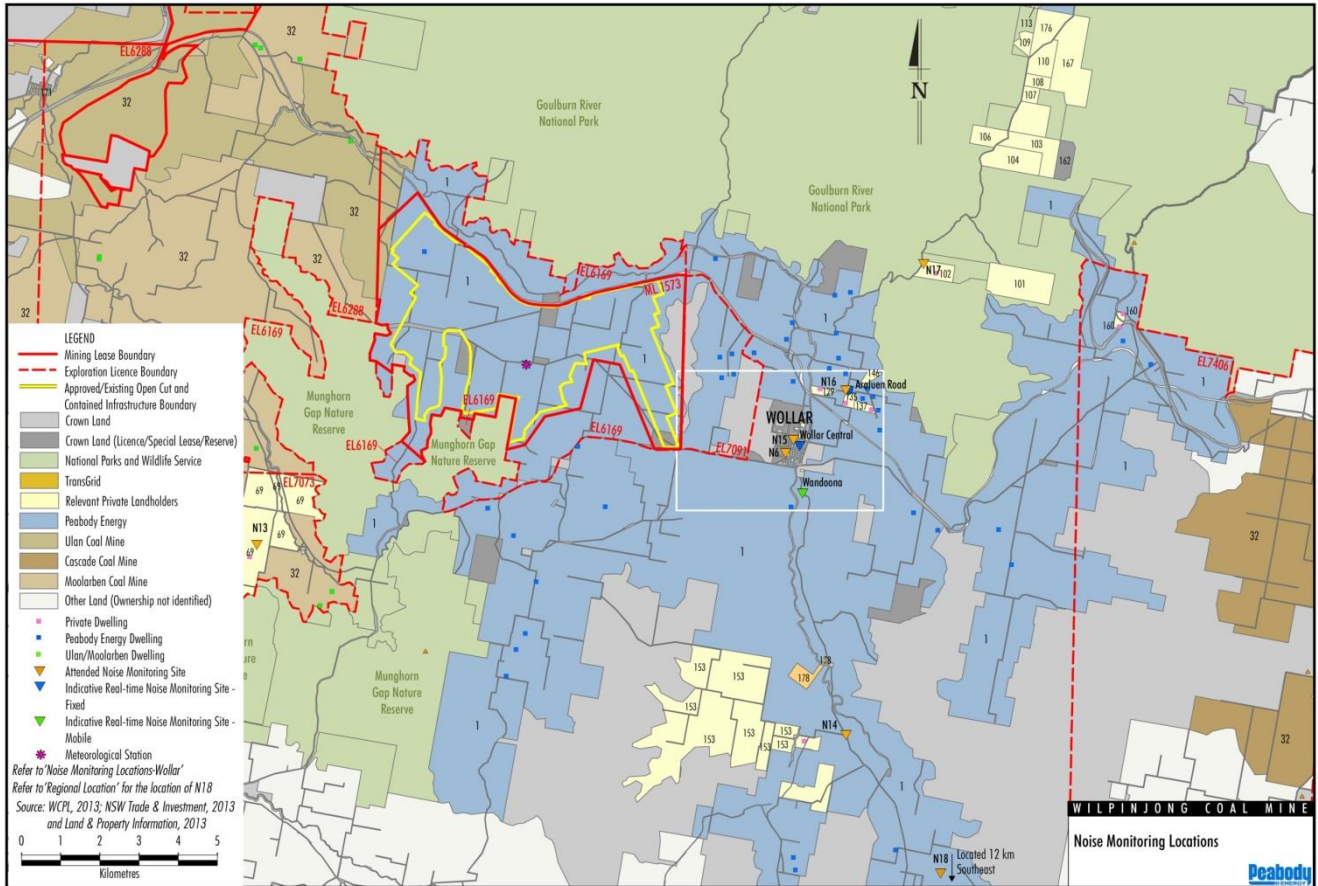
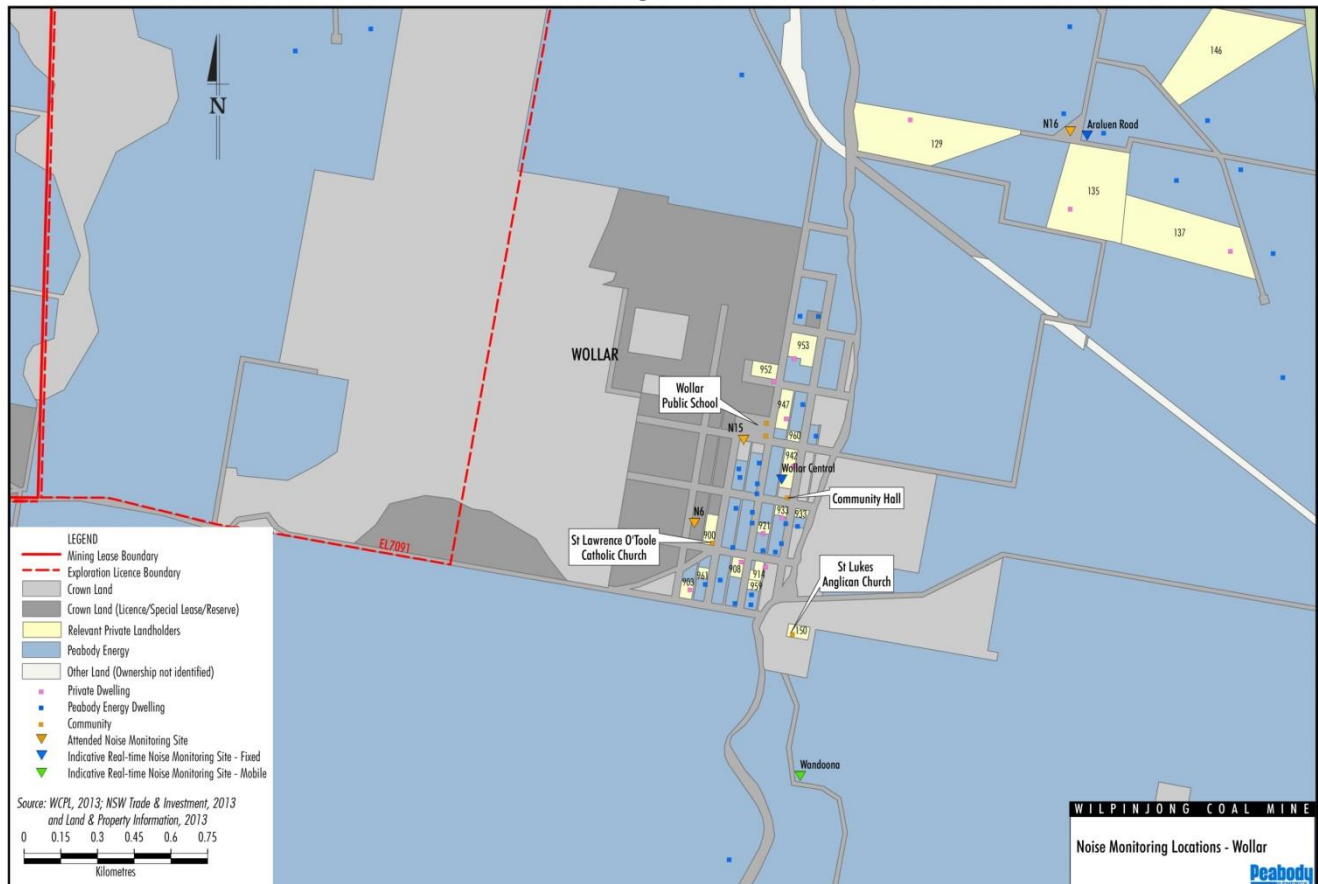


APPENDIX 3F – NOISE MONITORING DATA

Noise Monitoring Locations



Noise Monitoring Locations (Wollar)



Noise Monitoring Reports

Wilpinjong Coal

*Environmental Noise Monitoring
January 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*



Noise and Vibration Analysis and Solutions

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Environmental Noise Monitoring January 2016

Reference: 15474_R01

Report date: 19 February 2016

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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.

A modification (MOD5) to the WCP consent was approved in November 2014. The environment protection licence (EPL) for WCP was issued in early 2006 with subsequent variations approved. Monitoring for January 2015 was carried out as per the draft NMP dated March 2014.

Attended monitoring was conducted in accordance with the documents detailed above, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 18/19 January 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the January 2016 monitoring.

Low Frequency Assessment

During the January 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further assessment of low frequency noise was undertaken.

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 of 18/19 January 2016. Figure 1 shows the regular monitoring locations.

The purpose of the 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 Noise Monitoring Program (NMP).

Table 1.1: 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
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley

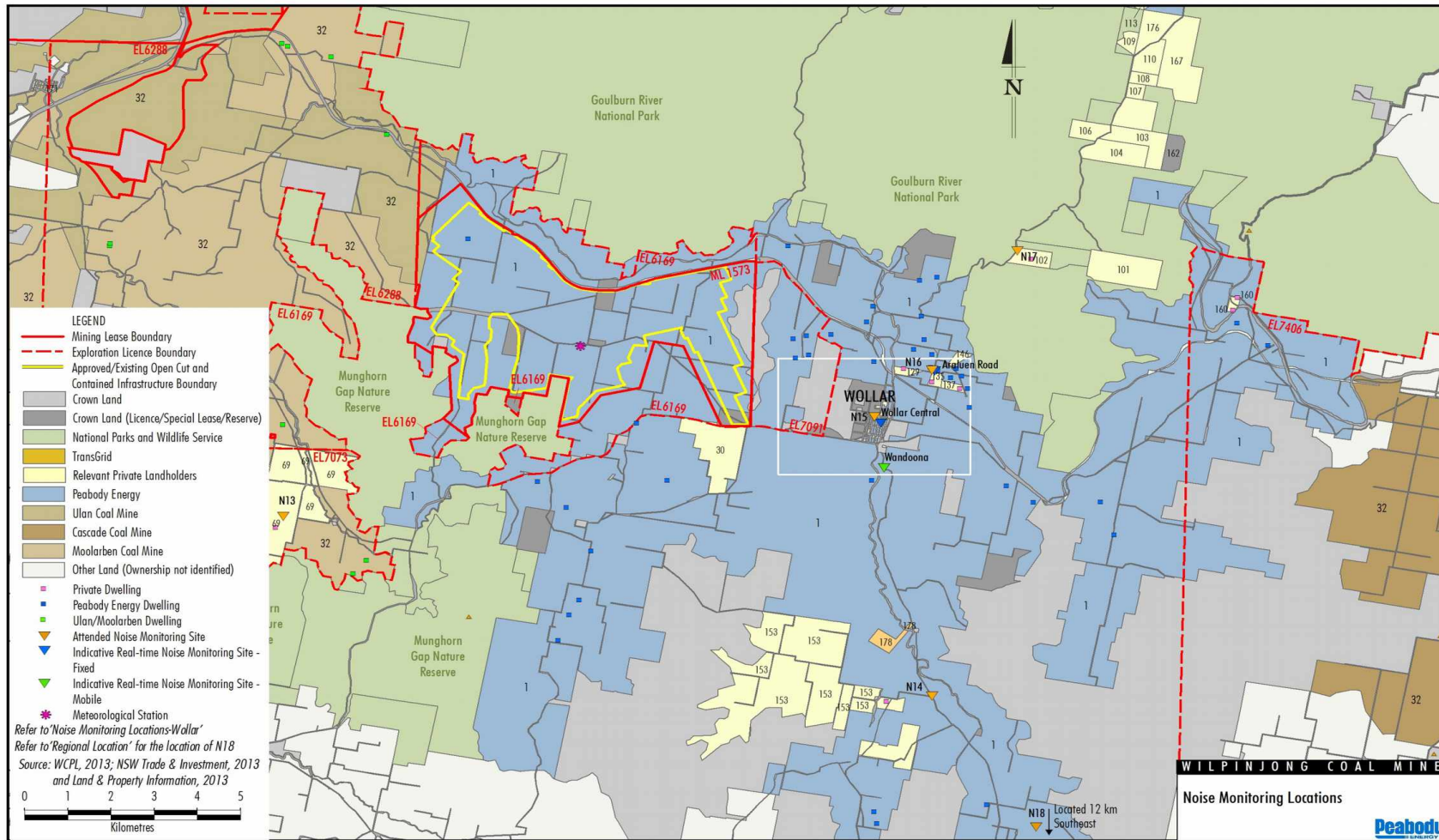


Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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
VIG	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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the 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 in October 2014. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The draft noise monitoring program (NMP) for WCP was prepared in March 2014 in response to the February 2014 modification to the project approval. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/00m.

2.5 EPL Criteria and Weather Conditions

Criteria are detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions of up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factor

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C - weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L _{Ceq}	>60	>65
INP	Site only L _{Ceq} minus site only L _{Aeq}	>=15	>=15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a practice note is not yet available, low frequency noise results from WCP have been compared to both assessment methods presented above above, when considering applicability of low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

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

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted NM in this report are due to insignificant absolute values.

A measurement of $L_{A1,1minute}$ corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms this is the highest noise level emitted from a Wilpinjong Coal Project (WCP) noise source 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 $L_{A1,1minute}$ measurement should be undertaken at one (1) metre from the dwelling façade and the L_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

3.2 Attended Monitoring

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

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	30921838	23/06/2017
Rion NC-73 acoustic calibrator	10527815	24/06/2017

4 RESULTS

4.1 Attended Noise Monitoring

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 LEVELS¹ – JANUARY 2016

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	18/01/2016 23:18	46	40	32	27	30	26	24	34
N13	19/01/2016 01:20	42	34	31	28	29	26	24	42
N14	18/01/2016 23:47	55	53	51	46	47	40	30	42
N15	18/01/2016 22:58	55	50	44	35	40	33	29	55
N16	18/01/2016 22:00	54	54	53	52	52	51	48	35
N17	18/01/2016 22:31	39	36	32	30	31	28	25	33
N18	19/01/2016 00:22	47	33	28	25	26	23	19	29

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during January 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – JANUARY 2016

Conditions	Total for January 2016
Number of measurements	7
Number of measurements where met applied (in accordance with EPL and project approval)	6
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JANUARY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	18/01/2016 23:18	0.0	2.8	35	Yes	IA	Nil
N13	19/01/2016 01:20	0.0	2.2	36	Yes	IA	Nil
N14	18/01/2016 23:47	0.0	3.0	35	Yes	IA	Nil
N15	18/01/2016 22:58	0.0	2.8	35	Yes	IA	Nil
N16	18/01/2016 22:00	0.6	0.2	35	Yes	IA	Nil
N17	18/01/2016 22:31	1.2	1.2	37	Yes	IA	Nil
N18	19/01/2016 00:22	0.0	5.0	35	No	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: *L_{A1,1minute}* GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JANUARY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP <i>L_{A1,1min}</i> n dB ^{4,5}	Exceedance ⁶
N6	18/01/2016 23:18	0.0	2.8	45	Yes	IA	Nil
N13	19/01/2016 01:20	0.0	2.2	45	Yes	IA	Nil
N14	18/01/2016 23:47	0.0	3.0	45	Yes	IA	Nil
N15	18/01/2016 22:58	0.0	2.8	45	Yes	IA	Nil
N16	18/01/2016 22:00	0.6	0.2	45	Yes	IA	Nil
N17	18/01/2016 22:31	1.2	1.2	45	Yes	IA	Nil
N18	19/01/2016 00:22	0.0	5.0	45	No	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times (in fact, mostly inaudible) no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – JANUARY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	18/01/2016 23:18	0.0	2.8	35	Yes	IA	Nil
N13	19/01/2016 01:20	0.0	2.2	35	Yes	IA	Nil
N14	18/01/2016 23:47	0.0	3.0	35	Yes	IA	Nil
N15	18/01/2016 22:58	0.0	2.8	35	Yes	IA	Nil
N16	18/01/2016 22:00	0.6	0.2	35	Yes	IA	Nil
N17	18/01/2016 22:31	1.2	1.2	35	Yes	IA	Nil
N18	19/01/2016 00:22	0.0	5.0	35	No	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: $L_{A1,1min}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – JANUARY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	18/01/2016 23:18	0.0	2.8	45	Yes	IA	Nil
N13	19/01/2016 01:20	0.0	2.2	45	Yes	IA	Nil
N14	18/01/2016 23:47	0.0	3.0	45	Yes	IA	Nil
N15	18/01/2016 22:58	0.0	2.8	45	Yes	IA	Nil
N16	18/01/2016 22:00	0.6	0.2	45	Yes	IA	Nil
N17	18/01/2016 22:31	1.2	1.2	45	Yes	IA	Nil
N18	19/01/2016 00:22	0.0	5.0	45	No	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – JANUARY 2016

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	18/01/2016 23:18	20	0.0	-	0
N13	19/01/2016 01:20	21	0.0	-	0
N14	18/01/2016 23:47	18	0.8	130	0
N15	18/01/2016 22:58	19	0.4	140	0
N16	18/01/2016 22:00	20	0.0	-	0
N17	18/01/2016 22:31	20	0.4	200	0
N18	19/01/2016 00:22	18	0.0	-	0

Notes:

1. Wind speed and direction measured at 1.8 metres.

Data obtained concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres ²
18/01/2016 22:00	0.8	95	0.0
18/01/2016 22:15	0.6	118	0.2
18/01/2016 22:30	1.0	154	1.2
18/01/2016 22:45	1.2	154	1.2
18/01/2016 23:00	0.0	-	1.8
18/01/2016 23:15	0.0	-	2.8
18/01/2016 23:30	0.0	-	2.8
18/01/2016 23:45	0.0	-	2.6
19/01/2016 00:00	0.0	-	3.0
19/01/2016 00:15	0.0	-	4.2
19/01/2016 00:30	0.0	-	5.0
19/01/2016 00:45	0.7	340	5.6
19/01/2016 01:00	0.7	336	5.4
19/01/2016 01:15	0.0	-	3.8
19/01/2016 01:30	0.0	-	2.2
19/01/2016 01:45	0.0	-	1.8
19/01/2016 02:00	0.0	-	2.4
19/01/2016 02:15	0.0	-	2.0

Notes:

1. Data supplied by WCP;
2. Lapse rate sourced from the WCP inversion tower; and
3. "-" in wind direction column indicates that conditions were calm.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

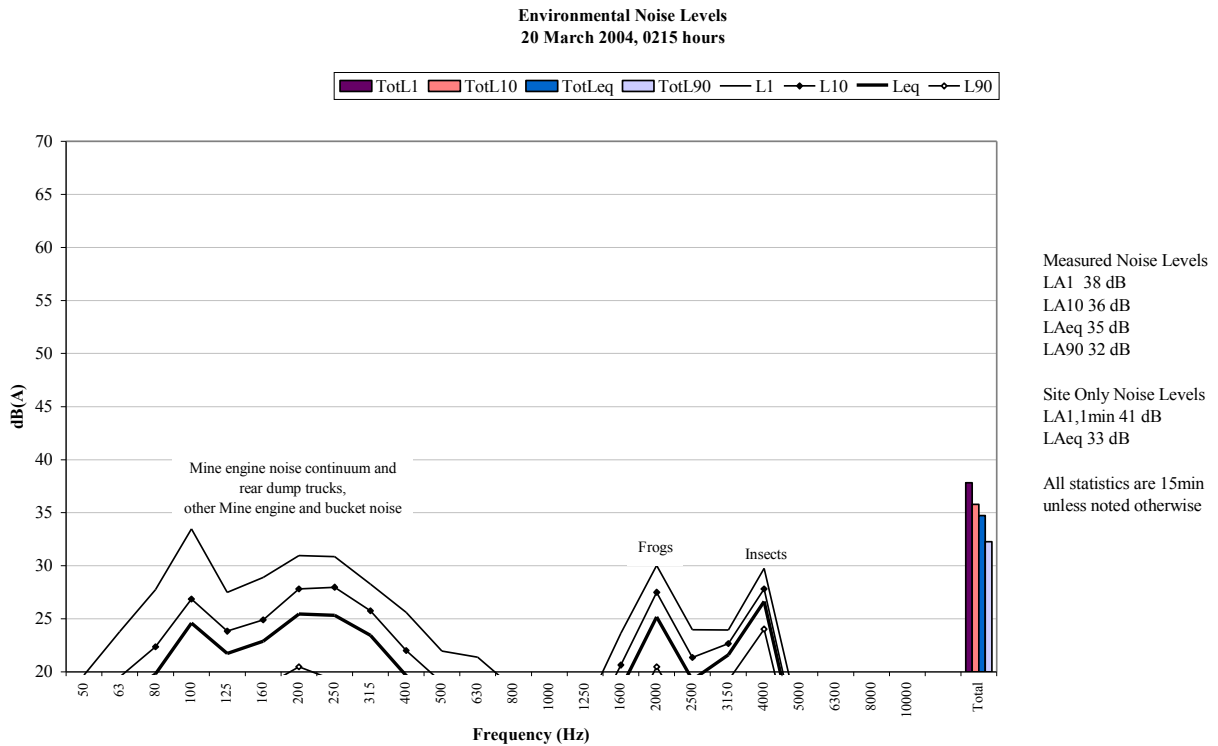


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 18 January 2016

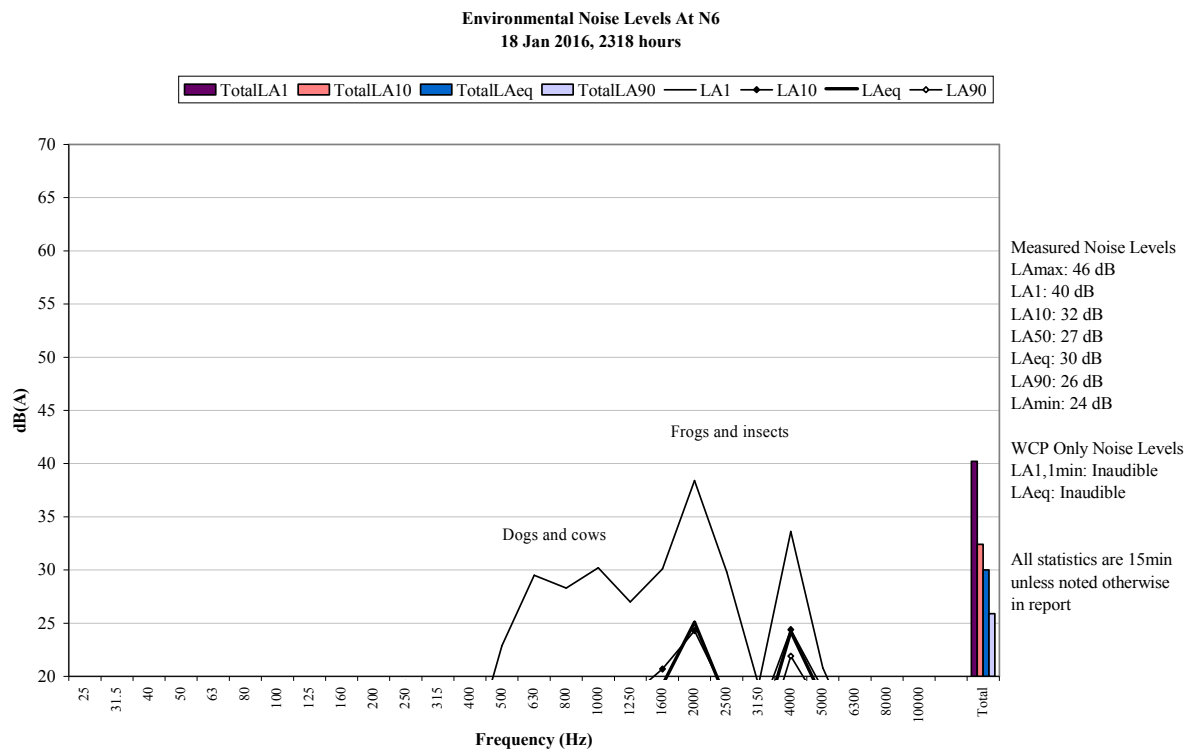


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was inaudible.

Insects and frogs generated the LA1, LA10, LAeq and LA90. Dogs generated the LAmix and contributed to the LA1.

Birds and cows were also noted.

5.1.2 N13, 19 January 2016

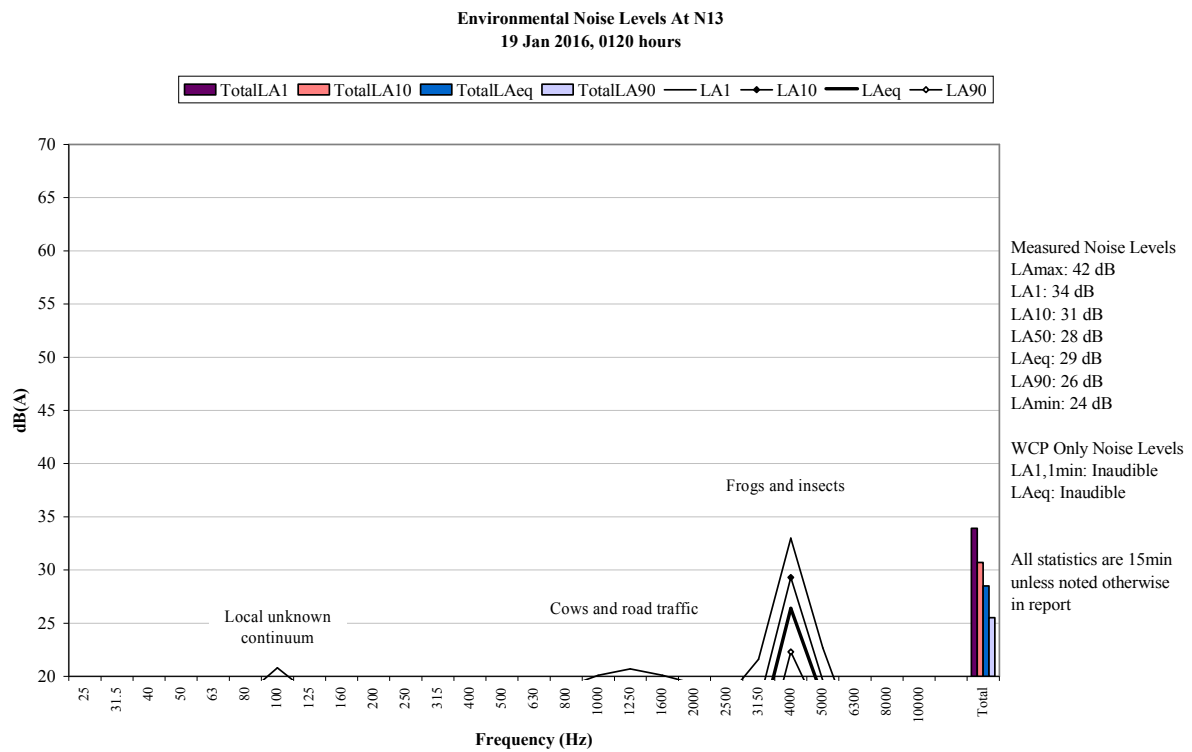


Figure 4: Environmental Noise Levels - N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Cows generated the LAmax. Insects and frogs generated the measured LA1, LA10, LAeq and LA90.

Road traffic and a low-level local continuum were also noted.

5.1.3 N14, 18 January 2016

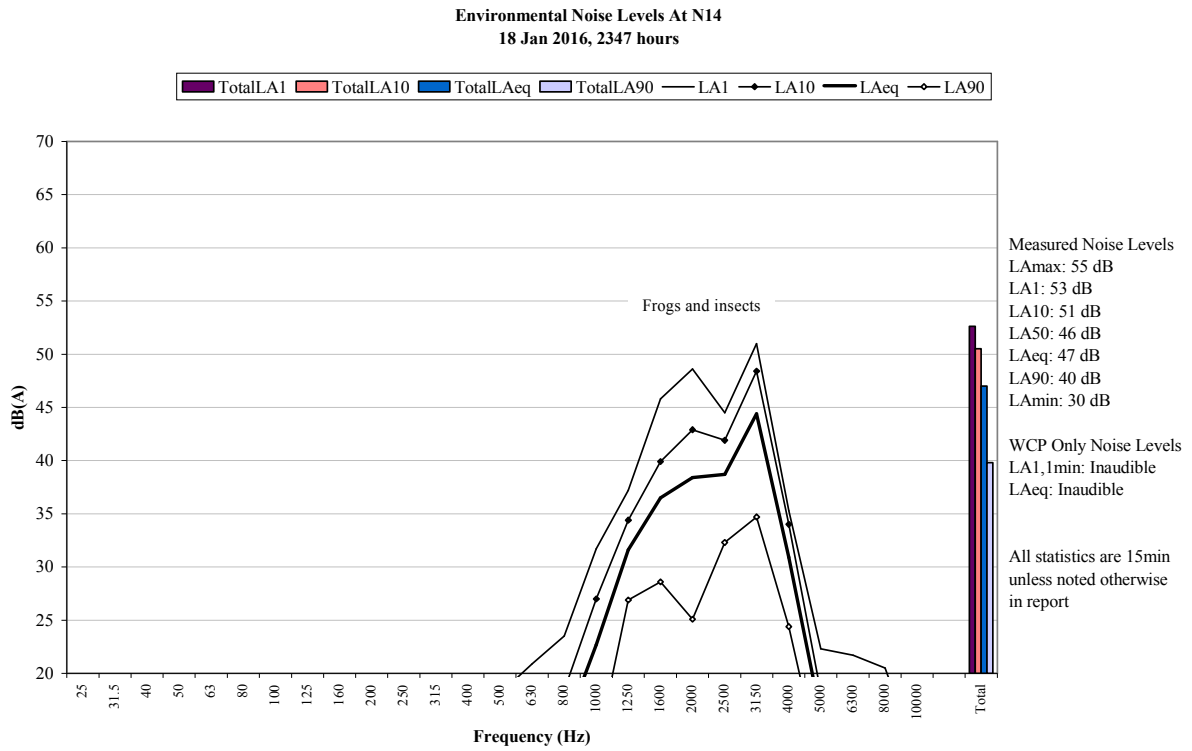


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Insects and frogs generated all measured levels.

A local continuum was also noted at low levels.

5.1.4 N15, 18 January 2016

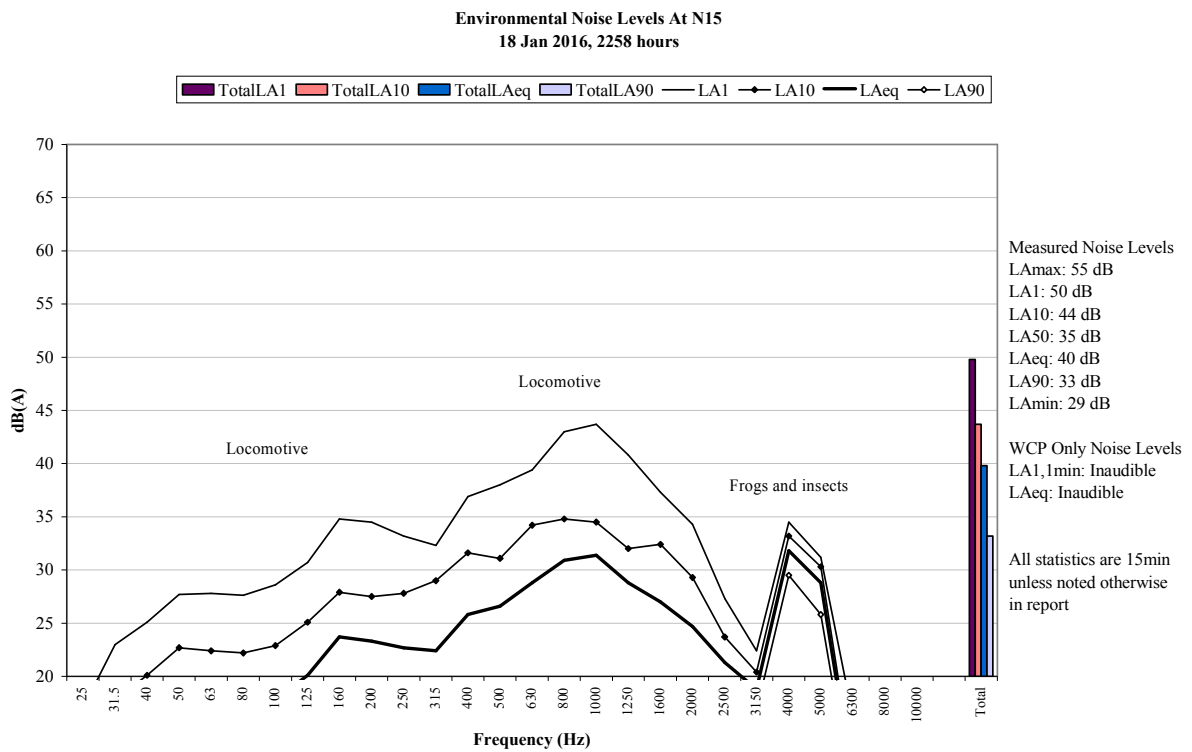


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Locomotive noise generated the measured LA1 and contributed to the LA10 and LAeq. Frogs and insects contributed to the LA10 and LAeq and were responsible for the LA90.

Dogs and livestock were also noted.

5.1.5 N16, 18 January 2016

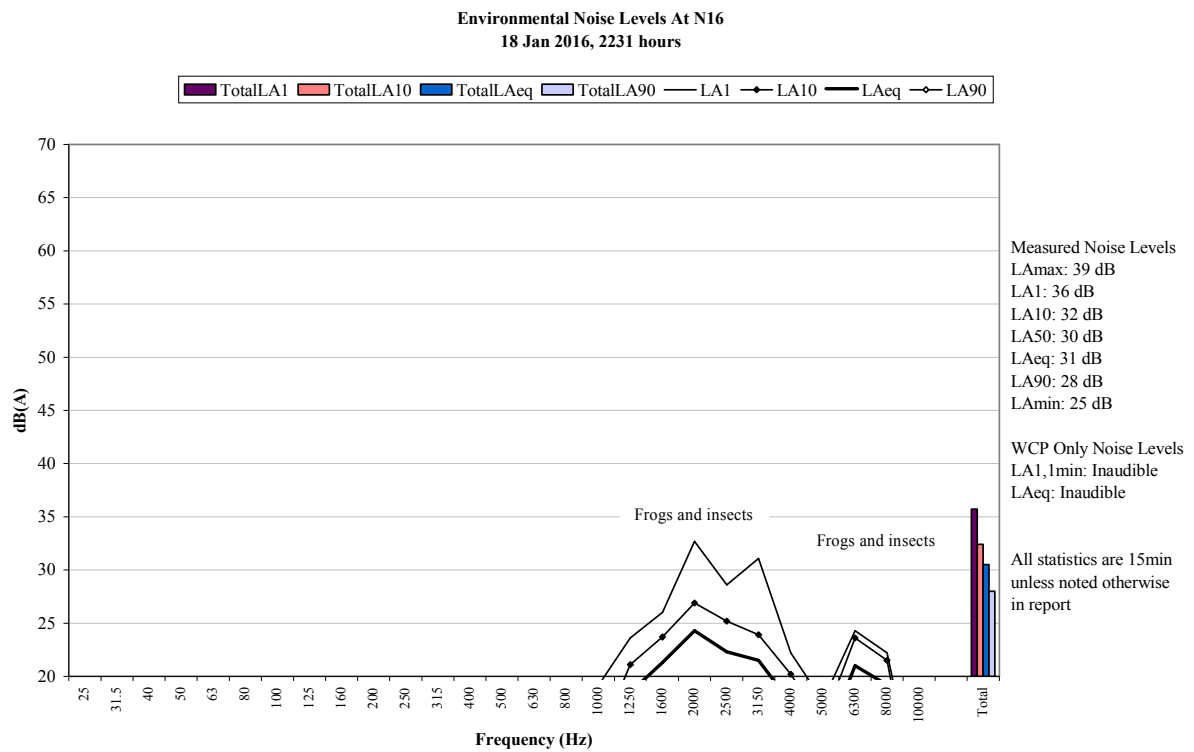


Figure 7: Environmental Noise Levels - N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible.

Insects and frogs generated all measured levels.

Distant road traffic was also noted.

5.1.6 N17, 18 January 2016

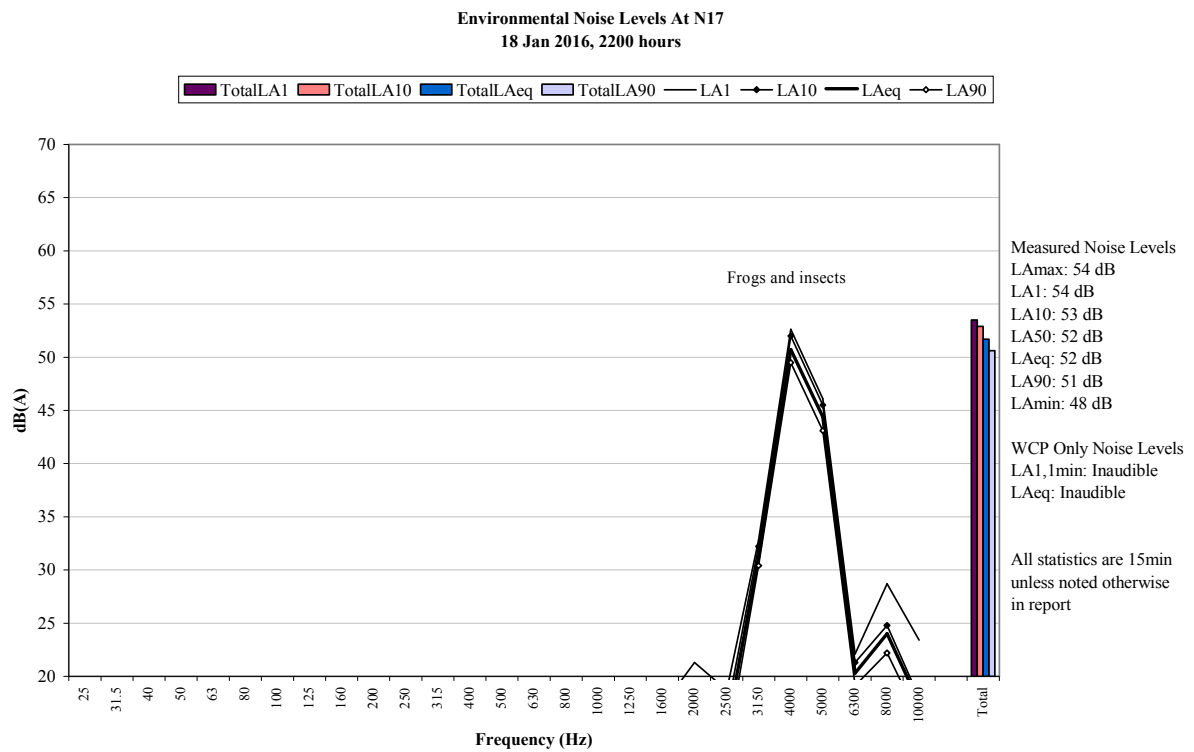


Figure 8: Environmental Noise Levels - N17, Mogo Road, off Araluen Road

WCP was inaudible.

Insects and frogs generated all measured levels.

Aircraft and birds were also noted.

5.1.7 N18, 19 January 2016

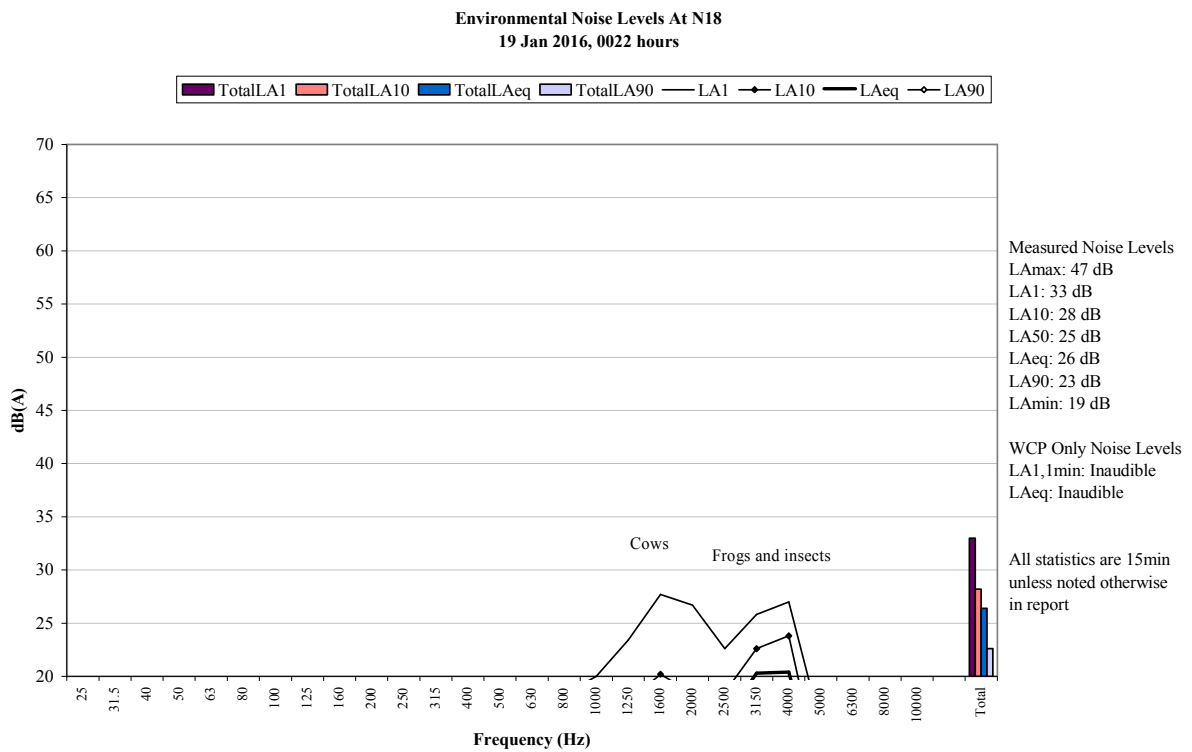


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Cows generated the L_{Amax} and contributed to the L_{A1}. Insects were responsible for the L_{A10}, L_{Aeq} and L_{A90}.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 18/19 January 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the January 2016 monitoring period.

6.2 Low Frequency Assessment

During the January 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further assessment of low frequency noise was undertaken.

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APPENDIX

A STATUTORY REQUIREMENTS

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

A.1 Wilpinjong Coal Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	<i>L_{Aeq}(15 minute)</i>	<i>L_{Aeq}(15 minute)</i>	<i>L_{Aeq}(15 minute)</i>	<i>L_{A1}(1 minute)</i>
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)
Wollar village	35	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Temperature inversion conditions greater than 3°C/100m.

- 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 (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 of Appendix E to the NSW Industrial Noise Policy.

- L5.5 To determine compliance:

- a) With the L_{eq}(15 minute) noise limits in condition L5.1, the noise measurement equipment must be located:

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in October 2014.

- 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.
- R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:
- a) an assessment of compliance with noise limits presented in Condition L5.1; and
 - b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The noise monitoring program for WCP dated March 2014 and the relevant sections are reproduced below.

6.0 NOISE MONITORING PROGRAM

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 3**. Unattended or real-time monitoring is primarily utilised as a proactive noise control system; providing noise alerts when predetermined noise levels are triggered.

6.1 Monitoring Locations

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 attended monitoring at seven locations (**Table 4, Figure 3 and Figure 4**). Real-time 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 4: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest non-mine owned residence to the West of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest non-mine owned residence to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest non-mine owned residence to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest non-mine owned residence to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest non-mine owned residence to the North-East of the Mine
Barrigan Valley ²	N18	Attended Noise	780033.3	6398618.1	DP&I Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine

Location	Site	Type	Easting ¹	Northing ¹	Justification
Wandoona ³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

Notes to Table 4:

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&I and OEH 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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 4** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&I and the EPA.

6.3.3 Methodology

Attended noise monitoring will be undertaken one night per month by an independent acoustic consultant in accordance with the INP (EPA, 2000) and AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'. Routine 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 3, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environmental and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&I and OEH within 24 hours.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

When determining the noise generated by the Mine, WCPL will monitor the modification factors in Section 4 of the INP (EPA, 2000).

6.3.4 Data Collection

Data and observations are collected in 15 minute periods and the Leq dBA results recorded. The Leq dBC noise levels will also be recorded to assess low frequency noise. All acoustic instrumentation will comply with AS 1259.2-1990 'Acoustics – Sound level meters – Integrating – Averaging'.

Comprehensive field notes will be taken to indicate both mine related and non-mine related noise sources and when they occurred. Notes about maximum mine noise levels (source and times) will also be taken. All percentiles (LA_{max}, LA₁, LA₁₀, LA₅₀, LA₉₀, LA_{min}, LA_{eq}) are measured in A weighting.

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

6.3.5 Evaluation of Compliance

Table 6 summarises the definition used by WCPL for the evaluation of compliance with statutory requirements. WCPL has developed a Compliance Review and Evaluation Process (Figure 5) that clearly illustrates when WCPL is deemed to have exceeded the Noise Criteria in Table 3.

Table 6: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is recorded when a second attended noise monitoring result, taken with 75 minutes of the first result and in accordance with the INP, exceeds the Noise Criteria in Table 3. The noise must be solely attributable to WCPL and meteorological conditions must be favourable (Figure 5). Reporting requirements for exceedances are detailed in Section 9.1.

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 5.5°C/100 m.

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

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

6.3.6 Response to Exceedance

Where any exceedance of the Noise Criteria and/or performance measures has occurred, WCPL will, at the earliest opportunity:

- Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- Consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action (Section 9.1);
- Implement remediation measures as directed by the Director-General; and
- Review and, if necessary, revise this Management Plan (refer Section 10.0),

to the satisfaction of the Director-General.

APPENDIX

B CALIBRATION CERTIFICATES



**Acoustic
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Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2006

Calibration Certificate

Calibration Number C15284

Client Details ARL Hire
423 Pennant Hills Rd
Pennant Hills

Equipment Tested/ Model Number : 30921838
Instrument Serial Number : Rion NA-28
Microphone Serial Number : 04128
Pre-amplifier Serial Number : 11893

Pre-Test Atmospheric Conditions
Ambient Temperature : 20.8°C
Relative Humidity : 46.9%
Barometric Pressure : 100.47kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 22.4°C
Relative Humidity : 43%
Barometric Pressure : 100.38kPa

Calibration Technician : Dennis Kim
Calibration Date : 23/06/2015

Secondary Check: Kate Alchin
Report Issue Date : 24/06/2015

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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: ±0.120dB	Temperature ±0.3°C
12.5kHz: ±0.165dB	Relative Humidity ±4.1%
16kHz: ±0.245dB	Barometric Pressure ±0.1kPa
Electrical Tests	
31.5 Hz to 20 kHz: ±0.121dB	

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.

PAGE 1 OF 1



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**Sound Calibrator
IEC 60942-2004**

Calibration Certificate

Calibration Number C15283

Client Details ARL Hire
423 Pennant Hills Road
Pennant Hills NSW 2120

Equipment Tested/ Model Number : Rion NC-73
Instrument Serial Number : 10527815

Atmospheric Conditions

Ambient Temperature : 23°C
Relative Humidity : 38%
Barometric Pressure : 999.98kPa

Calibration Technician : Dennis Kim
Calibration Date : 24/06/2015
Secondary Check: Tim Williams
Report Issue Date : 24/06/2015

Approved Signatory :  **Juan Aguero**

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

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 ±0.09dB	Temperature ±0.3°C
Short Term Fluct. ±0.02dB	Relative Humidity ±4.1%
Frequency ±0.01%	Barometric Pressure ±0.1kPa
Distortion ±0.26%	

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.

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Wilpinjong Coal

*Environmental Noise Monitoring
February 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*



Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring February 2016

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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.

A modification (MOD5) to the WCP consent was approved in November 2014. The environment protection licence (EPL) for WCP was issued in early 2006 with subsequent variations approved. Monitoring for December 2015 was carried out as per the draft NMP dated March 2014.

Attended monitoring was conducted in accordance with the documents detailed above, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 10/11 February 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the February 2016 monitoring.

Low Frequency Assessment

During the February 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further assessment of low frequency noise was undertaken.

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 of 10/11 February 2016. Figure 1 shows the regular monitoring locations.

The purpose of the 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 Noise Monitoring Program (NMP).

Table 1.1: 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
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley

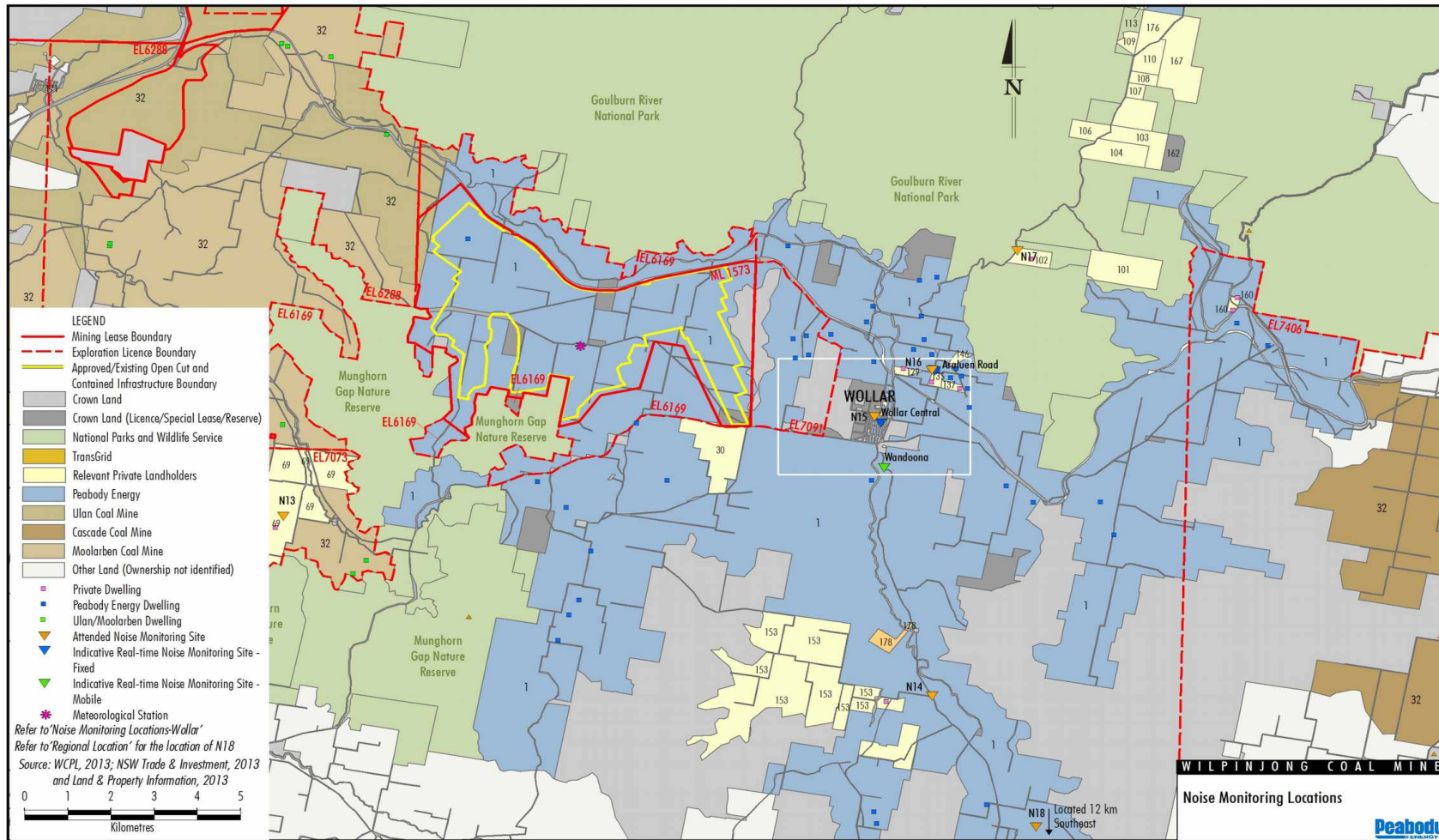


Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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
VIG	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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the 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 in October 2014. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The draft noise monitoring program (NMP) for WCP was prepared in March 2014 in response to the February 2014 modification to the project approval. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/00m.

2.5 EPL Criteria and Weather Conditions

Criteria are detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor/ Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions of up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factor

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C - weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L_{Ceq}	>60	>65
INP	Site only L_{Ceq} minus site only L_{Aeq}	≥ 15	≥ 15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a practice note is not yet available, low frequency noise results from WCP have been compared to both assessment methods presented above above, when considering applicability of low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

Attended monitoring during this reporting period was undertaken by Joel Curran.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

3.2 Attended Monitoring

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

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	01070590	06/11/2017
Pulsar acoustic calibrator	57413	23/12/2017

4 RESULTS

4.1 Attended Noise Monitoring

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 LEVELS¹ – FEBRUARY 2016

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	10/02/2016 22:02	46	36	33	31	32	30	28	40
N13	11/02/2016 01:59	42	34	28	26	27	25	24	44
N14	11/02/2016 00:16	55	44	43	41	41	38	33	35
N15	10/02/2016 22:27	44	37	36	34	34	31	29	40
N16	10/02/2016 23:38	58	53	47	32	42	22	18	56
N17	10/02/2016 23:03	55	54	53	51	51	49	47	22
N18	11/02/2016 00:56	54	53	53	47	49	37	33	28

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during February 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – FEBRUARY 2016

Conditions	Total for February 2016
Number of measurements	7
Number of measurements where met applied (in accordance with EPL and project approval)	6
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – FEBRUARY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	10/02/2016 22:02	1.7	-0.4	35	Yes	IA	Nil
N13	11/02/2016 01:59	0.6	1.0	36	Yes	20	Nil
N14	11/02/2016 00:16	0.0	2.2	35	Yes	<20	Nil
N15	10/02/2016 22:27	1.3	-0.2	35	Yes	IA	Nil
N16	10/02/2016 23:38	0.0	1.0	37	Yes	IA	Nil
N17	10/02/2016 23:03	0.0	0.8	35	Yes	IA	Nil
N18	11/02/2016 00:56	0.0	3.4	35	No	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – FEBRUARY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ n dB ^{4,5}	Exceedance ⁶
N6	10/02/2016 22:02	1.7	-0.4	45	Yes	IA	Nil
N13	11/02/2016 01:59	0.6	1.0	45	Yes	27	Nil
N14	11/02/2016 00:16	0.0	2.2	45	Yes	21	Nil
N15	10/02/2016 22:27	1.3	-0.2	45	Yes	IA	Nil
N16	10/02/2016 23:38	0.0	1.0	45	Yes	IA	Nil
N17	10/02/2016 23:03	0.0	0.8	45	Yes	IA	Nil
N18	11/02/2016 00:56	0.0	3.4	45	No	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times (in fact, mostly inaudible) no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – FEBRUARY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	10/02/2016 22:02	1.7	-0.4	35	Yes	IA	Nil
N13	11/02/2016 01:59	0.6	1.0	35	Yes	20	Nil
N14	11/02/2016 00:16	0.0	2.2	35	Yes	<20	Nil
N15	10/02/2016 22:27	1.3	-0.2	35	Yes	IA	Nil
N16	10/02/2016 23:38	0.0	1.0	35	Yes	IA	Nil
N17	10/02/2016 23:03	0.0	0.8	35	Yes	IA	Nil
N18	11/02/2016 00:56	0.0	3.4	35	No	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: *L_{A1,1minute}* GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – FEBRUARY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP <i>L_{A1,1min}</i> dB ^{4,5}	Exceedance ⁶
N6	10/02/2016 22:02	1.7	-0.4	45	Yes	IA	Nil
N13	11/02/2016 01:59	0.6	1.0	45	Yes	27	Nil
N14	11/02/2016 00:16	0.0	2.2	45	Yes	21	Nil
N15	10/02/2016 22:27	1.3	-0.2	45	Yes	IA	Nil
N16	10/02/2016 23:38	0.0	1.0	45	Yes	IA	Nil
N17	10/02/2016 23:03	0.0	0.8	45	Yes	IA	Nil
N18	11/02/2016 00:56	0.0	3.4	45	No	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – FEBRUARY 2016

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	10/02/2016 22:02	24	0.0	-	0
N13	11/02/2016 01:59	20	0.6	250	0
N14	11/02/2016 00:16	20	0.9	150	0
N15	10/02/2016 22:27	22	0.0	-	0
N16	10/02/2016 23:38	23	0.0	-	0
N17	10/02/2016 23:03	24	0.0	-	0
N18	11/02/2016 00:56	21	0.0	-	0

Notes:

1. Wind speed and direction measured at 1.8 metres.

Data obtained concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres ²
10/02/2016 22:00	2.1	112	-0.4
10/02/2016 22:15	1.7	116	-0.4
10/02/2016 22:30	1.2	114	-0.4
10/02/2016 22:45	1.3	127	-0.2
10/02/2016 23:00	0.9	137	-0.2
10/02/2016 23:15	0.0	-	0.8
10/02/2016 23:30	0.0	-	1.2
10/02/2016 23:45	0.0	-	1.0
11/02/2016 00:00	0.0	-	1.2
11/02/2016 00:15	0.0	-	2.4
11/02/2016 00:30	0.0	-	2.2
11/02/2016 00:45	1.0	340	2.8
11/02/2016 01:00	0.0	-	3.2
11/02/2016 01:15	0.0	-	3.4
11/02/2016 01:30	0.0	-	1.4
11/02/2016 01:45	0.0	-	1.2
11/02/2016 02:00	0.6	353	1.0
11/02/2016 02:15	0.0	-	1.6

Notes:

1. Data supplied by WCP;
2. Lapse rate sourced from the WCP inversion tower; and
3. "-" in wind direction column indicates that conditions were calm.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

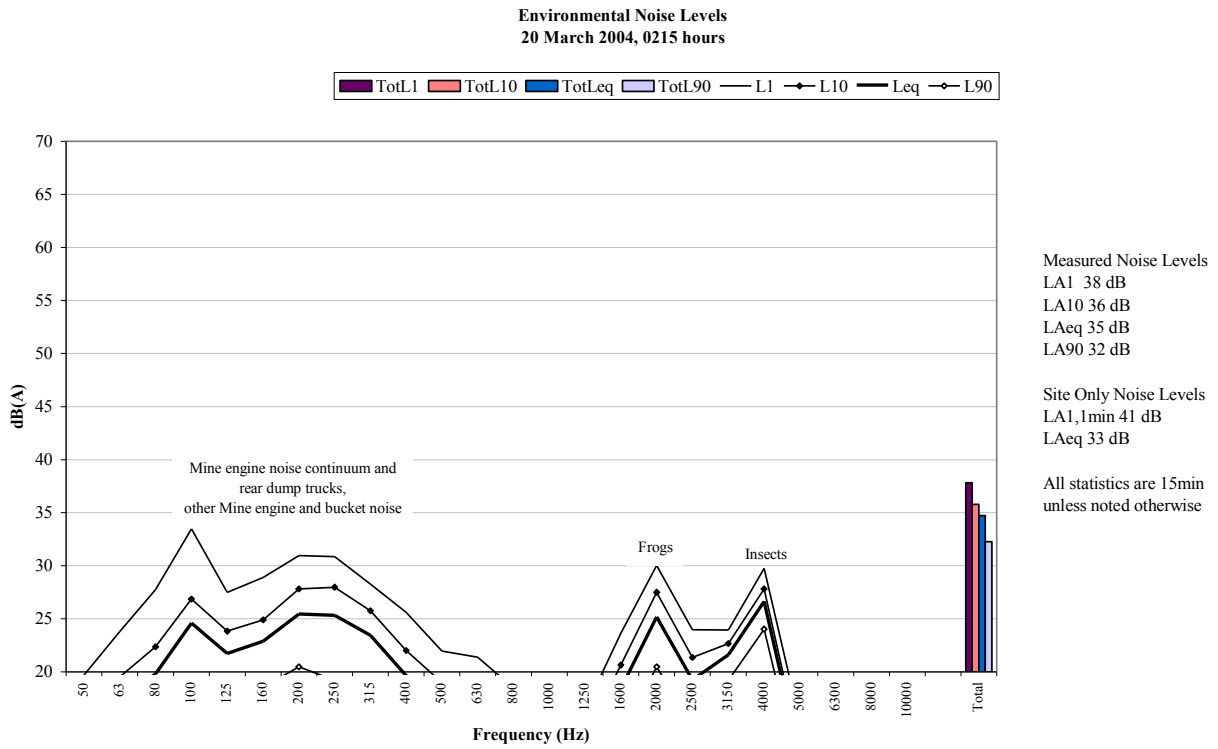


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 10 February 2016

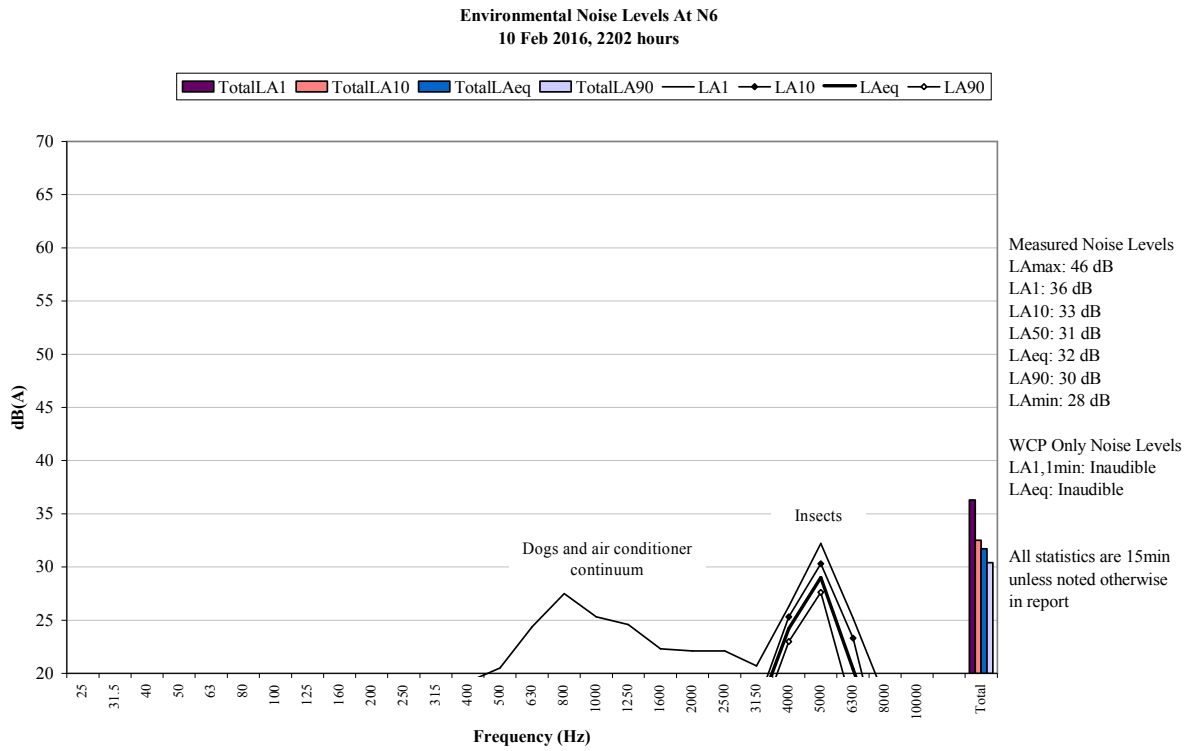


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was inaudible.

