**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.



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**Sound Level Meter**  
IEC 61672-3:2013  
**Calibration Certificate**  
Calibration Number C19342

**Client Details** Global Acoustics Pty Ltd  
12/16 Huntingdale Drive  
Thornton 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**  
**Ambient Temperature :** 26°C  
**Relative Humidity :** 40.2%  
**Barometric Pressure :** 100.96kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 26°C  
**Relative Humidity :** 40.7%  
**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	Temperature
12.5kHz	Relative Humidity
16kHz	Barometric Pressure
Electrical Tests	
51.5 Hz to 20 kHz	

*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




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**Sound Calibrator**  
IEC 60942-2017

## Calibration Certificate

Calibration Number C19124

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b> <b>Instrument Serial Number :</b>	Pulsar Model 106 74813
<b>Atmospheric Conditions</b>	
<b>Ambient Temperature :</b>	24°C
<b>Relative Humidity :</b>	50.4%
<b>Barometric Pressure :</b>	99.54kPa
<b>Calibration Technician :</b>	Lucky Jaiswal
<b>Secondary Check:</b>	Lewis Boorman
<b>Calibration Date :</b>	21 Feb 2019
<b>Report Issue Date :</b>	22 Feb 2019
<b>Approved Signatory :</b>	 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.

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PAGE 1 OF 1

# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
August 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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Noise and Vibration Analysis and Solutions

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## Wilpinjong Coal

### Environmental Noise Monitoring August 2019

Reference: 19209\_R01

Report date: 20 August 2019

#### Prepared for

Wilpinjong Coal Pty Ltd  
Locked Bag 2005  
Mudgee NSW 2850

#### Prepared by

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*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 Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

The current WCP development consent was approved in April 2017. The environment protection licence (EPL) for WCP was issued in early 2006 with subsequent variations approved.

Attended monitoring was conducted in accordance with the documents detailed above, Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. The duration of each night measurement was 15 minutes.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 1/2 August 2019 . The purpose of attended noise monitoring was to quantify and describe the acoustic environment around WCP and compare results with specified limits.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the August 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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# 1 INTRODUCTION

## 1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 1/2 August 2019 . Figure 1 shows the monitoring locations.

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.

## 1.2 Monitoring Locations

There were eight monitoring locations during this survey as listed in Table 1.1 and shown on Figure 1. These monitoring locations are detailed in the site Noise Monitoring Program (NMP).

*Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS*

<b>NMP Descriptor</b>	<b>Monitoring Location</b>
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

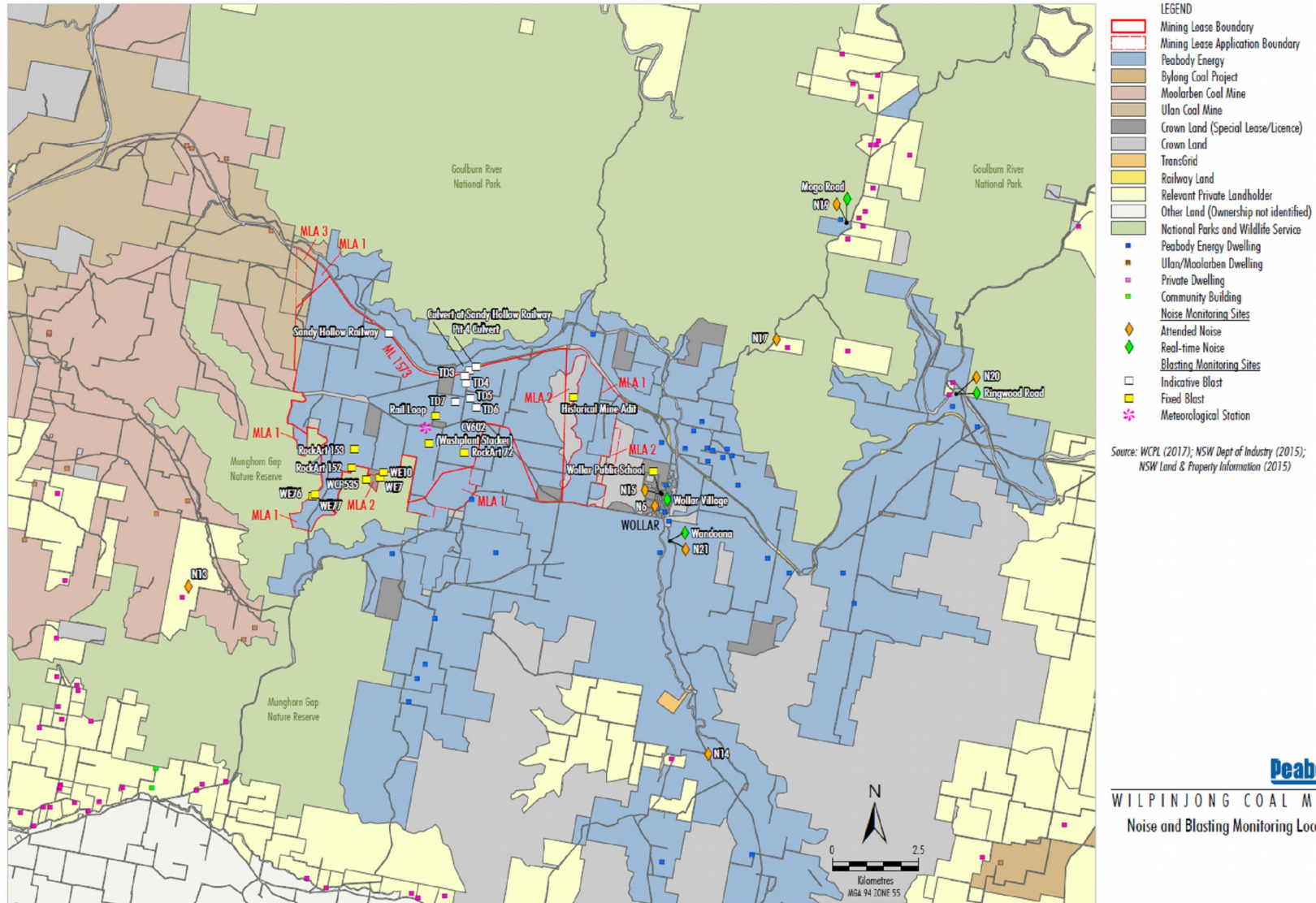


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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
L <sub>A</sub>	The A-weighted root mean squared (RMS) noise level at any instant
L <sub>Amax</sub>	The maximum A-weighted noise level over a time period or for an event
L <sub>A1</sub>	The noise level which is exceeded for 1 per cent of the time
L <sub>A1,1minute</sub>	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute
L <sub>A10</sub>	The noise level which is exceeded for 10 per cent of the time, which is approximately the average of the maximum noise levels
L <sub>A50</sub>	The noise level which is exceeded for 50 per cent of the time
L <sub>A90</sub>	The level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. The L <sub>A90</sub> level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes
L <sub>Amin</sub>	The minimum A-weighted noise level over a time period or for an event
L <sub>Aeq</sub>	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. From Wilpinjong Coal inversion tower data
SC	Stability Class. Based on Wilpinjong Coal inversion tower data
IA	Inaudible. When site-only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site-only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, 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

Approval was granted for the Wilpinjong Extension Project (SSD-6764) in 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

The EPL (No. 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent on 11 April 2019. Relevant noise sections of the licence are reproduced in Appendix A.

### 2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in June 2017. Chapter 6 of the NMP provides details on the noise monitoring program including locations and an attended monitoring methodology. The relevant sections are reproduced in Appendix A.

### 2.4 Project Specific Criteria

Criteria in the project approval and EPL are consistent as are the met exclusion rules determining when criteria apply. Criteria shown in Table 2.1 have been selected as the most appropriate for each monitoring location.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	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 <sup>2</sup>	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:

- 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
- 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 Assessment Method

Attended monitoring was conducted in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. Atmospheric condition measurement was also undertaken during each fifteen minute measurement. Monitoring is undertaken once per month at each location.

Attended monitoring during this reporting period was undertaken by Tambalyn Durney.

If the exact contribution from 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 levels, for example,  $L_{A10}$ ,  $L_{A50}$  or  $L_{A90}$ . 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 as per section 7.1 of the NPfI (e.g. measuring at an intermediate location and using relevant calculation) 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 or reasonable to employ NPfI methods such as using an intermediate location. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

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

As indicated in L5.5 (a) and (b) of the EPL, the  $L_{A1,1\text{minute}}$  measurement should be undertaken at one (1) metre from the dwelling façade and the  $L_{A\text{eq}}$  measurement within 30 metres of the dwelling. However, the direct measurement of noise at 1 metre from the façade is not practical during monitoring for this project. In

most cases, monitoring near the residence is impractical due to barking dogs or issues with obtaining access. In all cases, measurements for this survey were undertaken at a suitable and representative location.

Low-frequency noise has been assessed using the NPfI method, detailed in Section 2.5 of this report.

### 3.2 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 analyser	701424	14/06/2021
Rion NC-73 acoustic calibrator	30131882	05/02/2021
Rion NA-28 sound level analyser	74813	21/02/2021
Pulsar 106 acoustic calibrator	78226	01/02/2021

### 3.3 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.

### 3.4 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 3.2. Attended and real-time monitor locations are 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 – AUGUST 2019<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A50</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	02/08/2019 01:14	40	31	27	24	25	22	21	54
N13	02/08/2019 01:49	39	33	30	28	28	26	23	48
N14	02/08/2019 00:23	48	37	34	29	31	25	23	47
N15	01/08/2019 23:02	61	50	46	30	41	27	25	57
N17	01/08/2019 22:29	42	27	22	18	20	15	14	54
N19	01/08/2019 22:00	41	28	21	19	20	16	14	54
N20	01/08/2019 23:35	52	49	35	27	34	18	15	54
N21	02/08/2019 00:52	54	47	43	29	38	24	22	58

Note:

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

### 4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey. None of the measurements satisfied the conditions outlined in Section 3.3 when assessing low-frequency noise.

Therefore no further assessment of modifying factors was undertaken.

### 4.3 Attended Noise Monitoring

Table 4.2 and Table 4.3 detail  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  noise levels from WCP in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the project approval and EPL.

Table 4.2:  $L_{Aeq,15\text{minute}}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – AUGUST 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{Aeq,15\text{min}}$ dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	02/08/2019 01:14	0.0	G	37	No	<20	NA
N13	02/08/2019 01:49	0.0	G	35	No	26	NA
N14	02/08/2019 00:23	0.0	G	35	No	NM	NA
N15	01/08/2019 23:02	0.6	G	37	No	IA	NA
N17	01/08/2019 22:29	0.8	G	38	No	IA	NA
N19	01/08/2019 22:00	1.9	G	35	No	IA	NA
N20	01/08/2019 23:35	0.0	G	35	No	IA	NA
N21	02/08/2019 00:52	0.0	G	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

Table 4.3: LA1,1minute GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – AUGUST 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP LA1,1min dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	02/08/2019 01:14	0.0	G	45	No	<20	NA
N13	02/08/2019 01:49	0.0	G	45	No	31	NA
N14	02/08/2019 00:23	0.0	G	45	No	NM	NA
N15	01/08/2019 23:02	0.6	G	45	No	IA	NA
N17	01/08/2019 22:29	0.8	G	45	No	IA	NA
N19	01/08/2019 22:00	1.9	G	45	No	IA	NA
N20	01/08/2019 23:35	0.0	G	45	No	IA	NA
N21	02/08/2019 00:52	0.0	G	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.



#### 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<sub>Aeq</sub> and L<sub>A90</sub> are typically good indicators of mining noise levels.

Table 4.4: REAL-TIME AND ATTENDED NOISE LEVELS, AUGUST 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total L <sub>Aeq</sub> dB	Low pass (<630Hz) L <sub>Aeq</sub> dB	Low pass (<630Hz) L <sub>A90</sub> dB	
N15/SX33	01/08/2019 23:02	01/08/2019 23:00	41	40	20	IA
N19/SX32	01/08/2019 22:00	01/08/2019 22:00	20	14	NR	IA
N20/SX30	01/08/2019 23:35	01/08/2019 23:30	28	26	12	IA
N21/SX31	02/08/2019 00:52	02/08/2019 01:00	37	36	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 4.5. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – AUGUST 2019

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction ° MN	Cloud Cover eighths
N6	02/08/2019 01:14	3	0.0	-	0
N13	02/08/2019 01:49	7	0.8	210	0
N14	02/08/2019 00:23	5	1.5	170	0
N15	01/08/2019 23:02	6	0.8	260	0
N17	01/08/2019 22:29	7	0.0	-	0
N19	01/08/2019 22:00	8	0.4	260	0
N20	01/08/2019 23:35	3	0.0	-	0
N21	02/08/2019 00:52	3	0.0	-	0

Notes:

1. Wind speed and direction measured at 1.8 metres; and
2. "-" denotes calm conditions at 1.8 metres.

Data obtained from the WCP meteorological station and tower is used to determine compliance with specified noise criteria and is provided in Table 4.6.

Table 4.6: WCP METEOROLOGICAL STATION DATA<sup>1</sup>

Date and End Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres <sup>2</sup>
01/08/19 20:45	0.9	108	6.6
01/08/19 21:00	0.2	292	7.8
01/08/19 21:15	0.0	-	9.0
01/08/19 21:30	0.8	289	9.8
01/08/19 21:45	0.8	220	12.0
01/08/19 22:00	0.5	124	13.0
01/08/19 22:00	0.5	124	13.0
01/08/19 22:15	1.9	359	10.8
01/08/19 22:30	1.2	348	10.6
01/08/19 22:45	0.8	16	9.0
01/08/19 23:00	0.7	2	10.2
01/08/19 23:15	0.6	258	8.2
01/08/19 23:30	0.9	334	8.0
01/08/19 23:45	0.0	-	7.6
02/08/19 00:00	0.0	-	7.4
02/08/19 00:15	0.0	-	7.8
02/08/19 00:30	0.0	-	7.4
02/08/19 00:45	0.0	-	8.0
02/08/19 01:00	0.0	-	7.8
02/08/19 01:15	0.0	-	7.2
02/08/19 01:30	0.0	-	7.4
02/08/19 01:45	0.0	-	6.8
02/08/19 02:00	0.0	-	6.2
02/08/19 02:15	0.0	-	7.0
02/08/19 02:30	0.0	-	8.2
02/08/19 02:45	0.0	-	7.4
02/08/19 03:00	0.0	-	6.6

Notes:

1. Data supplied by WCP;
2. "-" indicates calm conditions and therefore no wind direction; and
3. Lapse rate calculated using data sourced from WCP inversion tower.

## 5 DISCUSSION

### 5.1 Noted Noise Sources

Data gathered during attended monitoring is shown in tables in Section 4. These noise levels 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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was, where possible, measured directly, or, determined by frequency analysis. Time variations of noise sources in each measurement, their temporal characteristics, are taken into account via statistical descriptors.

From these observations summaries have been derived for each location. The following chapter sections provide these summaries. Statistical 1/3 octave band analysis of environmental noise was undertaken, and Figure 3 to Figure 10 display the frequency ranges for various noise sources at each location for  $L_{A1}$ ,  $L_{A10}$ ,  $L_{A90}$  and  $L_{Aeq}$ . 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; mining noise is at frequencies less than 1000 Hz (this 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; this can be 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  $L_{Aeq}$ .

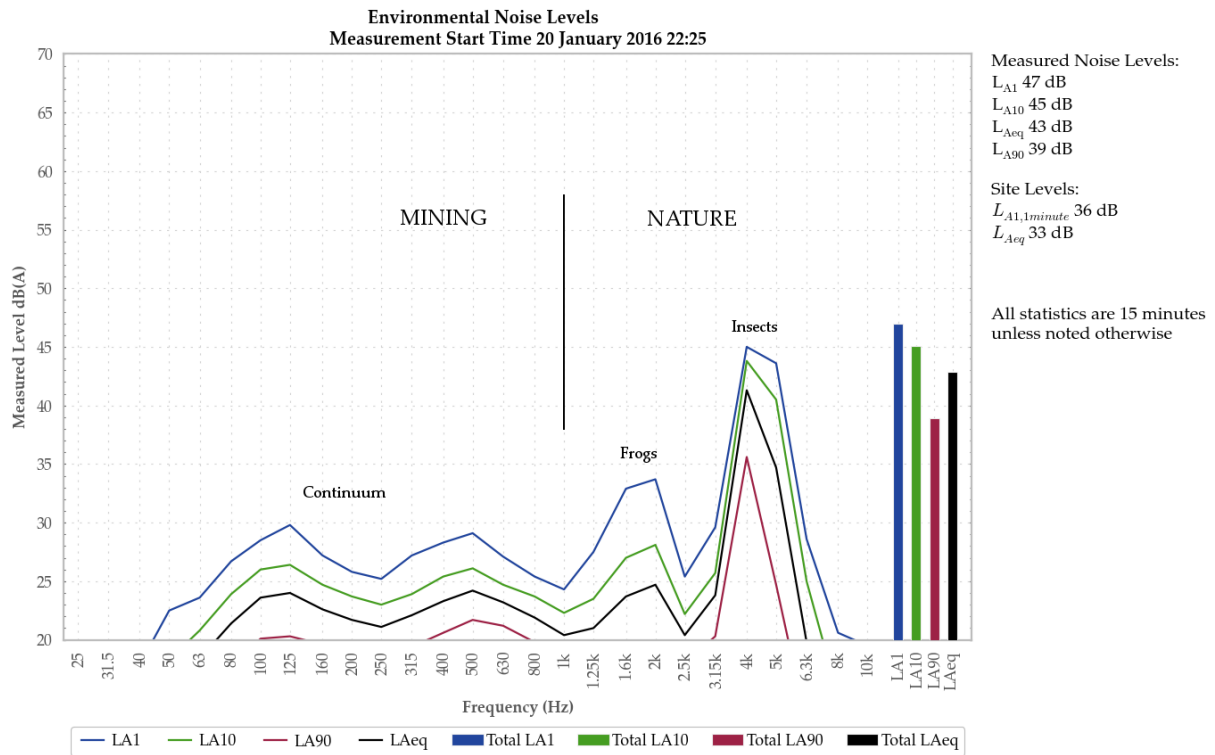


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 02 August 2019

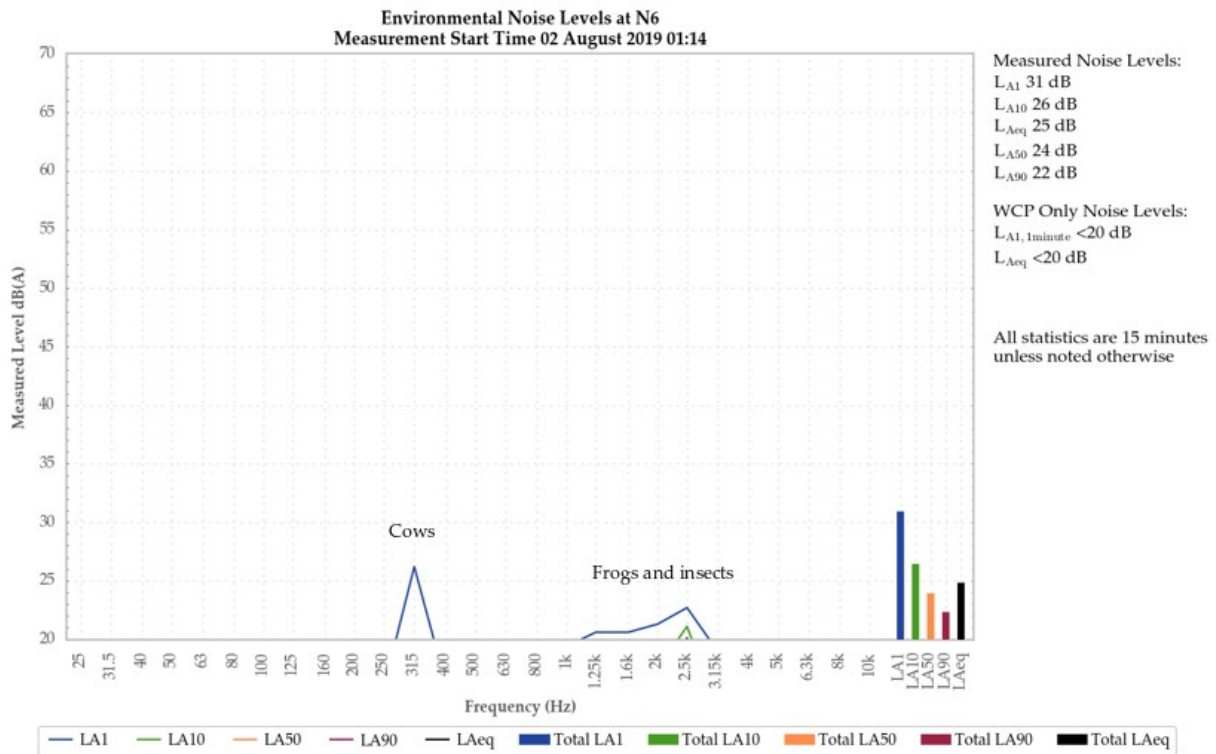


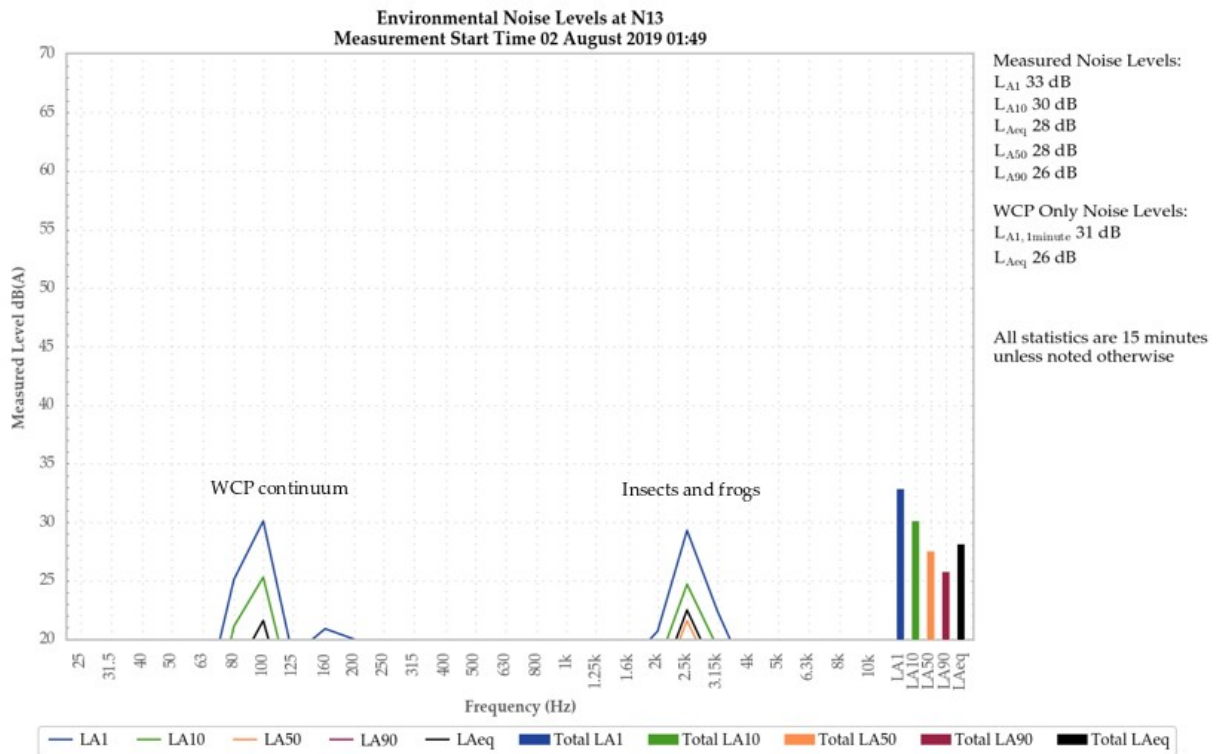
Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was audible at low levels, generating a site-only LAeq,15minute and LA1,1minute of less than 20 dB.

Frogs and insects generated the measured LA10 and contributed to the measured LA1. Cows were a major contributor to the measured LA1.

Bats and trains were also noted.

5.1.2 N13, 02 August 2019



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

WCP was audible during the measurement. General mine continuum generated a site-only LAeq,15minute of 26 dB. Engine noise generated an LA1,1minute of less than 31 dB.

WCP continuum contributed to the measured LA10, LA1 and LAeq. Frogs and insects generated the measured LA50 and contributed to the measured LA10, LA1 and LAeq.

Sheep were also noted.

5.1.3 N14, 02 August 2019

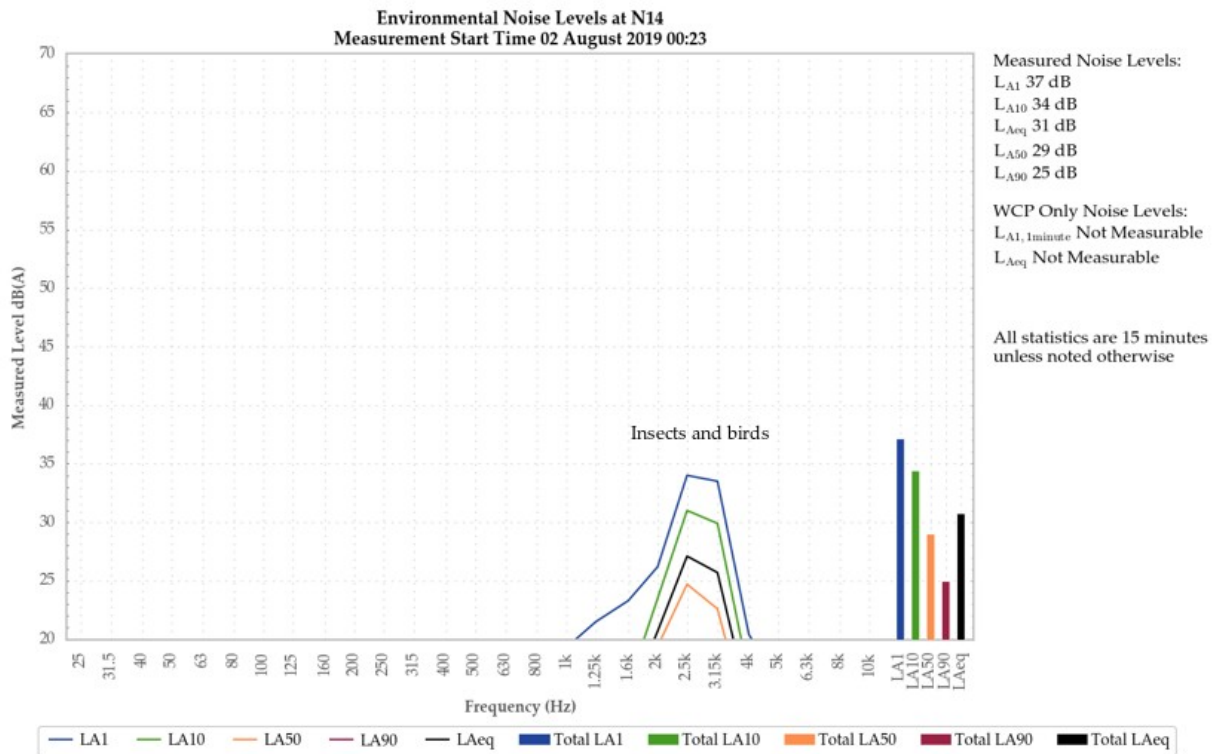


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was audible at low levels during the measurement and denoted as not measurable for a site-only LAeq,15minute and LA1,1minute.

Insects and birds generated all measured levels.

A distant train, cows and bats were also noted.



