APPENDIX 3F – NOISE MONITORING

Attended Noise Monitoring Reports

Wilpinjong Coal

Environmental Noise Monitoring

January 2015

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring
January 2015

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Report date: 9 March 2015

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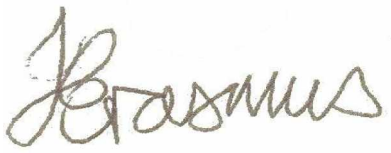

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Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation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

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 29/30 January 2015. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

WCP complied with relevant noise limits at all monitoring locations during the January 2015 monitoring.

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). As such, no further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

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Appendices

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 29/30 January 2015. 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

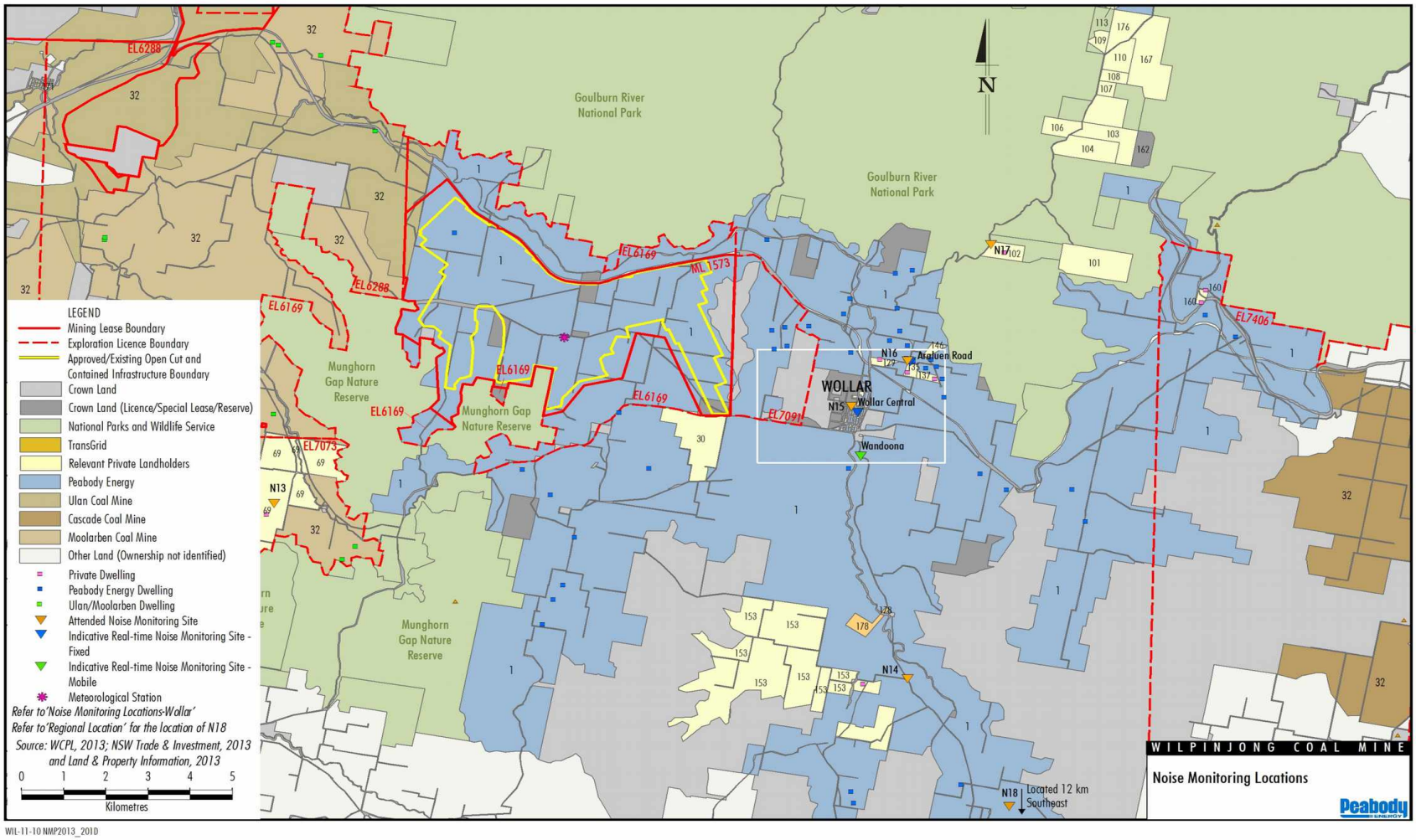

Figure 1: Attended Noise Monitoring Locations

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 of the project approval are reproduced in Appendix A.

2.2 Environment 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 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. 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 are 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	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 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 C-weighted and 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 total predicted C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to predicted levels.

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFYING FACTORS

Method	Assessment/Calculation Method	Night Period Modifying Factor Trigger	Day Period Modifying Factor Trigger
Broner, 2010	L_{Ceq} to 250 Hz	>60	>65
INP, total	Total L_{Ceq} minus 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), "Not measurable" (NM), "Less than 25 dB" (<25 dB) or "Less than 20 dB" (<20 dB) may be used in this report. When site noise is noted as IA then there was no site noise audible at the monitoring location.

However, if site noise is noted as NM, <25 dB or <20 dB, this means some noise was audible but could not be quantified. This means that noise from the site was either very low, or, being masked by other noise that was relatively loud. In the former case (very low site levels) we consider it not necessary to attempt to accurately quantify site noise as it would be significantly less than any criterion and most unlikely to cause annoyance (and in many cases, to be even noticed).

If site noise were NM, <25 dB or <20 dB due to masking then we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting if deemed necessary. All sites NM, <25 dB or <20 dB in this report are due to low 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	00960042	16/06/2016
Rion NC-73 acoustic calibrator	10417664	16/06/2016

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 – JANUARY 2015[1]

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	29/01/2015 22:36	52	49	44	36	39	30	27	57
N13	29/01/2015 22:00	41	34	31	27	28	23	20	45
N14	29/01/2015 23:06	48	46	44	34	39	25	20	43
N15	30/01/2015 00:29	52	34	30	28	29	27	25	32
N16	30/01/2015 01:00	43	41	37	23	32	21	18	53
N17	30/01/2015 01:31	38	28	23	19	21	16	14	39
N18	29/01/2015 23:43	41	32	27	23	25	21	19	34

Note:

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

4.2 Project Approval and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JANURY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	29/01/2015 22:36	0.0	4.5	35	No	IA	NA
N13	29/01/2015 22:00	0.0	2.4	35	Yes	IA	Nil
N14	29/01/2015 23:06	0.8	3.4	35	No	IA	NA
N15	30/01/2015 00:29	1.0	0.3	35	Yes	IA	Nil
N16	30/01/2015 01:00	0.0	0.0	35	Yes	IA	Nil
N17	30/01/2015 01:31	0.0	0.0	35	Yes	IA	Nil
N18	29/01/2015 23:43	0.7	2.2	35	Yes	IA	Nil

Notes:

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

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JANUARY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	29/01/2015 22:36	0.0	4.5	45	No	IA	NA
N13	29/01/2015 22:00	0.0	2.4	45	Yes	IA	Nil
N14	29/01/2015 23:06	0.8	3.4	45	No	IA	NA
N15	30/01/2015 00:29	1.0	0.3	45	Yes	IA	Nil
N16	30/01/2015 01:00	0.0	0.0	45	Yes	IA	Nil
N17	30/01/2015 01:31	0.0	0.0	45	Yes	IA	Nil
N18	29/01/2015 23:43	0.7	2.2	45	Yes	IA	Nil

Notes:

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

4.3 EPL and Weather Conditions

Table 4.4 and Table 4.5 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – JANUARY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	29/01/2015 22:36	0.0	4.5	35	No	IA	NA
N13	29/01/2015 22:00	0.0	2.4	36	Yes	IA	Nil
N14	29/01/2015 23:06	0.8	3.4	35	No	IA	NA
N15	30/01/2015 00:29	1.0	0.3	35	Yes	IA	Nil
N16	30/01/2015 01:00	0.0	0.0	37	Yes	IA	Nil
N17	30/01/2015 01:31	0.0	0.0	35	Yes	IA	Nil
N18	29/01/2015 23:43	0.7	2.2	35	Yes	IA	Nil

Notes:

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

Table 4.5: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – JANUARY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	29/01/2015 22:36	0.0	4.5	45	No	IA	NA
N13	29/01/2015 22:00	0.0	2.4	45	Yes	IA	Nil
N14	29/01/2015 23:06	0.8	3.4	45	No	IA	NA
N15	30/01/2015 00:29	1.0	0.3	45	Yes	IA	Nil
N16	30/01/2015 01:00	0.0	0.0	45	Yes	IA	Nil
N17	30/01/2015 01:31	0.0	0.0	45	Yes	IA	Nil
N18	29/01/2015 23:43	0.7	2.2	45	Yes	IA	Nil

Notes:

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

4.4 Low Frequency Assessment

Table 4.6 provides statistics for attended noise monitoring undertaken around WCP during the January 2015 survey.

Table 4.6: ATTENDED MEASUREMENT STATISTICS FOR WCP – JANUARY 2015

Conditions	Total for January 2015
Number of measurements	7
Number of measurements where met applies	7
Number of measurements where WCP is measurable (within 5dB of the criteria) and criteria and met applies in accordance with the project approval and/or EPL	0

None of the seven measurements occurred during which WCP was directly measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of "<30 dB"), within 5 dB of in the impact assessment criteria and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further analysis of low frequency is required.

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 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	29/01/2015 22:36	15	0.0	-	0
N13	29/01/2015 22:00	18	1.0	220	0
N14	29/01/2015 23:06	15	1.3	170	0
N15	30/01/2015 00:29	19	0.0	-	0
N16	30/01/2015 01:00	17	0.8	250	0
N17	30/01/2015 01:31	16	0.0	-	0
N18	29/01/2015 23:43	12	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 DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
1/29/2015 22:00	0.6	255	4.1
1/29/2015 22:15	0.0	-	2.4
1/29/2015 22:30	0.0	-	3.6
1/29/2015 22:45	0.0	-	4.5
1/29/2015 23:00	0.9	8	5.3
1/29/2015 23:15	0.8	38	3.4
1/29/2015 23:30	0.8	56	2.1
1/29/2015 23:45	0.0	-	1.7
1/30/2015 0:00	0.7	140	2.2
1/30/2015 0:15	1.2	110	0.9
1/30/2015 0:30	1.0	92	0.5
1/30/2015 0:45	1.0	72	0.3
1/30/2015 1:00	0.8	61	0.7
1/30/2015 1:15	1.1	76	0.5
1/30/2015 1:30	1.3	80	0.2
1/30/2015 1:45	0.9	76	0.3
1/30/2015 2:00	0.8	77	1.0

Notes:

1. *Data supplied by WCP; and*
2. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.5 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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.

Other mines audible at times at the WCP monitoring locations include Moolarben mine (MCO) or Ulan Coal Mine Limited (UCML).

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}.

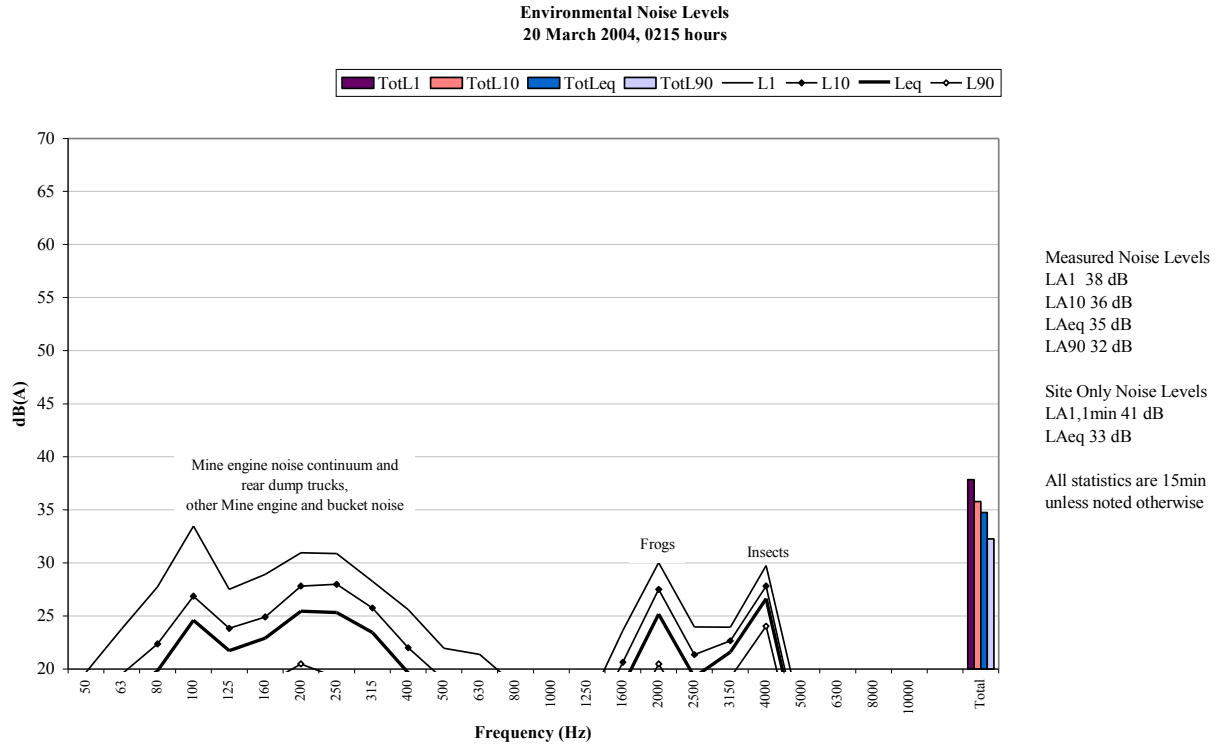

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 29 January 2015

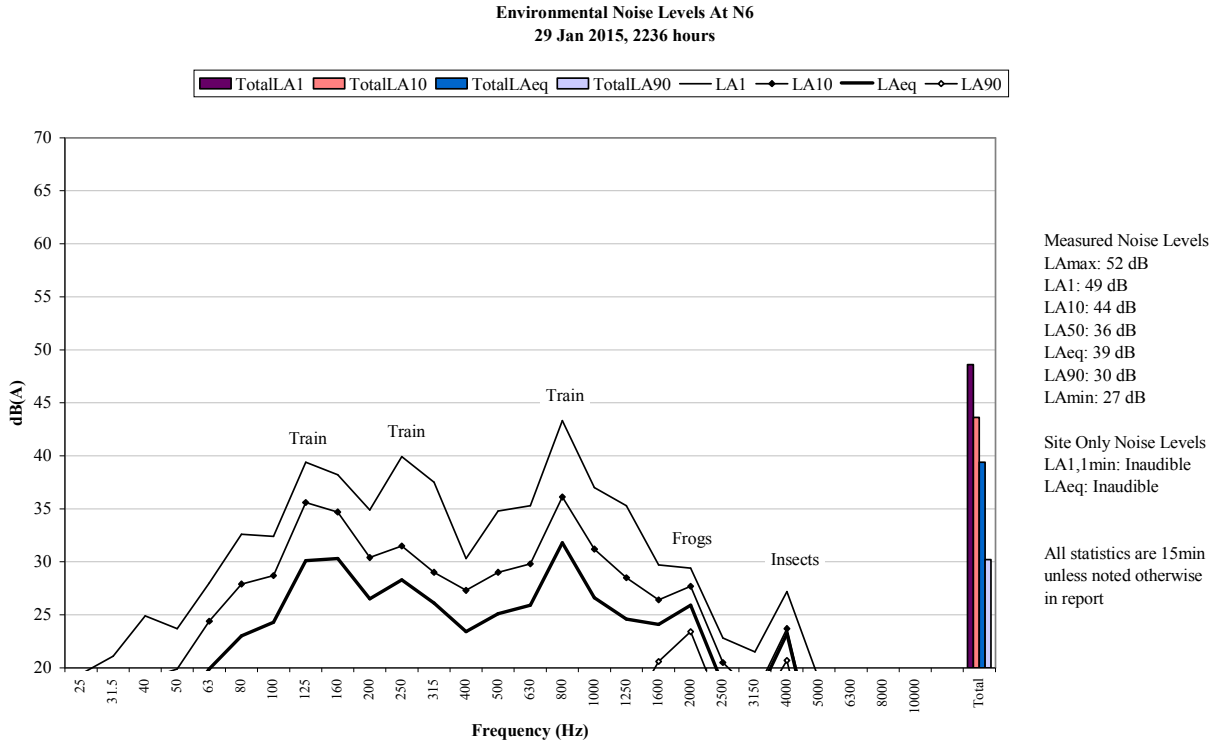

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

A train was responsible for the measured L_{Amax}, L_{A1}, L_{A10} and L_{Aeq}. Frogs and insects generated the measured L_{A90}.