Insects generated measured levels.

Dogs, frogs and an air conditioner continuum were also noted.

5.1.2 N13, 11 February 2016

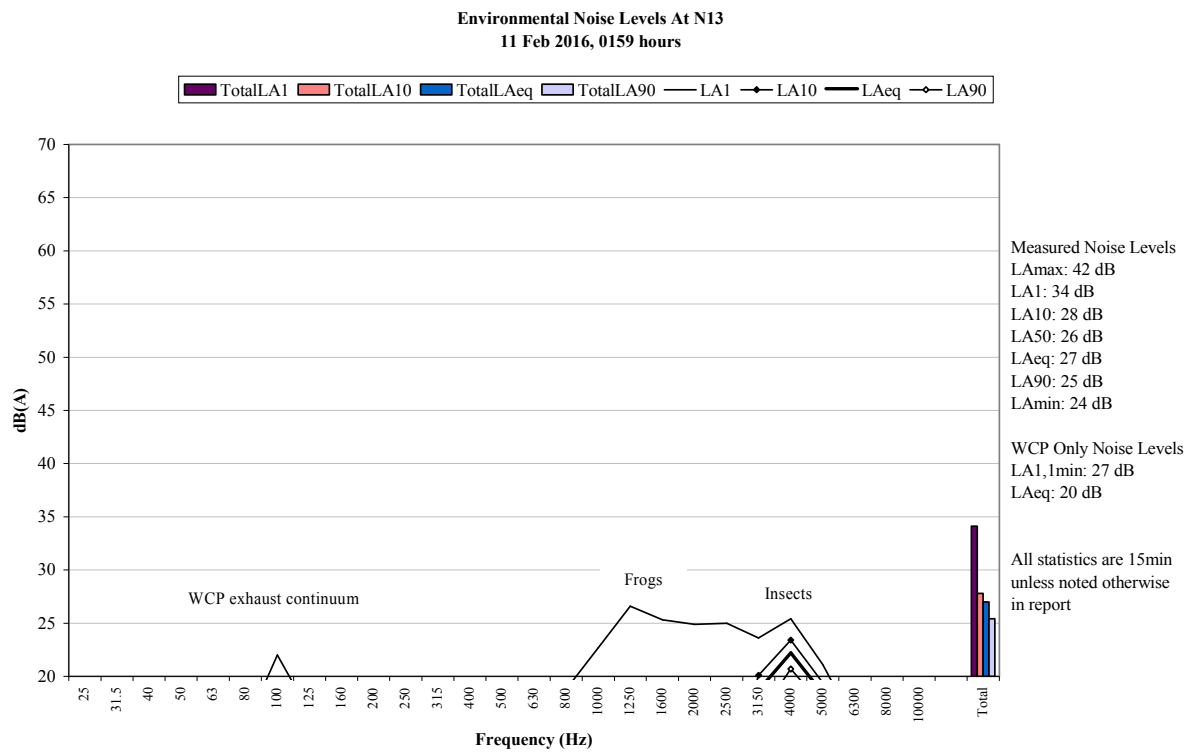


Figure 4: Environmental Noise Levels - N13, 'Coonaroo' off Moolarben Road

A low-level mining continuum and several instances of dozer track noise from WCP was audible during the measurement, generating a site only LAeq of 20 dB. Impact noise generated the LA1,1minute of 27 dB.

WCP contributed to the LAeq and LA90. Insects and frogs contributed to the LA1 and LA90 and generated the LA10 and LAeq.

Birds were also noted at low levels.

5.1.3 N14, 11 February 2016

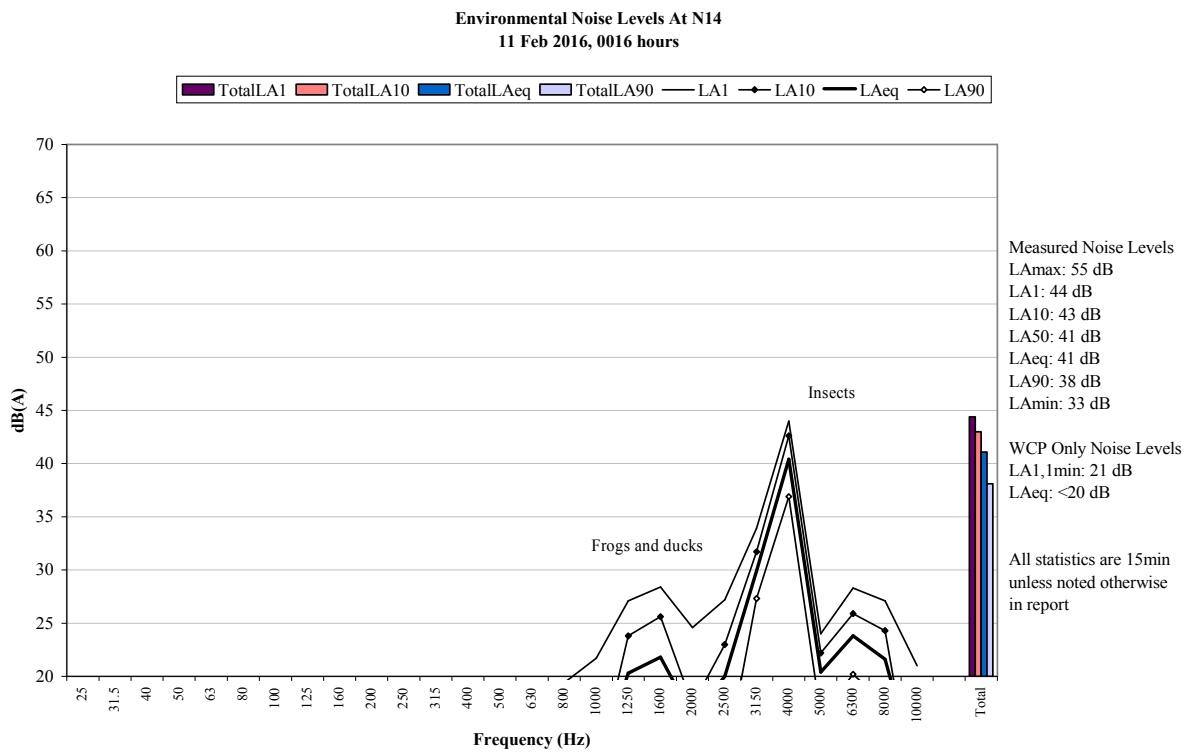


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

A low-level exhaust continuum from WCP was audible during the measurement, generating a site only L_{Aeq} of less than 20 dB. Surges in exhaust noise generated the LA_{1,1minute} of 21 dB.

Insects generated measured levels.

Ducks and frogs were also noted.

5.1.4 N15, 10 February 2016

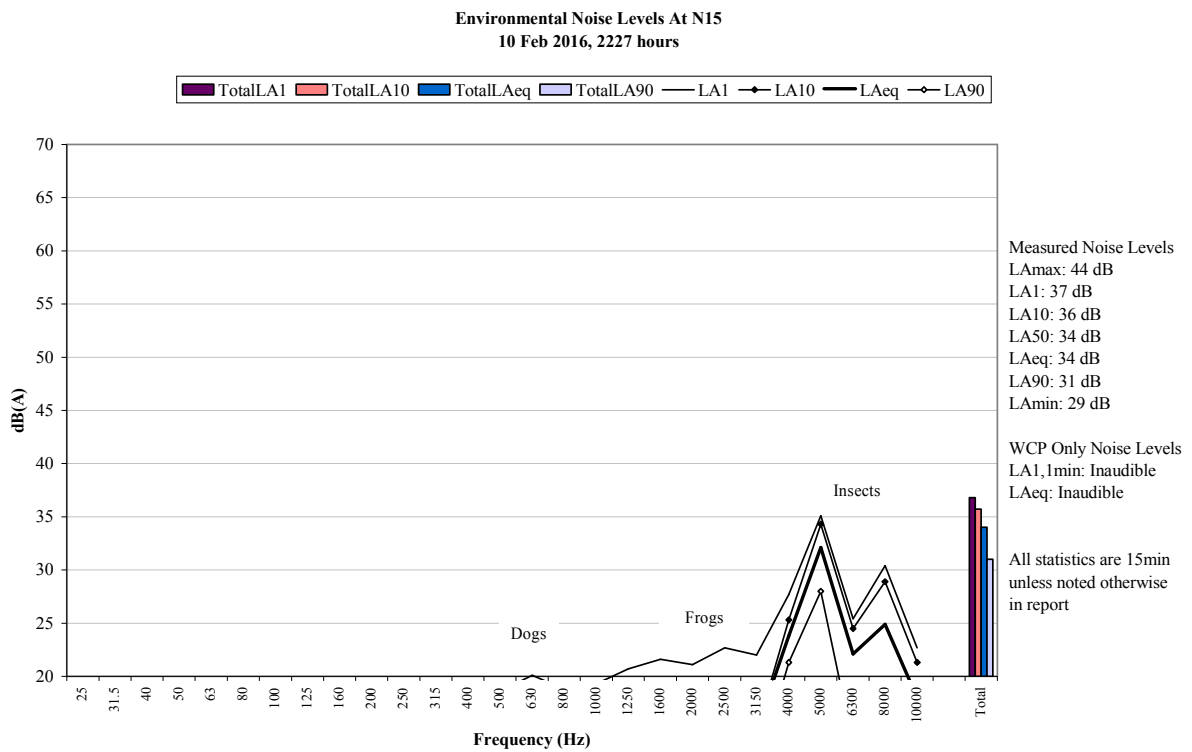


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Insects were responsible for all measured levels.

Dogs, frogs and a locomotive were also noted.

5.1.5 N16, 10 February 2016

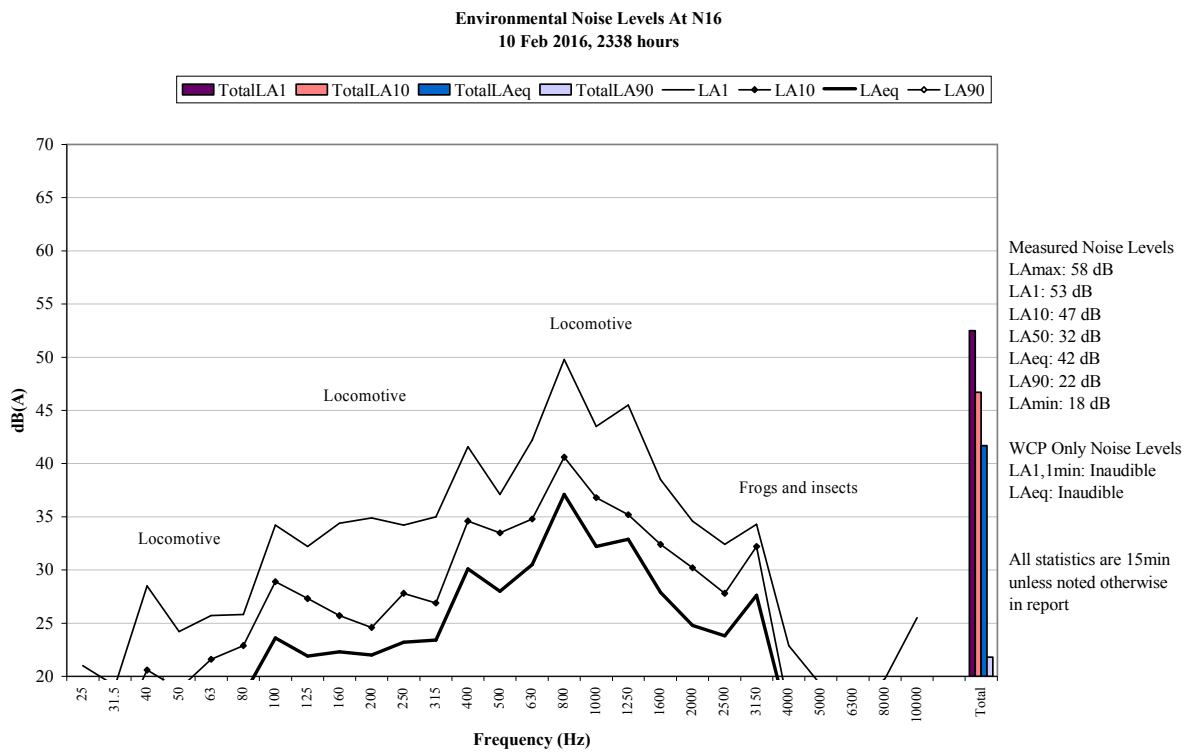


Figure 7: Environmental Noise Levels - N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible.

A locomotive was responsible for the LA1, LA10 and LAeq. Insects and frogs were responsible for the LA90.

Dogs were also noted at low levels.

5.1.6 N17, 10 February 2016

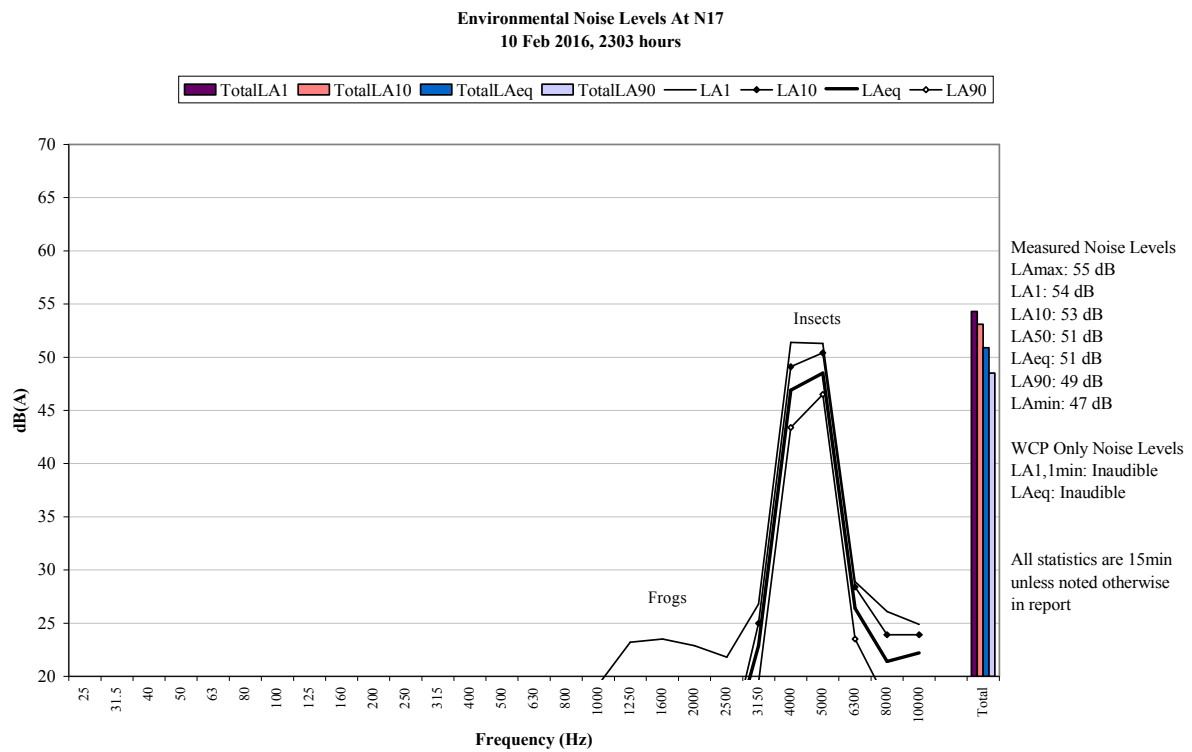


Figure 8: Environmental Noise Levels - N17, Mogo Road, off Araluen Road

WCP was inaudible.

Insects generated all measured levels.

Frogs and an unknown animal were also noted.

5.1.7 N18, 11 February 2016

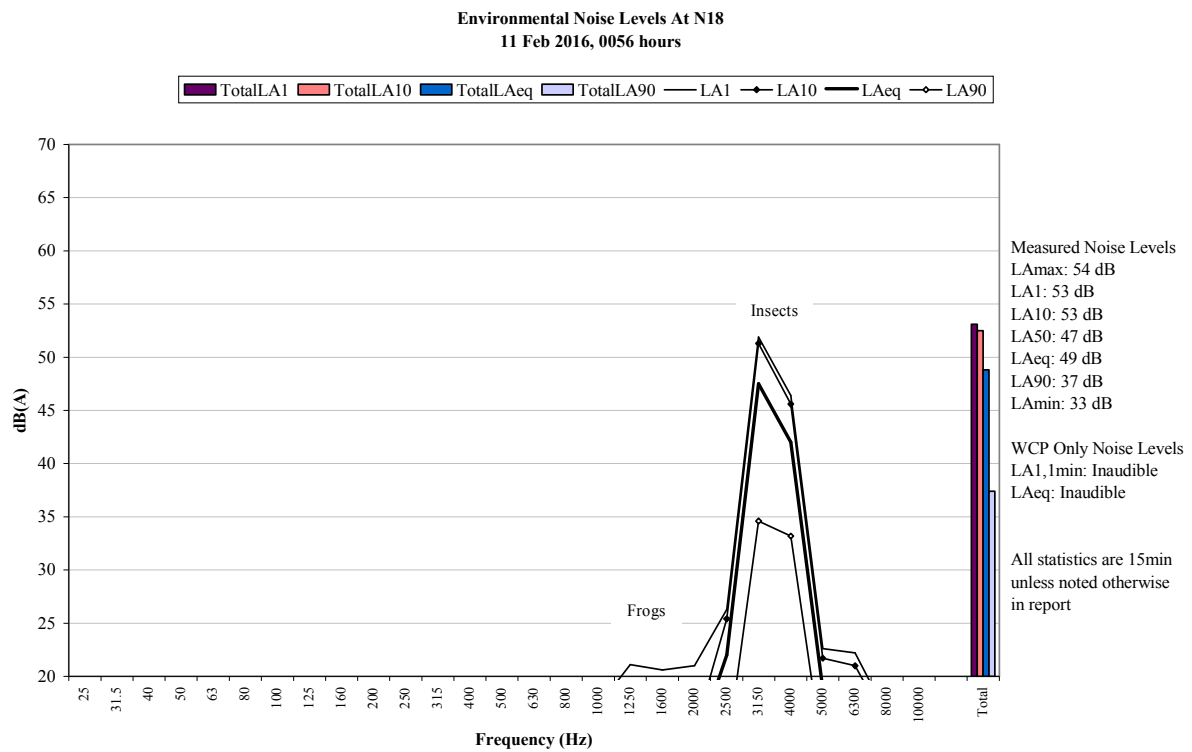


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Insects generated all measured levels.

Cows and frogs were also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 10/11 February 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the February 2016 monitoring period.

6.2 Low Frequency Assessment

During the February 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further assessment of low frequency noise was undertaken.

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APPENDIX

A STATUTORY REQUIREMENTS

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

A.1 Wilpinjong Coal Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	<i>L_{Aeq}(15 minute)</i>	<i>L_{Aeq}(15 minute)</i>	<i>L_{Aeq}(15 minute)</i>	<i>L_{A1}(1 minute)</i>
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	35	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Temperature inversion conditions greater than 3°C/100m.

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 (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 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:

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in October 2014.

- 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.
- R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:
- a) an assessment of compliance with noise limits presented in Condition L5.1; and
 - b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The noise monitoring program for WCP dated March 2014 and the relevant sections are reproduced below.

6.0 NOISE MONITORING PROGRAM

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 3**. Unattended or real-time monitoring is primarily utilised as a proactive noise control system; providing noise alerts when predetermined noise levels are triggered.

6.1 Monitoring Locations

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 attended monitoring at seven locations (**Table 4, Figure 3 and Figure 4**). Real-time 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 4: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest non-mine owned residence to the West of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest non-mine owned residence to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest non-mine owned residence to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest non-mine owned residence to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest non-mine owned residence to the North-East of the Mine
Barrigan Valley ²	N18	Attended Noise	780033.3	6398618.1	DP&I Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine

Location	Site	Type	Easting ¹	Northing ¹	Justification
Wandoona ³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

Notes to Table 4:

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&I and OEH 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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 4** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&I and the EPA.

6.3.3 Methodology

Attended noise monitoring will be undertaken one night per month by an independent acoustic consultant in accordance with the INP (EPA, 2000) and AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'. Routine 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 3, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environmental and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&I and OEH within 24 hours.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

When determining the noise generated by the Mine, WCPL will monitor the modification factors in Section 4 of the INP (EPA, 2000).

6.3.4 Data Collection

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

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

6.3.5 Evaluation of Compliance

Table 6 summarises the definition used by WCPL for the evaluation of compliance with statutory requirements. WCPL has developed a Compliance Review and Evaluation Process (Figure 5) that clearly illustrates when WCPL is deemed to have exceeded the Noise Criteria in Table 3.

Table 6: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is recorded when a second attended noise monitoring result, taken with 75 minutes of the first result and in accordance with the INP, exceeds the Noise Criteria in Table 3. The noise must be solely attributable to WCPL and meteorological conditions must be favourable (Figure 5). Reporting requirements for exceedances are detailed in Section 9.1.

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 5.5°C/100 m.

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

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

6.3.6 Response to Exceedance

Where any exceedance of the Noise Criteria and/or performance measures has occurred, WCPL will, at the earliest opportunity:

- Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- Consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action (Section 9.1);
- Implement remediation measures as directed by the Director-General; and
- Review and, if necessary, revise this Management Plan (refer Section 10.0),

to the satisfaction of the Director-General.

APPENDIX

B CALIBRATION CERTIFICATES



**Acoustic
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Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2006

Calibration Certificate

Calibration Number C15284

Client Details ARL Hire
423 Pennant Hills Rd
Pennant Hills

Equipment Tested/ Model Number : 30921838
Instrument Serial Number : Rion NA-28
Microphone Serial Number : 04128
Pre-amplifier Serial Number : 11893

Pre-Test Atmospheric Conditions
Ambient Temperature : 20.8°C
Relative Humidity : 46.9%
Barometric Pressure : 100.47kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 22.4°C
Relative Humidity : 43%
Barometric Pressure : 100.38kPa

Calibration Technician : Dennis Kim
Calibration Date : 23/06/2015

Secondary Check: Kate Alchin
Report Issue Date : 24/06/2015

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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: ±0.120dB	Temperature ±0.3°C
12.5kHz: ±0.165dB	Relative Humidity ±4.1%
16kHz: ±0.245dB	Barometric Pressure ±0.1kPa
Electrical Tests	
31.5 Hz to 20 kHz: ±0.121dB	

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.

PAGE 1 OF 1



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**Sound Calibrator
IEC 60942-2004**

Calibration Certificate

Calibration Number C15283

Client Details ARL Hire
423 Pennant Hills Road
Pennant Hills NSW 2120

Equipment Tested/ Model Number : Rion NC-73
Instrument Serial Number : 10527815

Atmospheric Conditions

Ambient Temperature : 23°C
Relative Humidity : 38%
Barometric Pressure : 999.98kPa

Calibration Technician : Dennis Kim
Calibration Date : 24/06/2015
Secondary Check: Tim Williams
Report Issue Date : 24/06/2015

Approved Signatory :  **Juan Aguero**

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

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 ±0.09dB	Temperature ±0.3°C
Short Term Fluct. ±0.02dB	Relative Humidity ±4.1%
Frequency ±0.01%	Barometric Pressure ±0.1kPa
Distortion ±0.26%	

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.

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Wilpinjong Coal

*Environmental Noise Monitoring
March 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*



Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring March 2016

Reference: 16070_R01

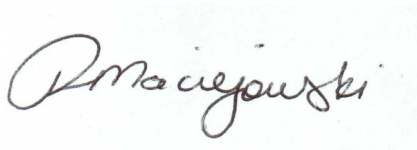
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EXECUTIVE SUMMARY

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.

A modification (MOD5) to the WCP consent was approved in November 2014. 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, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 02/03 March 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the March 2016 monitoring.

Low Frequency Assessment

During the March 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further assessment of low frequency noise was undertaken.

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 of 02/03 March 2016. Figure 1 shows the regular monitoring locations.

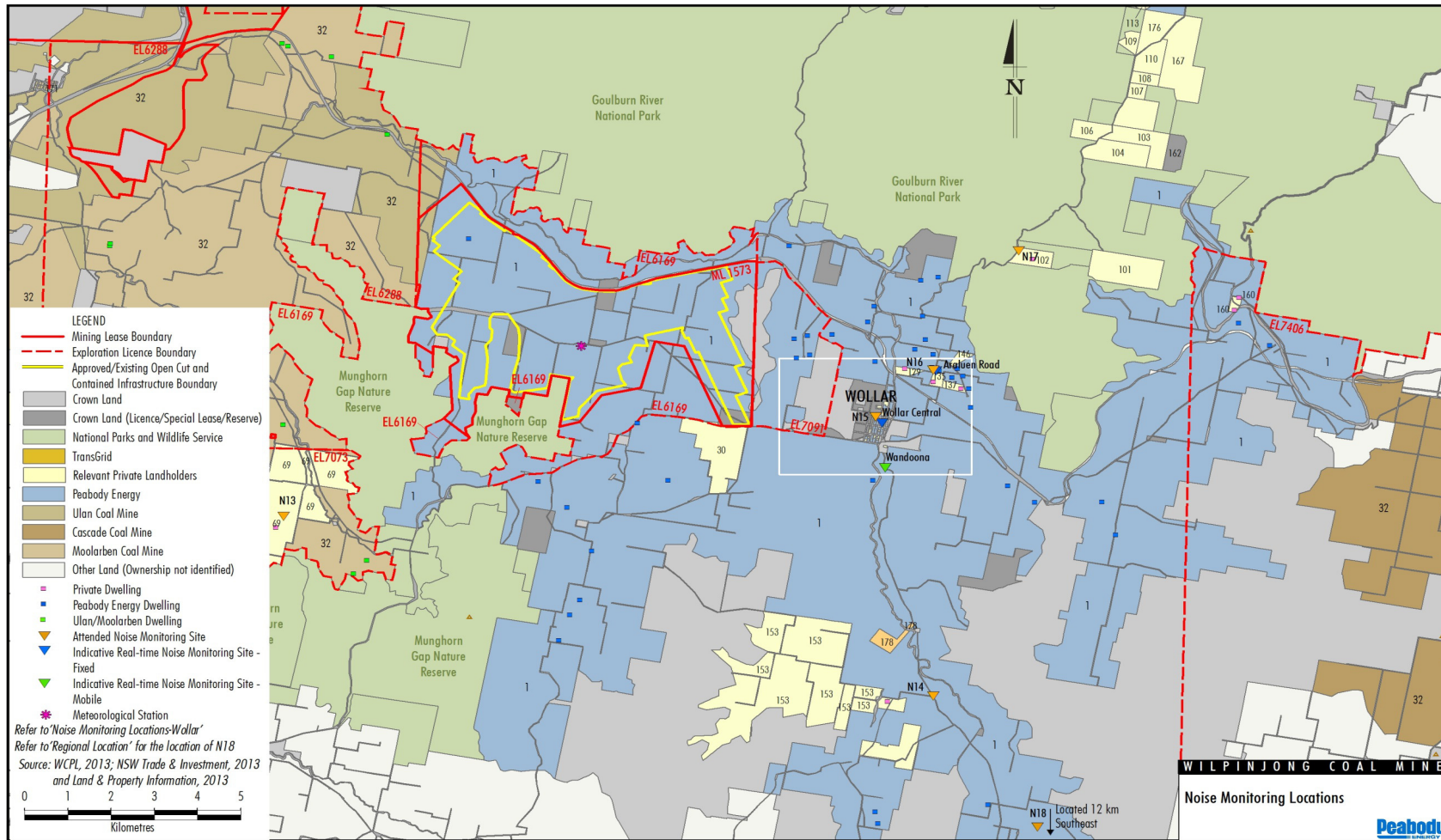
The purpose of the survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

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 Noise Monitoring Program (NMP).

Table 1.1: 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
N14	‘Tichular’, intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley



WIL-11-10 NMP2013_2010

Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the 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 in October 2014. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The draft noise monitoring program (NMP) for WCP was prepared in March 2014 in response to the February 2014 modification to the project approval. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/100m.

2.5 EPL Criteria and Weather Conditions

Criteria detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions of up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factor

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to be applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L_{Ceq}	>60	>65
INP	Site only L_{Ceq} minus site only L_{Aeq}	≥ 15	≥ 15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a practice note is not yet available, low frequency noise results from WCP have been compared to both assessment methods presented above above, when considering applicability of low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

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

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

3.2 Attended Monitoring

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

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	01070590	06/11/2017
Pulsar acoustic calibrator	57413	23/12/2017

4 RESULTS

4.1 Attended Noise Monitoring

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 LEVELS¹ – MARCH 2016¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	02/03/16 23:19	51	43	38	24	33	23	22	35
N13	03/03/16 01:23	50	36	32	31	31	30	28	42
N14	02/03/16 23:47	50	40	38	36	36	32	28	38
N15	02/03/16 22:58	57	37	35	34	34	30	26	36
N16	02/03/16 22:31	48	46	41	37	38	35	31	46
N17	02/03/16 22:00	55	53	53	52	52	51	49	50
N18	03/03/16 00:23	52	47	46	45	45	43	38	44

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during March 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – MARCH 2016

Conditions	Total for March 2016
Number of measurements	7
Number of measurements where met applied (in accordance with EPL and project approval)	7
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – MARCH 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	02/03/16 23:19	1.1	-0.2	35	Yes	IA	Nil
N13	03/03/16 01:23	0.0	1.6	36	Yes	<25	Nil
N14	02/03/16 23:47	0.6	0.2	35	Yes	IA	Nil
N15	02/03/16 22:58	1.2	0.0	35	Yes	IA	Nil
N16	02/03/16 22:31	1.6	-0.4	37	Yes	IA	Nil
N17	02/03/16 22:00	2.7	-1	35	Yes	IA	Nil
N18	03/03/16 00:23	1.7	0.2	35	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: LA1,1minute GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – MARCH 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP LA1,1min dB ^{4,5}	Exceedance ⁶
N6	02/03/16 23:19	1.1	-0.2	45	Yes	IA	Nil
N13	03/03/16 01:23	0.0	1.6	45	Yes	30	Nil
N14	02/03/16 23:47	0.6	0.2	45	Yes	IA	Nil
N15	02/03/16 22:58	1.2	0.0	45	Yes	IA	Nil
N16	02/03/16 22:31	1.6	-0.4	45	Yes	IA	Nil
N17	02/03/16 22:00	2.7	-1.0	45	Yes	IA	Nil
N18	03/03/16 00:23	1.7	0.2	45	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times (in fact, mostly inaudible) no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – MARCH 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	02/03/16 23:19	1.1	-0.2	35	Yes	IA	Nil
N13	03/03/16 01:23	0.0	1.6	35	Yes	<25	Nil
N14	02/03/16 23:47	0.6	0.2	35	Yes	IA	Nil
N15	02/03/16 22:58	1.2	0.0	35	Yes	IA	Nil
N16	02/03/16 22:31	1.6	-0.4	35	Yes	IA	Nil
N17	02/03/16 22:00	2.7	-1.0	35	Yes	IA	Nil
N18	03/03/16 00:23	1.7	0.2	35	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: LA1,1minute GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – MARCH 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP LA1,1min dB ^{4,5}	Exceedance ⁶
N6	02/03/16 23:19	1.1	-0.2	45	Yes	IA	Nil
N13	03/03/16 01:23	0.0	1.6	45	Yes	30	Nil
N14	02/03/16 23:47	0.6	0.2	45	Yes	IA	Nil
N15	02/03/16 22:58	1.2	0.0	45	Yes	IA	Nil
N16	02/03/16 22:31	1.6	-0.4	45	Yes	IA	Nil
N17	02/03/16 22:00	2.7	-1.0	45	Yes	IA	Nil
N18	03/03/16 00:23	1.7	0.2	45	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – MARCH 2016

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	02/03/16 23:19	26	-	-	0
N13	03/03/16 01:23	24	0.6	220	1
N14	02/03/16 23:47	23	-	-	0
N15	02/03/16 22:58	26	-	-	0
N16	02/03/16 22:31	25	-	-	0
N17	02/03/16 22:00	28	0.5	340	0
N18	03/03/16 00:23	20	-	-	1

Data obtained concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees ²	Lapse Rate Degrees / 100 metres ³
02/03/2016 22:00	3.0	86	-1.0
02/03/2016 22:15	2.7	95	-1.0
02/03/2016 22:30	1.6	109	-0.2
02/03/2016 22:45	1.6	116	-0.4
02/03/2016 23:00	1.8	110	-0.4
02/03/2016 23:15	1.2	110	0.0
02/03/2016 23:30	1.1	68	-0.2
02/03/2016 23:45	0.9	75	-0.2
03/03/2016 00:00	0.6	81	-0.2
03/03/2016 00:15	1.4	107	-0.2
03/03/2016 00:30	1.7	105	-0.4
03/03/2016 00:45	1.7	104	0.2
03/03/2016 01:00	0.9	101	0.6
03/03/2016 01:15	1.3	107	0.0
03/03/2016 1:30	0.8	105	0.4
03/03/2016 1:45	0.0	-	1.6
03/03/2016 2:00	0.0	-	1.8

Notes:

1. Data supplied by WCP;
2. "-" in wind direction column indicates that conditions were calm; and
3. Lapse rate sourced from the WCP inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

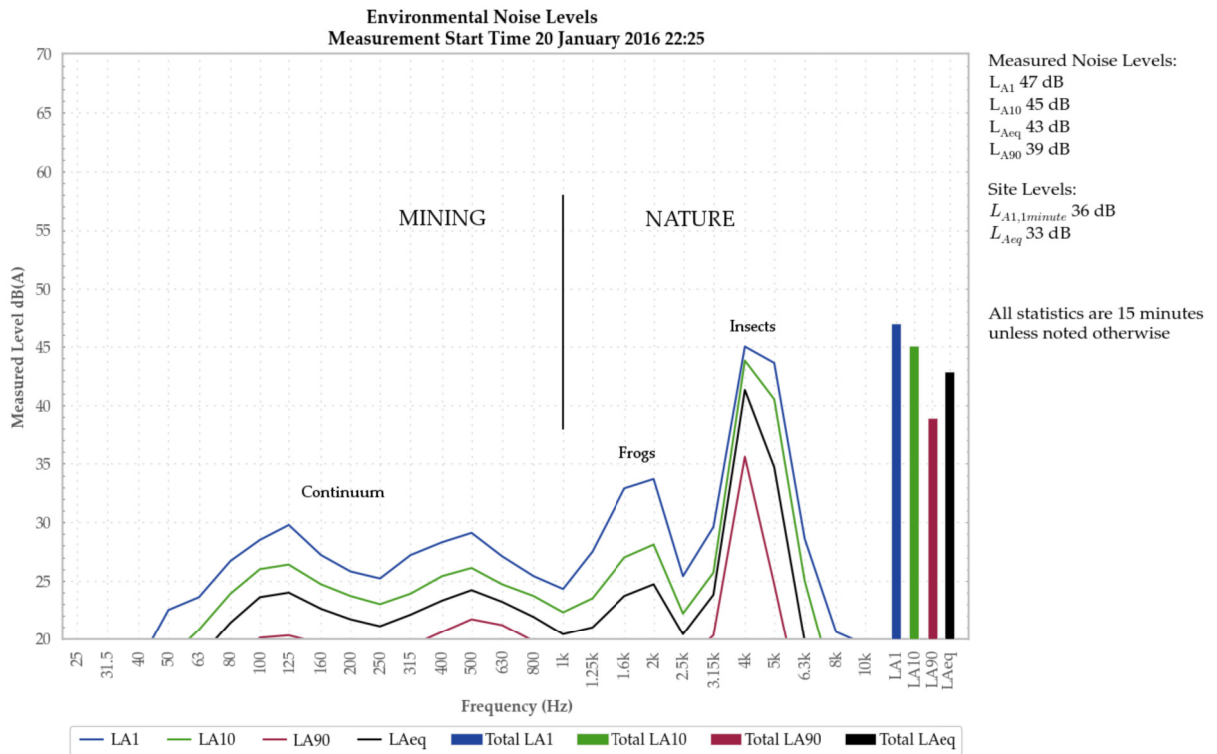


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 2 March 2016

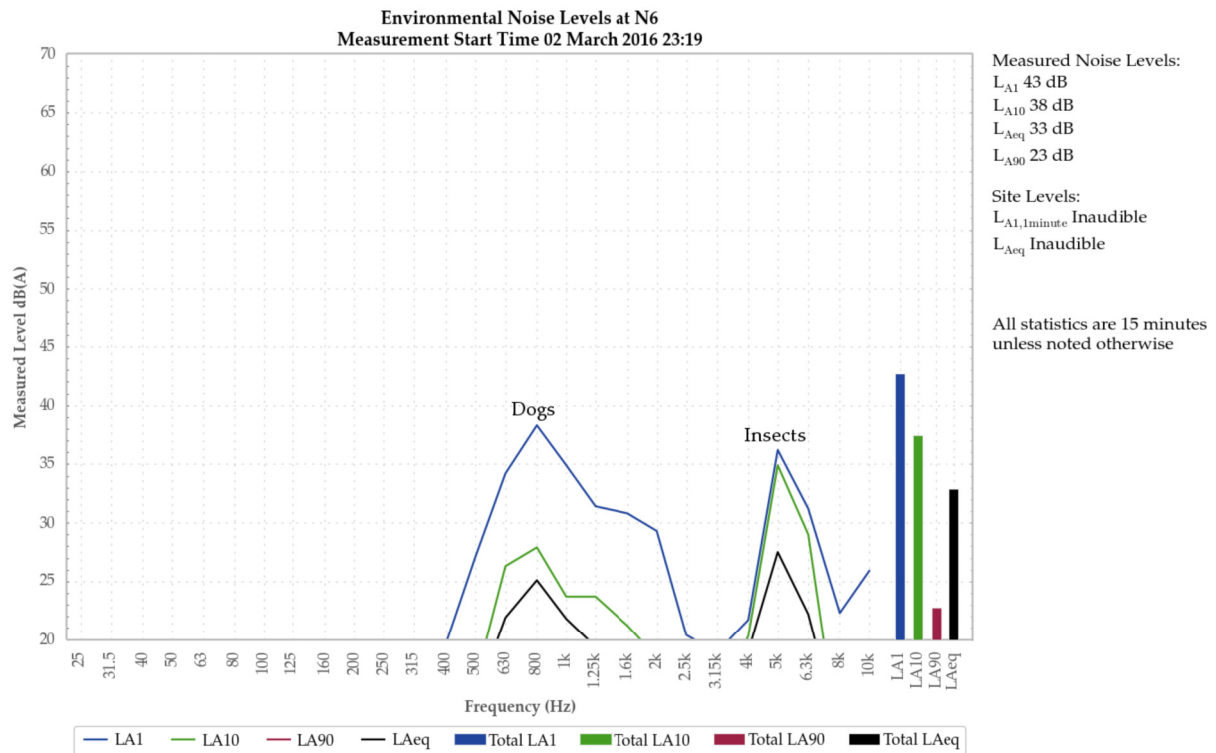


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was inaudible during the measurement.

Insects and dogs generated the measured levels.

5.1.2 N13, 3 March 2016

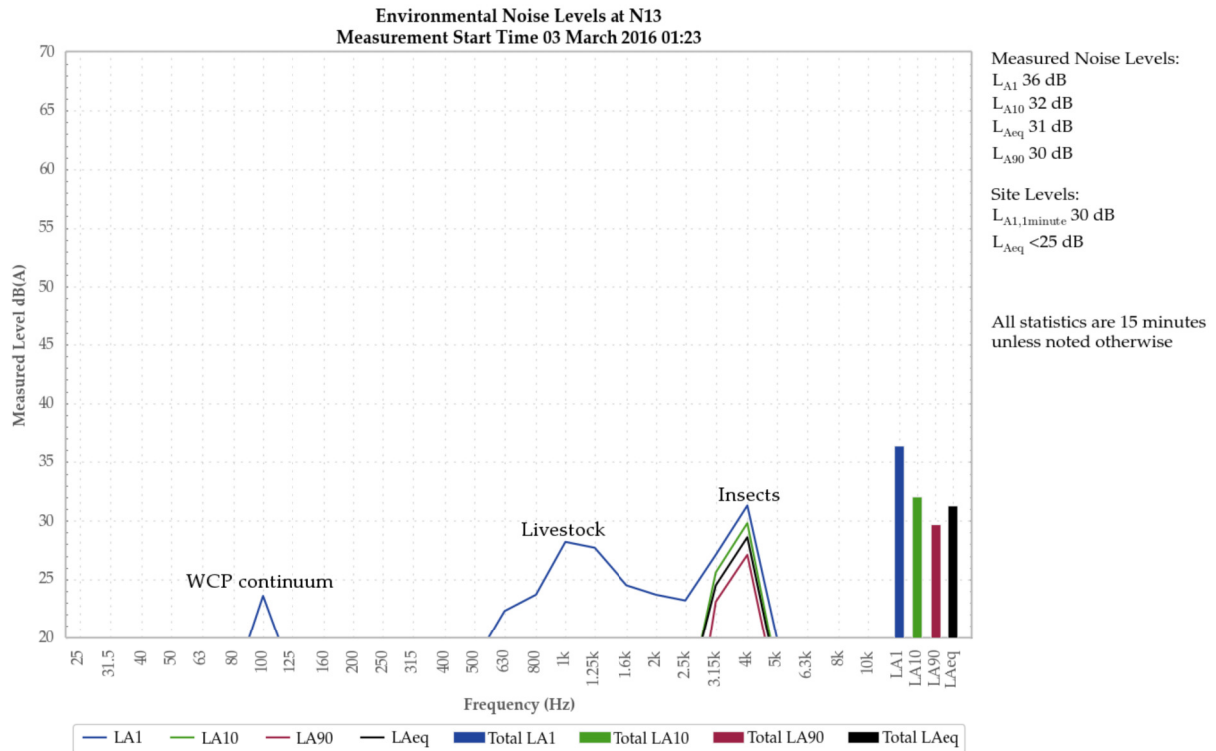


Figure 4: Environmental Noise Levels - N13, 'Coonaroo' off Moolarben Road

A low-level mining continuum from WCP was audible during the measurement, generating the site only LAeq of less than 25 dB. Impact noise generated the LA1,1minute of 30 dB.

Insects primarily generated all measured levels. Livestock contributed to the LA1.

Birds were also noted.

5.1.3 N14, 2 March 2016

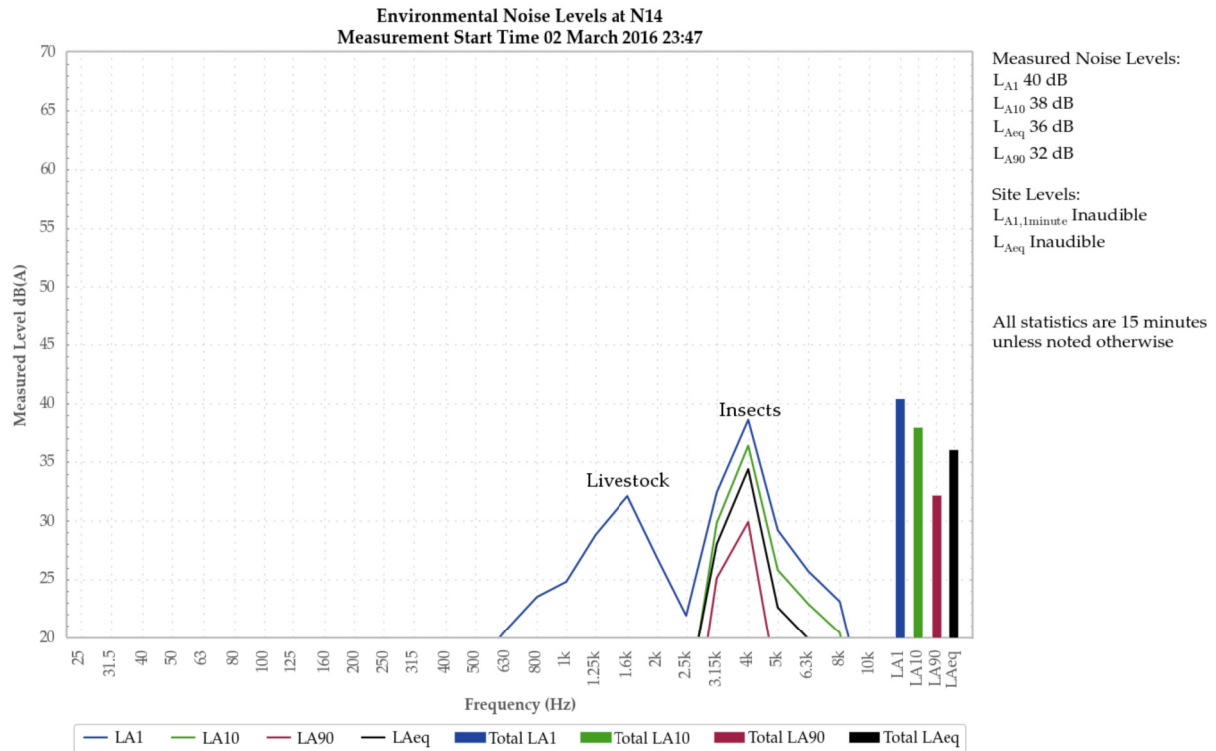


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible during the measurement.

Insects primarily generated the measured levels.

Livestock and birds were also noted.

5.1.4 N15, 2 March 2016

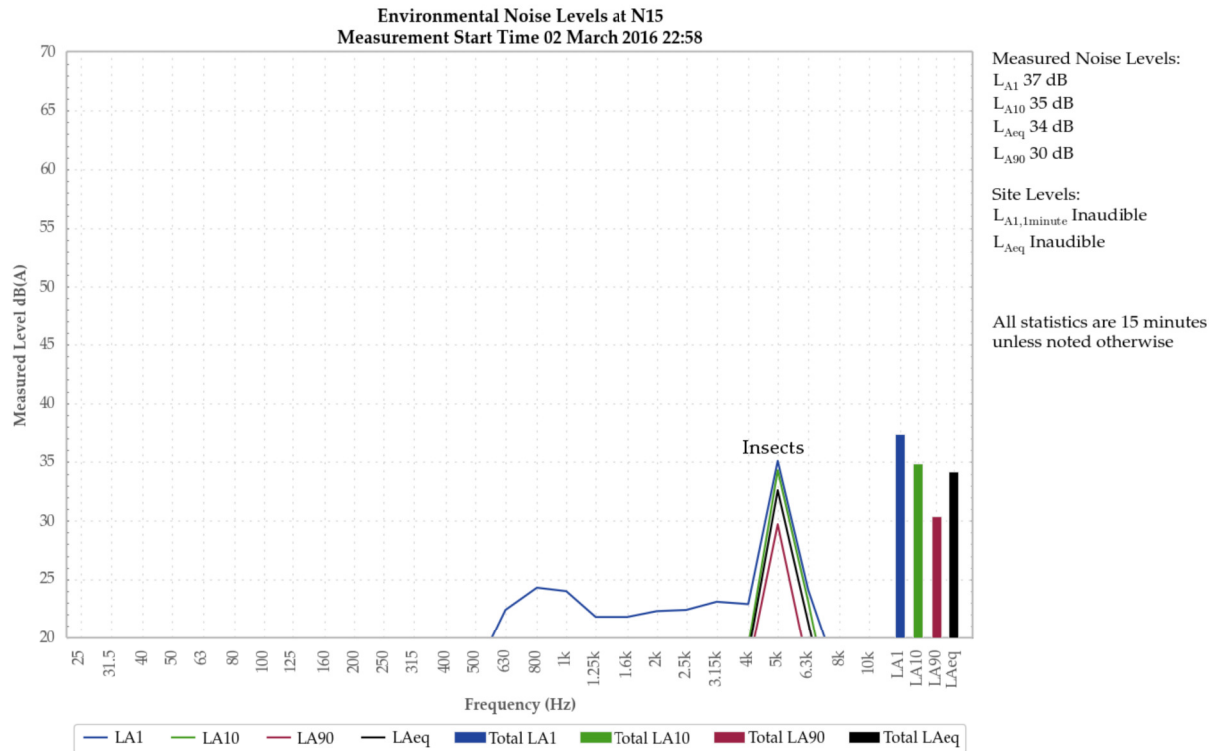


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible during the measurement.

Insects were responsible for all measured levels.

Dogs were also noted.

5.1.5 N16, 2 March 2016

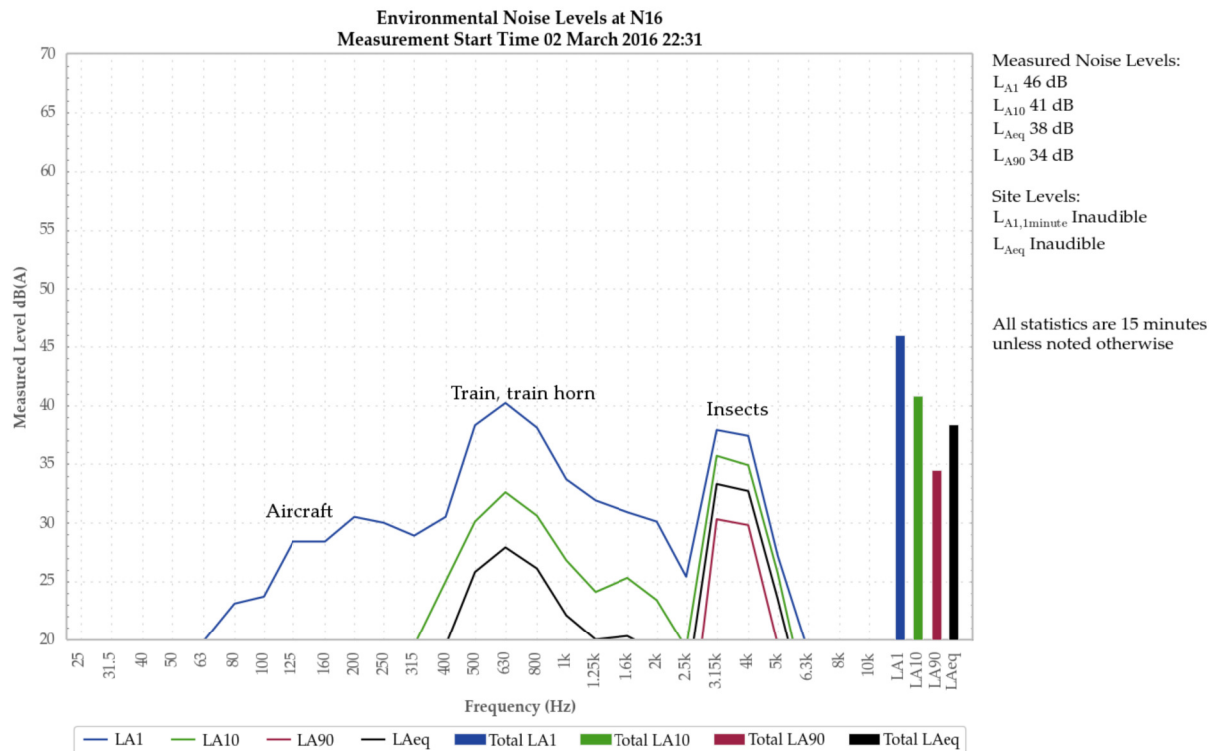


Figure 7: Environmental Noise Levels - N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible during the measurement.

A train primarily generated the L_{A1} and contributed to the L_{A10}. Insects were primarily responsible for the L_{A10} and generated the L_{Aeq} and L_{A90}.

An aircraft was also noted.

5.1.6 N17, 2 March 2016

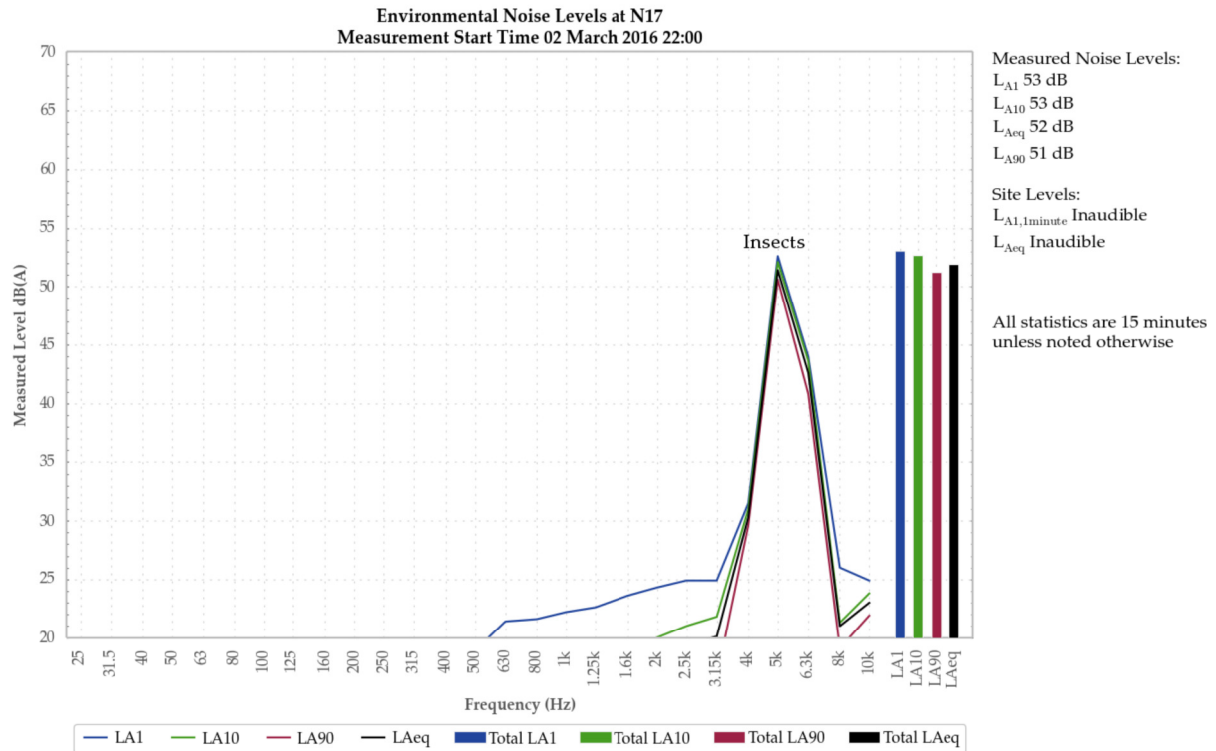


Figure 8: Environmental Noise Levels - N17, Mogo Road, off Araluen Road

WCP was inaudible during the measurement.

Insects generated all measured levels.

Breeze in foliage was also noted.

5.1.7 N18, 3 March 2016

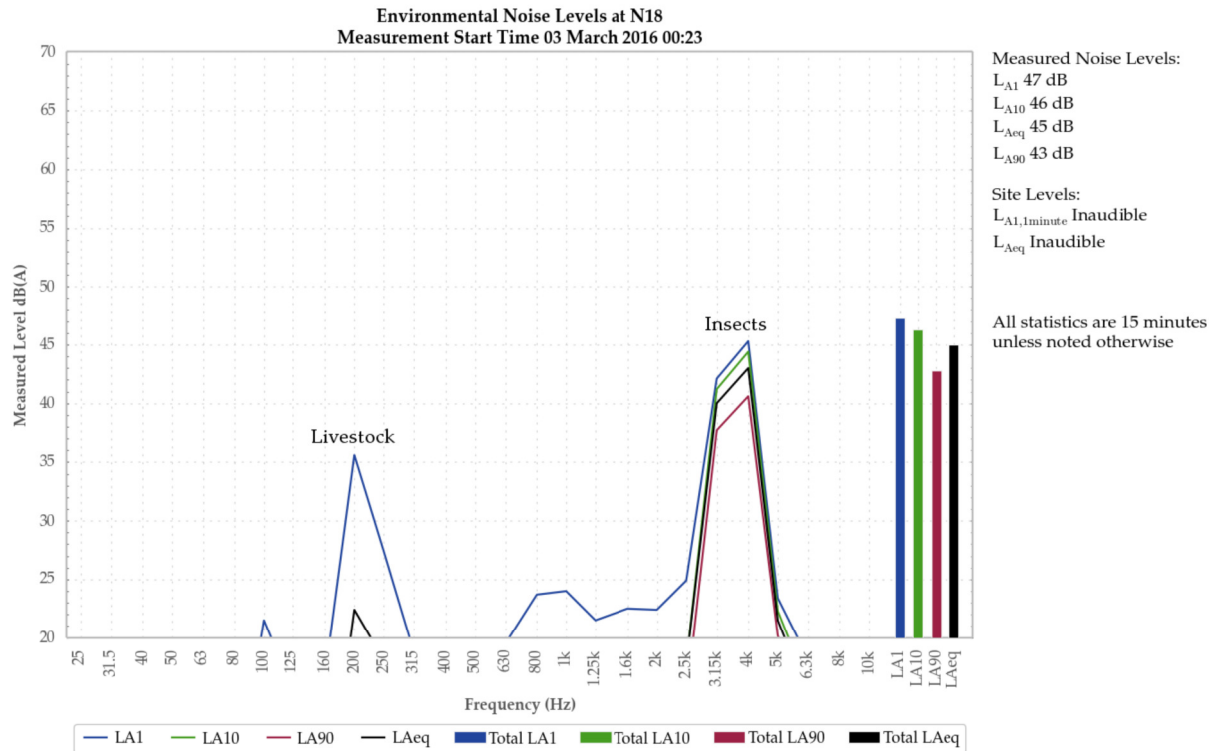


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible during the measurement.

Insects generated all measured levels.

Livestock were also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 02/03 March 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the March 2016 monitoring period.

6.2 Low Frequency Assessment

During the March 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

APPENDIX

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 Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	35	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Temperature inversion conditions greater than 3°C/100m.

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 (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 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:

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in October 2014.

- 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.

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:

- a) an assessment of compliance with noise limits presented in Condition L5.1; and
- b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The noise monitoring program for WCP dated March 2014 and the relevant sections are reproduced below.

6.0 NOISE MONITORING PROGRAM

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 3**. Unattended or real-time monitoring is primarily utilised as a proactive noise control system; providing noise alerts when predetermined noise levels are triggered.

6.1 Monitoring Locations

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 attended monitoring at seven locations (**Table 4, Figure 3 and Figure 4**). Real-time 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 4: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest non-mine owned residence to the West of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest non-mine owned residence to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest non-mine owned residence to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest non-mine owned residence to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest non-mine owned residence to the North-East of the Mine
Barrigan Valley ²	N18	Attended Noise	780033.3	6398618.1	DP&I Recommendation (MOD5) - Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine

Location	Site	Type	Easting ¹	Northing ¹	Justification
Wandoona ³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

Notes to **Table 4**:

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&I and OEH 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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 4** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&I and the EPA.