5.1.4 N15, 01 August 2019

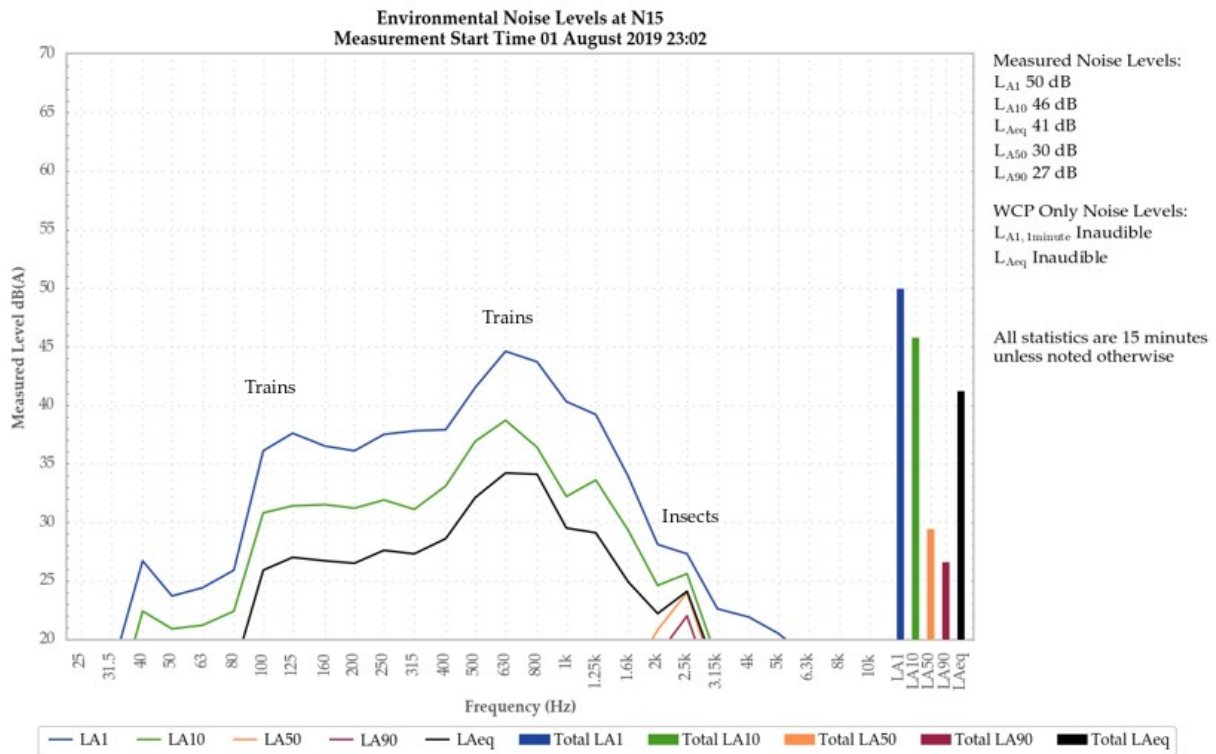


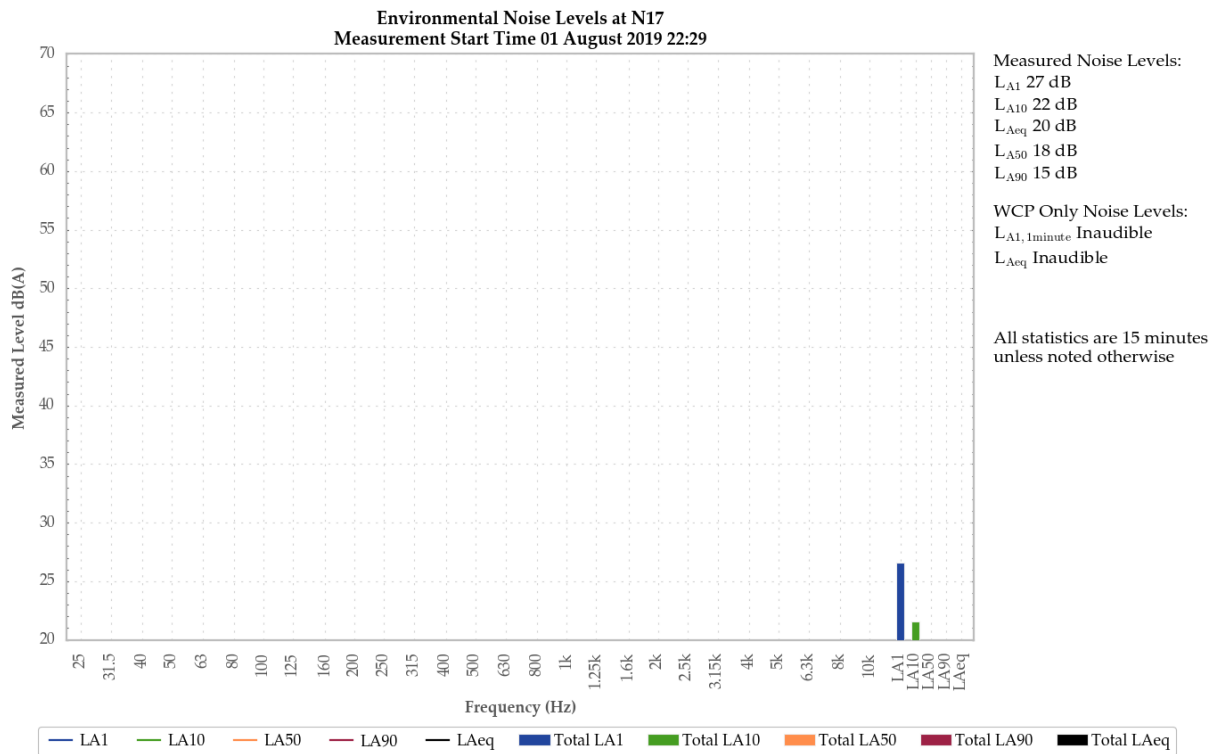
Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible during the measurement.

Trains primarily generated the measured LA10, LA1 and LAeq. Insects generated the measured LA90, LA50 and were a minor contributor to all other measured levels.

Birds, breeze in foliage and noise from a nearby residents were also noted.

5.1.5 N17, 01 August 2019



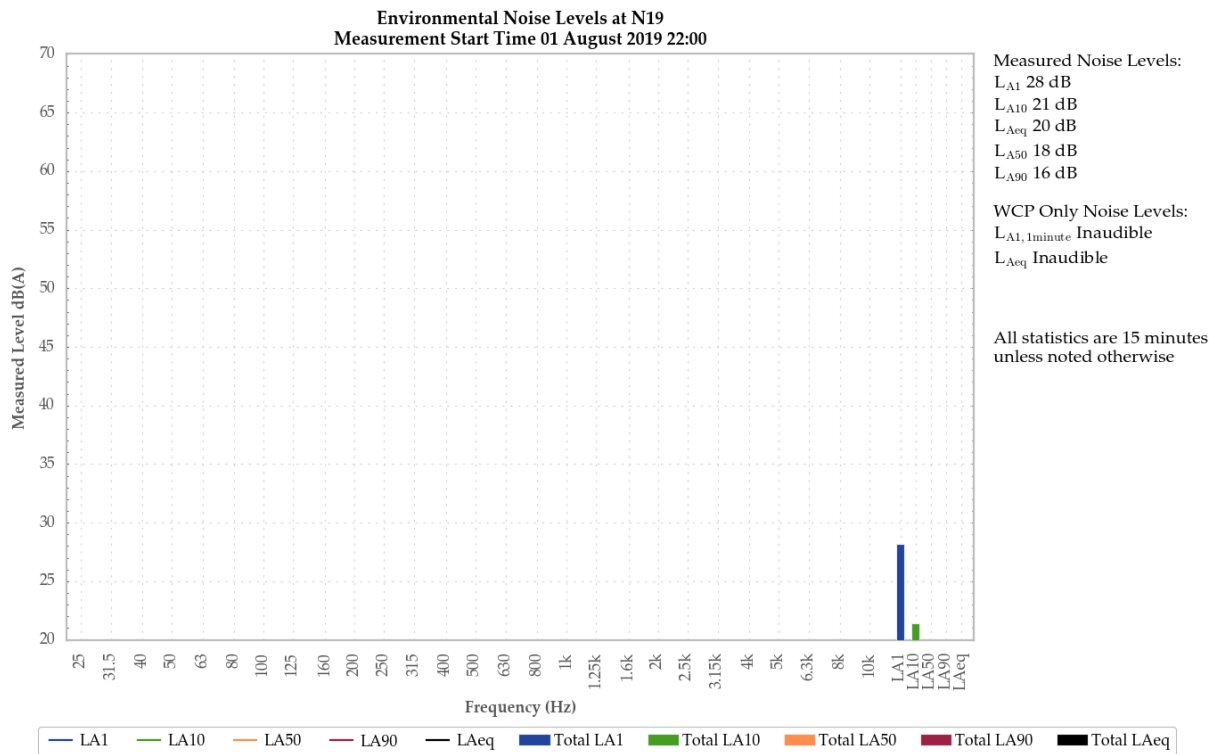
**Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road**

WCP was inaudible.

Aircraft generated measured levels.

Other mine, distant road traffic noise and bats were also noted.

### 5.1.6 N19, 01 August 2019



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

WCP was inaudible.

Nearby engine noise from a residents generated measured levels.

Animals in foliage, aircraft and noise form a nearby residents were also noted.

5.1.7 N20, 01 August 2019

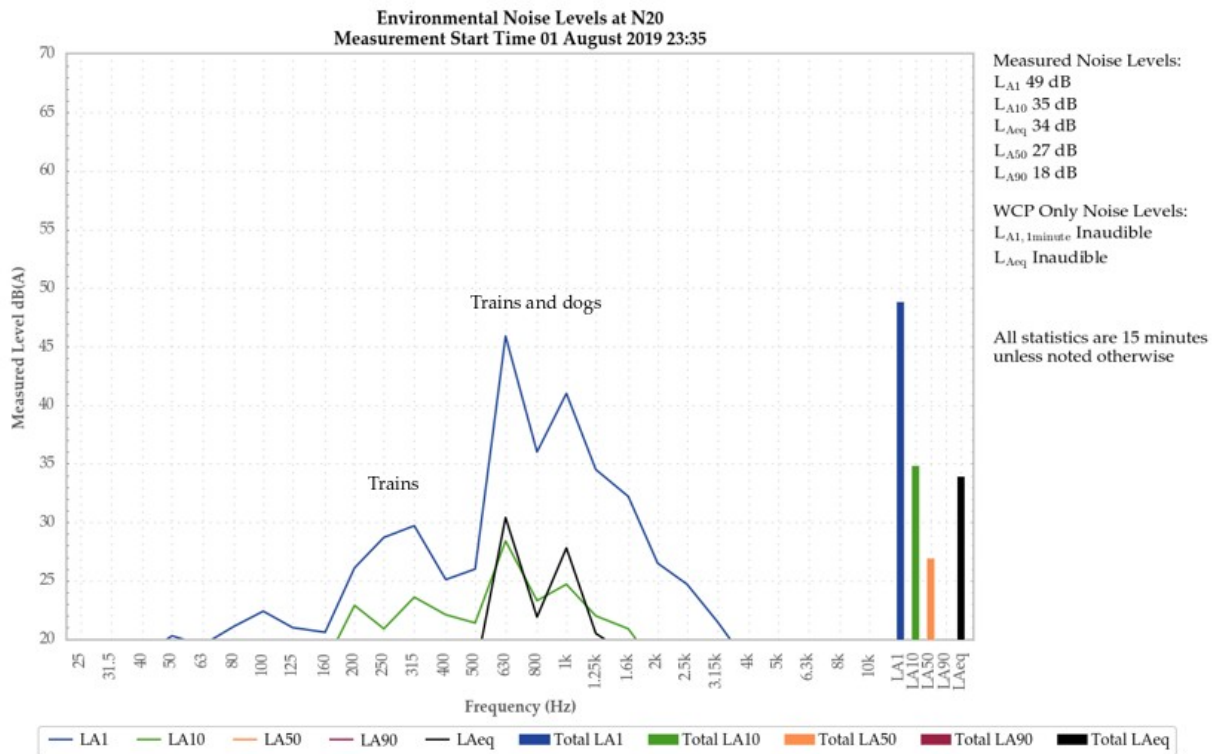


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible.

Trains primarily generated measured levels. Dogs were a minor contributor to the measured LA1 and LAeq.

Bats and birds were also noted.

5.1.8 N21, 01 August 2019

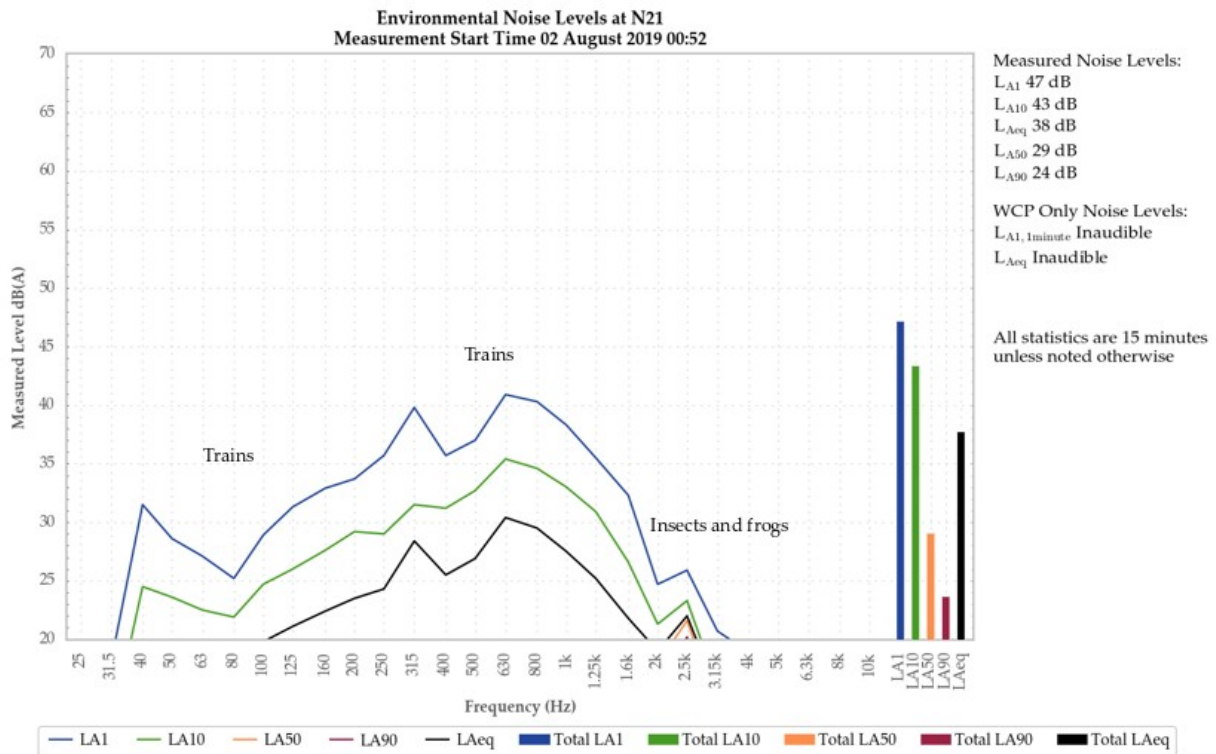


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

WCP was inaudible.

Trains primarily generated the measured LA1, LA10 and LAeq. Insects and frogs generated the measured LA90 and LA50.

## 6 SUMMARY OF COMPLIANCE

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken during the night period of 1/2 August 2019 . Attended noise monitoring was conducted at eight sites. The duration of all measurements was 15 minutes.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the August 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### A STATUTORY REQUIREMENTS

Several documents specify noise criteria that apply to the Wilpinjong operation. The noise sections of the relevant consent, licence and NMP are reproduced below.

## 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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.

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

<b>Hz/dB(Z)</b>	<b>One-third octave <math>L_{Zeq,15minute}</math> threshold level</b>												
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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations. Relevant extracts are shown below.

### 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

The relevant sections of the WCP Noise Management Plan, dated June 2017 are reproduced below.

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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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.

*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.

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## APPENDIX

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### ***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  
Thornton 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**  
**Ambient Temperature :** 26°C  
**Relative Humidity :** 40.2%  
**Barometric Pressure :** 100.96kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 26°C  
**Relative Humidity :** 40.7%  
**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.

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**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

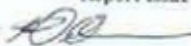
**Equipment Tested/ Model Number :** NA-28  
**Instrument Serial Number :** 30131882  
**Microphone Serial Number :** 04739  
**Pre-amplifier Serial Number :** 11942

**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.

Lean Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
11.5 Hz to 8kHz	±0.13dB	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.



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**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 - Environmental Conditions			
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.

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**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.

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# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
September 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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Noise and Vibration Analysis and Solutions

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## Wilpinjong Coal

### Environmental Noise Monitoring September 2019

Reference: 19248\_R01

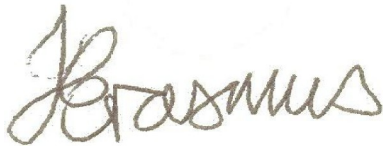
Report date: 13 September 2019

#### Prepared for

Wilpinjong Coal Pty Ltd  
Locked Bag 2005  
Mudgee NSW 2850

#### Prepared by

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Prepared: Jonathan Erasmus  
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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*



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## 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 10/11 September 2019 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

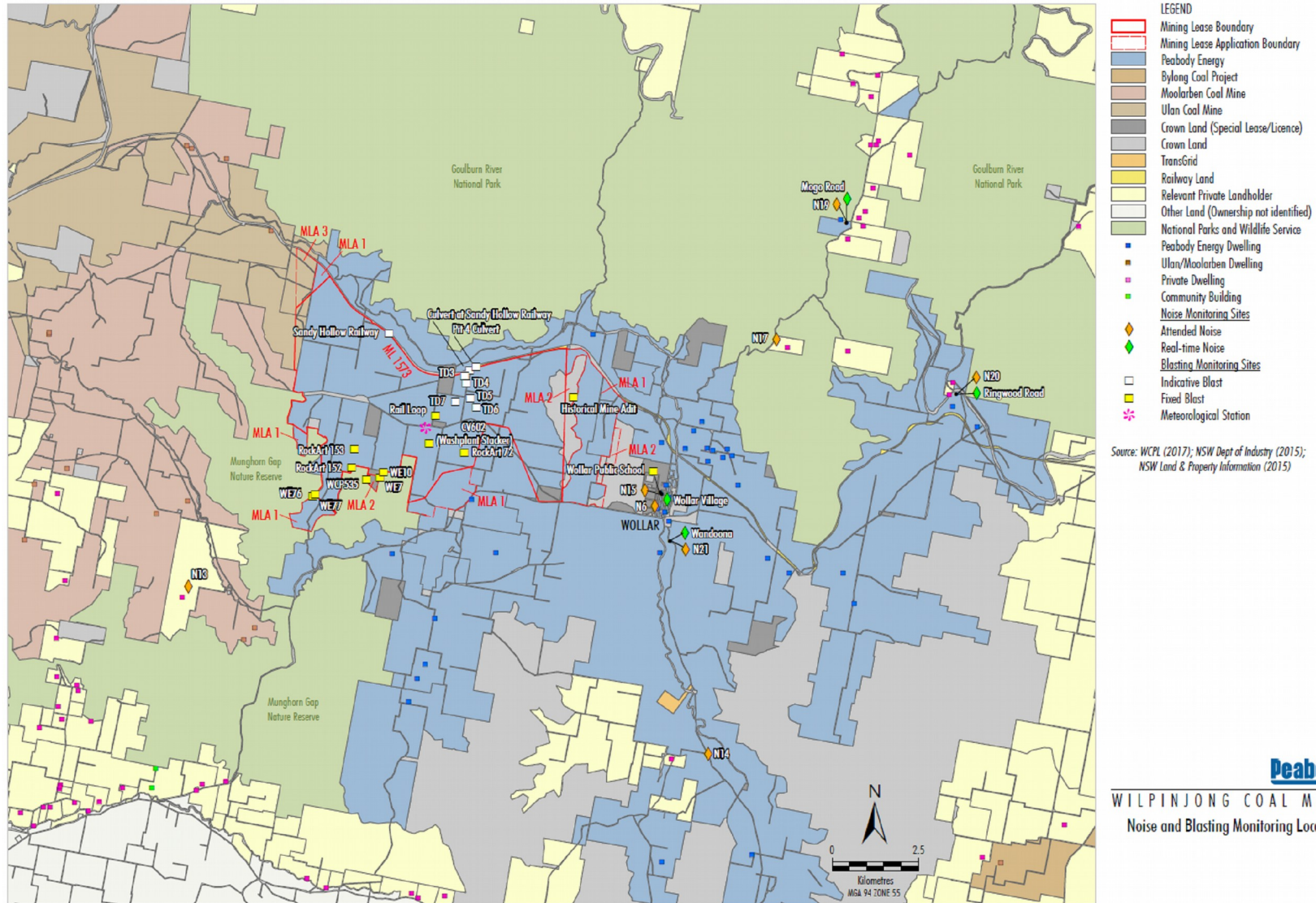


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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 <sub>Amax</sub>	The maximum A-weighted noise level over a time period.
L <sub>A1</sub>	The noise level which is exceeded for 1 per cent of the time.
L <sub>A1,1minute</sub>	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L <sub>A10</sub>	The noise level which is exceeded for 10 percent of the time.
L <sub>Aeq</sub>	The average noise A-weighted energy during a measurement period.
L <sub>A50</sub>	The noise level which is exceeded for 50 per cent of the time and the median noise level during a measurement period.
L <sub>A90</sub>	The level exceeded for 90 percent of the time. The L <sub>A90</sub> level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes.
L <sub>Amin</sub>	The minimum A-weighted noise level over a time period.
L <sub>Ceq</sub>	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 <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	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 <sup>2</sup>	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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was measured directly, where possible, or, determined by frequency analysis.

If the exact contribution of the source of interest 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  $L_{A1,1\text{minute}}$  corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms this is the highest noise level, or  $L_{A\text{max}}$ , 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	1070590	25/06/2020
Rion NA-28 sound level meter	701424	14/06/2021
Pulsar 106 acoustic calibrator	79631	22/01/2021
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  $L_{A\text{eq}}$  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  $L_{A\text{eq}}$  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  $L_{A\text{eq}}$  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 NPfL.

### 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 – SEPTEMBER 2019<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>Aeq</sub> dB	L <sub>A50</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	10/09/2019 23:15	46	43	40	34	24	18	17	55
N13	11/09/2019 00:37	51	36	26	25	21	19	16	54
N14	11/09/2019 00:23	53	33	26	24	20	17	15	54
N15	10/09/2019 22:56	42	34	27	24	21	19	17	54
N17	10/09/2019 22:27	34	27	22	20	18	16	15	54
N19	10/09/2019 22:02	45	31	26	24	22	19	18	54
N20	10/09/2019 23:44	47	40	31	28	20	17	16	54
N21	11/09/2019 00:50	41	31	25	22	20	18	16	54

Note:

- 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 – SEPTEMBER 2019**

Location	Start Date and Time	Wind Speed m/s <sup>1</sup>	Stability Class <sup>1</sup>	Criterion dB	Criterion Applies? <sup>2</sup>	WCP $L_{Aeq,15min}$ dB <sup>3</sup>	Exceedance <sup>4</sup>
N6	10/09/2019 23:15	1.7	E	37	Yes	IA	Nil
N13	11/09/2019 00:37	0.7	F	35	Yes	21	Nil
N14	11/09/2019 00:23	0.0	F	35	Yes	IA	Nil
N15	10/09/2019 22:56	1.7	E	38	Yes	IA	Nil
N17	10/09/2019 22:27	2.2	E	37	Yes	IA	Nil
N19	10/09/2019 22:02	2.4	E	35	Yes	IA	Nil
N20	10/09/2019 23:44	1.0	F	35	Yes	IA	Nil
N21	11/09/2019 00:50	0.7	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 atmospheric conditions have determined that criterion is not applicable.

**Table 4.3:  $L_{A1,1minute}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – SEPTEMBER 2019**

Location	Start Date and Time	Wind Speed m/s <sup>1</sup>	Stability Class <sup>1</sup>	Criterion dB	Criterion Applies? <sup>2</sup>	WCP $L_{A1,1min}$ dB <sup>3</sup>	Exceedance <sup>4</sup>
N6	10/09/2019 23:15	1.7	E	45	Yes	IA	Nil
N13	11/09/2019 00:37	0.7	F	45	Yes	26	Nil
N14	11/09/2019 00:23	0.0	F	45	Yes	IA	Nil
N15	10/09/2019 22:56	1.7	E	45	Yes	IA	Nil
N17	10/09/2019 22:27	2.2	E	45	Yes	IA	Nil
N19	10/09/2019 22:02	2.4	E	45	Yes	IA	Nil
N20	10/09/2019 23:44	1.0	F	45	Yes	IA	Nil
N21	11/09/2019 00:50	0.7	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 atmospheric conditions have determined that criterion is not applicable.

#### 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, SEPTEMBER 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total $L_{Aeq}$ dB	Low pass (<630Hz) $L_{Aeq}$ dB	Low pass (<630Hz) $L_{A90}$ dB	
N15/SX33	10/09/2019 22:56	10/09/2019 23:00	33	29	19	IA
N19/SX32	10/09/2019 22:02	10/09/2019 22:00	24	20	NR	IA
N20/SX30	10/09/2019 23:44	10/09/2019 23:45	39	38	13	IA
N21/SX31	11/09/2019 00:50	11/09/2019 00:45	26	23	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 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 – SEPTEMBER 2019*

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	10/09/2019 23:15	8	0.0	-	0
N13	11/09/2019 00:37	5	0.0	-	0
N14	11/09/2019 00:23	6	1.3	130	0
N15	10/09/2019 22:56	12	0.0	-	0
N17	10/09/2019 22:27	10	0.0	-	0
N19	10/09/2019 22:02	11	0.0	-	0
N20	10/09/2019 23:44	9	0.9	250	0
N21	11/09/2019 00:50	5	0.9	220	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 LA1, LA10, LAeq, LA50 and LA90 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 LA1 result by a small margin but is entirely accurate for LAeq.

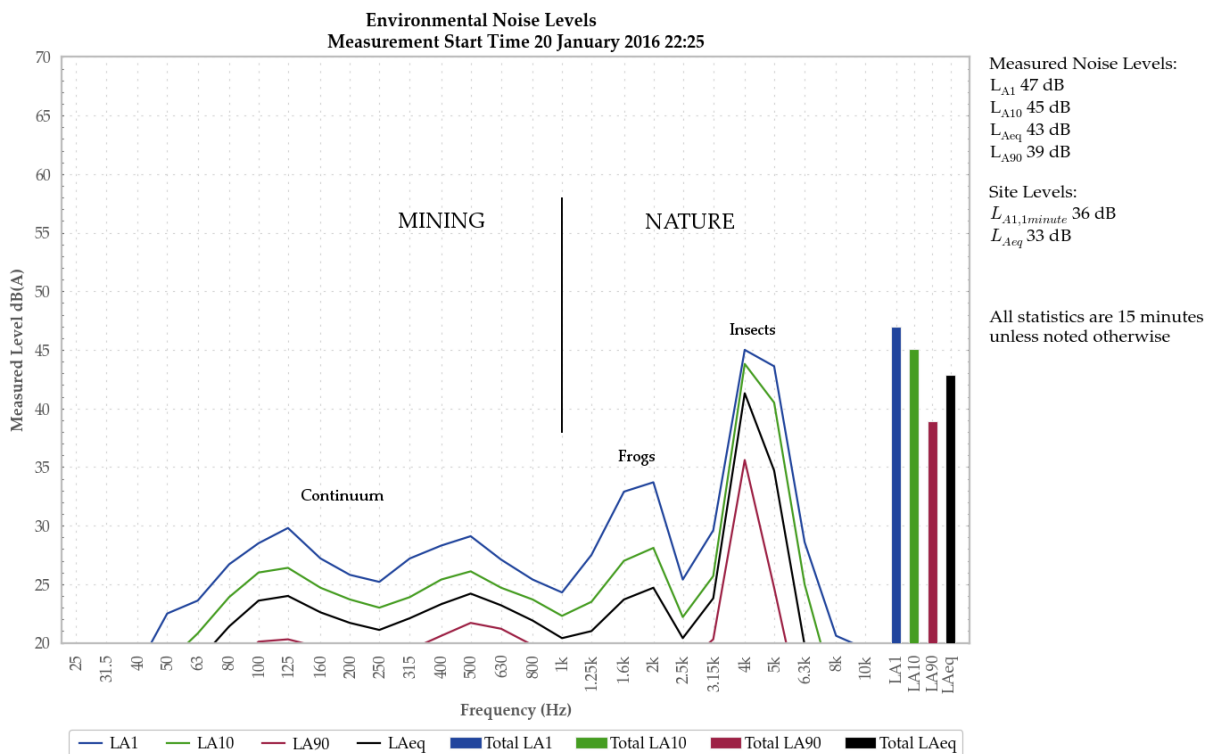
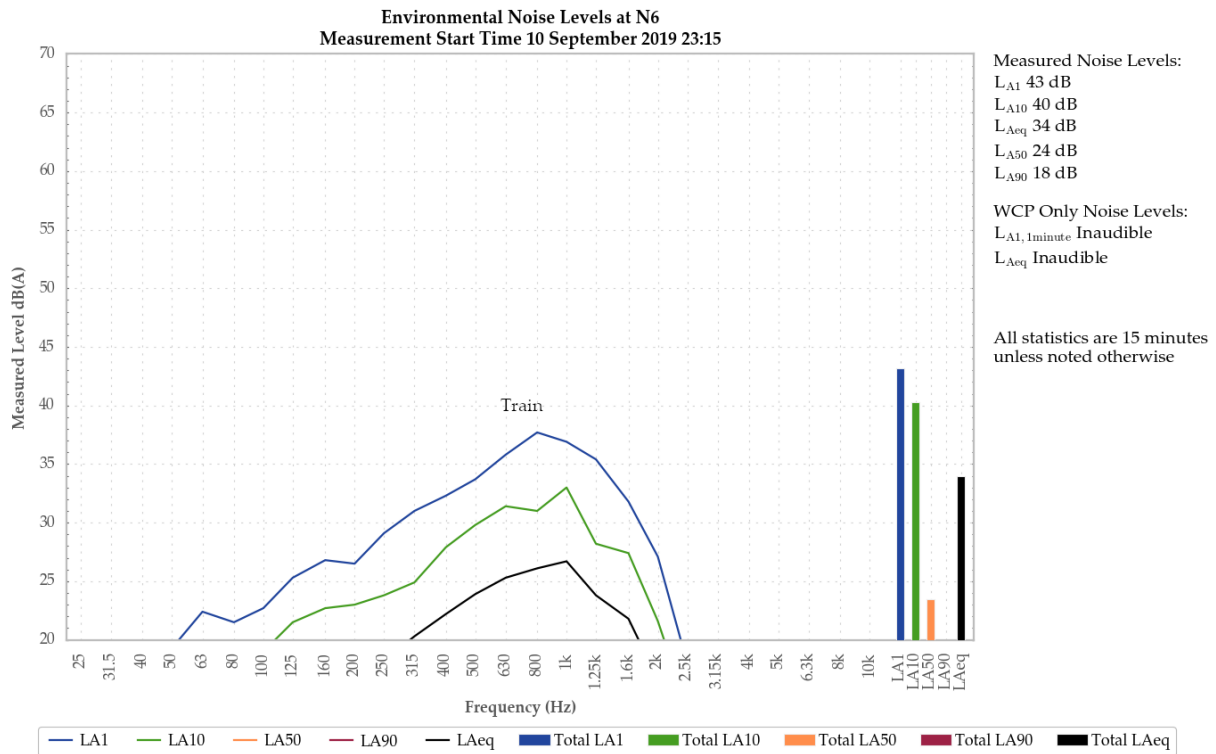


Figure 2: Example graph (refer to Section 5.1 for explanatory note)



5.1.1 N6



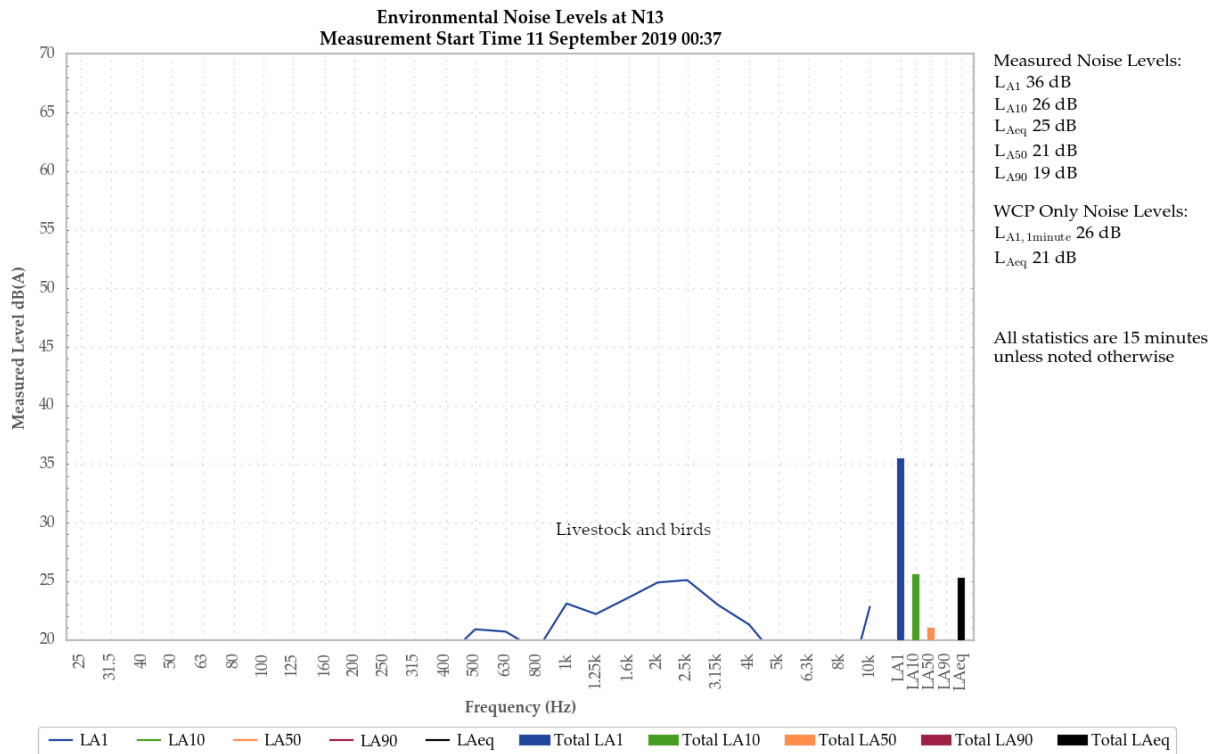
**Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village**

WCP was inaudible.