A local continuum, dogs, birds, an aircraft and livestock were also noted.

5.1.2 N13, 29 January 2015

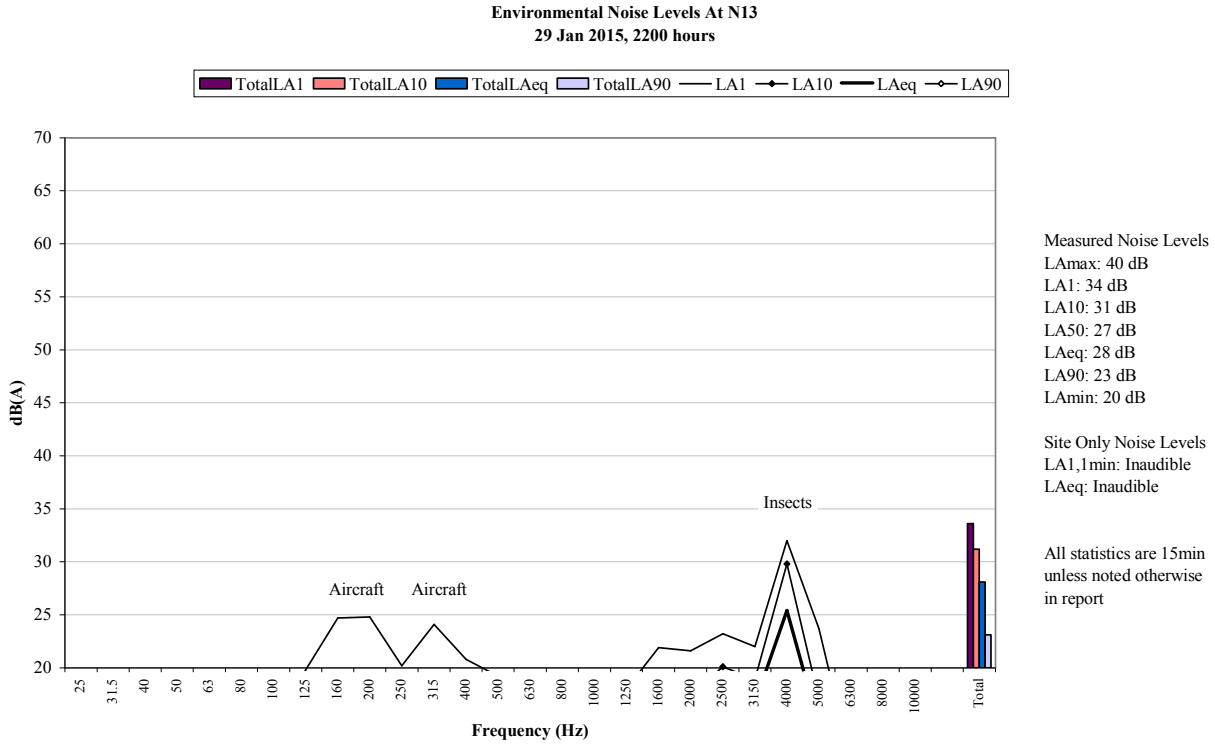

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Birds were responsible for the measured L_{Amax}. Insects were responsible for the measured L_{A1}, L_{A10}, L_{Aeq} and L_{A90}.

An aircraft was also noted.

5.1.3 N14, 29 January 2015

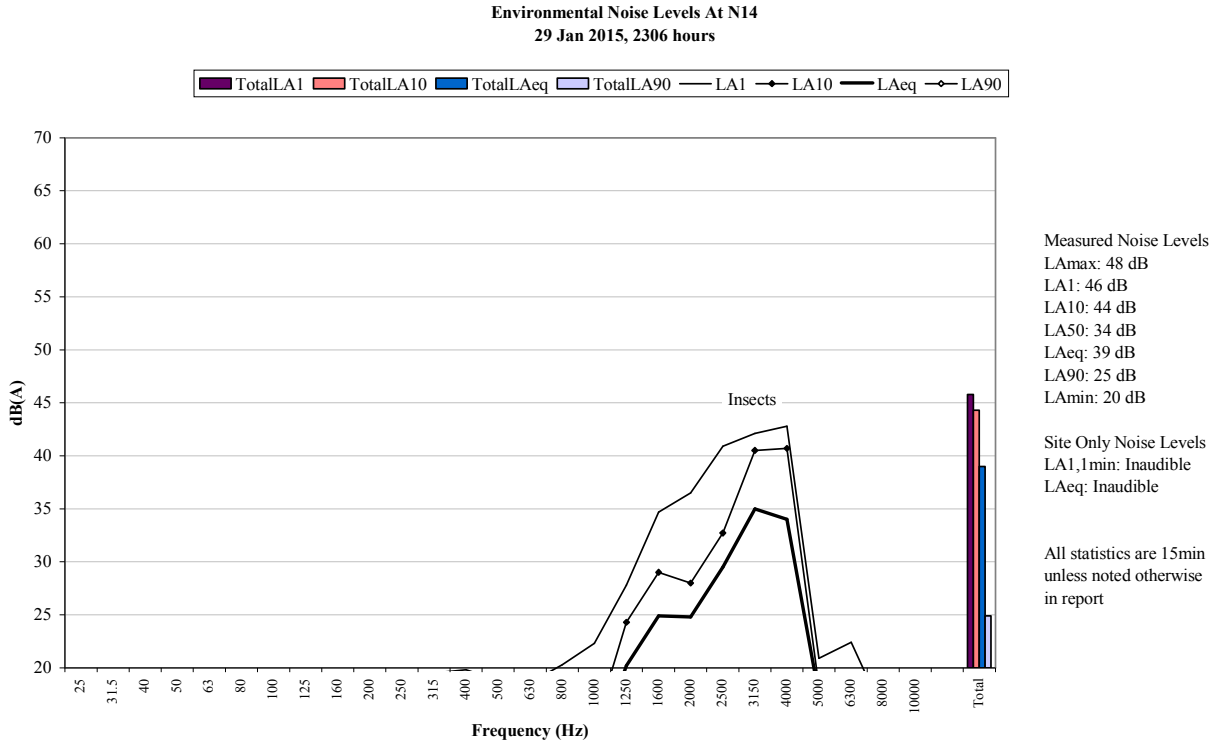

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Insects were responsible for measured levels.

A local continuum and birds were also noted.

5.1.4 N15, 30 January2015

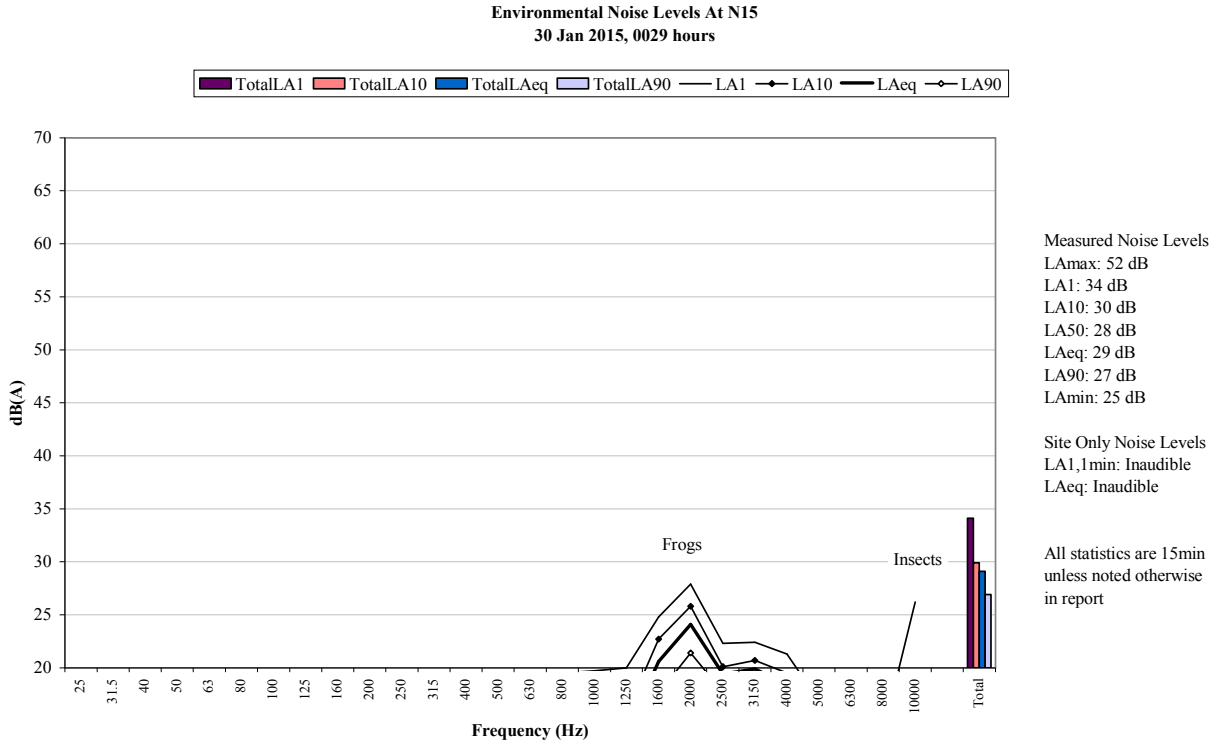

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Frogs and insects were responsible for measured levels.

5.1.5 N16, 30 January 2015

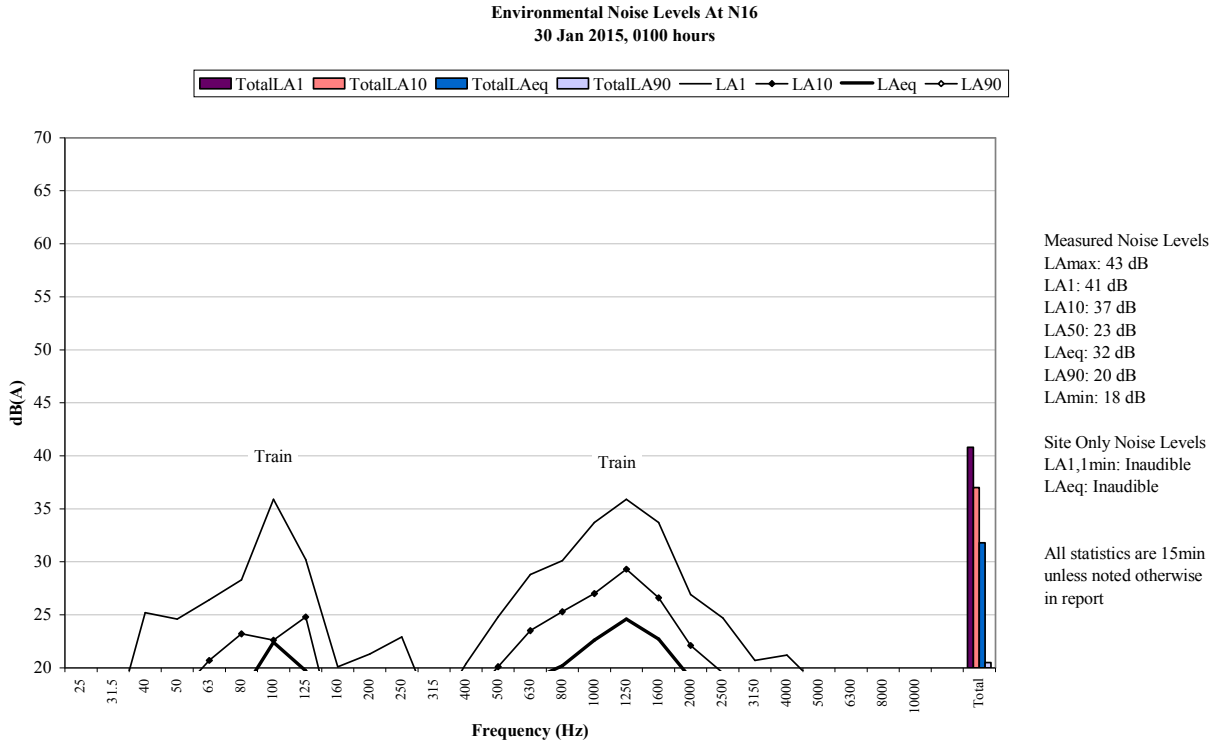

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible.

A train was responsible for the measured L_{Amax}, L_{A1}, L_{A10} and L_{Aeq}. Frogs generated the measured L_{A90}.

Dogs were also noted.

5.1.6 N17, 30 January 2015

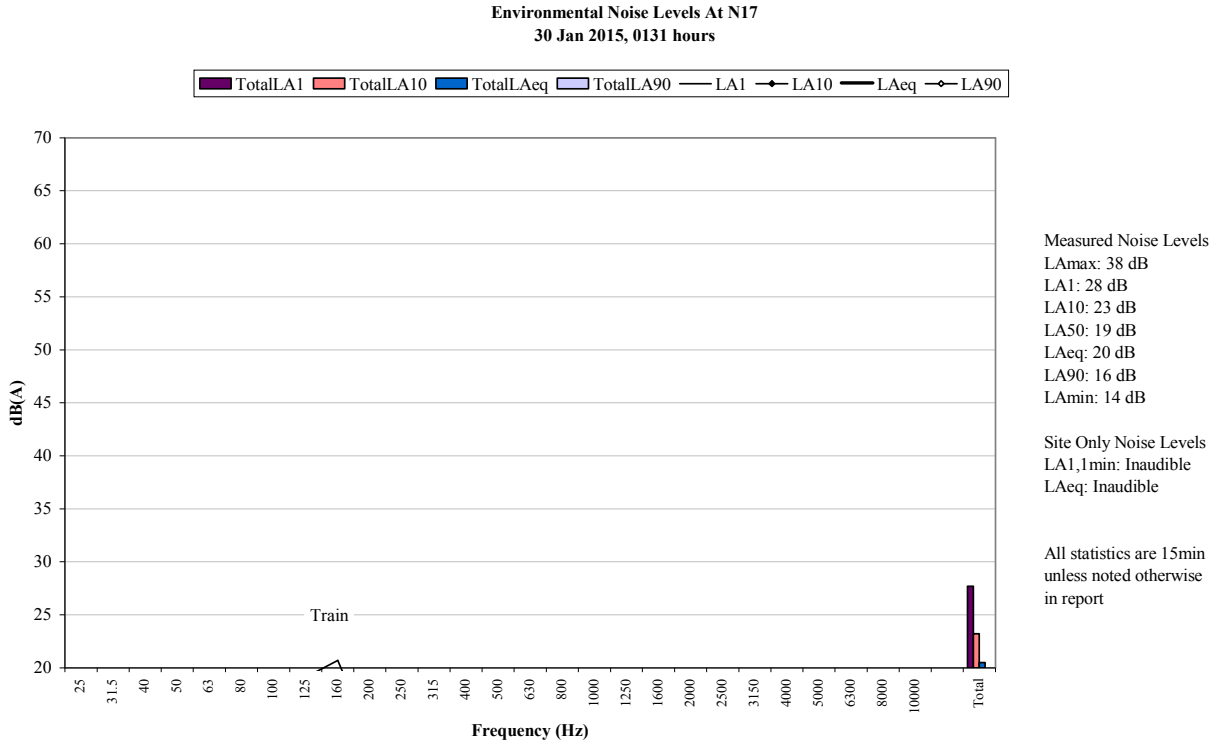

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible.

A bird was responsible for the measured L_{Amax}. A train was responsible for the measured L_{A1}. Insects and the train generated the measured L_{A10} and L_{Aeq}. Insects and the floor of the sound level meter were responsible for the measured L_{A90}.