6.3.3 Methodology

Attended noise monitoring will be undertaken one night per month by an independent acoustic consultant in accordance with the INP (EPA, 2000) and AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'. Routine 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 3**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environmental and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&I and OEH within 24 hours.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

When determining the noise generated by the Mine, WCPL will monitor the modification factors in Section 4 of the INP (EPA, 2000).

6.3.4 Data Collection

Data and observations are collected in 15 minute periods and the Leq dBA results recorded. The Leq dBC noise levels will also be recorded to assess low frequency noise. All acoustic instrumentation will comply with AS 1259.2-1990 'Acoustics – Sound level meters – Integrating – Averaging'.

Comprehensive field notes will be taken to indicate both mine related and non-mine related noise sources and when they occurred. Notes about maximum mine noise levels (source and times) will also be taken. All percentiles (LA_{max}, LA₁, LA₁₀, LA₅₀, LA₉₀, LA_{min}, LA_{eq}) are measured in A weighting.

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

6.3.5 Evaluation of Compliance

Table 6 summarises the definition used by WCPL for the evaluation of compliance with statutory requirements. WCPL has developed a Compliance Review and Evaluation Process (**Figure 5**) that clearly illustrates when WCPL is deemed to have exceeded the Noise Criteria in **Table 3**.

Table 6: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is recorded when a second attended noise monitoring result, taken with 75 minutes of the first result and in accordance with the INP, exceeds the Noise Criteria in Table 3 . The noise must be solely attributable to WCPL and meteorological conditions must be favourable (Figure 5). Reporting requirements for exceedances are detailed in Section 9.1 .

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 5.5°C/100 m.

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

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

6.3.6 Response to Exceedance

Where any exceedance of the Noise Criteria and/or performance measures has occurred, WCPL will, at the earliest opportunity:

- Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- Consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Director-General; and
- Review and, if necessary, revise this Management Plan (refer **Section 10.0**),

to the satisfaction of the Director-General.

APPENDIX

B CALIBRATION CERTIFICATES



**Acoustic
Research
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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 61672-3:2006

Calibration Certificate

Calibration Number C15583

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 : 00533
Pre-amplifier Serial Number : 70607

Pre-Test Atmospheric Conditions
Ambient Temperature : 20.6°C
Relative Humidity : 56.3%
Barometric Pressure : 98.64kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 21.2°C
Relative Humidity : 62.4%
Barometric Pressure : 98.56kPa

Calibration Technician : Corey Stewart
Calibration Date : 06/11/2015

Secondary Check: Kate Alchin
Report Issue Date : 10/11/2015

Approved Signatory : 

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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	±0.120dB	Temperature	±0.3°C
12.5kHz	±0.165dB	Relative Humidity	±4.1%
16kHz	±0.245dB	Barometric Pressure	±0.1kPa
Electrical Tests			
31.5 Hz to 20 kHz	±0.121dB		

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.

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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C15670

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

Equipment Tested/ Model Number : Pulsar 106
Instrument Serial Number : 57413

Atmospheric Conditions

Ambient Temperature : 22°C
Relative Humidity : 54.8%
Barometric Pressure : 99.85kPa

Calibration Technician : Corey Stewart
Calibration Date : 23/12/2015

Secondary Check: Tim Williams
Report Issue Date : 23/12/2015

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
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 60942:2004 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	±0.09dB	Temperature	±0.3°C
Short Term Fluct.	±0.02dB	Relative Humidity	±4.1%
Frequency	±0.01%	Barometric Pressure	±0.1kPa
Distortion	±0.51%		

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.

PAGE 1 OF 1

Wilpinjong Coal

*Environmental Noise Monitoring
April 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*



Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring April 2016

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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.

A modification (MOD5) to the WCP consent was approved in November 2014. 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, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 6/7 April 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the April 2016 monitoring.

Low Frequency Assessment

During the April 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). No further assessment of low frequency noise was undertaken.

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 of 6/7 April 2016. Figure 1 shows the regular monitoring locations.

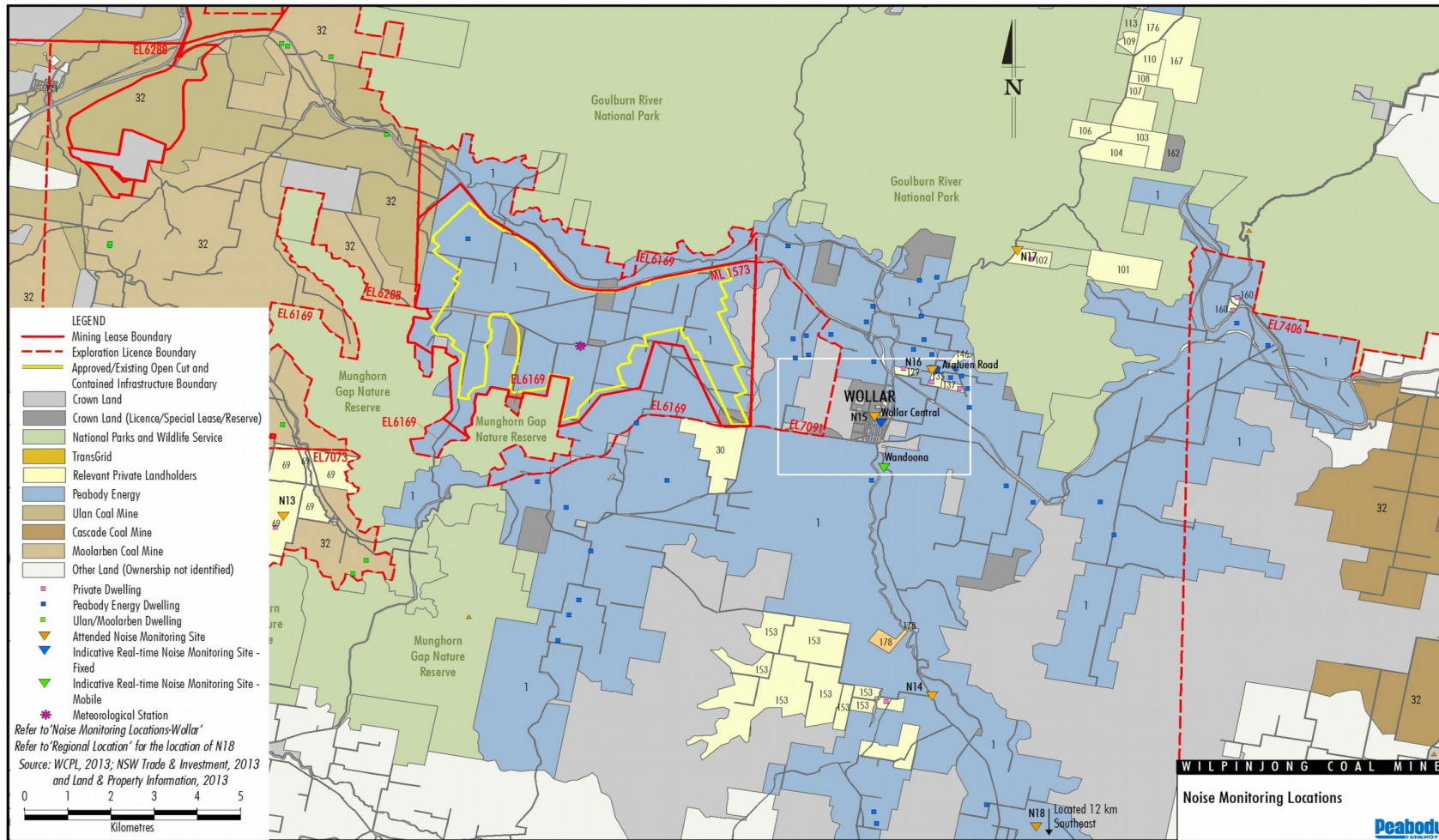
The purpose of the survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

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 Noise Monitoring Program (NMP).

Table 1.1: 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
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley



WIL-11-10 NMP2013_2010

Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the 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 in October 2014. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The draft noise monitoring program (NMP) for WCP was prepared in March 2014 in response to the February 2014 modification to the project approval. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/00m.

2.5 EPL Criteria and Weather Conditions

Criteria detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions of up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factor

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to be applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L _{Ceq}	>60	>65
INP	Site only L _{Ceq} minus site only L _{Aeq}	>=15	>=15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a practice note is not yet available, low frequency noise results from WCP have been compared to both assessment methods presented above above, when considering applicability of low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

Attended monitoring during this reporting period was undertaken by Joel Curran.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

3.2 Attended Monitoring

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

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	00370304	29/05/2017
Larson Davis CAL150 acoustic calibrator	3333	06/08/2017

4 RESULTS

4.1 Attended Noise Monitoring

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 LEVELS¹ – APRIL 2016¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	06/04/2016 22:00	37	33	30	27	28	26	23	47
N13	07/04/2016 02:07	51	37	29	20	26	19	17	39
N14	07/04/2016 00:32	50	36	27	25	27	23	21	43
N15	06/04/2016 22:25	47	44	38	30	34	28	25	52
N16	06/04/2016 23:53	38	29	26	24	25	22	20	46
N17	06/04/2016 23:08	43	36	33	29	30	26	21	37
N18	07/04/2016 01:08	42	33	27	22	24	21	19	38

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during April 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – APRIL 2016

Conditions	Total for April 2016
Number of measurements	6
Number of measurements where met applied (in accordance with EPL and project approval)	6
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – APRIL 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	06/04/2016 22:00	0.0	6.6	35	No	26	NA
N13	07/04/2016 02:07	0.9	4.8	36	No	IA	NA
N14	07/04/2016 00:32	0.7	5.6	35	No	NM	NA
N15	06/04/2016 22:25	1.8	7.2	35	No	28	NA
N16	06/04/2016 23:53	1.8	4.8	37	No	NM	NA
N17	06/04/2016 23:08	1.8	1.6	35	Yes	NM	Nil
N18	07/04/2016 01:08	1.1	6.0	35	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: *L_{A1,1minute}* GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – APRIL 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP <i>L_{A1,1min}</i> dB ^{4,5}	Exceedance ⁶
N6	06/04/2016 22:00	0.0	6.6	45	No	35	NA
N13	07/04/2016 02:07	0.9	4.8	45	No	IA	NA
N14	07/04/2016 00:32	0.7	5.6	45	No	23	NA
N15	06/04/2016 22:25	1.8	7.2	45	No	36	NA
N16	06/04/2016 23:53	1.8	4.8	45	No	32	NA
N17	06/04/2016 23:08	1.8	1.6	45	Yes	NM	Nil
N18	07/04/2016 01:08	1.1	6.0	45	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times (in fact, mostly inaudible) no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – APRIL 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	06/04/2016 22:00	0.0	6.6	35	No	26	NA
N13	07/04/2016 02:07	0.9	4.8	35	No	IA	NA
N14	07/04/2016 00:32	0.7	5.6	35	No	NM	NA
N15	06/04/2016 22:25	1.8	7.2	35	No	28	NA
N16	06/04/2016 23:53	1.8	4.8	35	No	NM	NA
N17	06/04/2016 23:08	1.8	1.6	35	Yes	NM	Nil
N18	07/04/2016 01:08	1.1	6.0	35	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: *L*_{A1,1minute} GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – APRIL 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP <i>L</i> _{A1,1min} dB ^{4,5}	Exceedance ⁶
N6	06/04/2016 22:00	0.0	6.6	45	No	35	NA
N13	07/04/2016 02:07	0.9	4.8	45	No	IA	NA
N14	07/04/2016 00:32	0.7	5.6	45	No	23	NA
N15	06/04/2016 22:25	1.8	7.2	45	No	36	NA
N16	06/04/2016 23:53	1.8	4.8	45	No	32	NA
N17	06/04/2016 23:08	1.8	1.6	45	Yes	NM	Nil
N18	07/04/2016 01:08	1.1	6.0	45	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – APRIL 2016

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	06/04/2016 22:00	21	0.0	-	3
N13	07/04/2016 02:07	17	0.0	-	0
N14	07/04/2016 00:32	18	0.7	95	0
N15	06/04/2016 22:25	20	0.0	-	3
N16	06/04/2016 23:53	21	0.4	220	0
N17	06/04/2016 23:08	20	0.0	-	2
N18	07/04/2016 01:08	17	0.0	-	0

Data obtained concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees ²	Lapse Rate Degrees / 100 metres ³
06/04/2016 22:00	0.0	-	7.4
06/04/2016 22:15	0.0	-	6.6
06/04/2016 22:30	0.0	-	6.8
06/04/2016 22:45	1.8	299	7.2
06/04/2016 23:00	2.6	256	0.6
06/04/2016 23:15	1.8	295	1.6
06/04/2016 23:30	1.9	318	4.4
06/04/2016 23:45	2.1	304	4.2
07/04/2016 00:00	1.8	299	4.8
07/04/2016 00:15	1.5	291	4.6
07/04/2016 00:30	1.2	299	5.0
07/04/2016 00:45	0.7	291	5.6
07/04/2016 01:00	1.0	280	4.2
07/04/2016 01:15	1.1	305	6.0
07/04/2016 01:30	1.6	275	4.2
07/04/2016 01:45	0.5	321	5.0
07/04/2016 02:00	0.9	257	4.8
07/04/2016 02:15	0.6	288	4.8

Notes:

1. *Data supplied by WCP;*
2. *"-" in wind direction column indicates that conditions were calm; and*
3. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

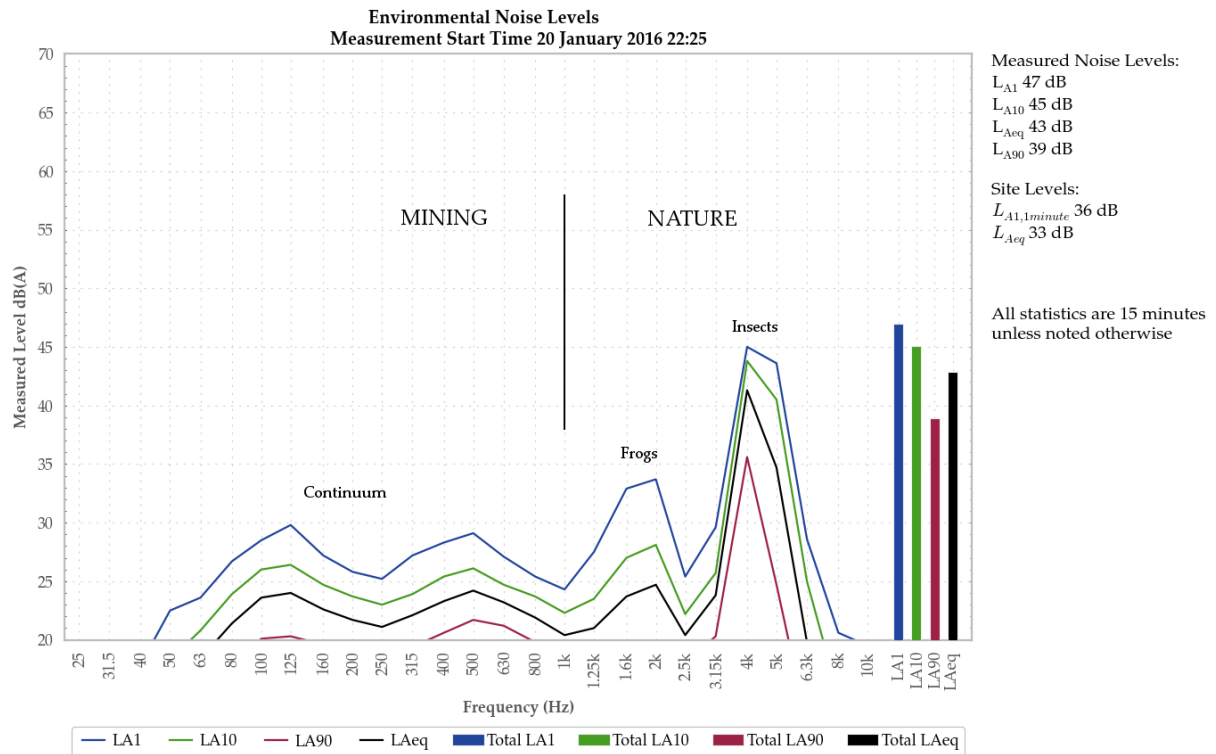


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 6 April 2016

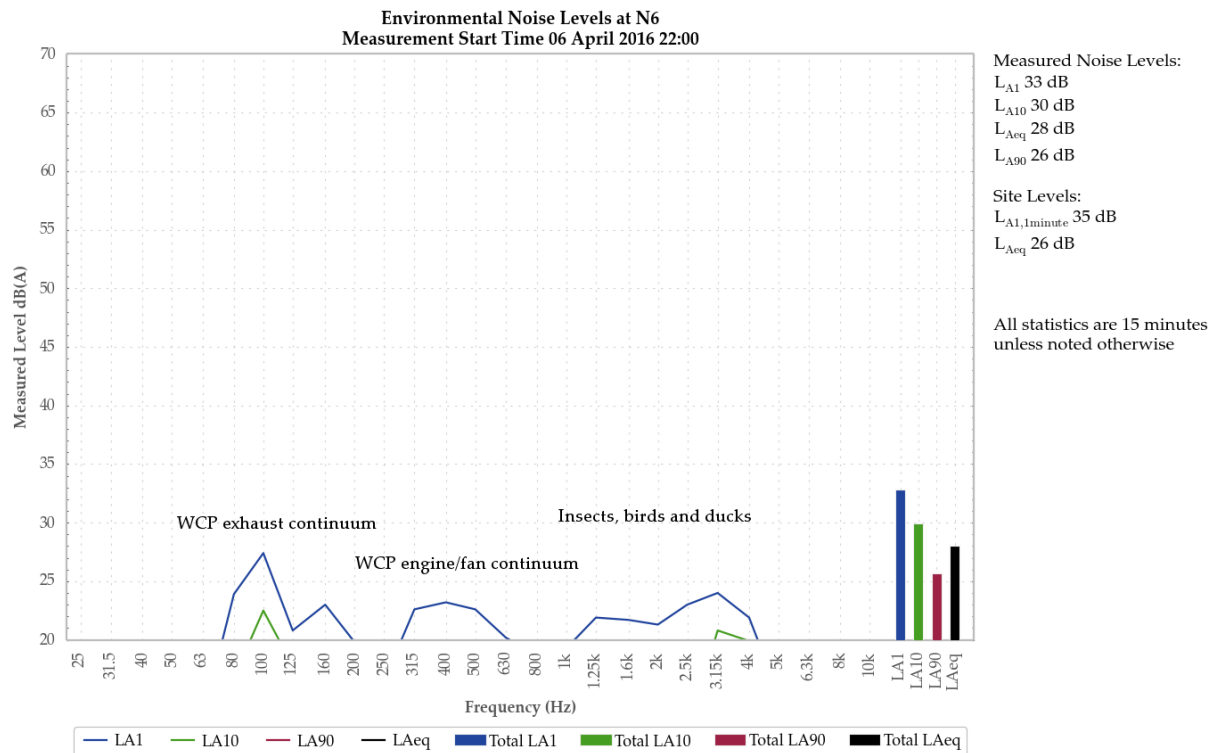


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was audible during the measurement as an exhaust and engine and fan continuum and regular dozer track noise, generating the site only LAeq of 26 dB. Exhaust noise generated the LA1,1minute of 35 dB. Horns were also noted.

Birds generated the LAmax and contributed to the LA1. Insects and activities at WCP contributed to the LA1, and generated the LA10, LAeq and LA90.

Local resident voices were also noted at low levels.

5.1.2 N13, 7 April 2016

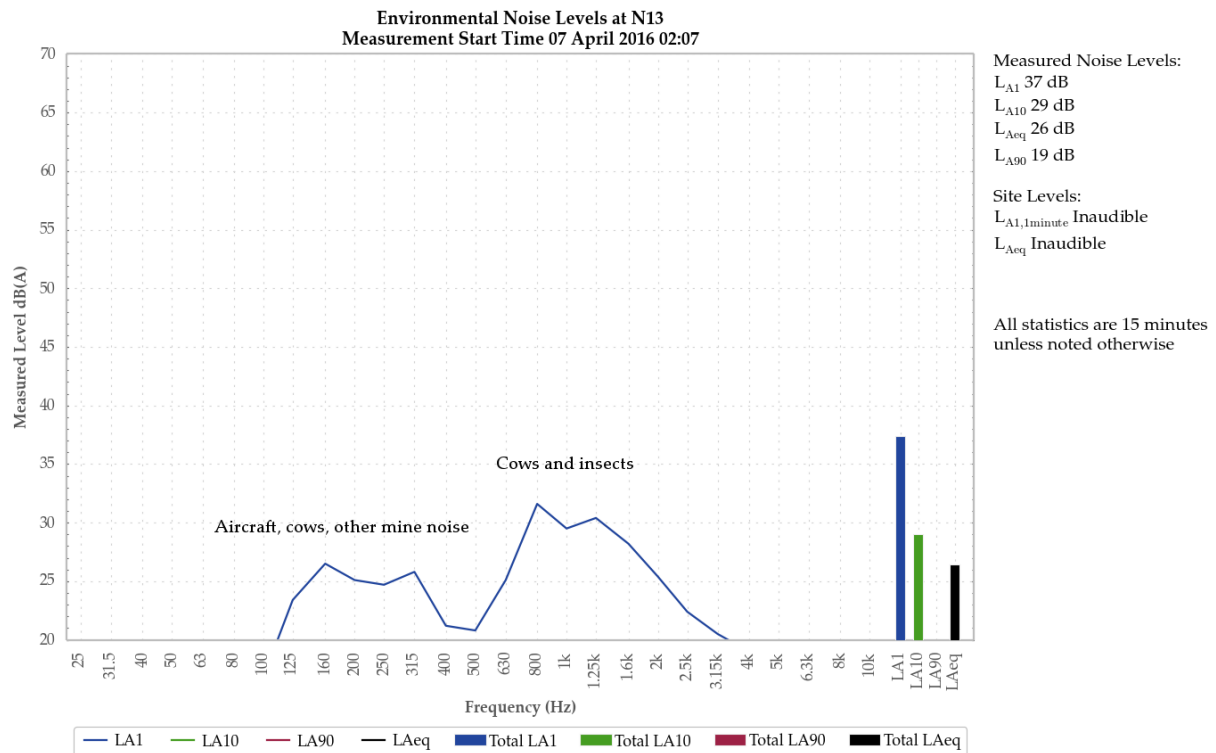


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Cows generated the L_{Amax} and L_{Aeq}, and combined with aircraft to generate the L_{A1} and L_{A10}. Insects, a continuum from another mine and the noise floor of the sound level meter contribute to the L_{A90}.

5.1.3 N14, 7 April 2016

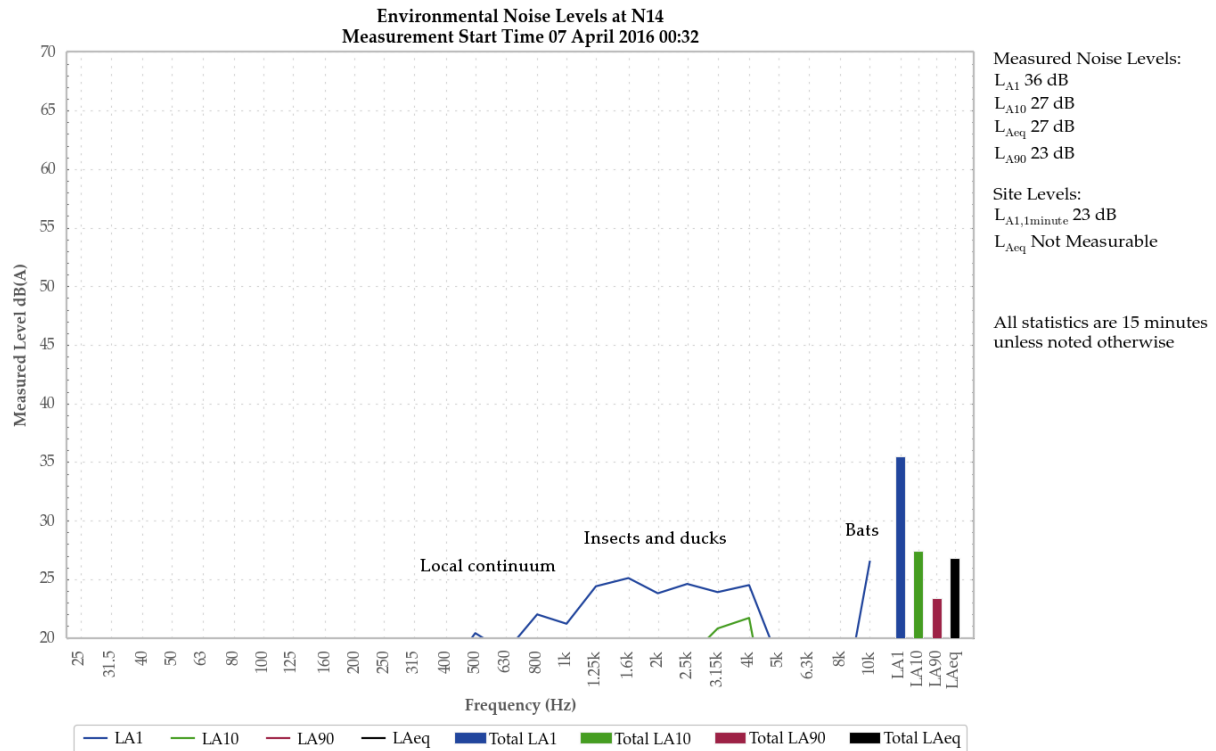


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

A low level exhaust continuum from WCP was audible during the measurement, however the site only LAeq was not measurable. Exhaust noise generated the LA1,1minute of 23 dB.

Insects contributed to the LAeq, LA10 and LA90. A local continuum contributed to the LAeq, LA10 and LA90. Ducks contributed to the LAeq and LA1 and generated the LAmax. Bats contributed to the LA1.

5.1.4 N15, 6 April 2016

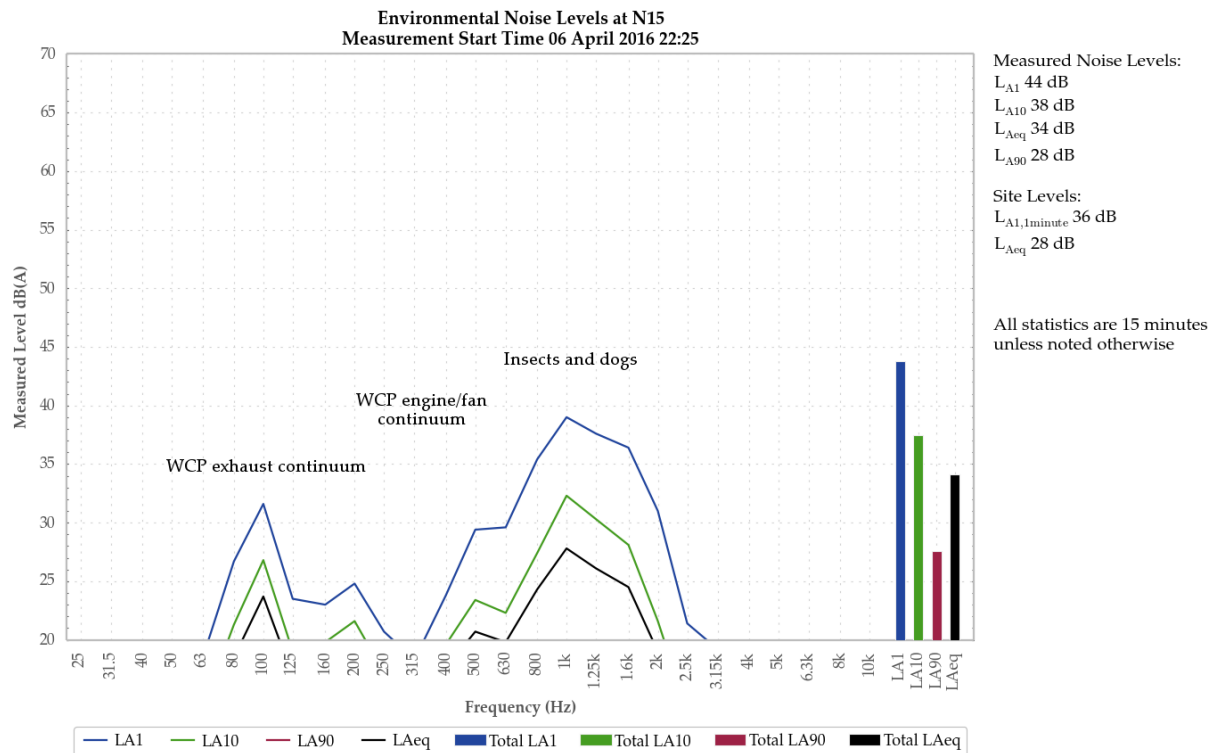


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A exhaust, engine and fan continuum from WCP was audible during the measurement, generating the site only LAeq of 28 dB. Exhaust noise generated the LA1,1minute of 36 dB. Horn noise was also noted.

Dogs generated the LAmax, LA1 and LA10 and contributed to the LAeq. WCP and insects generated the LA90.

Bats were also noted.

5.1.5 N16, 6 April 2016

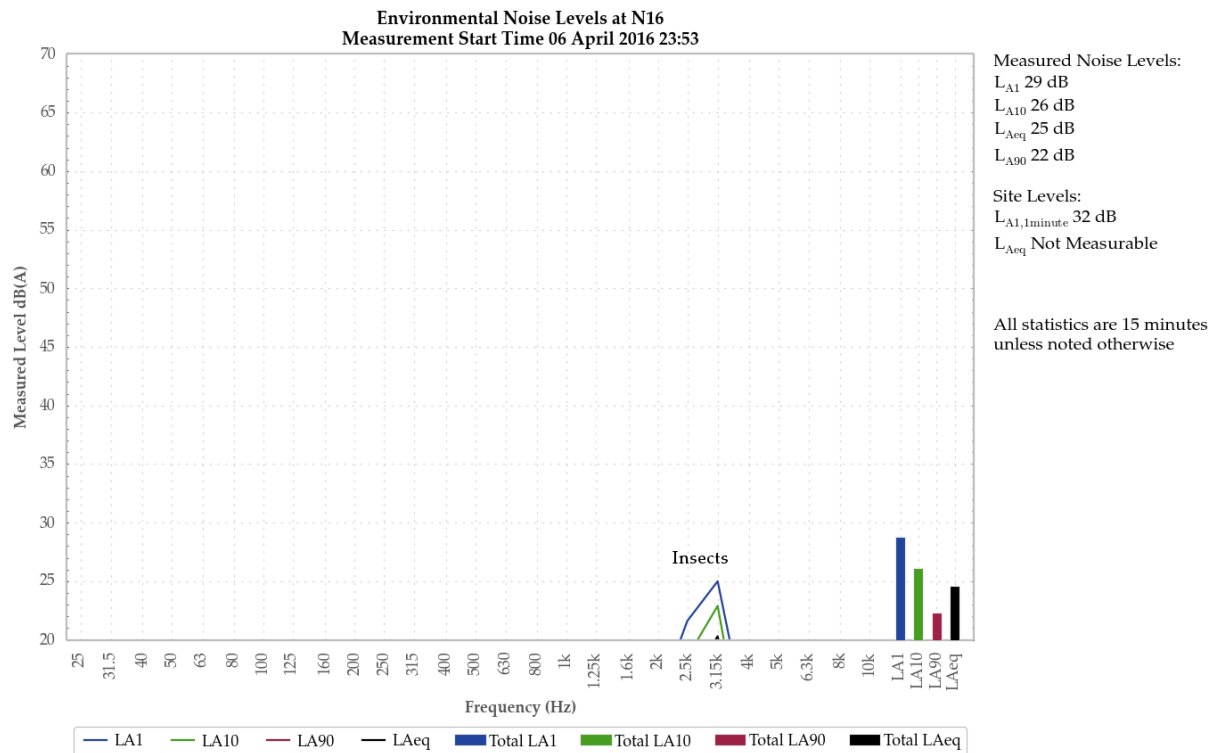


Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

A low-level exhaust continuum from WCP was audible during the measurement, however, the site only LAeq was not measurable. Impact noise generated the LA1,1minute of 32 dB.

Insects and the continuum from WCP combined to generate the LAeq, LA1 and LA90. Insects generated the LA10. Bats generated the LAmax.

5.1.6 N17, 6 April 2016

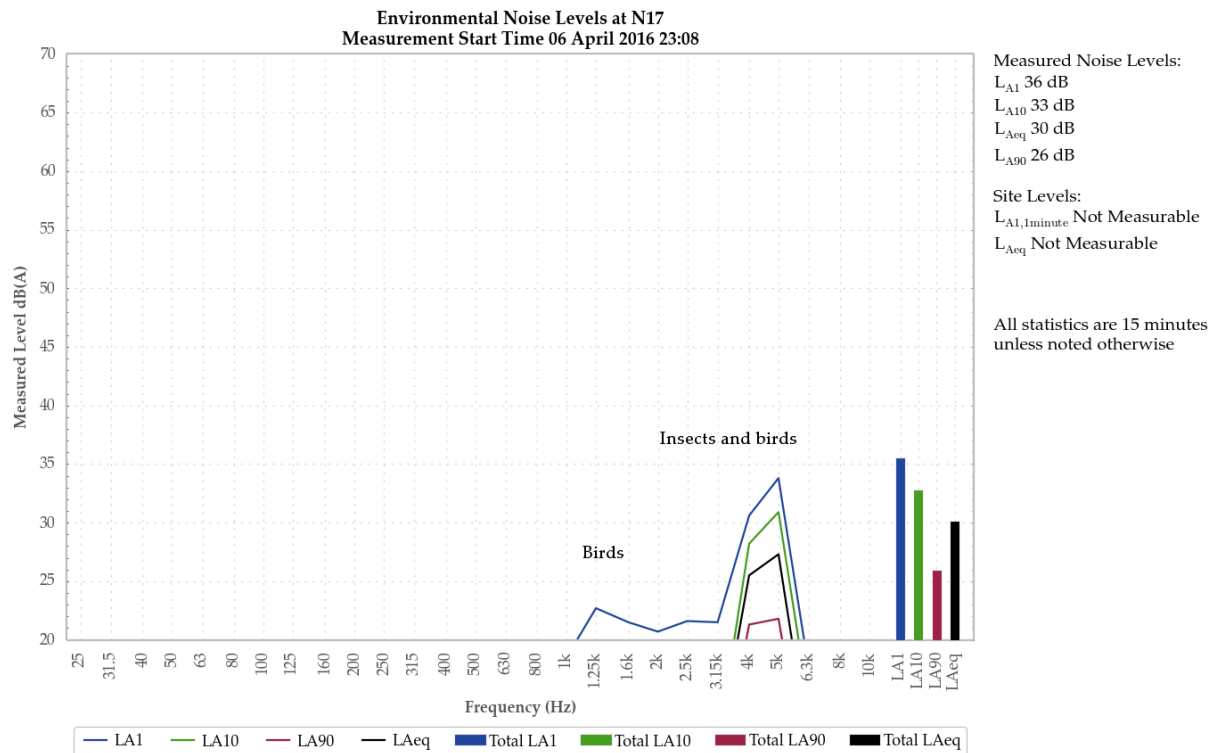


Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

A low-level continuum from WCP was audible during the measurement, however, the resulting site only LAeq and LA1,1minute were not measurable.

Bats generated the LAmax. Insects generated the LA10, LAeq and LA90 and contributed to the LA1.

Birds were also noted.

5.1.7 N18, 3 March 2016

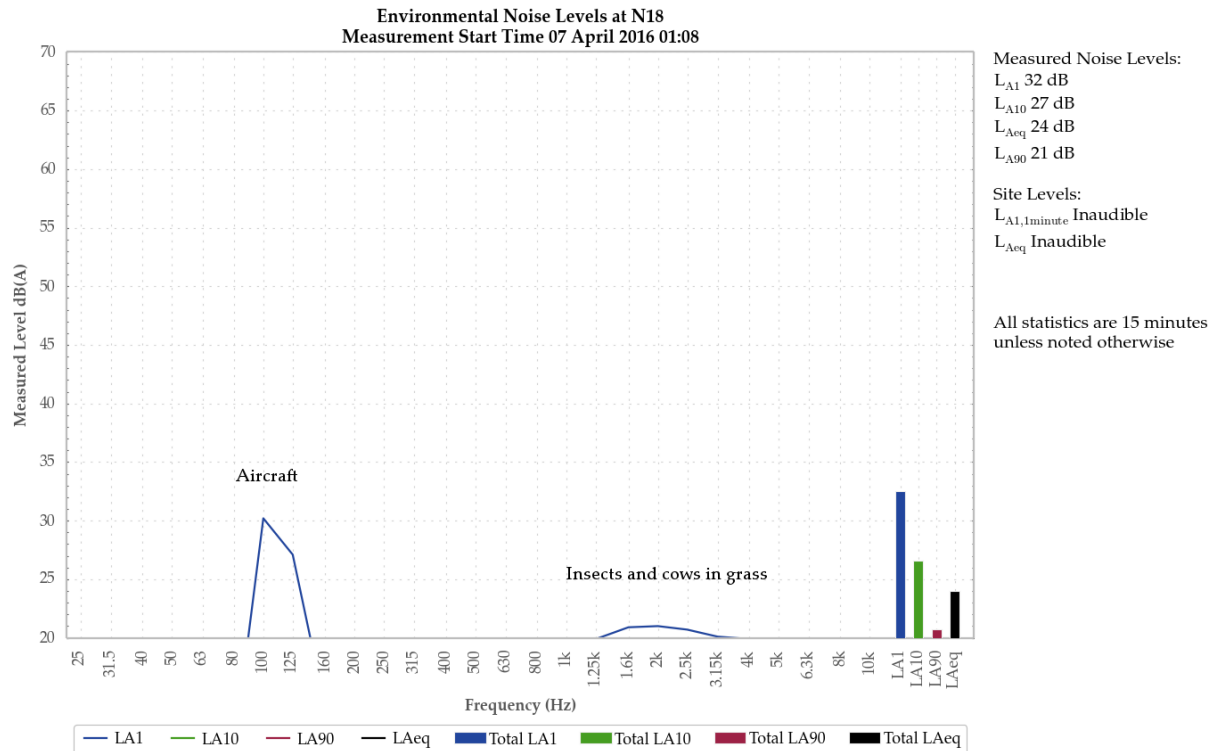


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible during the measurement.

Cows generated the L_{Amax} and contributed to the L_{A1} , L_{A10} and L_{Aeq} . Insects contributed to the L_{Aeq} , L_{A10} and L_{A90} . An aircraft was responsible for the L_{A1} and contributed to the L_{Aeq} and L_{A10} .

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 6/7 April 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the April 2016 monitoring period.

6.2 Low Frequency Assessment

During the April 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

APPENDIX

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 Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{A1}(1\text{ minute})$
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	35	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Temperature inversion conditions greater than 3°C/100m.

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 (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 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:

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in October 2014.

- 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.

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:

- a) an assessment of compliance with noise limits presented in Condition L5.1; and
- b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The noise monitoring program for WCP dated March 2014 and the relevant sections are reproduced below.

6.0 NOISE MONITORING PROGRAM

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 3**. Unattended or real-time monitoring is primarily utilised as a proactive noise control system; providing noise alerts when predetermined noise levels are triggered.

6.1 Monitoring Locations

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 attended monitoring at seven locations (**Table 4, Figure 3 and Figure 4**). Real-time 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 4: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest non-mine owned residence to the West of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest non-mine owned residence to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest non-mine owned residence to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest non-mine owned residence to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest non-mine owned residence to the North-East of the Mine
Barrigan Valley ²	N18	Attended Noise	780033.3	6398618.1	DP&I Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine

Location	Site	Type	Easting ¹	Northing ¹	Justification
Wandoona ³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

Notes to Table 4:

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&I and OEH 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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 4** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&I and the EPA.

6.3.3 Methodology

Attended noise monitoring will be undertaken one night per month by an independent acoustic consultant in accordance with the INP (EPA, 2000) and AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'. Routine 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 3**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environmental and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&I and OEH within 24 hours.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

When determining the noise generated by the Mine, WCPL will monitor the modification factors in Section 4 of the INP (EPA, 2000).

6.3.4 Data Collection

Data and observations are collected in 15 minute periods and the Leq dBA results recorded. The Leq dBC noise levels will also be recorded to assess low frequency noise. All acoustic instrumentation will comply with AS 1259.2-1990 'Acoustics – Sound level meters – Integrating – Averaging'.

Comprehensive field notes will be taken to indicate both mine related and non-mine related noise sources and when they occurred. Notes about maximum mine noise levels (source and times) will also be taken. All percentiles (LA_{max}, LA₁, LA₁₀, LA₅₀, LA₉₀, LA_{min}, LA_{eq}) are measured in A weighting.

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

6.3.5 Evaluation of Compliance

Table 6 summarises the definition used by WCPL for the evaluation of compliance with statutory requirements. WCPL has developed a Compliance Review and Evaluation Process (**Figure 5**) that clearly illustrates when WCPL is deemed to have exceeded the Noise Criteria in **Table 3**.

Table 6: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is recorded when a second attended noise monitoring result, taken with 75 minutes of the first result and in accordance with the INP, exceeds the Noise Criteria in Table 3 . The noise must be solely attributable to WCPL and meteorological conditions must be favourable (Figure 5). Reporting requirements for exceedances are detailed in Section 9.1 .

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 5.5°C/100 m.

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

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

6.3.6 Response to Exceedance

Where any exceedance of the Noise Criteria and/or performance measures has occurred, WCPL will, at the earliest opportunity:

- Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- Consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Director-General; and
- Review and, if necessary, revise this Management Plan (refer **Section 10.0**),

to the satisfaction of the Director-General.

APPENDIX

B CALIBRATION CERTIFICATES



**Acoustic
Research
Labs Pty Ltd**

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www.acousticresearch.com.au

Sound Level Meter

IEC 61672-3:2006

Calibration Certificate

Calibration Number C15250

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 : 480505
Pre-amplifier Serial Number : 60313

Pre-Test Atmospheric Conditions
Ambient Temperature : 21.2°C
Relative Humidity : 52.5%
Barometric Pressure : 99.94kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 21.6°C
Relative Humidity : 51.1%
Barometric Pressure : 99.94kPa

Calibration Technician : Dennis Kim
Calibration Date : 29/05/2015

Secondary Check: Sandra Minto
Report Issue Date : 01/06/2015

Approved Signatory : 

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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	±0.120dB	Temperature	±0.3°C
12.5kHz	±0.165dB	Relative Humidity	±4.1%
16kHz	±0.245dB	Barometric Pressure	±0.1kPa
Electrical Tests			
31.5 Hz to 20 kHz	±0.121dB		

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.

PAGE 1 OF 1



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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C15396

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

Equipment Tested/ Model Number : Larson Davis CAL150
Instrument Serial Number : 3333

Atmospheric Conditions

Ambient Temperature : 23.1°C
Relative Humidity : 30.1%
Barometric Pressure : 99.51kPa

Calibration Technician : Dennis Kim
Calibration Date : 06/08/2015
Secondary Check: Kate Alchin
Report Issue Date : 07/08/2015

Approved Signatory :

Juan Aguero

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

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.

Specific Tests		Least Uncertainties of Measurement - Environmental Conditions	
Generated SPL	±0.09dB	Temperature	±0.3°C
Short Term Fluct.	±0.02dB	Relative Humidity	±4.1%
Frequency	±0.01%	Barometric Pressure	±0.1kPa
Distortion	±0.26%		

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.

PAGE 1 OF 1

Wilpinjong Coal

*Environmental Noise Monitoring
May 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*


Global
Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring May 2016

Reference: 16150_R01

Report date: 8 June 2016

Prepared for

Wilpinjong Coal Pty Ltd

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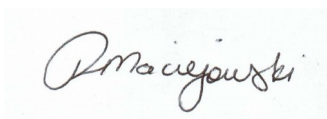
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Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation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

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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.

A modification (MOD5) to the WCP consent was approved in November 2014. 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, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 18/19 May 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the May 2016 monitoring.

Low Frequency Assessment

During the May 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). No further assessment of low frequency noise was undertaken.

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 of 18/19 May 2016. Figure 1 shows the regular monitoring locations.

The purpose of the 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 Noise Monitoring Program (NMP).

Table 1.1: 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
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley

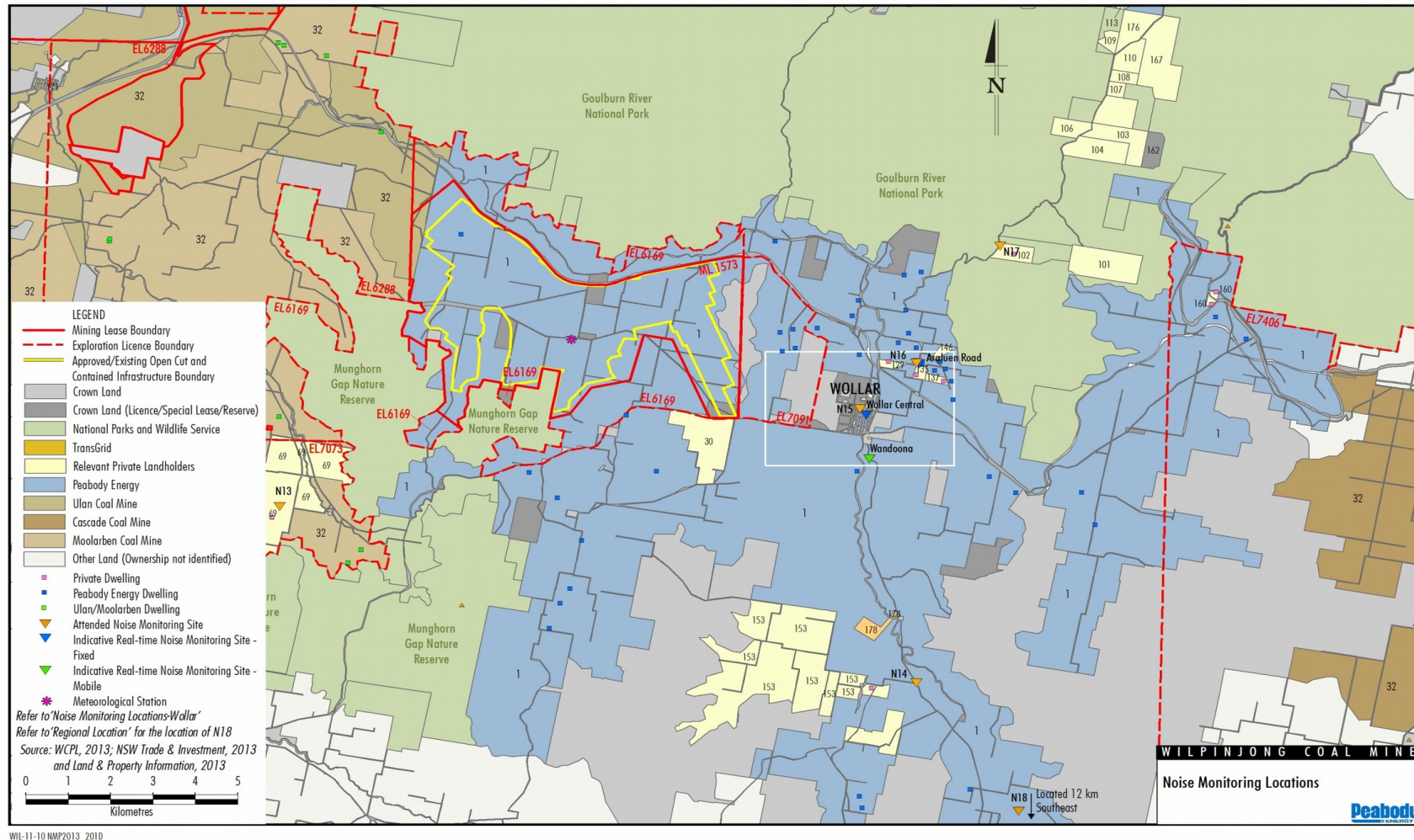


Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the 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 in October 2014. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The draft noise monitoring program (NMP) for WCP was prepared in March 2014 in response to the February 2014 modification to the project approval. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/100m.

2.5 EPL Criteria and Weather Conditions

Criteria detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions of up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to be applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L _{Ceq}	>60	>65
INP	Site only L _{Ceq} minus site only L _{Aeq}	>=15	>=15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a practice note is not yet available, low frequency noise results from WCP have been compared to both assessment methods presented above, when considering applicability of low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

Attended monitoring during this reporting period was undertaken by Jesse Tribby.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

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 A.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	00701424	22/05/2017
Pulsar 106 acoustic calibrator	74813	08/07/2017

4 RESULTS

4.1 Attended Noise Monitoring

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 LEVELS¹ – MAY 2016¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	18/05/2016 23:04	40	34	25	21	23	20	18	38
N13	19/05/2016 01:13	41	29	25	20	22	18	16	29
N14	18/05/2016 22:36	35	26	24	22	23	21	20	39
N15	18/05/2016 23:27	36	29	25	22	23	21	19	45
N16	19/05/2016 00:31	39	30	28	26	26	24	20	50
N17	18/05/2016 23:58	43	31	28	26	26	23	21	50
N18	18/05/2016 22:03	50	45	34	19	33	17	15	47

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during May 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – MAY 2016

Conditions	Total for May 2016
Number of measurements	7
Number of measurements where met applied (in accordance with project approval)	5
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – MAY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	18/05/2016 23:04	2.7	1.0	35	Yes	<20	Nil
N13	19/05/2016 01:13	0.0	2.4	36	Yes	IA	Nil
N14	18/05/2016 22:36	3.0	1.2	35	Yes	<20	Nil
N15	18/05/2016 23:27	3.1	-0.2	35	No	20	NA
N16	19/05/2016 00:31	1.5	0.4	37	Yes	25	Nil
N17	18/05/2016 23:58	1.8	-0.4	35	Yes	26	Nil
N18	18/05/2016 22:03	3.2	1.2	35	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – MAY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	18/05/2016 23:04	2.7	1.0	45	Yes	20	Nil
N13	19/05/2016 01:13	0.0	2.4	45	Yes	IA	Nil
N14	18/05/2016 22:36	3.0	1.2	45	Yes	23	Nil
N15	18/05/2016 23:27	3.1	-0.2	45	No	30	NA
N16	19/05/2016 00:31	1.5	0.4	45	Yes	31	Nil
N17	18/05/2016 23:58	1.8	-0.4	45	Yes	39	Nil
N18	18/05/2016 22:03	3.2	1.2	45	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times (in fact, mostly inaudible) no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – MAY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	18/05/2016 23:04	2.7	1.0	35	No	<20	NA
N13	19/05/2016 01:13	0.0	2.4	35	Yes	IA	Nil
N14	18/05/2016 22:36	3.0	1.2	35	No	<20	NA
N15	18/05/2016 23:27	3.1	-0.2	35	No	20	NA
N16	19/05/2016 00:31	1.5	0.4	35	Yes	25	Nil
N17	18/05/2016 23:58	1.8	-0.4	35	Yes	26	Nil
N18	18/05/2016 22:03	3.2	1.2	35	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – MAY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	18/05/2016 23:04	2.7	1.0	45	No	20	NA
N13	19/05/2016 01:13	0.0	2.4	45	Yes	IA	Nil
N14	18/05/2016 22:36	3.0	1.2	45	No	23	NA
N15	18/05/2016 23:27	3.1	-0.2	45	No	30	NA
N16	19/05/2016 00:31	1.5	0.4	45	Yes	31	Nil
N17	18/05/2016 23:58	1.8	-0.4	45	Yes	39	Nil
N18	18/05/2016 22:03	3.2	1.2	45	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – MAY 2016

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	18/05/2016 23:04	8	0.6	215	1
N13	19/05/2016 01:13	8	0.6	90	0
N14	18/05/2016 22:36	9	0.7	105	1
N15	18/05/2016 23:27	9	0.0	-	0
N16	19/05/2016 00:31	9	0.5	160	0
N17	18/05/2016 23:58	9	0.0	-	0
N18	18/05/2016 22:03	8	0.4	105	1

Data obtained concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees ²	Lapse Rate Degrees / 100 metres ³
18/05/2016 22:00	3.2	282	1.2
18/05/2016 22:15	3.2	294	1.2
18/05/2016 22:30	3.3	290	0.8
18/05/2016 22:45	3.0	289	1.2
18/05/2016 23:00	3.2	284	1.4
18/05/2016 23:15	2.7	270	1.0
18/05/2016 23:30	2.9	277	0.0
18/05/2016 23:45	3.1	271	-0.2
19/05/2016 00:00	2.8	269	-0.4
19/05/2016 00:15	1.8	278	-0.4
19/05/2016 00:30	2.0	282	0.2
19/05/2016 00:45	1.5	272	0.4
19/05/2016 01:00	1.6	278	0.6
19/05/2016 01:15	1.3	266	1.6
19/05/2016 01:30	0.0	-	2.4
19/05/2016 01:45	0.0	-	2.8
19/05/2016 02:00	1.3	278	2.0

Notes:

1. *Data supplied by WCP;*
2. *"-" in wind direction column indicates that conditions were calm; and*
3. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

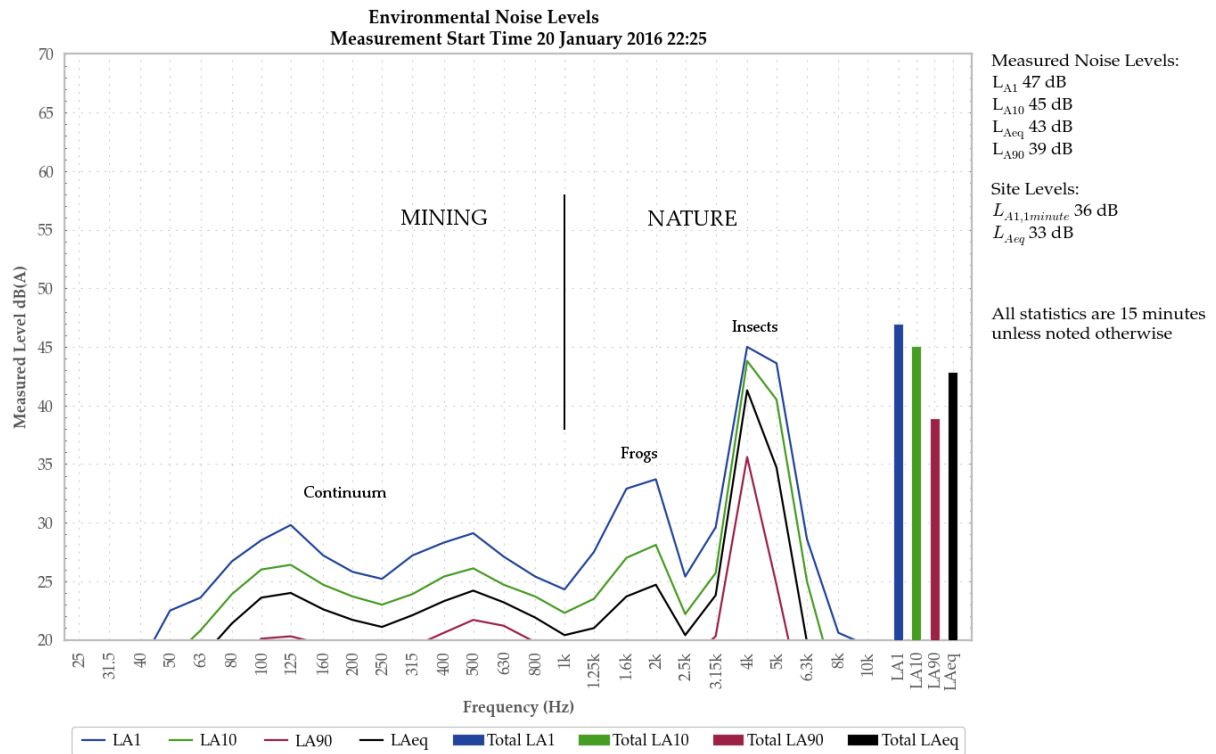


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 18 May 2016

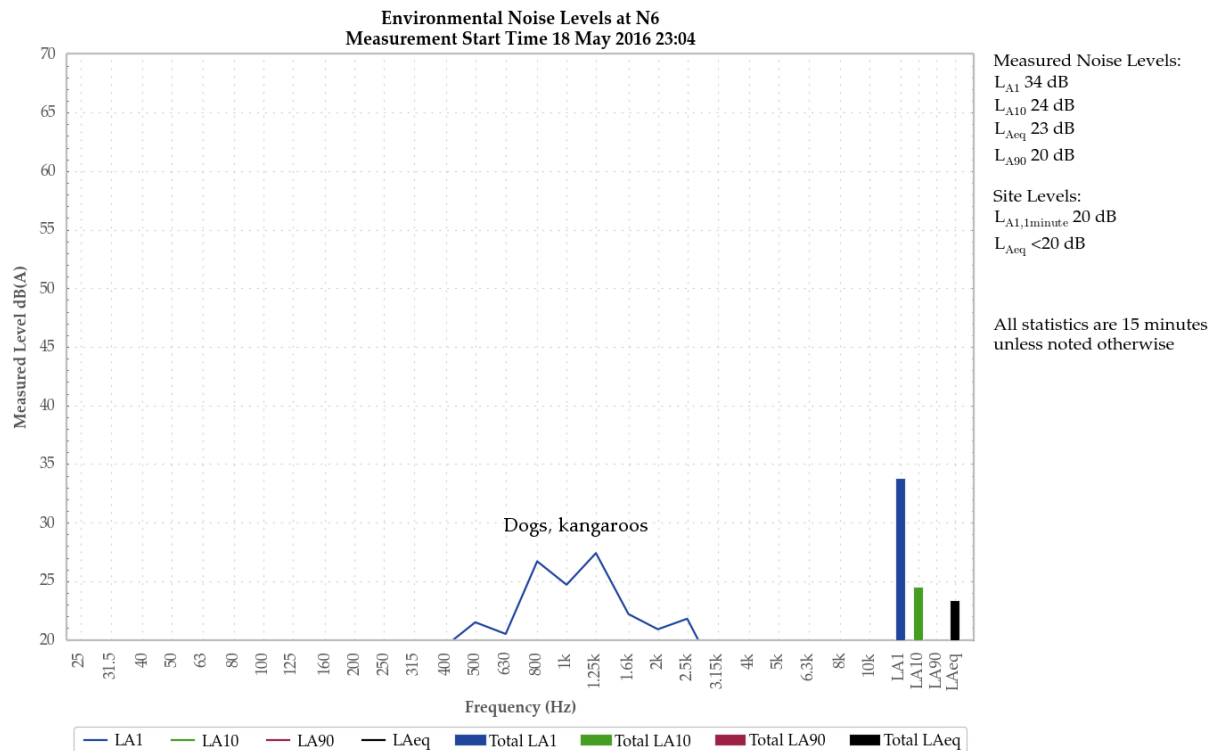


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

A low-level continuum and engine noise from WCP generated a site only LAeq of less than 20 dB and LA1,1minute of 20 dB.

WCP contributed to the total measured LAeq and LA90.

Dogs and kangaroos were primary contributors to the measured LA1 and LA10.

Frogs also contributed to the measured LA90.

A bird was also noted.

5.1.2 N13, 19 May 2016

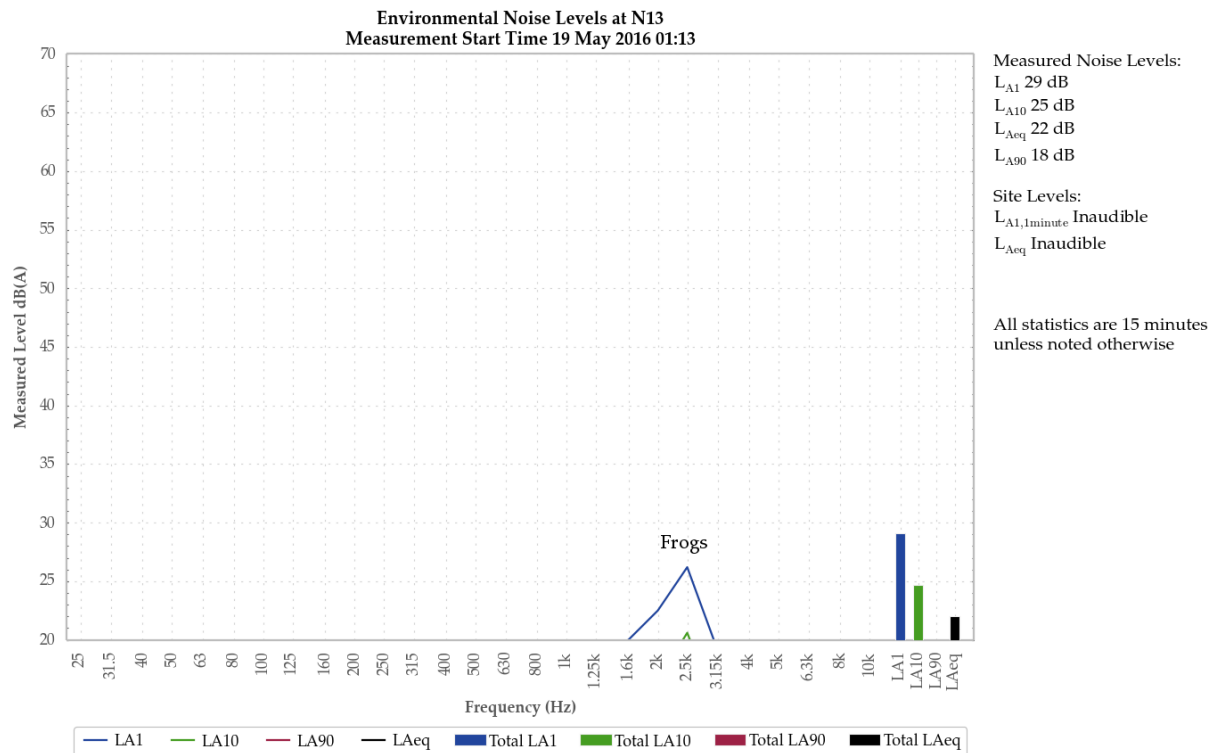


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible during the measurement.