A train generated the measured LA1, LA10, and LAeq. Frogs and insects generated the measured LA50 and LA90.

Dogs were also noted.

5.1.2 N13

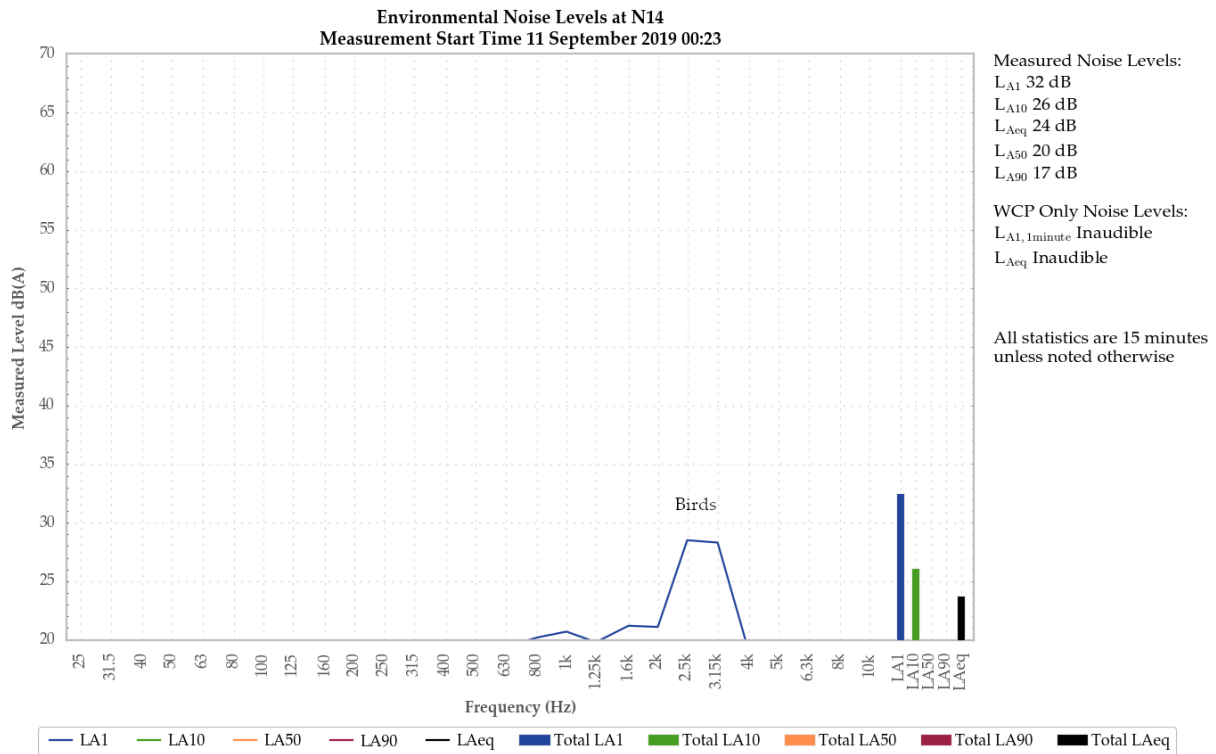


**Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road**

A continuum from WCP was audible throughout the measurement generating the site only LAeq of 21 dB and LA1,1minute of 26 dB.

Birds and livestock generated the measured LA1. The mining continuum from WCP generated the measured LA10, LA50, and LA90. The mining continuum from WCP, bats, birds and livestock generated the measured LAeq.

### 5.1.3 N14

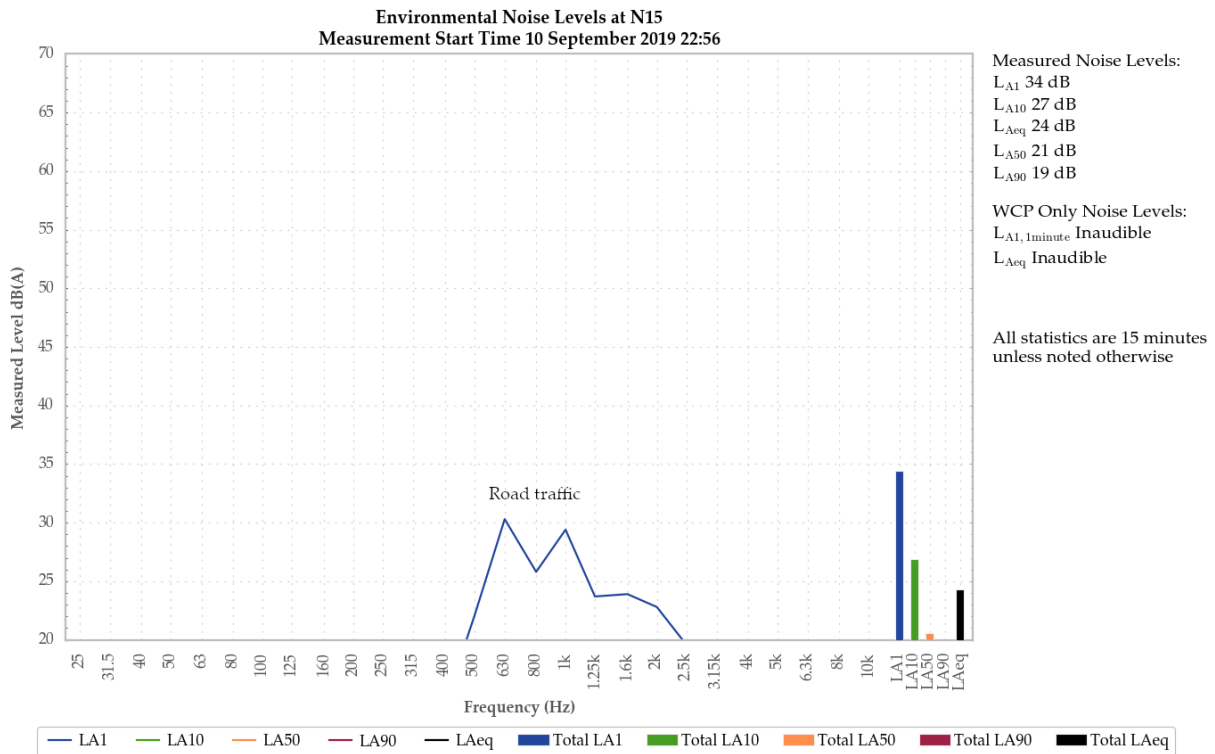


**Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads**

WCP was inaudible.

Birds and insects generated measured levels.

5.1.4 N15



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

WCP was inaudible.

Road traffic generated the measured LA1 and LA10 and with a train the LAeq. A local continuum generated the measured LA50 and LA90.

Fogs, insects, and dogs were also noted.

5.1.5 N17

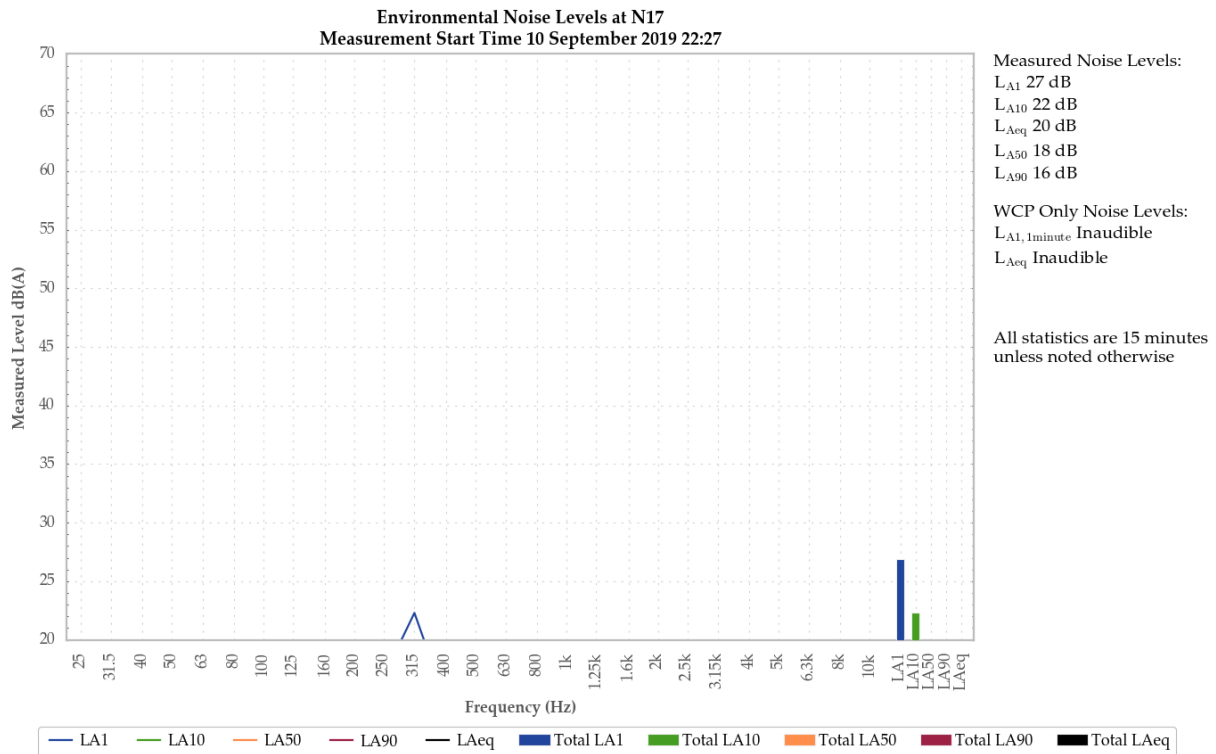
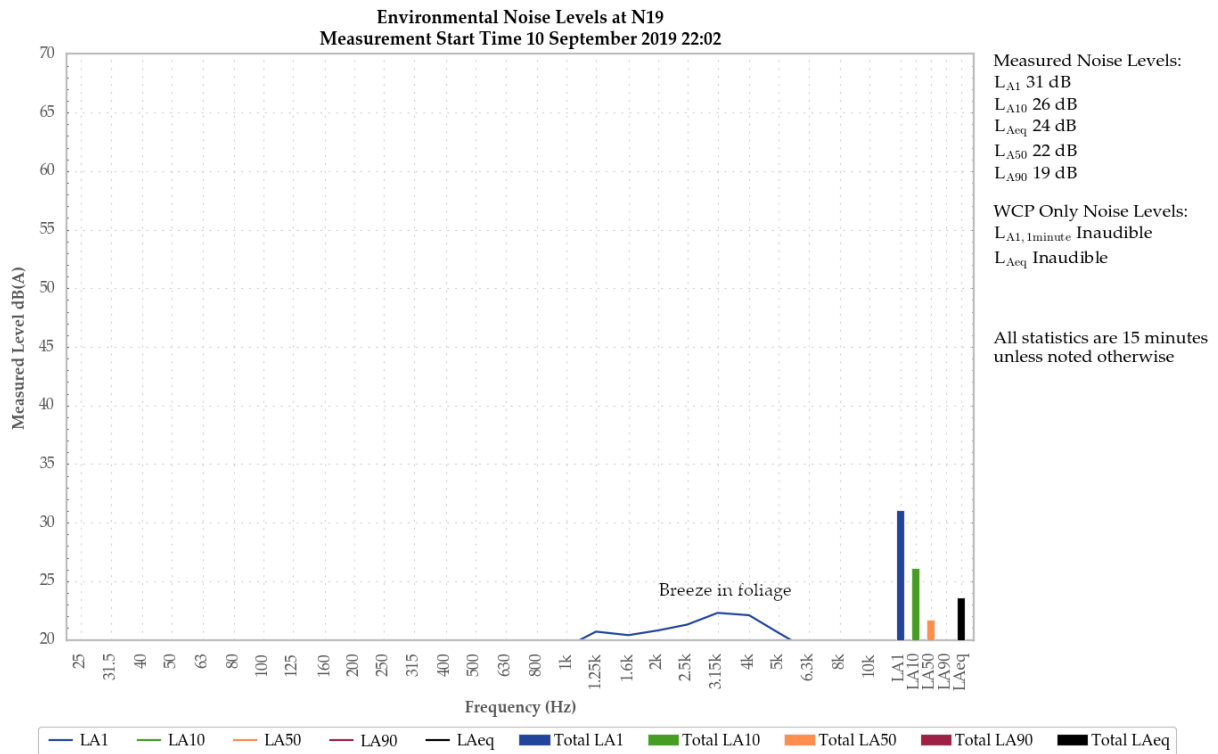


Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road

WCP was inaudible.

A train generated the measured LA1, LA10, and LAeq. The noise floor of the sound level meter generated the measured LA50 and LA90.

### 5.1.6 N19



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

WCP was inaudible.

Breeze in foliage and insects generated measured levels.

5.1.7 N20

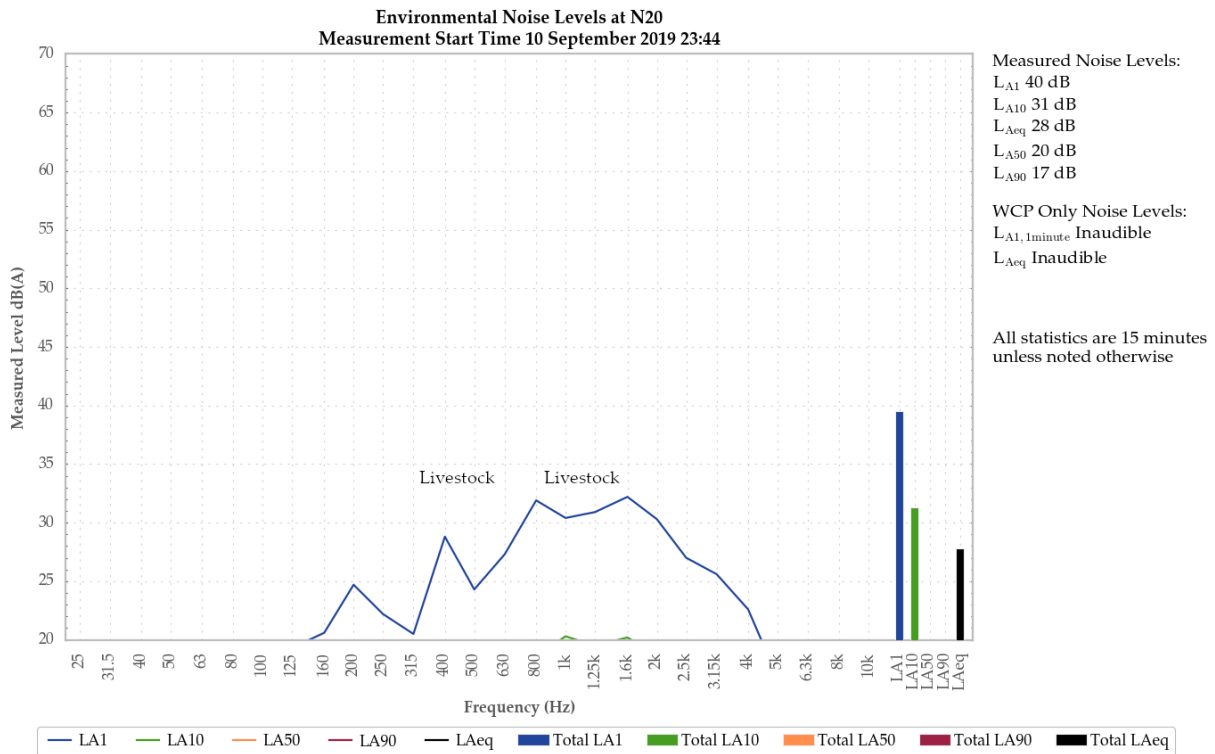
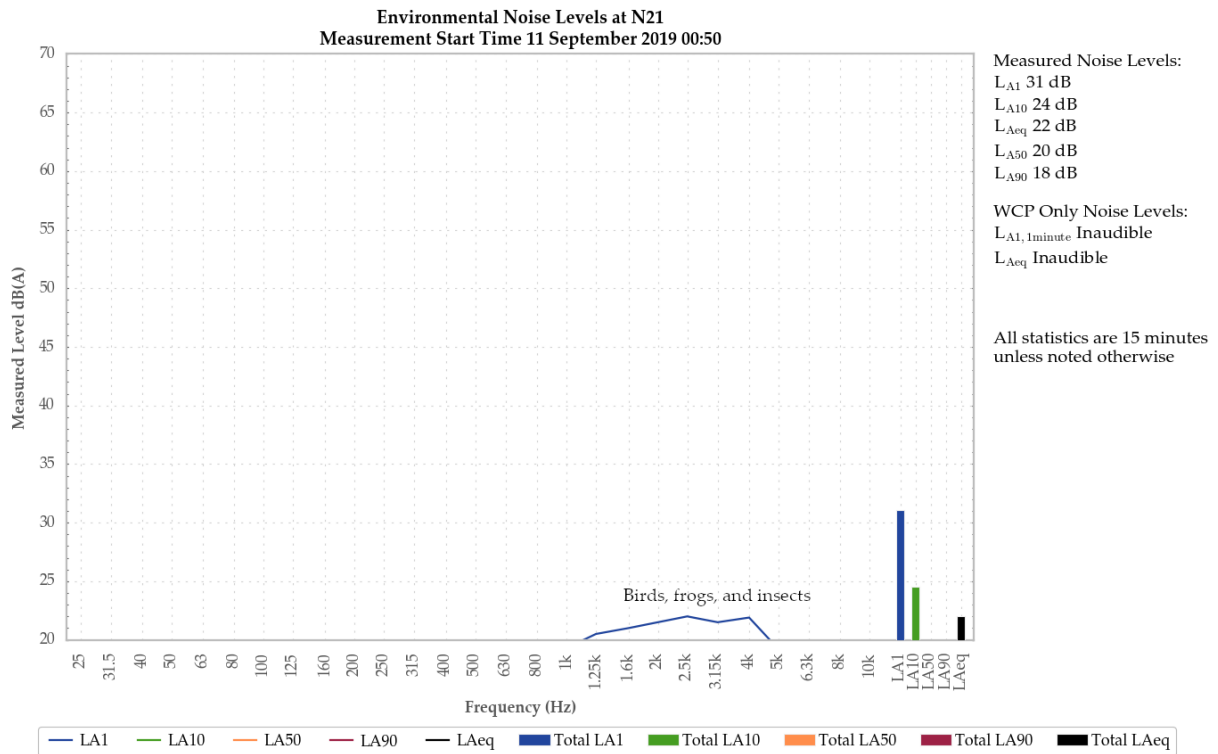


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible.

Livestock generated the measured LA1. A train generated the measured LA10. Livestock and a train generated the measured LAeq. The noise floor of the sound level meter generally generated the measured LA50 and LA90.

5.1.8 N21



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

WCP was inaudible.

Birds, insects, and frogs generated 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 10/11 September 2019 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the September 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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:

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

- L5.4 For the purpose of condition L5.3:
- 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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.

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## APPENDIX

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### ***B CALIBRATION CERTIFICATES***



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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**  
**Ambient Temperature :** 21.3°C  
**Relative Humidity :** 41.7%  
**Barometric Pressure :** 100.95kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 22.7°C  
**Relative Humidity :** 39.2%  
**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	±0.15dB	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.

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**Sound Level Meter**  
IEC 61672-3:2013  
**Calibration Certificate**  
Calibration Number C19342

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b>	Rion NA-28
<b>Instrument Serial Number :</b>	00701424
<b>Microphone Serial Number :</b>	01916
<b>Pre-amplifier Serial Number :</b>	01463
<b>Pre-Test Atmospheric Conditions</b>	<b>Post-Test Atmospheric Conditions</b>
<b>Ambient Temperature :</b> 26°C	<b>Ambient Temperature :</b> 26°C
<b>Relative Humidity :</b> 40.2%	<b>Relative Humidity :</b> 40.7%
<b>Barometric Pressure :</b> 100.96kPa	<b>Barometric Pressure :</b> 100.32kPa
<b>Calibration Technician :</b> Lucky Jaiswal	<b>Secondary Check:</b> Eloise Burrows
<b>Calibration Date :</b> 14 Jun 2019	<b>Report Issue Date :</b> 18 Jun 2019
<b>Approved Signatory :</b>	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 -			
<b>Acoustic Tests</b>		<b>Environmental Conditions</b>	
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
<b>Electrical Tests</b>			
31.5 Hz to 20 kHz	±0.11dB		

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



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**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.

Specific Tests	Least Uncertainties of Measurement - Environmental Conditions	
Generated SPL	±0.11dB	Temperature ±0.2°C
Frequency	±0.01%	Relative Humidity ±2.4%
Distortion	±0.3%	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.

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**Sound Calibrator**

IEC 60942-2017

**Calibration Certificate**

Calibration Number C19124

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b> <b>Instrument Serial Number :</b>	Pulsar Model 106 74813
<b>Atmospheric Conditions</b>	
<b>Ambient Temperature :</b>	24°C
<b>Relative Humidity :</b>	50.4%
<b>Barometric Pressure :</b>	99.54kPa
<b>Calibration Technician :</b>	Lucky Jaiswal
<b>Calibration Date :</b>	21 Feb 2019
<b>Secondary Check:</b>	Lewis Boorman
<b>Report Issue Date :</b>	22 Feb 2019
<b>Approved Signatory :</b>	 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.

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# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
October 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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Noise and Vibration Analysis and Solutions

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## Wilpinjong Coal

### Environmental Noise Monitoring October 2019

Reference: 19260\_R01

Report date: 23 October 2019

#### 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*

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# 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 October 2019 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*

<b>NMP Descriptor</b>	<b>Monitoring Location</b>
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

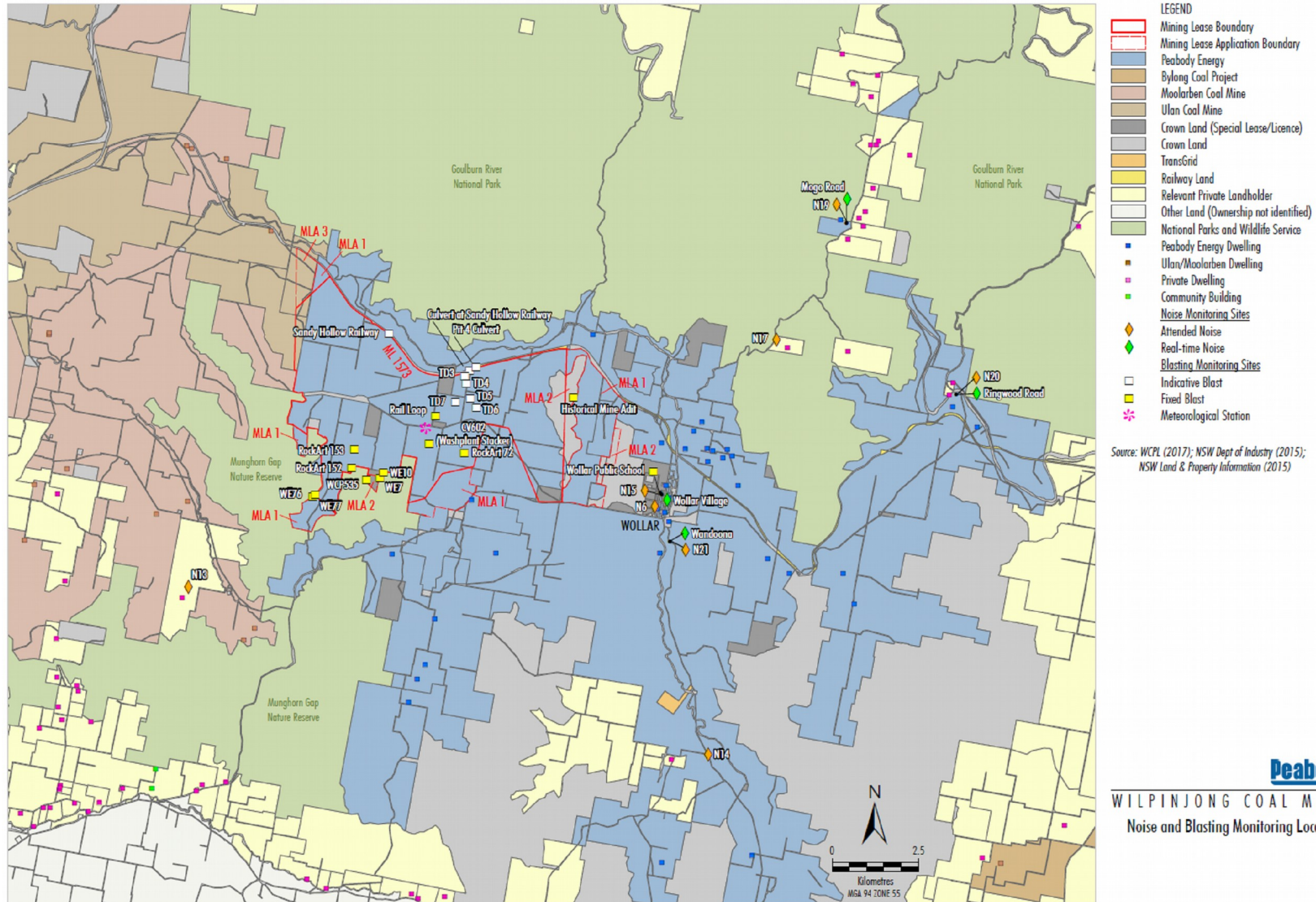


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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 <sub>Amax</sub>	The maximum A-weighted noise level over a time period.
L <sub>A1</sub>	The noise level which is exceeded for 1 per cent of the time.
L <sub>A1,1minute</sub>	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L <sub>A10</sub>	The noise level which is exceeded for 10 percent of the time.
L <sub>Aeq</sub>	The average noise A-weighted energy during a measurement period.
L <sub>A50</sub>	The noise level which is exceeded for 50 per cent of the time and the median noise level during a measurement period.
L <sub>A90</sub>	The level exceeded for 90 percent of the time. The L <sub>A90</sub> level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes.
L <sub>Amin</sub>	The minimum A-weighted noise level over a time period.
L <sub>Ceq</sub>	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 <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	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 <sup>2</sup>	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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was measured directly, where possible, or, determined by frequency analysis.