5.1.7 N18, 29 January 2015

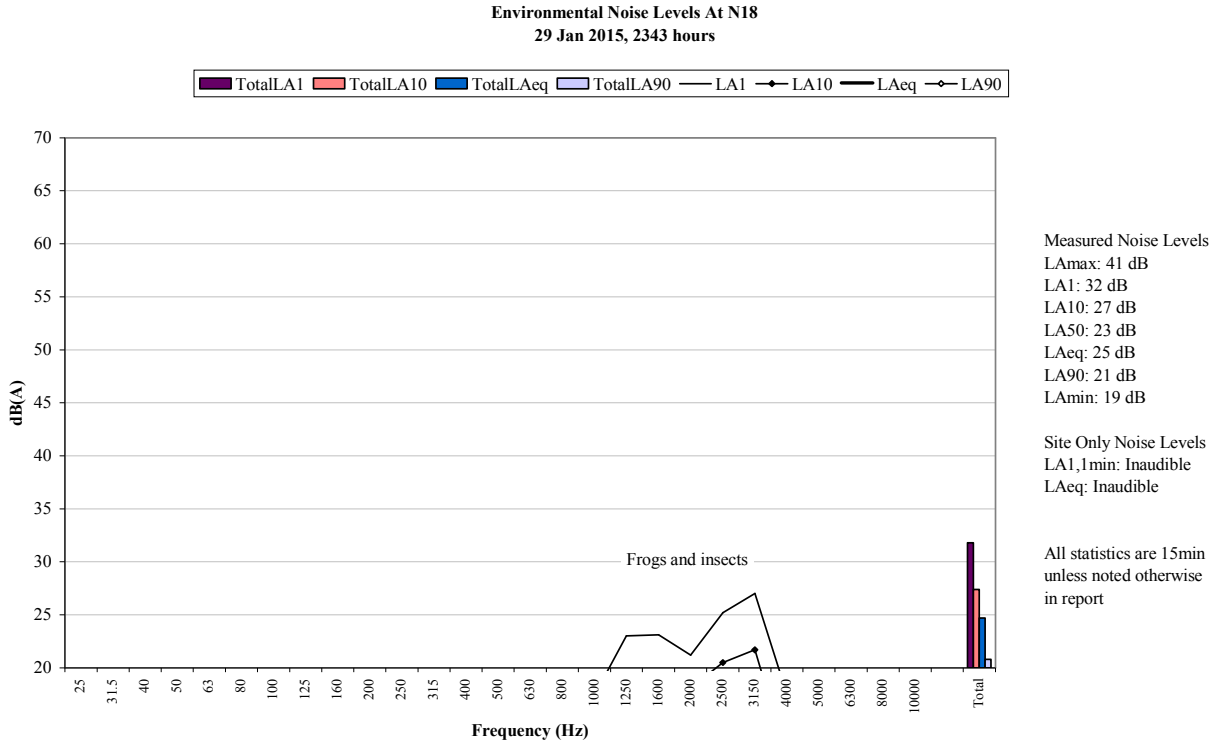

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Frogs and insects were responsible for measured levels.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during night period of 29/30 January 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

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 for this report.

Global Acoustics Pty Ltd

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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church	40 (internal) When in use			-
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

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 October 2014.

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.

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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
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 C14333

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

Equipment Tested/ Model Number : NA-28
Instrument Serial Number : 00960042
Microphone Serial Number : 00102
Pre-amplifier Serial Number : 60062

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	39.5°C	**Ambient Temperature :**	24.5°C
Relative Humidity :	22.1%	**Relative Humidity :**	35.5%
Barometric Pressure :	99.95kPa	**Barometric Pressure :**	99.88kPa

Calibration Technician : Kyle Alvarez
Calibration Date : 16/6/2014
Secondary Check: Tim Williams
Report Issue Date : 17/6/2014

Approved Signatory : Juan Aguero

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.

NATA
WORLD RECOGNISED ACCREDITATION

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

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

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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Pennant Hills NSW AUSTRALIA 2120
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Calibration Certificate

Number : C14331

Client Details :	ARL Hire 423 Pennant Hills Road Pennant Hills NSW 2120
Equipment Tested/ Model Number :	**Rion NC-73 Calibrator**
Instrument Serial Number :	10417664
Ambient Temperature :	21.3°C
Relative Humidity :	42.4%
Barometric Pressure :	99.93 kPa
Tested and Checked by :	Kyle Alvarez
Calibration Date :	16-June-2014
Secondary Check by :	Sandra Minto
Report Issue Date :	20-June-2014
Approved Signatory :	
Tested To :	IEC60942:2004
Comments :	All tests passed for type 2

Reference	Property	Measured Value	Result
94 dB at 1000 Hz	**SPL**	94.16 dB	Pass
	Frequency	988.65 Hz	Pass
	Short term fluctuation	0.00 dB	Pass
	Distortion	0.40%	Pass

NATA
WORLD RECOGNISED ACCREDITATION

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.

Wilpinjong Coal

Environmental Noise Monitoring

February 2015

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring
February 2015

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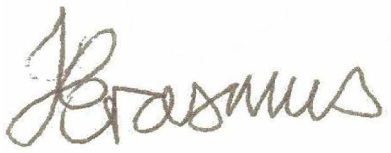

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EXECUTIVE SUMMARY

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 February 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 February 2015. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

WCP complied with relevant noise limits at all monitoring locations during the February 2015 monitoring.

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). As such, no further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

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Appendices

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 February 2015. 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

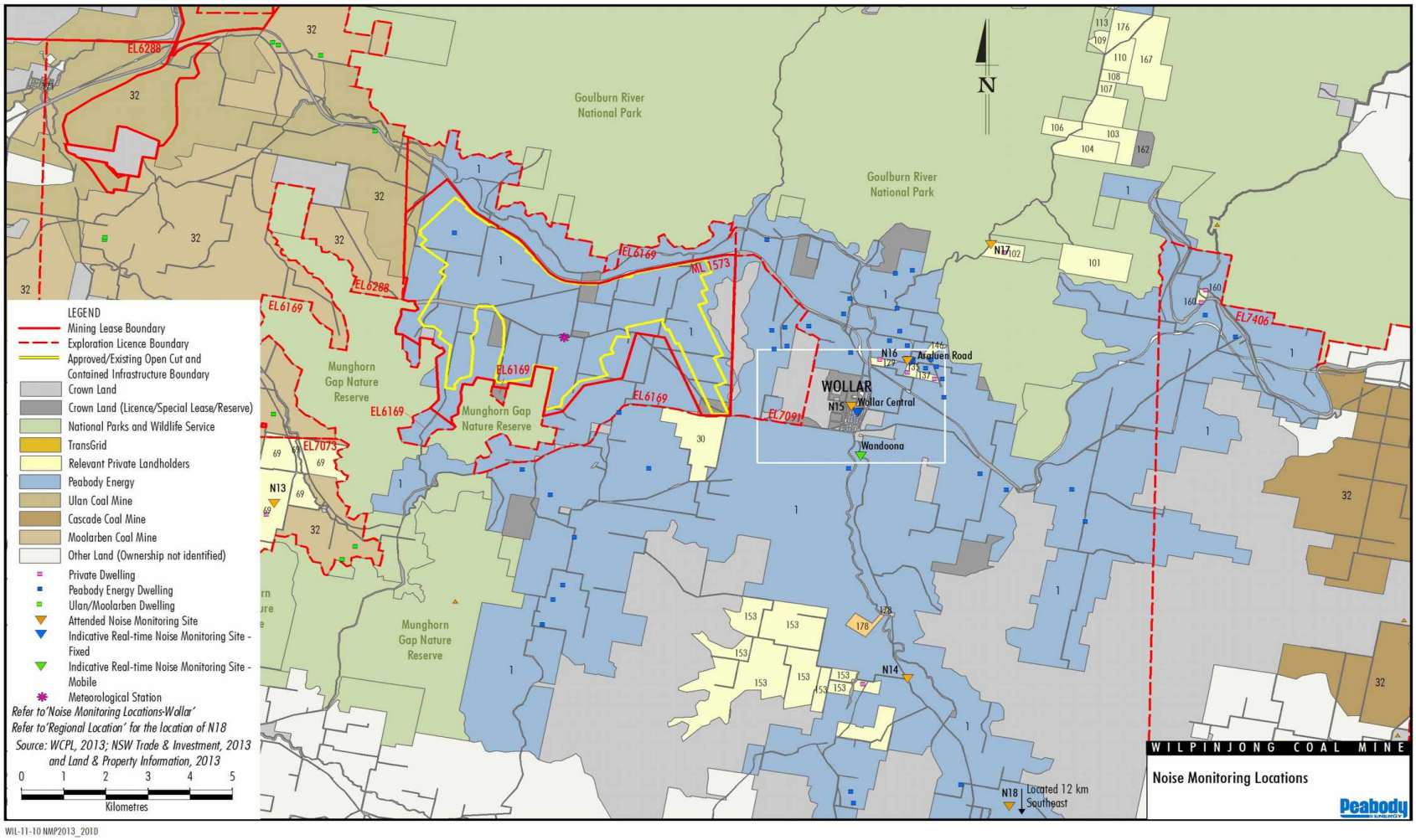

Figure 1: Attended Noise Monitoring Locations

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 (number 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 are 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 C-weighted and 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 total predicted C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to predicted levels.

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	L_{Ceq} to 250 Hz	>60	>65
INP, total	Total L_{Ceq} minus 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), "Not measurable" (NM), "Less than 25 dB" (<25 dB) or "Less than 20 dB" (<20 dB) may be used in this report. When site noise is noted as IA then there was no site noise audible at the monitoring location.

However, if site noise is noted as NM, <25 dB or <20 dB, this means some noise was audible but could not be quantified. This means that noise from the site was either very low, or, being masked by other noise that was relatively loud. In the former case (very low site levels) we consider it not necessary to attempt to accurately quantify site noise as it would be significantly less than any criterion and most unlikely to cause annoyance (and in many cases, to be even noticed).

If site noise were NM, <25 dB or <20 dB due to masking then we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting if deemed necessary. All sites NM, <25 dB or <20 dB in this report are due to low 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	14/06/2015
Rion NC-73 acoustic calibrator	10527815	28/08/2016

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 – FEBRUARY 2015[1]

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	18/02/2015 23:27	49	41	38	33	34	26	23	54
N13	19/02/2015 01:36	62	48	37	32	37	30	27	51
N14	18/02/2015 23:58	60	39	29	27	32	24	19	46
N15	18/02/2015 22:59	60	40	33	29	32	28	26	49
N16	18/02/2015 22:33	58	45	41	36	38	32	29	60
N17	18/02/2015 22:00	55	53	53	52	52	51	49	53
N18	19/02/2015 00:35	56	43	42	41	41	37	27	41

Note:

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

4.2 Project Approval and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – FEBRUARY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	18/02/2015 23:27	3.3	-0.5	35	No	IA	NA
N13	19/02/2015 01:36	2.3	-0.2	35	Yes	29	Nil
N14	18/02/2015 23:58	3.7	-0.5	35	No	IA	NA
N15	18/02/2015 22:59	3.5	-0.7	35	No	IA	NA
N16	18/02/2015 22:33	4.2	-0.7	35	No	IA	NA
N17	18/02/2015 22:00	3.7	-0.7	35	No	IA	NA
N18	19/02/2015 00:35	3.1	-0.5	35	No	IA	NA

Notes:

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

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – FEBRUARY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	18/02/2015 23:27	3.3	-0.5	45	No	IA	NA
N13	19/02/2015 01:36	2.3	-0.2	45	Yes	30	Nil
N14	18/02/2015 23:58	3.7	-0.5	45	No	IA	NA
N15	18/02/2015 22:59	3.5	-0.7	45	No	IA	NA
N16	18/02/2015 22:33	4.2	-0.7	45	No	IA	NA
N17	18/02/2015 22:00	3.7	-0.7	45	No	IA	NA
N18	19/02/2015 00:35	3.1	-0.5	45	No	IA	NA

Notes:

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

4.3 EPL and Weather Conditions

Table 4.4 and Table 4.5 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – FEBRUARY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	18/02/2015 23:27	3.3	-0.5	35	No	IA	NA
N13	19/02/2015 01:36	2.3	-0.2	36	Yes	29	Nil
N14	18/02/2015 23:58	3.7	-0.5	35	No	IA	NA
N15	18/02/2015 22:59	3.5	-0.7	35	No	IA	NA
N16	18/02/2015 22:33	4.2	-0.7	37	No	IA	NA
N17	18/02/2015 22:00	3.7	-0.7	35	No	IA	NA
N18	19/02/2015 00:35	3.1	-0.5	35	No	IA	NA

Notes:

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

Table 4.5: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – FEBRUARY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	18/02/2015 23:27	3.3	-0.5	45	No	IA	NA
N13	19/02/2015 01:36	2.3	-0.2	45	Yes	30	Nil
N14	18/02/2015 23:58	3.7	-0.5	45	No	IA	NA
N15	18/02/2015 22:59	3.5	-0.7	45	No	IA	NA
N16	18/02/2015 22:33	4.2	-0.7	45	No	IA	NA
N17	18/02/2015 22:00	3.7	-0.7	45	No	IA	NA
N18	19/02/2015 00:35	3.1	-0.5	45	No	IA	NA

Notes:

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

4.4 Low Frequency Assessment

Table 4.6 provides statistics for attended noise monitoring undertaken around WCP during the February 2015 survey.

Table 4.6: ATTENDED MEASUREMENT STATISTICS FOR WCP – FEBRUARY 2015

Conditions	Total for February 2015
Number of measurements	7
Number of measurements where met applies	7
Number of measurements where WCP is measurable (within 5dB of the criteria) and criteria and met applies in accordance with the project approval and/or EPL	0

None of the seven measurements occurred during which WCP was directly measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of "<30 dB"), within 5 dB of in the impact assessment criteria and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further analysis of low frequency is required.

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 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	18/02/2015 23:27	26	0.7	340	0
N13	19/02/2015 01:36	22	0.0	-	0
N14	18/02/2015 23:58	26	0.5	130	0
N15	18/02/2015 22:59	23	1.7	70	0
N16	18/02/2015 22:33	24	1.9	140	0
N17	18/02/2015 22:00	24	0.7	0	0
N18	19/02/2015 00:35	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 DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
18/02/2015 22:00	4.0	90	-0.7
18/02/2015 22:15	3.7	92	-0.7
18/02/2015 22:30	3.5	102	-0.7
18/02/2015 22:45	4.2	94	-0.7
18/02/2015 23:00	4.3	98	-0.7
18/02/2015 23:15	3.5	98	-0.7
18/02/2015 23:30	3.4	95	-0.5
18/02/2015 23:45	3.3	97	-0.5
19/02/2015 00:00	3.4	101	-0.5
19/02/2015 00:15	3.7	104	-0.5
19/02/2015 00:30	3.3	106	-0.7
19/02/2015 00:45	3.1	107	-0.5
19/02/2015 01:00	2.9	116	-0.3
19/02/2015 01:15	2.3	111	-0.2
19/02/2015 01:30	2.4	113	-0.3
19/02/2015 01:45	2.3	111	-0.2
19/02/2015 02:00	2.2	102	0.0

Notes:

1. *Data supplied by WCP; and*
2. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.5 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