Frogs were generally responsible for measured levels.

Cows, bats and a bird were also noted.

5.1.3 N14, 18 May 2016

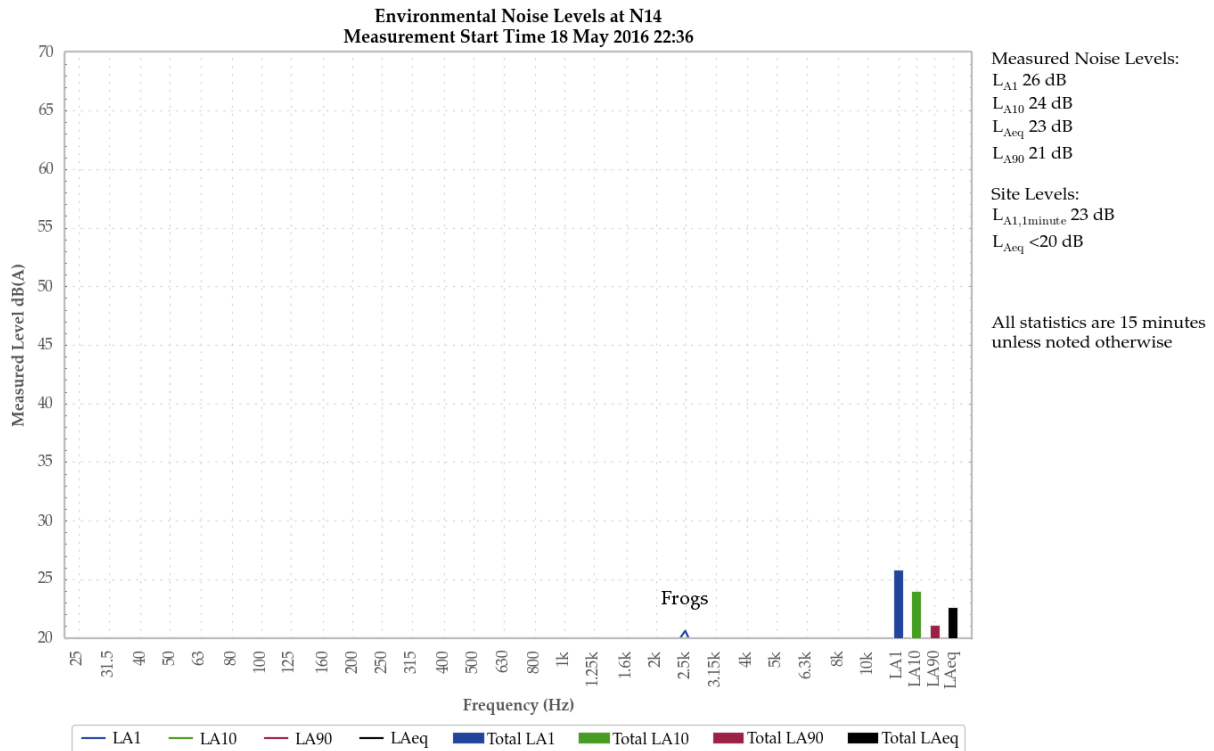


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

A low-level exhaust continuum from WCP was audible during the measurement, generating a site only LAeq of less than 20 dB. Surges in engine noise generated the LA1,1minute of 23 dB.

Frogs were primarily responsible for measured levels. Activities at WCP and a local substation continuum also contributed to measured levels.

5.1.4 N15, 18 May 2016

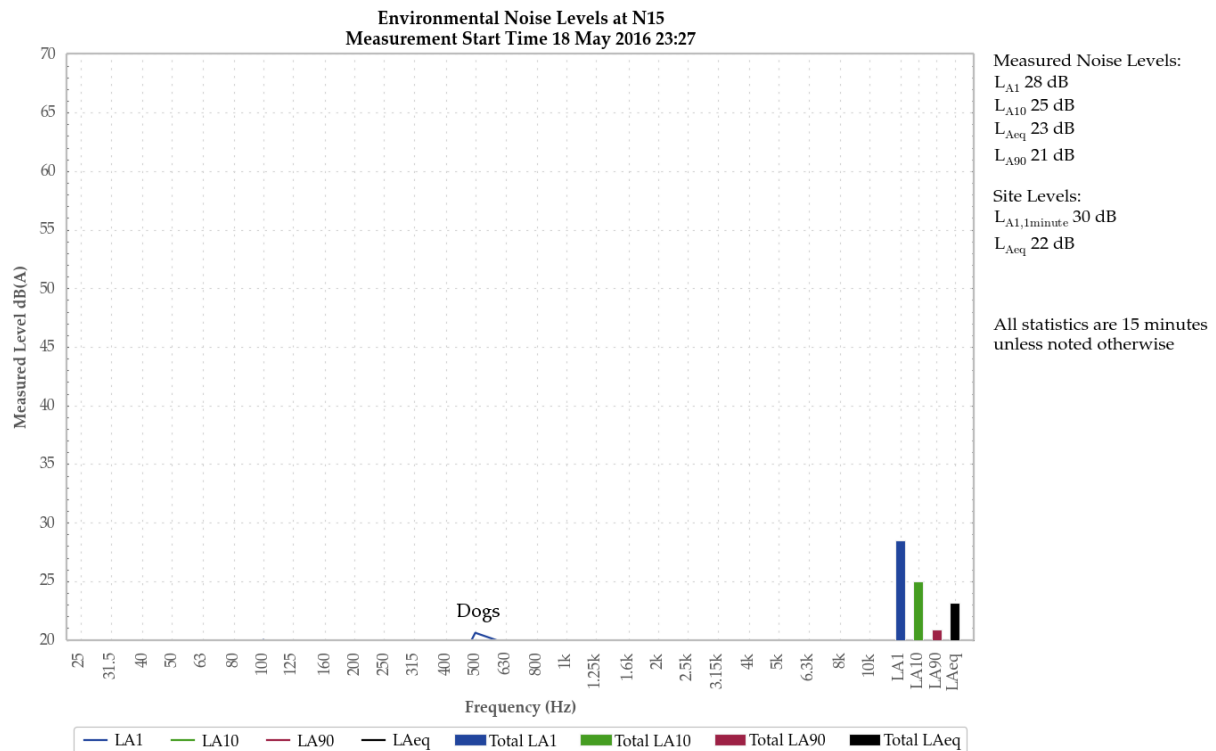


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A low-level continuum from WCP was audible during the measurement, generating a site only LAeq of 20 dB. A surge in engine noise generated the LA1,1minute of 30 dB.

WCP was primarily responsible for measured levels. Birds and dogs also contributed to the measured LA1 and LAeq.

5.1.5 N16, 19 May 2016

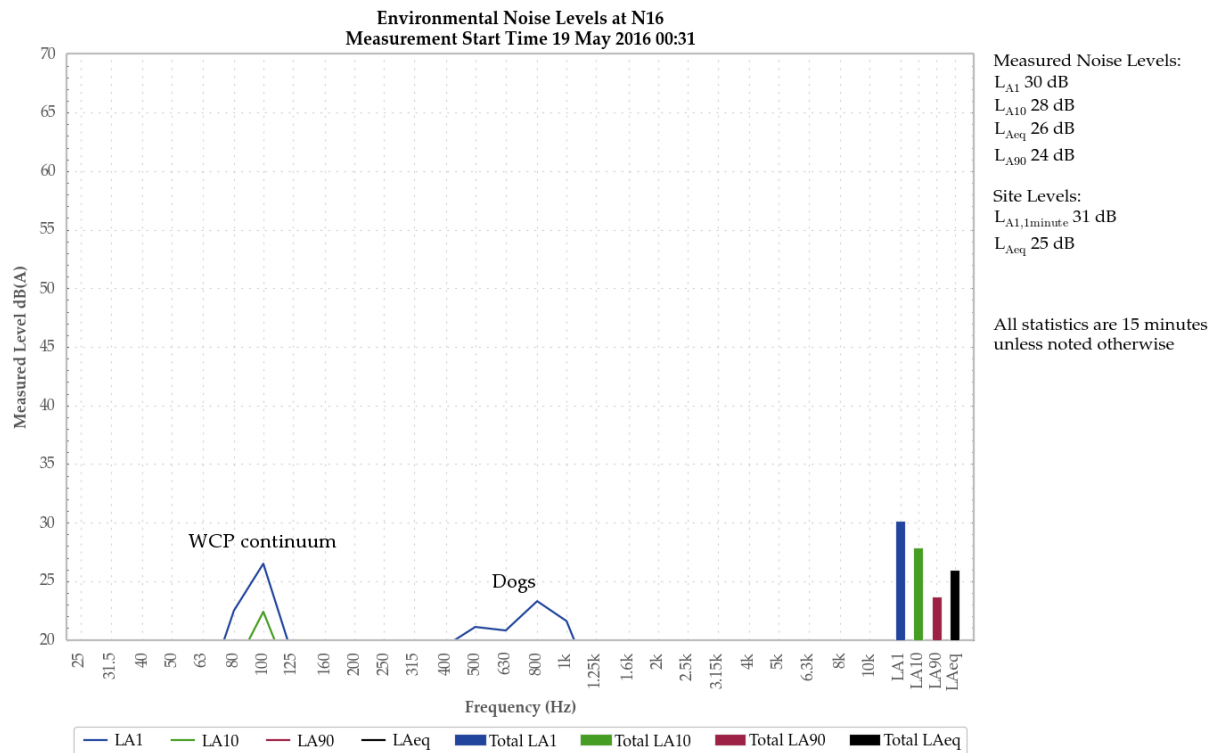


Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

A continuum from WCP generated a site only LAeq of 25 dB. A surge in engine noise generated the LA1,1minute of 31 dB.

WCP was primarily responsible for measured levels. Dogs also contributed to the measured LA1.

Kangaroos and sheep were also noted.

5.1.6 N17, 18 May 2016

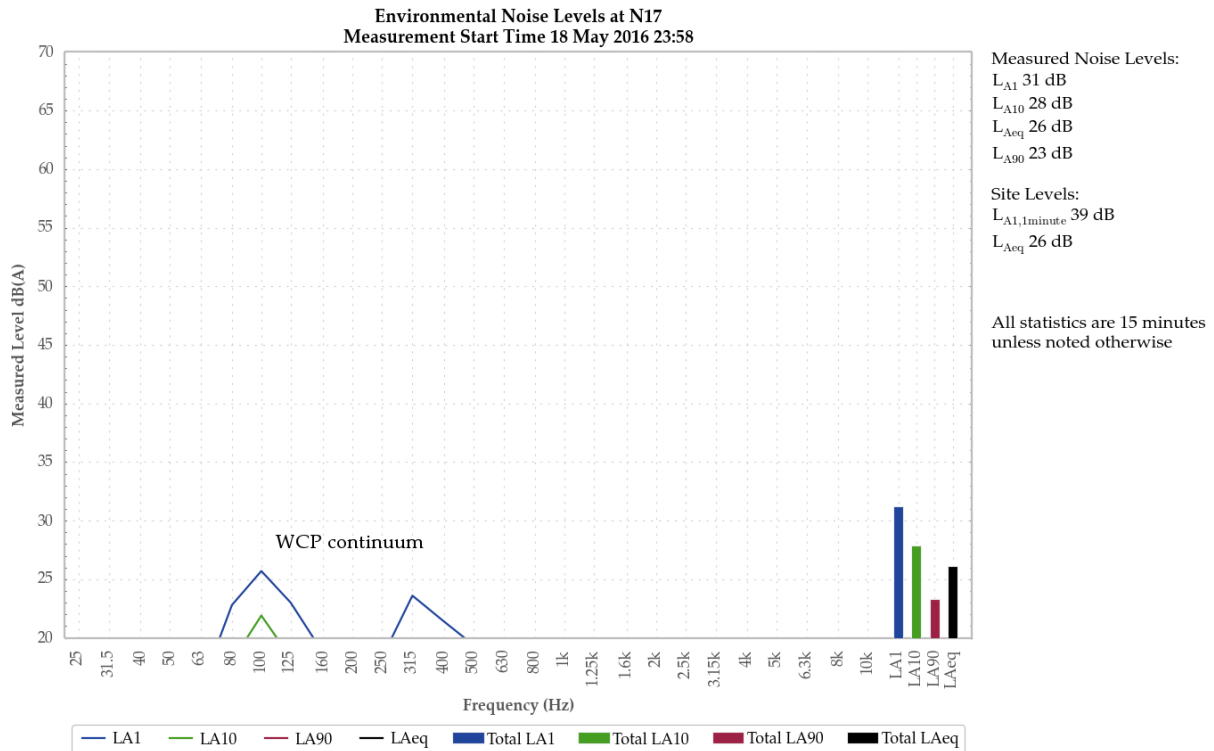


Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

An engine and exhaust continuum from WCP was audible during the measurement, generating a site only LAeq of 26 dB. Impact noise generated an LA1,1minute of 39 dB.

WCP was responsible for generating all measured levels.

A train horn was also noted.

5.1.7 N18, 18 May 2016

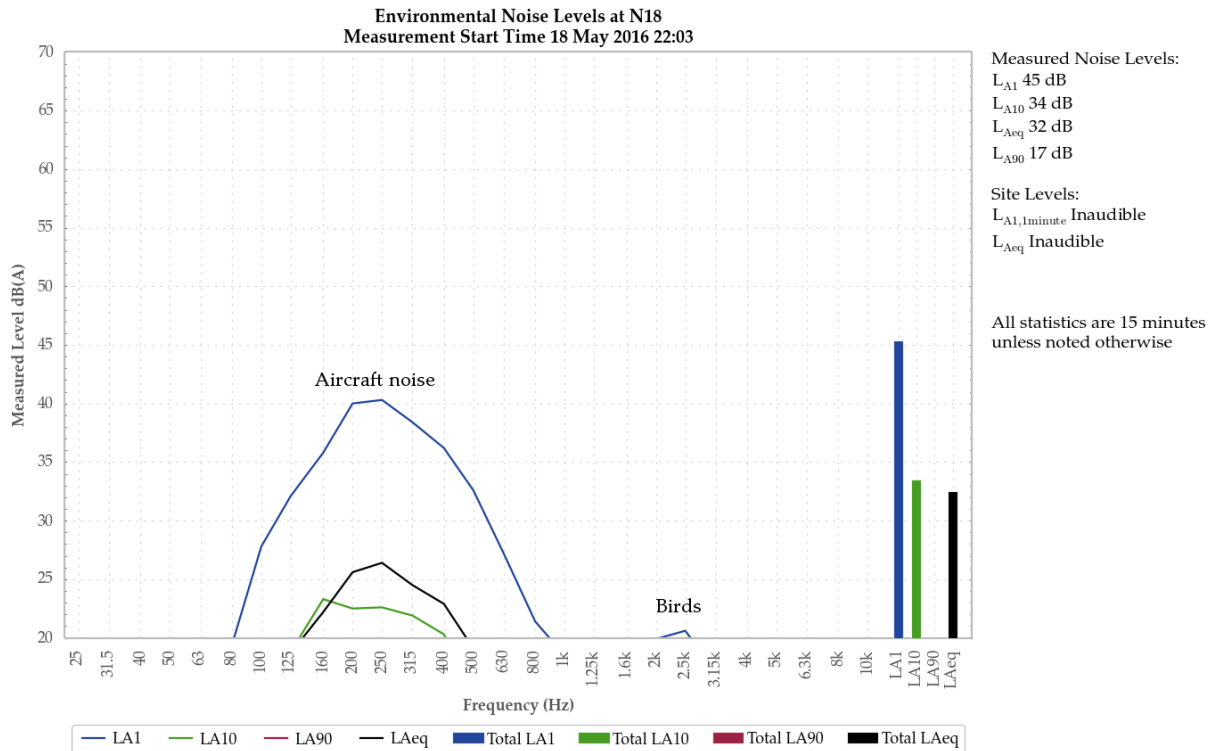


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible during the measurement.

An aircraft generated the measured LA1, LA10 and LAeq. Frogs were primarily responsible for the LA90.

Birds were also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 18/19 May 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the May 2016 monitoring period.

6.2 Low Frequency Assessment

During the May 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

APPENDIX

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 Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{A1}(1\text{ minute})$
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	35	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Temperature inversion conditions greater than 3°C/100m.

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 (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 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:

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in October 2014.

- 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.

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:

- a) an assessment of compliance with noise limits presented in Condition L5.1; and
- b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The noise monitoring program for WCP dated March 2014 and the relevant sections are reproduced below.

6.0 NOISE MONITORING PROGRAM

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 3**. Unattended or real-time monitoring is primarily utilised as a proactive noise control system; providing noise alerts when predetermined noise levels are triggered.

6.1 Monitoring Locations

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 attended monitoring at seven locations (**Table 4, Figure 3 and Figure 4**). Real-time 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 4: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest non-mine owned residence to the West of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest non-mine owned residence to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest non-mine owned residence to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest non-mine owned residence to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest non-mine owned residence to the North-East of the Mine
Barrigan Valley ²	N18	Attended Noise	780033.3	6398618.1	DP&I Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine

Location	Site	Type	Easting ¹	Northing ¹	Justification
Wandoona ³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

Notes to Table 4:

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&I and OEH 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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 4** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&I and the EPA.

6.3.3 Methodology

Attended noise monitoring will be undertaken one night per month by an independent acoustic consultant in accordance with the INP (EPA, 2000) and AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'. Routine 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 3**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environmental and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&I and OEHL within 24 hours.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

When determining the noise generated by the Mine, WCPL will monitor the modification factors in Section 4 of the INP (EPA, 2000).

6.3.4 Data Collection

Data and observations are collected in 15 minute periods and the Leq dBA results recorded. The Leq dBC noise levels will also be recorded to assess low frequency noise. All acoustic instrumentation will comply with AS 1259.2-1990 'Acoustics – Sound level meters – Integrating – Averaging'.

Comprehensive field notes will be taken to indicate both mine related and non-mine related noise sources and when they occurred. Notes about maximum mine noise levels (source and times) will also be taken. All percentiles (LA_{max}, LA₁, LA₁₀, LA₅₀, LA₉₀, LA_{min}, LA_{eq}) are measured in A weighting.

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

6.3.5 Evaluation of Compliance

Table 6 summarises the definition used by WCPL for the evaluation of compliance with statutory requirements. WCPL has developed a Compliance Review and Evaluation Process (**Figure 5**) that clearly illustrates when WCPL is deemed to have exceeded the Noise Criteria in **Table 3**.

Table 6: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is recorded when a second attended noise monitoring result, taken with 75 minutes of the first result and in accordance with the INP, exceeds the Noise Criteria in Table 3 . The noise must be solely attributable to WCPL and meteorological conditions must be favourable (Figure 5). Reporting requirements for exceedances are detailed in Section 9.1 .

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 5.5°C/100 m.

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

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

6.3.6 Response to Exceedance

Where any exceedance of the Noise Criteria and/or performance measures has occurred, WCPL will, at the earliest opportunity:

- Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- Consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Director-General; and
- Review and, if necessary, revise this Management Plan (refer **Section 10.0**),

to the satisfaction of the Director-General.

APPENDIX

B CALIBRATION CERTIFICATES



**Acoustic
Research
Labs Pty Ltd**

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 61672-3.2006

Calibration Certificate

Calibration Number C15226

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 : 20°C
Relative Humidity : 55.7%
Barometric Pressure : 99.62kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 21.6°C
Relative Humidity : 53%
Barometric Pressure : 99.82kPa

Calibration Technician : Dennis Kim
Calibration Date : 22/05/2015

Secondary Check: Sandra Minto
Report Issue Date : 25/05/2015

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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	±0.120dB	Temperature	±0.3°C
12.5kHz	±0.165dB	Relative Humidity	±4.1%
16kHz	±0.245dB	Barometric Pressure	±0.1kPa
Electrical Tests			
31.5 Hz to 20 kHz	±0.121dB		

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



WORLD RECOGNISED
ACCREDITATION

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

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

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 C15325

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 : 21.9°C
Relative Humidity : 44%
Barometric Pressure : 100.6kPa

Calibration Technician : Dennis Kim
Calibration Date : 08/07/2015
Secondary Check: Sandra Minto
Report Issue Date : 13/07/2015

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

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	±0.09dB	Temperature	±0.3°C
Short Term Fluct.	±0.02dB	Relative Humidity	±4.1%
Frequency	±0.01%	Barometric Pressure	±0.1kPa
Distortion	±0.26%		

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.

PAGE 1 OF 1

Wilpinjong Coal

*Environmental Noise Monitoring
June 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*


Global
Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring June 2016

Reference: 16187_R01

Report date: 30 June 2016

Prepared for

Wilpinjong Coal Pty Ltd
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Prepared by

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Prepared: Joel Curran
Chemical Engineer (Acoustics)



QA Review: Jeremy Welbourne
Civil Engineer (Acoustics)

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.

A modification (MOD5) to the WCP consent was approved in November 2014. 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, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 22/23 June 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the June 2016 monitoring.

Low Frequency Assessment

During the June 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). No further assessment of low frequency noise was undertaken.

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 of 22/23 June 2016. Figure 1 shows the regular monitoring locations.

The purpose of the survey was 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 Noise Monitoring Program (NMP).

Table 1.1: 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
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley

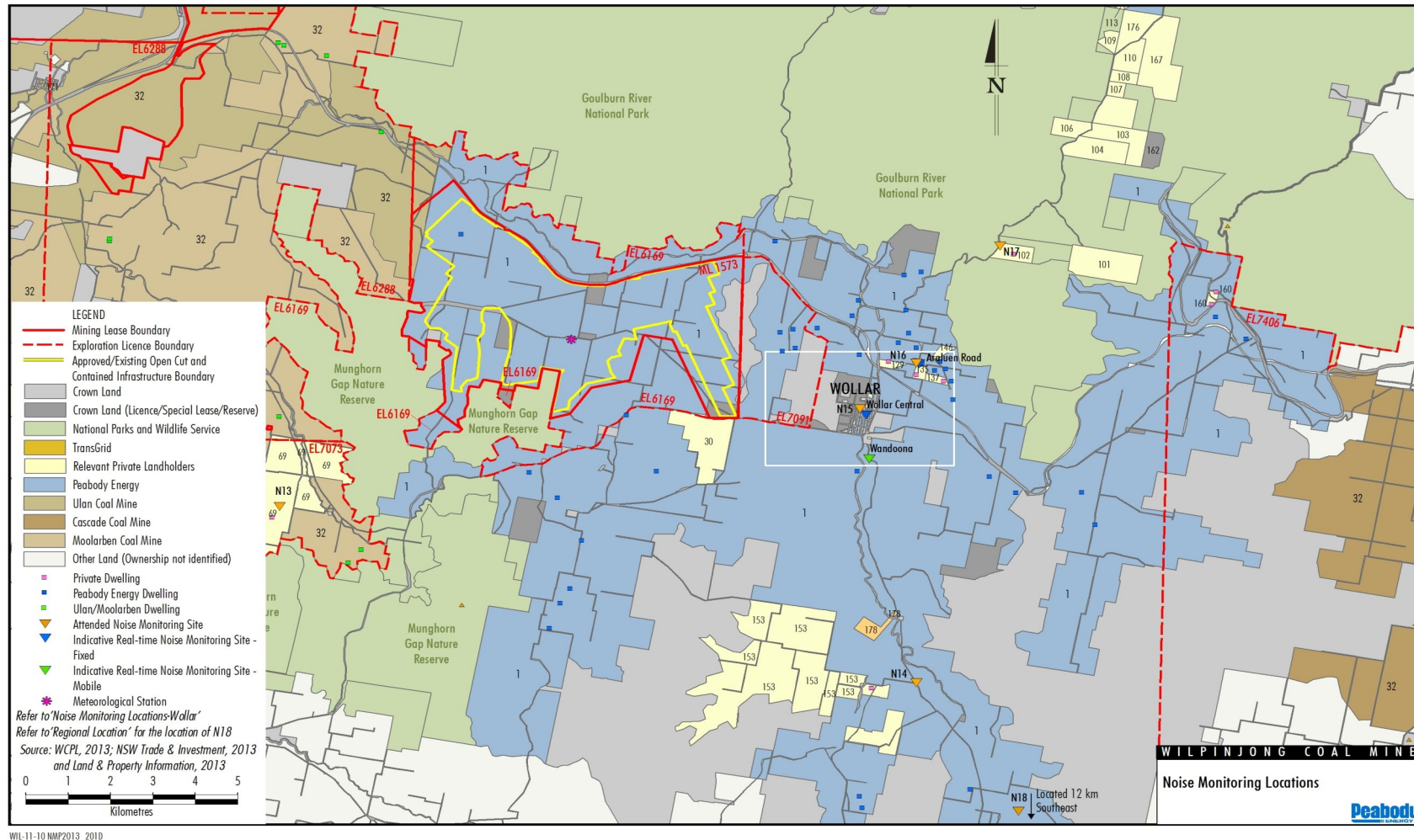


Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

The Environment Protection License (EPL) (No. 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in October 2014. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The draft noise monitoring program (NMP) for WCP was prepared in March 2014 in response to the February 2014 modification to the project approval. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT APPROVAL CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/00m.

2.5 EPL Criteria and Weather Conditions

Criteria detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the EPL associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL EPL CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions of up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with the EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the INP:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the INP:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to be applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L _{Ceq}	>60	>65
INP	Site only L _{Ceq} minus site only L _{Aeq}	>=15	>=15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a practice note is not yet available, low frequency noise results from WCP have been compared to both assessment methods presented above above, when considering applicability of low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

Attended monitoring during this reporting period was undertaken by Joel Curran.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency noise from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

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 A.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	00370304	29/05/2017
Larson Davis 150 acoustic calibrator	3333	06/08/2017

4 RESULTS

4.1 Attended Noise Monitoring

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 LEVELS¹ – JUNE 2016¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	22/06/2016 23:50	40	28	26	25	25	23	21	45
N13	23/06/2016 00:34	41	38	35	33	33	30	27	43
N14	23/06/2016 00:21	51	30	27	24	25	22	20	45
N15	22/06/2016 23:21	40	34	32	30	31	28	27	48
N16	22/06/2016 22:53	46	32	29	26	27	24	20	51
N17	22/06/2016 22:20	44	32	30	27	28	24	20	47
N18	23/06/2016 01:00	39	27	24	22	23	22	21	36

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during June 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – JUNE 2016

Conditions	Total for June 2016
Number of measurements	7
Number of measurements where met applied (in accordance with project approval)	7
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency noise source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JUNE 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	22/06/2016 23:50	0.6	0.8	35	Yes	21	Nil
N13	23/06/2016 00:34	0.0	0.2	36	Yes	IA	Nil
N14	23/06/2016 00:21	0.0	0.2	35	Yes	22	Nil
N15	22/06/2016 23:21	0.0	1.0	35	Yes	28	Nil
N16	22/06/2016 22:53	0.7	1.2	37	Yes	27	Nil
N17	22/06/2016 22:20	0.0	0.0	35	Yes	28	Nil
N18	23/06/2016 01:00	0.9	0.4	35	Yes	NM	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JUNE 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	22/06/2016 23:50	0.6	0.8	45	Yes	26	Nil
N13	23/06/2016 00:34	0.0	0.2	45	Yes	IA	Nil
N14	23/06/2016 00:21	0.0	0.2	45	Yes	25	Nil
N15	22/06/2016 23:21	0.0	1.0	45	Yes	34	Nil
N16	22/06/2016 22:53	0.7	1.2	45	Yes	33	Nil
N17	22/06/2016 22:20	0.0	0.0	45	Yes	32	Nil
N18	23/06/2016 01:00	0.9	0.4	45	Yes	NM	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – JUNE 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	22/06/2016 23:50	0.6	0.8	35	Yes	21	Nil
N13	23/06/2016 00:34	0.0	0.2	35	Yes	IA	Nil
N14	23/06/2016 00:21	0.0	0.2	35	Yes	22	Nil
N15	22/06/2016 23:21	0.0	1.0	35	Yes	28	Nil
N16	22/06/2016 22:53	0.7	1.2	35	Yes	27	Nil
N17	22/06/2016 22:20	0.0	0.0	35	Yes	28	Nil
N18	23/06/2016 01:00	0.9	0.4	35	Yes	NM	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: *L_{A1,1minute}* GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – JUNE 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP <i>L_{A1,1min}</i> dB ^{4,5}	Exceedance ⁶
N6	22/06/2016 23:50	0.6	0.8	45	Yes	26	Nil
N13	23/06/2016 00:34	0.0	0.2	45	Yes	IA	Nil
N14	23/06/2016 00:21	0.0	0.2	45	Yes	25	Nil
N15	22/06/2016 23:21	0.0	1.0	45	Yes	34	Nil
N16	22/06/2016 22:53	0.7	1.2	45	Yes	33	Nil
N17	22/06/2016 22:20	0.0	0.0	45	Yes	32	Nil
N18	23/06/2016 01:00	0.9	0.4	45	Yes	NM	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – JUNE 2016

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	22/06/2016 23:50	8	0.4	270	8
N13	23/06/2016 00:34	8	0.5	130	8
N14	23/06/2016 00:21	6	0.6	120	8
N15	22/06/2016 23:21	9	0.0	-	8
N16	22/06/2016 22:53	10	0.0	-	8
N17	22/06/2016 22:20	10	0.0	-	8
N18	23/06/2016 01:00	9	0.0	-	8

Data obtained concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees ²	Lapse Rate Degrees / 100 metres ³
22/06/2016 22:00	0.9	349	0.8
22/06/2016 22:15	0.0	-	0.4
22/06/2016 22:30	0.0	-	0
22/06/2016 22:45	0.0	-	0.8
22/06/2016 23:00	0.0	-	1.2
22/06/2016 23:15	0.7	224	1.2
22/06/2016 23:30	0.0	-	1
22/06/2016 23:45	0.7	18	1.4
23/06/2016 00:00	0.6	51	0.8
23/06/2016 00:15	0.0	-	0.6
23/06/2016 00:30	0.0	-	0.2
23/06/2016 00:45	0.0	-	0.2
23/06/2016 01:00	0.7	345	0.2
23/06/2016 01:15	0.9	275	0.4
23/06/2016 01:30	0.0	-	0.4
23/06/2016 01:45	0.7	322	0.8
23/06/2016 02:00	0.0	-	1.4

Notes:

1. Data supplied by WCP;
2. "-" in wind direction column indicates that conditions were calm; and
3. Lapse rate sourced from the WCP inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

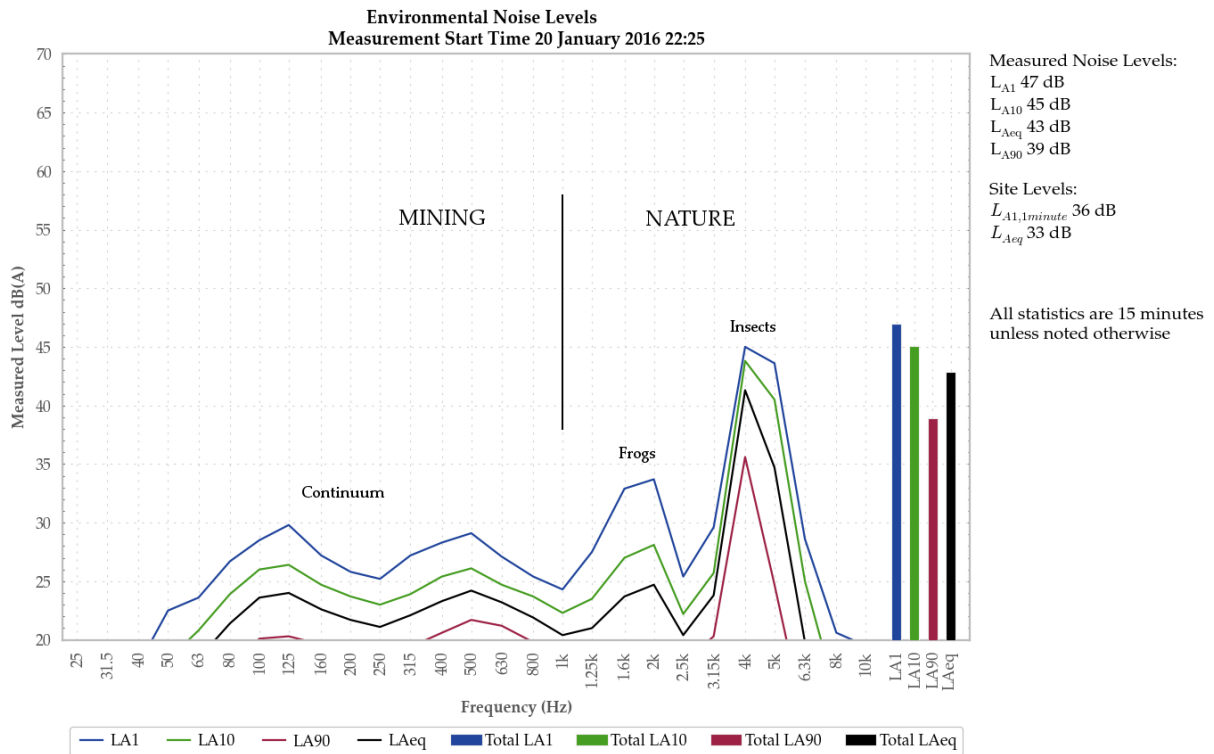


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 22 June 2016

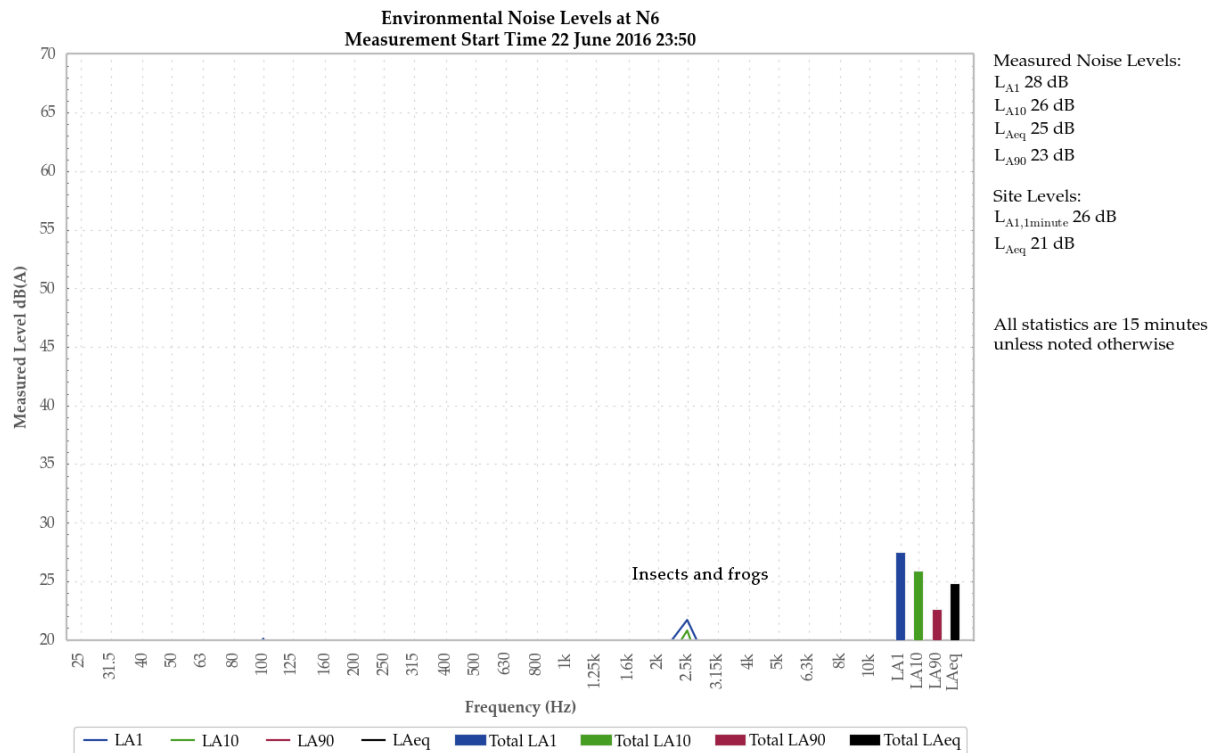


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

A low-level exhaust and engine/fan continuum from WCP generated a site only LAeq of 21 dB. A surge in exhaust noise generated the LA1,1minute of 26 dB.

WCP combined with insects and frogs to generate all measured levels.

5.1.2 N13, 23 June 2016

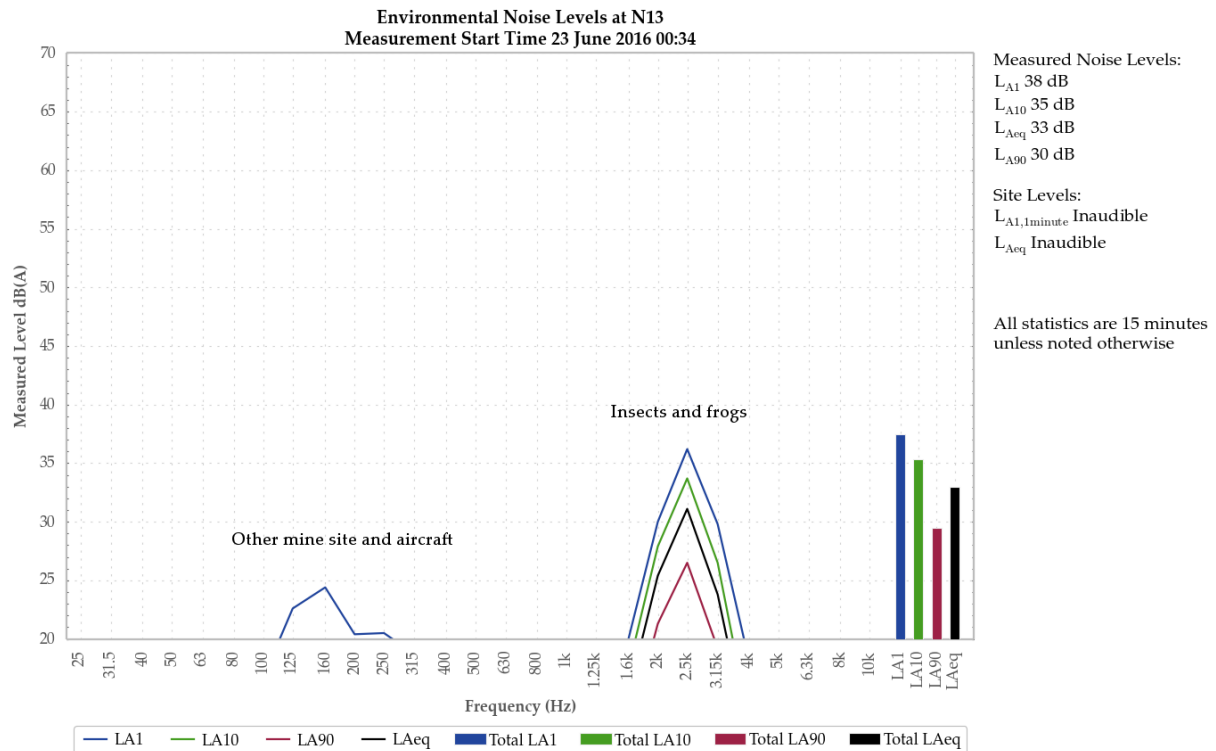


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible during the measurement.

Insects and frogs were responsible for measured levels. Continuum from another mine was just perceptible on occasion.

Breeze in foliage and an aircraft were also noted.

5.1.3 N14, 23 June 2016

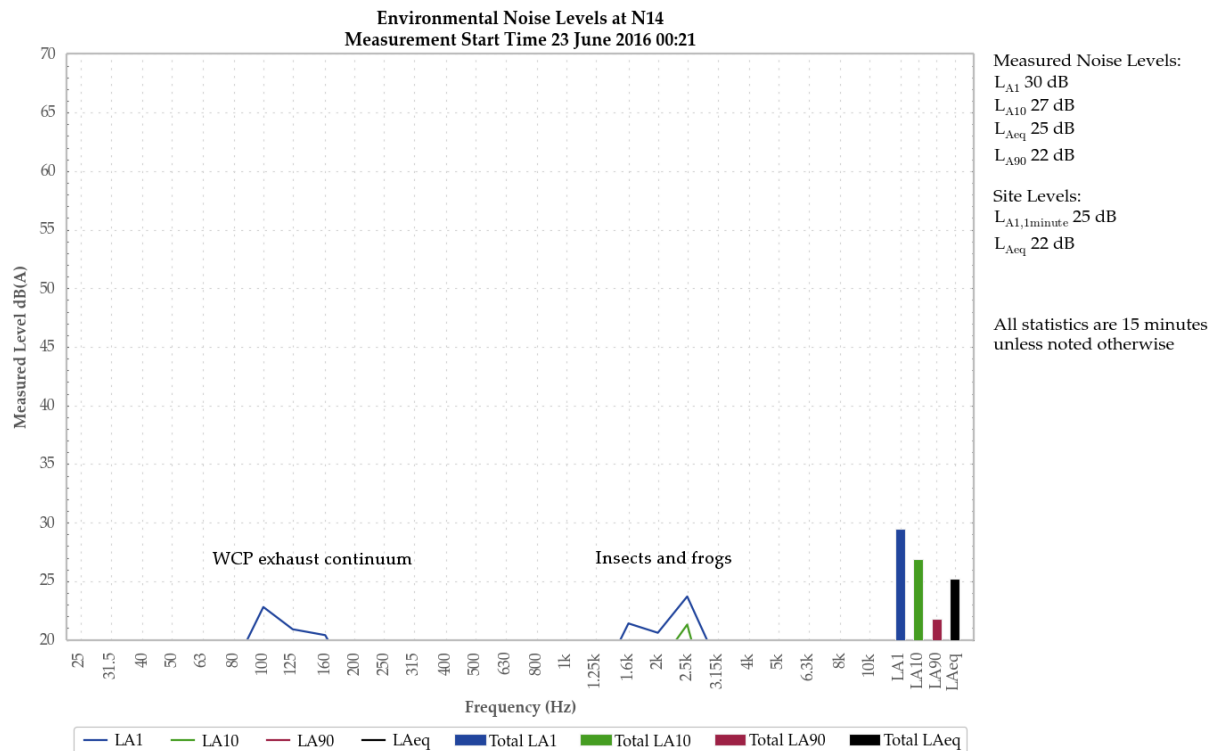


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

A low-level exhaust continuum from WCP was audible during the measurement, generating a site only LAeq of 22 dB. Impact noise generated the LA1,1minute of 25 dB.

WCP combined with insects and frogs to generate all measured levels.

5.1.4 N15, 22 June 2016

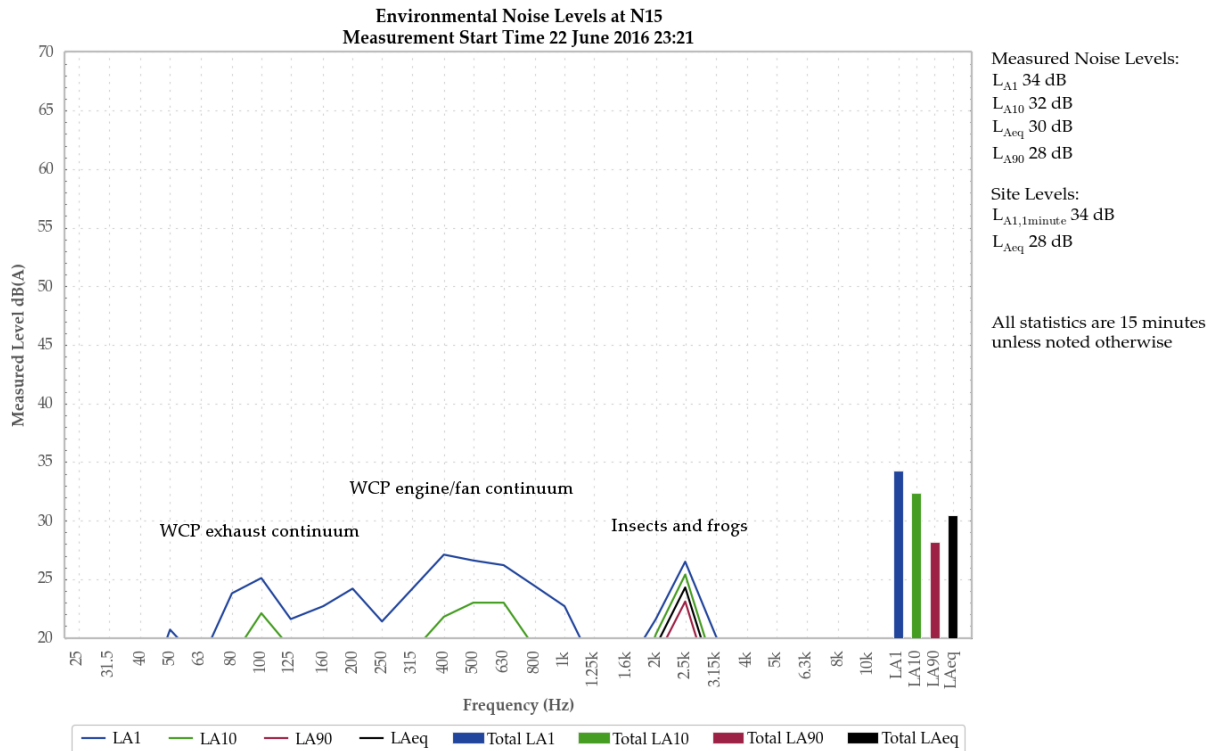


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was audible for an exhaust and engine/fan continuum during the measurement, generating a site only LAeq of 28 dB. A surge in exhaust noise generated the LA1,1minute of 34 dB.

WCP combined with insects and frogs to generate all measured levels.

5.1.5 N16, 22 June 2016

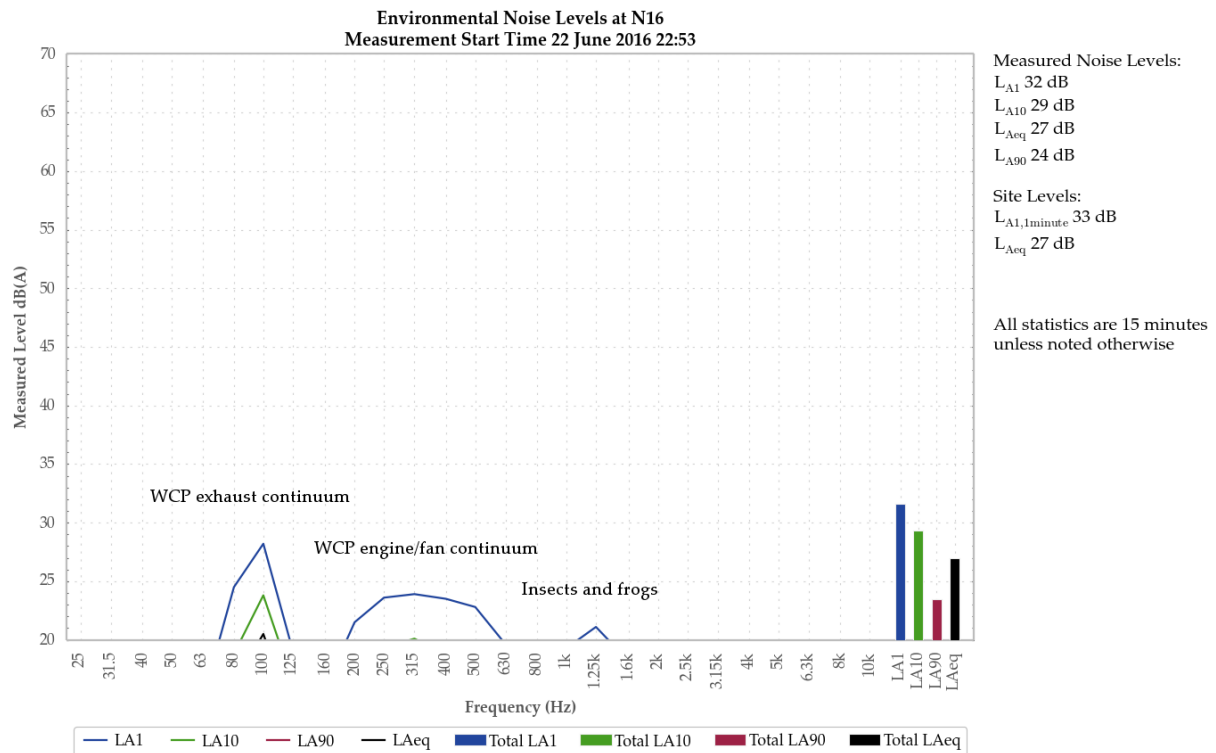


Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

WCP was audible for an exhaust and engine fan continuum, along with low level dozer track noise, generating a site only LAeq of 27 dB. A surge in exhaust noise generated the LA1,1minute of 33 dB.

WCP was primarily responsible for measured levels. Insects and frogs were a minor contributor to measured LA90.

Birds were also noted.

5.1.6 N17, 18 June 2016

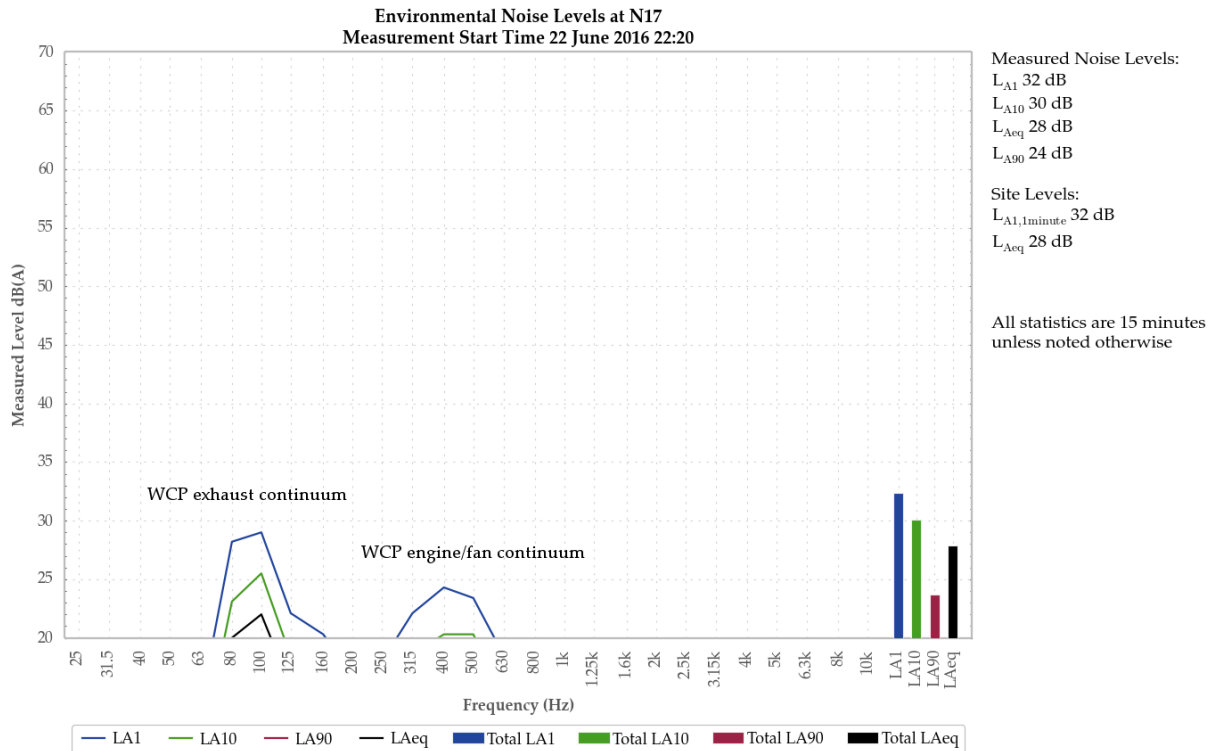


Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was audible for an exhaust and engine/fan continuum, generating a site only LAeq of 28 dB. A surge in engine noise generated an LA1,1minute of 32 dB.

WCP was responsible for all measured levels.

Insects, frogs and birds were also noted.

5.1.7 N18, 23 June 2016

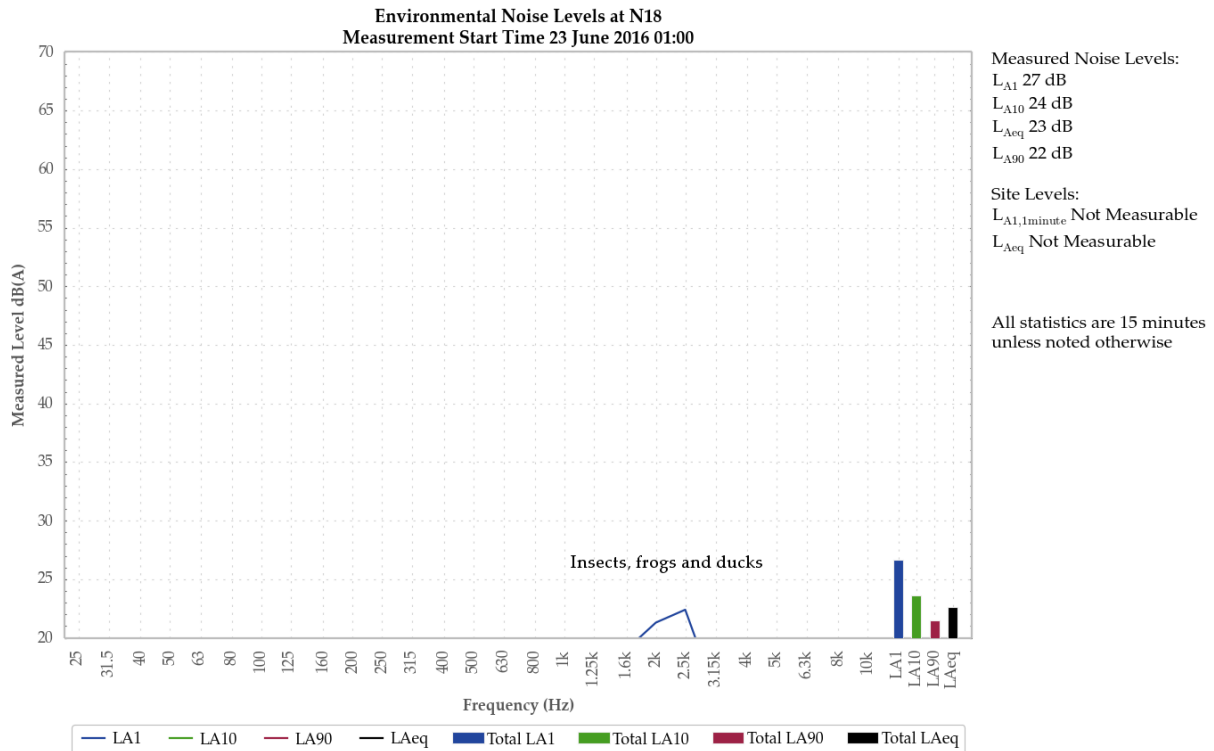


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was audible for a low level continuum; these levels were not measurable.

Insects and frogs generated all measured levels.

Ducks were also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 22/23 June 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the June 2016 monitoring period.

6.2 Low Frequency Assessment

During the June 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

APPENDIX

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 Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{A1}(1\text{ minute})$
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	35	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Temperature inversion conditions greater than 3°C/100m.

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 (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 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:

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in October 2014.

- 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.

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:

- a) an assessment of compliance with noise limits presented in Condition L5.1; and
- b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The noise monitoring program for WCP dated March 2014 and the relevant sections are reproduced below.

6.0 NOISE MONITORING PROGRAM

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 3**. Unattended or real-time monitoring is primarily utilised as a proactive noise control system; providing noise alerts when predetermined noise levels are triggered.

6.1 Monitoring Locations

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 attended monitoring at seven locations (**Table 4, Figure 3 and Figure 4**). Real-time 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 4: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest non-mine owned residence to the West of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest non-mine owned residence to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest non-mine owned residence to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest non-mine owned residence to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest non-mine owned residence to the North-East of the Mine
Barrigan Valley ²	N18	Attended Noise	780033.3	6398618.1	DP&I Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine

Location	Site	Type	Easting ¹	Northing ¹	Justification
Wandoona ³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

Notes to **Table 4**:

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&I and OEH 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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 4** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&I and the EPA.

6.3.3 Methodology

Attended noise monitoring will be undertaken one night per month by an independent acoustic consultant in accordance with the INP (EPA, 2000) and AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'. Routine 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 3**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environmental and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&I and OEH within 24 hours.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

When determining the noise generated by the Mine, WCPL will monitor the modification factors in Section 4 of the INP (EPA, 2000).

6.3.4 Data Collection

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

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

6.3.5 Evaluation of Compliance

Table 6 summarises the definition used by WCPL for the evaluation of compliance with statutory requirements. WCPL has developed a Compliance Review and Evaluation Process (**Figure 5**) that clearly illustrates when WCPL is deemed to have exceeded the Noise Criteria in **Table 3**.

Table 6: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is recorded when a second attended noise monitoring result, taken with 75 minutes of the first result and in accordance with the INP, exceeds the Noise Criteria in Table 3 . The noise must be solely attributable to WCPL and meteorological conditions must be favourable (Figure 5). Reporting requirements for exceedances are detailed in Section 9.1 .

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 5.5°C/100 m.

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

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

6.3.6 Response to Exceedance

Where any exceedance of the Noise Criteria and/or performance measures has occurred, WCPL will, at the earliest opportunity:

- Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- Consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Director-General; and
- Review and, if necessary, revise this Management Plan (refer **Section 10.0**),

to the satisfaction of the Director-General.

APPENDIX

B CALIBRATION CERTIFICATES



**Acoustic
Research
Labs Pty Ltd**

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Octave Band Filter
AS 4476:1997
Calibration Certificate

Calibration Number C15250A

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 : 480505
Pre-amplifier Serial Number : 60313

Atmospheric Conditions

Ambient Temperature : 22°C
Relative Humidity : 55.1%
Barometric Pressure : 99.9kPa

Calibration Technician : Dennis Kim
Calibration Date : 29/05/2015
Secondary Check: Sandra Minto
Report Issue Date : 01/06/2015

Approved Signatory :  Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
4.4 & 5.3: 1/1 Octave relative attenuation	Pass	4.6 & 5.5: Linear operating range	Pass
4.4 & 5.3: 1/3 Octave relative attenuation	Pass	4.8 & 5.7: Anti-alias filters	Pass
		4.10 & 5.9: Flat frequency response	Pass

Least Uncertainties of Measurement -

Electrical Tests		Environmental Conditions	
< 16Hz	±0.182dB	Temperature	±0.3°C
16Hz - 100Hz	±0.105dB	Relative Humidity	±4.1%
100Hz-1000Hz	±0.089dB	Barometric Pressure	±0.1kPa
1000Hz-10kHz	±0.166dB		
> 10kHz	±0.119dB		

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.

PAGE 1 OF 1



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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C15396

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

Equipment Tested/ Model Number : Larson Davis CAL150
Instrument Serial Number : 3333

Atmospheric Conditions

Ambient Temperature : 23.1°C
Relative Humidity : 30.1%
Barometric Pressure : 99.51kPa

Calibration Technician : Dennis Kim
Calibration Date : 06/08/2015
Secondary Check: Kate Alchin
Report Issue Date : 07/08/2015

Approved Signatory :

Juan Aguero

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

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 - Environmental Conditions			
Specific Tests		Temperature	±0.3°C
Generated SPL	±0.09dB	Relative Humidity	±4.1%
Short Term Fluct.	±0.02dB	Barometric Pressure	±0.1kPa
Frequency	±0.01%		
Distortion	±0.26%		

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.

PAGE 1 OF 1

Wilpinjong Coal

*Environmental Noise Monitoring
July 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*


Global
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Wilpinjong Coal

Environmental Noise Monitoring July 2016

Reference: 16230_R01

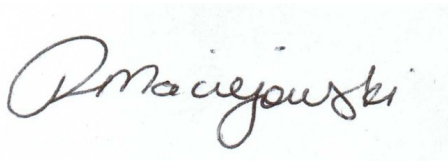
Report date: 12 August 2016

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
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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

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.

A modification (MOD5) to the WCP consent was approved in November 2014. 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, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 14/15 July 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the July 2016 monitoring.