If the exact contribution of the source of interest 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  $L_{A1,1\text{minute}}$  corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms this is the highest noise level, or  $L_{A\text{max}}$ , 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	701424	14/06/2021
Rion NA-28 sound level meter	30131882	05/02/2021
Pulsar 106 acoustic calibrator	74813	21/02/2021
Pulsar 106 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  $L_{A\text{eq}}$  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  $L_{A\text{eq}}$  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  $L_{A\text{eq}}$  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 NPfL.

### 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 – OCTOBER 2019<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>Aeq</sub> dB	L <sub>A50</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	02/10/2019 01:11	43	25	20	20	19	18	17	54
N13	02/10/2019 00:34	63	34	26	33	22	21	19	53
N14	02/10/2019 00:22	48	36	28	26	21	18	16	54
N15	01/10/2019 23:11	55	50	47	41	28	17	16	58
N17	01/10/2019 22:39	40	26	19	18	16	16	15	54
N19	01/10/2019 22:10	44	35	27	25	23	20	18	48
N20	01/10/2019 23:44	84	69	62	58	30	20	16	65
N21	02/10/2019 00:50	53	50	44	38	22	20	18	47

Note:

- 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 – OCTOBER 2019

Location	Start Date and Time	Wind Speed m/s <sup>1</sup>	Stability Class <sup>1</sup>	Criterion dB	Criterion Applies? <sup>2</sup>	WCP $L_{Aeq,15min}$ dB <sub>3</sub>	Exceedance <sup>4</sup>
N6	02/10/2019 01:11	0.0	G	37	No	<20	NA
N13	02/10/2019 00:34	0.0	F	35	Yes	<25	Nil
N14	02/10/2019 00:22	0.0	F	35	Yes	<20	Nil
N15	01/10/2019 23:11	0.9	E	37	Yes	IA	Nil
N17	01/10/2019 22:39	0.7	E	38	Yes	IA	Nil
N19	01/10/2019 22:10	0.6	E	35	Yes	<20	Nil
N20	01/10/2019 23:44	0.5	E	35	Yes	IA	Nil
N21	02/10/2019 00:50	0.0	F	35	Yes	<20	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 2019

Location	Start Date and Time	Wind Speed m/s <sup>1</sup>	Stability Class <sup>1</sup>	Criterion dB	Criterion Applies? <sup>2</sup>	WCP $L_{A1,1min}$ dB <sub>3</sub>	Exceedance <sup>4</sup>
N6	02/10/2019 01:11	0.0	G	45	No	<20	NA
N13	02/10/2019 00:34	0.0	F	45	Yes	<25	Nil
N14	02/10/2019 00:22	0.0	F	45	Yes	<25	Nil
N15	01/10/2019 23:11	0.9	E	45	Yes	IA	Nil
N17	01/10/2019 22:39	0.7	E	45	Yes	IA	Nil
N19	01/10/2019 22:10	0.6	E	45	Yes	<20	Nil
N20	01/10/2019 23:44	0.5	E	45	Yes	IA	Nil
N21	02/10/2019 00:50	0.0	F	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  $L_{A1,1\text{minute}}$  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, OCTOBER 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total $L_{Aeq}$ dB	Low pass (<630Hz) $L_{Aeq}$ dB	Low pass (<630Hz) $L_{A90}$ dB	WCP $L_{Aeq}$ dB
N15/SX33	01/10/2019 23:11	01/10/2019 23:15	45	44	NR	IA
N19/SX32	01/10/2019 22:10	01/10/2019 22:15	25	23	NR	<20
N20/SX30	01/10/2019 23:44	01/10/2019 23:45	39	36	NR	IA
N21/SX31	02/10/2019 00:50	02/10/2019 00:45	29	25	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 – OCTOBER 2019

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	02/10/2019 01:11	8	0.0	-	0
N13	02/10/2019 00:34	13	0.0	-	0
N14	02/10/2019 00:22	12	0.0	-	0
N15	01/10/2019 23:11	10	0.0	-	0
N17	01/10/2019 22:39	14	0.0	-	0
N19	01/10/2019 22:10	13	0.8	50	0
N20	01/10/2019 23:44	9	1.5	230	0



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Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N21	02/10/2019 00:50	9	0.0	-	0

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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 LA1, LA10, LAeq, LA50 and LA90 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 LA1 result by a small margin but is entirely accurate for LAeq.

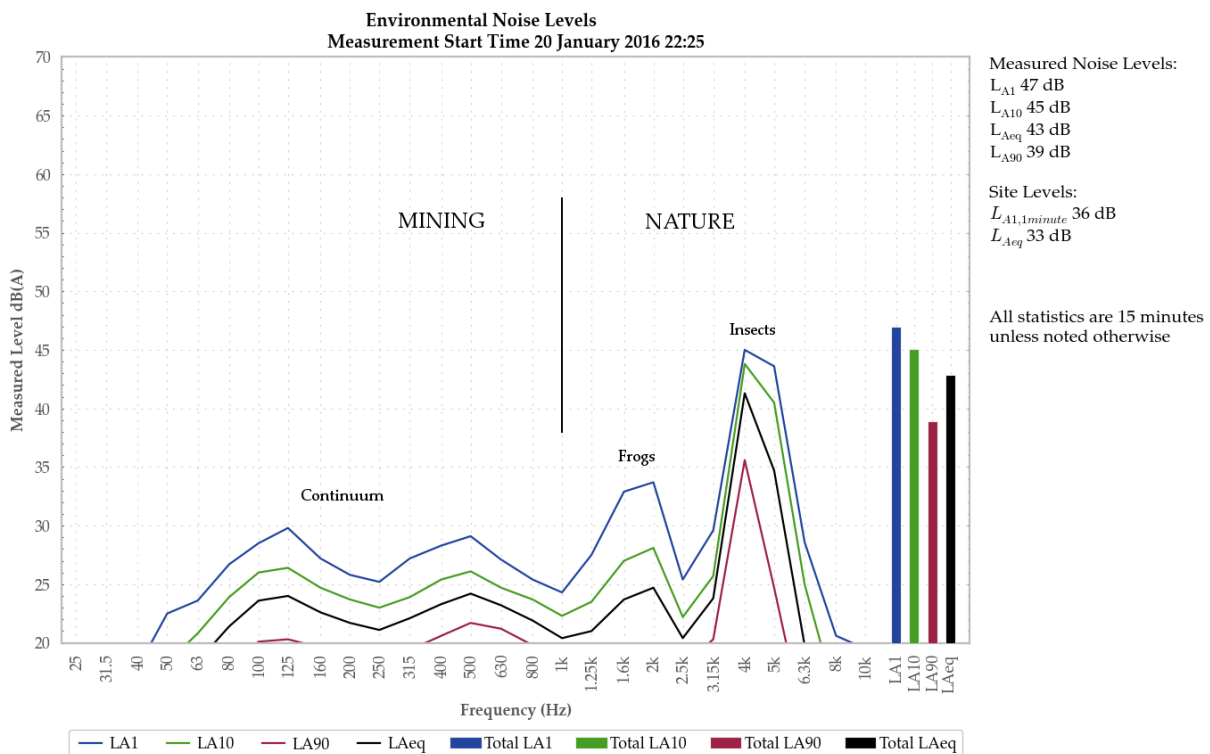
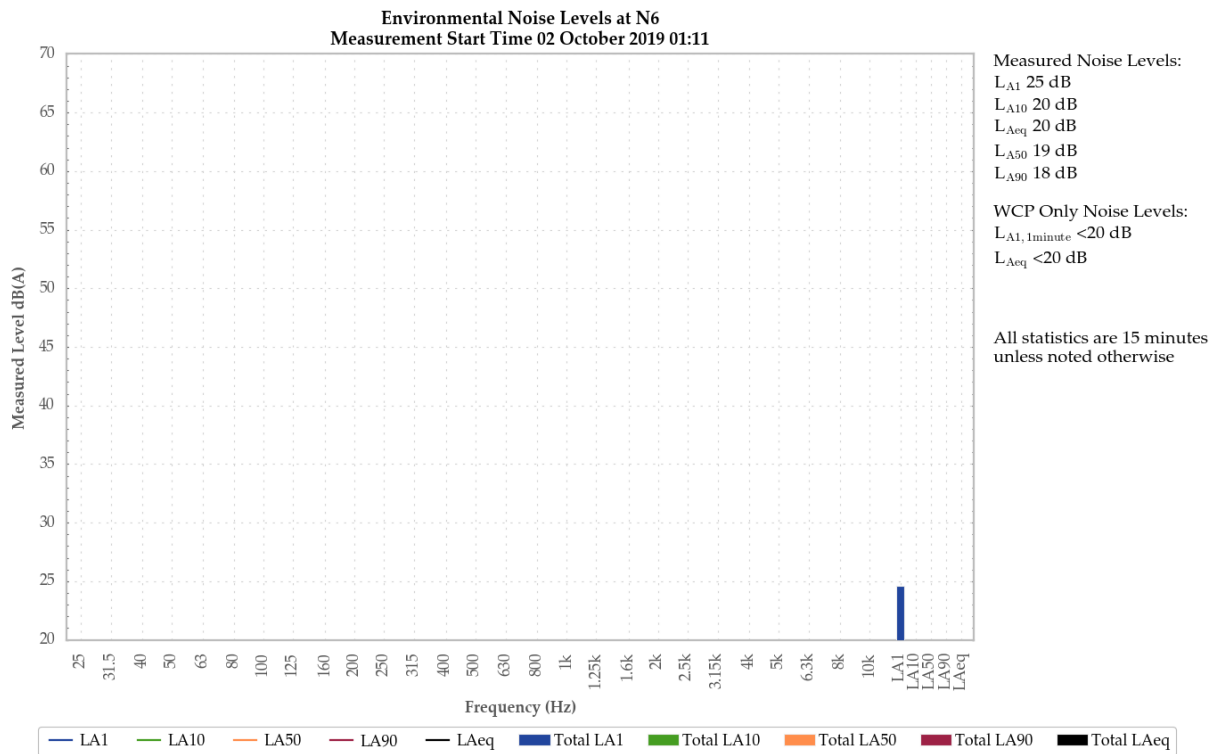


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6



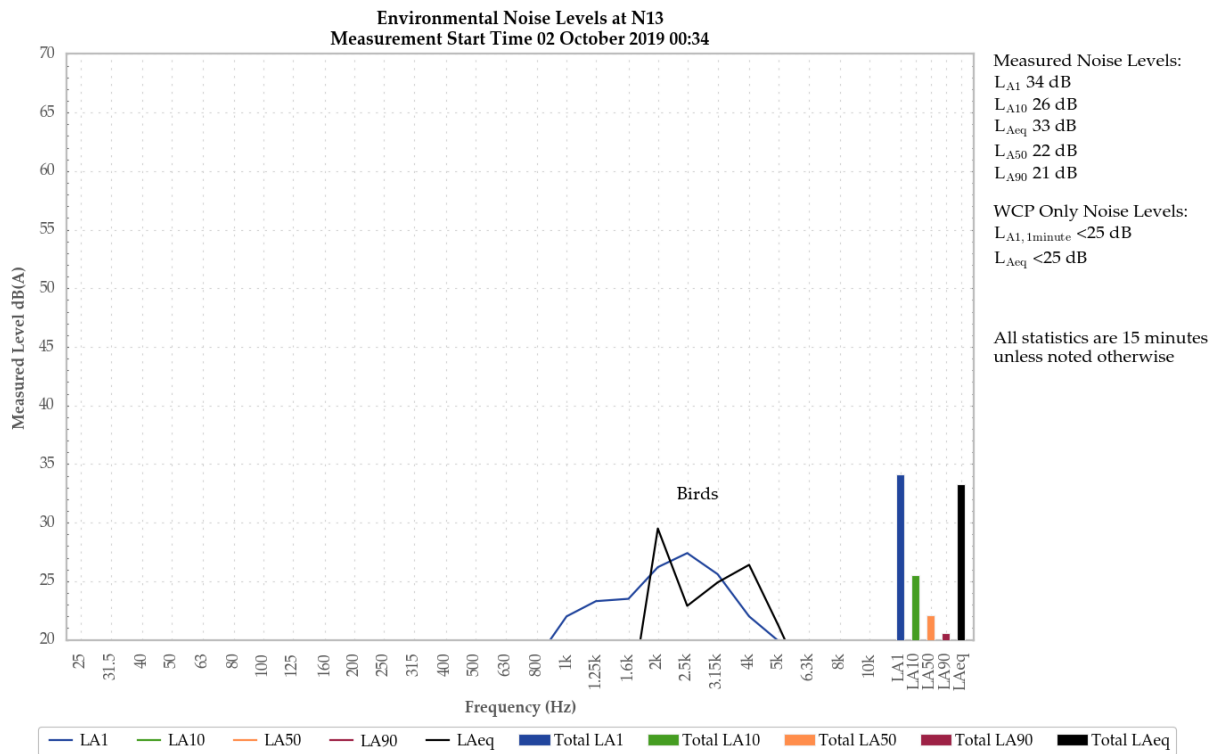
**Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village**

A low-level continuum from WCP was audible at times during the measurement and generated the site only LAeq and LA1,1minute of less than 20 dB.

Dogs and birds were primarily responsible for all measured noise levels. The noise floor of the sound level meter contributed to the measured LA90, LA50, LAeq and LA10.

Bats were also noted.

5.1.2 N13



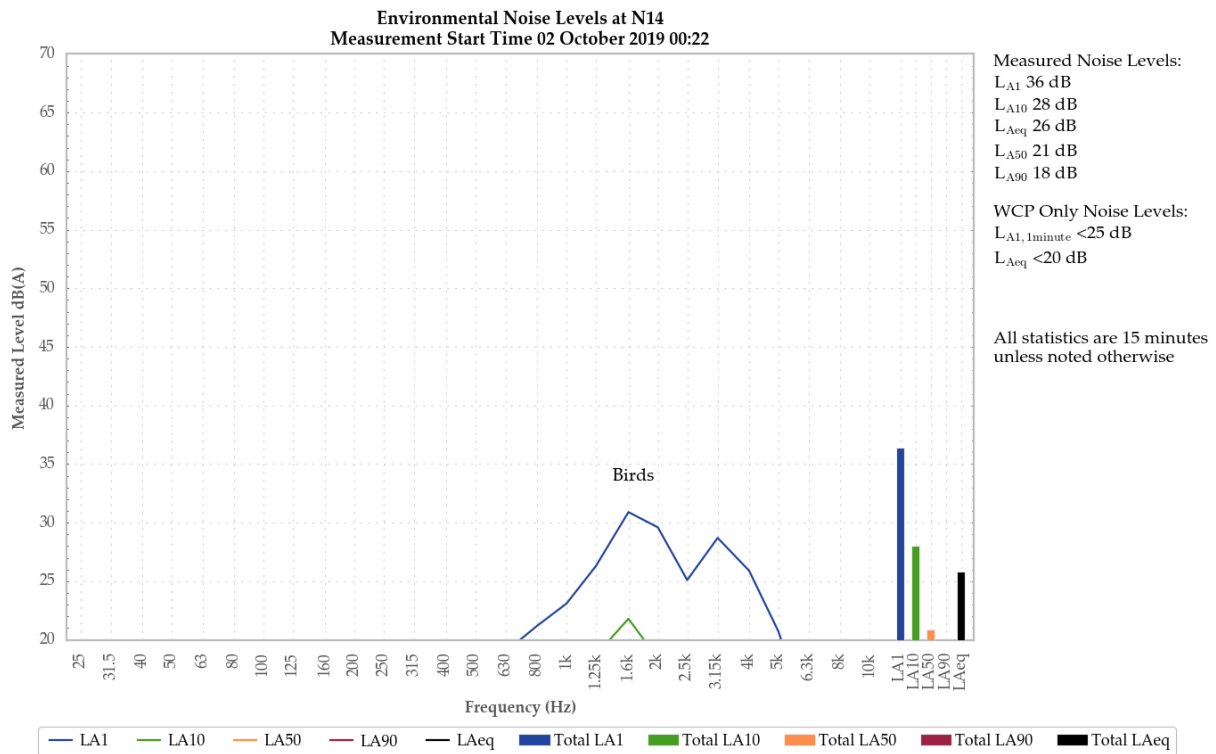
**Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road**

A low-level continuum from WCP was audible throughout the measurement and generated the site only LAeq and LA1,1minute of less than 25 dB.

Birds were responsible for the measured LA1 and LAeq. The WCP continuum and a continuum from another mining operation combined to generate the measured LA50 and LA90.

Cows and frogs were also noted.

### 5.1.3 N14



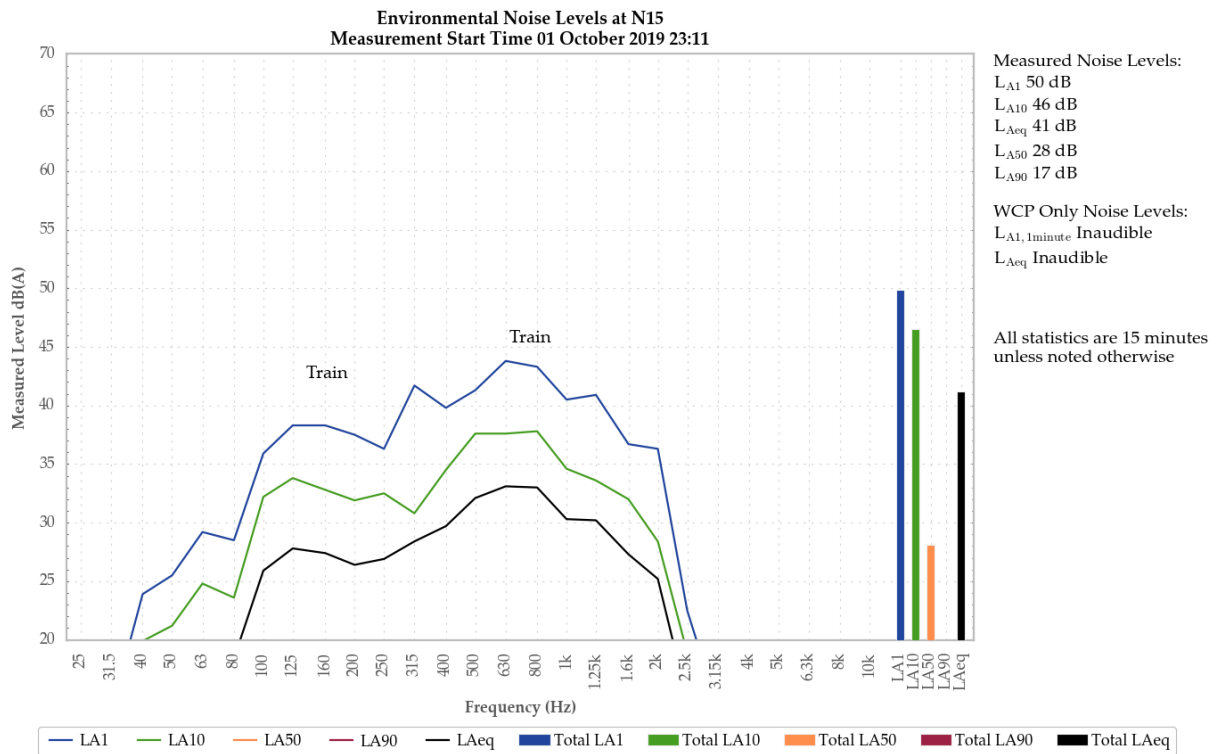
**Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads**

A low-level continuum from WCP was audible throughout the measurement generating a site-only LAeq,15minute of less than 20 dB and LA1,1minute of 25 dB.

Birds and insects generated the measured LA1. Insects were primarily responsible for the measured LA10, LAeq and LA90. The continuum from WCP contributed to the measured LAeq and LA90.

Cows were also noted.

### 5.1.4 N15



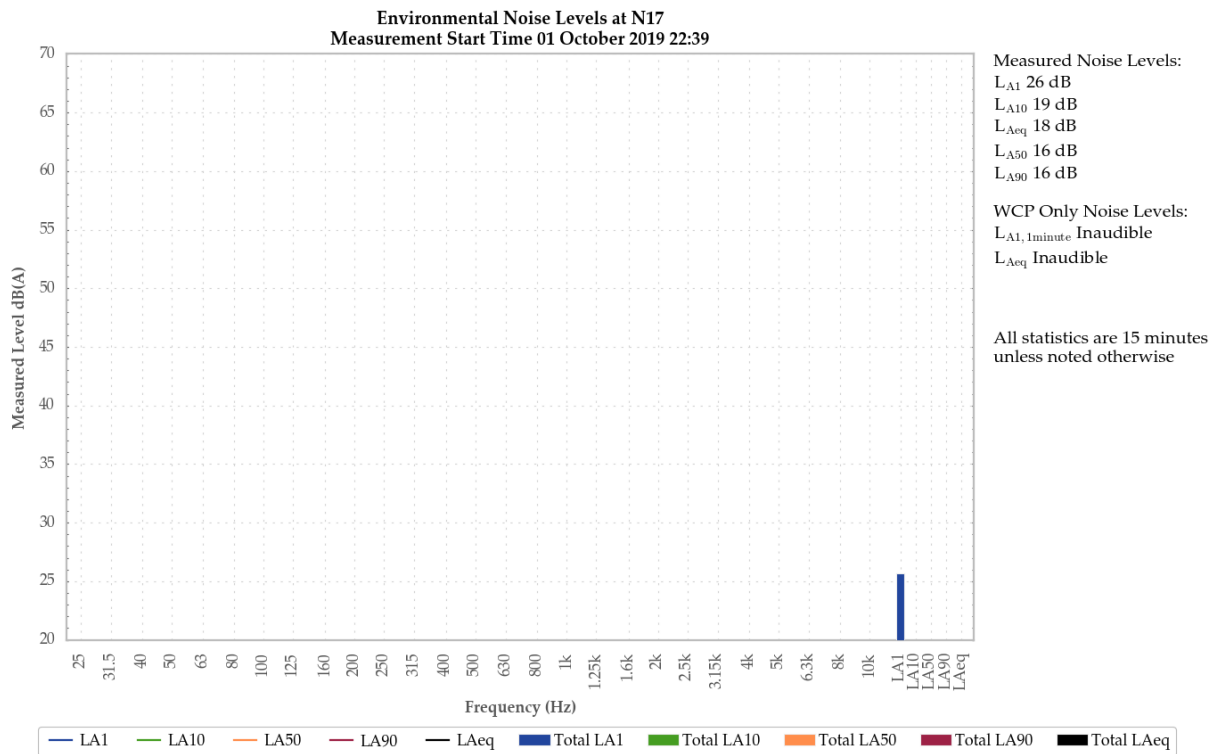
**Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village**

WCP was inaudible.

A train was primarily responsible for all measured noise levels. Dogs contributed to the measured LA50. The noise floor of the sound level meter was responsible for the measured LA90.

Bats were also noted.

5.1.5 N17



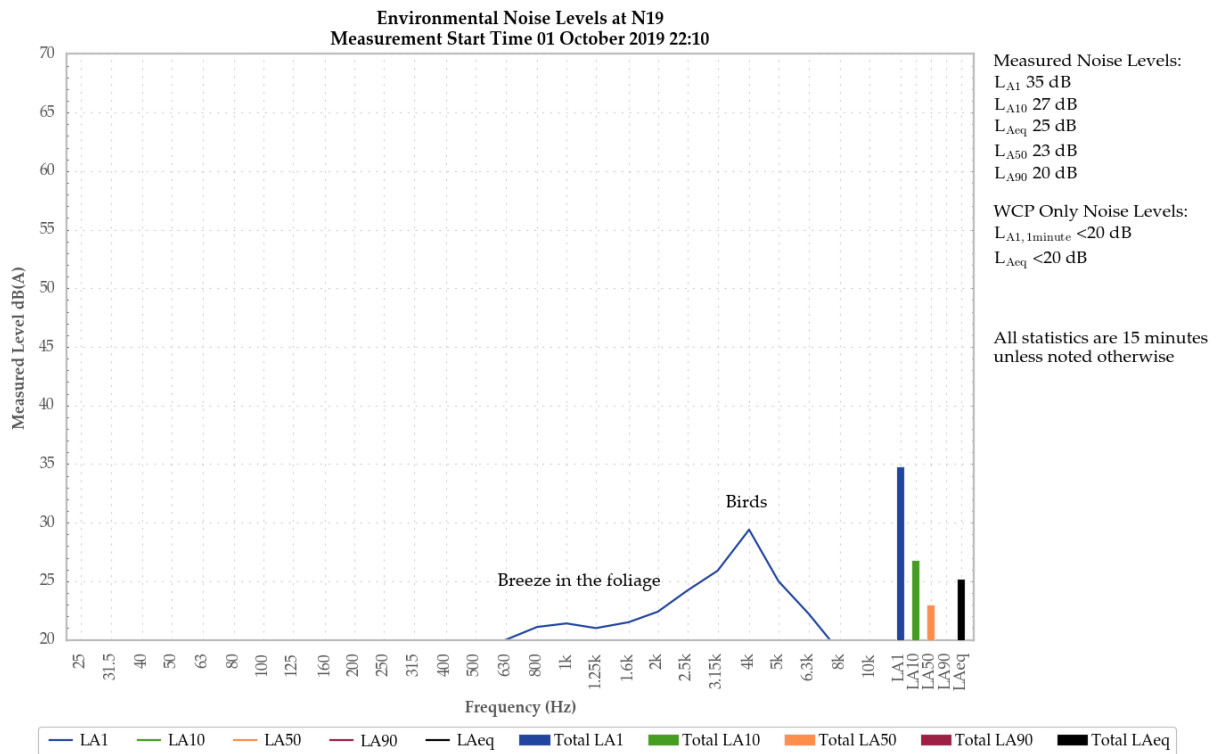
**Figure 7: Environmental Noise Levels – N17 Mogo Road, off Araluen Road**

WCP was inaudible.

Animals in the foliage generated the measured LA1. Breeze in the foliage and the noise floor of the sound level meter generated the measured LA10, LAeq, LA50 and LA90.

Birds were also noted.

### 5.1.6 N19



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

A low-level continuum from WCP was audible at times during the measurement and generated the site only LAeq and LA1,1minute of less than 20 dB.

Breeze in the foliage and birds were primarily responsible for all measured noise levels. The noise floor of the sound level meter was a minor contributor to the measured LA90.

Animals in the foliage were also noted.