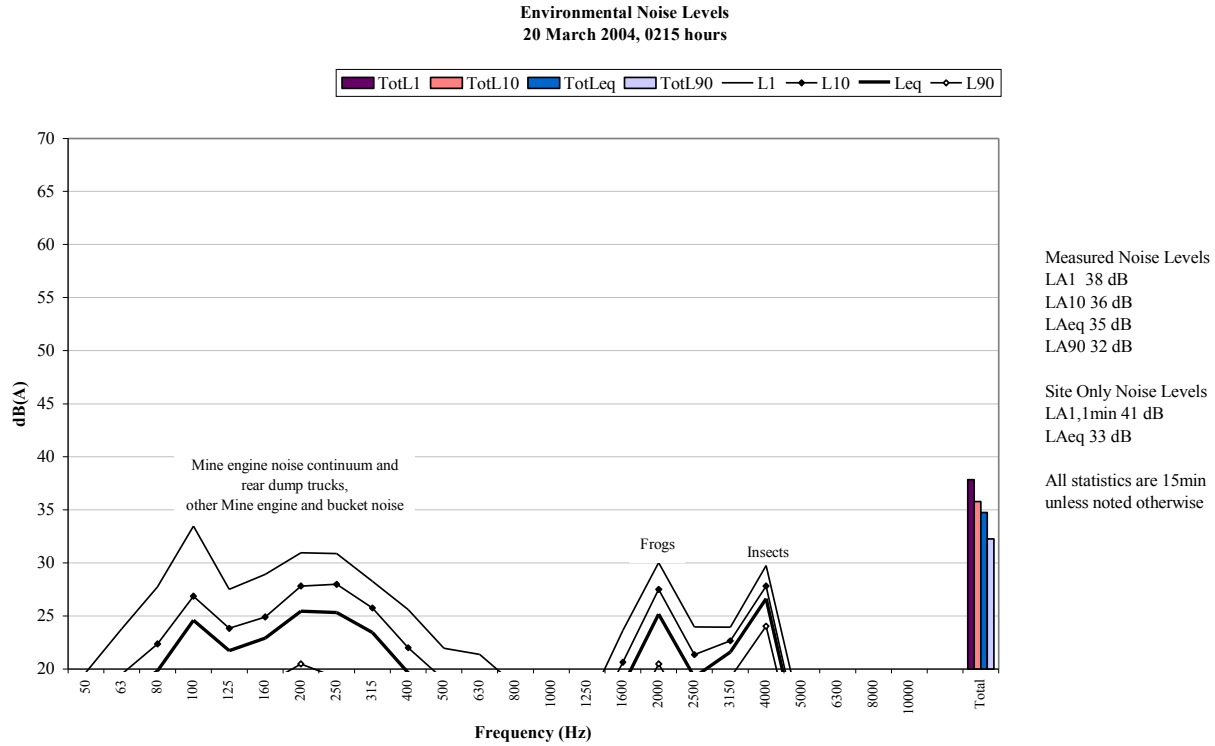

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 18 February 2015

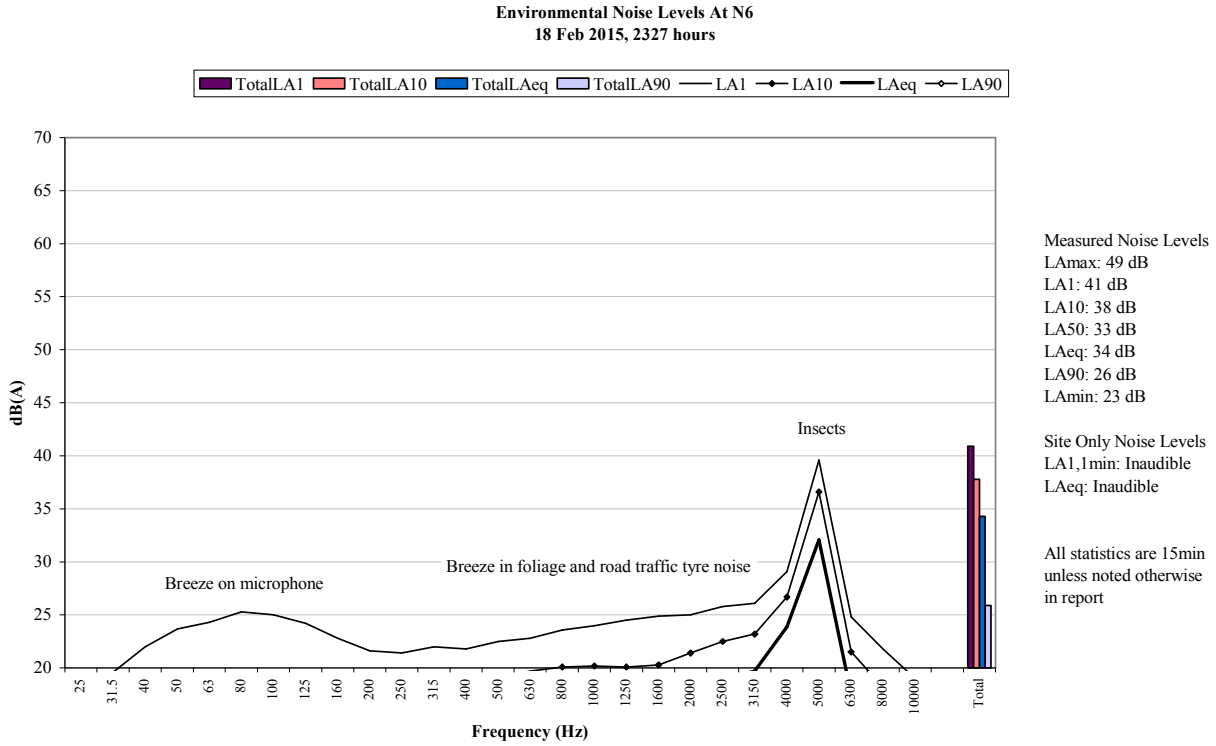

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Insects were responsible for measured levels.

Road traffic tyre noise, breeze in foliage and breeze on the microphone were also noted.

5.1.2 N13, 19 February 2015

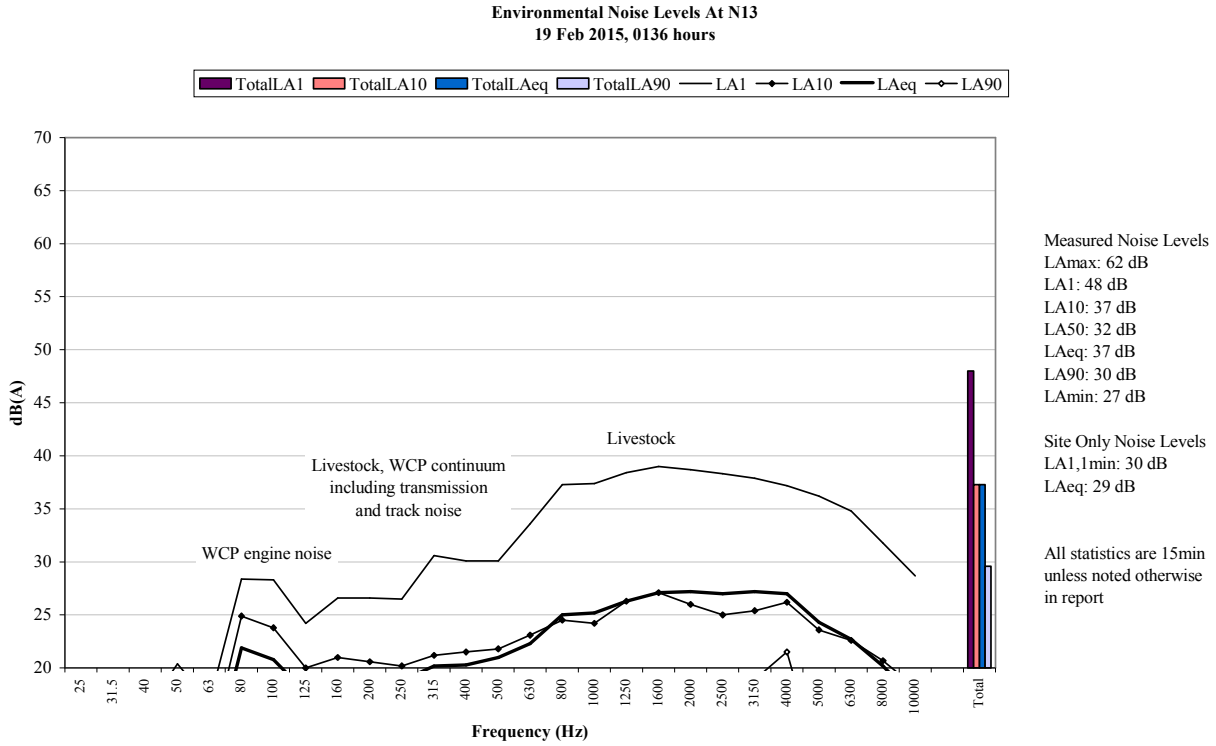

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

A continuum including engine, transmission and track noise from WCP was audible throughout the measurement generating the site only L_{Aeq} of 29 dB and $L_{A1,1minute}$ if 30 dB.

Livestock were responsible for the measured L_{Amax}, L_{A1}, L_{A10} and L_{Aeq}. Insects and WCP generated the measured L_{A90}.

5.1.3 N14, 18 February 2015

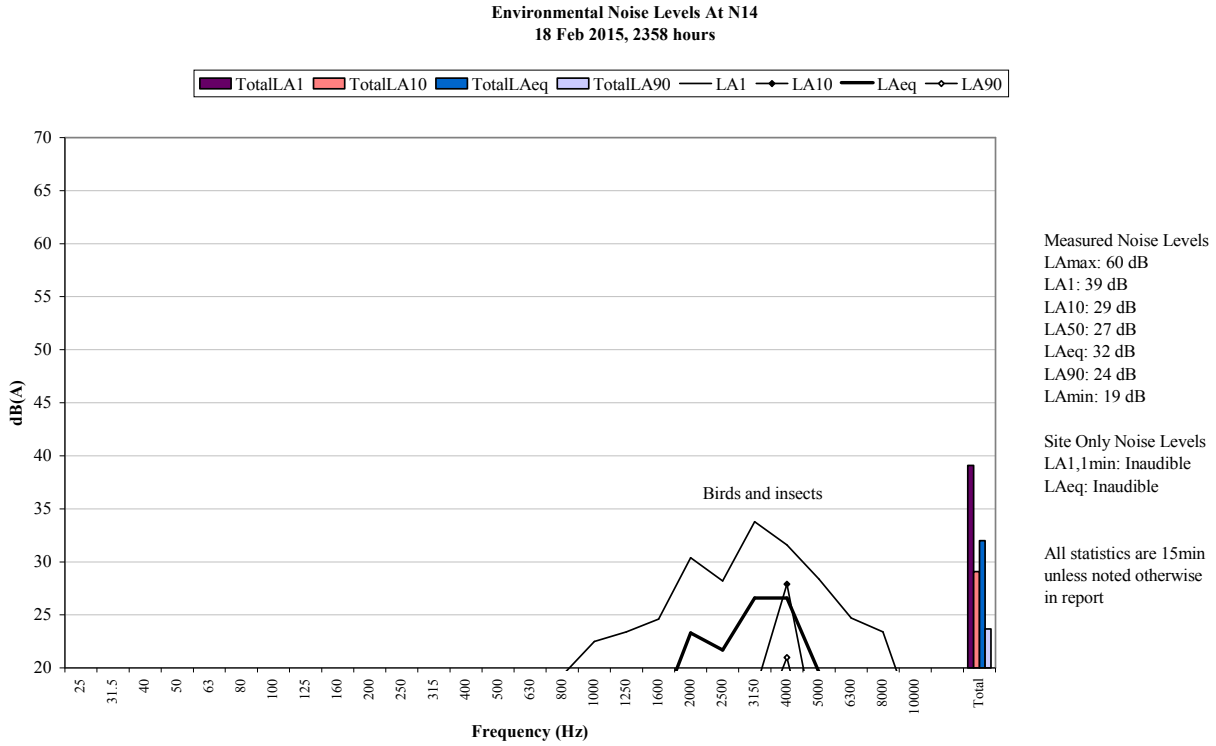

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Birds and insects were responsible for measured levels.

5.1.4 N15, 18 February 2015

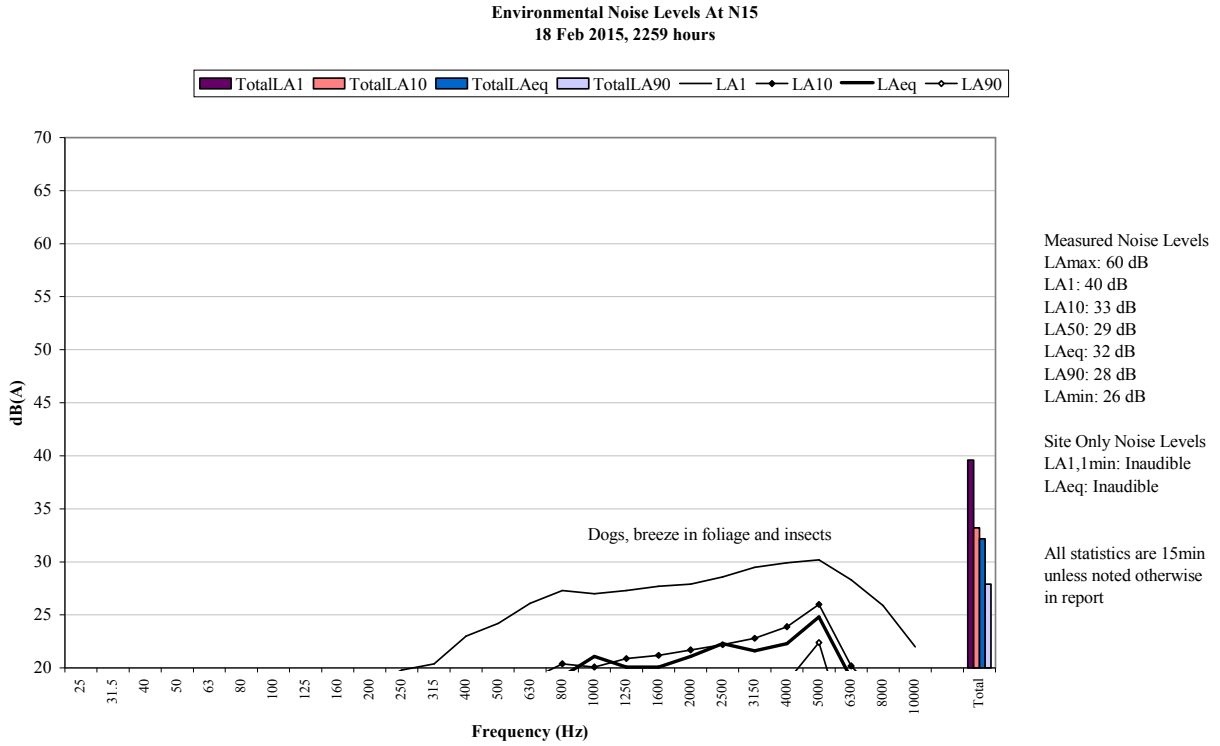

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Breeze in foliage was responsible for the measured L_{Amax}, L_{A1}, L_{A10} and L_{Aeq}. Insects generated the measured L_{A90}.

Dogs were also noted.

5.1.5 N16, 18 February 2015

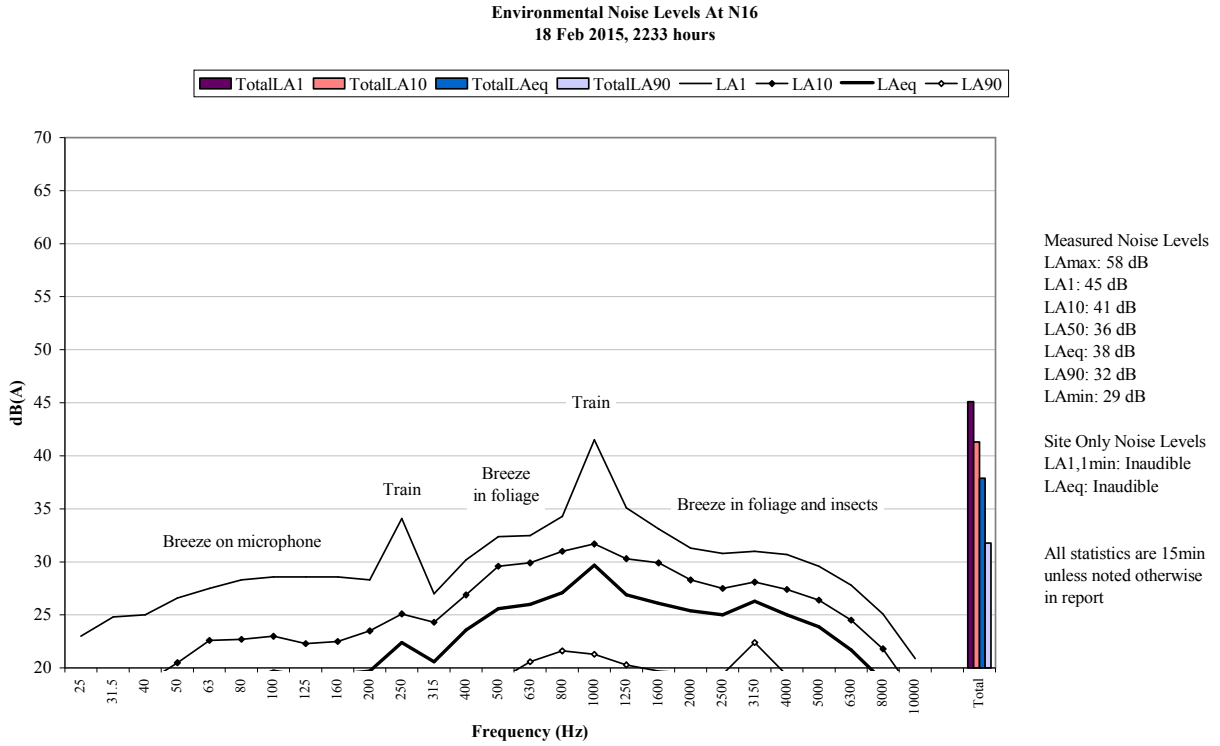

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible.