Low Frequency Assessment

During the July 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). No further assessment of low frequency noise was undertaken.

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 of 14/15 July 2016. Figure 1 shows the regular monitoring locations.

The purpose of the survey was 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 Noise Monitoring Program (NMP).

Table 1.1: 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
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley

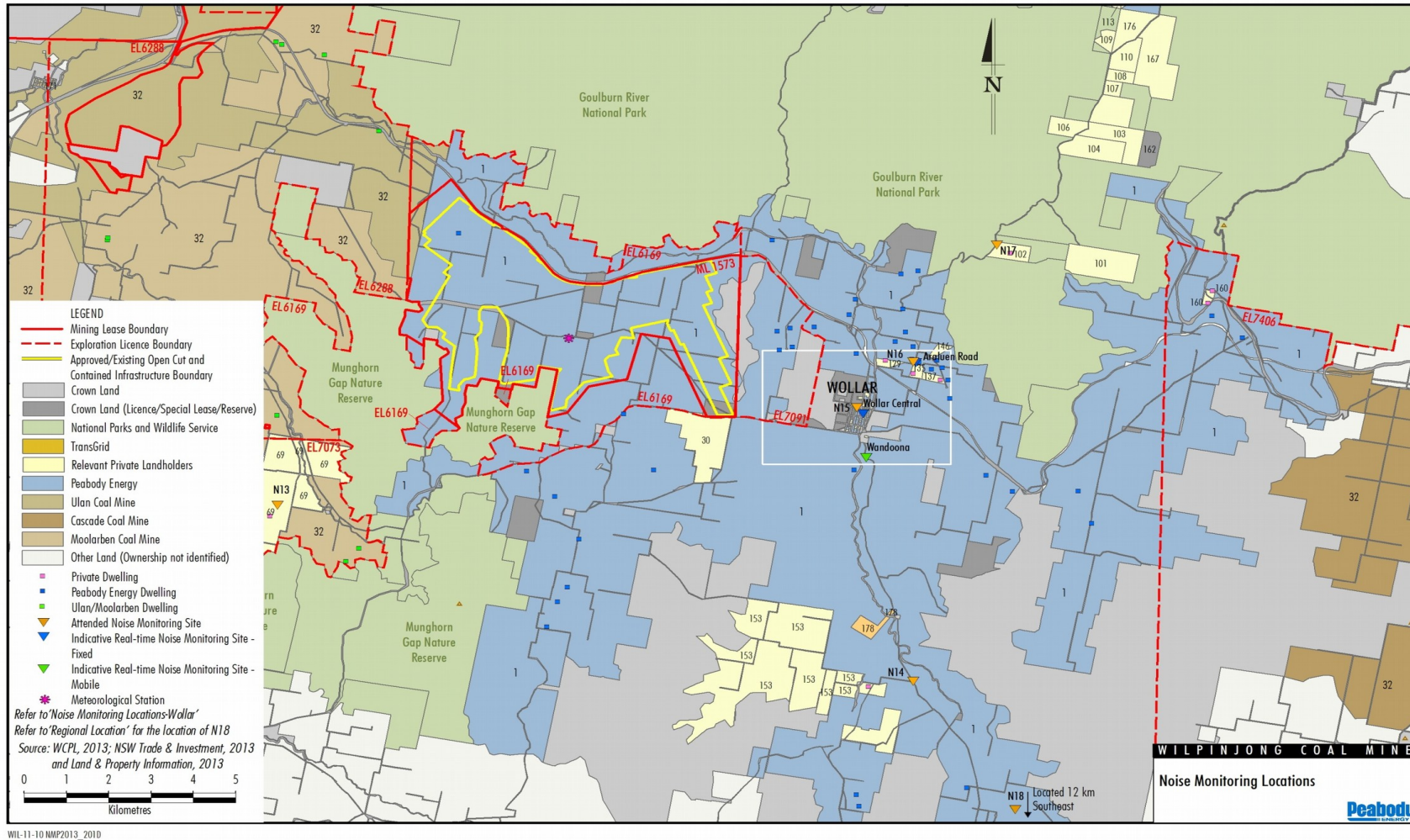


Figure 1: Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the project approval are reproduced in Appendix A.

2.2 Environment Protection Licence

The Environment Protection License (EPL) (No. 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in October 2014. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The draft noise monitoring program (NMP) for WCP was prepared in March 2014 in response to the February 2014 modification to the project approval. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT APPROVAL CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/00m.

2.5 EPL Criteria and Weather Conditions

Criteria detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the EPL associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL EPL CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions of up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with the EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the INP:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the INP:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to be applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L _{Ceq}	>60	>65
INP	Site only L _{Ceq} minus site only L _{Aeq}	>=15	>=15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a Draft Industrial Noise Guideline (ING) was released in September 2015, low frequency noise results from WCP have been compared to the assessment methods and modifying factor triggers presented above. The applicability of these triggers have been considering when applying low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

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

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency noise from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

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 A.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	01070590	28/06/2018
Rion NA-28 sound level analyser	00701424	22/05/2017
Pulsar 106 acoustic calibrator	57413	23/12/2017
Pulsar 106 acoustic calibrator	74813	25/07/2018

4 RESULTS

4.1 Attended Noise Monitoring

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 LEVELS¹ – JULY 2016¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	14/07/2016 23:08	53	48	40	27	36	24	22	40
N13	15/07/2016 00:49	32	26	19	16	18	15	14	28
N14	14/07/2016 22:36	49	34	24	21	24	19	18	32
N15	14/07/2016 23:32	49	43	37	25	33	22	21	35
N16	15/07/2016 00:39	60	58	51	27	46	21	19	57
N17	15/07/2016 00:04	47	29	24	22	23	20	18	42
N18	14/07/2016 22:00	45	27	23	21	22	20	19	31

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during July 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – JULY 2016

Conditions	Total for July 2016
Number of measurements	7
Number of measurements where met applied (in accordance with project approval)	5
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency noise source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JULY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	14/07/2016 23:08	2.6	2.2	35	No	IA	NA
N13	15/07/2016 00:49	1.7	-0.2	36	Yes	IA	Nil
N14	14/07/2016 22:36	2.2	2.4	35	No	IA	NA
N15	14/07/2016 23:32	1.7	1.6	35	Yes	IA	Nil
N16	15/07/2016 00:39	2.1	0.2	37	Yes	<20	Nil
N17	15/07/2016 00:04	1.9	0.8	35	Yes	<25	Nil
N18	14/07/2016 22:00	1.4	2.6	35	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JULY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	14/07/2016 23:08	2.6	2.2	45	No	IA	NA
N13	15/07/2016 00:49	1.7	-0.2	45	Yes	IA	Nil
N14	14/07/2016 22:36	2.2	2.4	45	No	IA	NA
N15	14/07/2016 23:32	1.7	1.6	45	Yes	IA	Nil
N16	15/07/2016 00:39	2.1	0.2	45	Yes	<25	Nil
N17	15/07/2016 00:04	1.9	0.8	45	Yes	26	Nil
N18	14/07/2016 22:00	1.4	2.6	45	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – JULY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	14/07/2016 23:08	2.6	2.2	35	No	IA	NA
N13	15/07/2016 00:49	1.7	-0.2	35	Yes	IA	Nil
N14	14/07/2016 22:36	2.2	2.4	35	No	IA	NA
N15	14/07/2016 23:32	1.7	1.6	35	Yes	IA	Nil
N16	15/07/2016 00:39	2.1	0.2	35	No	<20	NA
N17	15/07/2016 00:04	1.9	0.8	35	Yes	<25	Nil
N18	14/07/2016 22:00	1.4	2.6	35	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – JULY 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	14/07/2016 23:08	2.6	2.2	45	No	IA	NA
N13	15/07/2016 00:49	1.7	-0.2	45	Yes	IA	Nil
N14	14/07/2016 22:36	2.2	2.4	45	No	IA	NA
N15	14/07/2016 23:32	1.7	1.6	45	Yes	IA	Nil
N16	15/07/2016 00:39	2.1	0.2	45	No	<25	NA
N17	15/07/2016 00:04	1.9	0.8	45	Yes	26	Nil
N18	14/07/2016 22:00	1.4	2.6	45	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to and including 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – JULY 2016

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	14/07/2016 23:08	1.2	-	-	0
N13	15/07/2016 00:49	0.9	-	-	0
N14	14/07/2016 22:36	0.7	0.7	170	0
N15	14/07/2016 23:32	0.3	-	-	0
N16	15/07/2016 00:39	1.2	0.6	330	0
N17	15/07/2016 00:04	2.4	-	-	0
N18	14/07/2016 22:00	0.6	0.4	320	0

Notes:

1. Wind speed and direction measured at 1.8 metres; and
2. "-" in wind direction column indicates that conditions were calm.

Data obtained concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees ²	Lapse Rate Degrees / 100 metres ³
14/07/16 22:00	0.5	240	2.6
14/07/16 22:15	1.4	295	2.6
14/07/16 22:30	2.1	283	2.6
14/07/16 22:45	2.2	252	2.4
14/07/16 23:00	1.5	251	2.4
14/07/16 23:15	2.6	307	2.2
14/07/16 23:30	2.6	298	2.2
14/07/16 23:45	1.7	261	1.6
15/07/16 00:00	1.9	273	1.0
15/07/16 00:15	1.9	275	0.8
15/07/16 00:30	1.8	282	0.6
15/07/16 00:45	2.1	252	0.2
15/07/16 01:00	1.7	246	-0.2
15/07/16 01:15	2.0	267	0.2
15/07/16 01:30	0.2	70	1.0
15/07/16 01:45	0.4	319	1.4

Notes:

3. Data supplied by WCP;
4. "-" in wind direction column indicates that conditions were calm; and
5. Lapse rate sourced from the WCP inversion tower.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

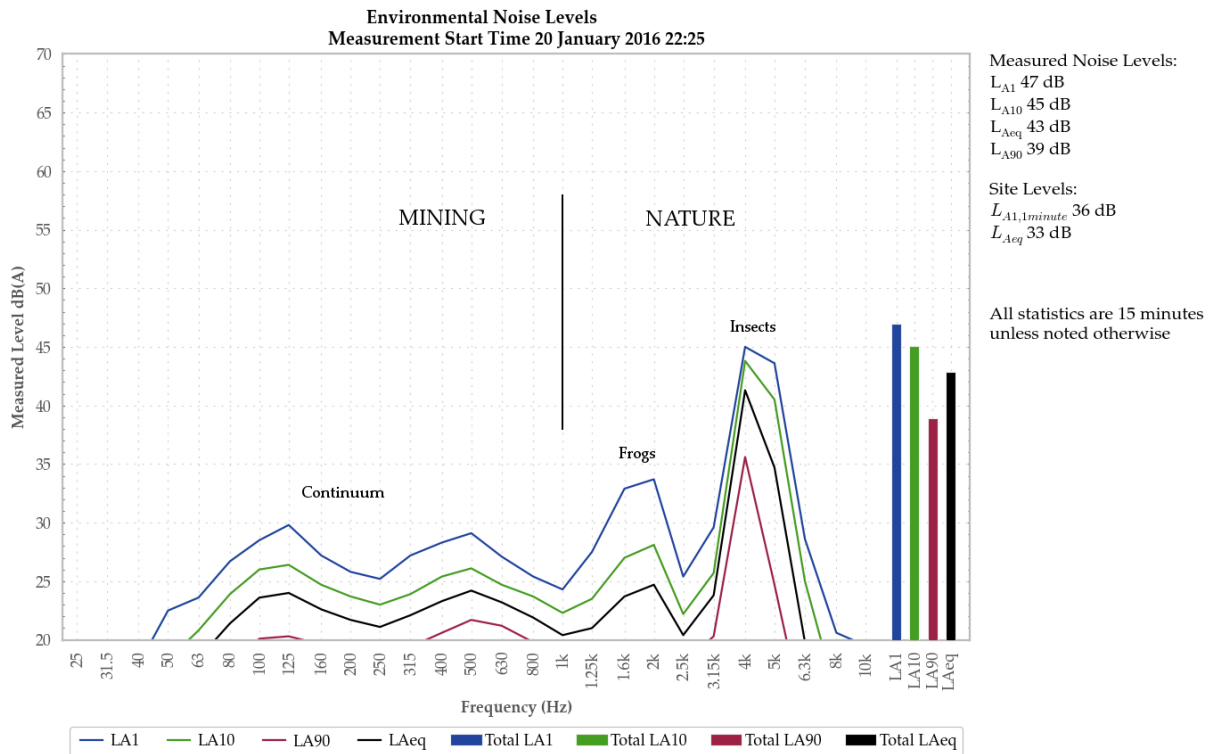


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 14 July 2016

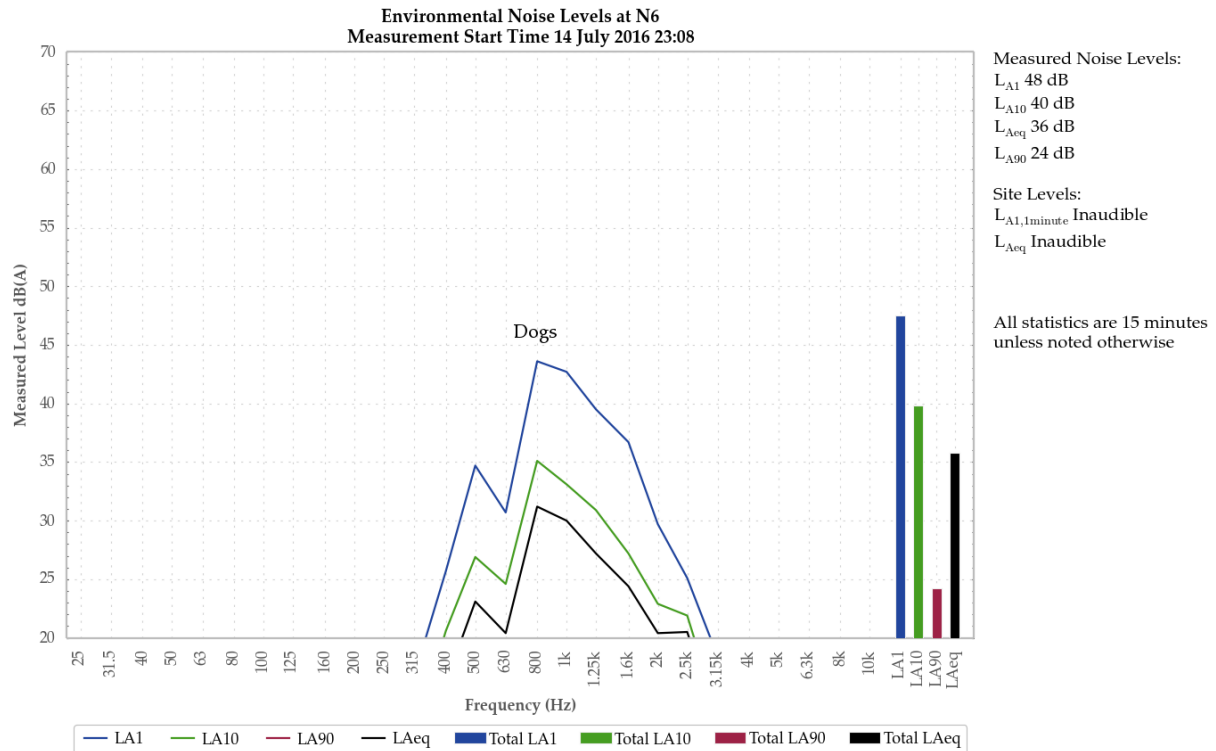


Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible during the measurement.

Dogs generated the measured LA1, LA10 and LAeq. Frogs were responsible for the measured LA90.

Distant road traffic tyre noise was also noted.

5.1.2 N13, 15 July 2016

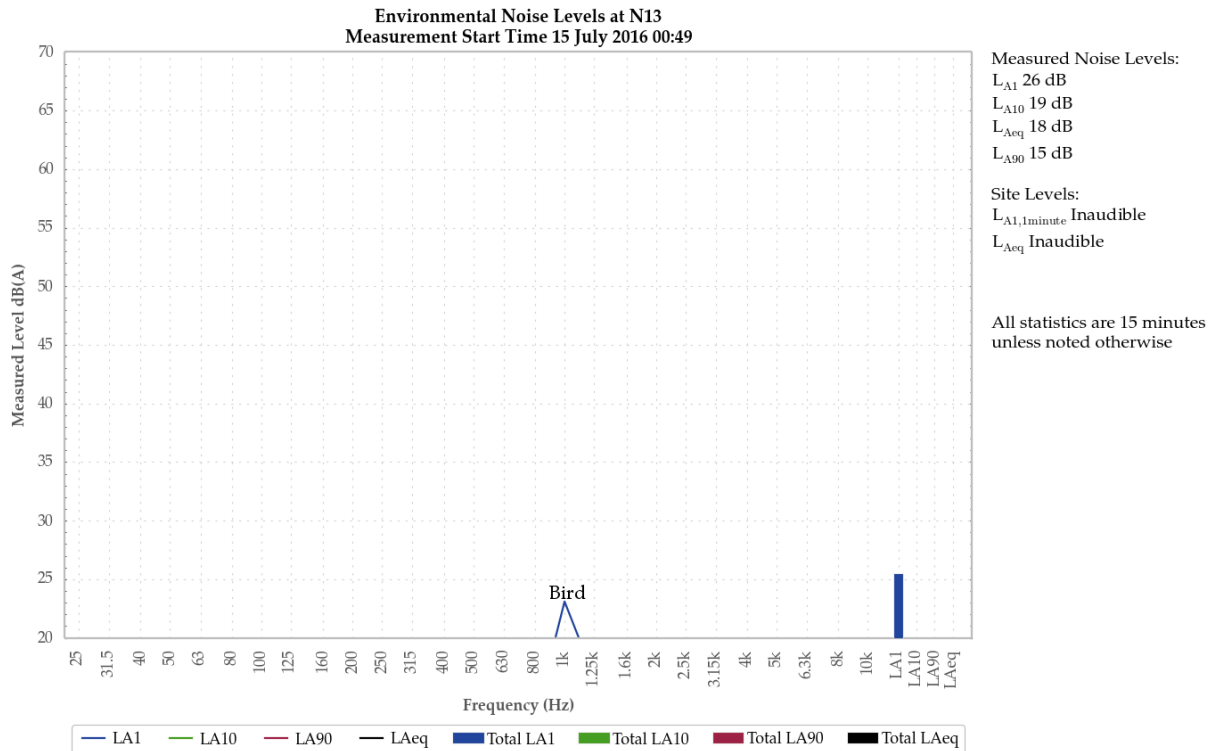


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible during the measurement.

A bird and possum generated the LA1.

Frogs were also noted.

5.1.3 N14, 14 July 2016

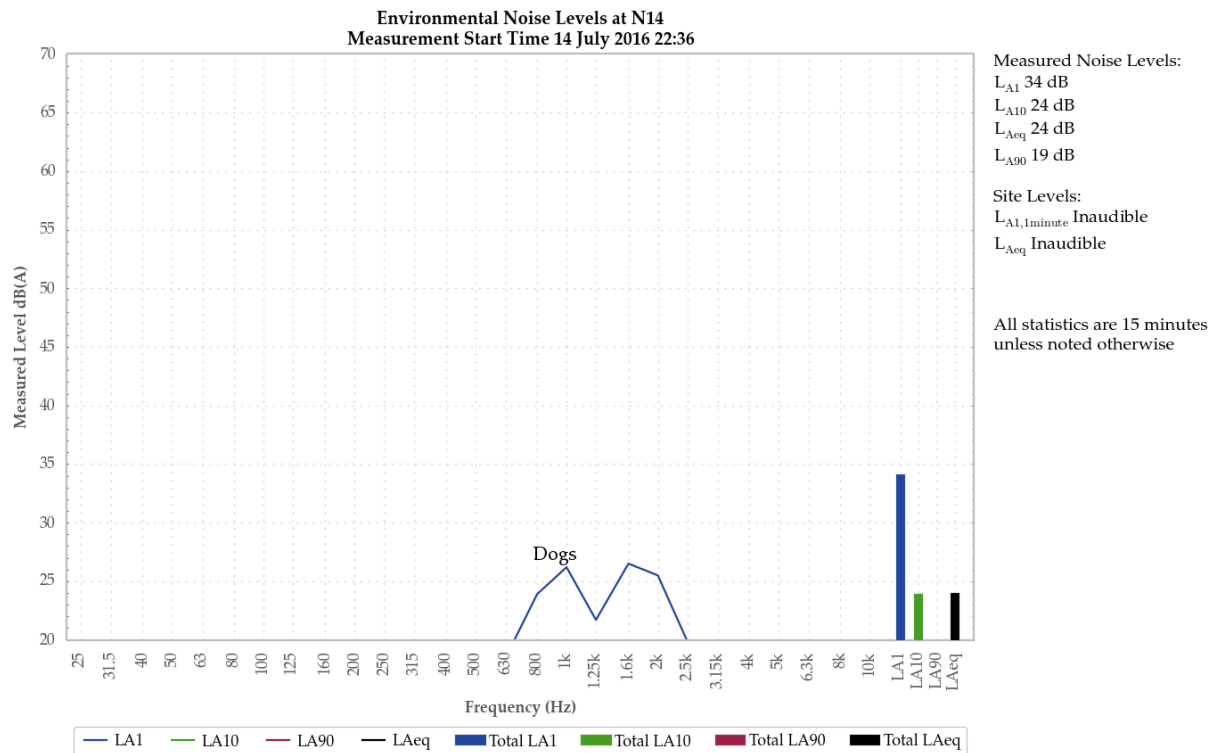


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible during the measurement.

Dogs generated the measured L_{A1} , L_{A10} and L_{Aeq} . A nearby substation continuum and insects generated the measured L_{A90} .

Birds, insects and frogs were also noted.

5.1.4 N15, 14 July 2016

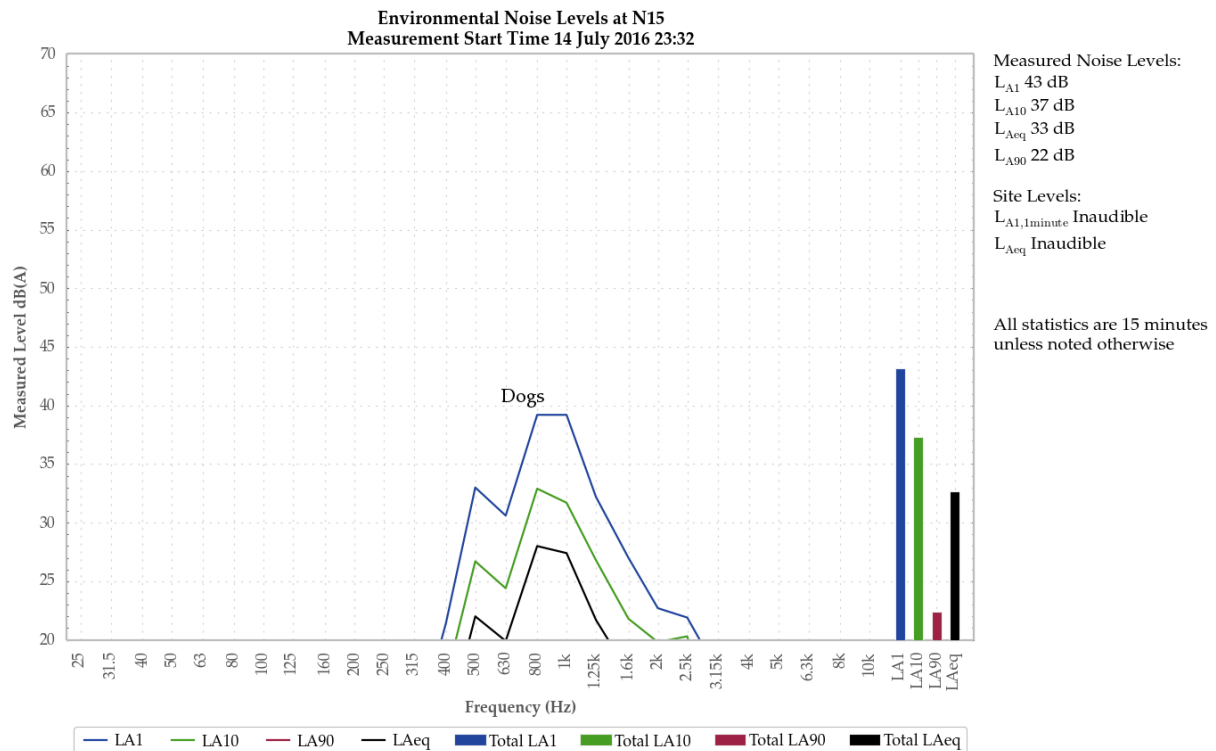


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible during the measurement.

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

5.1.5 N16, 15 July 2016

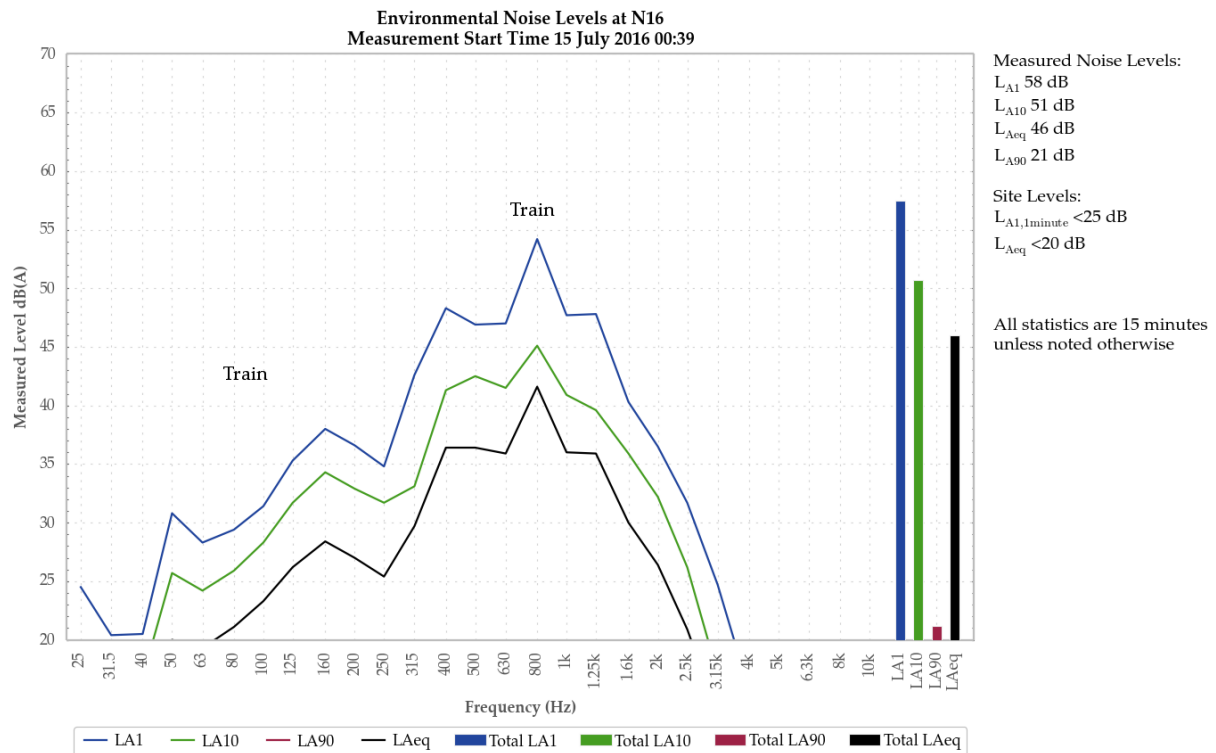


Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

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

A train was responsible for the measured LA1, LA10 and LAeq. Insects and frogs generated the measured LA90.

Dogs were also noted.

5.1.6 N17, 15 July 2016

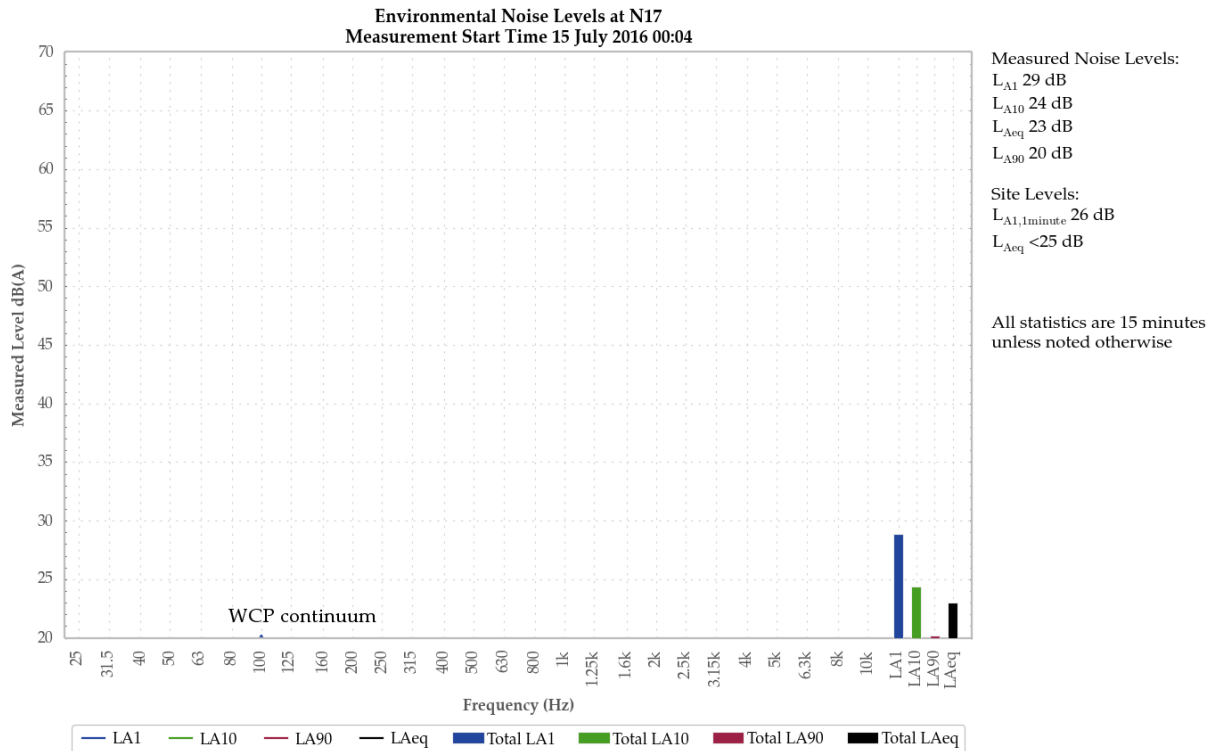


Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

A low-level continuum from WCP generated the site only LAeq of less than 25 dB. A surge in engine noise generated the LA1,1minute of 26 dB.

Dogs were primarily responsible for the measured LA1. The continuum from WCP contributed to the LA1 and was primarily responsible for the measured LA10, LAeq and LA90.

Insects were also noted.

5.1.7 N18, 14 July 2016

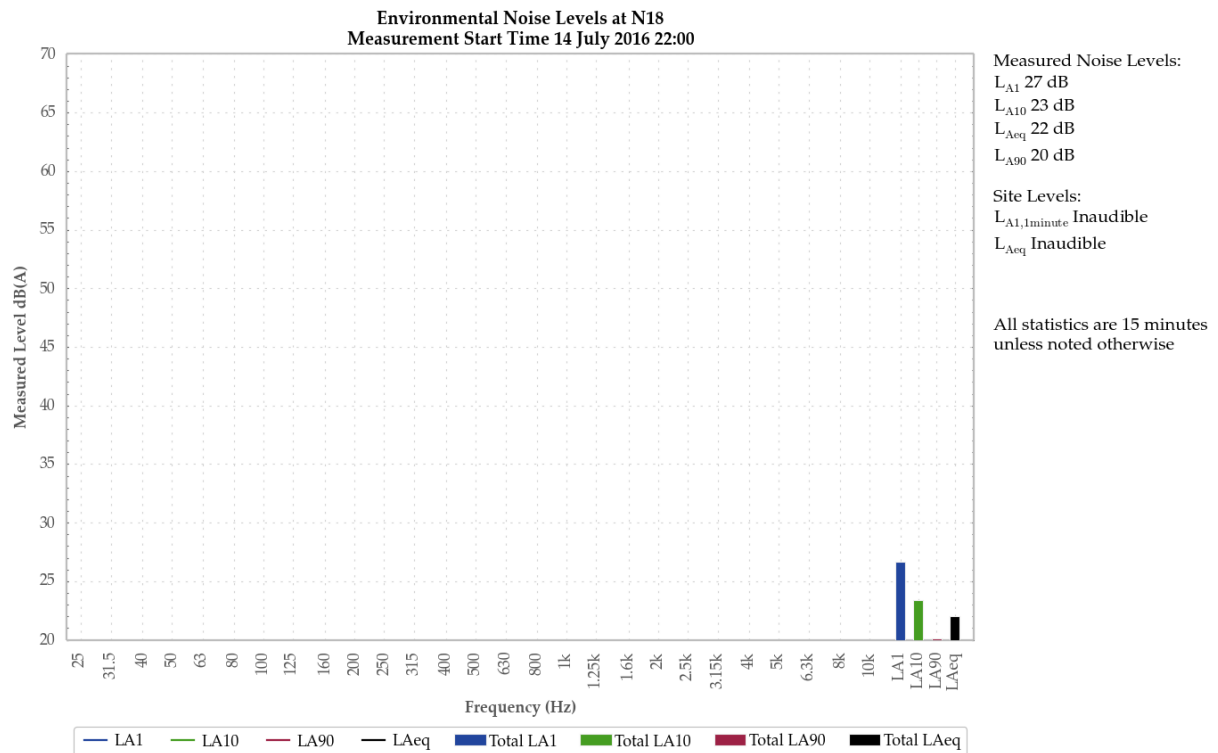


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible during the measurement.

Frogs generated all measured levels.

A very low-level local continuum was also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 14/15 July 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the July 2016 monitoring period.

6.2 Low Frequency Assessment

During the July 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

APPENDIX

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 Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{A1}(1\text{ minute})$
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	35	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Temperature inversion conditions greater than 3°C/100m.

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 (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 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:

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in October 2014.

- 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.

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:

- a) an assessment of compliance with noise limits presented in Condition L5.1; and
- b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The noise monitoring program for WCP dated March 2014 and the relevant sections are reproduced below.

6.0 NOISE MONITORING PROGRAM

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 3**. Unattended or real-time monitoring is primarily utilised as a proactive noise control system; providing noise alerts when predetermined noise levels are triggered.

6.1 Monitoring Locations

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 attended monitoring at seven locations (**Table 4, Figure 3 and Figure 4**). Real-time 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 4: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest non-mine owned residence to the West of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest non-mine owned residence to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest non-mine owned residence to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest non-mine owned residence to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest non-mine owned residence to the North-East of the Mine
Barrigan Valley ²	N18	Attended Noise	780033.3	6398618.1	DP&I Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions
Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine

Location	Site	Type	Easting ¹	Northing ¹	Justification
Wandoona ³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

Notes to **Table 4**:

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&I and OEH 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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 4** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&I and the EPA.

6.3.3 Methodology

Attended noise monitoring will be undertaken one night per month by an independent acoustic consultant in accordance with the INP (EPA, 2000) and AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'. Routine 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 3**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environmental and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&I and OEH within 24 hours.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

When determining the noise generated by the Mine, WCPL will monitor the modification factors in Section 4 of the INP (EPA, 2000).

6.3.4 Data Collection

Data and observations are collected in 15 minute periods and the Leq dBA results recorded. The Leq dBC noise levels will also be recorded to assess low frequency noise. All acoustic instrumentation will comply with AS 1259.2-1990 'Acoustics – Sound level meters – Integrating – Averaging'.

Comprehensive field notes will be taken to indicate both mine related and non-mine related noise sources and when they occurred. Notes about maximum mine noise levels (source and times) will also be taken. All percentiles (L_{Amax}, L_{A1}, L_{A10}, L_{A50}, L_{A90}, L_{Amin}, L_{Aeq}) are measured in A weighting.

Where practicable, the L_{A1} measurement will be undertaken at 1 m from the dwelling façade and the L_{Aeq} measurement within 30 m of the dwelling. Where impracticable, measurements will be undertaken at a suitable and representative location as close to the dwelling as practicable.

6.3.5 Evaluation of Compliance

Table 6 summarises the definition used by WCPL for the evaluation of compliance with statutory requirements. WCPL has developed a Compliance Review and Evaluation Process (**Figure 5**) that clearly illustrates when WCPL is deemed to have exceeded the Noise Criteria in **Table 3**.

Table 6: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is recorded when a second attended noise monitoring result, taken with 75 minutes of the first result and in accordance with the INP, exceeds the Noise Criteria in Table 3 . The noise must be solely attributable to WCPL and meteorological conditions must be favourable (Figure 5). Reporting requirements for exceedances are detailed in Section 9.1 .

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 5.5°C/100 m.

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

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

6.3.6 Response to Exceedance

Where any exceedance of the Noise Criteria and/or performance measures has occurred, WCPL will, at the earliest opportunity:

- Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- Consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action (**Section 9.1**);
- Implement remediation measures as directed by the Director-General; and
- Review and, if necessary, revise this Management Plan (refer **Section 10.0**),

to the satisfaction of the Director-General.

APPENDIX

B CALIBRATION CERTIFICATES



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www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2006

Calibration Certificate

Calibration Number C16323

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 : 21.4°C
Relative Humidity : 37.5%
Barometric Pressure : 100.19kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 21.4°C
Relative Humidity : 37.5%
Barometric Pressure : 100.23kPa

Calibration Technician : Calvin
Simpfendorfer
Calibration Date : 28/06/2016

Secondary Check: Riley Cooper
Report Issue Date : 30/06/2016

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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		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.

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Sound Calibrator

IEC 60942-2004

Calibration Certificate

Calibration Number C15670

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

Equipment Tested/ Model Number : Pulsar 106
Instrument Serial Number : 57413

Atmospheric Conditions

Ambient Temperature : 22°C
Relative Humidity : 54.8%
Barometric Pressure : 99.85kPa

Calibration Technician : Corey Stewart
Calibration Date : 23/12/2015
Secondary Check: Tim Williams
Report Issue Date : 23/12/2015

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
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 60942:2004 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 ±0.09dB	Temperature ±0.3°C
Short Term Fluct. ±0.02dB	Relative Humidity ±4.1%
Frequency ±0.01%	Barometric Pressure ±0.1kPa
Distortion ±0.51%	

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



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**Sound Level Meter
IEC 61672-3.2006**

Calibration Certificate

Calibration Number C15226

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 : 20°C
Relative Humidity : 55.7%
Barometric Pressure : 99.62kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 21.6°C
Relative Humidity : 53%
Barometric Pressure : 99.82kPa

Calibration Technician : Dennis Kim
Calibration Date : 22/05/2015

Secondary Check: Sandra Minto
Report Issue Date : 25/05/2015

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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	±0.3°C
31.5 Hz to 8kHz	±0.120dB	Relative Humidity	±4.1%
12.5kHz	±0.165dB	Barometric Pressure	±0.1kPa
16kHz	±0.245dB		
Electrical Tests			
31.5 Hz to 20 kHz	±0.121dB		

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 C16383


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 : 20.9°C
Relative Humidity : 39.8%
Barometric Pressure : 99.08kPa

Calibration Technician : Dennis Kim
Calibration Date : 25/07/2016
Secondary Check: Sandra Minto
Report Issue Date : 25/07/2016

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	1000.34

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	±0.09dB	Temperature	±0.05°C
Short Term Fluct.	±0.02dB	Relative Humidity	±0.46%
Frequency	±0.01%	Barometric Pressure	±0.017kPa
Distortion	±0.51%		

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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PAGE 1 OF 1

Wilpinjong Coal

*Environmental Noise Monitoring
August 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*

Global 
Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring August 2016

Reference: 16273_R01

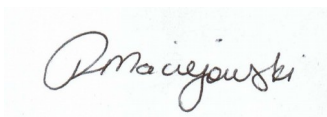
Report date: 25 August 2016

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: Ronni Maciejowski
Acoustics Technician



QA Review: Katie Weekes
Environmental Scientist (Acoustics)

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.

A modification (MOD5) to the WCP consent was approved in November 2014. 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, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 4/5 August 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the August 2016 monitoring.

Low Frequency Assessment

During the August 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). No further assessment of low frequency noise was undertaken.

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 of 4/5 August 2016. Figure 1 shows the regular monitoring locations.

The purpose of the 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 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	'Coonaroo' off Moolarben Road
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley

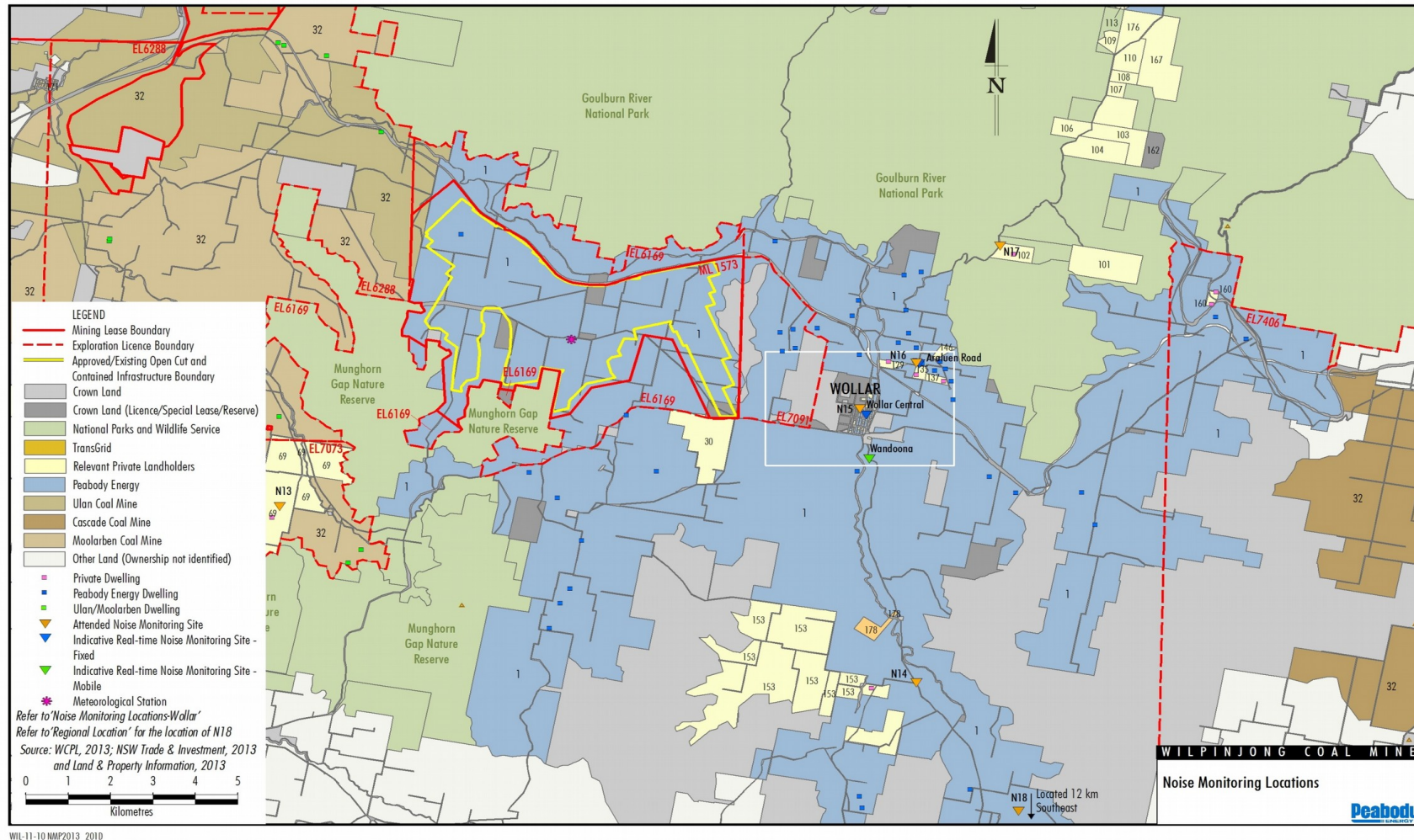


Figure 1: WCP Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the 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 in July 2016. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in May 2016. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/100m.

2.5 EPL Criteria and Weather Conditions

Criteria detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to be applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L _{Ceq}	>60	>65
INP	Site only L _{Ceq} minus site only L _{Aeq}	>=15	>=15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a Draft Industrial Noise Guideline (ING) was released in September 2015, low frequency noise results from WCP have been compared to the assessment methods and modifying factor triggers presented above. The applicability of these triggers have been considered when applying low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

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

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency noise from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

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 A.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	00370304	29/05/2017
Larson Davis CAL150 acoustic calibrator	3333	06/08/2017

4 RESULTS

4.1 Attended Noise Monitoring

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 LEVELS¹ – AUGUST 2016¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	04/08/2016 23:16	45	35	30	26	28	25	23	37
N13	05/08/2016 01:30	47	38	37	34	34	30	28	47
N14	04/08/2016 22:47	42	33	25	22	24	21	20	34
N15	04/08/2016 23:38	39	31	26	23	24	22	20	39
N16	05/08/2016 00:43	51	39	37	26	31	18	16	52
N17	05/08/2016 00:10	34	26	18	15	17	15	14	21
N18	04/08/2016 22:10	44	34	29	27	27	25	24	35

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during August 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – AUGUST 2016

Conditions	Total for August 2016
Number of measurements	7
Number of measurements where met applied (in accordance with project approval)	4
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – AUGUST 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	04/08/2016 23:16	0	2.8	35	Yes	IA	Nil
N13	05/08/2016 01:30	0.6	2.6	36	Yes	27	Nil
N14	04/08/2016 22:47	1.1	3.4	35	No	IA	NA
N15	04/08/2016 23:38	0.0	2.8	35	Yes	IA	Nil
N16	05/08/2016 00:43	0.0	4.0	37	No	IA	NA
N17	05/08/2016 00:10	0.0	3.4	35	No	IA	NA
N18	04/08/2016 22:10	1.3	0.2	35	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: *L_{A1,1minute}* GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – AUGUST 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP <i>L_{A1,1min}</i> dB ^{4,5}	Exceedance ⁶
N6	04/08/2016 23:16	0	2.8	45	Yes	IA	Nil
N13	05/08/2016 01:30	0.6	2.6	45	Yes	31	Nil
N14	04/08/2016 22:47	1.1	3.4	45	No	IA	NA
N15	04/08/2016 23:38	0.0	2.8	45	Yes	IA	Nil
N16	05/08/2016 00:43	0.0	4.0	45	No	IA	NA
N17	05/08/2016 00:10	0.0	3.4	45	No	IA	NA
N18	04/08/2016 22:10	1.3	0.2	45	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times (in fact, mostly inaudible) no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – AUGUST 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	04/08/2016 23:16	0	2.8	35	Yes	IA	Nil
N13	05/08/2016 01:30	0.6	2.6	35	Yes	27	Nil
N14	04/08/2016 22:47	1.1	3.4	35	No	IA	NA
N15	04/08/2016 23:38	0.0	2.8	36	Yes	IA	Nil
N16	05/08/2016 00:43	0.0	4.0	35	No	IA	NA
N17	05/08/2016 00:10	0.0	3.4	35	No	IA	NA
N18	04/08/2016 22:10	1.3	0.2	35	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – AUGUST 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	04/08/2016 23:16	0	2.8	45	Yes	IA	Nil
N13	05/08/2016 01:30	0.6	2.6	45	Yes	31	Nil
N14	04/08/2016 22:47	1.1	3.4	45	No	IA	NA
N15	04/08/2016 23:38	0.0	2.8	45	Yes	IA	Nil
N16	05/08/2016 00:43	0.0	4.0	45	No	IA	NA
N17	05/08/2016 00:10	0.0	3.4	45	No	IA	NA
N18	04/08/2016 22:10	1.3	0.2	45	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – AUGUST 2016

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	04/08/2016 23:16	7	-	-	0
N13	05/08/2016 01:30	5	-	-	0
N14	04/08/2016 22:47	7	-	-	0
N15	04/08/2016 23:38	4	-	-	0
N16	05/08/2016 00:43	5	-	-	0
N17	05/08/2016 00:10	7	-	-	0
N18	04/08/2016 22:10	6	0.4	130	0

Notes:

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

Data obtained concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees ^{2,4}	Lapse Rate Degrees / 100 metres ³
04/08/16 22:00	2.2	159	0.2
04/08/16 22:15	2.0	156	0.0
04/08/16 22:30	1.3	159	0.2
04/08/16 22:45	0.9	348	2.4
04/08/16 23:00	1.1	327	3.4
04/08/16 23:15	0.7	294	3.2
04/08/16 23:30	0.0	-	2.8
04/08/16 23:45	0.0	-	3.0
05/08/16 00:00	0.0	-	2.8
05/08/16 00:15	0.6	266	3.2
05/08/16 00:30	0.0	-	3.4
05/08/16 00:45	0.7	355	4.0
05/08/16 01:00	0.0	-	4.0
05/08/16 01:15	0.8	74	3.0
05/08/16 01:30	0.7	325	2.8
05/08/16 01:45	0.6	260	2.6
05/08/16 02:00	0.6	328	3.0

Notes:

1. Data supplied by WCP;
2. "-" in wind direction column indicates that conditions were calm;
3. Lapse rate sourced from the WCP inversion tower; and
4. NA indicates data not available/recorded.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

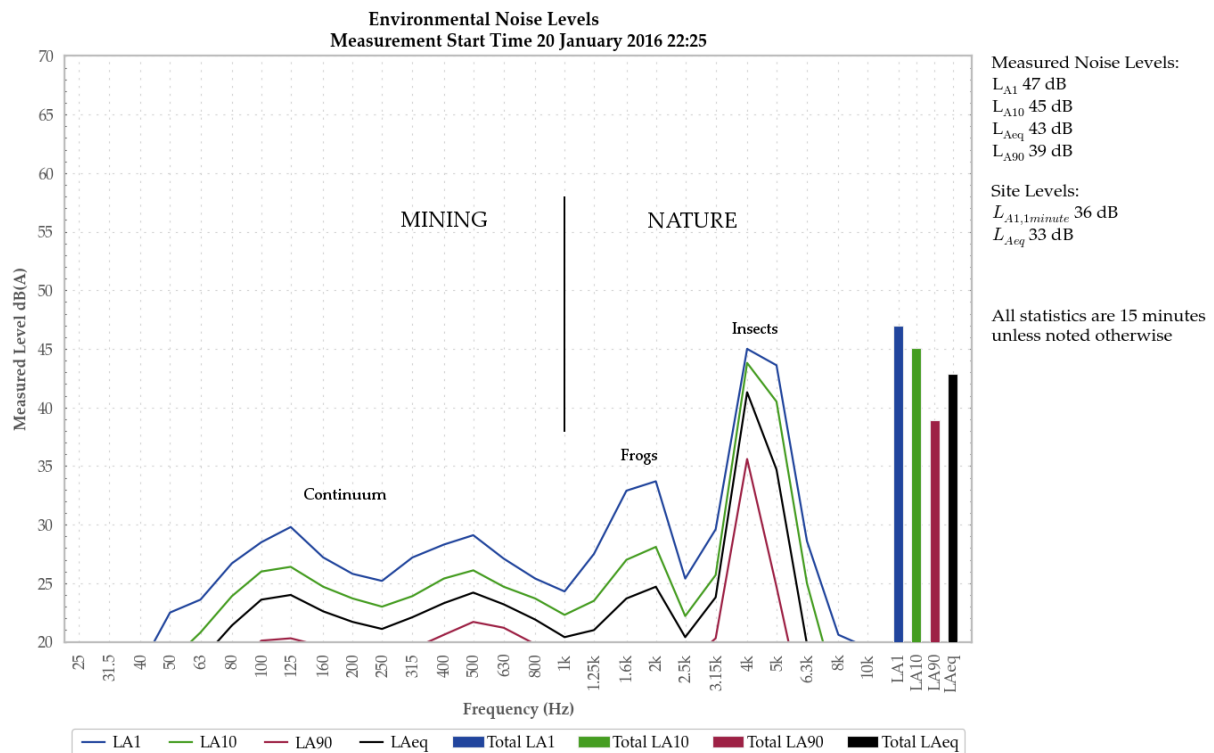


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 4 August 2016

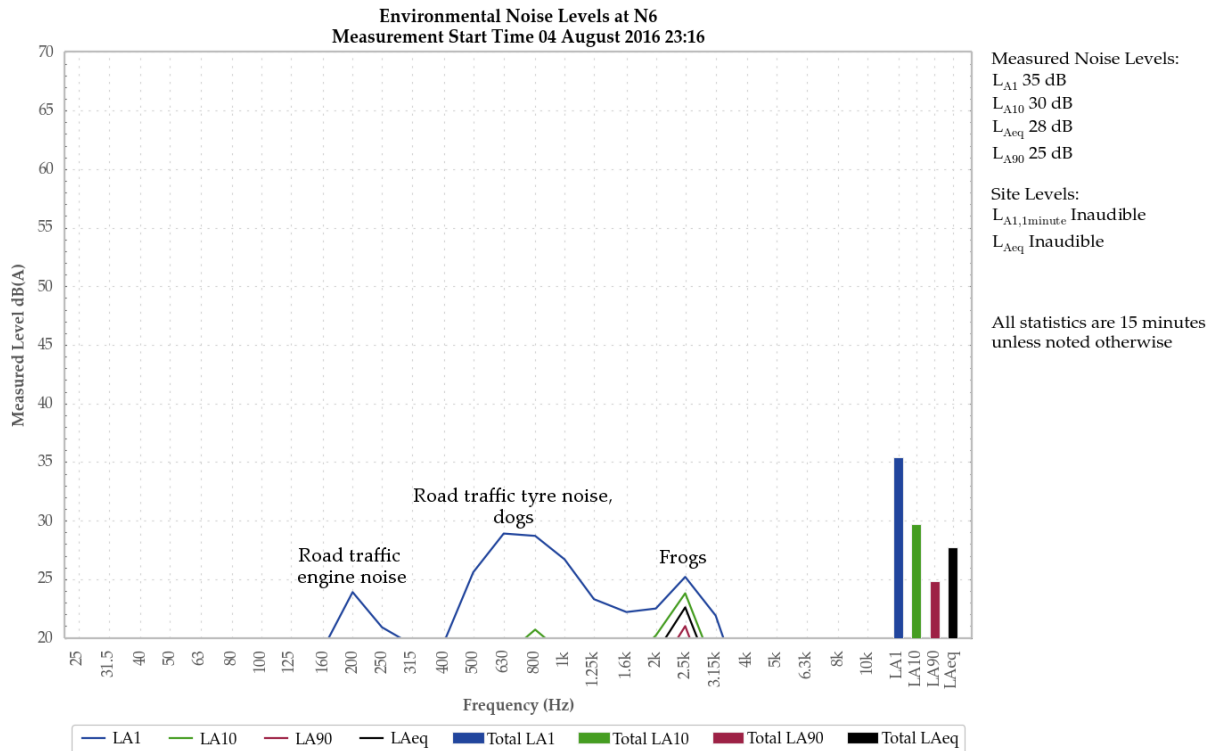


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was inaudible during the measurement.

Dogs and road traffic tyre noise were primary contributors to the measured LA1.

Frogs generated the measured LAeq, LA10 and LA90.

Road traffic engine noise and cows were also noted.

5.1.2 N13, 5 August 2016

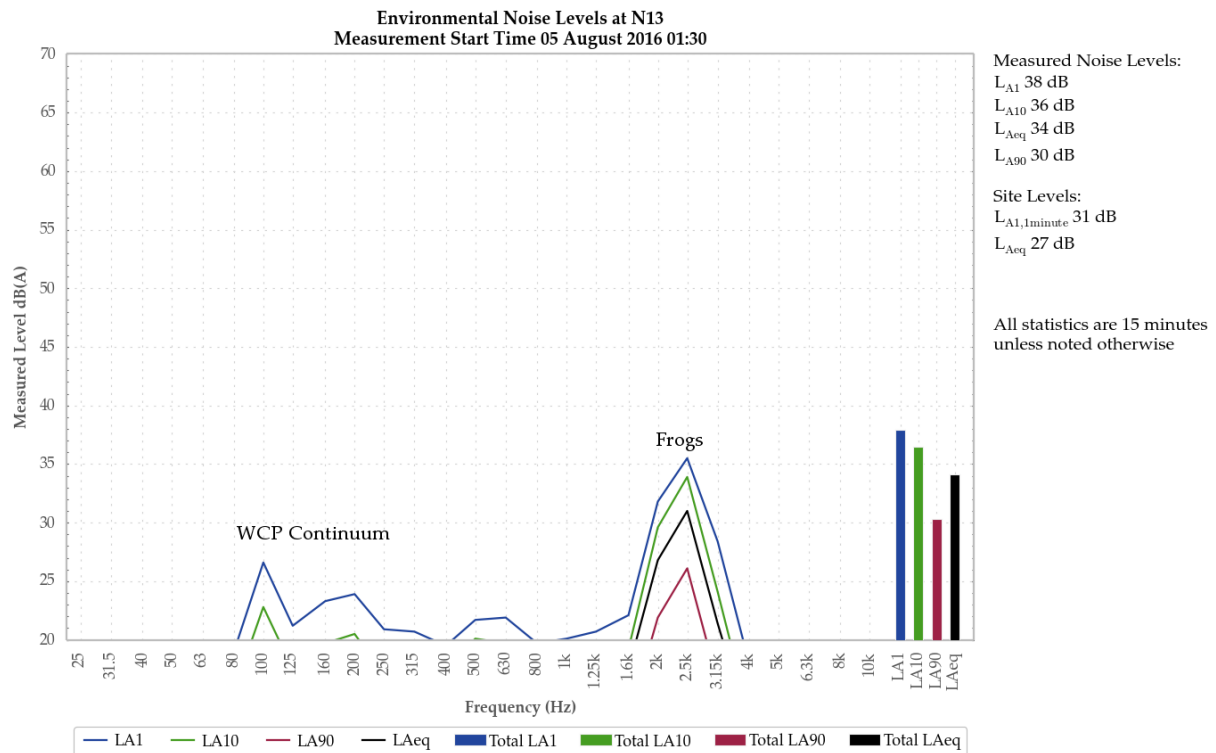


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

A continuum, consisting of mostly rear dump truck noise, from WCP was audible during the measurement, generating a site only LAeq of 27 dB, and an LA1,1minute of 31 dB.

Frogs were primarily responsible for all measured levels.

Breeze in foliage was also noted.

5.1.3 N14, 4 August 2016

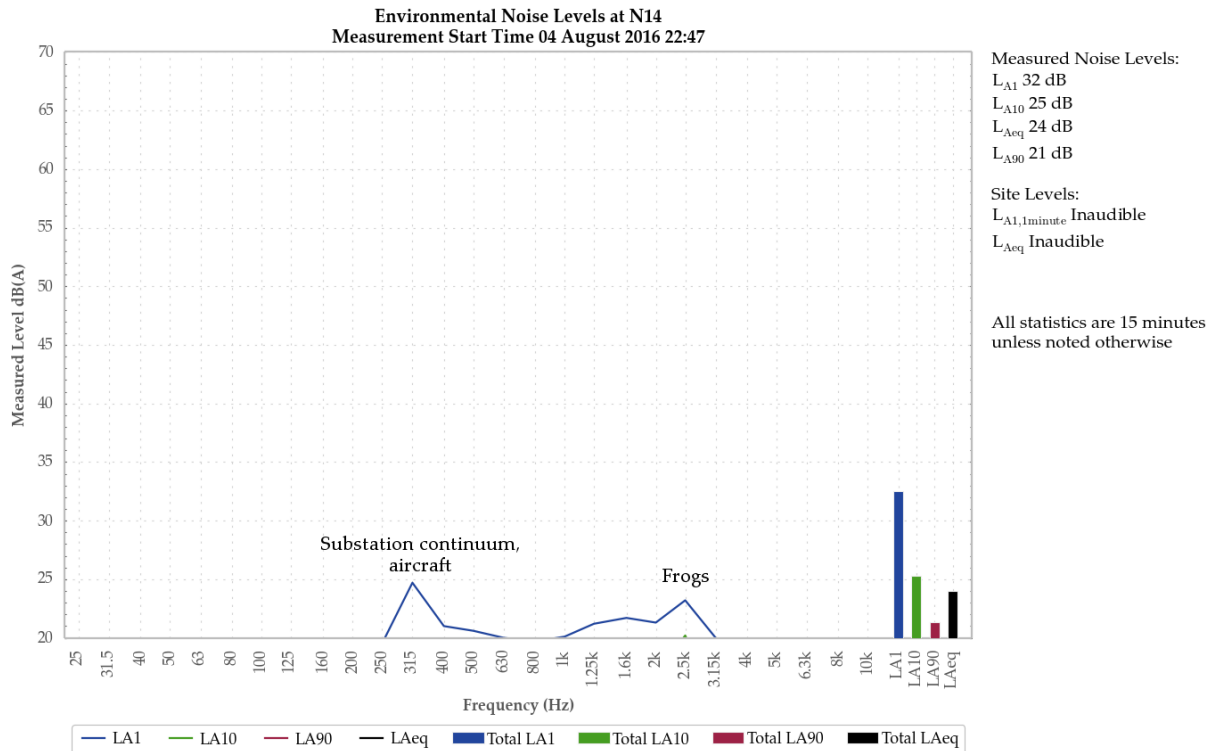


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible during the measurement.