5.1.7 N20

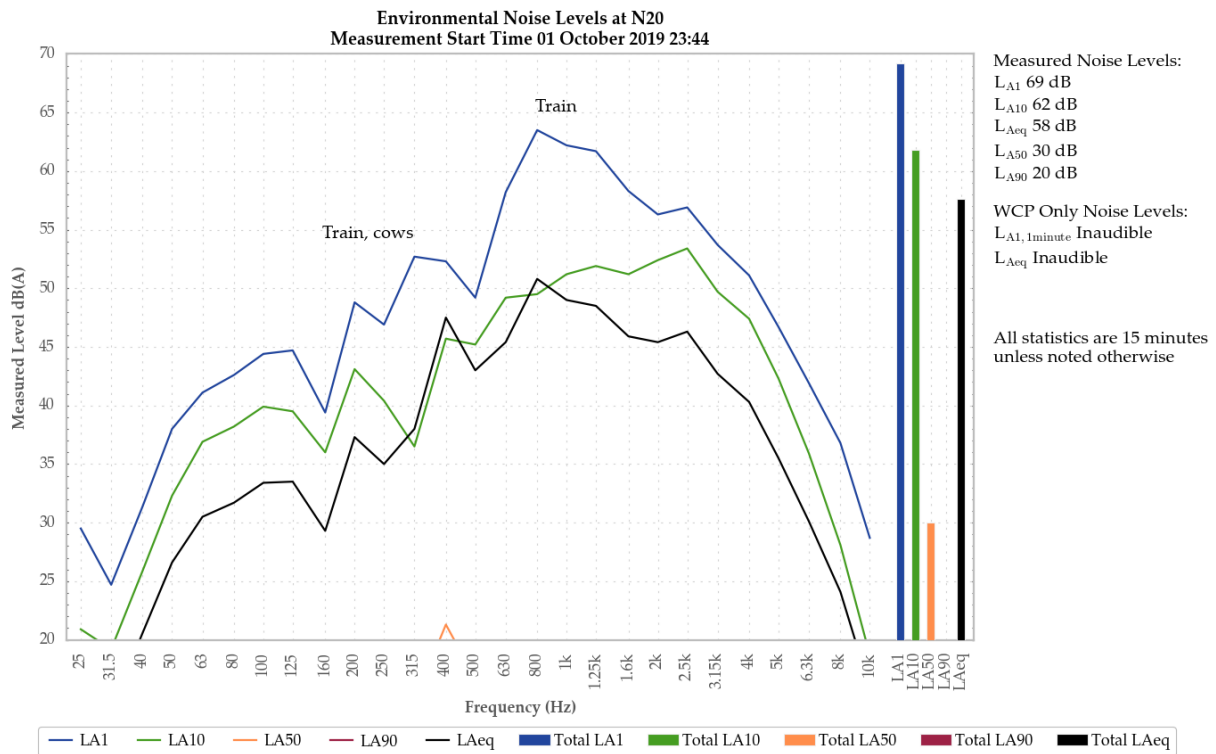


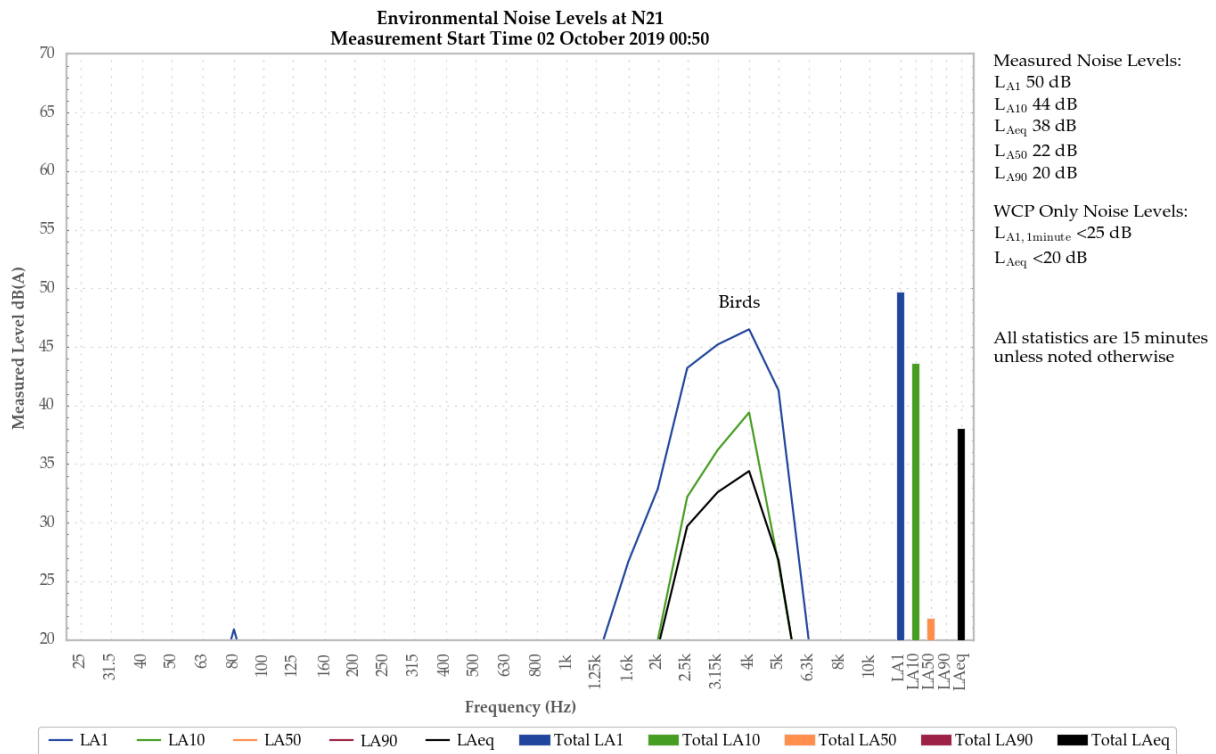
Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible.

A train was primarily responsible for all measured noise levels. Breeze in the foliage generated the measured LA90 and contributed to the measured LA50.

Cows 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 LAeq,15minute of less than 20 and LA1,1minute of less than 25 dB.

Birds were primarily responsible for all measured noise levels. Insects, the continuum from WCP and the noise floor of the sound level meter contributed to the measured LA90.

## 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 October 2019 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the October 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.

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## APPENDIX

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### ***B CALIBRATION CERTIFICATES***



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  
Thornton 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**  
**Ambient Temperature :** 26°C  
**Relative Humidity :** 40.2%  
**Barometric Pressure :** 100.96kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 26°C  
**Relative Humidity :** 40.7%  
**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	31.5 Hz to 8kHz	±0.15dB	Environmental Conditions
	12.5kHz	±0.2dB	
	16kHz	±0.29dB	
Electrical Tests	31.5 Hz to 20 kHz	±0.11dB	Temperature
			Relative Humidity
			Barometric Pressure

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.

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Accredited for compliance with ISO/IEC 17025 - calibration.

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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 - Environmental Conditions			
Acoustic Tests		Temperature	±0.2°C
31.5 Hz to 8kHz	±0.13dB	Relative Humidity	±2.4%
12.5kHz	±0.2dB	Barometric Pressure	±0.015kPa
16kHz	±0.29dB		
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.

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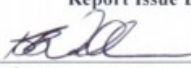
**Acoustic  
Research  
Labs Pty Ltd**

Level 7 Building 2 423 Pennant Hills Rd  
Pennant Hills NSW AUSTRALIA 2120  
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**Sound Calibrator**  
IEC 60942-2017

## Calibration Certificate

Calibration Number C19124

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b>	Pulsar Model 106
<b>Instrument Serial Number :</b>	74813
<b>Atmospheric Conditions</b>	
<b>Ambient Temperature :</b>	24°C
<b>Relative Humidity :</b>	50.4%
<b>Barometric Pressure :</b>	99.54kPa
<b>Calibration Technician :</b>	Lucky Jaiswal
<b>Calibration Date :</b>	21 Feb 2019
<b>Secondary Check:</b>	Lewis Boorman
<b>Report Issue Date :</b>	22 Feb 2019
<b>Approved Signatory :</b>	 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 - Environmental Conditions			
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.

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

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**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	Temperature
Frequency	Relative Humidity
Distortion	Barometric Pressure

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.

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# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
November 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

---



Noise and Vibration Analysis and Solutions

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## Wilpinjong Coal

### Environmental Noise Monitoring November 2019

Reference: 19299\_R01

Report date: 13 December 2019

#### 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: 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 Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

The current WCP development consent was approved in April 2017. The environment protection licence (EPL) for WCP was issued in early 2006 with subsequent variations approved.

Attended monitoring was conducted in accordance with the documents detailed above, Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. The duration of each night measurement was 15 minutes.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 18/19 November 2019. The purpose of attended noise monitoring was to quantify and describe the acoustic environment around WCP and compare results with specified limits.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the November 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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# 1 INTRODUCTION

## 1.1 Background

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken at eight locations during the night period of 18/19 November 2019. Figure 1 shows the monitoring locations.

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.

## 1.2 Monitoring Locations

There were eight monitoring locations during this survey as listed in Table 1.1 and shown on Figure 1. These monitoring locations are detailed in the site Noise Monitoring Program (NMP).

*Table 1.1: WCP ATTENDED NOISE MONITORING LOCATIONS*

<b>NMP Descriptor</b>	<b>Monitoring Location</b>
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



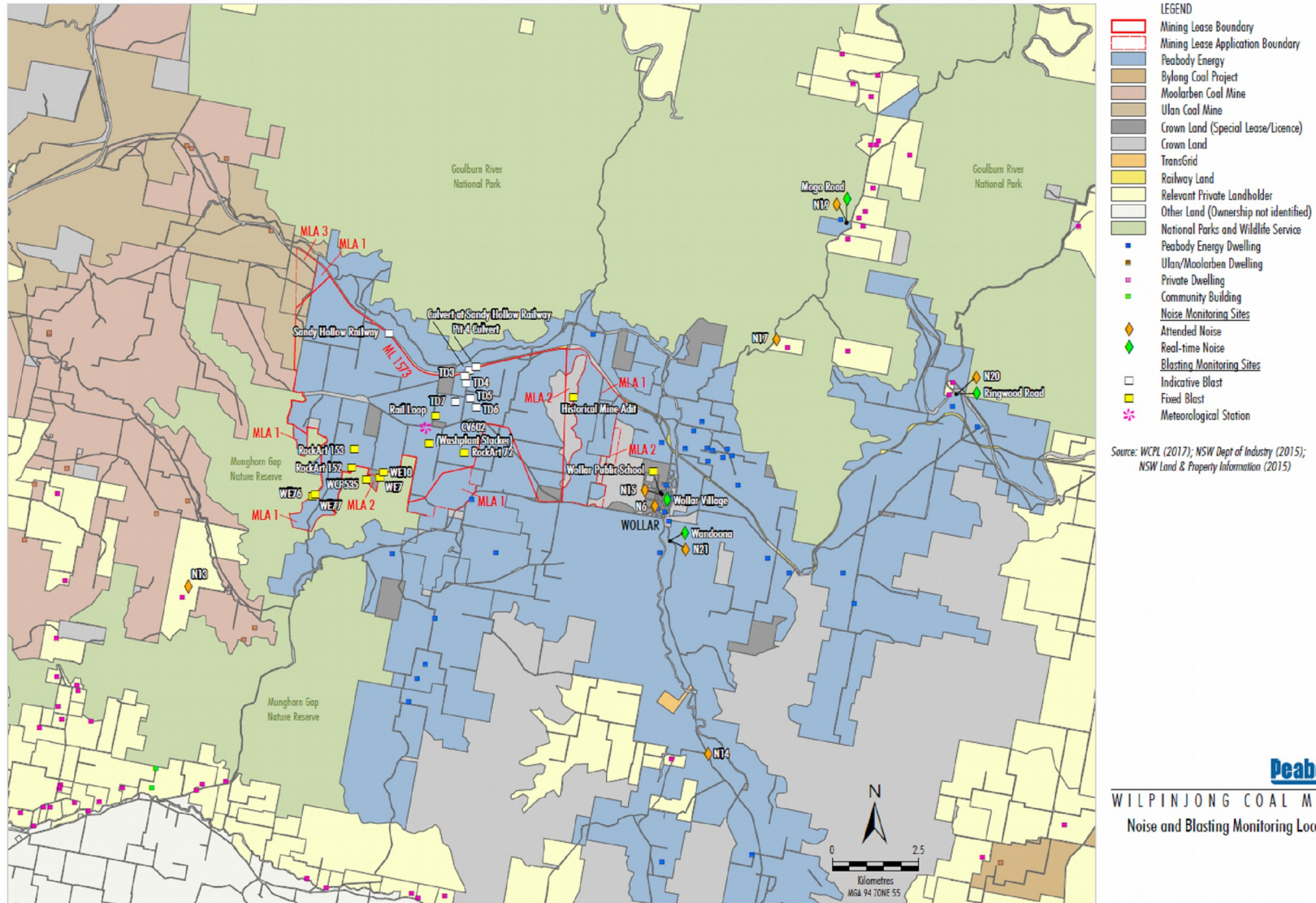


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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
$L_A$	The A-weighted root mean squared (RMS) noise level at any instant
$L_{Amax}$	The maximum A-weighted noise level over a time period or for an event
$L_{A1}$	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 per cent of the time, which is approximately the average of the maximum noise levels
$L_{A50}$	The noise level which is exceeded for 50 per cent of the time
$L_{A90}$	The level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. 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 or for an event
$L_{Aeq}$	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. From Wilpinjong Coal inversion tower data
SC	Stability Class. Based on Wilpinjong Coal inversion tower data
IA	Inaudible. When site-only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site-only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, 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

Approval was granted for the Wilpinjong Extension Project (SSD-6764) in 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

The EPL (No. 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent on 23 March 2018. Relevant noise sections of the licence are reproduced in Appendix A.

### 2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in June 2017. Chapter 6 of the NMP provides details on the noise monitoring program including locations and an attended monitoring methodology. The relevant sections are reproduced in Appendix A.

### 2.4 Project Specific Criteria

Criteria in the project approval and EPL are consistent as are the met exclusion rules determining when criteria apply. Criteria shown in Table 2.1 have been selected as the most appropriate for each monitoring location.

Table 2.1: WCP PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	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 <sup>2</sup>	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:

- 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
- 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 Assessment Method

Attended monitoring was conducted in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. Atmospheric condition measurement was also undertaken during each fifteen minute measurement. Monitoring is undertaken once per month at each location.

Attended monitoring during this reporting period was undertaken by Jason Cameron.

If the exact contribution from 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 levels, for example,  $L_{A10}$ ,  $L_{A50}$  or  $L_{A90}$ . 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 as per section 7.1 of the NPfI (e.g. measuring at an intermediate location and using relevant calculation) 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 or reasonable to employ NPfI methods such as using an intermediate location. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

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

As indicated in L5.5 (a) and (b) of the EPL, the  $L_{A1,1\text{minute}}$  measurement should be undertaken at one (1) metre from the dwelling façade and the  $L_{A\text{eq}}$  measurement within 30 metres of the dwelling. However, the direct measurement of noise at 1 metre from the façade is not practical during monitoring for this project. In

most cases, monitoring near the residence is impractical due to barking dogs or issues with obtaining access. In all cases, measurements for this survey were undertaken at a suitable and representative location.

Low-frequency noise has been assessed using the NPfI method, detailed in Section 2.5 of this report.

### 3.2 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 analyser	00701424	14/06/2021
Pulsar 106 acoustic calibrator	74813	21/02/2021
Rion NA-28 sound level analyser	30131882	05/02/2021
Pulsar 105 acoustic calibrator	78226	01/02/2021

### 3.3 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.

### 3.4 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 3.2. Attended and real-time monitor locations are 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 – NOVEMBER 2019<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A50</sub> dB	L <sub>Aeq</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	19/11/2019 01:59	43	27	22	21	20	19	17	48
N13	19/11/2019 02:19	41	29	23	21	18	17	16	46
N14	19/11/2019 01:10	51	40	28	27	22	19	16	45
N15	19/11/2019 00:05	41	29	26	24	23	21	19	48
N17	18/11/2019 23:30	50	27	21	21	19	18	17	53
N19	18/11/2019 23:06	31	28	27	26	26	24	19	54
N20	19/11/2019 00:34	45	26	24	21	19	17	16	53
N21	19/11/2019 01:38	43	29	25	24	23	21	19	50

Note:

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

### 4.2 Modifying Factors

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

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey. None of the measurements satisfied the conditions outlined in Section 3.3 when assessing low-frequency noise.

Therefore no further assessment of modifying factors was undertaken.

### 4.3 Attended Noise Monitoring

Table 4.2 and Table 4.3 detail  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  noise levels from WCP in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the project approval and EPL.

Table 4.2:  $L_{Aeq,15\text{minute}}$  GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – NOVEMBER 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP $L_{Aeq,15\text{min}}$ dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	19/11/2019 01:59	0.0	F	37	Yes	<20	Nil
N13	19/11/2019 02:19	0.6	F	35	Yes	IA	Nil
N14	19/11/2019 01:10	0.0	G	35	No	IA	NA
N15	19/11/2019 00:05	1.1	F	37	Yes	23	Nil
N17	18/11/2019 23:30	0.7	F	38	Yes	<20	Nil
N19	18/11/2019 23:06	0.3	G	35	No	IA	NA
N20	19/11/2019 00:34	1.2	F	35	Yes	<20	Nil
N21	19/11/2019 01:38	0.0	F	35	Yes	23	Nil

Notes:

1. Wind speed is sourced from the WCP weather station, stability class is determined based on WCP inversion tower data;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

Table 4.3: LA1,1minute GENERATED BY WCP AGAINST PROJECT SPECIFIC CRITERIA – NOVEMBER 2019

Location	Start Date and Time	Wind Speed m/s <sup>1,2</sup>	Stability Class <sup>1,2</sup>	Criterion dB	Criterion Applies? <sup>2,3</sup>	WCP LA1,1min dB <sup>4,5</sup>	Exceedance <sup>5,6</sup>
N6	19/11/2019 01:59	0.0	F	45	Yes	26	Nil
N13	19/11/2019 02:19	0.6	F	45	Yes	IA	Nil
N14	19/11/2019 01:10	0.0	G	45	No	IA	NA
N15	19/11/2019 00:05	1.1	F	45	Yes	28	Nil
N17	18/11/2019 23:30	0.7	F	45	Yes	<20	Nil
N19	18/11/2019 23:06	0.3	G	45	No	IA	NA
N20	19/11/2019 00:34	1.2	F	45	Yes	<20	Nil
N21	19/11/2019 01:38	0.0	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. Criterion may or may not apply due to rounding of meteorological data values;
3. 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;
4. These are results for WCP in the absence of all other noise sources;
5. Bold results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions have determined that criterion is not applicable.

#### 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, NOVEMBER 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total $L_{Aeq}$ dB	Low pass (<630Hz) $L_{Aeq}$ dB	Low pass (<630Hz) $L_{A90}$ dB	WCP $L_{Aeq}$ dB
N15/SX33	19/11/2019 00:05	19/11/2019 00:00	28	26	24	23
N19/SX32	18/11/2019 23:06	18/11/2019 23:00	27	18	11	IA
N20/SX30	19/11/2019 00:34	19/11/2019 00:30	22	15	11	<20
N21/SX31	19/11/2019 01:38	19/11/2019 01:45	27	26	NR <sup>2</sup>	23

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 or hail.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – NOVEMBER 2019

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	19/11/2019 01:59	15	0.0	-	0
N13	19/11/2019 02:19	18	0.6	200	0
N14	19/11/2019 01:10	14	1.3	120	0
N15	19/11/2019 00:05	17	0.0	-	0
N17	18/11/2019 23:30	18	0.0	-	0
N19	18/11/2019 23:06	18	0.6	190	0
N20	19/11/2019 00:34	15	0.7	270	0
N21	19/11/2019 01:38	15	0.0	-	0

Notes:

1. Wind speed and direction measured at 1.8 metres; and
2. "-" denotes calm conditions at 1.8 metres.

Data obtained from the WCP meteorological station and tower is used to determine compliance with specified noise criteria and is provided in Table 4.6.

Table 4.6: WCP METEOROLOGICAL STATION DATA<sup>1</sup>

Date and End Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres <sup>2</sup>
18/11/2019 21:00	2.0	224	0.6
18/11/2019 21:15	2.5	227	0.0
18/11/2019 21:30	2.7	227	-0.4
18/11/2019 21:45	1.9	279	4.0
18/11/2019 22:00	1.2	287	7.0
18/11/2019 22:00	1.2	287	7.0
18/11/2019 22:15	1.7	305	6.6
18/11/2019 22:30	1.6	295	7.2
18/11/2019 22:45	1.1	302	8.0
18/11/2019 23:00	0.6	320	8.8
18/11/2019 23:15	0.3	69	7.2
18/11/2019 23:30	0.6	311	4.4
18/11/2019 23:45	0.7	325	3.8
19/11/2019 00:00	0.8	288	2.2
19/11/2019 00:15	1.1	279	2.2
19/11/2019 00:30	0.7	293	1.8
19/11/2019 00:45	1.2	315	3.4
19/11/2019 01:00	0.7	324	4.6
19/11/2019 01:15	0.0	-	5.4
19/11/2019 01:30	0.0	-	4.4
19/11/2019 01:45	0.0	-	3.0
19/11/2019 02:00	0.0	-	3.8
19/11/2019 02:15	0.0	-	3.8
19/11/2019 02:30	0.6	309	3.6
19/11/2019 02:45	0.0	-	4.4
19/11/2019 03:00	0.6	330	4.6
19/11/2019 03:15	0.0	-	6.6

Notes:

1. Data supplied by WCP;
2. "-" indicates calm conditions and therefore no wind direction; and
3. Lapse rate calculated using data sourced from WCP inversion tower.

## 5 DISCUSSION

### 5.1 Noted Noise Sources

Data gathered during attended monitoring is shown in tables in Section 4. These noise levels 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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was, where possible, measured directly, or, determined by frequency analysis. Time variations of noise sources in each measurement, their temporal characteristics, are taken into account via statistical descriptors.

From these observations summaries have been derived for each location. The following chapter sections provide these summaries. Statistical 1/3 octave band analysis of environmental noise was undertaken, and Figure 3 to Figure 10 display the frequency ranges for various noise sources at each location for  $L_{A1}$ ,  $L_{A10}$ ,  $L_{A90}$  and  $L_{Aeq}$ . 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; mining noise is at frequencies less than 1000 Hz (this 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; this can be 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  $L_{Aeq}$ .

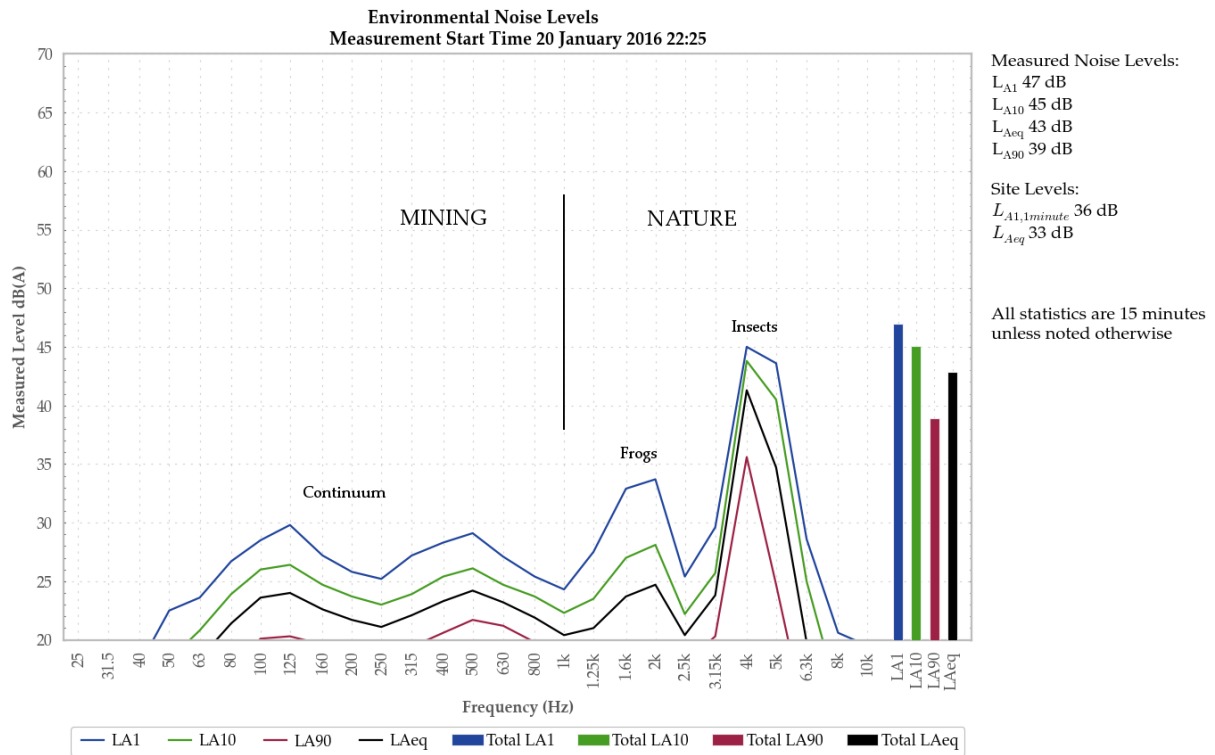


Figure 2: Example graph (refer to Section 5.1 for explanatory note)



5.1.1 N6, 19 November 2019

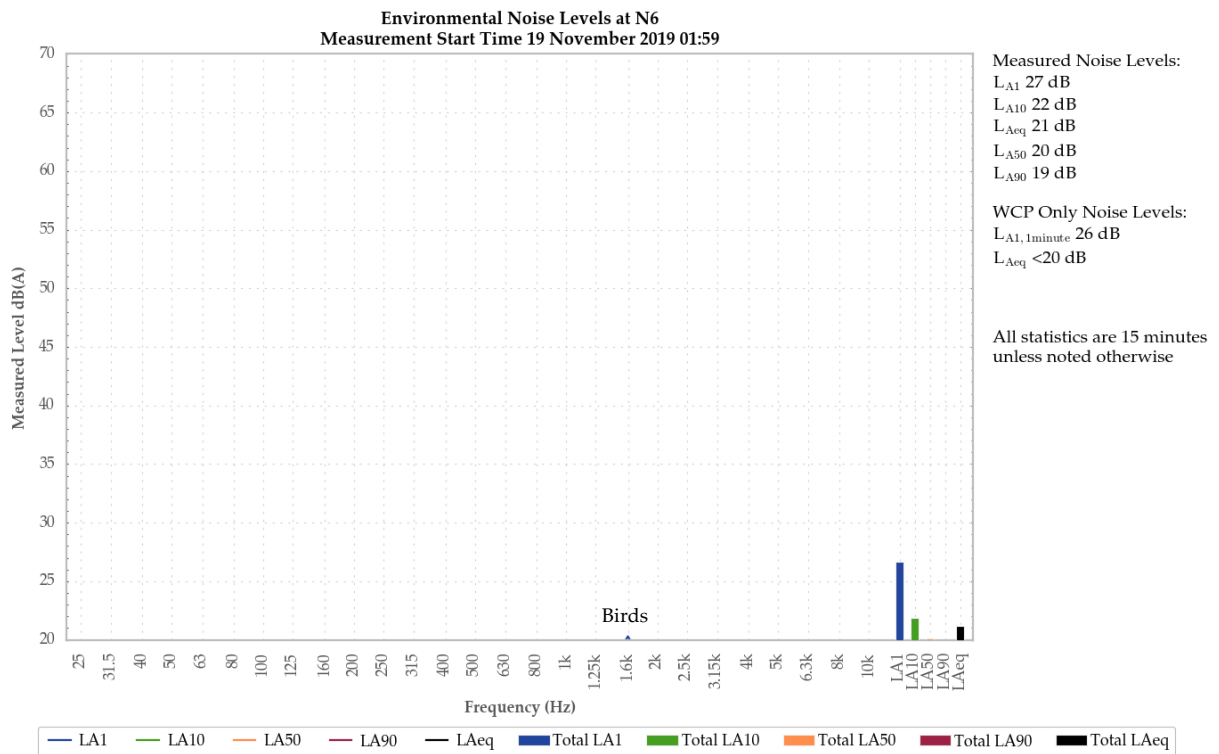


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was audible at times, generating a site-only LAeq,15minute of less than 20 dB. A brief surge in engine fan noise resulted in a site-only LA1,1minute of 26 dB.

Birds were primarily responsible for all measured levels. WCP was a minor contributor to the measured LA1.

Dogs were also noted.

5.1.2 N13, 19 November 2019

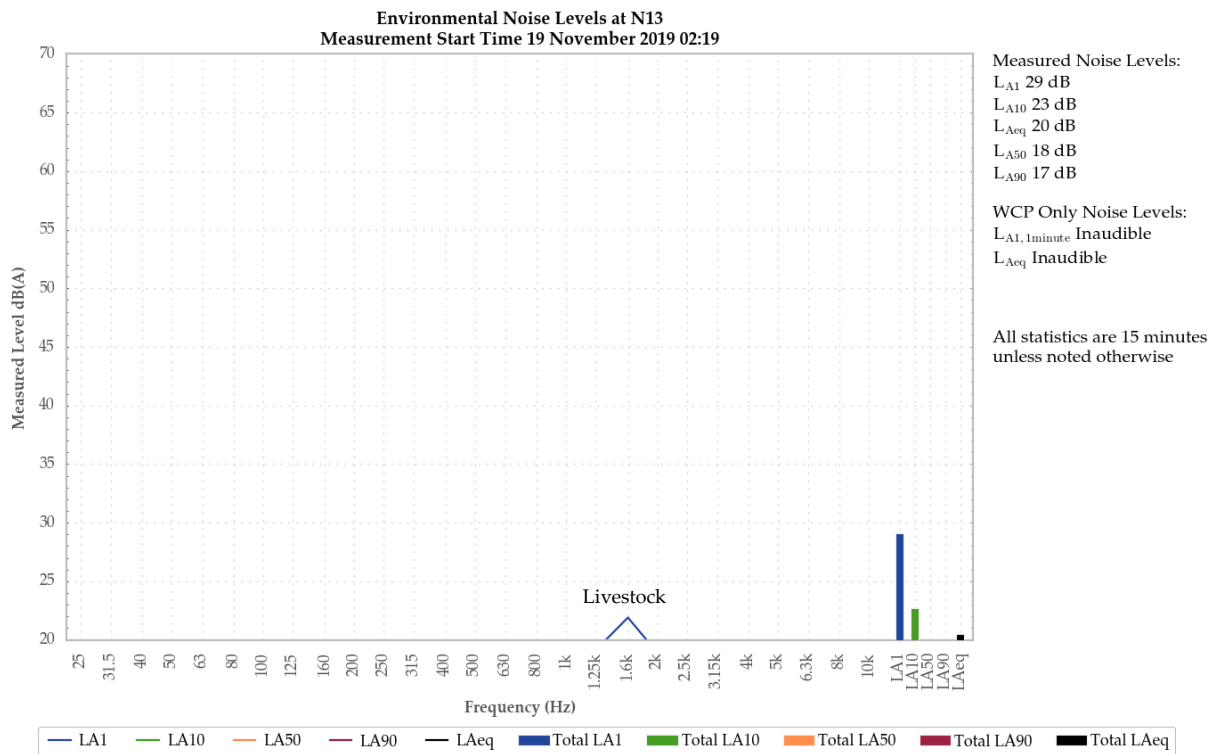


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Livestock generated the measured LA1 and LA10. Insects, frogs, and the noise floor of the sound level meter were responsible for the measured LA50 and LA90.