A train generated the measured L_{Amax} and L_{A1} and was a minor contributor to the measured L_{Aeq}. Breeze in foliage was responsible for the measured L_{A10} and L_{Aeq}. Breeze in foliage and insects generated the measured L_{A90}.

An aircraft was also noted.

5.1.6 N17, 18 February 2015

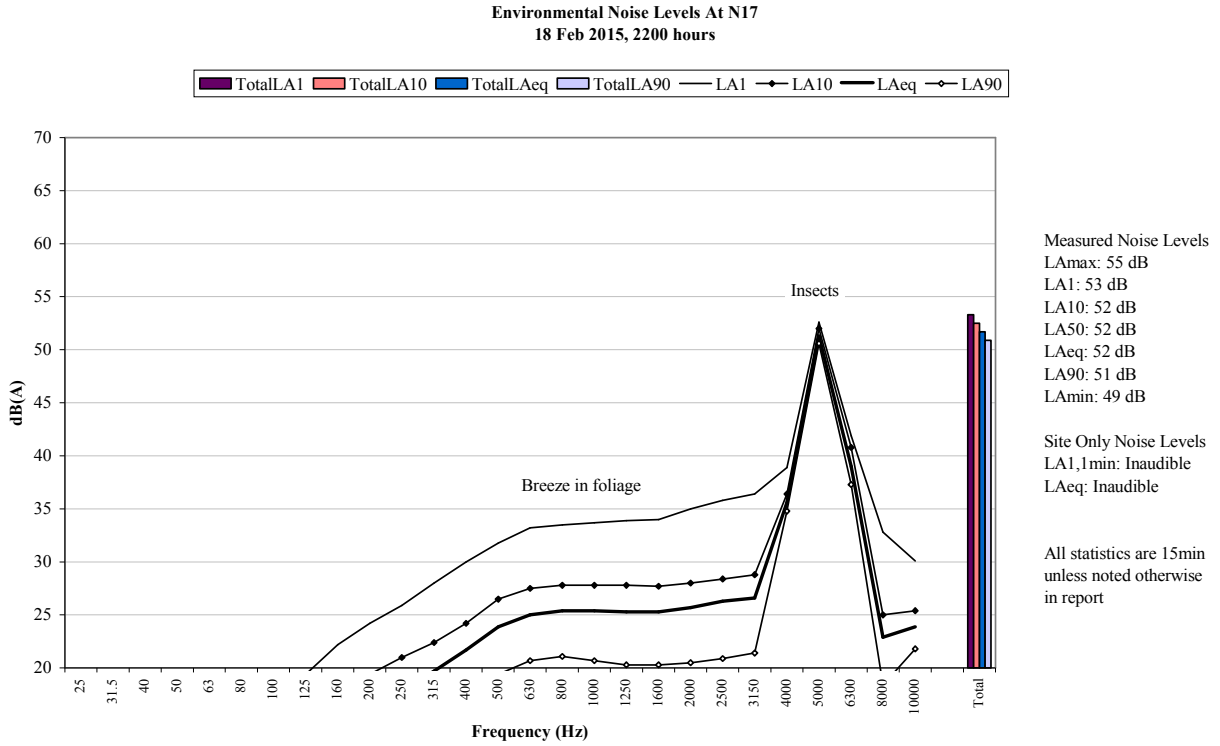

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible.

Insects were responsible for measured levels.

Breeze in foliage was also noted.

5.1.7 N18, 19 February 2015

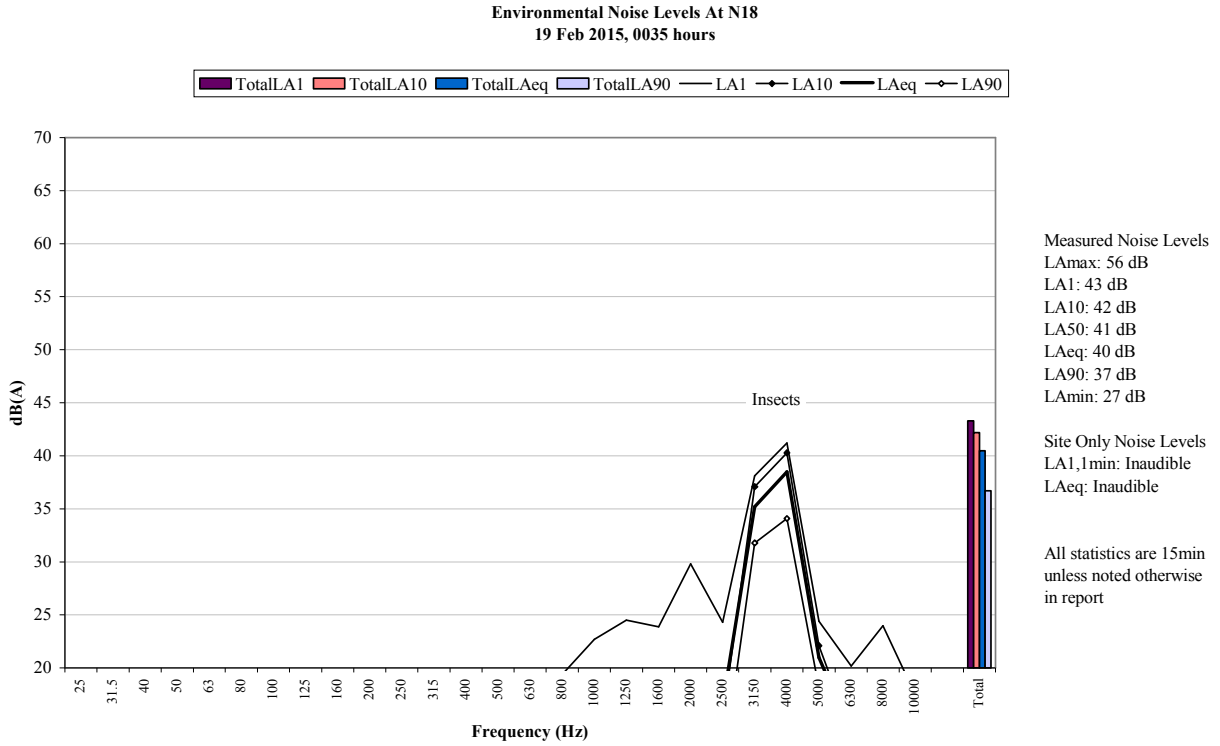

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Insects were responsible for measured levels.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during night period of 18/19 February 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church	40 (internal) When in use			-
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

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 October 2014.

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:

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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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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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

Calibration Certificate

Number : C13320A

Client Details :	ARL Hire 423 Pennant Hills Road Pennant Hills NSW 2120
Equipment Tested/ Model Number :	**Rion NA-28**
Instrument Serial Number :	30921838
Microphone Serial Number :	04128
Preamplifier Serial Number :	11893
Ambient Temperature :	25°C
Relative Humidity :	35%
Barometric Pressure :	100.3 kPa
Tested and Checked by :	Adrian Walker
Calibration Date :	14-June-2013
Secondary Check by :	Sandra Minto
Report Issue Date :	18-June-2013
Approved Signatory :	
Tested To :	AS4476:1997
Comments :	All tests passed for class 1

Characteristics Tested	Result
Whole octaves from 16.00 Hz to 15,849.00 Hz	Pass
Third octaves from 13.00 Hz to 25,119.00 Hz	Pass

NATA
WORLD RECOGNISED ACCREDITATION

Acoustic Research Labs Pty Ltd
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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C14507

Client Details ARL Hire
423 Pennant Hills
Pennant Hills NSW 2120

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

Atmospheric Conditions
Ambient Temperature : 23.8°C
Relative Humidity : 44.9%
Barometric Pressure : 100.41kPa

Calibration Technician : Corey Stewart
Calibration Date : 28/08/2014
Secondary Check: Tim Williams
Report Issue Date : 28/08/2014
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressre 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	*±0.15dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±4.1%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.1kPa*
Distortion	*±0.08%*		

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

NATA
WORLD RECOGNISED ACCREDITATION

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

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

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

March 2015

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring
March 2015

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Prepared for

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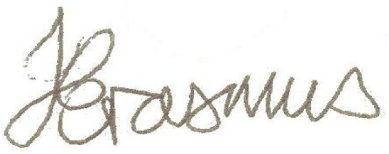

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EXECUTIVE SUMMARY

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 March 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 23/24 March 2015. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

WCP complied with relevant noise limits at all monitoring locations during the March 2015 monitoring.

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). As such, no further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

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Appendices

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 23/24 March 2015. 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

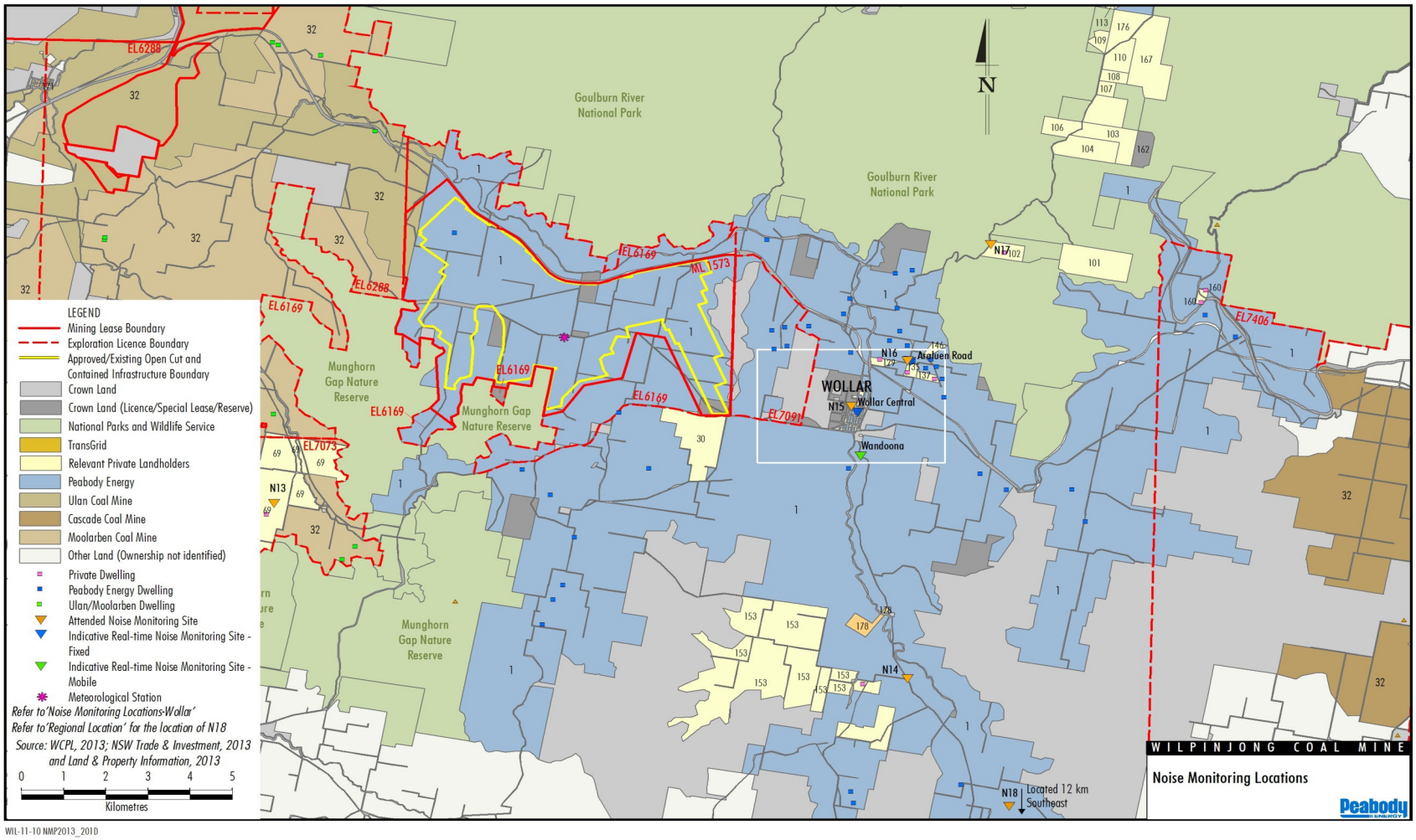

Figure 1: Attended Noise Monitoring Locations

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 (number 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 are 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 C-weighted and 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 total predicted C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to predicted levels.

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	L_{Ceq} to 250 Hz	>60	>65
INP, total	Total L_{Ceq} minus 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), "Not measurable" (NM), "Less than 25 dB" (<25 dB) or "Less than 20 dB" (<20 dB) may be used in this report. When site noise is noted as IA then there was no site noise audible at the monitoring location.

However, if site noise is noted as NM, <25 dB or <20 dB, this means some noise was audible but could not be quantified. This means that noise from the site was either very low, or, being masked by other noise that was relatively loud. In the former case (very low site levels) we consider it not necessary to attempt to accurately quantify site noise as it would be significantly less than any criterion and most unlikely to cause annoyance (and in many cases, to be even noticed).

If site noise were NM, <25 dB or <20 dB due to masking then we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting if deemed necessary. All sites NM, <25 dB or <20 dB in this report are due to low 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	01070590	13/112015
Pulsar 106 acoustic calibrator	57413	19/12/2016

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 – MARCH 2015[1]

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	23/03/2015 23:22	45	37	29	21	26	21	19	35
N13	24/03/2015 01:24	42	35	32	30	31	29	26	45
N14	23/03/2015 23:51	49	35	30	25	27	23	20	48
N15	23/03/2015 23:01	58	46	26	20	31	19	18	37
N16	23/03/2015 22:34	52	36	28	23	27	20	18	39
N17	23/03/2015 22:00	44	39	39	37	37	35	33	42
N18	24/03/2015 00:26	43	34	32	29	29	25	21	35

Note:

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

4.2 Project Approval and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – MARCH 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	23/03/2015 23:22	0.0	4.5	35	No	IA	NA
N13	24/03/2015 01:24	0.0	5.5	35	No	IA	NA
N14	23/03/2015 23:51	1.0	4.3	35	No	IA	NA
N15	23/03/2015 23:01	0.9	3.6	35	No	IA	NA
N16	23/03/2015 22:34	0.0	4.5	35	No	IA	NA
N17	23/03/2015 22:00	0.9	3.8	35	No	IA	NA
N18	24/03/2015 00:26	0.0	5.2	35	No	IA	NA

Notes:

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

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – MARCH 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	23/03/2015 23:22	0.0	4.5	45	No	IA	NA
N13	24/03/2015 01:24	0.0	5.5	45	No	IA	NA
N14	23/03/2015 23:51	1.0	4.3	45	No	IA	NA
N15	23/03/2015 23:01	0.9	3.6	45	No	IA	NA
N16	23/03/2015 22:34	0.0	4.5	45	No	IA	NA
N17	23/03/2015 22:00	0.9	3.8	45	No	IA	NA
N18	24/03/2015 00:26	0.0	5.2	45	No	IA	NA

Notes:

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

4.3 EPL and Weather Conditions

Table 4.4 and Table 4.5 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – MARCH 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	23/03/2015 23:22	0.0	4.5	35	No	IA	NA
N13	24/03/2015 01:24	0.0	5.5	36	No	IA	NA
N14	23/03/2015 23:51	1.0	4.3	35	No	IA	NA
N15	23/03/2015 23:01	0.9	3.6	35	No	IA	NA
N16	23/03/2015 22:34	0.0	4.5	37	No	IA	NA
N17	23/03/2015 22:00	0.9	3.8	35	No	IA	NA
N18	24/03/2015 00:26	0.0	5.2	35	No	IA	NA

Notes:

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

Table 4.5: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – MARCH 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	23/03/2015 23:22	0.0	4.5	45	No	IA	NA
N13	24/03/2015 01:24	0.0	5.5	45	No	IA	NA
N14	23/03/2015 23:51	1.0	4.3	45	No	IA	NA
N15	23/03/2015 23:01	0.9	3.6	45	No	IA	NA
N16	23/03/2015 22:34	0.0	4.5	45	No	IA	NA
N17	23/03/2015 22:00	0.9	3.8	45	No	IA	NA
N18	24/03/2015 00:26	0.0	5.2	45	No	IA	NA

Notes:

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

4.4 Low Frequency Assessment

Table 4.6 provides statistics for attended noise monitoring undertaken around WCP during the March 2015 survey.