Frogs were responsible for the LA90 and contributed to the total measured LA1, LA10 and LAeq.

A continuum from a nearby substation and an aircraft also contributed to the LA1.

Low-level noise from birds splashing in a dam, dogs and cows were also noted.

5.1.4 N15, 4 August 2016

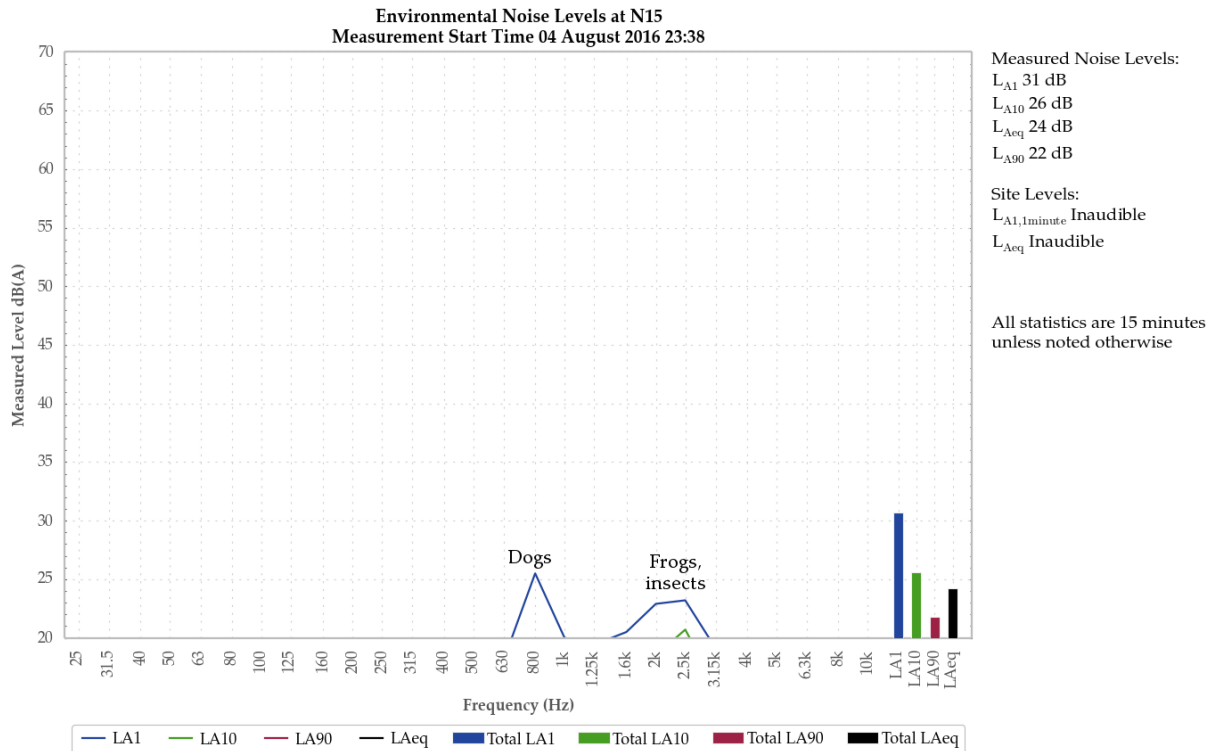


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible during the measurement.

Frogs and insects were primarily responsible for measured levels. Dogs contributed to the measured LA1.

Sheep were also noted.

5.1.5 N16, 5 August 2016

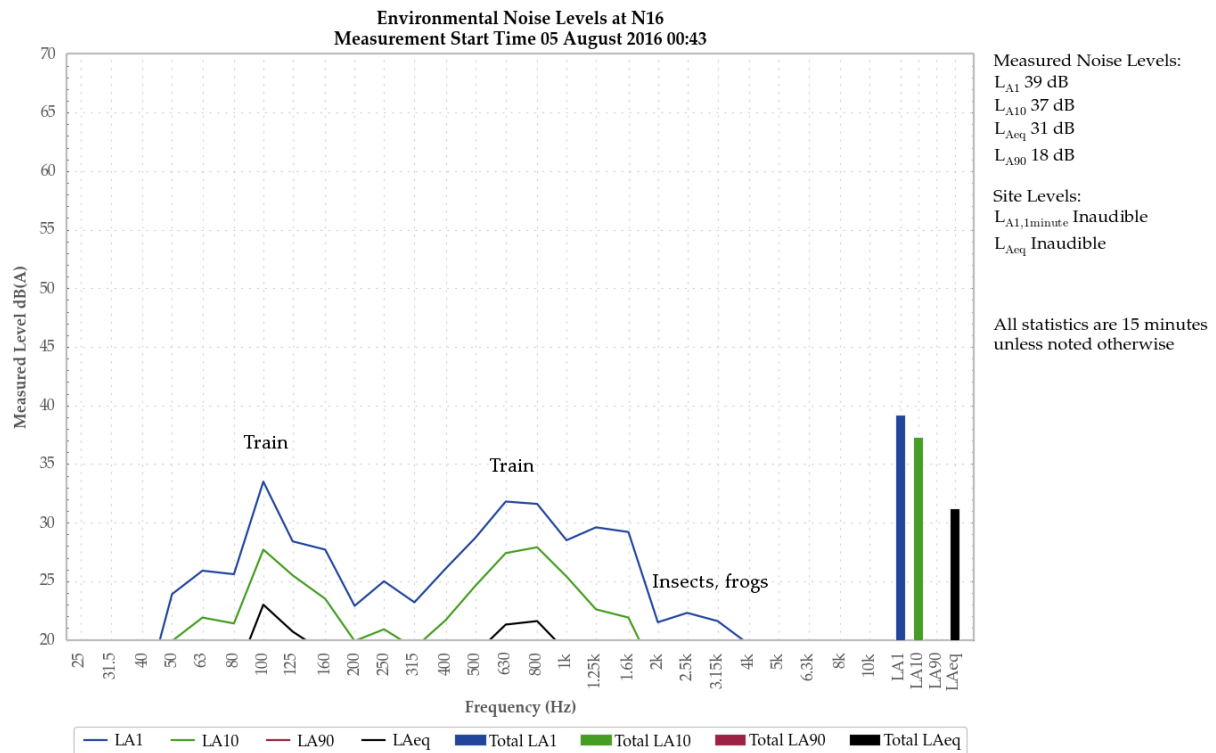


Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible during the measurement.

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

Frogs and insects generated the measured L_{A90} .

A train horn was also noted.

5.1.6 N17, 5 August 2016

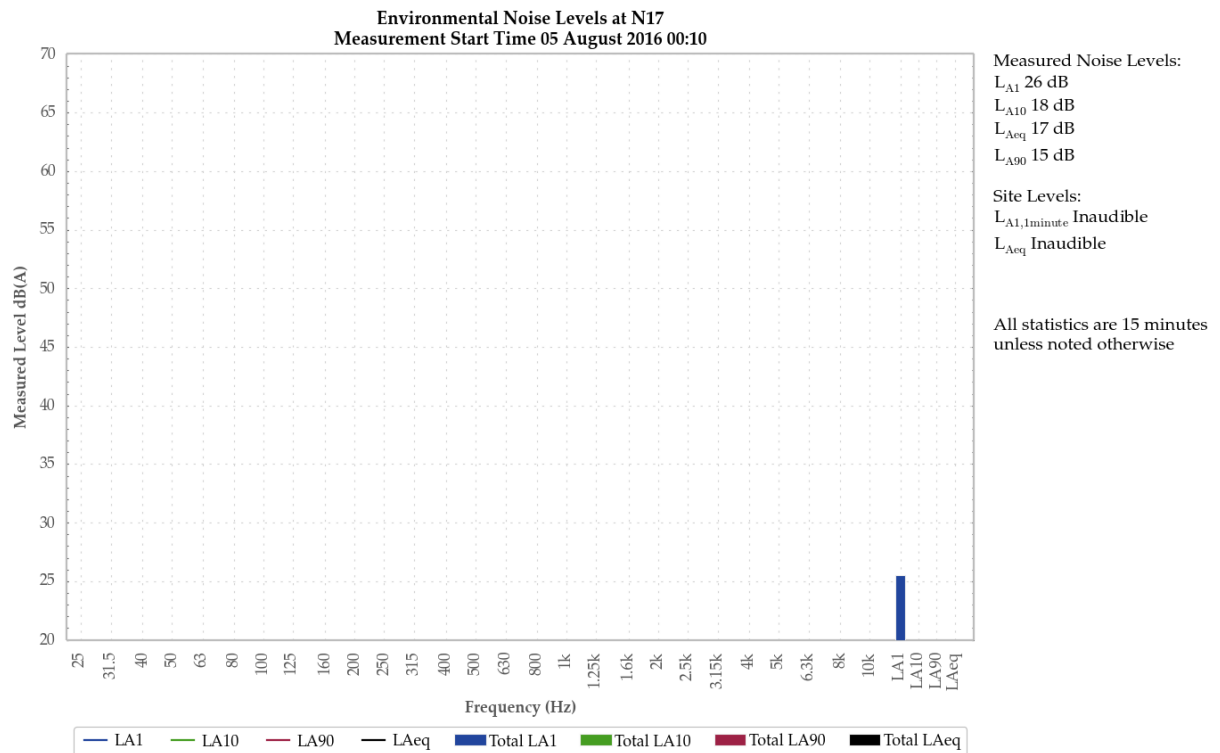


Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible during the measurement.

A bird, frogs and low-level traffic noise were noted. The floor of the sound level meter contributed to measured levels.

5.1.7 N18, 4 August 2016

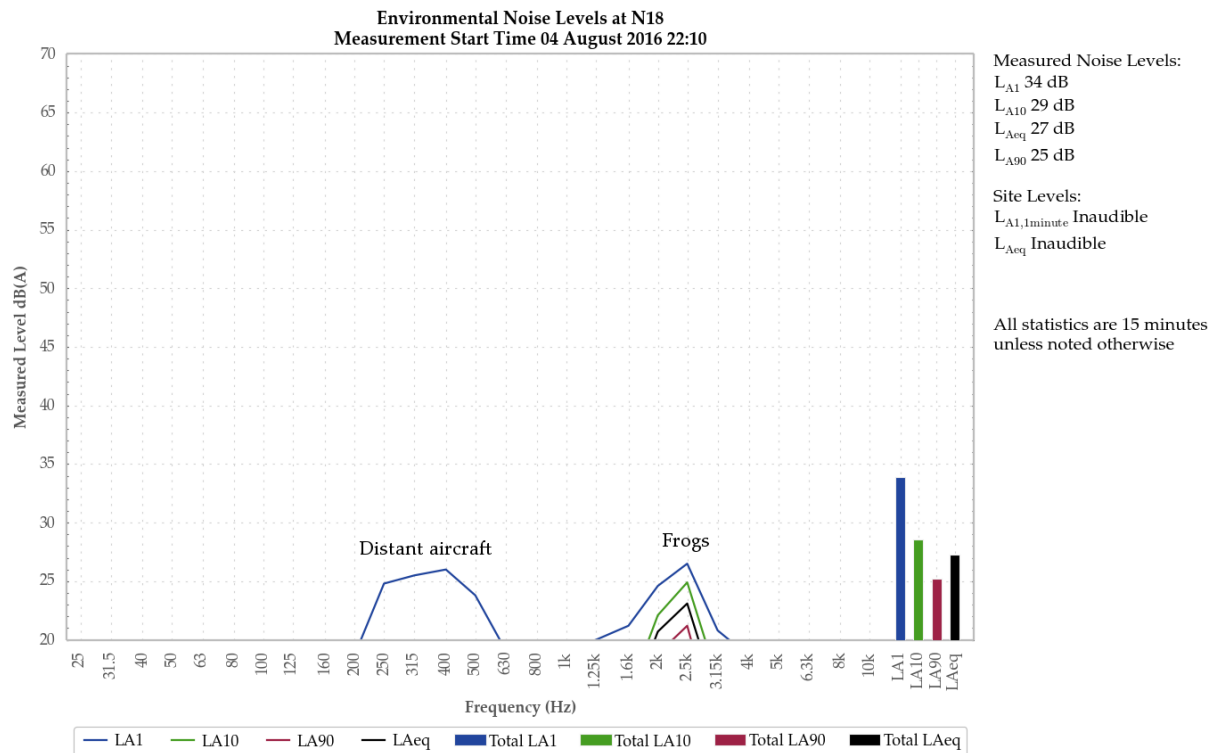


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible during the measurement.

Frogs primarily generated measured levels. A distant aircraft also contributed to the L_{A1}.

Distant running water was also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 4/5 August 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the August 2016 monitoring period.

6.2 Low Frequency Assessment

During the August 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

APPENDIX

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 Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{A1}(1\text{ minute})$
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in July 2016.

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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	36	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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
- Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- Temperature inversion conditions greater than 3°C/100m.

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

- The meteorological data to be used for determining meteorological conditions is the data recorded by the meteorological weather station identified as EPA identification Point 21 in condition P1.1; and
- Temperature inversion conditions (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 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.

R4 Other reporting conditions

- R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:
- a) an assessment of compliance with noise limits presented in Condition L5.1; and
 - b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The relevant sections of the noise monitoring program for WCP dated May 2016 are reproduced below.

6 Noise Monitoring Program

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 4**. Unattended or real-time 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

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 attended monitoring at up to seven locations (**Table 5, Figure 3 and Figure 4**). Real-time 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 5: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest community structure to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
Barrigan Valley²	N18	Attended Noise	780033.3	6398618.1	DP&E Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions

Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine
Wandoona³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 5** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&E and the EPA.

6.3 Attended Noise Monitoring

6.3.1 Purpose

Attended noise monitoring will be used to evaluate compliance against the Noise Criteria detailed in **Table 4**.

6.3.2 Summary

Attended noise will be undertaken in accordance with **Table 6**.

Table 6: Attended Noise Monitoring Summary

Element	Description
Locations	As per Table 5, Figure 3 and Figure 4
Period	Night-time period (10 pm-7 am) being the most sensitive time period for noise.
Frequency	12 times per year and on one night per month

6.3.3 Methodology

Attended noise monitoring will be undertaken as outlined in **Table 6** by an independent acoustic consultant in accordance with the INP (EPA, 2000) and *AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'*. Routine 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 4**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environment and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&E and EPA immediately, upon confirming the exceedance.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

6.3.4 Data Collection

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

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

6.3.5 Evaluation of Compliance

Tables 7 and 8 summarises the definition used by WCPL in this NMP for the evaluation of compliance with the Project Approval. The reporting requirements and actions that WCPL will take in the event of an exceedance or non-compliance are detailed in Figure 5 and Section 6.3.7.

Table 7: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is deemed to have occurred when an attended noise monitoring result, taken in accordance with the INP and Project Approval, exceeds the Noise Criteria in Table 4 . The noise must be solely attributable to WCPL and meteorological conditions must be favourable (6.3.6).
Non-compliance	A non-compliance is deemed to have occurred when a second attended noise monitoring result, taken within 75 minutes of an exceedance and in accordance with the INP and Project Approval, exceeds the Noise Criteria in Table 4 for a second time. The noise must be solely attributable to WCPL and meteorological conditions must be favourable (6.3.6). Reporting requirements for a non-compliance are detailed in Section 6.3.7 .

6.3.6 Favourable Meteorological Conditions

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 3°C/100m.

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

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

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria has occurred, WCPL will, at the earliest opportunity:

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

APPENDIX

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 61672-3.2006

Calibration Certificate

Calibration Number C15250

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 : 480505
Pre-amplifier Serial Number : 60313

Pre-Test Atmospheric Conditions
Ambient Temperature : 21.2°C
Relative Humidity : 52.5%
Barometric Pressure : 99.94kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 21.6°C
Relative Humidity : 51.1%
Barometric Pressure : 99.94kPa

Calibration Technician : Dennis Kim
Calibration Date : 29/05/2015

Secondary Check: Sandra Minto
Report Issue Date : 01/06/2015

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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	±0.120dB	Temperature	±0.3°C
12.5kHz	±0.165dB	Relative Humidity	±4.1%
16kHz	±0.245dB	Barometric Pressure	±0.1kPa
Electrical Tests			
31.5 Hz to 20 kHz	±0.121dB		

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.

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**Sound Calibrator
IEC 60942-2004**

Calibration Certificate

Calibration Number C15396

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

Equipment Tested/ Model Number : Larson Davis CAL150
Instrument Serial Number : 3333

Atmospheric Conditions

Ambient Temperature : 23.1°C
Relative Humidity : 30.1%
Barometric Pressure : 99.51kPa

Calibration Technician : Dennis Kim **Secondary Check:** Kate Alchin
Calibration Date : 06/08/2015 **Report Issue Date :** 07/08/2015

Approved Signatory :  Juan Aguero

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

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.

Specific Tests		Least Uncertainties of Measurement - Environmental Conditions	
Generated SPL	±0.09dB	Temperature	±0.3°C
Short Term Fluct.	±0.02dB	Relative Humidity	±4.1%
Frequency	±0.01%	Barometric Pressure	±0.1kPa
Distortion	±0.26%		

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.

PAGE 1 OF 1

Wilpinjong Coal

*Environmental Noise Monitoring
September 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*


Global
Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring September 2016

Reference: 16322_R01

Report date: 27 October 2016

Prepared for

Wilpinjong Coal Pty Ltd
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Prepared by

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Thornton NSW 2322



Prepared: Jonathan Erasmus
Acoustics Technician



QA Review: Katie Weekes
Environmental Scientist (Acoustics)

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.

A modification (MOD5) to the WCP consent was approved in November 2014. 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, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 7/8 September 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the September 2016 monitoring.

Low Frequency Assessment

During the September 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). No further assessment of low frequency noise was undertaken.

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 of 7/8 September 2016. Figure 1 shows the regular monitoring locations.

The purpose of the 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 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	'Coonaroo' off Moolarben Road
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley

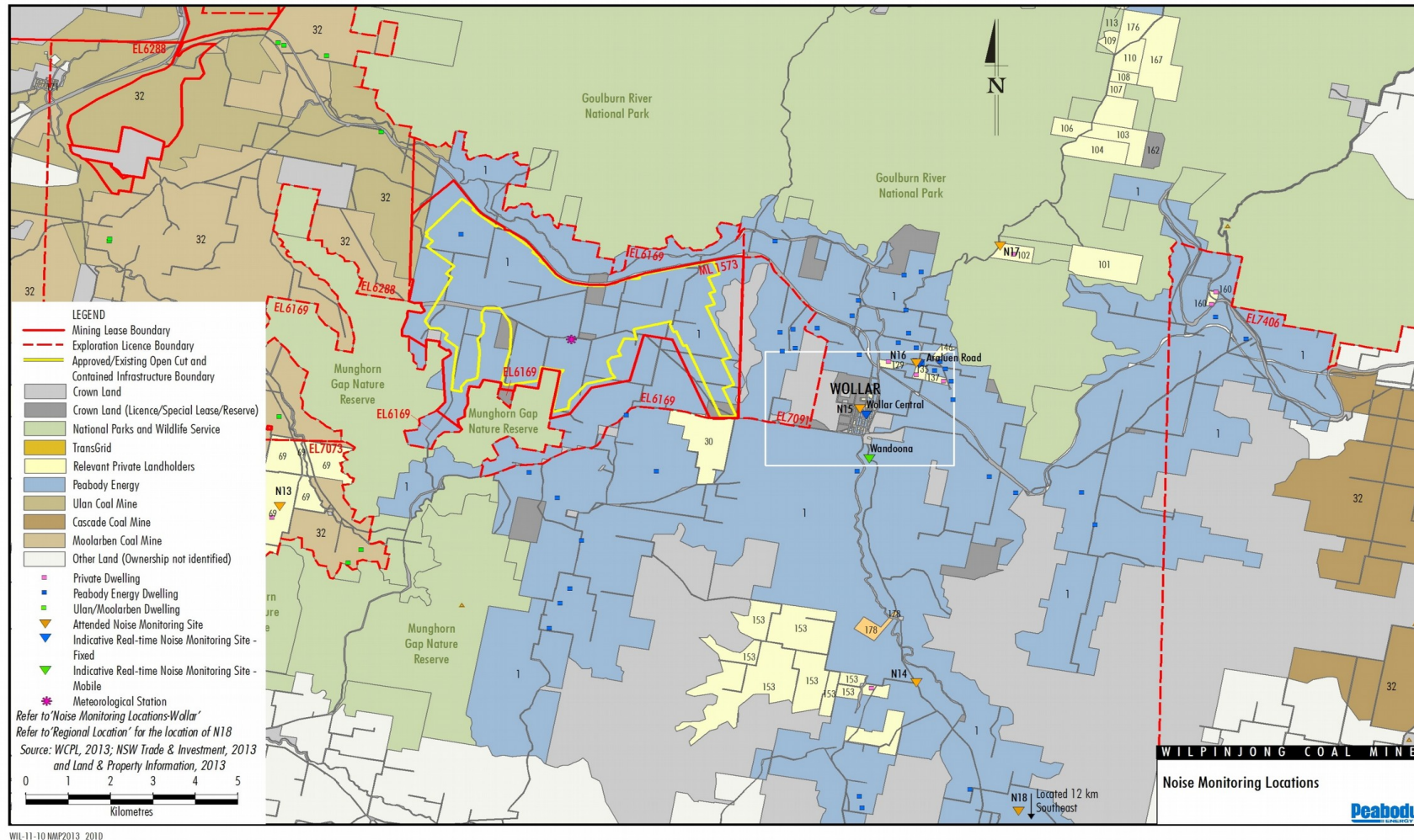


Figure 1: WCP Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the 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 in July 2016. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in May 2016. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/100m.

2.5 EPL Criteria and Weather Conditions

Criteria detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to be applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L _{Ceq}	>60	>65
INP	Site only L _{Ceq} minus site only L _{Aeq}	>=15	>=15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a Draft Industrial Noise Guideline (ING) was released in September 2015, low frequency noise results from WCP have been compared to the assessment methods and modifying factor triggers presented above. The applicability of these triggers have been considered when applying low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

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

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency noise from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

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 A.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	0107590	06/11/2017
Pulsar 106 acoustic calibrator	57413	23/12/2017

4 RESULTS

4.1 Attended Noise Monitoring

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 LEVELS¹ – SEPTEMBER 2016¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	07/09/2016 23:18	52	38	34	32	32	30	28	41
N13	08/09/2016 01:27	46	40	39	37	37	35	32	49
N14	07/09/2016 23:45	44	36	33	30	31	29	27	39
N15	07/09/2016 22:58	60	55	50	36	46	32	30	61
N16	07/09/2016 22:32	46	37	32	30	31	28	26	36
N17	07/09/2016 22:00	42	34	29	27	28	27	25	36
N18	08/09/2016 00:23	52	37	31	30	31	29	28	37

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during September 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – SEPTEMBER 2016

Conditions	Total for September 2016
Number of measurements	7
Number of measurements where meteorological conditions applied (in accordance with project approval)	0
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – SEPTEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	07/09/2016 23:18	0.8	6.8	35	No	IA	NA
N13	08/09/2016 01:27	0.5	8.2	36	No	29	NA
N14	07/09/2016 23:45	0.0	7.4	35	No	IA	NA
N15	07/09/2016 22:58	0.0	6.6	35	No	IA	NA
N16	07/09/2016 22:32	0.0	5.8	37	No	IA	NA
N17	07/09/2016 22:00	0.0	6.8	35	No	IA	NA
N18	08/09/2016 00:23	0.0	7.4	35	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: *L_{A1,1minute}* GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – SEPTEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP <i>L_{A1,1min}</i> dB ^{4,5}	Exceedance ⁶
N6	07/09/2016 23:18	0.8	6.8	45	No	IA	NA
N13	08/09/2016 01:27	0.5	8.2	45	No	33	NA
N14	07/09/2016 23:45	0.0	7.4	45	No	IA	NA
N15	07/09/2016 22:58	0.0	6.6	45	No	IA	NA
N16	07/09/2016 22:32	0.0	5.8	45	No	IA	NA
N17	07/09/2016 22:00	0.0	6.8	45	No	IA	NA
N18	08/09/2016 00:23	0.0	7.4	45	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times (in fact, mostly inaudible) no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – SEPTEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	07/09/2016 23:18	0.8	6.8	35	No	IA	NA
N13	08/09/2016 01:27	0.5	8.2	35	No	29	NA
N14	07/09/2016 23:45	0.0	7.4	35	No	IA	NA
N15	07/09/2016 22:58	0.0	6.6	36	No	IA	NA
N16	07/09/2016 22:32	0.0	5.8	35	No	IA	NA
N17	07/09/2016 22:00	0.0	6.8	35	No	IA	NA
N18	08/09/2016 00:23	0.0	7.4	35	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – SEPTEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	07/09/2016 23:18	0.8	6.8	45	No	IA	NA
N13	08/09/2016 01:27	0.5	8.2	45	No	33	NA
N14	07/09/2016 23:45	0.0	7.4	45	No	IA	NA
N15	07/09/2016 22:58	0.0	6.6	45	No	IA	NA
N16	07/09/2016 22:32	0.0	5.8	45	No	IA	NA
N17	07/09/2016 22:00	0.0	6.8	45	No	IA	NA
N18	08/09/2016 00:23	0.0	7.4	45	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – SEPTEMBER 2016

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	07/09/2016 23:18	11	0.9	210	0
N13	08/09/2016 01:27	14	0.4	230	0
N14	07/09/2016 23:45	13	0.0	-	2
N15	07/09/2016 22:58	12	0.0	-	0
N16	07/09/2016 22:32	13	0.6	130	0
N17	07/09/2016 22:00	13	0.0	-	0
N18	08/09/2016 00:23	13	0.4	160	7

Notes:

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

Data obtained concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees ^{2,4}	Lapse Rate Degrees / 100 metres ³
07/09/2016 22:00	1.0	334	6.0
07/09/2016 22:15	0.0	-	6.8
07/09/2016 22:30	0.0	-	6.2
07/09/2016 22:45	0.0	-	5.8
07/09/2016 23:00	0.0	-	4.8
07/09/2016 23:15	0.0	-	6.6
07/09/2016 23:30	0.8	351	6.8
07/09/2016 23:45	0.0	-	6.0
08/09/2016 00:00	0.0	-	7.4
08/09/2016 00:15	0.0	-	7.8
08/09/2016 00:30	0.0	-	7.4
08/09/2016 00:45	0.0	-	7.4
08/09/2016 01:00	0.0	-	7.4
08/09/2016 01:15	0.0	-	7.6
08/09/2016 01:30	0.0	-	8.2
08/09/2016 01:45	0.5	9	8.2
08/09/2016 02:00	0.0	-	7.4

Notes:

1. Data supplied by WCP;
2. "-" in wind direction column indicates that conditions were calm;
3. Lapse rate sourced from the WCP inversion tower; and
4. NA indicates data not available/recorded.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

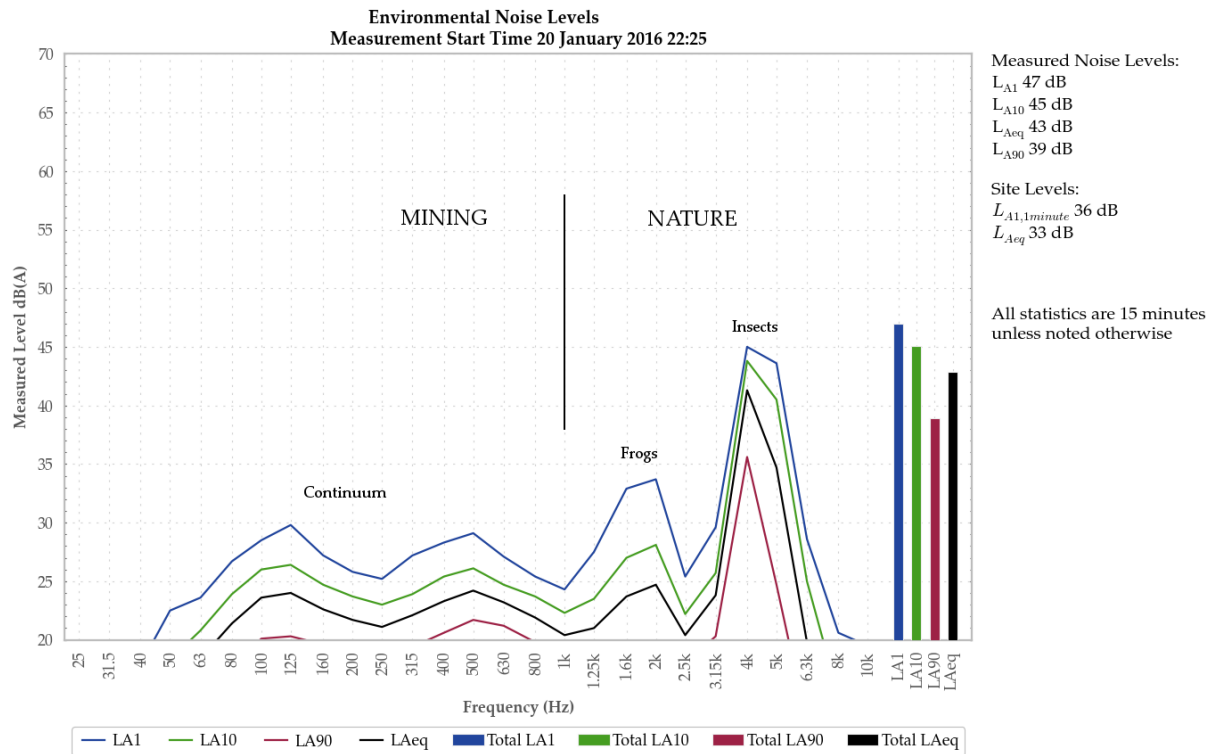


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 7 September 2016

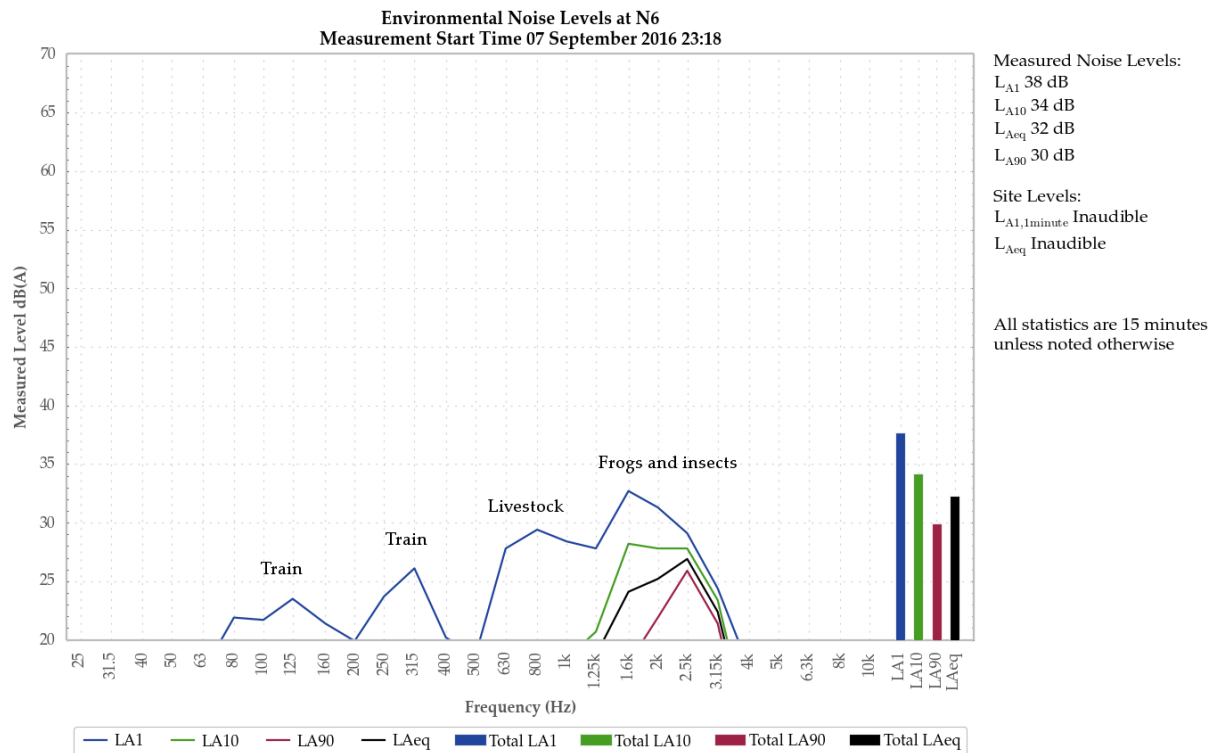


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was inaudible during the measurement.

Frogs and insects generated measured levels.

Livestock and a train were also noted.

5.1.2 N13, 8 September 2016

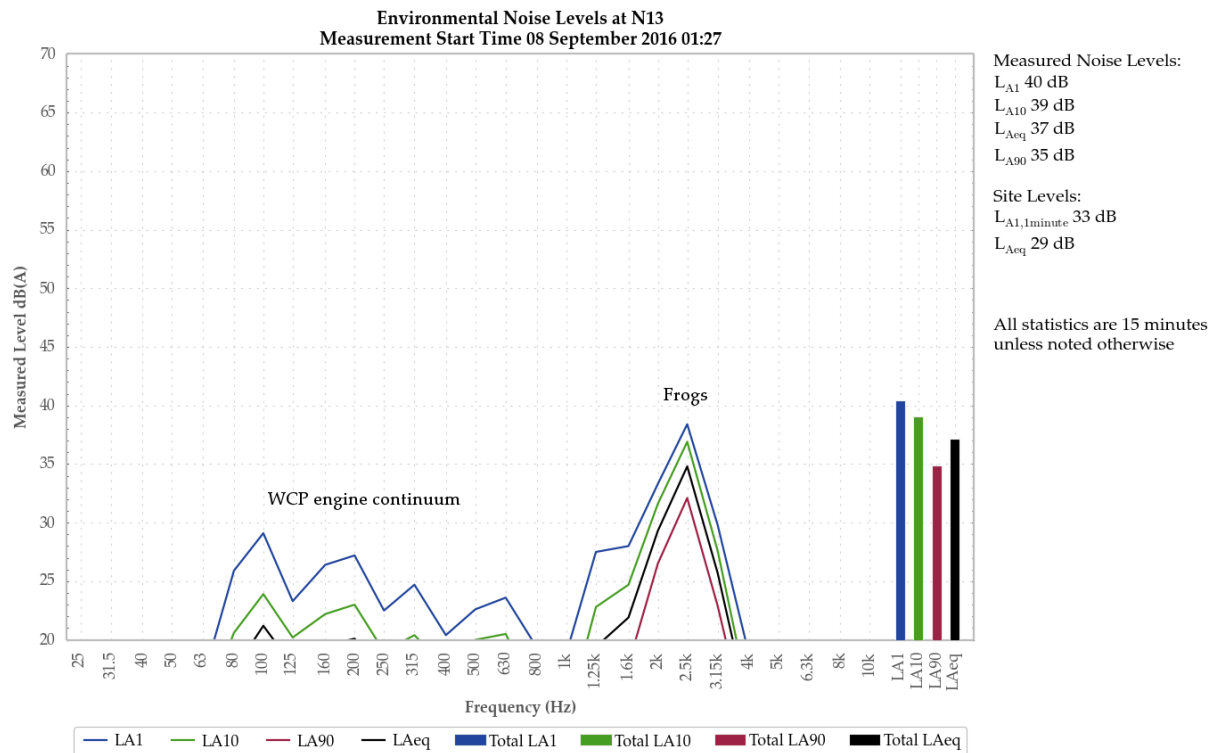


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

A continuum from WCP was audible throughout the measurement generating the site only LAeq of 29 dB and LA1,1minute of 33 dB. Horn noise was also noted.

Frogs primarily generated measured levels. The continuum from WCP was a minor contributor to the measured LA10, LAeq and LA90.

5.1.3 N14, 7 September 2016

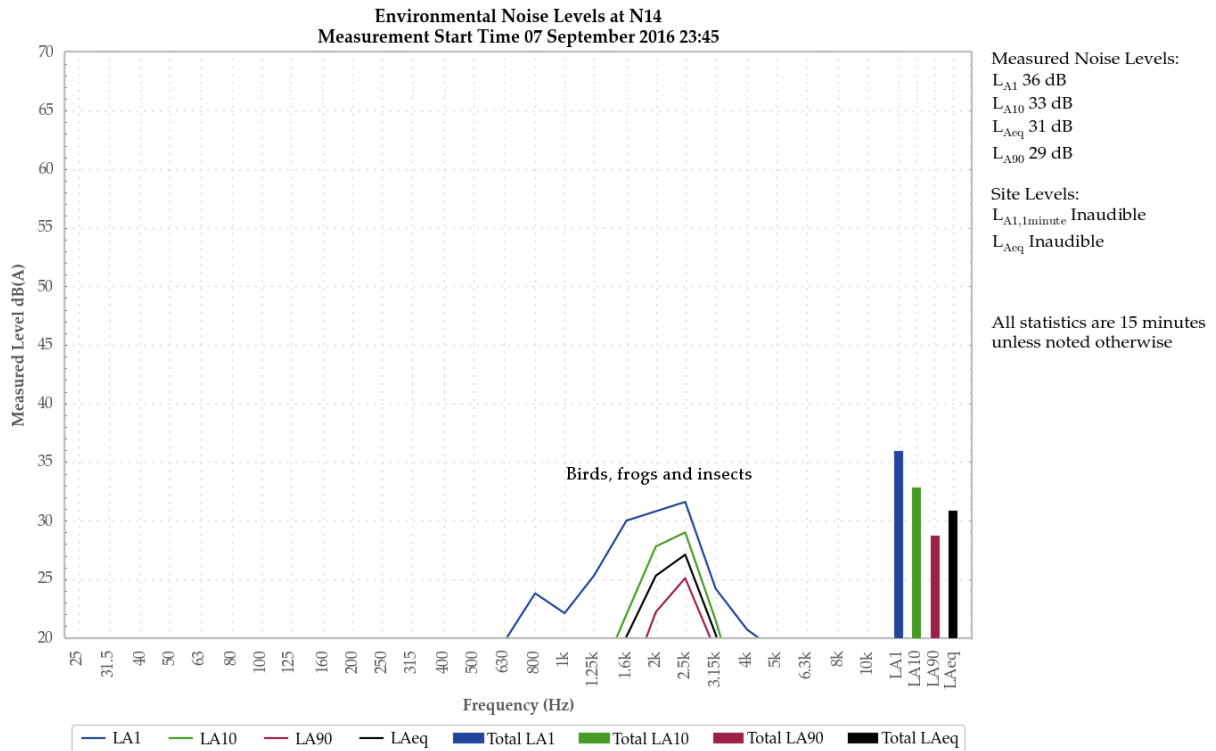


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible during the measurement.

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

A local continuum was also noted at low levels.

5.1.4 N15, 7 September 2016

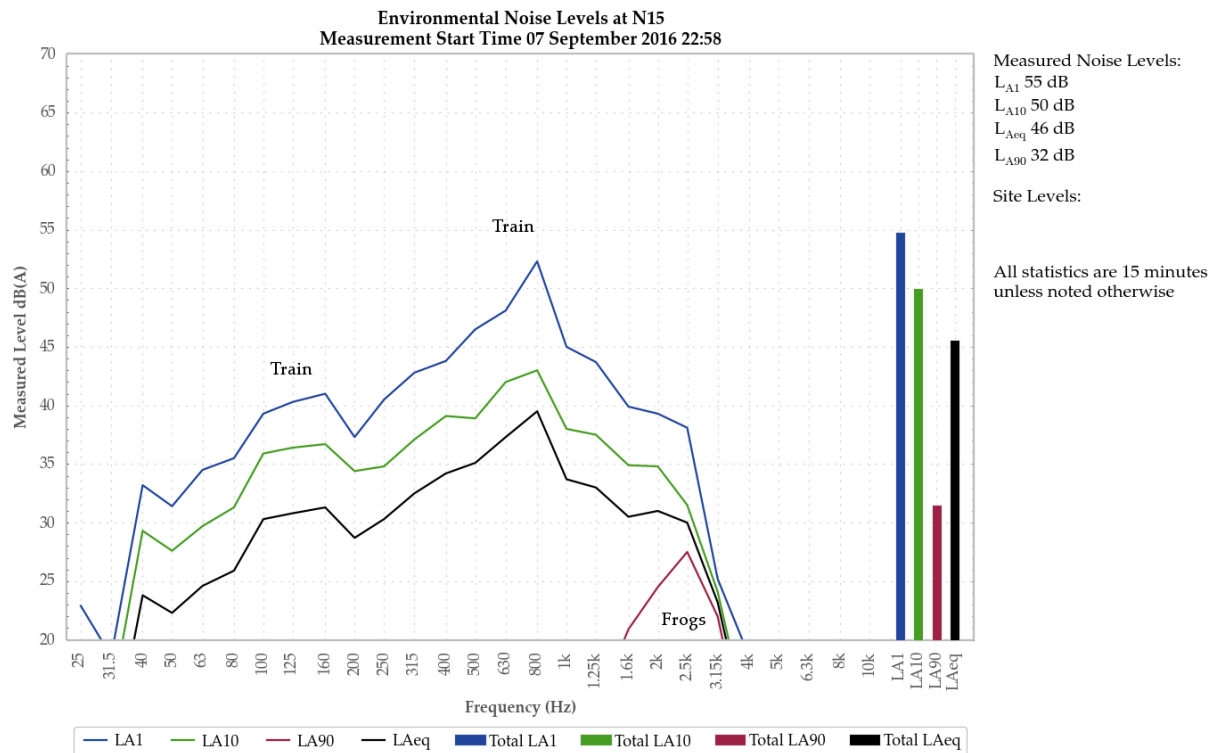


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible during the measurement.

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

Livestock was also noted.

5.1.5 N16, 7 September 2016

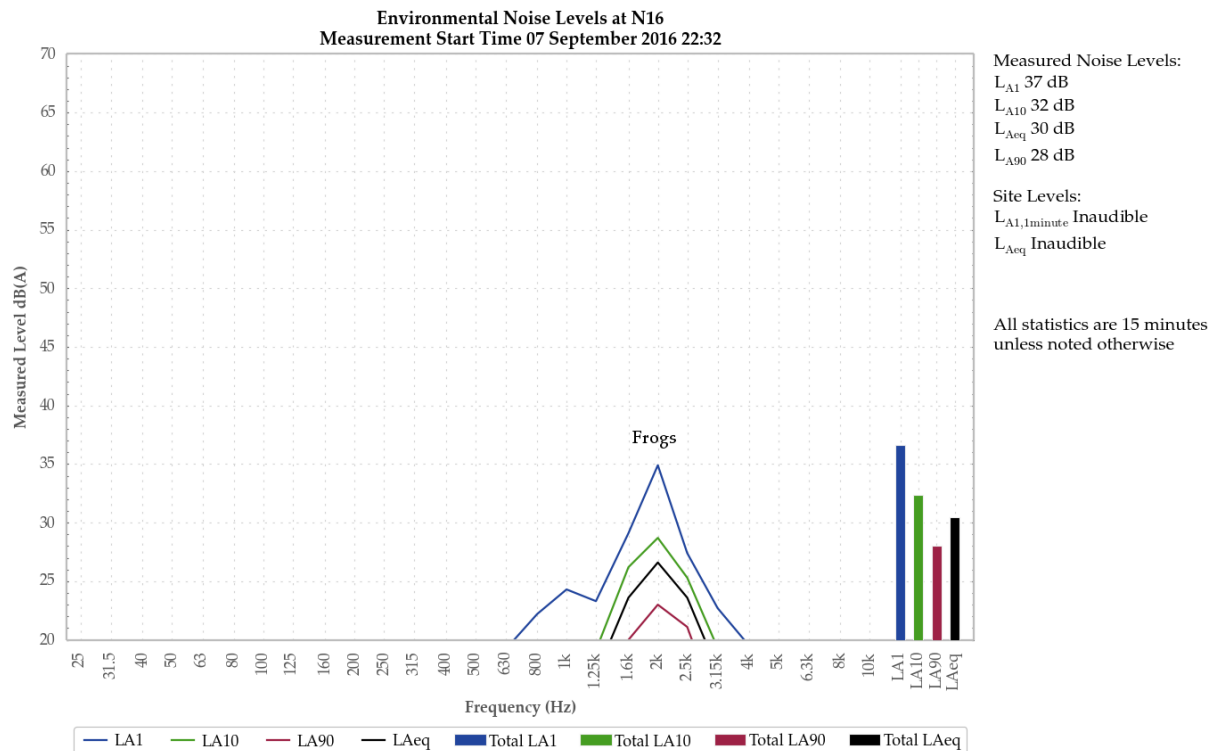


Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible during the measurement.

Frogs generated measured levels.

Road traffic tyre noise and an aircraft were also noted.

5.1.6 N17, 7 September 2016

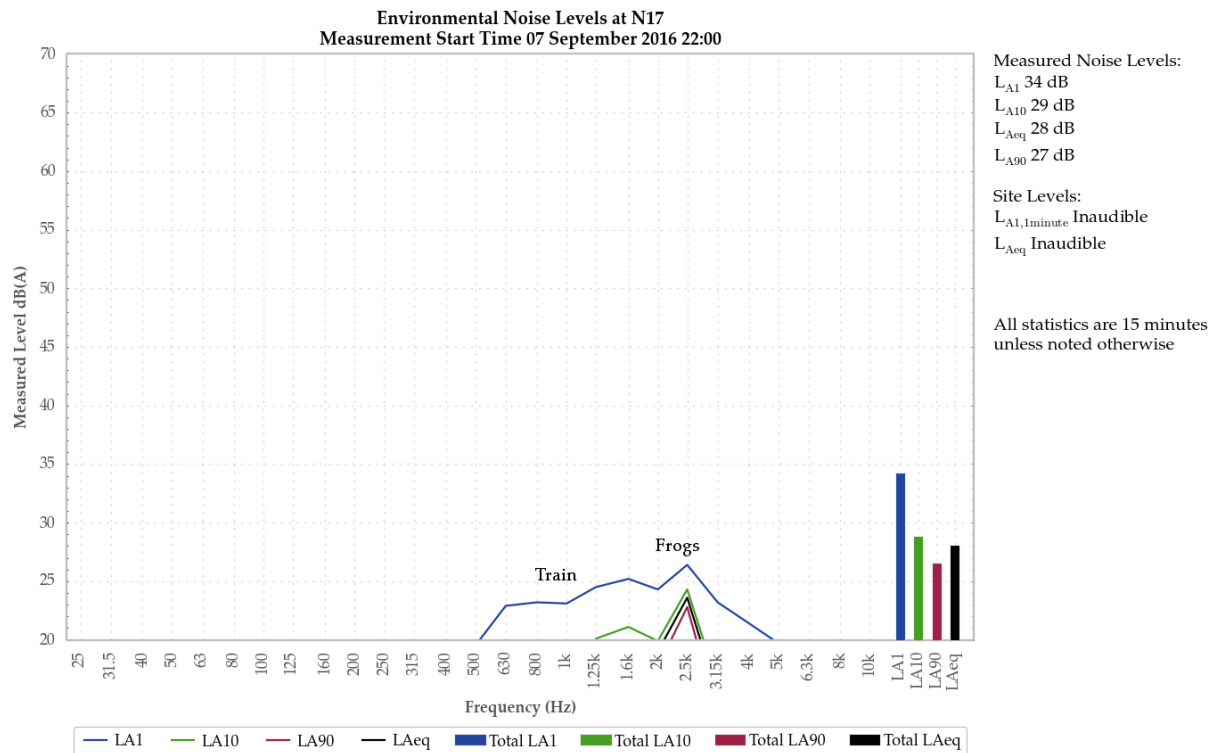


Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible during the measurement.

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

5.1.7 N18, 8 September 2016

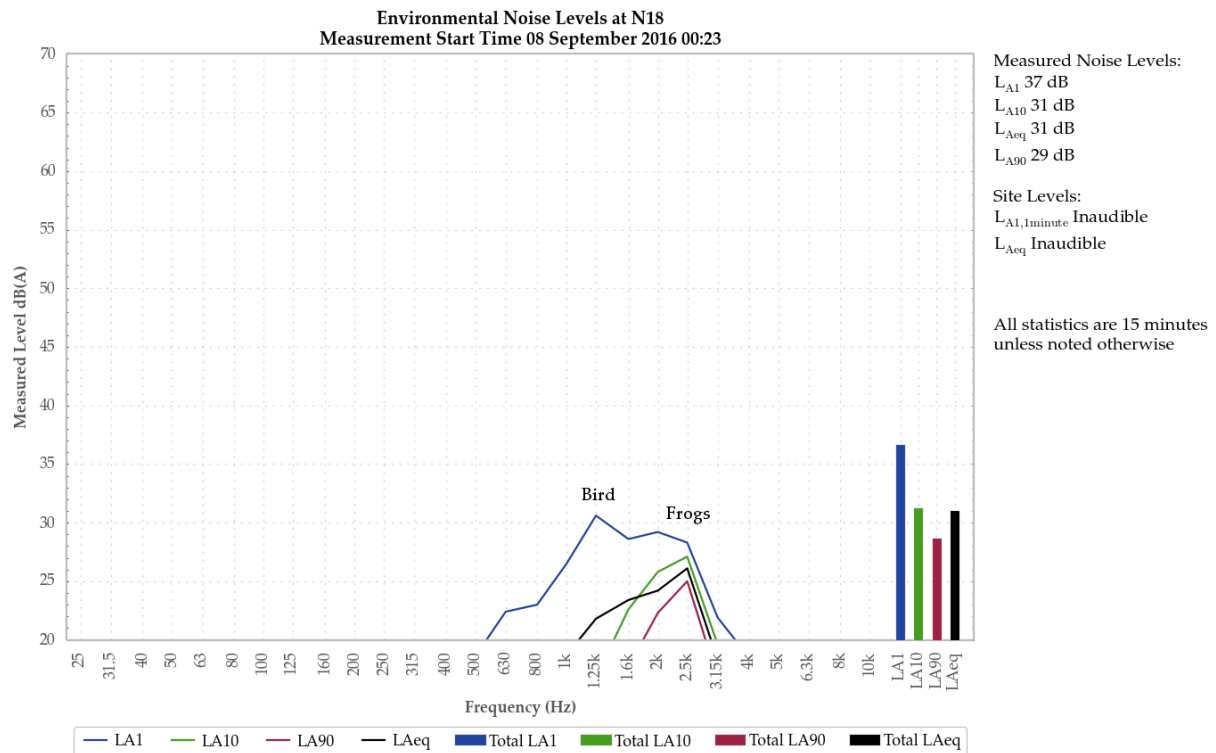


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible during the measurement.

A bird and frogs generated the measured LA1. Frogs primarily generated the measured LA10, LAeq and LA90. The bird was a minor contributor to the measured LAeq.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 7/8 September 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the September 2016 monitoring period.

6.2 Low Frequency Assessment

During the September 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

APPENDIX

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 Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{A1}(1\text{ minute})$
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in July 2016.

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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	36	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Temperature inversion conditions greater than 3°C/100m.

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 (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 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.

R4 Other reporting conditions

- R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:
- a) an assessment of compliance with noise limits presented in Condition L5.1; and
 - b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The relevant sections of the noise monitoring program for WCP dated May 2016 are reproduced below.

6 Noise Monitoring Program

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 4**. Unattended or real-time 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

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 attended monitoring at up to seven locations (**Table 5, Figure 3 and Figure 4**). Real-time 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 5: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest community structure to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
Barrigan Valley²	N18	Attended Noise	780033.3	6398618.1	DP&E Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions

Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine
Wandoona³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 5** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&E and the EPA.

6.3 Attended Noise Monitoring

6.3.1 Purpose

Attended noise monitoring will be used to evaluate compliance against the Noise Criteria detailed in **Table 4**.

6.3.2 Summary

Attended noise will be undertaken in accordance with **Table 6**.

Table 6: Attended Noise Monitoring Summary

Element	Description
Locations	As per Table 5 , Figure 3 and Figure 4
Period	Night-time period (10 pm-7 am) being the most sensitive time period for noise.
Frequency	12 times per year and on one night per month

6.3.3 Methodology

Attended noise monitoring will be undertaken as outlined in **Table 6** by an independent acoustic consultant in accordance with the INP (EPA, 2000) and *AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'*. Routine 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 4**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environment and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&E and EPA immediately, upon confirming the exceedance.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

6.3.4 Data Collection

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

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

6.3.5 Evaluation of Compliance

Tables 7 and **8** summarises the definition used by WCPL in this NMP for the evaluation of compliance with the Project Approval. The reporting requirements and actions that WCPL will take in the event of an exceedance or non-compliance are detailed in **Figure 5** and **Section 6.3.7**.

Table 7: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is deemed to have occurred when an attended noise monitoring result, taken in accordance with the INP and Project Approval, exceeds the Noise Criteria in Table 4 . The noise must be solely attributable to WCPL and meteorological conditions must be favourable (6.3.6).
Non-compliance	A non-compliance is deemed to have occurred when a second attended noise monitoring result, taken within 75 minutes of an exceedance and in accordance with the INP and Project Approval, exceeds the Noise Criteria in Table 4 for a second time. The noise must be solely attributable to WCPL and meteorological conditions must be favourable (6.3.6). Reporting requirements for a non-compliance are detailed in Section 6.3.7 .

6.3.6 Favourable Meteorological Conditions

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 3°C/100m.

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

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

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria has occurred, WCPL will, at the earliest opportunity:

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

APPENDIX

B CALIBRATION CERTIFICATES



**Acoustic
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Labs Pty Ltd**

Level 7 Building 2 423 Pennant Hills Rd
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Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
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Sound Level Meter

IEC 61672-3.2006

Calibration Certificate

Calibration Number C15583

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 : 00533
Pre-amplifier Serial Number : 70607

Pre-Test Atmospheric Conditions
Ambient Temperature : 20.6°C
Relative Humidity : 56.3%
Barometric Pressure : 98.64kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 21.2°C
Relative Humidity : 62.4%
Barometric Pressure : 98.56kPa

Calibration Technician : Corey Stewart
Calibration Date : 06/11/2015

Secondary Check: Kate Alchin
Report Issue Date : 10/11/2015

Approved Signatory : 

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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	±0.120dB	Temperature	±0.3°C
12.5kHz	±0.165dB	Relative Humidity	±4.1%
16kHz	±0.245dB	Barometric Pressure	±0.1kPa
Electrical Tests			
31.5 Hz to 20 kHz	±0.121dB		

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.

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**Sound Calibrator
IEC 60942-2004**

Calibration Certificate

Calibration Number C15670

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

Equipment Tested/ Model Number : Pulsar 106
Instrument Serial Number : 57413

Atmospheric Conditions
Ambient Temperature : 22°C
Relative Humidity : 54.8%
Barometric Pressure : 99.85kPa

Calibration Technician : Corey Stewart
Calibration Date : 23/12/2015
Secondary Check: Tim Williams
Report Issue Date : 23/12/2015

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
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 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Least Uncertainties of Measurement - Environmental Conditions	
Specific Tests	Environmental Conditions
Generated SPL	Temperature
Short Term Fluct.	Relative Humidity
Frequency	Barometric Pressure
Distortion	

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



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

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
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The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

PAGE 1 OF 1

Wilpinjong Coal

*Environmental Noise Monitoring
October 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*


Global
Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring October 2016

Reference: 16366_R01


Report date: 14 November 2016

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
Scientist (Acoustics)



QA Review: Katie Weekes
Environmental Scientist (Acoustics)

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.

A modification (MOD5) to the WCP consent was approved in November 2014. 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, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 11/12 October 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the October 2016 monitoring.

Low Frequency Assessment

During the October 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). No further assessment of low frequency noise was undertaken.

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 of 11/12 October 2016. Figure 1 shows the regular monitoring locations.

The purpose of the 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 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	'Coonaroo' off Moolarben Road
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley

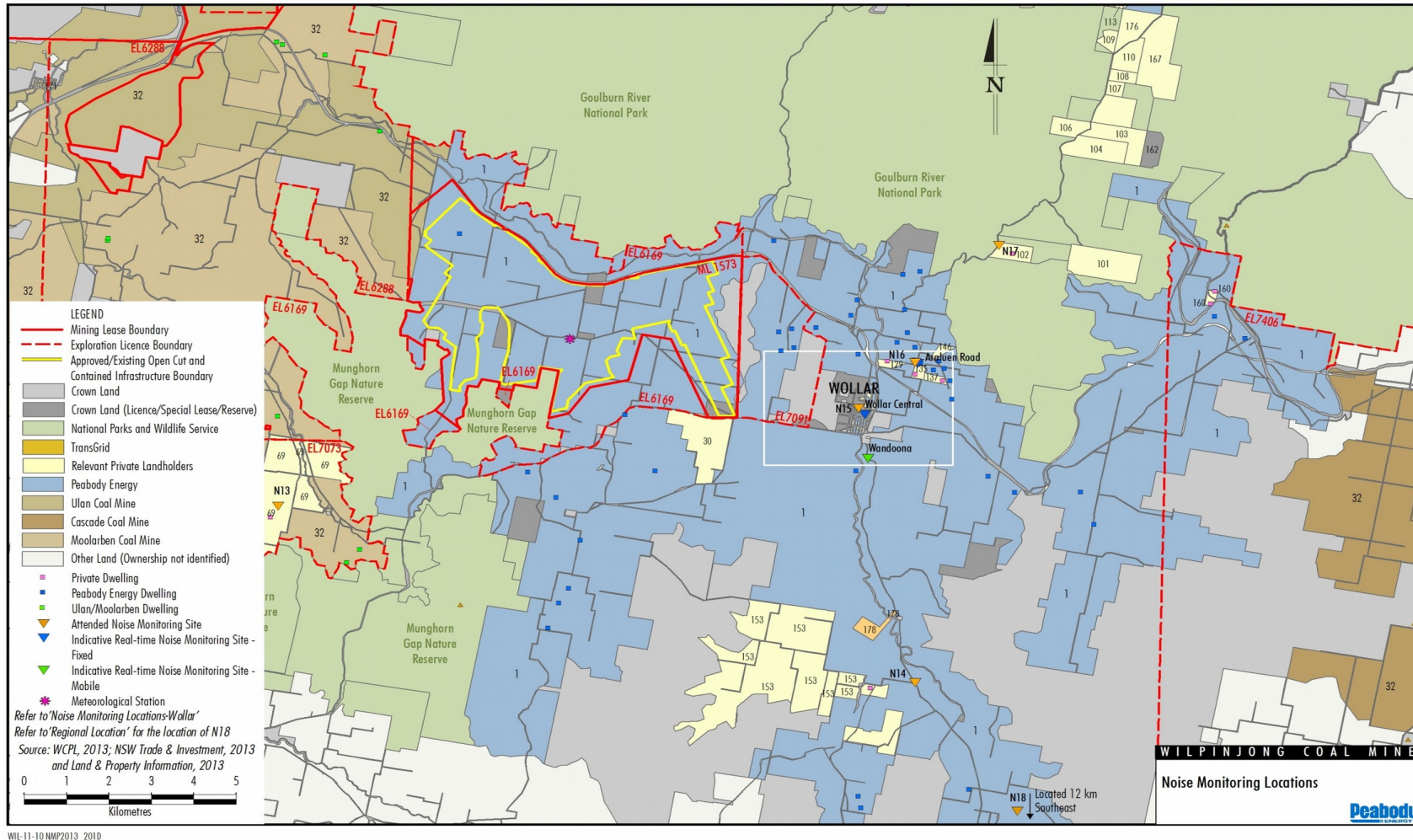


Figure 1: WCP Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the 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 in July 2016. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in May 2016. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/100m.