5.1.3 N14, 29 November 2019

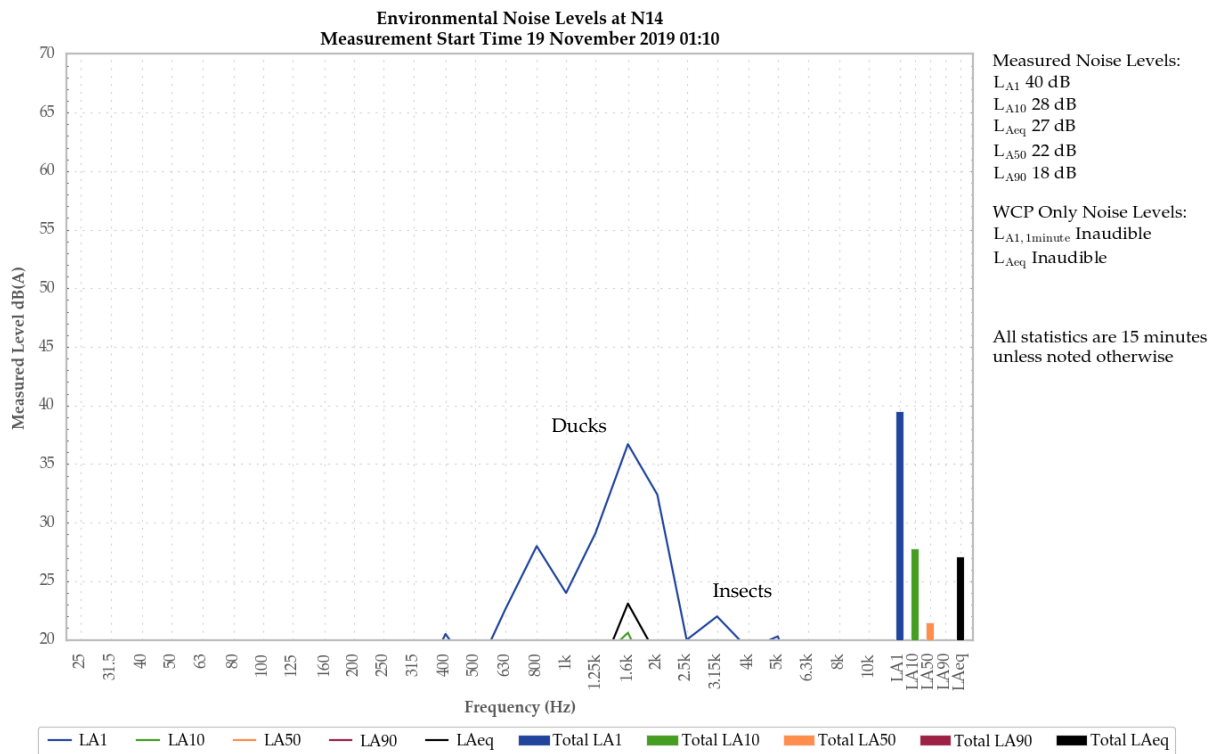


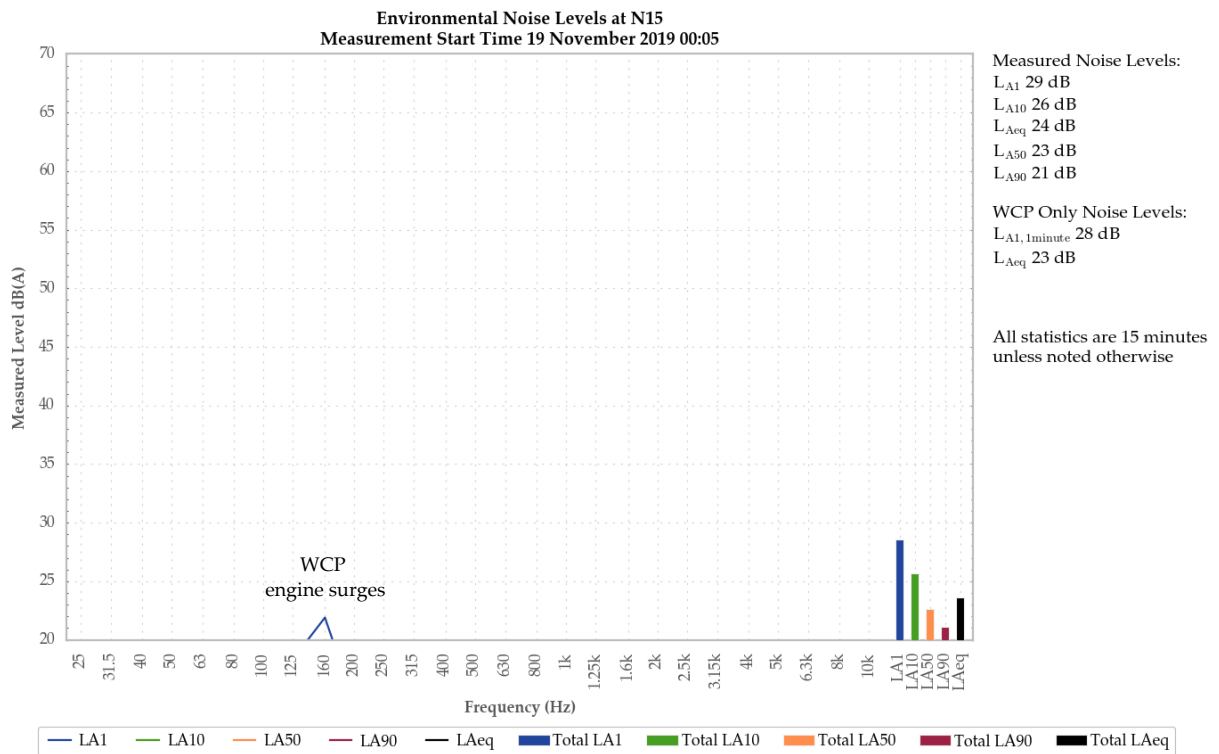
Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Ducks generated the measured LA1, LA10, LA50 and LAeq. A pump was responsible for the measured LA90.

Insects, cows, and dogs were also noted.

5.1.4 N15, 19 November 2019

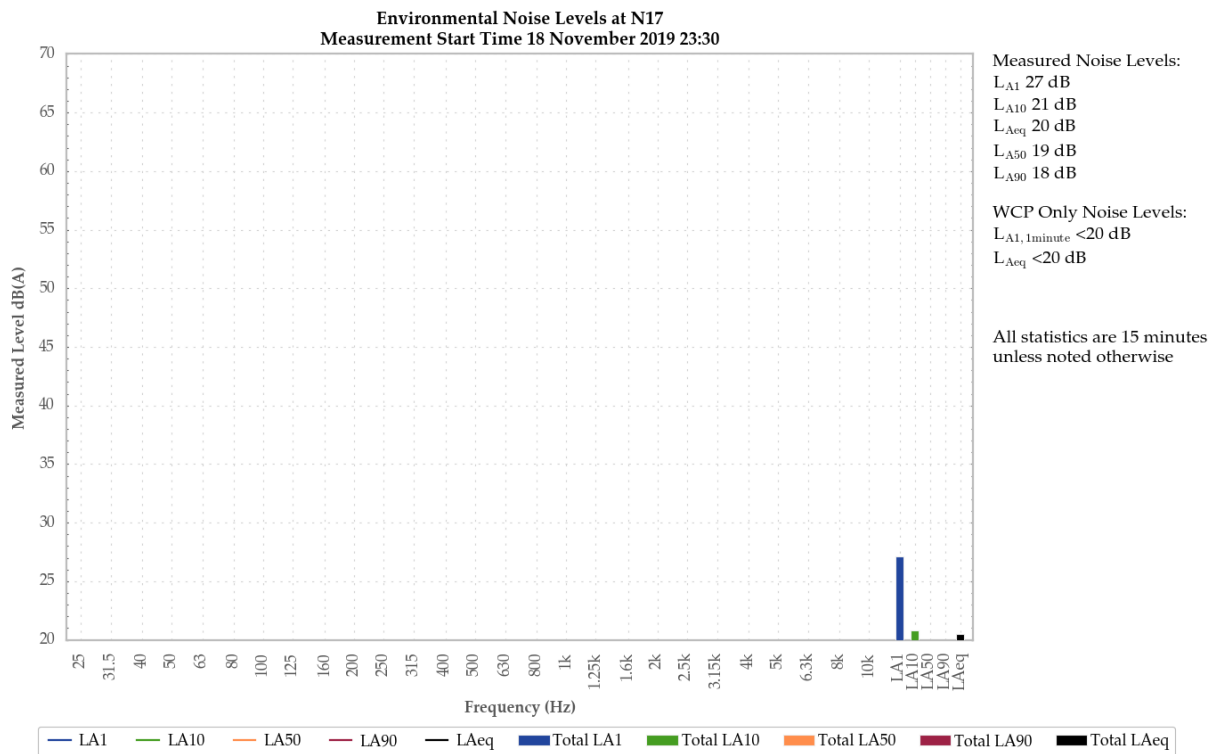


**Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village**

An engine continuum from WCP was audible during the measurement generating the site-only LAeq,15minute of 23 dB. Surges in the continuum generated the site-only LA1,1minute of 28 dB. Dozer track noise was also noted.

The continuum from WCP primarily generated measured levels. Birds and bats were minor contributors to measured levels.

### 5.1.5 N17, 18 November 2019



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

A low-level continuum from WCP was audible at times generating the site-only LAeq,15minute and LA1,1minute of less than 20 dB.

Insects and bats generated measured levels.

5.1.6 N19, 18 November 2019

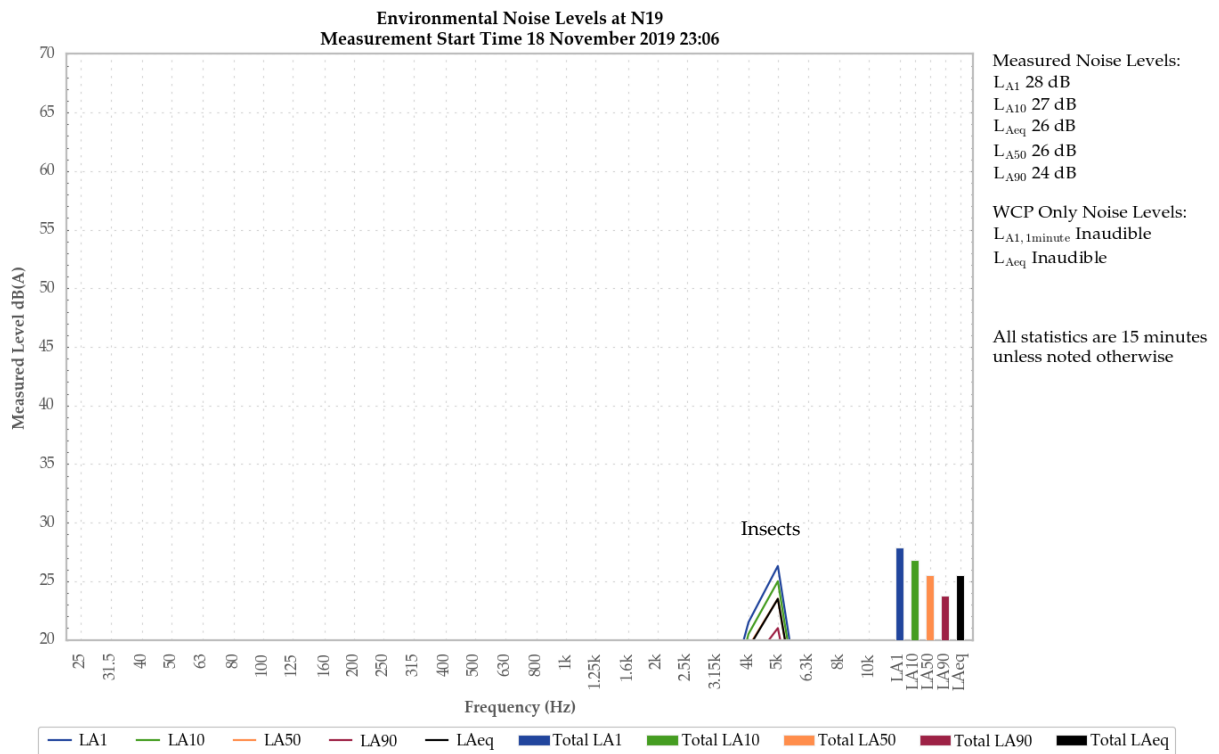


Figure 8: Environmental Noise Levels – N19, Upper Mogo Road

WCP was inaudible.

Insects generated measured levels.

Wildlife noises and a breeze were also noted.

5.1.7 N20, 19 November 2019

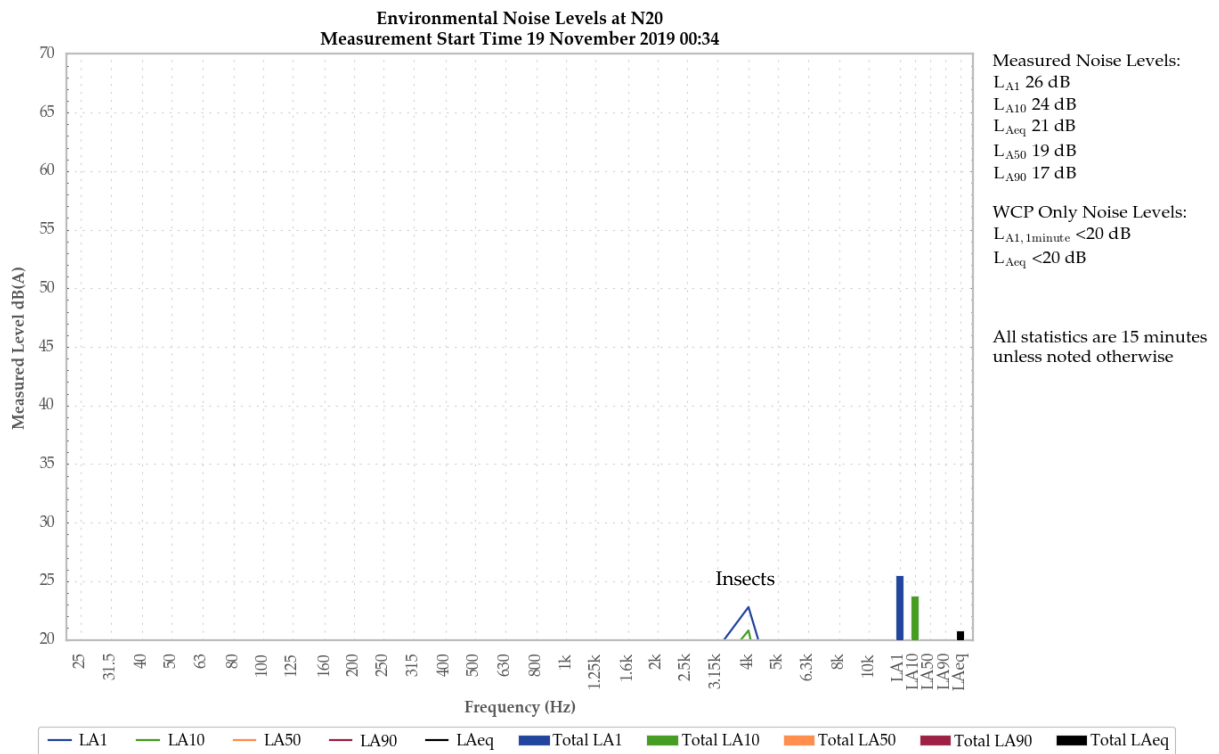


Figure 9: Environmental Noise Levels, N20 – Ringwood Road

A low-level continuum from WCP was audible at times generating the site-only LAeq,15minute and LA1,1minute of less than 20 dB.

Insects generated measured levels.

Cows and birds were also noted.

5.1.8 N21, 19 November 2019

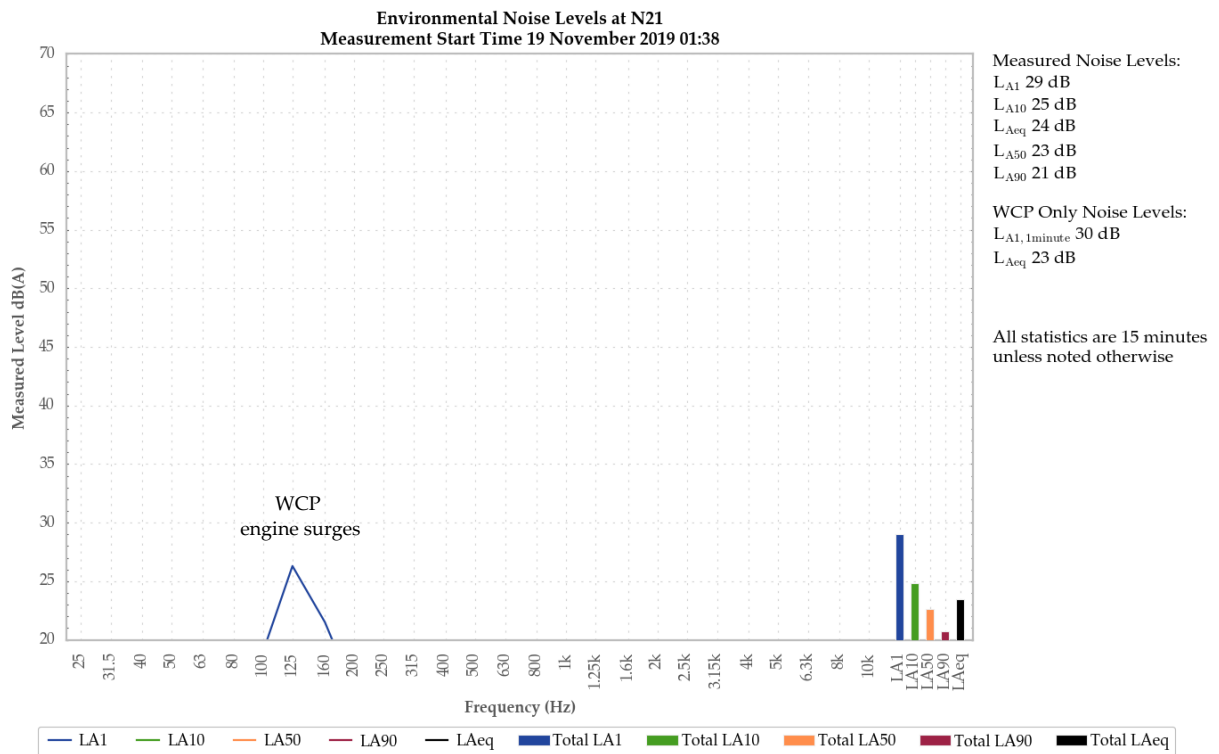


Figure 10: Environmental Noise Levels, N21 – 'Wandoona', Barigan Road

An engine continuum from WCP was audible during the measurement generating the site-only LAeq,15minute of 23 dB. Surges in the continuum generated the site-only LA1,1minute of 30 dB.

WCP continuum was primarily responsible for measured levels. Birds and cows were minor contributors to the measured levels.



## 6 SUMMARY OF COMPLIANCE

Global Acoustics was engaged by Wilpinjong Coal Pty Ltd to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine located approximately 40 kilometres north east of Mudgee.

Environmental noise monitoring described in this report was undertaken during the night period of 18/19 November 2019. Attended noise monitoring was conducted at eight sites. The duration of all measurements was 15 minutes.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the November 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### A STATUTORY REQUIREMENTS

Several documents specify noise criteria that apply to the Wilpinjong operation. The noise sections of the relevant consent, licence and NMP are reproduced below.

## 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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.

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

<b>Hz/dB(Z)</b>	<b>One-third octave <math>L_{Zeq,15minute}</math> threshold level</b>												
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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations. Relevant extracts are shown below.

### 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

The relevant sections of the WCP Noise Management Plan, dated June 2017 are reproduced below.

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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.

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## APPENDIX

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### ***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

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b>	Rion NA-28
<b>Instrument Serial Number :</b>	00701424
<b>Microphone Serial Number :</b>	01916
<b>Pre-amplifier Serial Number :</b>	01463
<b>Pre-Test Atmospheric Conditions</b>	<b>Post-Test Atmospheric Conditions</b>
<b>Ambient Temperature :</b> 26°C	<b>Ambient Temperature :</b> 26°C
<b>Relative Humidity :</b> 40.2%	<b>Relative Humidity :</b> 40.7%
<b>Barometric Pressure :</b> 100.96kPa	<b>Barometric Pressure :</b> 100.32kPa
<b>Calibration Technician :</b> Lucky Jaiswal	<b>Secondary Check:</b> Eloise Burrows
<b>Calibration Date :</b> 14 Jun 2019	<b>Report Issue Date :</b> 18 Jun 2019
<b>Approved Signatory :</b>	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 - Environmental Conditions			
Acoustic Tests		Temperature	±0.2°C
31.5 Hz to 8kHz	±0.15dB	Relative Humidity	±2.4%
12.5kHz	±0.2dB	Barometric Pressure	±0.015kPa
16kHz	±0.29dB		
Electrical Tests			
51.5 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.

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**Sound Level Meter**  
IEC 61672-3:2013  
**Calibration Certificate**  
Calibration Number C19073

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b>	NA-28
<b>Instrument Serial Number :</b>	30131882
<b>Microphone Serial Number :</b>	04739
<b>Pre-amplifier Serial Number :</b>	11942
<b>Pre-Test Atmospheric Conditions</b>	<b>Post-Test Atmospheric Conditions</b>
Ambient Temperature : 24.5°C	Ambient Temperature : 23.6°C
Relative Humidity : 54.5%	Relative Humidity : 51%
Barometric Pressure : 99.30kPa	Barometric Pressure : 99.36kPa
<b>Calibration Technician :</b> Charlie Neil	<b>Secondary Check:</b> Lewis Boorman
<b>Calibration Date :</b> 5 Feb 2019	<b>Report Issue Date :</b> 6 Feb 2019
<b>Approved Signatory :</b>	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.

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Sound Calibrator  
IEC 60942-2017

### Calibration Certificate

Calibration Number C19124

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b> <b>Instrument Serial Number :</b>	Pulsar Model 106 74813
<b>Atmospheric Conditions</b>	
<b>Ambient Temperature :</b>	24°C
<b>Relative Humidity :</b>	50.4%
<b>Barometric Pressure :</b>	99.54kPa
<b>Calibration Technician :</b> Lucky Jaiswal <b>Calibration Date :</b> 21 Feb 2019	<b>Secondary Check:</b> Lewis Boorman <b>Report Issue Date :</b> 22 Feb 2019
<b>Approved Signatory :</b> 	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.

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**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.

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# *Wilpinjong Coal*

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*Environmental Noise Monitoring  
December 2019*

*Prepared for  
Wilpinjong Coal Pty Ltd*

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Noise and Vibration Analysis and Solutions

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## Wilpinjong Coal

### Environmental Noise Monitoring December 2019

Reference: 19324\_R01

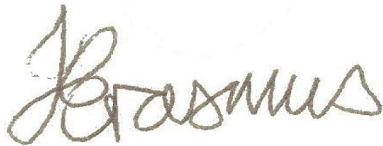
Report date: 17 December 2019

#### Prepared for

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#### Prepared by

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*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*

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# 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 2019 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*

<b>NMP Descriptor</b>	<b>Monitoring Location</b>
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

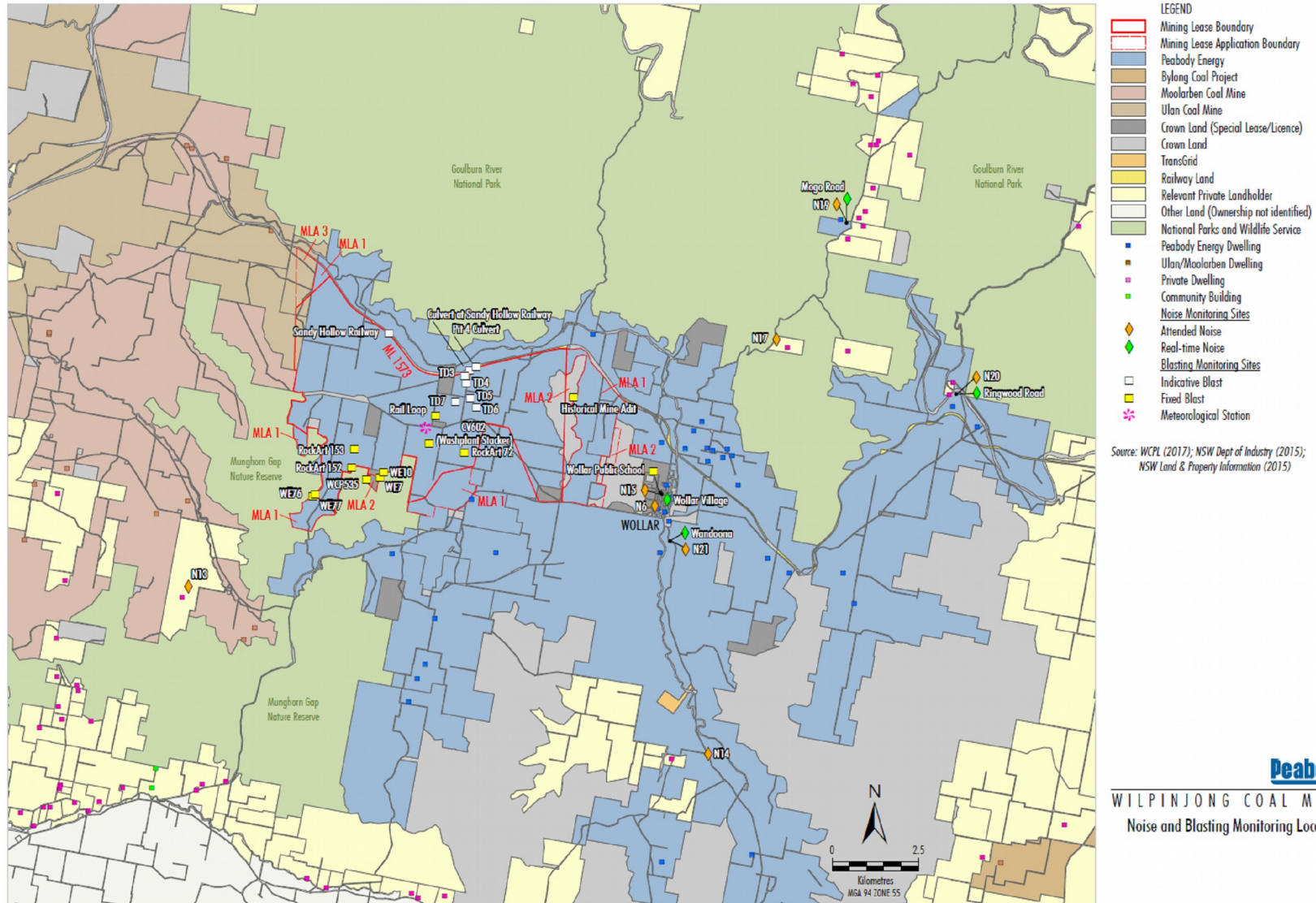


Figure 1: WCP Attended Noise Monitoring Locations (Source: WCP NMP, 2017)

### 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 <sub>Amax</sub>	The maximum A-weighted noise level over a time period.
L <sub>A1</sub>	The noise level which is exceeded for 1 per cent of the time.
L <sub>A1,1minute</sub>	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L <sub>A10</sub>	The noise level which is exceeded for 10 percent of the time.
L <sub>Aeq</sub>	The average noise A-weighted energy during a measurement period.
L <sub>A50</sub>	The noise level which is exceeded for 50 per cent of the time and the median noise level during a measurement period.
L <sub>A90</sub>	The level exceeded for 90 percent of the time. The L <sub>A90</sub> level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes.
L <sub>Amin</sub>	The minimum A-weighted noise level over a time period.
L <sub>Ceq</sub>	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 <sub>Aeq,15minute</sub>	Evening L <sub>Aeq,15minute</sub>	Night L <sub>Aeq,15minute</sub> / L <sub>A1,1minute</sub>
N6 <sup>1</sup>	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 <sup>2</sup>	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  $L_{Aeq,15\text{minute}}$  and  $L_{A1,1\text{minute}}$  (in the absence of any other noise) was measured directly, where possible, or, determined by frequency analysis.

If the exact contribution of the source of interest 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  $L_{A1,1\text{minute}}$  corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms this is the highest noise level, or  $L_{A\text{max}}$ , 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	00370304	26/11/2020
Rion NA-28 sound level meter	01070590	25/06/2020
Pulsar 106 acoustic calibrator	81334	22/11/2020
Pulsar 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  $L_{A\text{eq}}$  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  $L_{A\text{eq}}$  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  $L_{A\text{eq}}$  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 NPfL.