Table 4.6: ATTENDED MEASUREMENT STATISTICS FOR WCP – MARCH 2015

Conditions	Total for March 2015
Number of measurements	7
Number of measurements where met applies	7
Number of measurements where WCP is measurable (within 5dB of the criteria) and criteria and met applies in accordance with the project approval and/or EPL	0

None of the seven measurements occurred during which WCP was directly measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of "<30 dB"), within 5 dB of in the impact assessment criteria and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further analysis of low frequency is required.

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 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	23/03/2015 23:22	21	0.0	-	0
N13	24/03/2015 01:24	21	0.0	-	0
N14	23/03/2015 23:51	18	0.3	160	0
N15	23/03/2015 23:01	22	0.0	-	0
N16	23/03/2015 22:34	25	0.0	-	0
N17	23/03/2015 22:00	23	0.0	-	0
N18	24/03/2015 00:26	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 DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
23/03/2015 22:00	1.2	156	3.4
23/03/2015 22:15	0.9	145	3.8
23/03/2015 22:30	0.7	110	4.0
23/03/2015 22:45	0.0	-	4.5
23/03/2015 23:00	0.0	-	2.9
23/03/2015 23:15	0.9	158	3.6
23/03/2015 23:30	0.0	-	4.5
23/03/2015 23:45	0.7	116	4.3
24/03/2015 00:00	1.0	158	4.3
24/03/2015 00:15	1.1	148	3.6
24/03/2015 00:30	1.0	150	3.8
24/03/2015 00:45	0.0	-	5.2
24/03/2015 01:00	0.0	-	6.4
24/03/2015 01:15	0.9	347	7.1
24/03/2015 01:30	0.8	347	6.6
24/03/2015 01:45	0.0	-	5.5
24/03/2015 02:00	0.0	-	4.7

Notes:

1. *Data supplied by WCP; and*
2. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.5 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

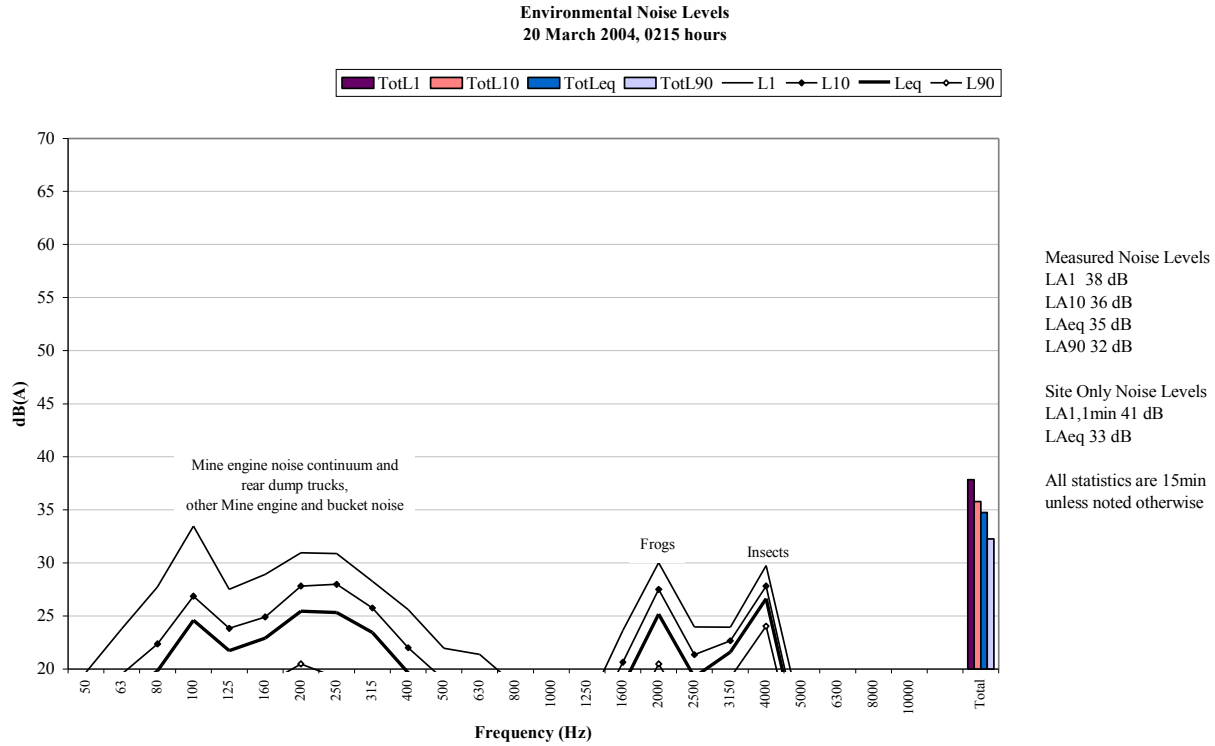

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 23 March 2015

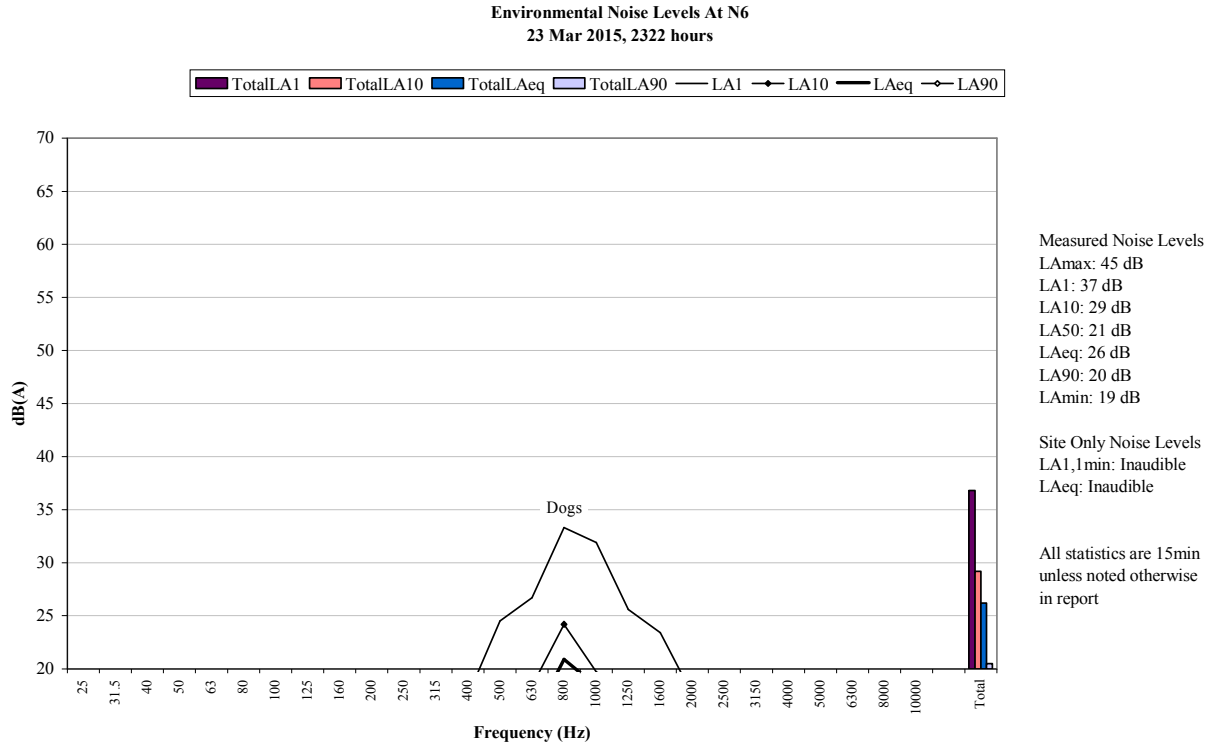

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Dogs were responsible for mot measured levels. The floor of the instrument contributed to the measured L_{A90}.

Insects and livestock were also noted.

5.1.2 N13, 24 March 2015

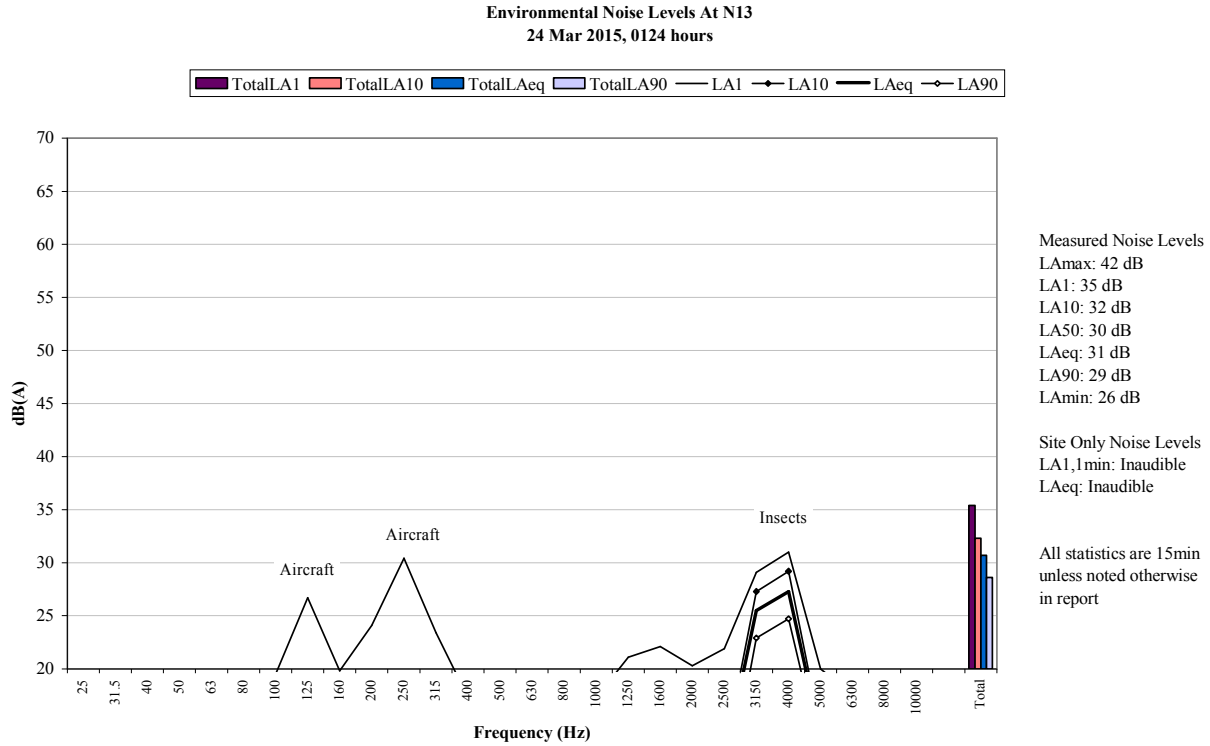

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Aircraft and insects generated the measured L_{A1}. Insects were responsible for the measured L_{A10}, L_{Aeq} and L_{A90}.

A continuum from another mine was also noted.

5.1.3 N14, 23 March 2015

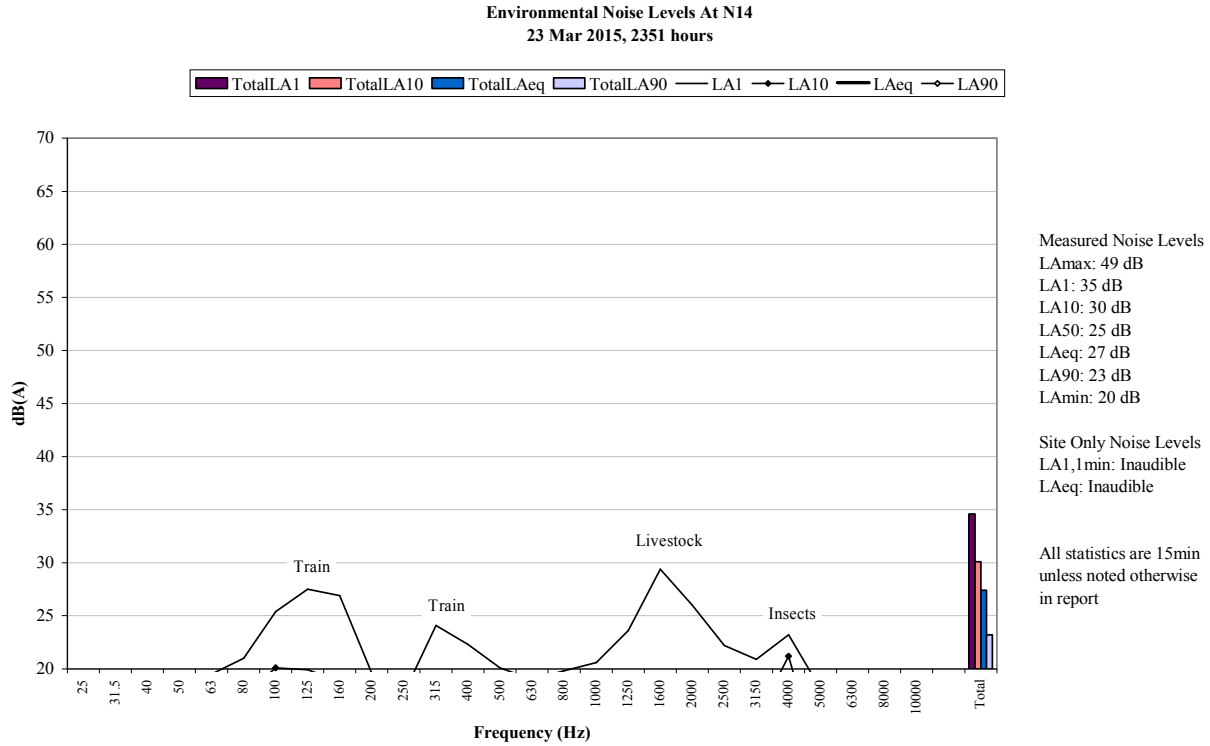

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Livestock were responsible for the measured L_{A1}. A train was primarily responsible for the measured L_{A10}. A train and a local continuum were responsible for the measured L_{Aeq}. A local continuum generated the measured L_{A90}.

Birds and insects were also noted.