2.5 EPL Criteria and Weather Conditions

Criteria detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to be applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low Frequency Assessment Method

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L_{Ceq}	>60	>65
INP	Site only L_{Ceq} minus site only L_{Aeq}	≥ 15	≥ 15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a Draft Industrial Noise Guideline (ING) was released in September 2015, low frequency noise results from WCP have been compared to the assessment methods and modifying factor triggers presented above. The applicability of these triggers have been considered when applying low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

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

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency noise from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

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 A.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	0701424	22/05/2017
Pulsar 106 acoustic calibrator	74813	25/07/2018

4 RESULTS

4.1 Attended Noise Monitoring

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 2016¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	11/10/2016 23:10	46	33	31	28	28	25	23	40
N13	12/10/2016 01:28	44	36	26	21	25	18	15	31
N14	11/10/2016 22:40	61	54	30	22	38	19	17	47
N15	11/10/2016 23:32	50	38	34	30	31	27	24	47
N16	12/10/2016 00:37	45	38	24	20	25	18	17	37
N17	12/10/2016 00:05	49	31	23	20	22	18	16	37
N18	11/10/2016 22:03	52	35	30	25	27	23	21	34

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during October 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – OCTOBER 2016

Conditions	Total for October 2016
Number of measurements	7
Number of measurements where meteorological conditions applied (in accordance with project approval)	6
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – OCTOBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	11/10/2016 23:10	1.9	0.8	35	Yes	<25	Nil
N13	12/10/2016 01:28	0.7	3.2	36	No	IA	NA
N14	11/10/2016 22:40	2.0	0.4	35	Yes	IA	Nil
N15	11/10/2016 23:32	1.3	0.0	35	Yes	<25	Nil
N16	12/10/2016 00:37	0.6	1.2	37	Yes	<25	Nil
N17	12/10/2016 00:05	0.6	0.4	35	Yes	<20	Nil
N18	11/10/2016 22:03	2.0	-1.0	35	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – OCTOBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	11/10/2016 23:10	1.9	0.8	45	Yes	28	Nil
N13	12/10/2016 01:28	0.7	3.2	45	No	IA	NA
N14	11/10/2016 22:40	2.0	0.4	45	Yes	IA	Nil
N15	11/10/2016 23:32	1.3	0.0	45	Yes	31	Nil
N16	12/10/2016 00:37	0.6	1.2	45	Yes	<25	Nil
N17	12/10/2016 00:05	0.6	0.4	45	Yes	29	Nil
N18	11/10/2016 22:03	2.0	-1.0	45	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times (in fact, mostly inaudible) no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – OCTOBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	11/10/2016 23:10	1.9	0.8	35	Yes	<25	Nil
N13	12/10/2016 01:28	0.7	3.2	35	No	IA	NA
N14	11/10/2016 22:40	2.0	0.4	35	Yes	IA	Nil
N15	11/10/2016 23:32	1.3	0.0	36	Yes	<25	Nil
N16	12/10/2016 00:37	0.6	1.2	35	Yes	<25	Nil
N17	12/10/2016 00:05	0.6	0.4	35	Yes	<20	Nil
N18	11/10/2016 22:03	2.0	-1.0	35	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: $L_{A1,1\text{minute}}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – OCTOBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	11/10/2016 23:10	1.9	0.8	45	Yes	28	Nil
N13	12/10/2016 01:28	0.7	3.2	45	No	IA	NA
N14	11/10/2016 22:40	2.0	0.4	45	Yes	IA	Nil
N15	11/10/2016 23:32	1.3	0.0	45	Yes	31	Nil
N16	12/10/2016 00:37	0.6	1.2	45	Yes	<25	Nil
N17	12/10/2016 00:05	0.6	0.4	45	Yes	29	Nil
N18	11/10/2016 22:03	2.0	-1.0	45	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – OCTOBER 2016

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	11/10/2016 23:10	10	0.8	260	6
N13	12/10/2016 01:28	7	0.4	230	0
N14	11/10/2016 22:40	13	0.9	220	5
N15	11/10/2016 23:32	10	0.8	170	5
N16	12/10/2016 00:37	10	0.0	-	1
N17	12/10/2016 00:05	11	0.0	-	4
N18	11/10/2016 22:03	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 concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees ^{2,4}	Lapse Rate Degrees / 100 metres ³
11/10/2016 22:00	2.0	248	-1.0
11/10/2016 22:00	2.0	248	-1.0
11/10/2016 22:15	2.0	246	-1.0
11/10/2016 22:30	1.9	245	0.0
11/10/2016 22:45	1.7	230	0.6
11/10/2016 23:00	2.0	236	0.4
11/10/2016 23:15	2.4	237	1.0
11/10/2016 23:30	1.9	224	0.8
11/10/2016 23:45	1.3	201	0.0
12/10/2016 00:00	1.4	197	0.2
12/10/2016 00:15	0.6	192	0.4
12/10/2016 00:30	0.5	0	0.8
12/10/2016 00:45	0.6	191	1.0
12/10/2016 01:00	0.6	339	1.2
12/10/2016 01:15	1.1	357	2.4
12/10/2016 01:30	0.8	342	3.8
12/10/2016 01:45	0.7	273	3.2
12/10/2016 02:00	0.7	282	2.6

Notes:

1. Data supplied by WCP;
2. "-" in wind direction column indicates that conditions were calm;
3. Lapse rate sourced from the WCP inversion tower; and
4. NA indicates data not available/recorded.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

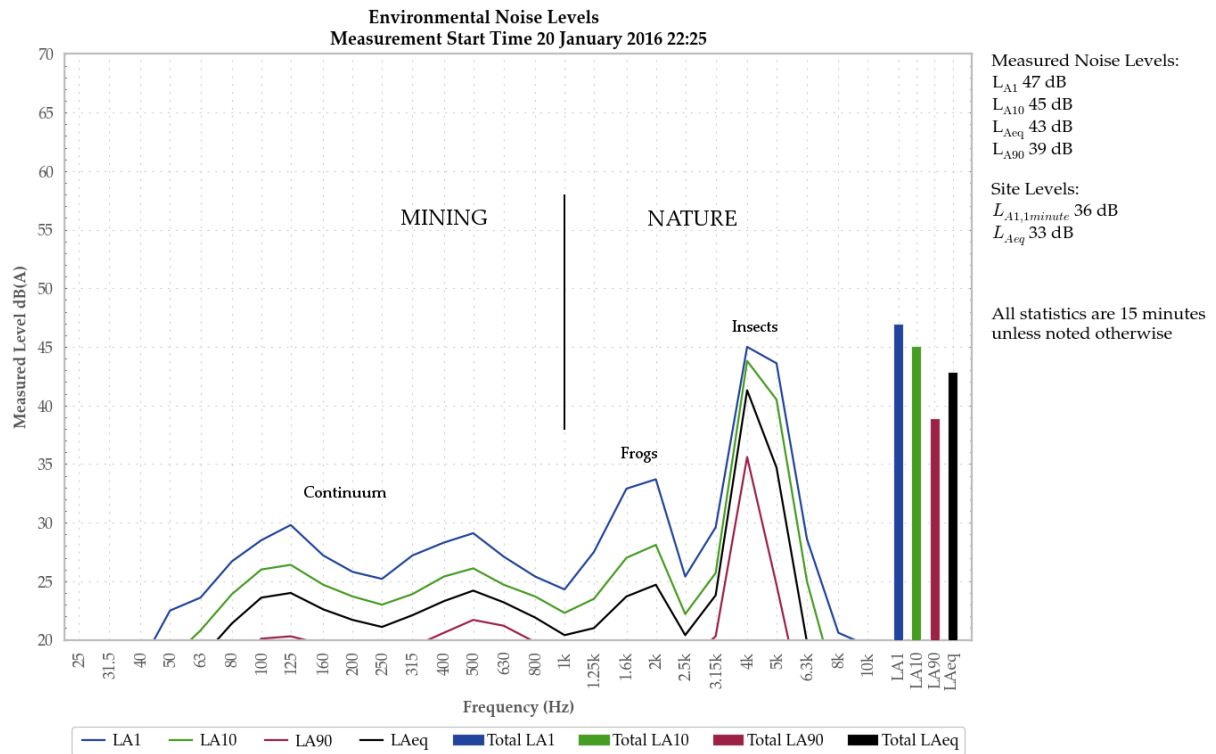


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 11 October 2016

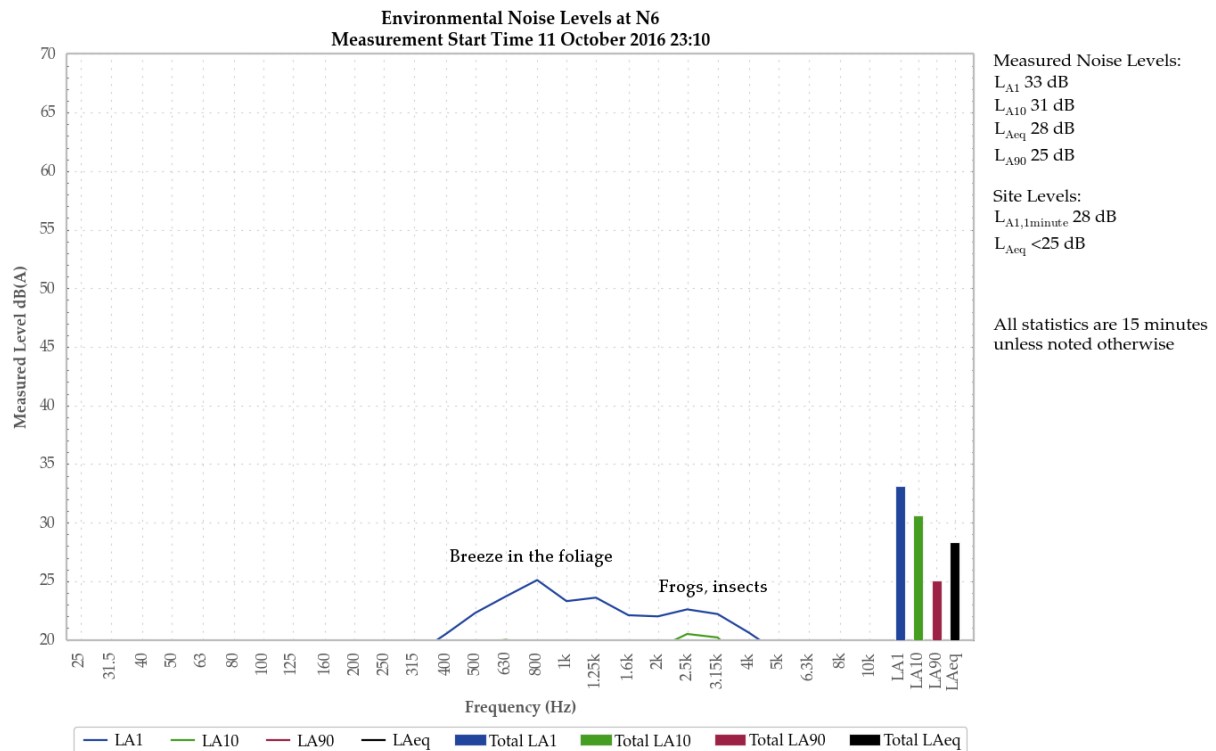


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

A low-level continuum from WCP was audible during the measurement and generated the site only LAeq of less than 25 dB.

Frogs and insects combined with the continuum from WCP to generate the measured LA90. Breeze in foliage and breeze on the microphone was primarily responsible for the measured LA1, LA10 and LAeq.

Dogs were also noted.

5.1.2 N13, 12 October 2016

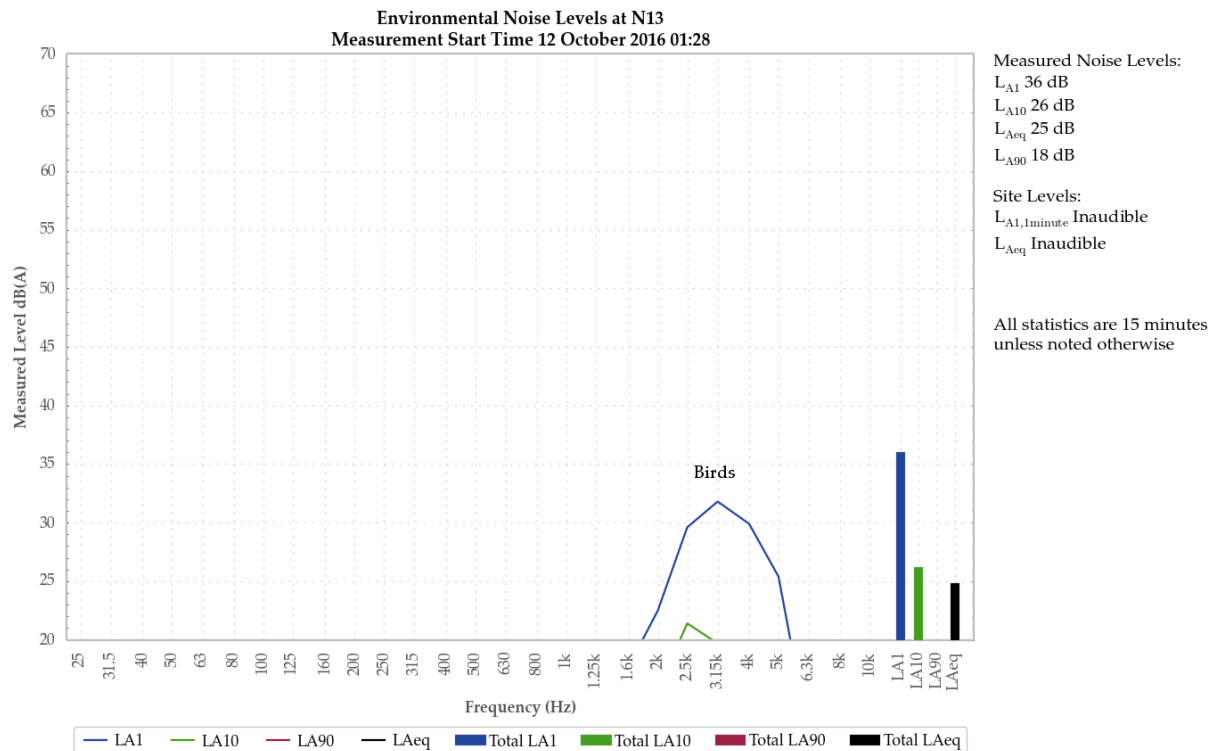


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Birds were responsible for the measured LA1, LA10 and LAeq. Frogs and insects were responsible for the measured LA90.

Cows were also noted.

5.1.3 N14, 11 October 2016

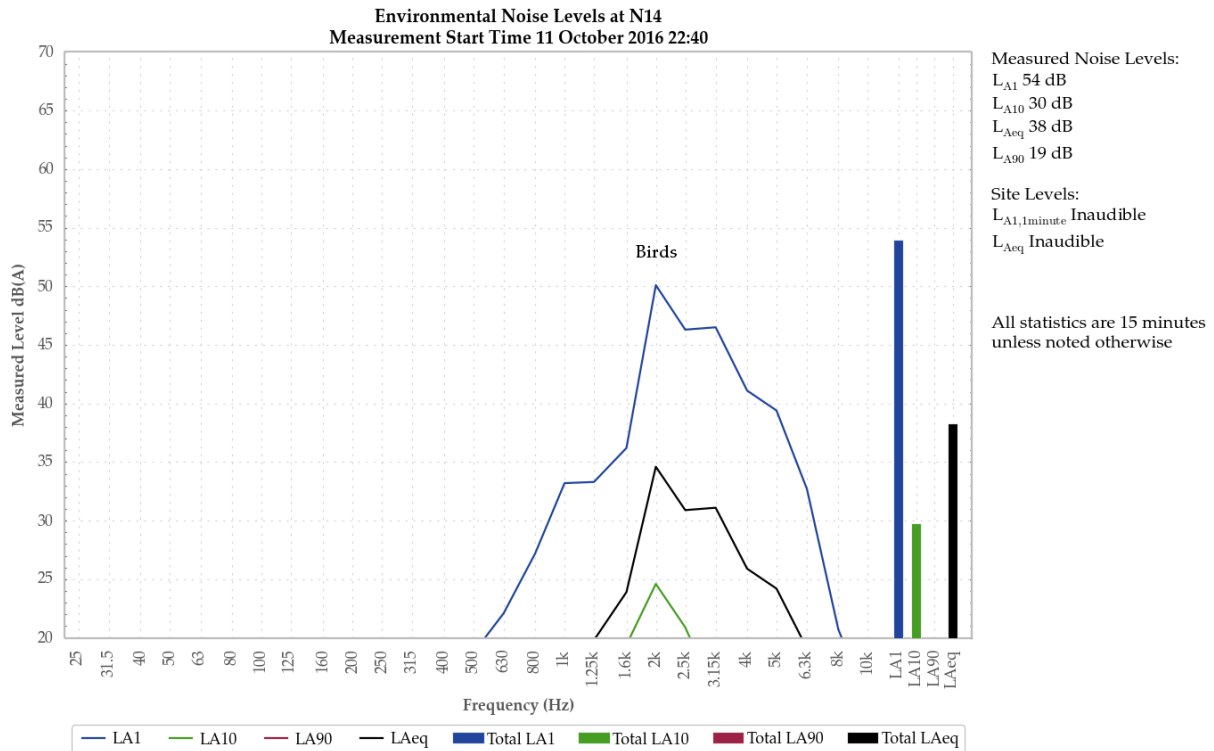


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible during the measurement.

Birds generated the measured L_{A1}, L_{A10} and L_{Aeq}. Frogs and insects were responsible for the measured L_{A90}.

A nearby substation continuum, cows and breeze on the microphone were also noted.

5.1.4 N15, 11 October 2016

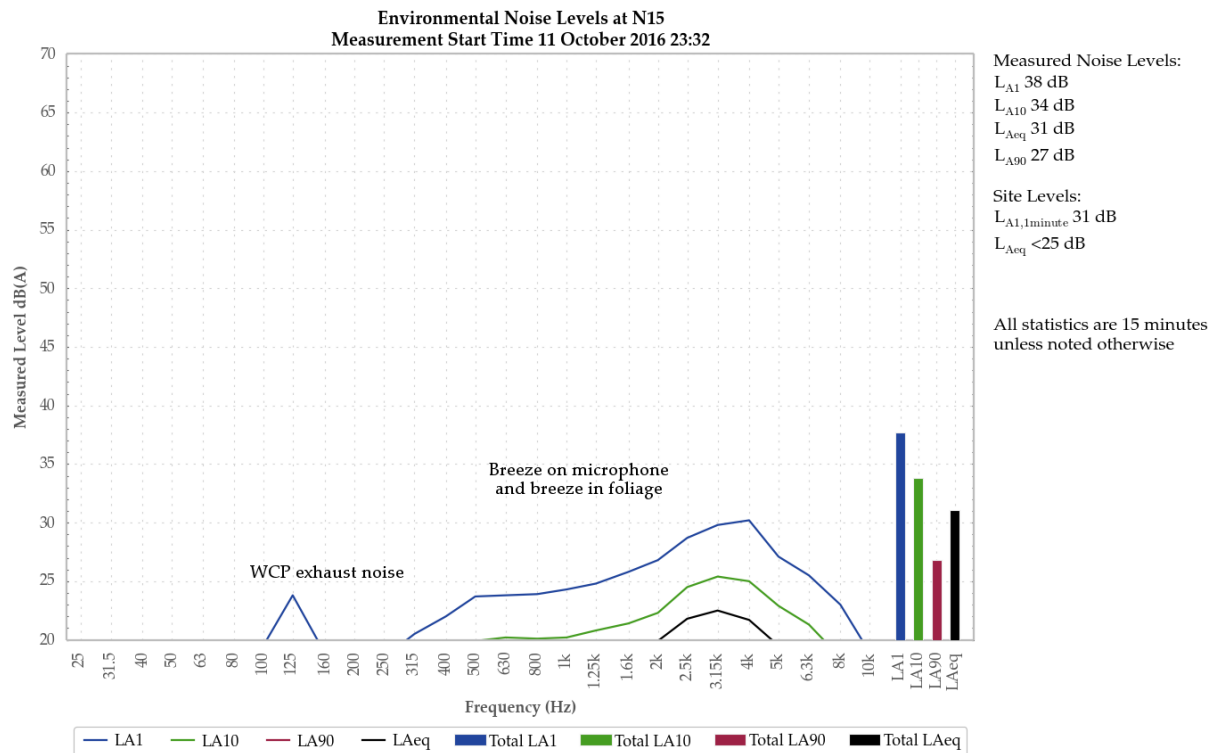


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A low-level continuum from WCP was audible throughout the measurement and generated the site only LAeq of less than 25 dB. An engine and exhaust surge was audible on one occasion and generated the site only LA1,1minute of 31 dB.

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

Birds and insects were also noted.

5.1.5 N16, 12 October 2016

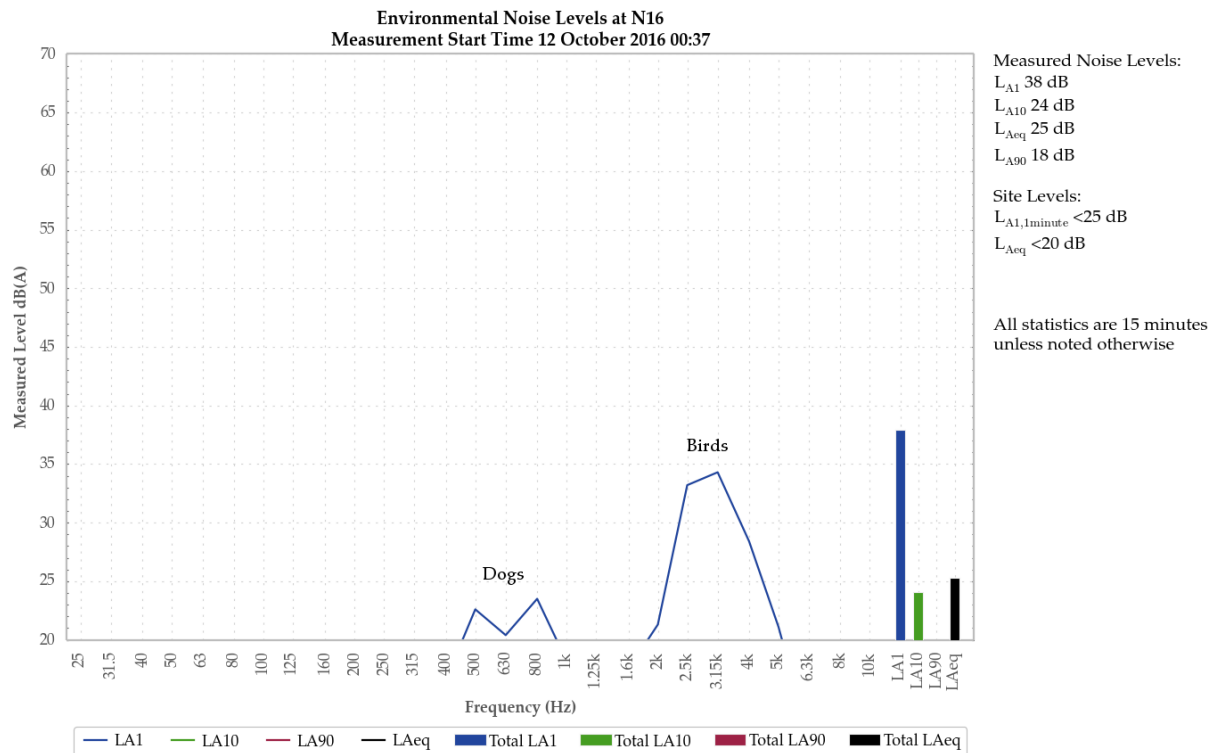


Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

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

Birds were responsible for the measured LA1, LA10 and LAeq. The continuum from WCP and insects combined to generate the measured LA90.

A nearby generator and dogs were also noted.

5.1.6 N17, 12 October 2016

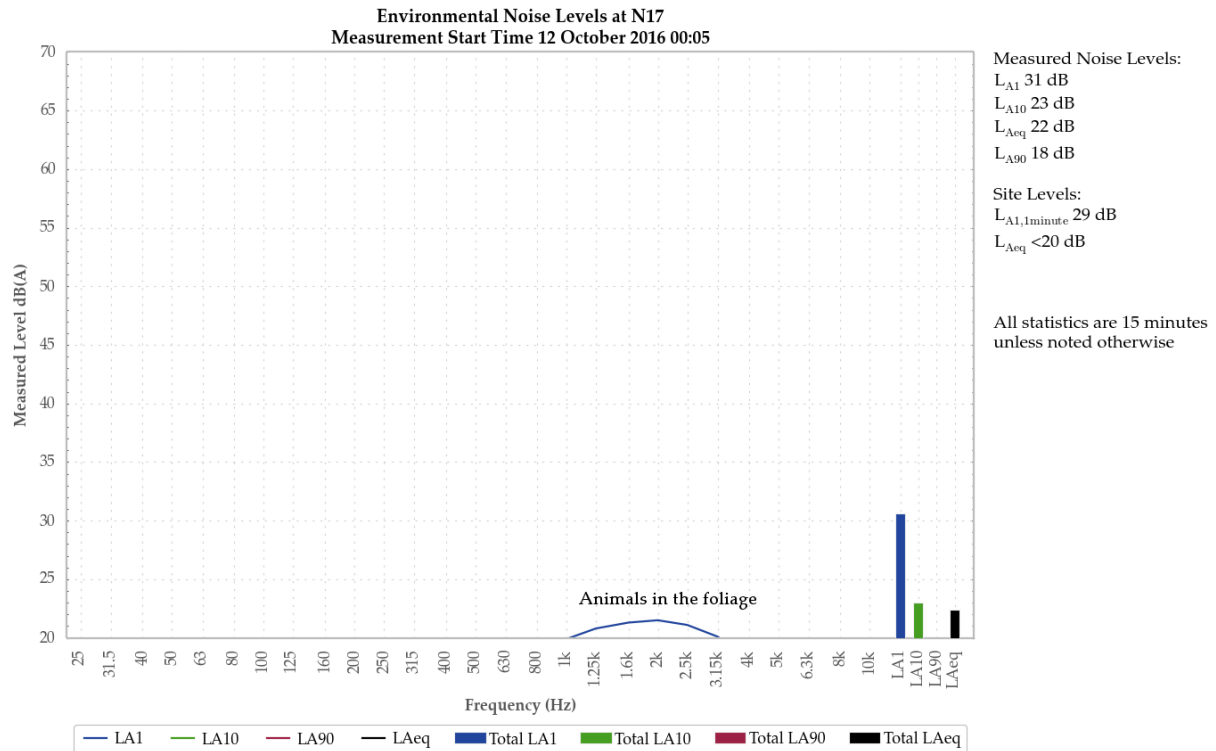


Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

A low-level continuum from WCP was audible during the measurement and generated the site only L_{Aeq} of less than 20. An impact noise was audible on one occasion and generated the site only $L_{A1,1minute}$ 29 dB.

Animals in foliage were responsible for the measured L_{A1} . Frogs, insects and the continuum from WCP combined to generate the measured L_{A10} , L_{Aeq} and L_{A90} .

5.1.7 N18, 11 October 2016

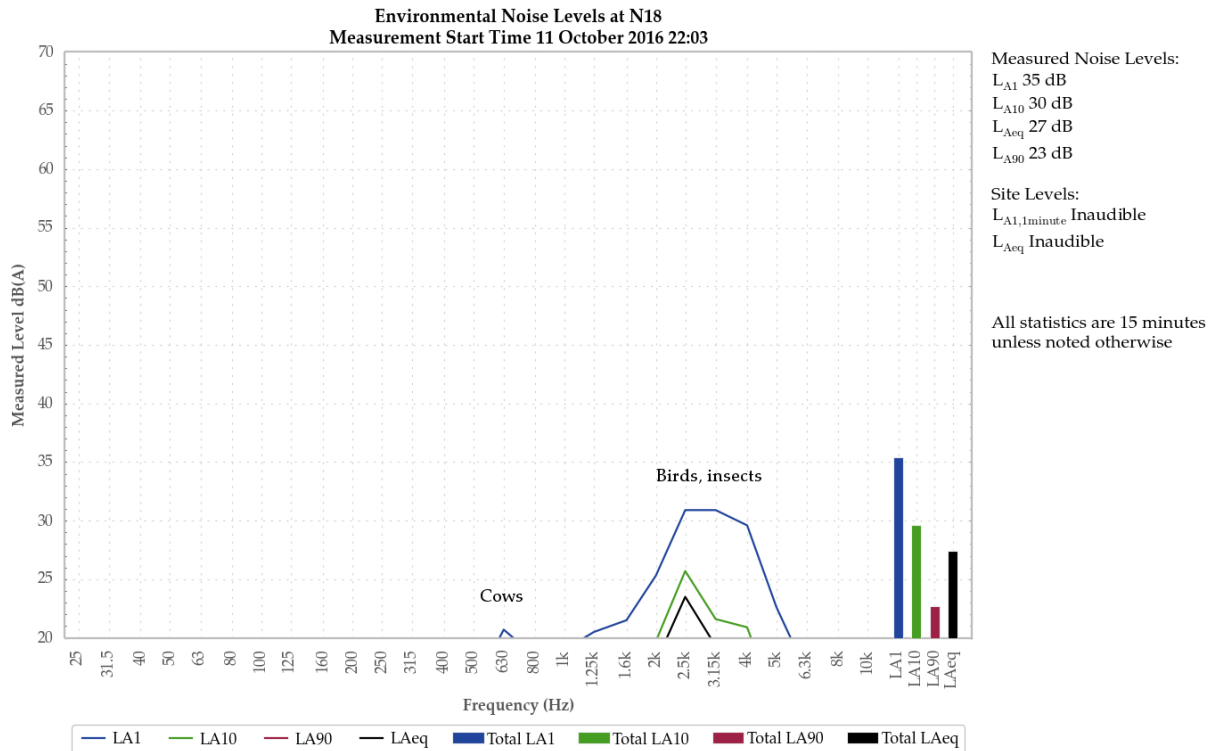


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible during the measurement.

Birds were responsible for the measured LA1. Insects generated the measured LA10, LAeq and LA90.

Cows were also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 11/12 October 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the October 2016 monitoring period.

6.2 Low Frequency Assessment

During the October 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

APPENDIX

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 Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in July 2016.

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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	36	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Temperature inversion conditions greater than 3°C/100m.

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 (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 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.

R4 Other reporting conditions

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:

- a) an assessment of compliance with noise limits presented in Condition L5.1; and
- b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The relevant sections of the noise monitoring program for WCP dated May 2016 are reproduced below.

6 Noise Monitoring Program

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 4**. Unattended or real-time 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

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 attended monitoring at up to seven locations (**Table 5, Figure 3 and Figure 4**). Real-time 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 5: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest community structure to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
Barrigan Valley²	N18	Attended Noise	780033.3	6398618.1	DP&E Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions

Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine
Wandoona³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 5** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&E and the EPA.

6.3 Attended Noise Monitoring

6.3.1 Purpose

Attended noise monitoring will be used to evaluate compliance against the Noise Criteria detailed in **Table 4**.

6.3.2 Summary

Attended noise will be undertaken in accordance with **Table 6**.

Table 6: Attended Noise Monitoring Summary

Element	Description
Locations	As per Table 5 , Figure 3 and Figure 4
Period	Night-time period (10 pm-7 am) being the most sensitive time period for noise.
Frequency	12 times per year and on one night per month

6.3.3 Methodology

Attended noise monitoring will be undertaken as outlined in **Table 6** by an independent acoustic consultant in accordance with the INP (EPA, 2000) and *AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'*. Routine 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 4**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environment and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&E and EPA immediately, upon confirming the exceedance.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

6.3.4 Data Collection

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

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

6.3.5 Evaluation of Compliance

Tables 7 and 8 summarises the definition used by WCPL in this NMP for the evaluation of compliance with the Project Approval. The reporting requirements and actions that WCPL will take in the event of an exceedance or non-compliance are detailed in Figure 5 and Section 6.3.7.

Table 7: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is deemed to have occurred when an attended noise monitoring result, taken in accordance with the INP and Project Approval, exceeds the Noise Criteria in Table 4 . The noise must be solely attributable to WCPL and meteorological conditions must be favourable (6.3.6).
Non-compliance	A non-compliance is deemed to have occurred when a second attended noise monitoring result, taken within 75 minutes of an exceedance and in accordance with the INP and Project Approval, exceeds the Noise Criteria in Table 4 for a second time. The noise must be solely attributable to WCPL and meteorological conditions must be favourable (6.3.6). Reporting requirements for a non-compliance are detailed in Section 6.3.7 .

6.3.6 Favourable Meteorological Conditions

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 3°C/100m.

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

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

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria has occurred, WCPL will, at the earliest opportunity:

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

APPENDIX

B CALIBRATION CERTIFICATES



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Octave Band Filter AS 4476:1997 Calibration Certificate

Calibration Number C15226A

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

Atmospheric Conditions

Ambient Temperature : 22.2°C
Relative Humidity : 52.1%
Barometric Pressure : 99.85kPa

Calibration Technician : Adrian Walker
Calibration Date : 22/05/2015
Secondary Check: Sandra Minto
Report Issue Date : 25/05/2015

Approved Signatory :  Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
4.4 & 5.3: 1/1 Octave relative attenuation	Pass	4.6 & 5.5: Linear operating range	Pass
4.4 & 5.3: 1/3 Octave relative attenuation	Pass	4.8 & 5.7: Anti-alias filters	Pass
		4.10 & 5.9: Flat frequency response	Pass

Least Uncertainties of Measurement -

Electrical Tests		Environmental Conditions	
< 16Hz	±0.182dB	Temperature	±0.3°C
16Hz - 100Hz	±0.105dB	Relative Humidity	±4.1%
100Hz-1000Hz	±0.089dB	Barometric Pressure	±0.1kPa
1000Hz-10kHz	±0.166dB		
>10kHz	±0.119dB		

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.

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**Sound Calibrator
IEC 60942-2004**

Calibration Certificate

Calibration Number C16383

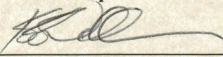
Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
THORNTON NSW 2322

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

Atmospheric Conditions

Ambient Temperature : 20.9°C
Relative Humidity : 39.8%
Barometric Pressure : 99.08kPa

Calibration Technician : Dennis Kim
Calibration Date : 25/07/2016
Secondary Check: Sandra Minto
Report Issue Date : 25/07/2016

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	1000.34

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	±0.09dB	Temperature	±0.05°C
Short Term Fluct.	±0.02dB	Relative Humidity	±0.46%
Frequency	±0.01%	Barometric Pressure	±0.017kPa
Distortion	±0.51%		

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.

PAGE 1 OF 1

Wilpinjong Coal

*Environmental Noise Monitoring
November 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*


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Acoustics

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Wilpinjong Coal

Environmental Noise Monitoring November 2016

Reference: 16416_R01

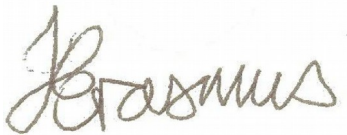
Report date: 22 November 2016

Prepared for

Wilpinjong Coal Pty Ltd
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Mudgee NSW 2850

Prepared by

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Prepared: Jonathan Erasmus
Acoustic Technician



QA Review: Katie Weekes
Environmental Scientist (Acoustics)

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.

A modification (MOD5) to the WCP consent was approved in November 2014. 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, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 2/3 November 2016. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the November 2016 monitoring.

Low Frequency Assessment

During the November 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). No further assessment of low frequency noise was undertaken.

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 of 2/3 November 2016. Figure 1 shows the monitoring locations.

The purpose of the 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 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	'Coonaroo' off Moolarben Road
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley

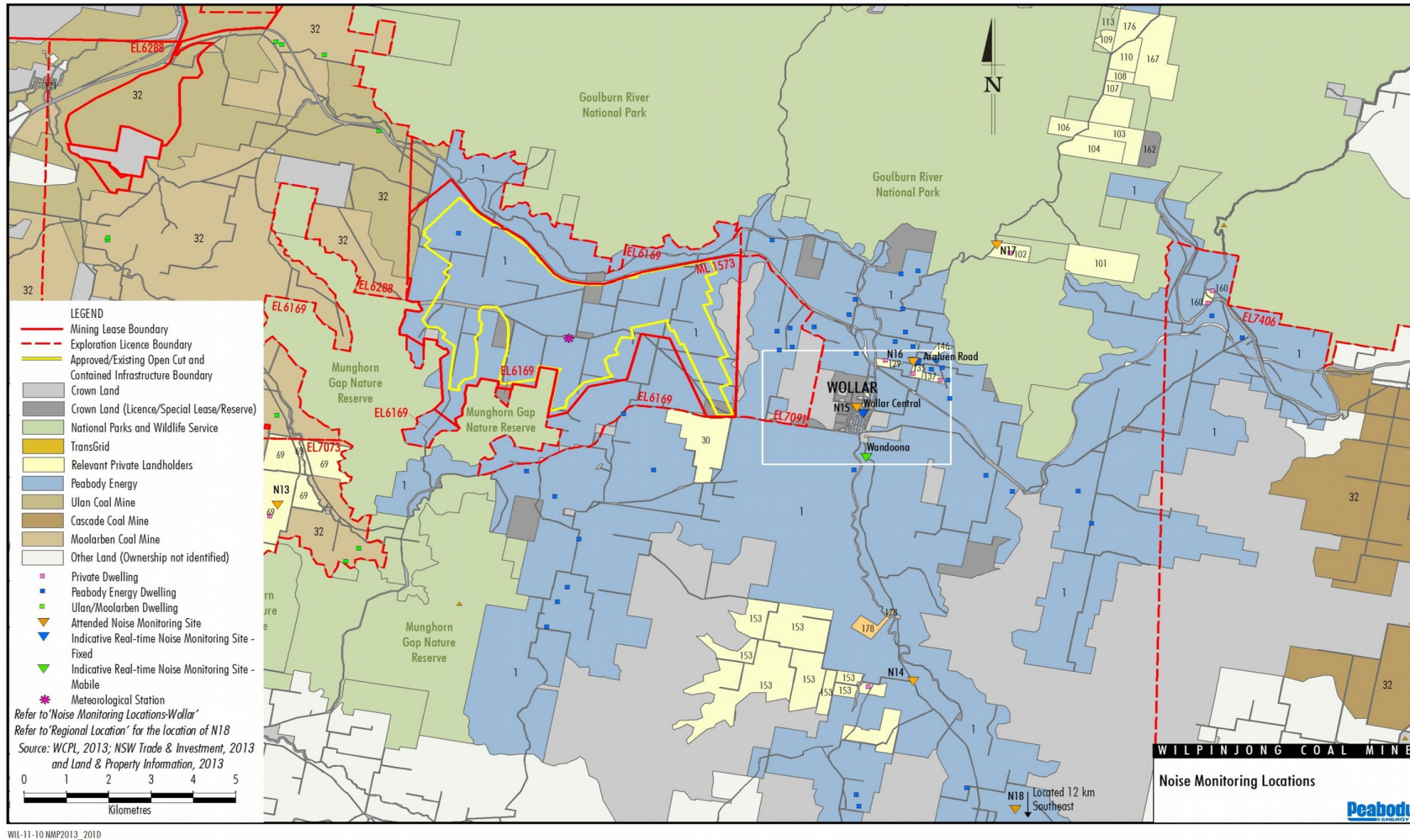


Figure 1: WCP Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the 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 in July 2016. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in May 2016. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/100m.

2.5 EPL Criteria and Weather Conditions

Criteria detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor / Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to be applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low Frequency Assessment Method

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L_{Ceq}	>60	>65
INP	Site only L_{Ceq} minus site only L_{Aeq}	≥ 15	≥ 15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a Draft Industrial Noise Guideline (ING) was released in September 2015, low frequency noise results from WCP have been compared to the assessment methods and modifying factor triggers presented above. The applicability of these triggers have been considered when applying low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

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

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting. All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency noise from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

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 A.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	01070590	06/11/2017
Pulsar 106 acoustic calibrator	57413	23/12/2017

4 RESULTS

4.1 Attended Noise Monitoring

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 2016¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	02/11/2016 23:20	46	41	34	23	30	21	19	34
N13	03/11/2016 01:26	49	38	34	32	33	30	27	51
N14	02/11/2016 23:48	52	35	28	23	26	20	18	42
N15	02/11/2016 23:00	46	39	34	23	29	21	19	47
N16	02/11/2016 22:31	51	45	39	26	34	25	23	49
N17	02/11/2016 22:00	42	31	29	24	25	21	20	38
N18	03/11/2016 00:26	62	54	37	27	41	26	25	44

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during November 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – NOVEMBER 2016

Conditions	Total for November 2016
Number of measurements	7
Number of measurements where meteorological conditions applied (in accordance with project approval)	0
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – NOVEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	02/11/2016 23:20	1.0	8.1	35	No	IA	NA
N13	03/11/2016 01:26	0.0	4.0	36	No	IA	NA
N14	02/11/2016 23:48	0.7	6.9	35	No	IA	NA
N15	02/11/2016 23:00	0.8	8.3	35	No	IA	NA
N16	02/11/2016 22:31	0.6	4.1	37	No	25	NA
N17	02/11/2016 22:00	1.4	5.0	35	No	IA	NA
N18	03/11/2016 00:26	0.0	7.2	35	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – NOVEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	02/11/2016 23:20	1.0	8.1	45	No	IA	NA
N13	03/11/2016 01:26	0.0	4.0	45	No	IA	NA
N14	02/11/2016 23:48	0.7	6.9	45	No	IA	NA
N15	02/11/2016 23:00	0.8	8.3	45	No	IA	NA
N16	02/11/2016 22:31	0.6	4.1	45	No	35	NA
N17	02/11/2016 22:00	1.4	5.0	45	No	IA	NA
N18	03/11/2016 00:26	0.0	7.2	45	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times (in fact, mostly inaudible) no analysis of modifying factors, for mining this is only low-frequency content, was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – NOVEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	02/11/2016 23:20	1.0	8.1	35	No	IA	NA
N13	03/11/2016 01:26	0.0	4.0	35	No	IA	NA
N14	02/11/2016 23:48	0.7	6.9	35	No	IA	NA
N15	02/11/2016 23:00	0.8	8.3	36	No	IA	NA
N16	02/11/2016 22:31	0.6	4.1	35	No	25	NA
N17	02/11/2016 22:00	1.4	5.0	35	No	IA	NA
N18	03/11/2016 00:26	0.0	7.2	35	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: $L_{A1,1min}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – NOVEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{A1,1min}$ dB ^{4,5}	Exceedance ⁶
N6	02/11/2016 23:20	1.0	8.1	45	No	IA	NA
N13	03/11/2016 01:26	0.0	4.0	45	No	IA	NA
N14	02/11/2016 23:48	0.7	6.9	45	No	IA	NA
N15	02/11/2016 23:00	0.8	8.3	45	No	IA	NA
N16	02/11/2016 22:31	0.6	4.1	45	No	35	NA
N17	02/11/2016 22:00	1.4	5.0	45	No	IA	NA
N18	03/11/2016 00:26	0.0	7.2	45	No	IA	NA

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – NOVEMBER 2016

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	02/11/2016 23:20	14	0.4	180	0
N13	03/11/2016 01:26	16	1.8	200	0
N14	02/11/2016 23:48	11	1.3	140	0
N15	02/11/2016 23:00	12	0.8	120	0
N16	02/11/2016 22:31	14	0.7	180	0
N17	02/11/2016 22:00	16	0.0	-	0
N18	03/11/2016 00:26	6	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 concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date and Time	Wind Speed m/s	Wind Direction Degrees ^{2,4}	Lapse Rate Degrees / 100 metres ³
02/11/2016 22:00	1.8	198	1.2
02/11/2016 22:15	1.4	3	5.0
02/11/2016 22:30	0.7	14	4.8
02/11/2016 22:45	0.6	257	4.1
02/11/2016 23:00	0.0	-	6.4
02/11/2016 23:15	0.8	353	8.3
02/11/2016 23:30	1.0	2	8.1
02/11/2016 23:45	1.6	357	7.1
03/11/2016 00:00	0.7	295	6.9
03/11/2016 00:15	0.0	-	5.7
03/11/2016 00:30	0.7	335	6.4
03/11/2016 00:45	0.0	-	7.2
03/11/2016 01:00	0.9	56	4.5
03/11/2016 01:15	0.5	289	3.8
03/11/2016 01:30	1.3	232	2.1
03/11/2016 01:45	0.0	-	4.0
03/11/2016 02:00	0.5	289	5.0

Notes:

1. Data supplied by WCP;
2. "-" in wind direction column indicates that conditions were calm;
3. Lapse rate sourced from the WCP inversion tower; and
4. NA indicates data not available/recorded.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

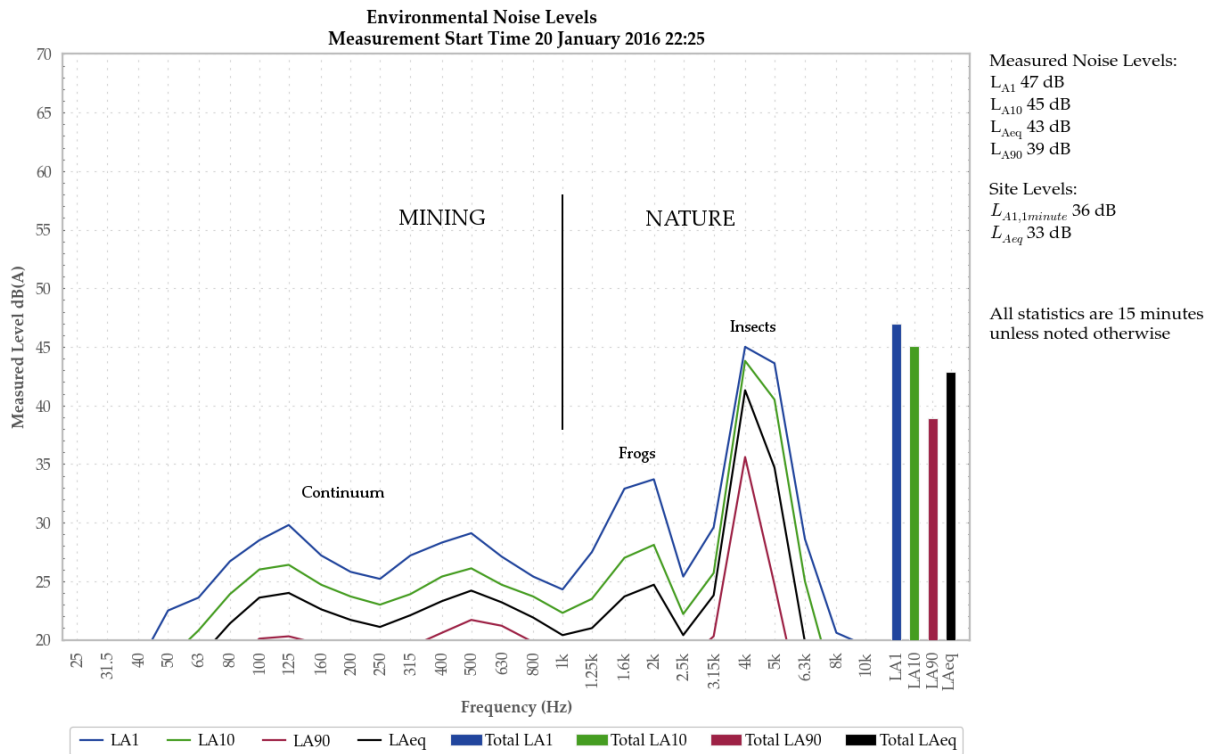


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 2 November 2016

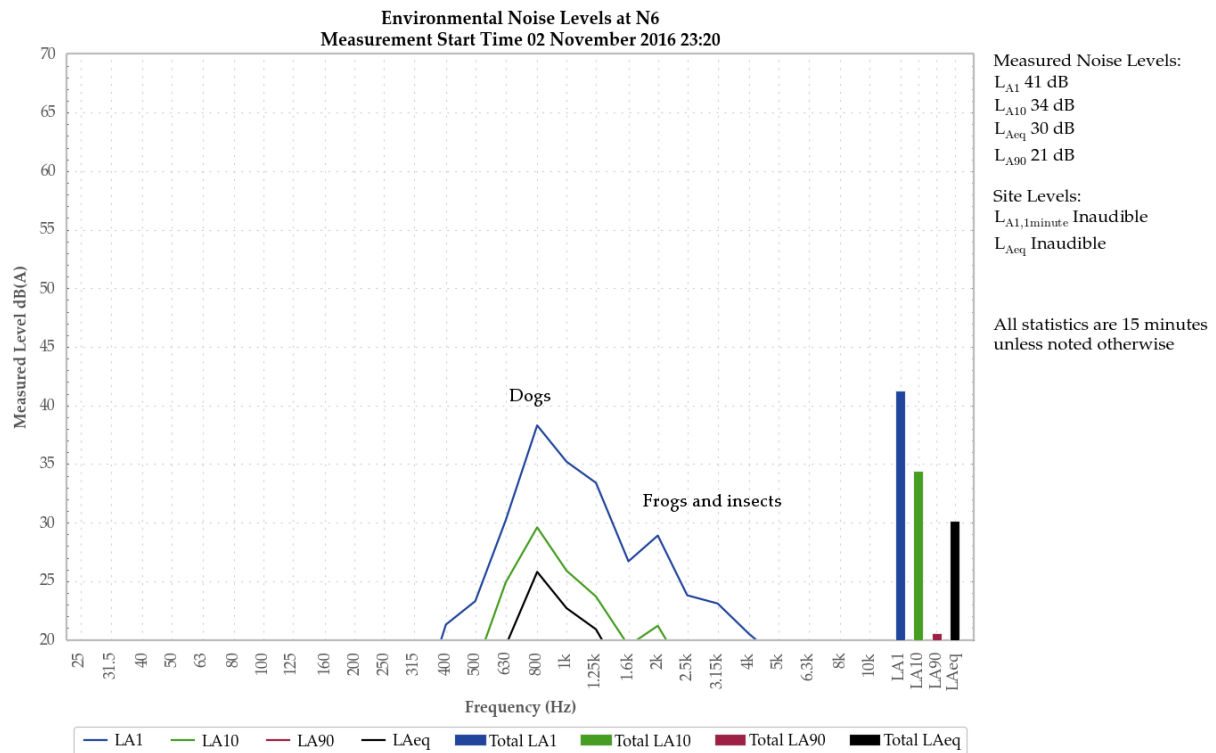


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

WCP was inaudible.

Dogs generated the measured LA1, LA10 and LAeq. Frogs and insects were primarily responsible for the measured LA90.

Breeze in foliage and a train were also noted.

5.1.2 N13, 3 November 2016

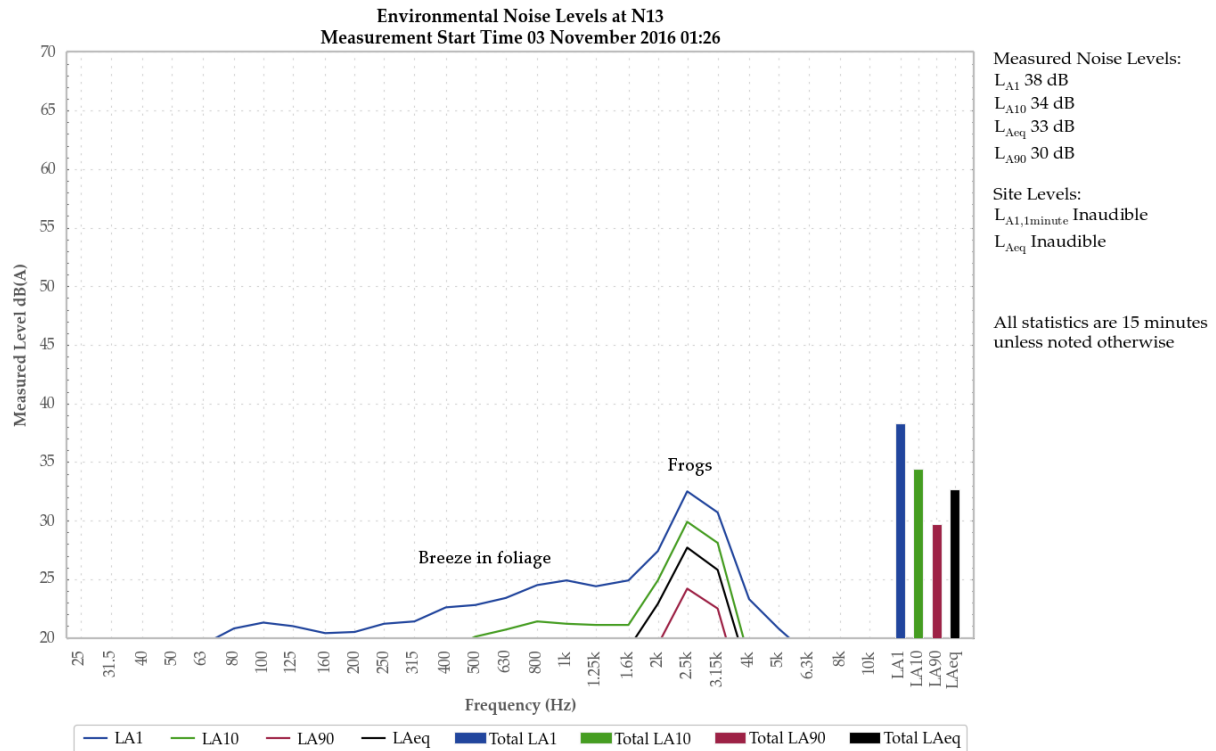


Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Frogs generated most measured levels.

Breeze in foliage and breeze on the microphone were also noted.

5.1.3 N14, 2 November 2016

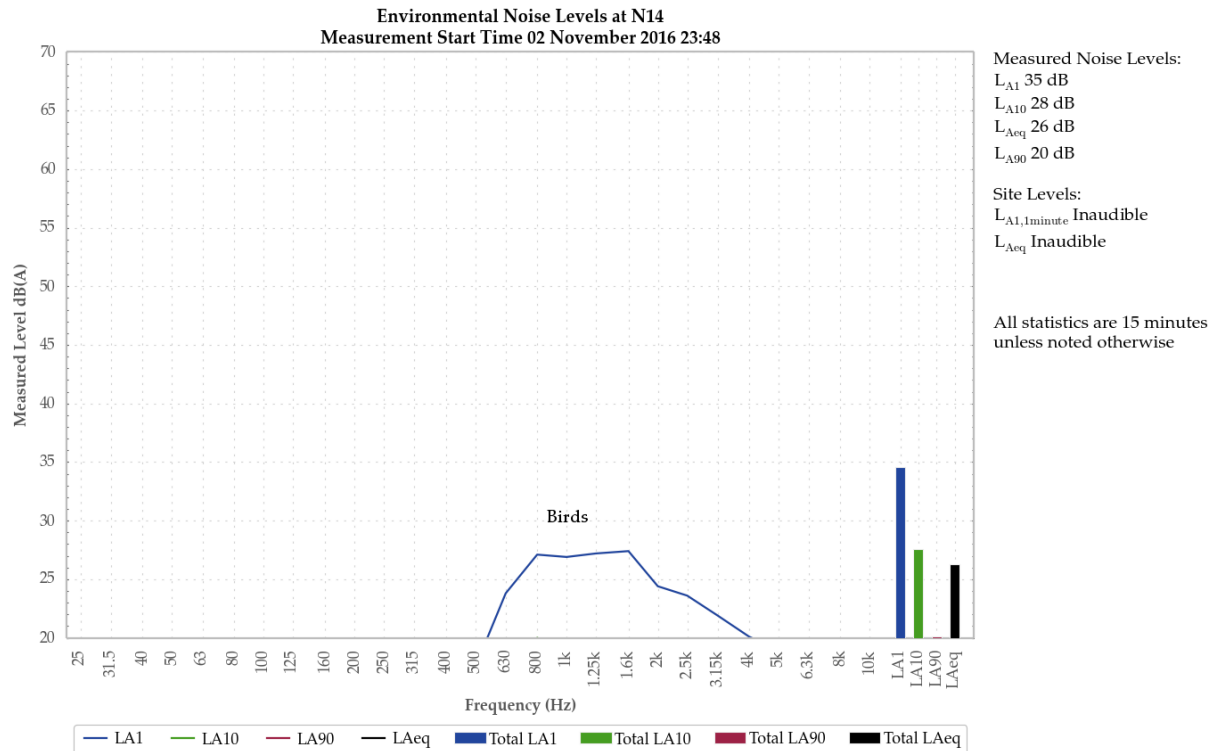


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Birds generated the measured LA1 and LAeq. Frogs and insects primarily generated the measured LA10 and LA90.

An aircraft was also noted.

5.1.4 N15, 2 November 2016

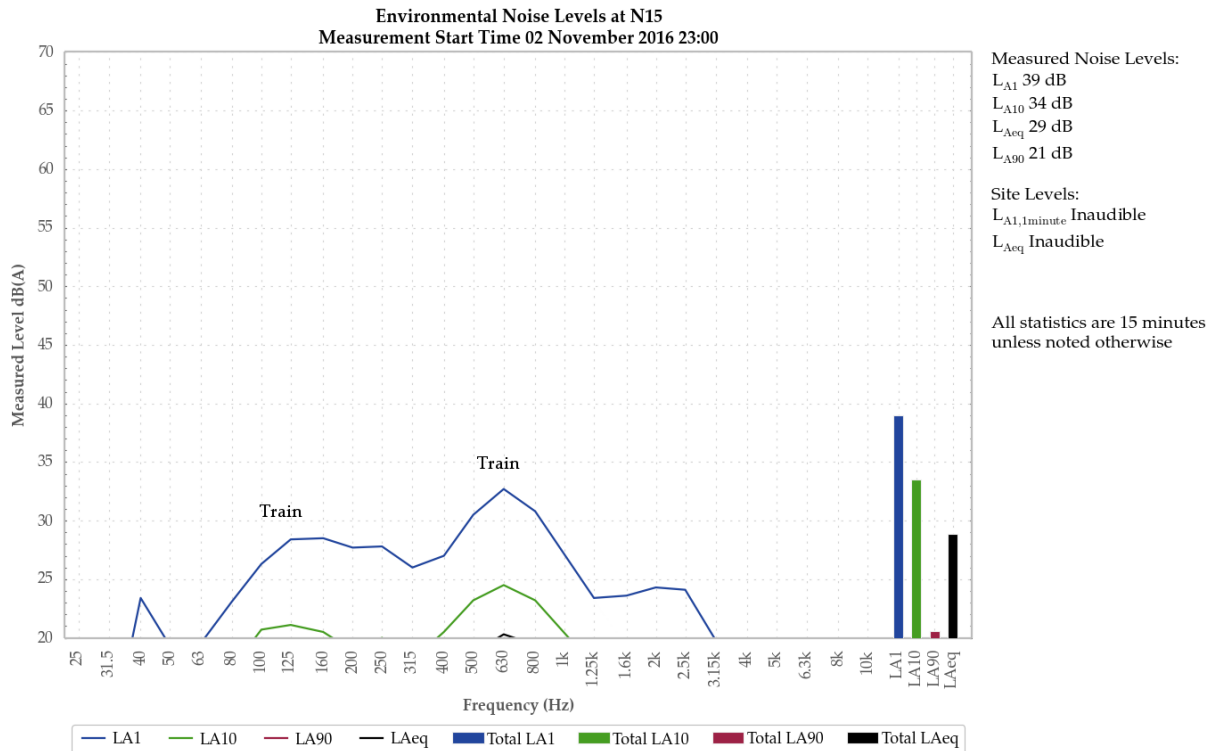


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

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

Breeze in foliage was also noted.

5.1.5 N16, 2 November 2016

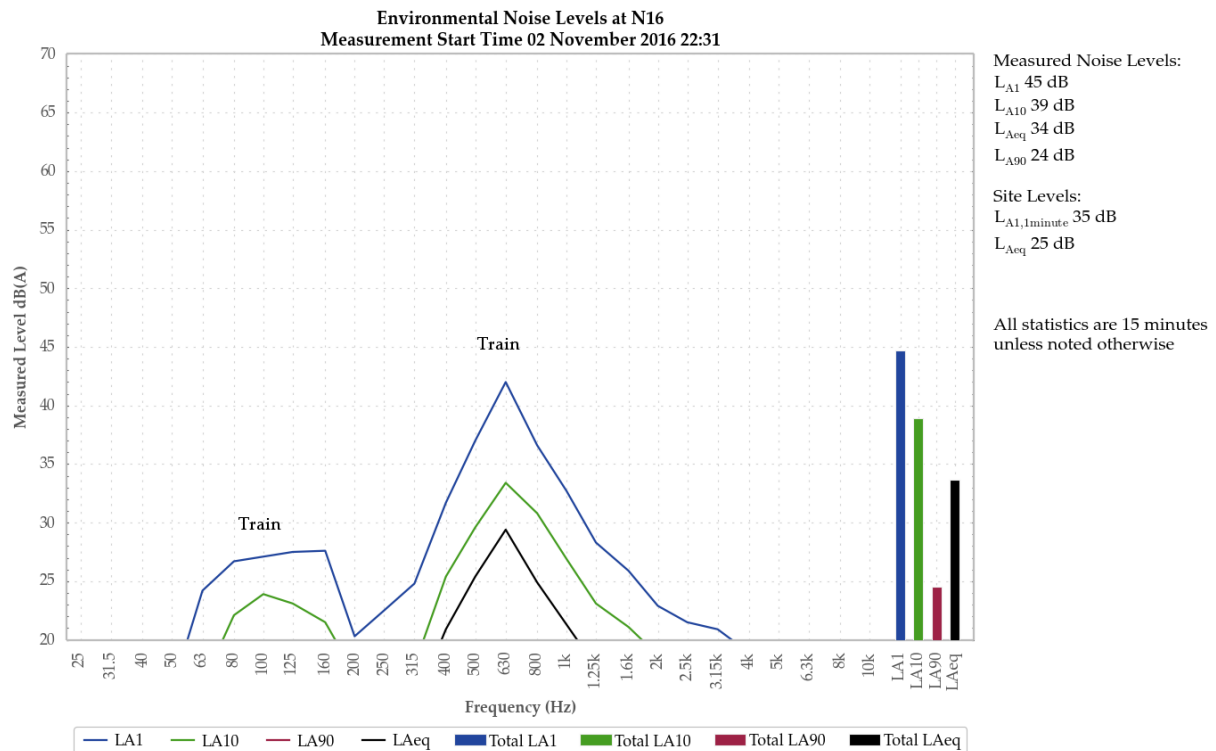


Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

A low-level continuum from WCP was audible during the measurement and generated the site only LAeq of 25 dB. Track noise generated the site only LA1,1minute of 35 dB.