### 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 – DECEMBER 2019<sup>1</sup>

Location	Start Date and Time	L <sub>Amax</sub> dB	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>Aeq</sub> dB	L <sub>A50</sub> dB	L <sub>A90</sub> dB	L <sub>Amin</sub> dB	L <sub>Ceq</sub> dB
N6	09/12/2019 23:14	50	46	43	39	37	35	31	57
N13	10/12/2019 00:35	48	39	35	33	32	30	28	53
N14	10/12/2019 00:23	50	39	28	27	22	20	17	54
N15	09/12/2019 22:54	54	49	48	47	47	46	43	55
N17	09/12/2019 22:25	57	56	55	54	55	52	50	53
N19	09/12/2019 22:00	52	52	51	49	49	48	45	55
N20	09/12/2019 23:44	69	66	62	55	33	29	26	65
N21	10/12/2019 00:49	57	46	40	36	26	22	20	57

Note:

- 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 – DECEMBER 2019

Location	Start Date and Time	Wind Speed m/s <sup>1</sup>	Stability Class <sup>1</sup>	Criterion dB	Criterion Applies? <sup>2</sup>	WCP $L_{Aeq,15min}$ dB <sub>3</sub>	Exceedance <sup>4</sup>
N6	09/12/2019 23:14	0.7	G	37	No	IA	NA
N13	10/12/2019 00:35	0.0	G	35	No	<25	NA
N14	10/12/2019 00:23	0.0	G	35	No	IA	NA
N15	09/12/2019 22:54	1.0	G	37	No	<20	NA
N17	09/12/2019 22:25	0.9	G	38	No	IA	NA
N19	09/12/2019 22:00	0.8	G	35	No	IA	NA
N20	09/12/2019 23:44	0.0	G	35	No	IA	NA
N21	10/12/2019 00:49	0.7	G	35	No	<20	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 – DECEMBER 2019

Location	Start Date and Time	Wind Speed m/s <sup>1</sup>	Stability Class <sup>1</sup>	Criterion dB	Criterion Applies? <sup>2</sup>	WCP $L_{A1,1min}$ dB <sub>3</sub>	Exceedance <sup>4</sup>
N6	09/12/2019 23:14	0.7	G	45	No	IA	NA
N13	10/12/2019 00:35	0.0	G	45	No	<25	NA
N14	10/12/2019 00:23	0.0	G	45	No	IA	NA
N15	09/12/2019 22:54	1.0	G	45	No	<20	NA
N17	09/12/2019 22:25	0.9	G	45	No	IA	NA
N19	09/12/2019 22:00	0.8	G	45	No	IA	NA
N20	09/12/2019 23:44	0.0	G	45	No	IA	NA
N21	10/12/2019 00:49	0.7	G	45	No	<20	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, DECEMBER 2019<sup>1</sup>

Location/ Sentinex	Attended Start Date and Time	Sentinex Start Date and Time	Sentinex Data <sup>1</sup>			Attended measurement
			Total $L_{Aeq}$ dB	Low pass (<630Hz) $L_{Aeq}$ dB	Low pass (<630Hz) $L_{A90}$ dB	WCP $L_{Aeq}$ dB
N15/SX33	09/12/19 22:54	09/12/19 23:00	33	29	16	<20
N19/SX32	09/12/19 22:00	09/12/19 22:00	37	21	13	IA
N20/SX30	09/12/19 23:44	09/12/19 23:45	46	41	24 <sup>3</sup>	IA
N21/SX31	10/12/19 00:49	10/12/19 00:45	35	32	24 <sup>4</sup>	<20

Notes:

1. Levels in this table are not necessarily the result of activity at WCP;
2. NR – no Sentinex data recorded for this period;
3. Trains were the primary contributor to low pass  $L_{A90}$  noise; and
4. Trains and WCP engine noise were the primary contributors to low pass  $L_{A90}$  noise.

## 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 – DECEMBER 2019*

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	09/12/2019 23:14	24	0.0	-	0
N13	10/12/2019 00:35	24	0.0	-	0
N14	10/12/2019 00:23	23	0.7	300	0
N15	09/12/2019 22:54	23	0.0	-	0
N17	09/12/2019 22:25	29	0.0	-	0
N19	09/12/2019 22:00	30	0.7	50	0
N20	09/12/2019 23:44	25	0.7	260	0
N21	10/12/2019 00:49	24	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 LA1, LA10, LAeq, LA50 and LA90 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 LA1 result by a small margin but is entirely accurate for LAeq.

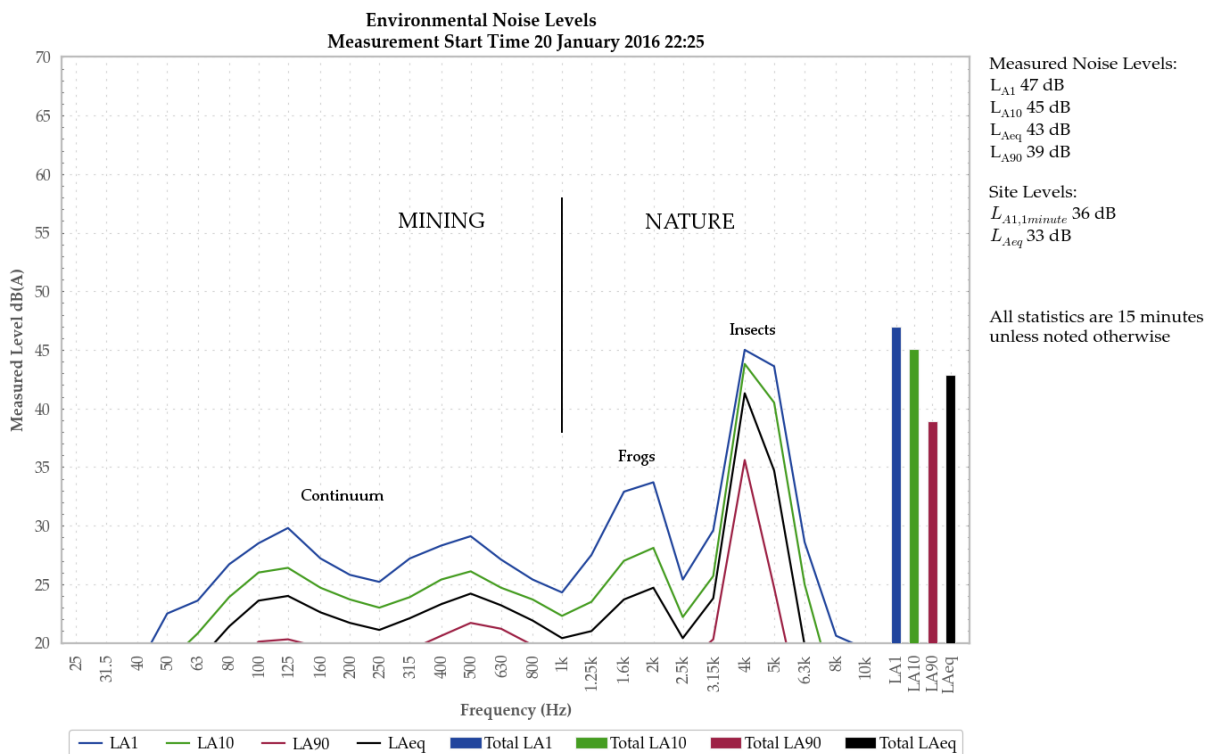
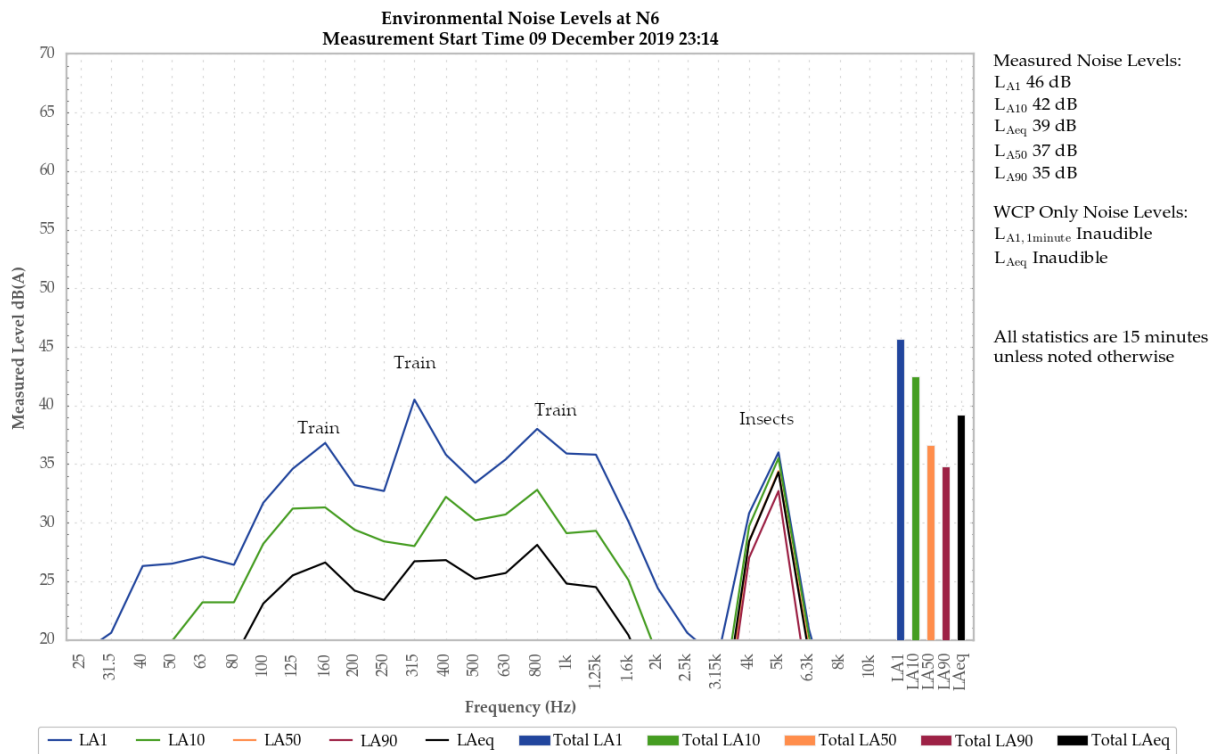


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6



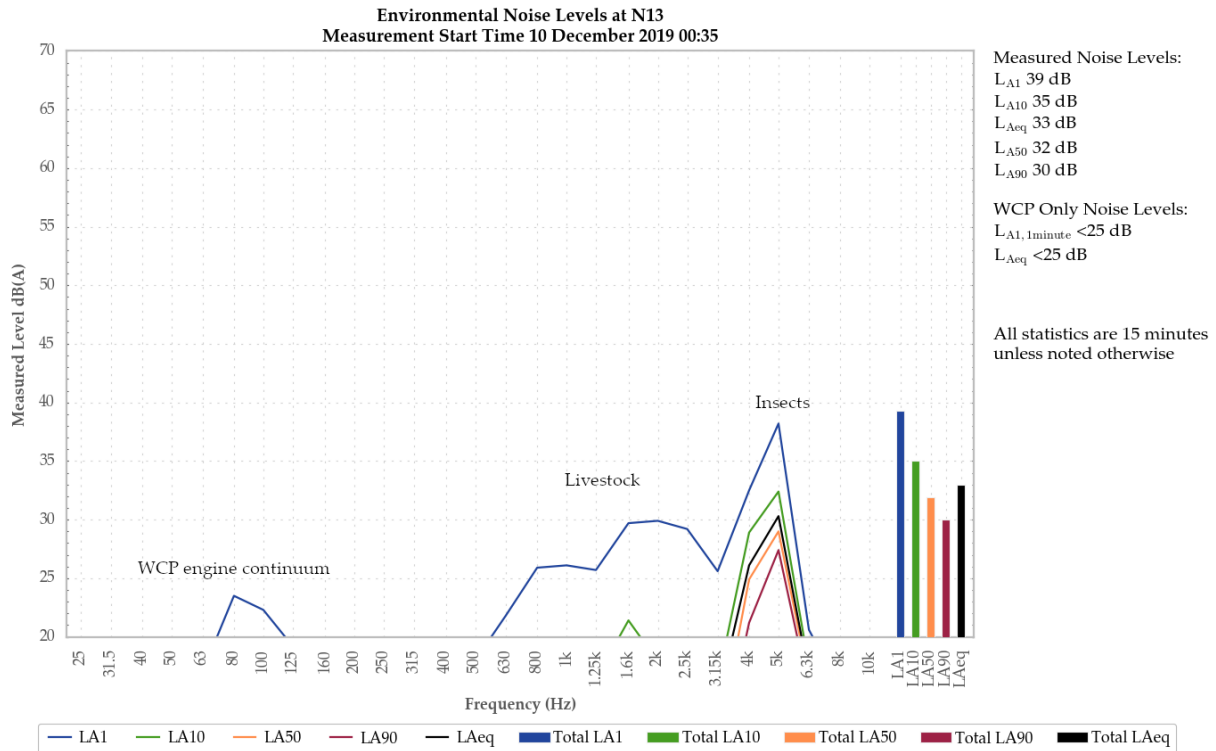
**Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village**

WCP was inaudible.

A train and insects generated the measured LA1, LA10, and LAeq. Insects generated the measured LA50 and LA90.

Birds and dogs were also noted.

5.1.2 N13



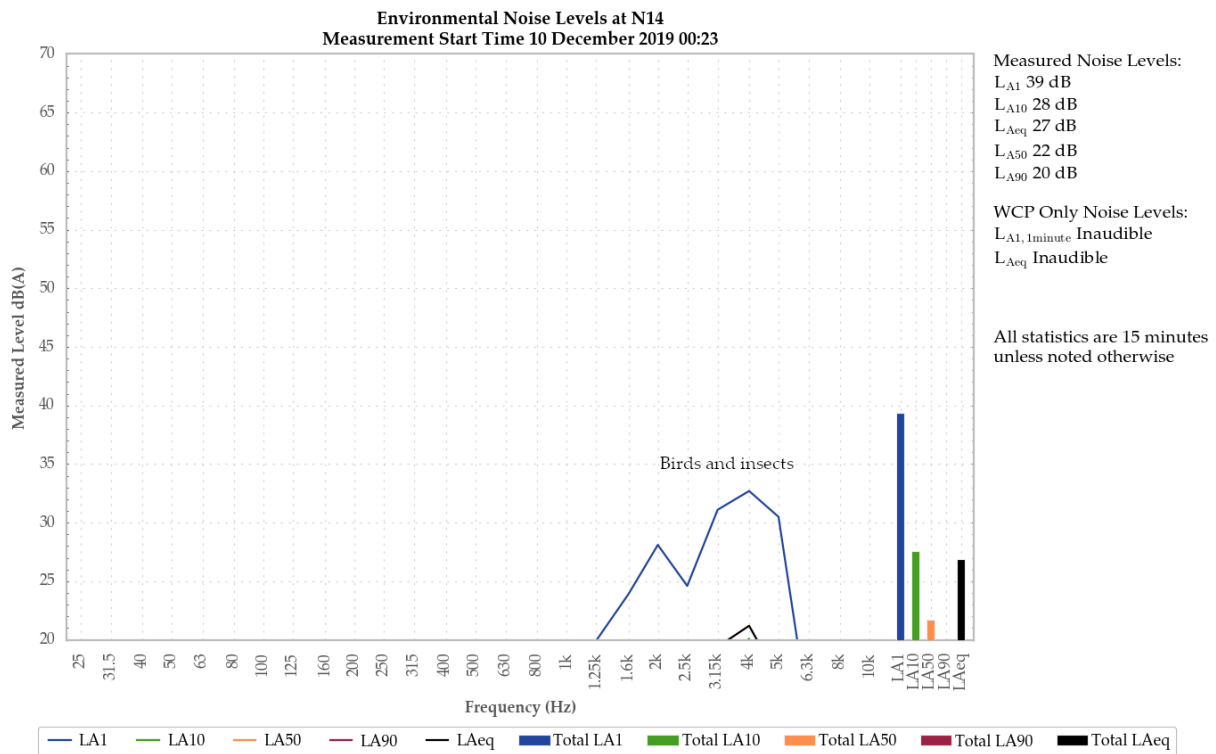
**Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road**

A low-level continuum from WCP was audible throughout the measurement generating the site only LAeq and LA1,1minute of less than 25 dB.

Insects primarily generated the measured LA1, LA10, LA50, LAeq and LA90. Livestock contributed to the measured LA1.

Birds were also noted.

### 5.1.3 N14



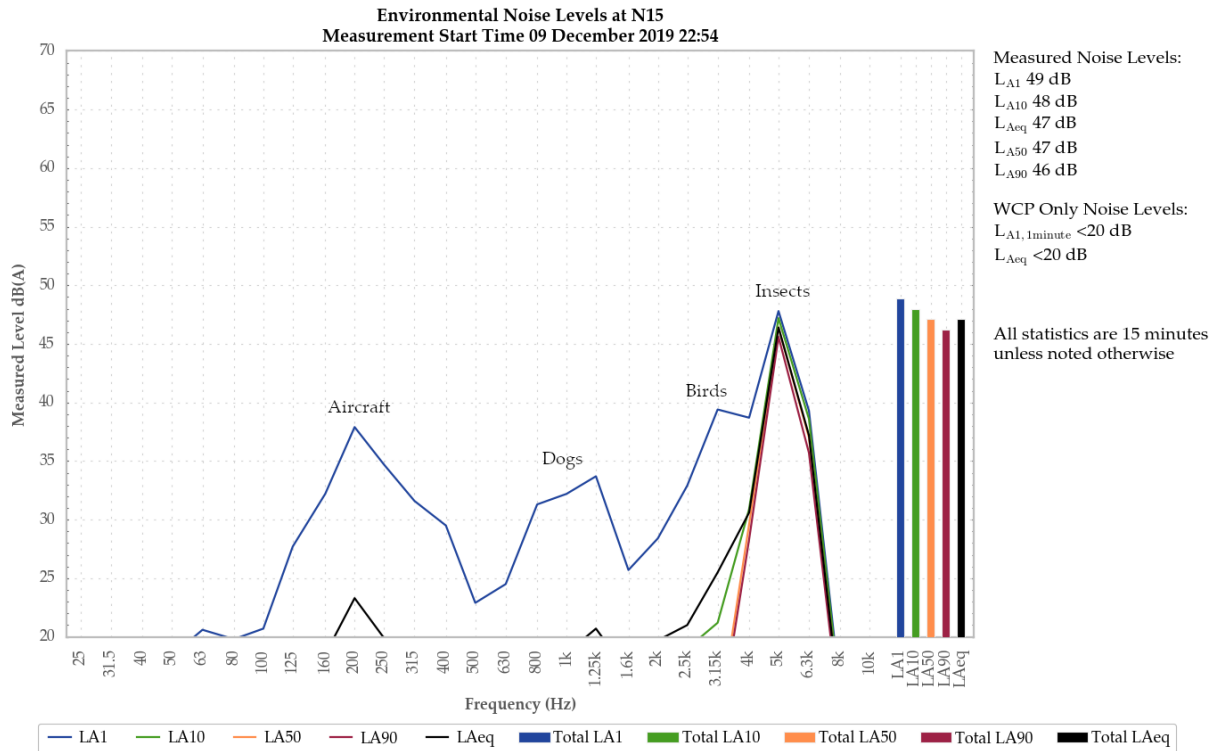
**Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads**

WCP was inaudible.

Birds and insects generated the measured LA1, LA10, LAeq, LA50, and LA90.

A train and local continuum were also noted.

5.1.4 N15

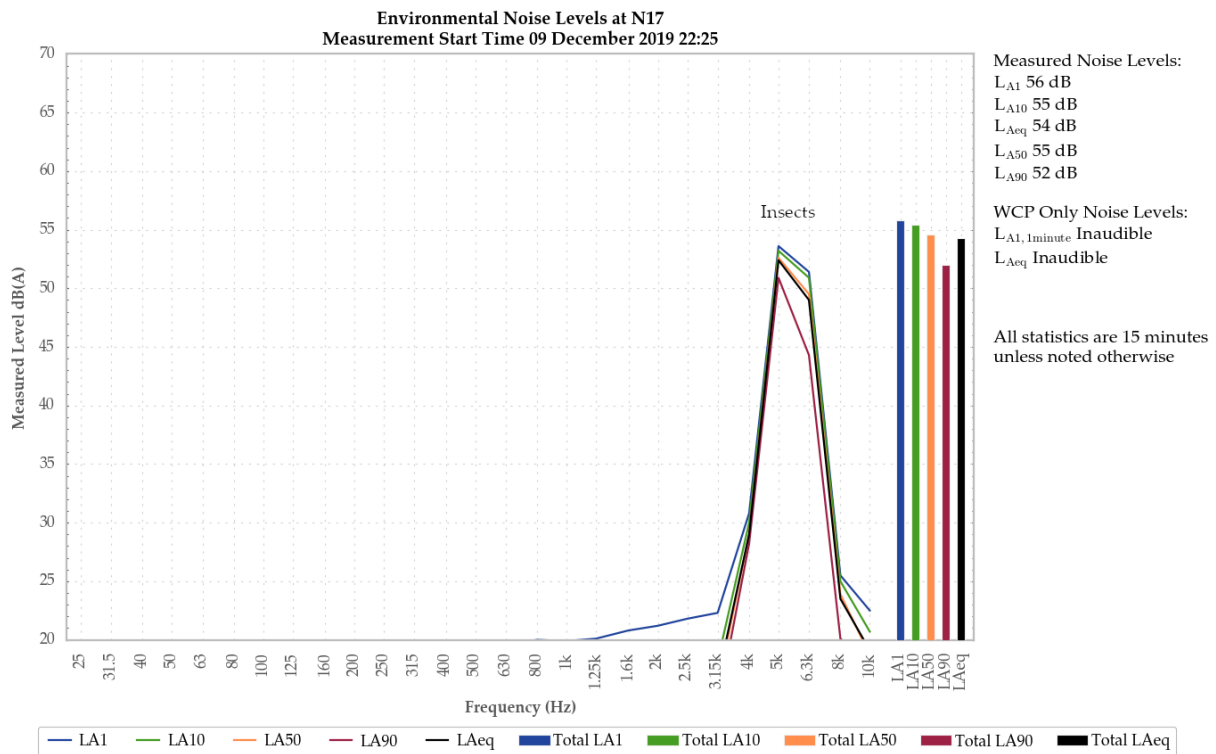


**Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village**

A low-level engine continuum from WCP was audible during the measurement generating the site-only L<sub>Aeq,15minute</sub> and L<sub>A1,1minute</sub> of less than 20 dB.

Insects primarily generated measured L<sub>A1</sub>, L<sub>A10</sub>, L<sub>Aeq</sub>, L<sub>A50</sub> and L<sub>A90</sub>. Aircraft, dogs, and birds contributed to the measured L<sub>A1</sub>.

5.1.5 N17



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

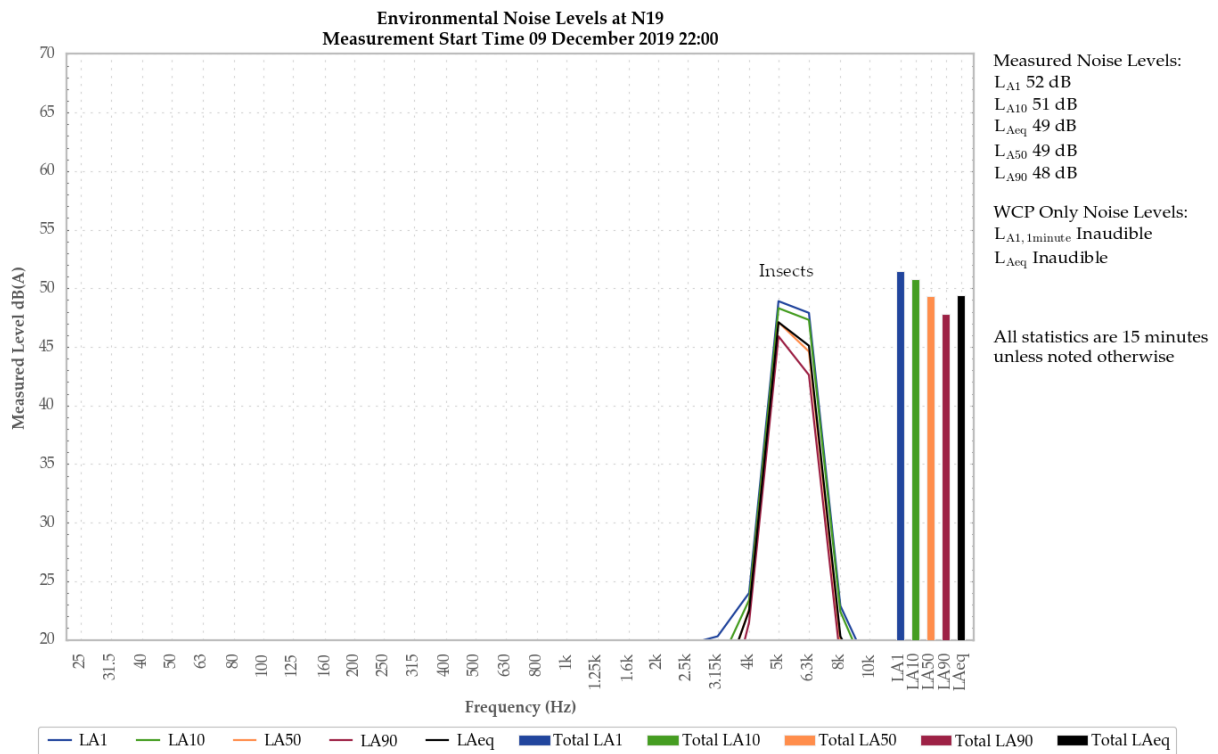
WCP was inaudible.

Insects generated the measured LA1, LA10, LAeq, LA50, and LA90.

A train, and breeze in foliage were also noted.



5.1.6 N19



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

WCP was inaudible.

Insects generated the measured LA1, LA10, LAeq, LA50, and LA90.

Breeze in foliage was also noted.

5.1.7 N20

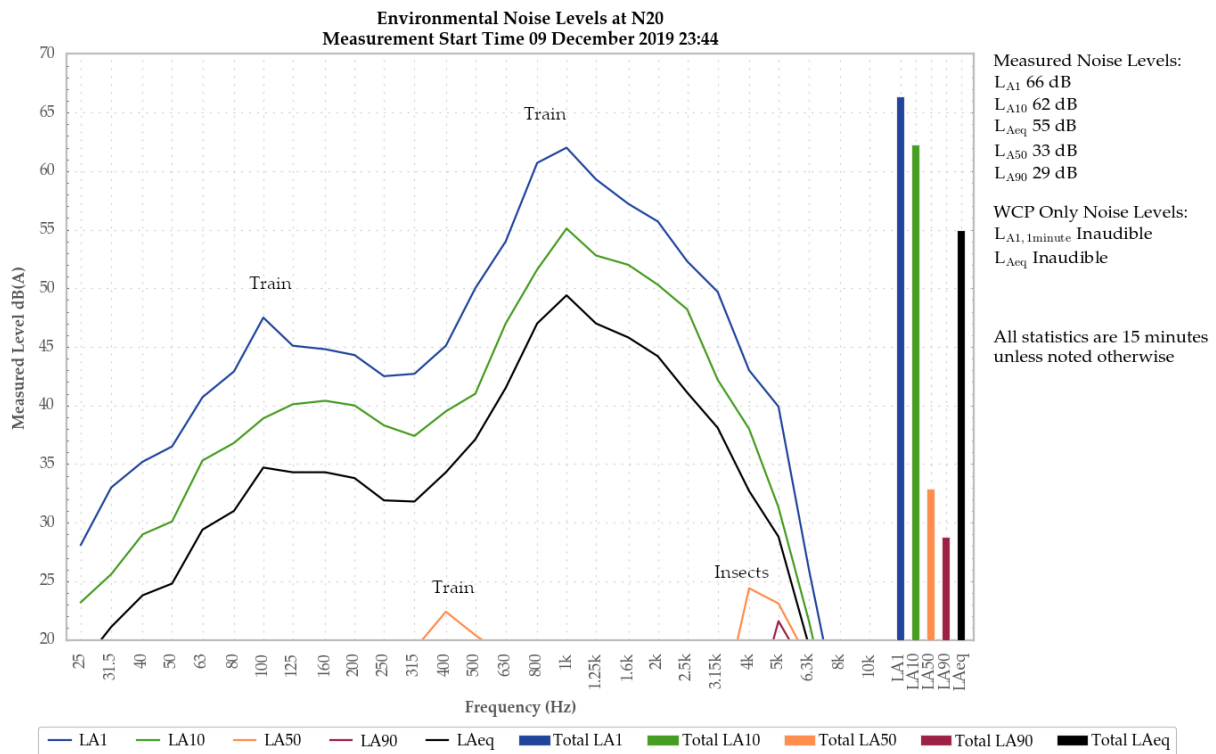


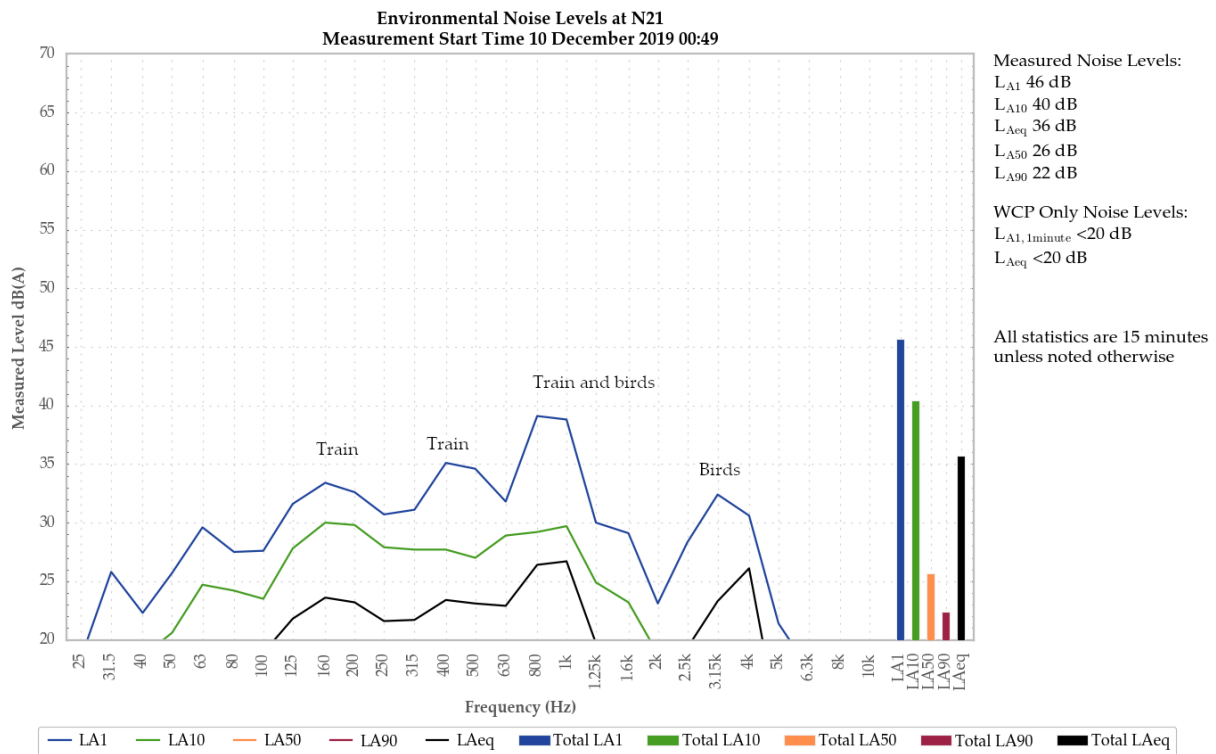
Figure 9: Environmental Noise Levels, N20 – Ringwood Road

WCP was inaudible.