5.1.4 N15, 23 March 2015

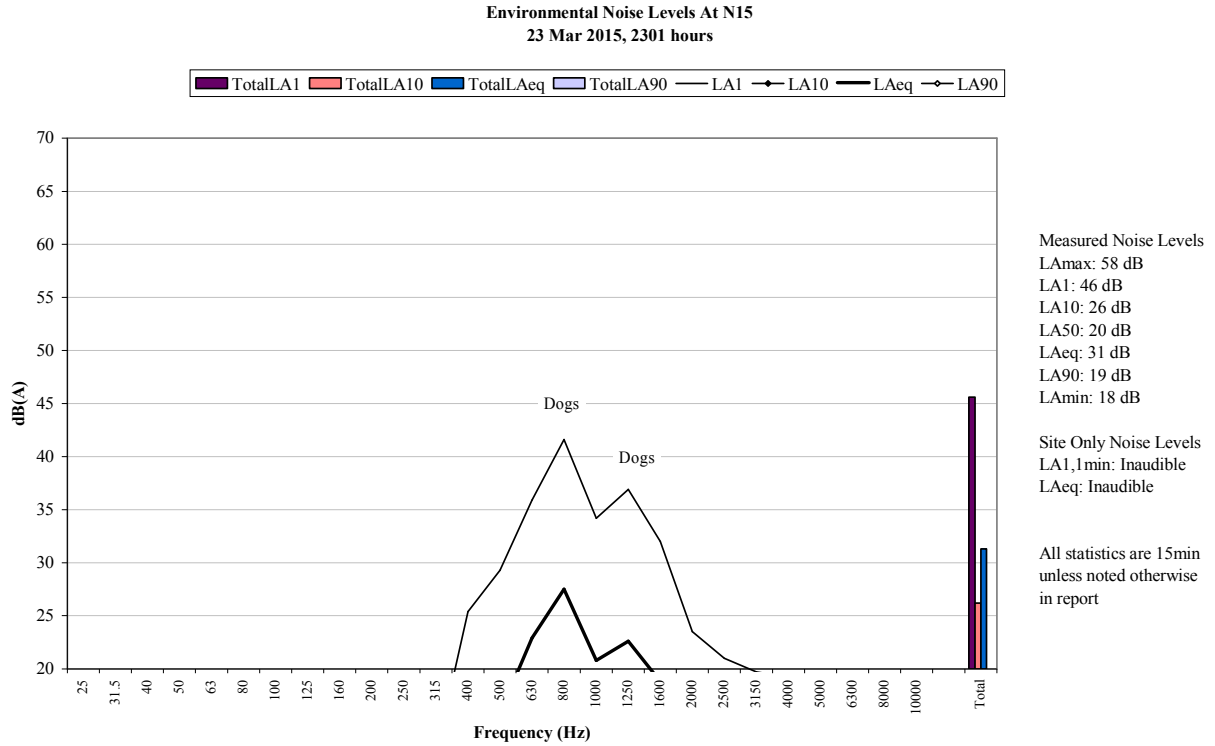

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Dogs were responsible for the measured L_{A1} and L_{Aeq}. Dogs and insects generated the measured L_{A10}. Insects and the floor of the instrument generated the measured L_{A90}.

Birds and local impact noise were also noted.

5.1.5 N16, 23 March 2015

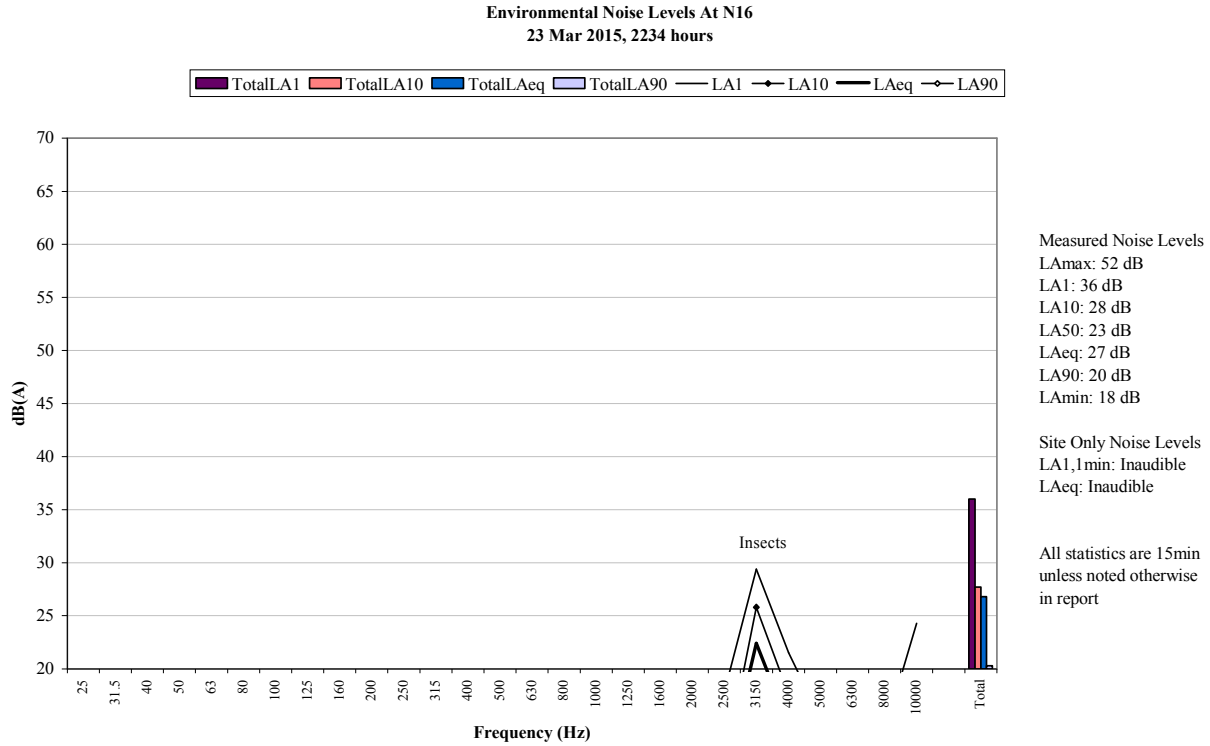

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible.

Insects were primarily responsible for measured levels. The floor of the instrument was a mionr contributor to the measured L_{A90}.

An aircraft was also noted.

5.1.6 N17, 23 March 2015

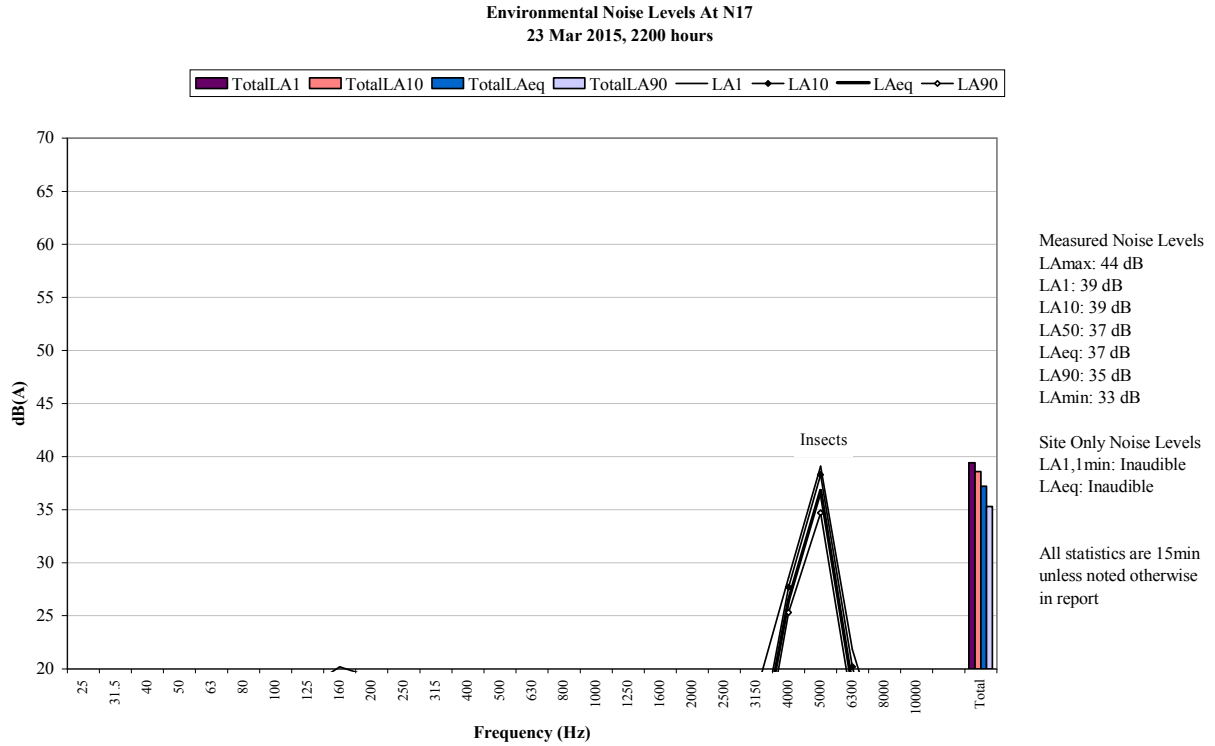

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible.

Insects were responsible for measured levels.

A train was also noted.

5.1.7 N18, 24 March 2015

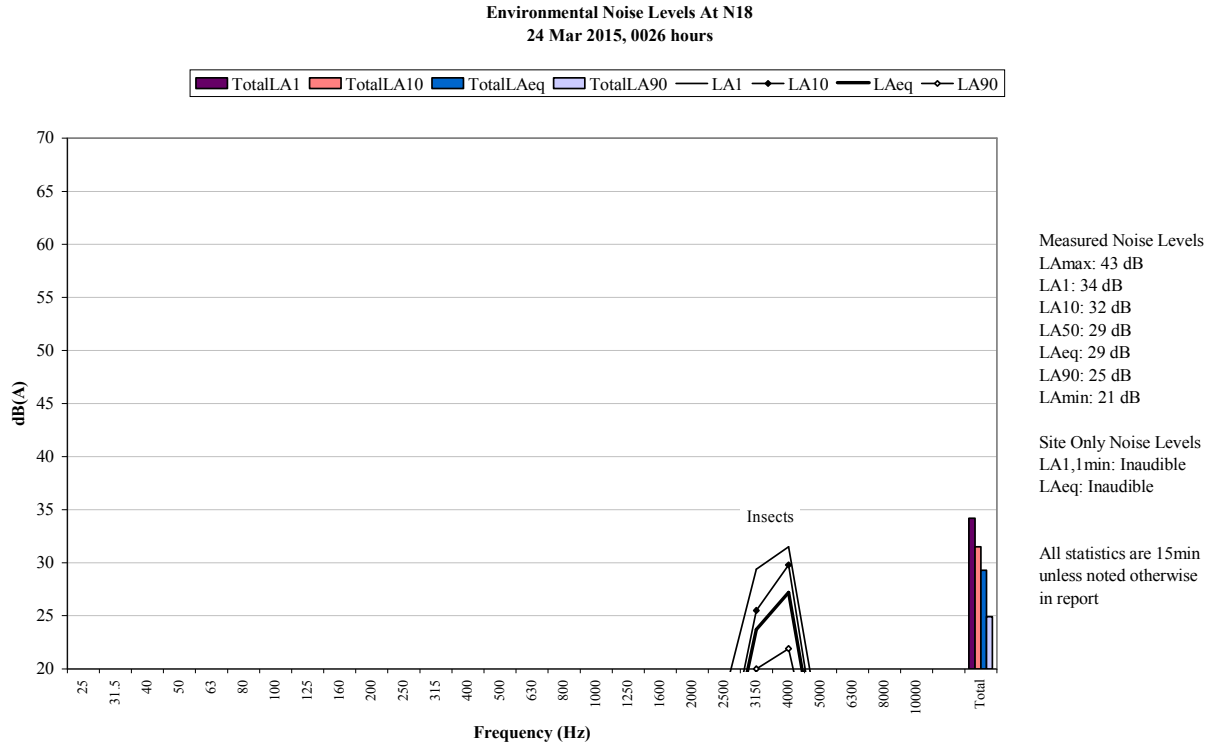

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Insects were responsible for measured levels.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during night period of 23/24 March 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

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 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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church	40 (internal) When in use			-
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

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 ºC and 3ºC/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3ºC/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 October 2014.

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:

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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Calibration Certificate

Number : C13646

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

Preamplifier Serial Number : 70607

Ambient Temperature : 21°C

Relative Humidity : 48%

Barometric Pressure : 101.1 kPa

Calibration Technician : Adrian Walker

Calibration Date : 13-November-2013

Secondary Check by : Luke Hudson

Report Issue Date : 13-November-2013

Approved Signatory :

Tested To : IEC61672-3:2006

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
9: Indication at the calibration check frequency	Pass	14: Level linearity on the reference level range	Pass
10: Self-generated noise	Pass	15: Level linearity incl. the level range control	Pass
11: Acoustical tests of a frequency weighting	Pass	16: Toneburst response	Pass
12: Electrical tests of frequency weightings	Pass	17: Peak C sound level	Pass
13: Frequency and time weightings at 1 kHz	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.

NATA
WORLD RECOGNISED ACCREDITATION

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.
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Sound Calibrator

IEC 60942-2004

Calibration Certificate

Calibration Number C14693

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

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

Atmospheric Conditions

Ambient Temperature : 23.5°C
Relative Humidity : 48%
Barometric Pressure : 99.15kPa

Calibration Technician : Corey Stewart
Calibration Date : 19/12/2014
Secondary Check: Sandra Minto
Report Issue Date : 22/12/2014

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressre 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	*±0.15dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±4.1%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.1kPa*
Distortion	*±0.08%*		

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

NATA WORLD RECOGNISED ACCREDITATION

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

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

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 2015

Prepared for
Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring
April 2015

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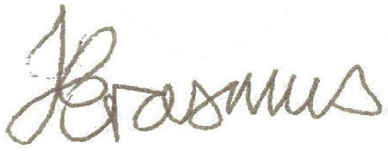

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EXECUTIVE SUMMARY

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 April 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 17/18 April 2015. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

WCP complied with relevant noise limits at all monitoring locations during the April 2015 monitoring.

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). As such, no further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

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Appendices

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 17/18 April 2015. 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

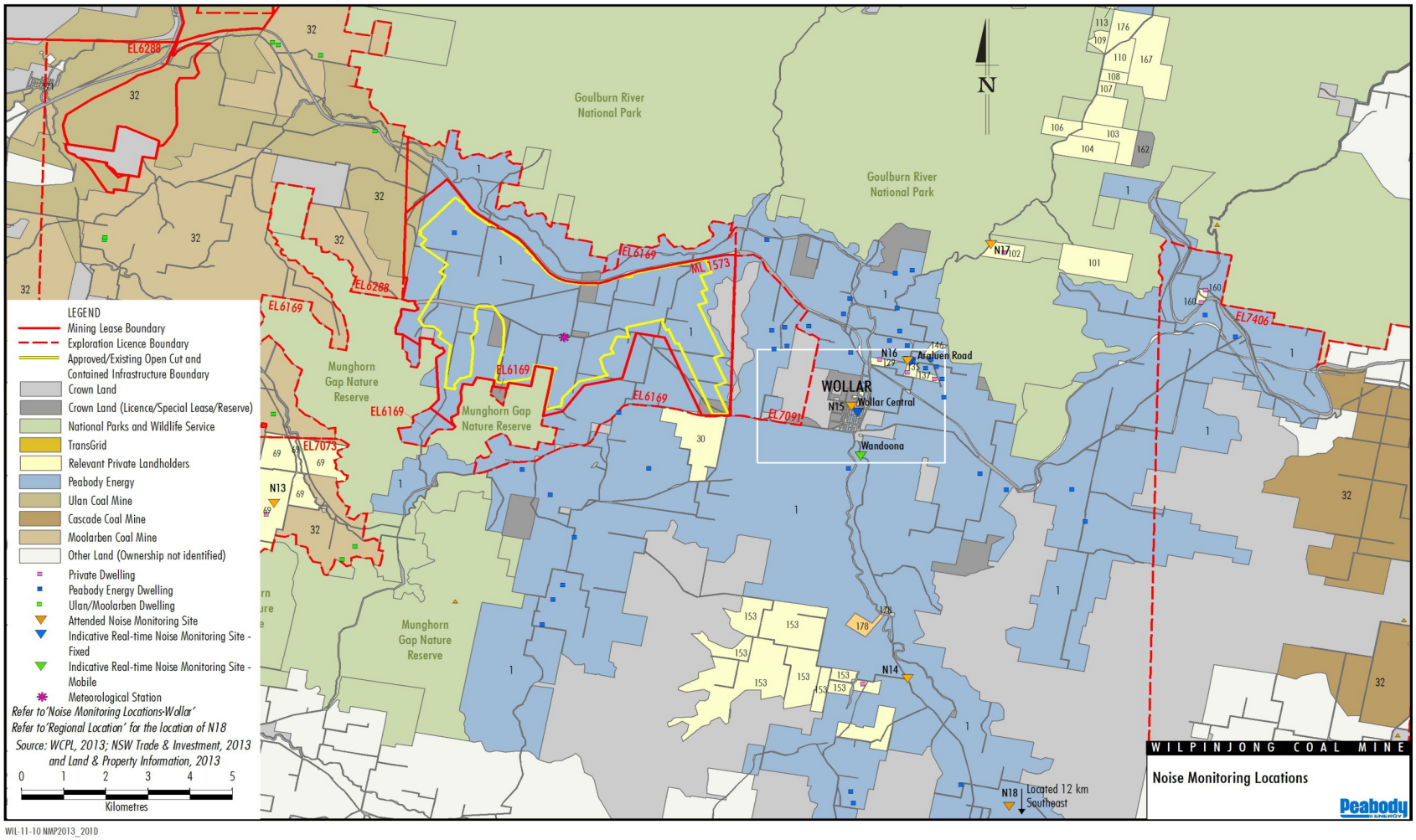

Figure 1: Attended Noise Monitoring Locations

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 (number 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 are 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 C-weighted and 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 total predicted C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to predicted levels.