A train generated the measured LA1, LA10 and LAeq. The continuum from WCP and frogs generated the measured LA90.

5.1.6 N17, 2 November 2016

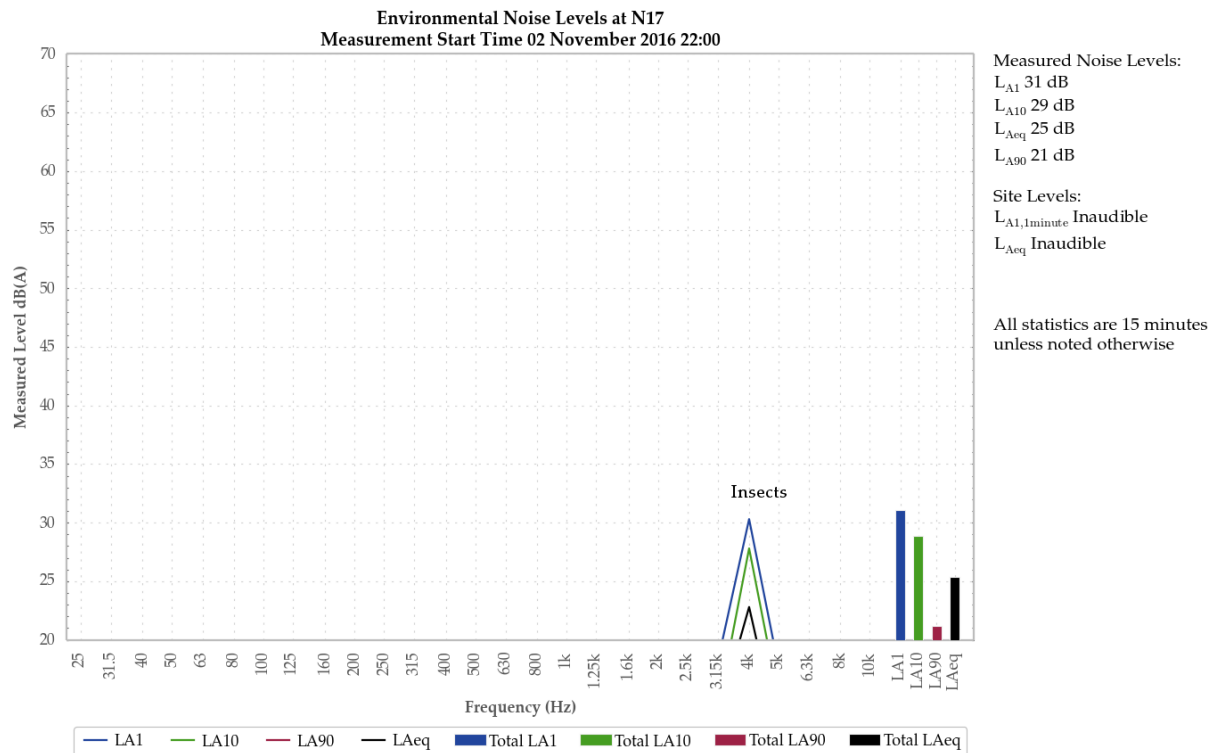


Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible.

Insects generated measured levels.

Birds and an aircraft were also noted.

5.1.7 N18, 3 November 2016

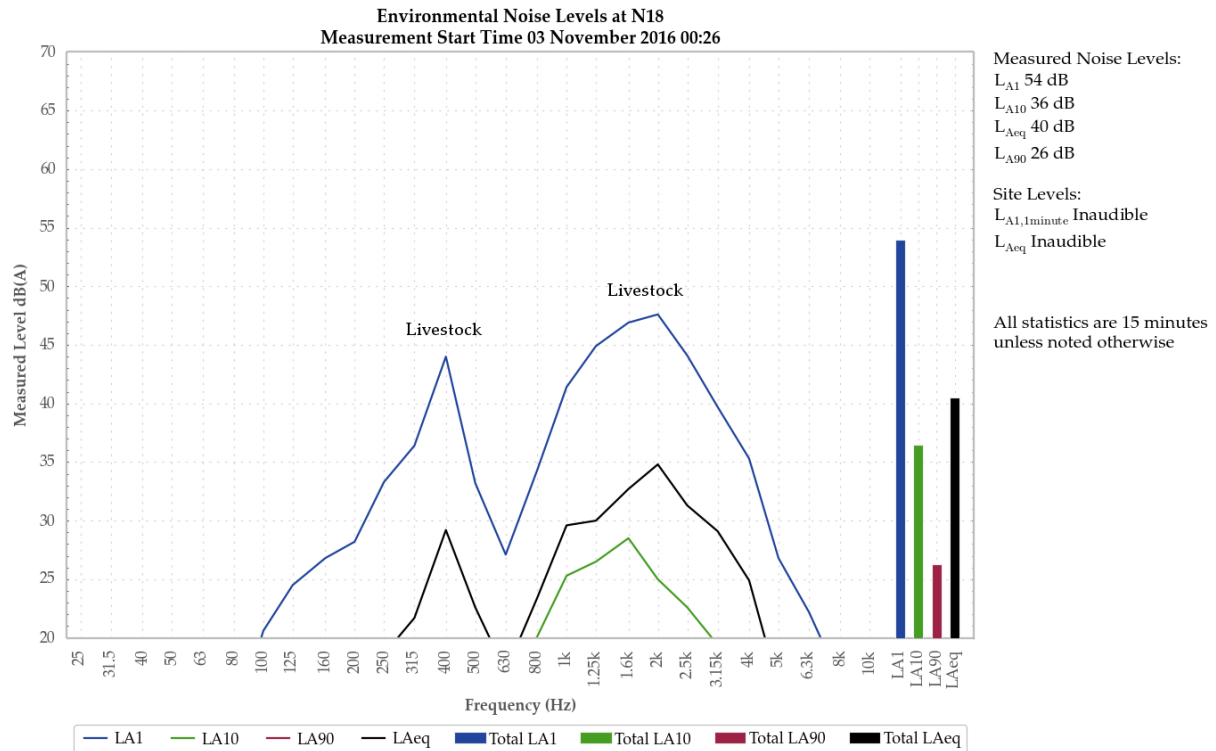


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Livestock generated the measured LA1, LA10 and LAeq. A local continuum generated the measured LA90.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 2/3 November 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the November 2016 monitoring period.

6.2 Low Frequency Assessment

During the November 2016 survey, WCP did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

APPENDIX

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 Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{A1}(1\text{ minute})$
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in July 2016.

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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	36	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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.

L5.5 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.

R4 Other reporting conditions

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and

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of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The relevant sections of the noise monitoring program for WCP dated May 2016 are reproduced below.

6 Noise Monitoring Program

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 4**. Unattended or real-time 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

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 attended monitoring at up to seven locations (**Table 5, Figure 3 and Figure 4**). Real-time 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 5: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest community structure to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
Barrigan Valley²	N18	Attended Noise	780033.3	6398618.1	DP&E Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions

Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine
Wandoona³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 5** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&E and the EPA.

6.3 Attended Noise Monitoring

6.3.1 Purpose

Attended noise monitoring will be used to evaluate compliance against the Noise Criteria detailed in **Table 4**.

6.3.2 Summary

Attended noise will be undertaken in accordance with **Table 6**.

Table 6: Attended Noise Monitoring Summary

Element	Description
Locations	As per Table 5, Figure 3 and Figure 4
Period	Night-time period (10 pm-7 am) being the most sensitive time period for noise.
Frequency	12 times per year and on one night per month

6.3.3 Methodology

Attended noise monitoring will be undertaken as outlined in **Table 6** by an independent acoustic consultant in accordance with the INP (EPA, 2000) and *AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'*. Routine 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 4**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environment and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&E and EPA immediately, upon confirming the exceedance.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

6.3.4 Data Collection

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

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

6.3.5 Evaluation of Compliance

Tables 7 and 8 summarises the definition used by WCPL in this NMP for the evaluation of compliance with the Project Approval. The reporting requirements and actions that WCPL will take in the event of an exceedance or non-compliance are detailed in Figure 5 and Section 6.3.7.

Table 7: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is deemed to have occurred when an attended noise monitoring result, taken in accordance with the INP and Project Approval, exceeds the Noise Criteria in Table 4 . The noise must be solely attributable to WCPL and meteorological conditions must be favourable (6.3.6).
Non-compliance	A non-compliance is deemed to have occurred when a second attended noise monitoring result, taken within 75 minutes of an exceedance and in accordance with the INP and Project Approval, exceeds the Noise Criteria in Table 4 for a second time. The noise must be solely attributable to WCPL and meteorological conditions must be favourable (6.3.6). Reporting requirements for a non-compliance are detailed in Section 6.3.7 .

6.3.6 Favourable Meteorological Conditions

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 3°C/100m.

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

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

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria has occurred, WCPL will, at the earliest opportunity:

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

APPENDIX

B CALIBRATION CERTIFICATES



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Sound Level Meter

IEC 61672-3.2006

Calibration Certificate

Calibration Number C15583

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 : 00533
Pre-amplifier Serial Number : 70607

Pre-Test Atmospheric Conditions
Ambient Temperature : 20.6°C
Relative Humidity : 56.3%
Barometric Pressure : 98.64kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 21.2°C
Relative Humidity : 62.4%
Barometric Pressure : 98.56kPa

Calibration Technician : Corey Stewart
Calibration Date : 06/11/2015

Secondary Check: Kate Alchin
Report Issue Date : 10/11/2015

Approved Signatory : 

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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	±0.120dB	Temperature	±0.3°C
12.5kHz	±0.165dB	Relative Humidity	±4.1%
16kHz	±0.245dB	Barometric Pressure	±0.1kPa
Electrical Tests			
31.5 Hz to 20 kHz	±0.121dB		

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.

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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C15670

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

Equipment Tested/ Model Number : Pulsar 106
Instrument Serial Number : 57413

Atmospheric Conditions
Ambient Temperature : 22°C
Relative Humidity : 54.8%
Barometric Pressure : 99.85kPa

Calibration Technician : Corey Stewart
Calibration Date : 23/12/2015

Secondary Check: Tim Williams
Report Issue Date : 23/12/2015

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
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 60942:2004 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 ±0.09dB	Temperature ±0.3°C
Short Term Fluct. ±0.02dB	Relative Humidity ±4.1%
Frequency ±0.01%	Barometric Pressure ±0.1kPa
Distortion ±0.51%	

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.

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

PAGE 1 OF 1

Wilpinjong Coal

*Environmental Noise Monitoring
December 2016*

*Prepared for
Wilpinjong Coal Pty Ltd*



Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring December 2016

Reference: 16432_R01

Report date: 24 January 2017

Prepared for

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Thornton NSW 2322



Prepared: Amanda Borserio
Environmental Scientist (Acoustics)

QA Review: Katie Weekes
Environmental Scientist (Acoustics)

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.

A modification (MOD5) to the WCP consent was approved in November 2014. 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, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each night measurement was 15 minutes. Results of monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 19/20 December 2016. The purpose of attended noise monitoring was to quantify and describe the acoustic environment around WCP and compare results with specified limits.

Operational Noise Assessment

WCP complied with relevant noise limits at all monitoring locations during the December 2016 monitoring.

Low Frequency Assessment

During the December 2016 survey, none of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). No further assessment of low frequency noise was undertaken.

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 of 19/20 December 2016. Figure 1 shows the monitoring locations.

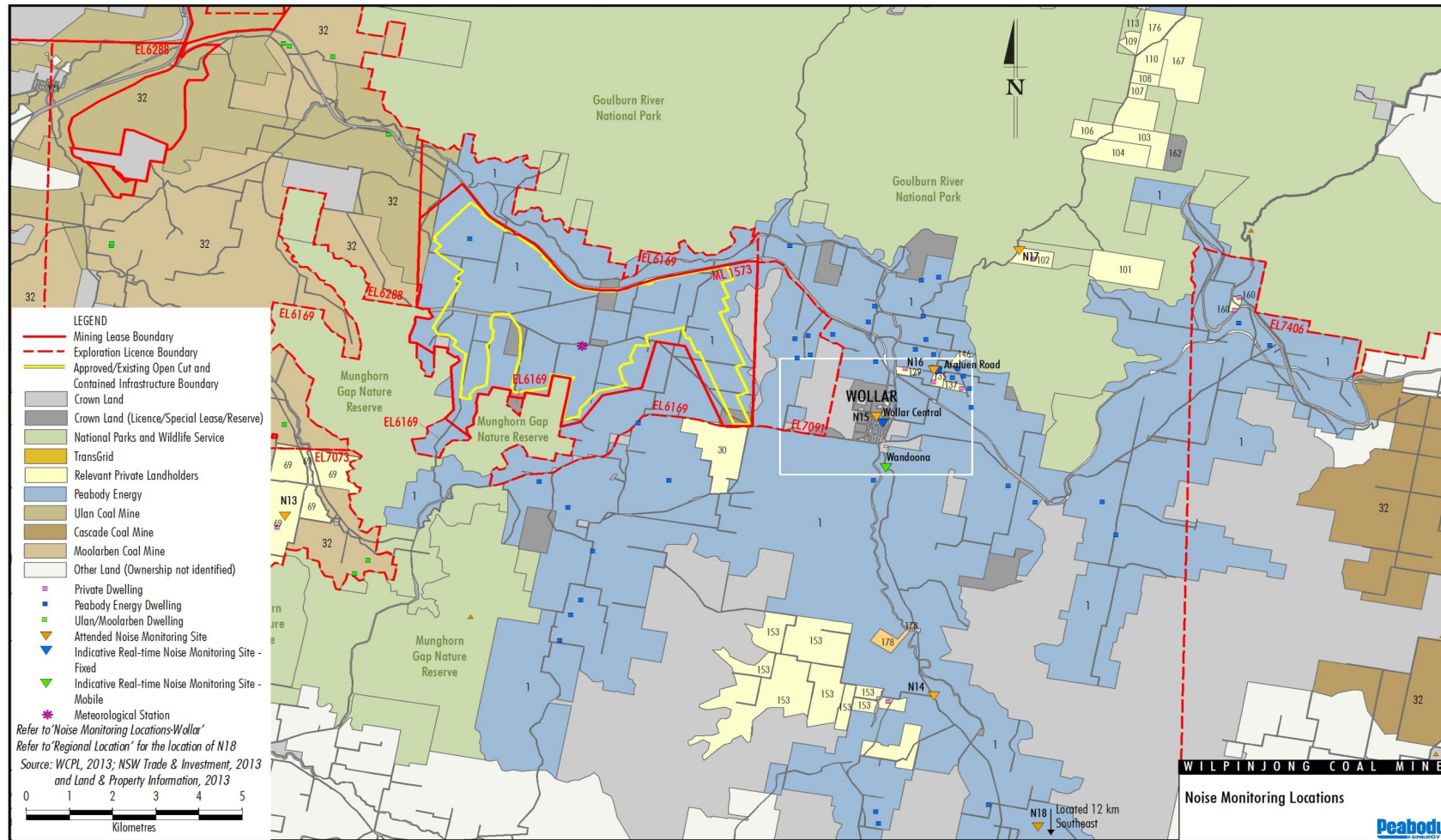
The purpose of the attended noise monitoring survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

1.2 Monitoring Locations

There were seven monitoring locations during this survey as listed in Table 1.1 and shown on Figure 1. These monitoring locations are detailed in the 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	'Coonaroo' off Moolarben Road
N14	'Tichular', intersection of Tichular and Barigan Roads
N15	Track off Barigan Street near Wollar School, Wollar Village
N16	Araluen Road, off Ulan-Wollar Road
N17	Mogo Road, off Araluen Road
N18	Barigan Road, Barigan Valley



WIL-11-10 NMP2013_2010

Figure 1: WCP Attended Noise Monitoring Locations

1.3 Terminology & Abbreviations

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

Table 1.2: TERMINOLOGY & 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 _{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
VIG	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

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in November 2014. The relevant noise conditions from the 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 in July 2016. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

2.3 Noise Monitoring Program

The noise monitoring program (NMP) for WCP was most recently updated in May 2016. 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 Approval Criteria and Weather Conditions

Criteria detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.1: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor/ Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church	35	35	35/45
N13	'Coonaroo'	36	36	36/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	35	35	35/45
N16	Araluen Road	37	37	37/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Appendix 10, Condition 1 of the project approval states:

The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:

- a) wind speeds greater than 3 m/s at 10m above ground level;
- b) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10m above ground level; or
- c) temperature inversion conditions greater than 3°C/100m.

2.5 EPL Criteria and Weather Conditions

Criteria detailed in Table 2.2 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project.

Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor/ Resident Number	Monitoring Location	Day L _{Aeq,15minute}	Evening L _{Aeq,15minute}	Night L _{Aeq,15minute} / L _{A1,1minute}
N6	St Laurence O'Toole Catholic Church, Wollar Village	35	35	35/45
N13	'Coonaroo'	35	35	35/45
N14	'Tichular'	35	35	35/45
N15	Wollar Village	36	35	35/45
N16	Araluen Road	35	35	35/45
N17	Mogo Road, off Araluen Road	35	35	35/45
N18	Barigan Road, Barigan Valley	35	35	35/45

Condition L5.3 in the EPL states:

The noise limits set out in condition 5.1 apply under all meteorological conditions except for the following:

- a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or
- b) Temperature inversion conditions up to 3°C per 100 metres and wind speeds greater than 2 metres per second at 10 metres above the ground level; or
- c) Temperature inversion conditions greater than 3°C per 100 metres.

2.6 INP Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Appendix 10, Condition 5 of the project approval:

Unless the Director-General agrees otherwise, 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: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.

and Condition L5.7 of the EPL:

For the purposes 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.

Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

Tonal noise contains a prominent frequency and is characterised by a definite pitch.

Impulsive noise has high peaks of short duration or a sequence of such peaks.

Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.6.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction/penalty of 5 dB is to be applied *if the difference between the two levels is 15 dB or more.*

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the site only C - weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to the measured level.

Low Frequency Assessment Method

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFICATION FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	Site only L _{Ceq}	>60	>65
INP	Site only L _{Ceq} minus site only L _{Aeq}	>=15	>=15

The EPA is currently undertaking a review of the assessment of low frequency noise. While a Draft Industrial Noise Guideline (ING) was released in September 2015, low frequency noise results from WCP have been compared to the assessment methods and modifying factor triggers presented above. The applicability of these triggers have been considered when applying low frequency modifying factor corrections.

3 METHODOLOGY

3.1 Assessment Method

Attended monitoring was conducted in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

Attended monitoring during this reporting period was undertaken by Amanda Borserio.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq} 30$ dB, which is insignificant in terms of any applicable criterion.

If site noise were NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting. All sites noted NM in this report are due to insignificant absolute values.

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 emitted from a Wilpinjong Coal Project (WCP) noise source 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_{Aeq} 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.

As indicated in L5.7 of the EPL, modifying factors from Section 4 of the INP should be implemented where applicable. Low frequency noise from WCP was assessed by analysis of the measured L_{Aeq} spectrum.

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 A.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	00370304	16/11/2018
Larson Davis 150 acoustic calibrator	3333	30/09/2018

4 RESULTS

4.1 Attended Noise Monitoring

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 2016¹

Location	Start Date and Time	L _{Amax} dB	L _{A1} dB	L _{A10} dB	L _{A50} dB	L _{Aeq} dB	L _{A90} dB	L _{Amin} dB	L _{Ceq} dB
N6	19/12/2016 23:23	51	44	39	35	36	31	28	39
N13	20/12/2016 01:25	51	35	32	31	31	29	28	53
N14	19/12/2016 22:56	52	50	48	46	46	43	35	50
N15	19/12/2016 23:42	46	42	40	36	37	32	27	41
N16	20/12/2016 00:44	47	41	36	31	33	28	25	44
N17	20/12/2016 00:14	42	39	38	36	36	35	33	46
N18	19/12/2016 22:25	54	41	39	34	36	31	28	38

Note:

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

4.2 Low Frequency Assessment

Table 4.2 provides statistics for attended noise monitoring undertaken around WCP during December 2016.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – DECEMBER 2016

Conditions	Total for December 2016
Number of measurements	7
Number of measurements where meteorological conditions applied (in accordance with project approval)	7
Number of measurements where WCP was the only low-frequency source and levels were within 5 dB of the criterion and criterion applied	0

None of the seven measurements occurred during which WCP was the only low frequency source, was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion, and where meteorological conditions resulted in criteria applying (in accordance with the EPL and project approval). No further assessment was required.

4.3 Project Approval and Weather Conditions

Table 4.3 and Table 4.4 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. If applicable, modifying factors are considered in Section 4.2.

Table 4.3: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – DECEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	19/12/2016 23:23	1.3	-0.4	35	Yes	<20	Nil
N13	20/12/2016 01:25	1.0	-0.2	36	Yes	<25	Nil
N14	19/12/2016 22:56	2.0	-0.8	35	Yes	<25	Nil
N15	19/12/2016 23:42	1.4	-0.4	35	Yes	<20	Nil
N16	20/12/2016 00:44	1.4	-0.4	37	Yes	<20	Nil
N17	20/12/2016 00:14	1.4	-0.4	35	Yes	<20	Nil
N18	19/12/2016 22:25	2.8	-1.0	35	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.4: *L_{A1,1minute}* GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – DECEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP <i>L_{A1,1min}</i> dB ^{4,5}	Exceedance ⁶
N6	19/12/2016 23:23	1.3	-0.4	45	Yes	<20	Nil
N13	20/12/2016 01:25	1.0	-0.2	45	Yes	30	Nil
N14	19/12/2016 22:56	2.0	-0.8	45	Yes	28	Nil
N15	19/12/2016 23:42	1.4	-0.4	45	Yes	<20	Nil
N16	20/12/2016 00:44	1.4	-0.4	45	Yes	25	Nil
N17	20/12/2016 00:14	1.4	-0.4	45	Yes	<20	Nil
N18	19/12/2016 22:25	2.8	-1.0	45	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second at a height of 10 metres, temperature inversion conditions between 1.5°C and 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. As WCP levels were more than 5 dB below relevant criteria at all times no analysis of modifying factors (for mining this is only low-frequency content) was required.

Table 4.5: $L_{Aeq,15\text{minute}}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – DECEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP $L_{Aeq,15\text{min}}$ dB ^{4,5}	Exceedance ⁶
N6	19/12/2016 23:23	1.3	-0.4	35	Yes	<20	Nil
N13	20/12/2016 01:25	1.0	-0.2	35	Yes	<25	Nil
N14	19/12/2016 22:56	2.0	-0.8	35	Yes	<25	Nil
N15	19/12/2016 23:42	1.4	-0.4	36	Yes	<20	Nil
N16	20/12/2016 00:44	1.4	-0.4	35	Yes	<20	Nil
N17	20/12/2016 00:14	1.4	-0.4	35	Yes	<20	Nil
N18	19/12/2016 22:25	2.8	-1.0	35	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

Table 4.6: *L_{A1,1minute}* GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – DECEMBER 2016

Location	Start Date and Time	Wind Speed m/s ^{1,2}	VTG °C per 100m ^{1,2}	Criterion dB	Criterion Applies? ^{2,3}	WCP <i>L_{A1,1min}</i> dB ^{4,5}	Exceedance ⁶
N6	19/12/2016 23:23	1.3	-0.4	45	Yes	<20	Nil
N13	20/12/2016 01:25	1.0	-0.2	45	Yes	30	Nil
N14	19/12/2016 22:56	2.0	-0.8	45	Yes	28	Nil
N15	19/12/2016 23:42	1.4	-0.4	45	Yes	<20	Nil
N16	20/12/2016 00:44	1.4	-0.4	45	Yes	25	Nil
N17	20/12/2016 00:14	1.4	-0.4	45	Yes	<20	Nil
N18	19/12/2016 22:25	2.8	-1.0	45	Yes	IA	Nil

Notes:

1. Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
2. Criterion may or may not apply due to rounding of meteorological data values;
3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres), temperature inversion conditions of up to 3°C/100m with winds up to and including 2 m/s, or temperature inversion conditions up to and including 3°C/100m;
4. These are results for WCP in the absence of all other noise sources;
5. Bolded results in red are those greater than the relevant criterion (if applicable); and
6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified.

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 4.7. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.7: MEASURED ATMOSPHERIC CONDITIONS – DECEMBER 2016

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	19/12/2016 23:23	20	0.0	-	0
N13	20/12/2016 01:25	17	0.3	160	0
N14	19/12/2016 22:56	21	0.0	-	0
N15	19/12/2016 23:42	21	0.0	-	0
N16	20/12/2016 00:44	18	0.0	-	0
N17	20/12/2016 00:14	20	0.0	-	0
N18	19/12/2016 22:25	22	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 concurrently by the WCP meteorological station is provided in Table 4.8 and is used to determine compliance with specified noise criteria.

Table 4.8: WCP METEOROLOGICAL STATION DATA¹

End Date	End Time	Wind Speed m/s	Wind Direction Degrees ^{2,4}	Lapse Rate Degrees / 100 metres ³
19/12/2016	22:00	3.0	84	-1.0
19/12/2016	22:15	3.6	80	-1.2
19/12/2016	22:30	3.4	79	-1.2
19/12/2016	22:45	2.8	79	-1.0
19/12/2016	23:00	2.3	83	-1.0
19/12/2016	23:15	2.0	72	-0.8
19/12/2016	23:30	1.8	57	-0.8
19/12/2016	23:45	1.3	49	-0.4
20/12/2016	00:00	1.4	78	-0.4
20/12/2016	00:15	1.4	103	-0.8
20/12/2016	00:30	1.4	107	-0.4
20/12/2016	00:45	1.6	113	-0.4
20/12/2016	01:00	1.4	104	-0.4
20/12/2016	01:15	1.1	89	-0.4
20/12/2016	01:30	1.0	88	-0.4
20/12/2016	01:45	1.0	89	-0.2
20/12/2016	02:00	1.2	97	0.2

Notes:

1. Data supplied by WCP;
2. "-" in wind direction column indicates that conditions were calm;
3. Lapse rate sourced from the WCP inversion tower; and
4. NA indicates data not available/recorded.

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.6 present data gathered during attended monitoring. 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} .

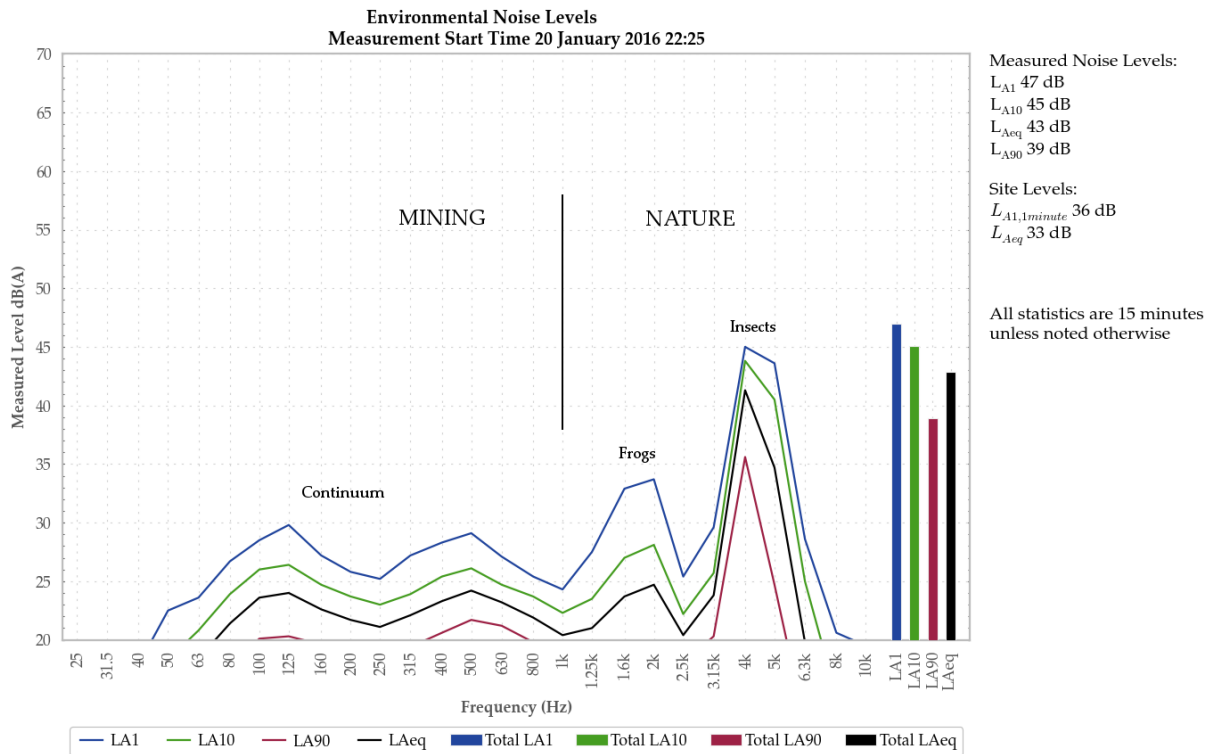


Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 19 December 2016

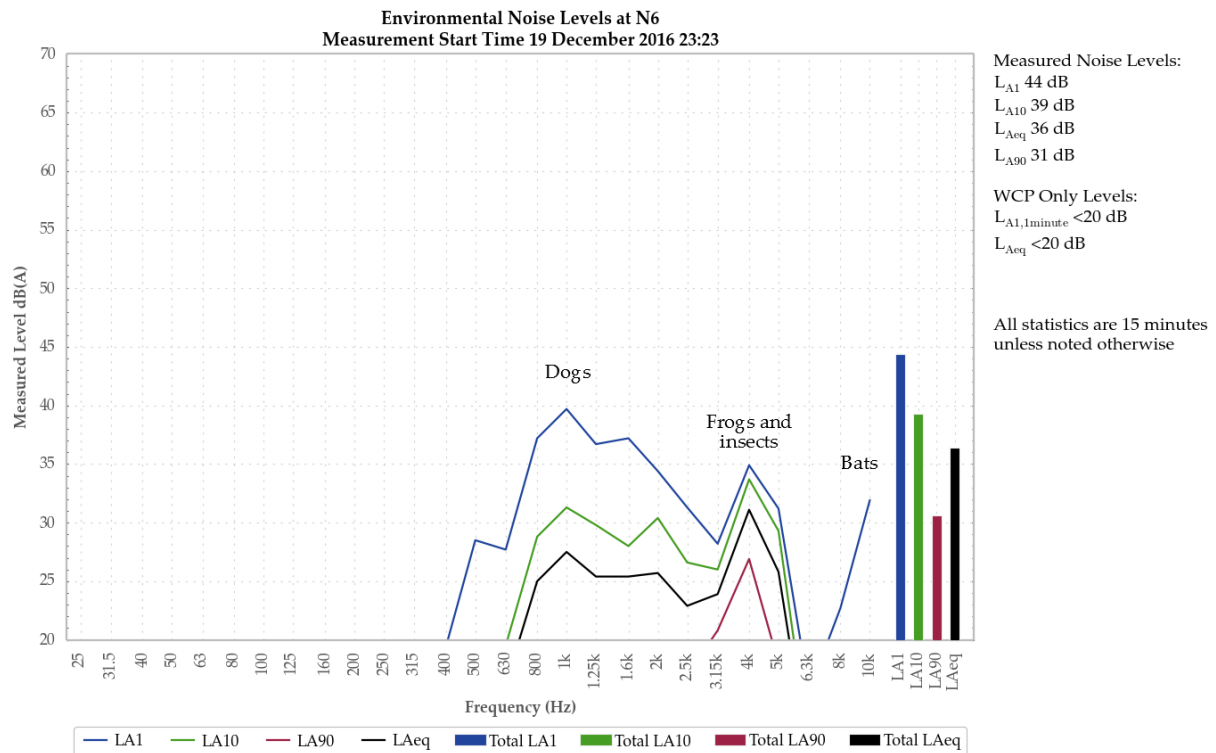


Figure 3: Environmental Noise Levels - N6, St Laurence O’Toole Catholic Church, Wollar Village

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

Dogs primarily generated the measured LA1 and contributed to the measured LA10 and LAeq. Frogs and insects primarily generated the measured LA10, LAeq and LA90.

Bats, livestock, owls, birds and a possum were also noted.

5.1.2 N13, 20 December 2016

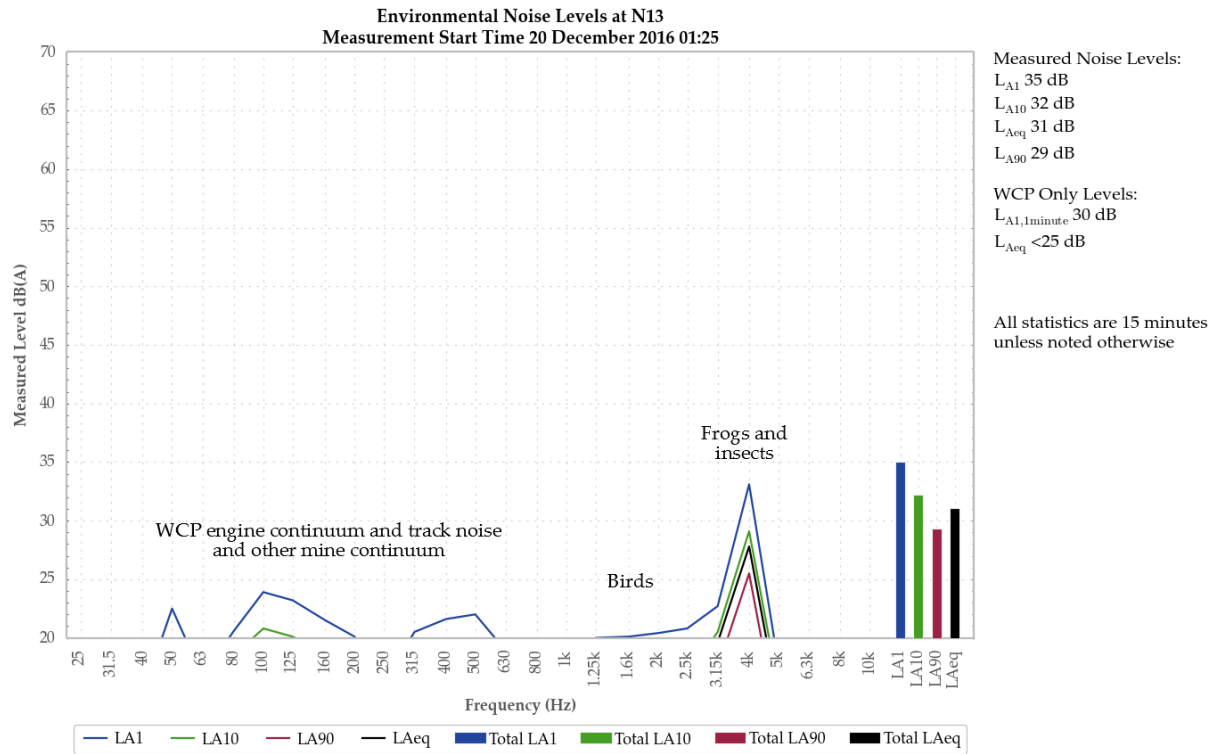


Figure 4: Environmental Noise Levels - N13, 'Coonaroo' off Moolarben Road

An engine continuum from WCP was audible during the measurement. Impact and track noise were also noted. These sources generated the site only LAeq of less than 25 dB. Track noise generated the site only LA1,1minute of 30 dB.

Frogs and insects generated measured levels.

Birds, breeze in foliage, cows and a continuum from another mine were also noted.

5.1.3 N14, 19 December 2016

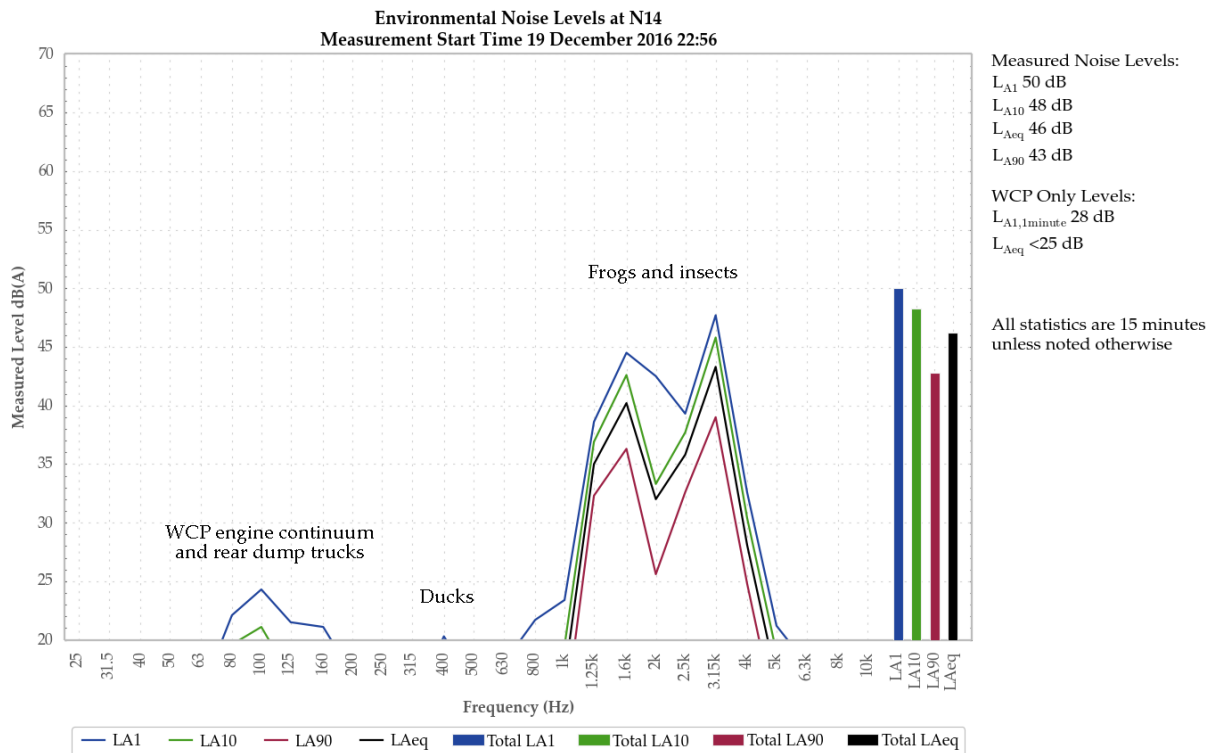


Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

An engine continuum from WCP was audible during the measurement. Rear dump truck noise was also noted. These sources generated the site only LAeq of less than 25 dB. Rear dump trucks generated the site only LA1,1minute of 28 dB.

Frogs and insects generated measured levels.

Ducks were also noted.

5.1.4 N15, 19 December 2016

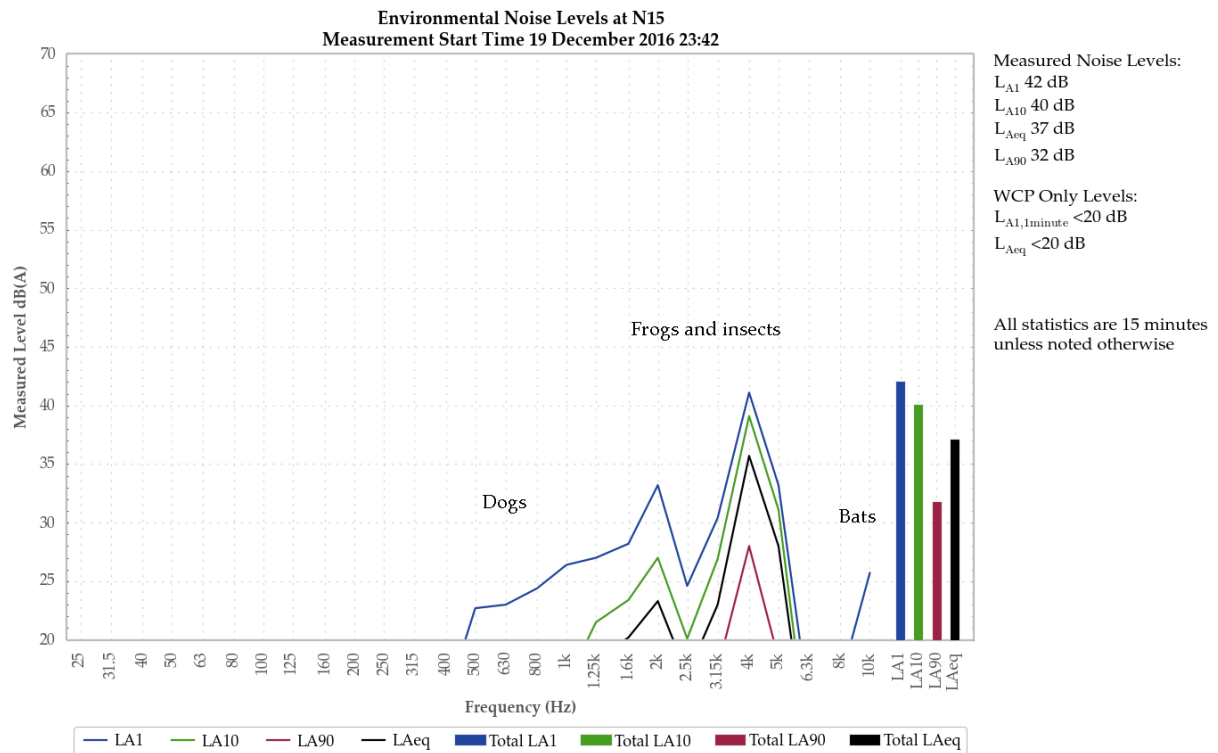


Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

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

Frogs and insects generated measured levels.

Dogs, bats, owls and cows were also noted.

5.1.5 N16, 20 December 2016

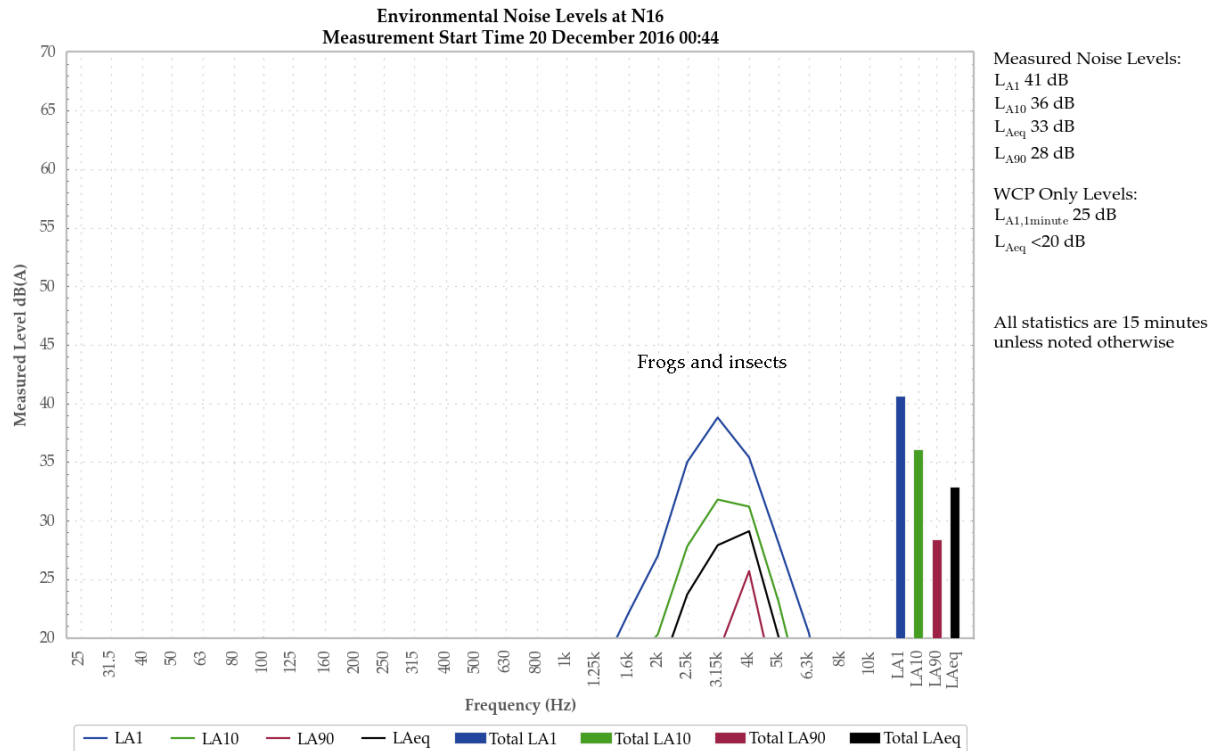


Figure 7: Environmental Noise Levels - N16, Araluen Road, off Ulan-Wollar Road

Low level engine continuum and rear dump truck noise were audible from WCP during the measurement, generating the site only LAeq of less than 20 dB and the site only LA1,1minute of 25 dB.

Frogs and insects generated measured levels.

Birds, cows and possums were also noted.

5.1.6 N17, 20 December 2016

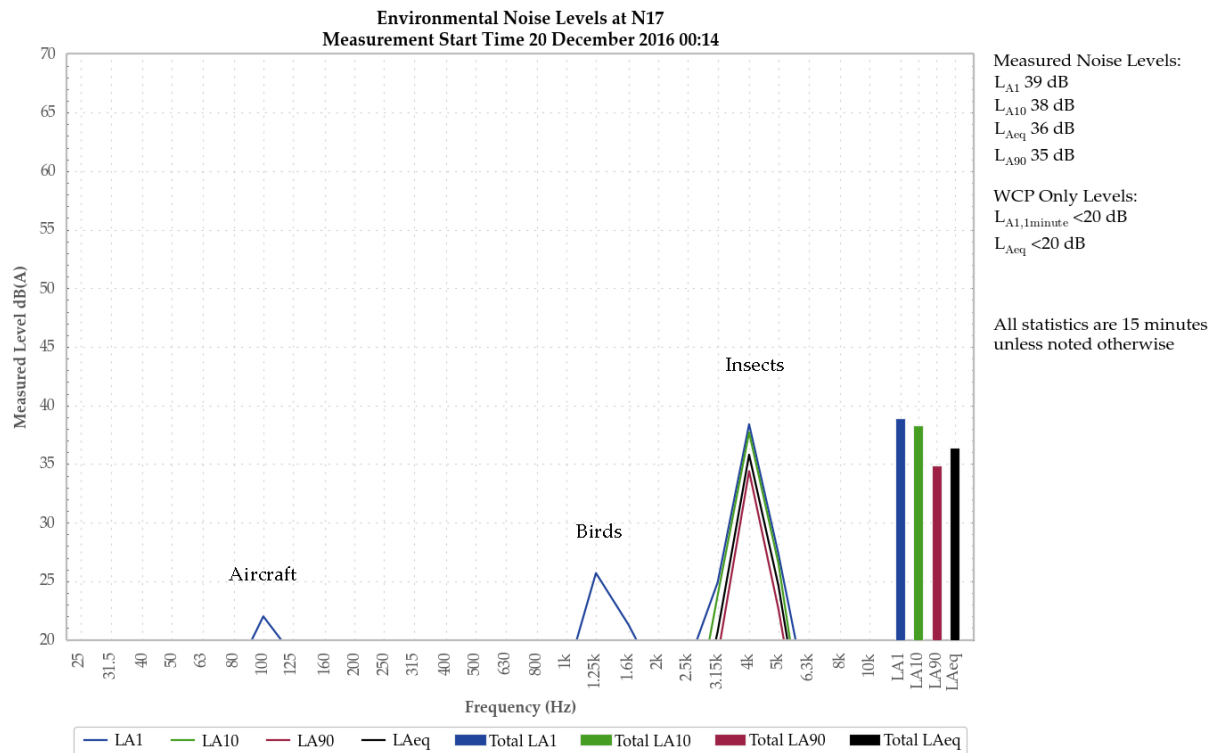


Figure 8: Environmental Noise Levels - N17, Mogo Road, off Araluen Road

A low-level continuum was audible from WCP during some of the measurement, generating the site only L_{Aeq} and L_{A1,1minute} of less than 20 dB.

Insects generated measured levels.

Birds, other wildlife, an aircraft, a train and a train horn were also noted.

5.1.7 N18, 19 December 2016

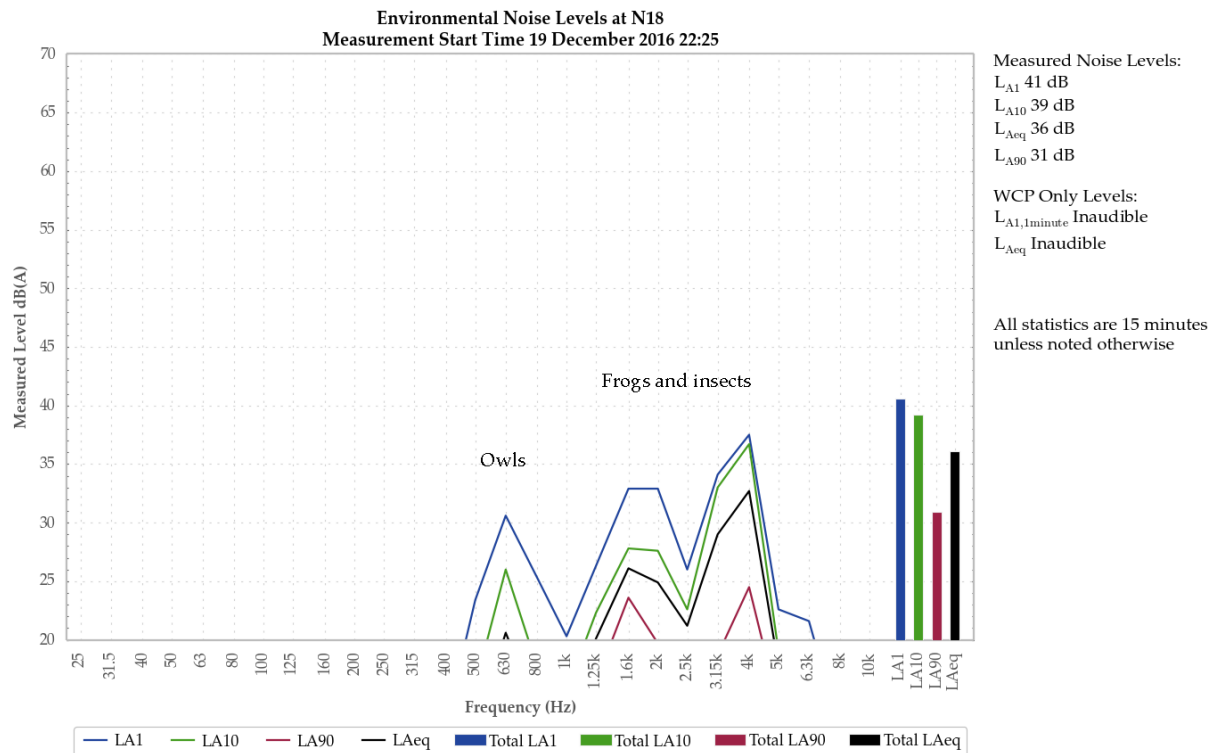


Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Frogs and insects generated measured levels.

Owls, bats, birds and livestock were also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 19/20 December 2016. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

6.1 Operational Noise Assessment

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the December 2016 monitoring period.

6.2 Low Frequency Assessment

During the December 2016 survey, none of the measurements occurred during which WCP was measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). No further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

APPENDIX

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 Project Approval

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5 – 6 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 7.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or at the other specified locations.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{Aeq}(15\text{ minute})$	$L_{A1}(1\text{ minute})$
135	38	38	38	45
129 and 137	37	37	37	45
69	36	36	36	45
Wollar Village – Residential	36	35	35	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				-
Goulburn River National Park/Munghorn Gap Nature Reserve		50 When in use		-

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 11 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, the criteria in Table 2 do not apply if the Proponent has an agreement with the relevant owner/s to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7; and
- For the Goulburn River National Park/Munghorn Nature Reserve noise levels are to be assessed at the most affected point at the boundary of the Goulburn River National Park/Munghorn Nature Reserve.

Mitigation Upon Request

3. Upon receiving a written request from the owner of any residence on the land listed in either Table 1 or Table 3, the Proponent shall implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible, and directed towards reducing the noise impacts of the project on the residence.

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

Table 3: Land subject to additional noise mitigation upon request

Receiver ID
69, 129, 135 and 137

Note: To interpret the land referred to in Table 3, see the applicable figures in Appendix 7.

Operating Conditions

4. The Proponent shall:
 - (a) implement best management practice to minimise the operational, road, and rail noise of the project;
 - (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 approval;
 - (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
 - (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 project is complying with the relevant conditions of this approval, and publish these monitoring results on its website, to the satisfaction of the Director-General.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
 - (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
 - (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 approval; 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 approval 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.

APPENDIX 8 STATEMENT OF COMMITMENTS

Operational Noise

WCPL will continue to implement real-time noise monitoring and associated controls, such that noise from the Wilpinjong Coal Mine will comply with relevant Project Approval noise criteria (including a commitment to modify the operations as required to achieve continued compliance with project specific noise levels in the Village of Wollar under relevant meteorological conditions, as described in the Project Approval, EPL 12425 and the amended Noise Management Plan).

APPENDIX 10 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 of the conditions 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) temperature inversion conditions between 1.5 °C and 3°C/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
 - (c) temperature inversion conditions greater than 3°C/100m

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall 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 Director-General directs otherwise.
5. Unless the Director-General agrees otherwise, 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

The EPL (number 12425) for WCP was originally issued in February 2006 and has been the subject of subsequent variations, the most recent in July 2016.

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 by the property identification numbers on Figure 4A Relevant Land Ownership Plan Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010. The property identification numbers are indicated on Figure 4B Relevant Land Ownership List Wilpinjong Coal Mine Mining Rate Modification Environmental Assessment 17 May 2010.

Location	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
Wollar village	36	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
All other privately owned land (outside the village of Wollar)	35	35	35	45

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
- Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- Temperature inversion conditions greater than 3°C/100m.

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

- The meteorological data to be used for determining meteorological conditions is the data recorded by the meteorological weather station identified as EPA identification Point 21 in condition P1.1; and
- Temperature inversion conditions (vertical temperature gradient in degrees C) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 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.

R4 Other reporting conditions

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the second round of quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:

- a) an assessment of compliance with noise limits presented in Condition L5.1; and
- b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L5.1.

A.3 Noise Monitoring Program

The relevant sections of the noise monitoring program for WCP dated May 2016 are reproduced below.

6 Noise Monitoring Program

WCPL utilise a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring will be used for determining compliance against the Noise Criteria in **Table 4**. Unattended or real-time 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

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 attended monitoring at up to seven locations (**Table 5, Figure 3 and Figure 4**). Real-time 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 5: Noise Related Monitoring Locations

Location	Site	Type	Easting ¹	Northing ¹	Justification
St Laurence O'Toole Church	N6	Attended Noise	777299.9	6415716.9	Location based on the nearest community structure to the East of the Mine
Coonaroo	N13	Attended Noise	763758.9	6413471.9	Location based on the nearest community structure to the West of the Mine
Tichular	N14	Attended Noise	778791.9	6408624.7	Location based on the nearest community structure to the South of the Mine
Wollar Village	N15	Attended Noise	777452.0	6416158.9	Location based on the nearest community structure to the South-East of the Mine
Araluen Rd	N16	Attended Noise	778787.4	6417418.7	Location based on the nearest community structure to the East of the Mine
Mogo Rd	N17	Attended Noise	780771.0	6420641.0	Location based on the nearest community structure to the North-East of the Mine
Barrigan Valley²	N18	Attended Noise	780033.3	6398618.1	DP&E Recommendation (MOD5) – Location approximately 20 km to the south of the Mine
WCPL Rail Loop		Meteorology & Inversion	770630.9	6418085.1	Location based on consideration of prevailing meteorological conditions

Wollar Village		Real-Time Noise - Fixed	777608.9	6415996.8	Location based on the nearest non-mine owned residence to the South-East of the Mine
Araluen Rd		Real-Time Noise - Fixed	778856.4	6417401.3	Location based on the nearest non-mine owned residence to the East of the Mine
Wandoona³		Real-Time Noise - Mobile	777684.4	6414786.2	Location based on the nearest non-mine owned residence to the South-East of the Mine

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.

Should circumstances change, WCPL may amend the noise monitoring locations shown in **Table 5** with consideration to the above criteria. WCPL will update this Management Plan, in consultation with DP&E and the EPA.

6.3 Attended Noise Monitoring

6.3.1 Purpose

Attended noise monitoring will be used to evaluate compliance against the Noise Criteria detailed in **Table 4**.

6.3.2 Summary

Attended noise will be undertaken in accordance with **Table 6**.

Table 6: Attended Noise Monitoring Summary

Element	Description
Locations	As per Table 5, Figure 3 and Figure 4
Period	Night-time period (10 pm-7 am) being the most sensitive time period for noise.
Frequency	12 times per year and on one night per month

6.3.3 Methodology

Attended noise monitoring will be undertaken as outlined in **Table 6** by an independent acoustic consultant in accordance with the INP (EPA, 2000) and *AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'*. Routine 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 4**, then the result will be recorded and the regular monitoring program resumed.

If the second measurement does exceed the applicable Noise Criteria ('confirmed exceedance') then:

- a) The noise consultant will immediately report both results to the WCPL Environment and Community Manager or delegate immediately; and
- b) WCPL will report both results to DP&E and EPA immediately, upon confirming the exceedance.

WCPL will:

- a) Take immediate action in accordance with the NMS;
- b) Arrange for additional 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.

6.3.4 Data Collection

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

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

6.3.5 Evaluation of Compliance

Tables 7 and 8 summarises the definition used by WCPL in this NMP for the evaluation of compliance with the Project Approval. The reporting requirements and actions that WCPL will take in the event of an exceedance or non-compliance are detailed in **Figure 5** and **Section 6.3.7**.

Table 7: Definition of an Exceedance

Term	Definition
Exceedance	An exceedance is deemed to have occurred when an attended noise monitoring result, taken in accordance with the INP and Project Approval, exceeds the Noise Criteria in Table 4 . The noise must be solely attributable to WCPL and meteorological conditions must be favourable (6.3.6).
Non-compliance	A non-compliance is deemed to have occurred when a second attended noise monitoring result, taken within 75 minutes of an exceedance and in accordance with the INP and Project Approval, exceeds the Noise Criteria in Table 4 for a second time. The noise must be solely attributable to WCPL and meteorological conditions must be favourable (6.3.6). Reporting requirements for a non-compliance are detailed in Section 6.3.7 .

6.3.6 Favourable Meteorological Conditions

Favourable meteorological conditions means:

- No rain or hail;
- Average wind speed at microphone height less than 5 m/s;
- Wind speeds not greater than 3 m/s at 10 m above ground level; and
- Temperature inversion conditions less than 3°C/100m.

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

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

6.3.7 Response to Non-Compliance or Exceedance

Where any non-compliance of the Noise Criteria has occurred, WCPL will, at the earliest opportunity:

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

APPENDIX

B CALIBRATION CERTIFICATES



**Acoustic
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Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
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Sound Level Meter
IEC 61672-3.2006
Calibration Certificate

Calibration Number C16643

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 : 22.2°C
Relative Humidity : 46.6%
Barometric Pressure : 99.95kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 22.4°C
Relative Humidity : 44.5%
Barometric Pressure : 99.95kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 16/11/2016

Secondary Check: Sandra Minto
Report Issue Date : 17/11/2016

Approved Signatory :

Juan Agüero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	Pass	14: Level linearity on the reference level range	Pass
11: Acoustical tests of a frequency weighting	Pass	15: Level linearity incl. the level range control	Pass
12: Electrical tests of frequency weightings	Pass	16: Toneburst response	Pass
13: Frequency and time weightings at 1 kHz	Pass	17: Peak C sound level	Pass
		18: Overload Indication	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	±0.12dB	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.

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 C16526


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

Equipment Tested/ Model Number : LarsonDavis Cal150
Instrument Serial Number : 3333

Atmospheric Conditions

Ambient Temperature : 21.8°C
Relative Humidity : 38.1%
Barometric Pressure : 97.74kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 30/09/2016
Secondary Check: Riley Cooper
Report Issue Date : 04/10/2016

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	1000.04
Measured Output	114.0	1000.0	113.9	1000.05

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	Temperature
Short Term Fluct.	Relative Humidity
Frequency	Barometric Pressure
Distortion	

±0.09dB
±0.02dB
±0.01%
±0.5%

±0.05°C
±0.46%
±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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The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.