A train generated the measured LA1, LA10, and LAeq. Insects and trains generated the measured LA50 and LA90.

Road traffic was 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 LAeq,15minute and LA1,1minute of less than 20 dB.

A train, birds, and insects generated the measured LA1 and LAeq. A train generated the measured LA10, LA50, and LA90.

## 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 2019 at eight monitoring locations.

Noise levels from WCP complied with relevant noise limits at all monitoring locations during the December 2019 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

**Global Acoustics Pty Ltd**

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## APPENDIX

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### 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	
	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
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 <sup>1</sup>	Northing <sup>1</sup>	Justification
<b>St Laurence O'Toole Church</b>	N6	Operator-attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
<b>Coonaroo</b>	N13	Operator-attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
<b>Tichular</b>	N14	Operator-attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
<b>Wollar Village</b>	N15	Operator-attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
<b>Mogo Rd</b>	N17	Operator-attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
<b>Mogo Rd</b>	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 <sup>+</sup>	Northing <sup>+</sup>	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 <sup>4</sup>	-	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 <sup>4</sup>	-	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 <sup>3</sup>	-	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 LZe <sub>q</sub> ,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.

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## APPENDIX

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### ***B CALIBRATION CERTIFICATES***



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

<b>Client Details</b>	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
<b>Equipment Tested/ Model Number :</b>	Rion NA-28
<b>Instrument Serial Number :</b>	00370304
<b>Microphone Serial Number :</b>	10421
<b>Pre-amplifier Serial Number :</b>	60313
<b>Pre-Test Atmospheric Conditions</b>	<b>Post-Test Atmospheric Conditions</b>
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
<b>Calibration Technician :</b> Lucky Jaiswal	<b>Secondary Check:</b> Lewis Boorman
<b>Calibration Date :</b> 26 Nov 2018	<b>Report Issue Date :</b> 29 Nov 2018
<b>Approved Signatory :</b>	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.





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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**  
**Ambient Temperature :** 21.3°C  
**Relative Humidity :** 41.7%  
**Barometric Pressure :** 100.95kPa

**Post-Test Atmospheric Conditions**  
**Ambient Temperature :** 22.7°C  
**Relative Humidity :** 39.2%  
**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	±0.15dB	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.



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www.acousticresearch.com.au

### Sound Calibrator

IEC 60942-2017

## Calibration Certificate

Calibration Number: C18619

**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 :** 24.2°C  
**Relative Humidity :** 42.9%  
**Barometric Pressure :** 97.69kPa

**Calibration Technician :** Lucky Jaiswal  
**Calibration Date :** 22 Nov 2018  
**Secondary Check:** Lewis Boorman  
**Report Issue Date :** 29 Nov 2018

**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-	94.2	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 ±0.11dB	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.

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**Acoustic  
Research  
Labs Pty Ltd**

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**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.

Specific Tests	Least Uncertainties of Measurement - Environmental Conditions	
Generated SPL	±0.11dB	Temperature ±0.2°C
Frequency	±0.01%	Relative Humidity ±2.4%
Distortion	±0.3%	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.

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12 March 2020

Wilpinjong Coal Pty Ltd  
Locked Bag 2005  
Mudgee NSW 2850  
Attention: James Heesterman

Dear James,

**Regarding:** Long-term noise trends for Wilpinjong Coal Project – 2015 to 2019

## 1 INTRODUCTION

This letter provides information regarding long-term trends in noise generated by Wilpinjong Coal Project (WCP). Attended environmental noise monitoring data collected at eight locations from January 2015 to December 2019 (inclusive) was evaluated. The purpose of this is to address a consent requirement to provide analysis of long-term noise data trends.

Definitions of terminology that may be used in this document are provided in Table 1.1.

*Table 1.1: TERMINOLOGY*

Descriptor	Definition
dB	Decibels. For sound pressure level this is 10 times the logarithm to the base 10 of the ratio of the mean-square sound pressure to the square of the reference sound pressure (20 $\mu$ Pa);
dB(A)	Noise level measurement units are decibels (dB). The A-weighting scale is used to approximate human perception of noise
SPL	Sound pressure level
L <sub>Aeq</sub>	The average A-weighted noise energy (in dB) for a measurement period
L <sub>A90</sub>	The noise level (in dB) exceeded for 90 percent of a measurement period, also known as the background level

## 2 METHODOLOGY

Site-only  $L_{Aeq}$  noise levels measured during monthly attended environmental noise monitoring over a 5-year period from January 2015 to December 2019 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.

## 3 RESULTS

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 1 to Figure 8 provide percentage occurrence information for WCP noise levels at eight monitoring locations.

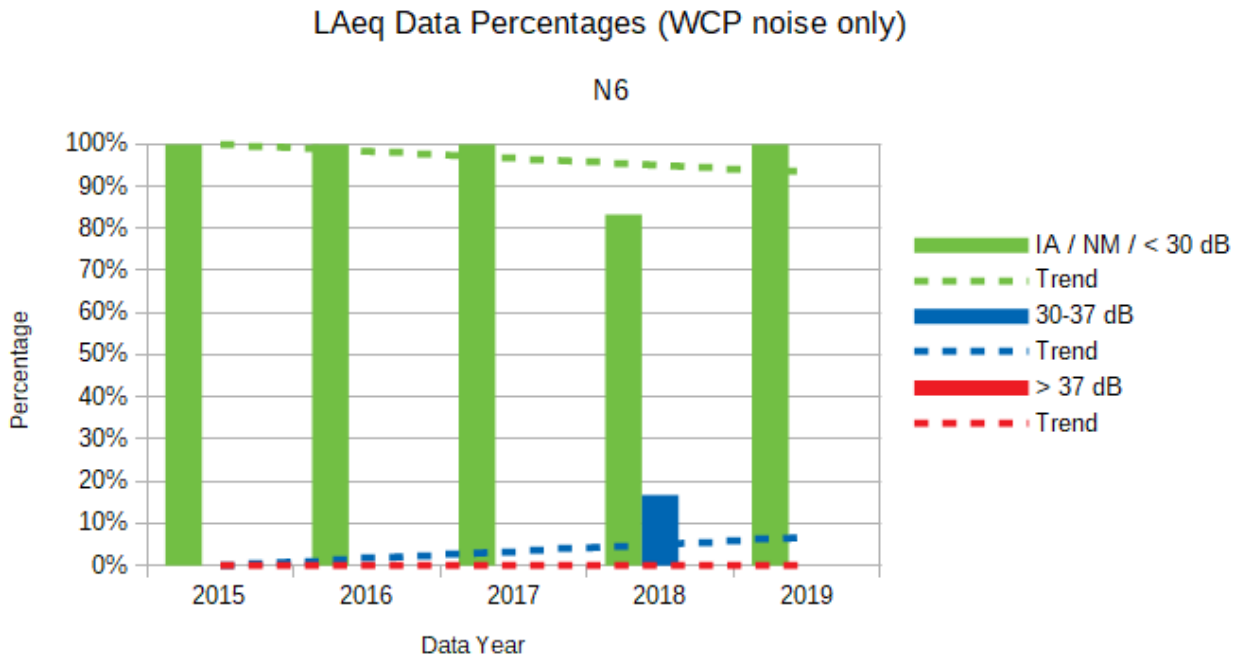


Figure 1: Attended noise monitoring data, N6

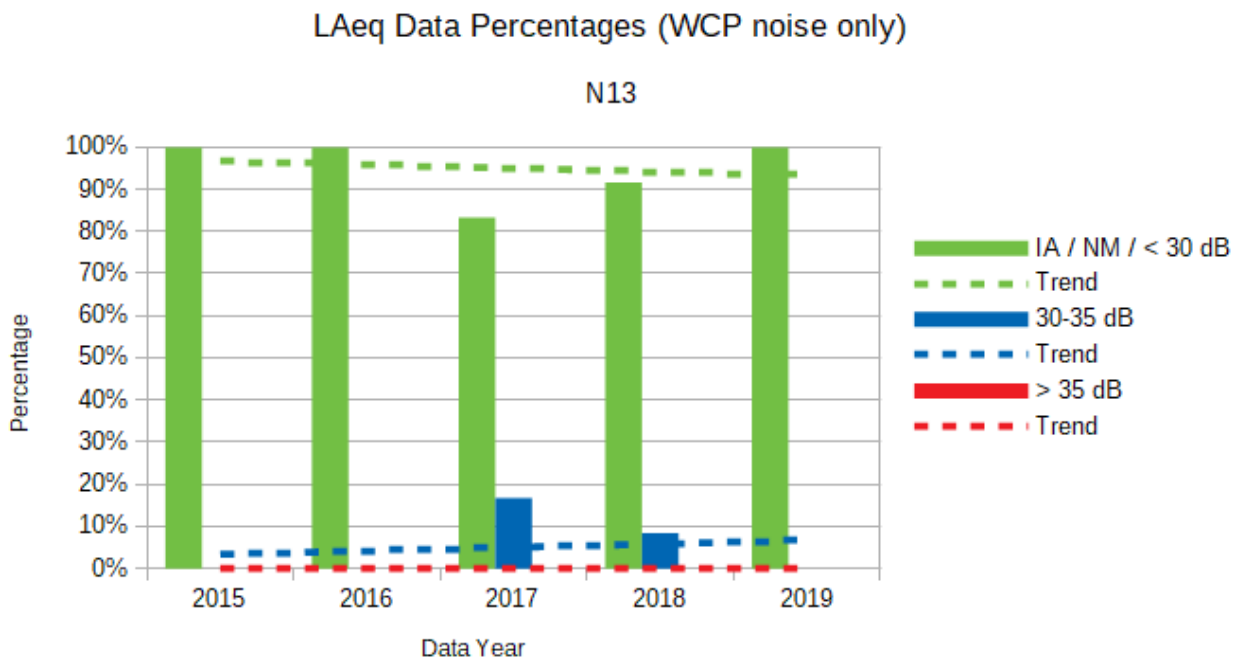


Figure 2: Attended noise monitoring data, N13

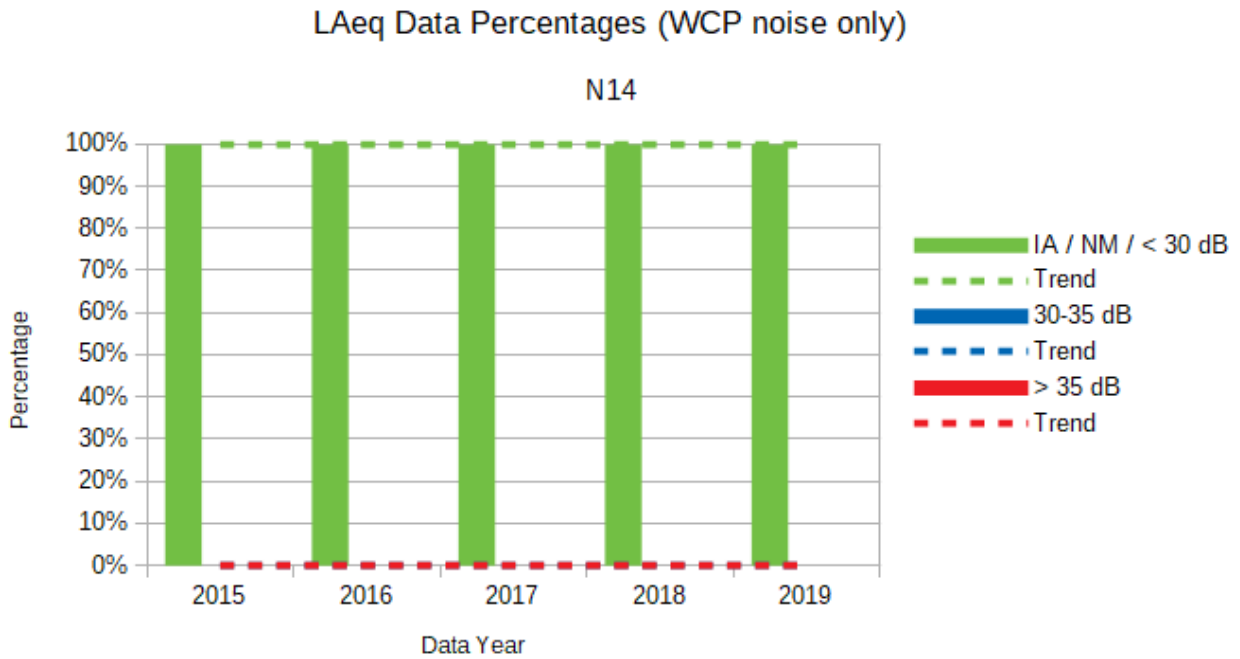


Figure 3: Attended noise monitoring data, N14

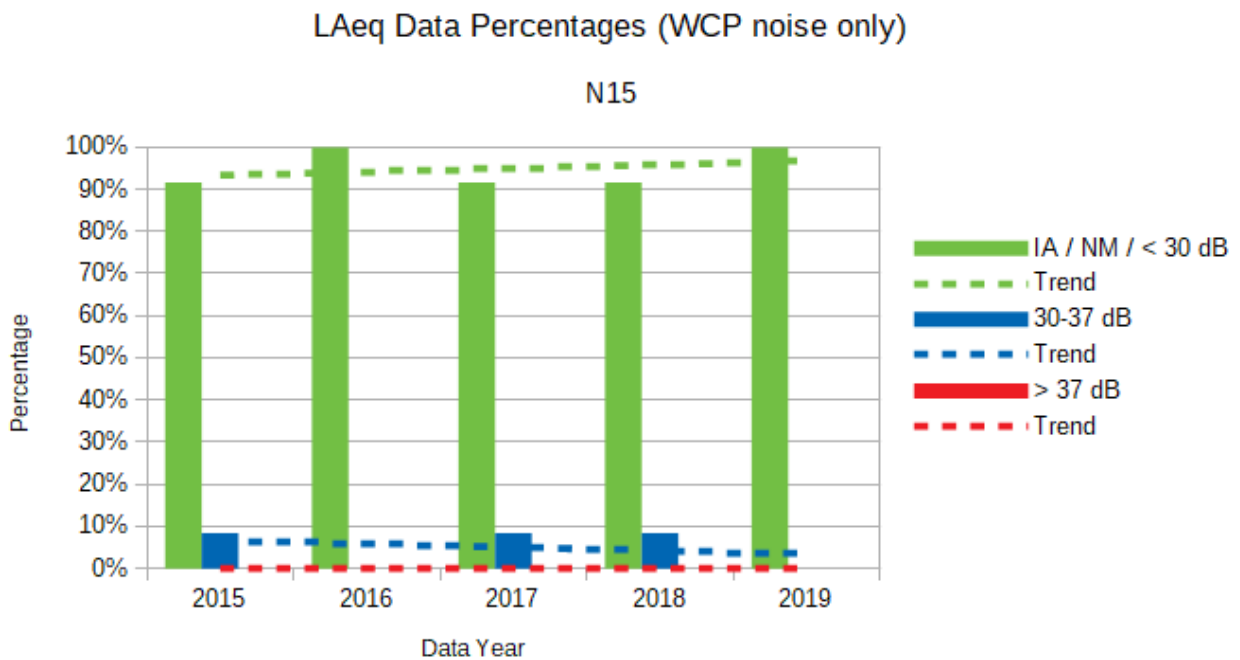


Figure 4: Attended noise monitoring data, N15

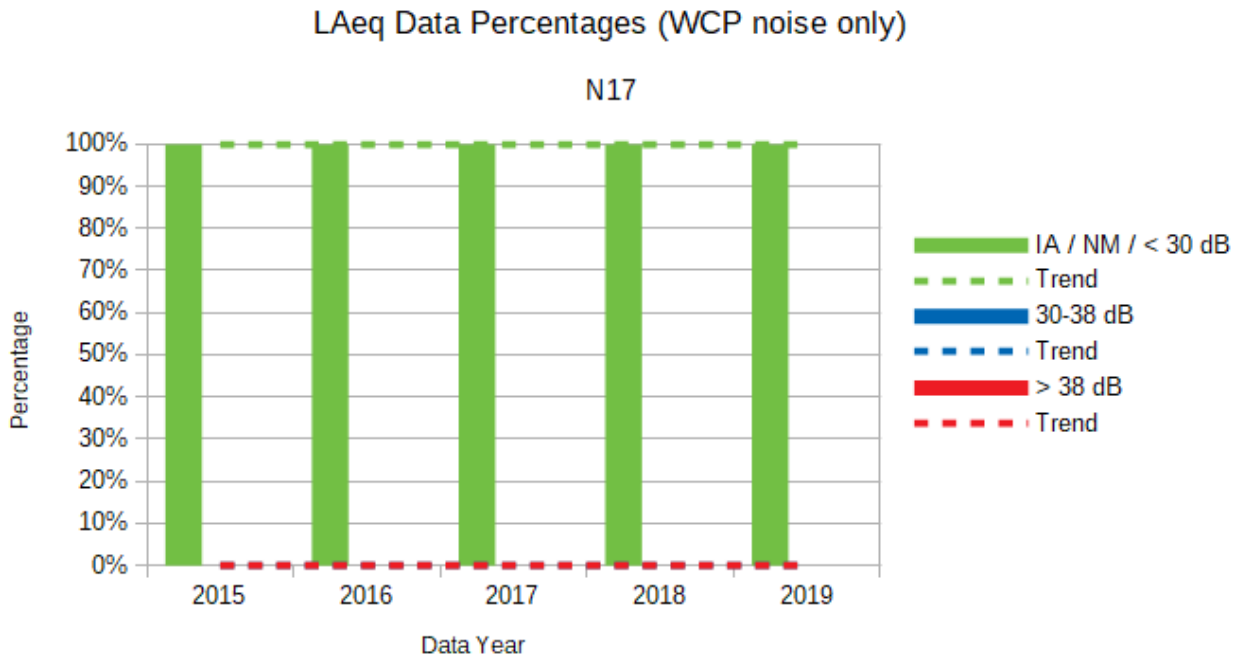


Figure 5: Attended noise monitoring data, N17

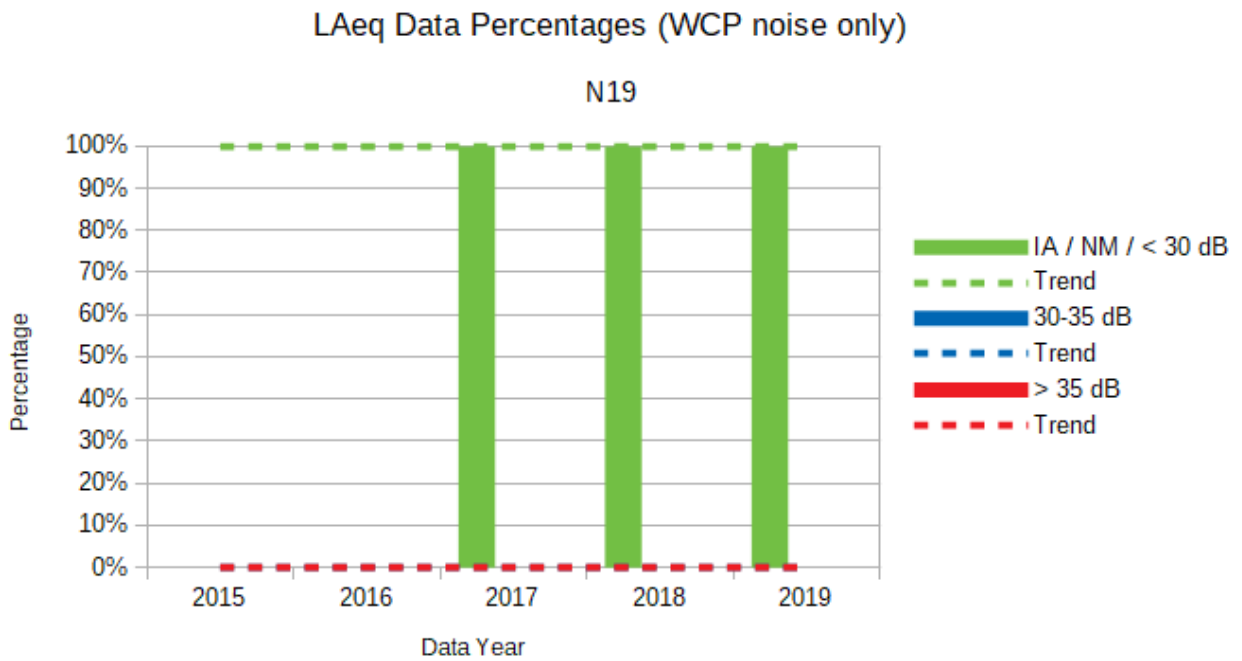


Figure 6: Attended noise monitoring data, N19



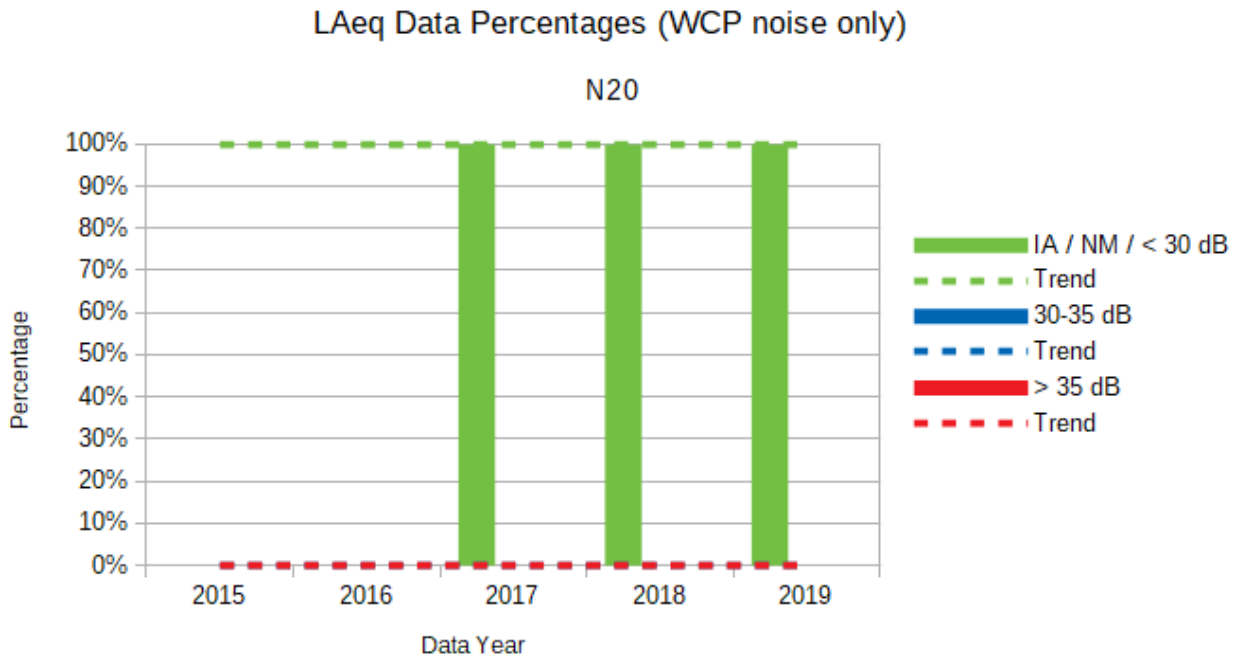


Figure 7: Attended noise monitoring data, N20

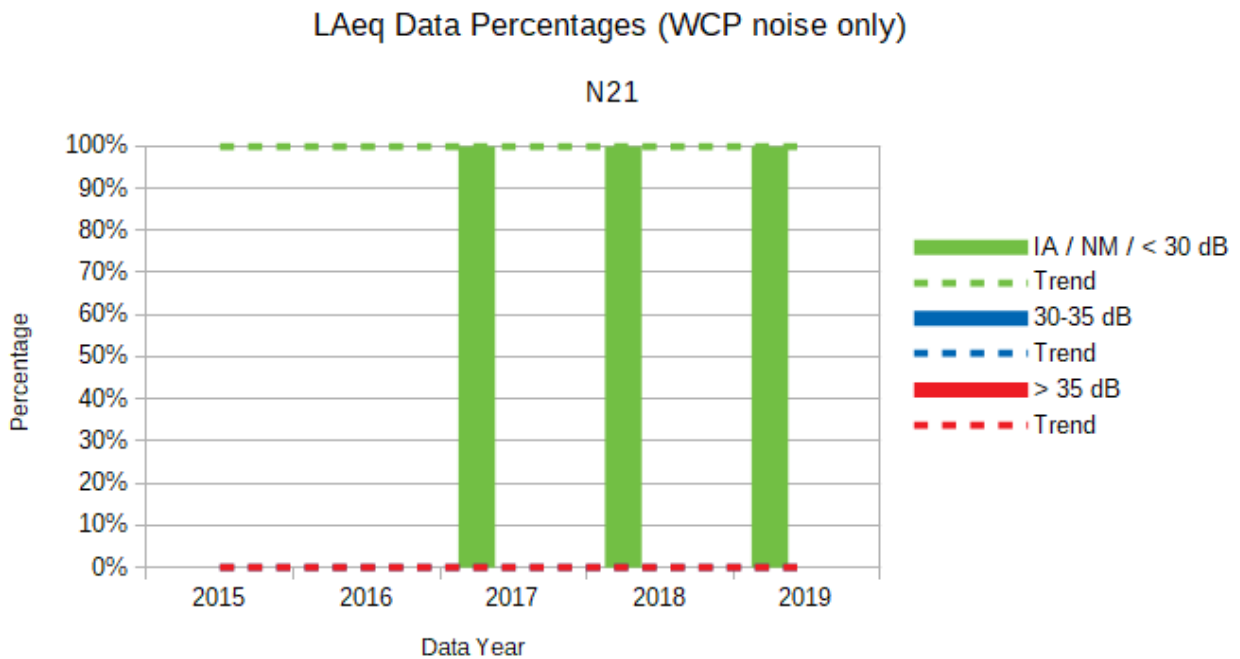


Figure 8: Attended noise monitoring data, N21

#### 4 DISCUSSION

There were no potential exceedances of WCP impact assessment  $L_{Aeq}$  noise criteria at any monitoring location during the 5-year period assessed. 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 Ringwood Road (N20), site-only  $L_{Aeq}$  noise levels were inaudible or less than 20 dB during all attended noise monitoring measurements;
- At North Mogo Road (N19), site-only  $L_{Aeq}$  noise levels were inaudible or less than 25 dB during all attended noise monitoring measurements;
- At Tichular (N14), Mogo Road (N17) and Wandoona (N21), site-only  $L_{Aeq}$  noise levels were less than 30 dB during all attended noise monitoring measurements; and
- At Wollar Village (N6 and NA15) and Coonaroo (N13), site-only  $L_{Aeq}$  noise levels were occasionally above 30 dB during attended noise monitoring, but always below the relevant impact assessment criterion. When this occurred, primarily in 2017 and 2018, it was in less than 20% of the attended monitoring measurements.

Long-term noise trend lines were largely constant, occasionally increasing or decreasing very slightly.

During 2019 attended noise monitoring, WCP-only  $L_{Aeq}$  noise levels were IA, NM, or less than 30 dB at all monitoring locations.



Prepared: Jesse Tribby  
Consultant



QA review: Robert Kirwan  
Consultant