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	L_{Ceq} to 250 Hz	>60	>65
INP, total	Total L_{Ceq} minus 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), "Not measurable" (NM), "Less than 25 dB" (<25 dB) or "Less than 20 dB" (<20 dB) may be used in this report. When site noise is noted as IA then there was no site noise audible at the monitoring location.

However, if site noise is noted as NM, <25 dB or <20 dB, this means some noise was audible but could not be quantified. This means that noise from the site was either very low, or, being masked by other noise that was relatively loud. In the former case (very low site levels) we consider it not necessary to attempt to accurately quantify site noise as it would be significantly less than any criterion and most unlikely to cause annoyance (and in many cases, to be even noticed).

If site noise were NM, <25 dB or <20 dB due to masking then we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting if deemed necessary. All sites NM, <25 dB or <20 dB in this report are due to low 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	1070590	13/11/2015
Pulsar 106 acoustic calibrator	57413	19/12/2016

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 – APRIL 2015[1]

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	17/04/2015 23:28	57	39	26	22	29	21	19	33
N13	18/04/2015 01:40	59	57	44	29	44	27	24	48
N14	17/04/2015 23:56	47	35	29	23	26	21	19	47
N15	17/04/2015 23:07	52	37	27	20	26	18	17	41
N16	17/04/2015 22:39	43	31	28	25	26	23	19	49
N17	17/04/2015 22:05	44	37	36	34	33	25	22	41
N18	18/04/2015 00:35	51	36	33	23	29	20	19	32

Note:

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

4.2 Project Approval and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – APRIL 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	17/04/2015 23:28	2.0	-0.7	35	Yes	IA	Nil
N13	18/04/2015 01:40	1.0	-0.9	35	Yes	22	Nil
N14	17/04/2015 23:56	1.7	-0.9	35	Yes	IA	Nil
N15	17/04/2015 23:07	1.8	-0.5	35	Yes	IA	Nil
N16	17/04/2015 22:39	1.4	0.0	35	Yes	<20	Nil
N17	17/04/2015 22:05	1.0	1.7	35	Yes	IA	Nil
N18	18/04/2015 00:35	1.8	-0.9	35	Yes	IA	Nil

Notes:

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

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – APRIL 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	17/04/2015 23:28	2.0	-0.7	45	Yes	IA	Nil
N13	18/04/2015 01:40	1.0	-0.9	45	Yes	40	Nil
N14	17/04/2015 23:56	1.7	-0.9	45	Yes	IA	Nil
N15	17/04/2015 23:07	1.8	-0.5	45	Yes	IA	Nil
N16	17/04/2015 22:39	1.4	0.0	45	Yes	<20	Nil
N17	17/04/2015 22:05	1.0	1.7	45	Yes	IA	Nil
N18	18/04/2015 00:35	1.8	-0.9	45	Yes	IA	Nil

Notes:

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

4.3 EPL and Weather Conditions

Table 4.4 and Table 4.5 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – APRIL 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	17/04/2015 23:28	2.0	-0.7	35	Yes	IA	Nil
N13	18/04/2015 01:40	1.0	-0.9	36	Yes	22	Nil
N14	17/04/2015 23:56	1.7	-0.9	35	Yes	IA	Nil
N15	17/04/2015 23:07	1.8	-0.5	35	Yes	IA	Nil
N16	17/04/2015 22:39	1.4	0.0	37	Yes	<20	Nil
N17	17/04/2015 22:05	1.0	1.7	35	Yes	IA	Nil
N18	18/04/2015 00:35	1.8	-0.9	35	Yes	IA	Nil

Notes:

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

Table 4.5: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – APRIL 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies? [1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance [5]
N6	17/04/2015 23:28	2.0	-0.7	45	Yes	IA	Nil
N13	18/04/2015 01:40	1.0	-0.9	45	Yes	40	Nil
N14	17/04/2015 23:56	1.7	-0.9	45	Yes	IA	Nil
N15	17/04/2015 23:07	1.8	-0.5	45	Yes	IA	Nil
N16	17/04/2015 22:39	1.4	0.0	45	Yes	<20	Nil
N17	17/04/2015 22:05	1.0	1.7	45	Yes	IA	Nil
N18	18/04/2015 00:35	1.8	-0.9	45	Yes	IA	Nil

Notes:

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

4.4 Low Frequency Assessment

Table 4.6 provides statistics for attended noise monitoring undertaken around WCP during the April 2015 survey.

Table 4.6: ATTENDED MEASUREMENT STATISTICS FOR WCP – APRIL 2015

Conditions	Total for April 2015
Number of measurements	7
Number of measurements where met applies	7
Number of measurements where WCP is measurable (within 5 dB of the criteria) and criteria and met applies in accordance with the project approval and/or EPL	0

None of the seven measurements occurred during which WCP was directly measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of "<30 dB"), within 5 dB of in the impact assessment criteria and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further analysis of low frequency is required.

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 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	17/04/2015 23:28	20	0	-	8
N13	18/04/2015 01:40	20	1.1	30	8
N14	17/04/2015 23:56	19	0.6	150	8
N15	17/04/2015 23:07	21	0	-	8
N16	17/04/2015 22:39	21	0.8	30	8
N17	17/04/2015 22:05	21	0	-	0
N18	18/04/2015 00:35	19	0	-	7

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 DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
4/17/2015 22:00	0.6	67	1.7
4/17/2015 22:15	1	53	1.7
4/17/2015 22:30	0.8	70	0.7
4/17/2015 22:45	1	67	0.3
4/17/2015 23:00	1.4	57	0.0
4/17/2015 23:15	1.8	61	-0.5
4/17/2015 23:30	1.6	71	-0.7
4/17/2015 23:45	2	79	-0.7
4/18/2015 0:00	1.7	73	-0.9
4/18/2015 0:15	1.7	76	-0.9
4/18/2015 0:30	1.7	110	-0.9
4/18/2015 0:45	1.8	83	-0.9
4/18/2015 1:00	1.3	97	-0.9
4/18/2015 1:15	0.9	100	-1.0
4/18/2015 1:30	1.8	92	-1.0
4/18/2015 1:45	1.2	92	-1.0
4/18/2015 2:00	1	93	-0.9
4/18/2015 2:15	0.9	105	-0.9
4/18/2015 2:30	1	114	-1.0
4/18/2015 2:45	0.9	101	-0.9
4/18/2015 3:00	0.9	75	-0.7

Notes:

1. *Data supplied by WCP; and*
2. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.5 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

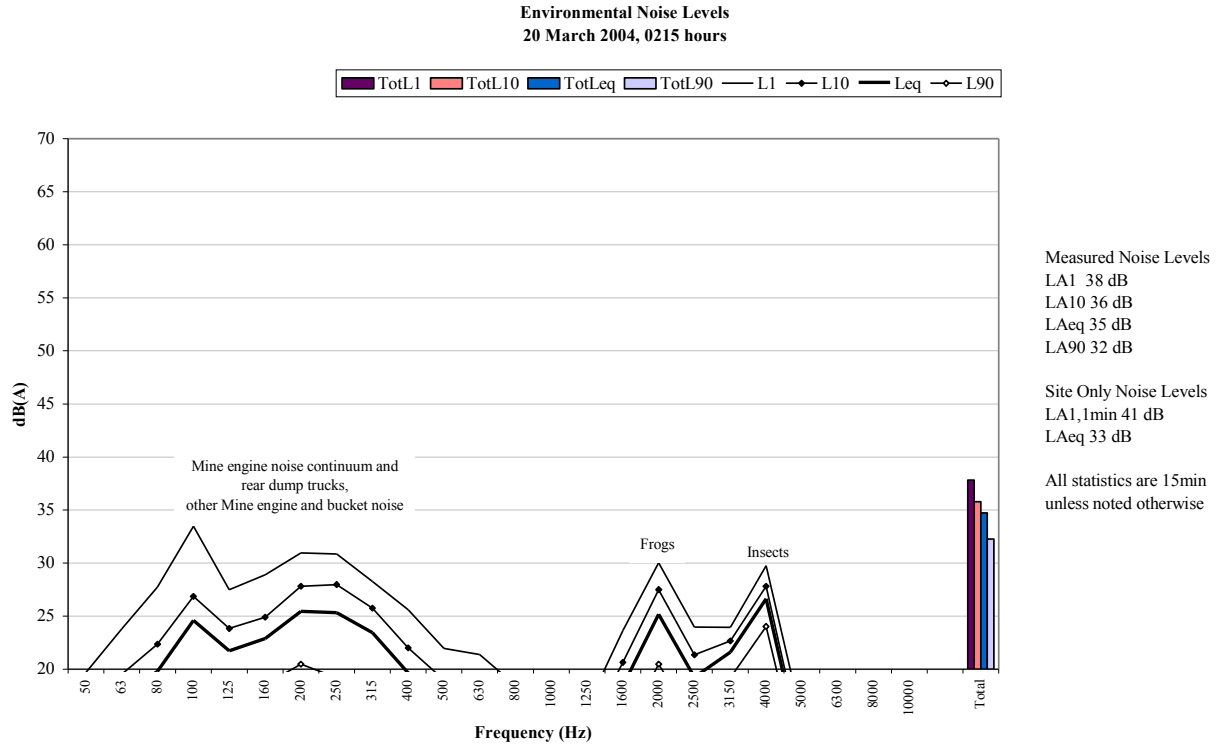

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 17 April 2015

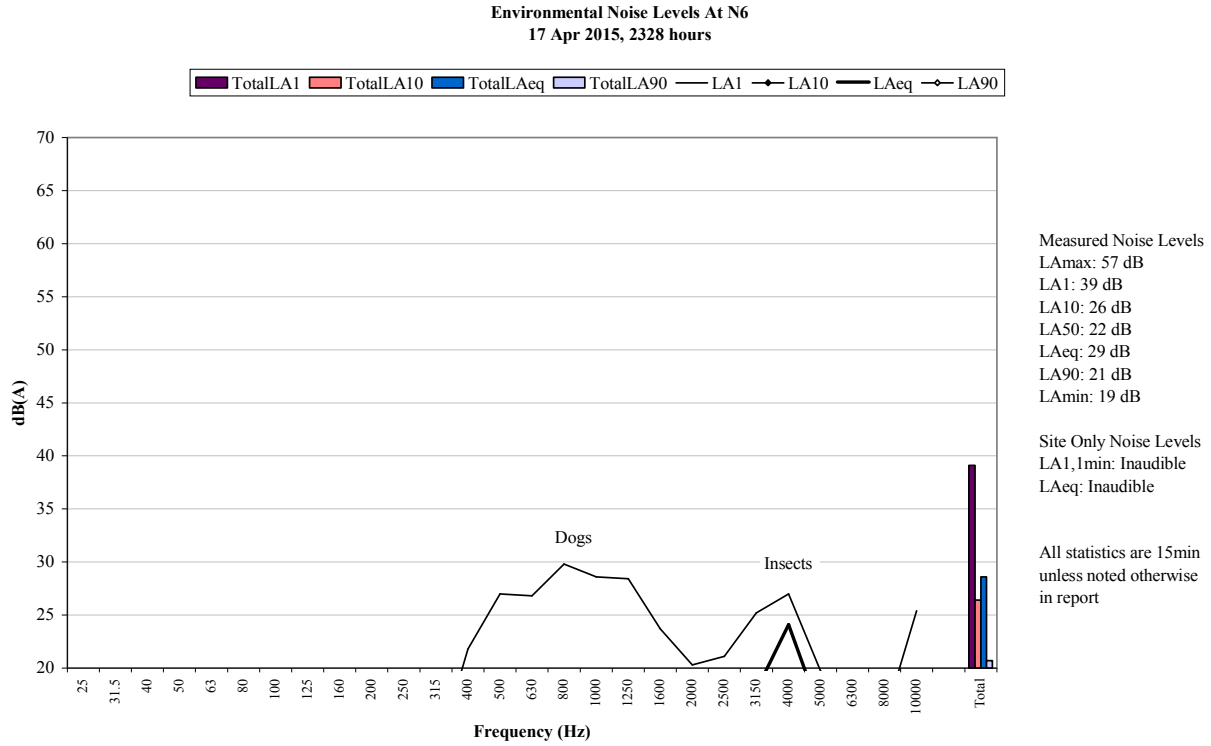

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Birds generated the measured L_{Amax}. Dogs primarily generated the measured L_{A1}. Insects and dogs generated the measured L_{A10} and L_{Aeq}. Insects generated the measured L_{A90}.

5.1.2 N13, 18 April 2015

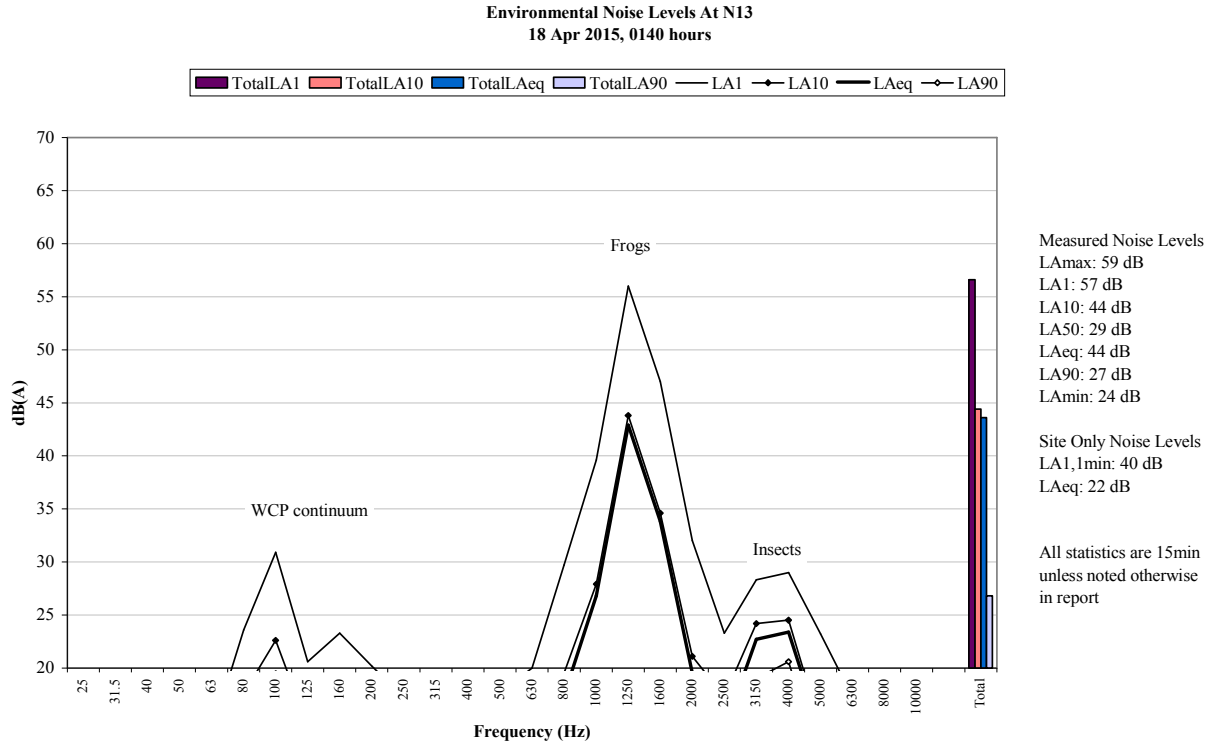

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

An engine and fan continuum from WCP was audible throughout the measurement generating the site only L_{Aeq} of 22 dB and $L_{A1,1minute}$ of 40 dB.

Frogs and insects generated measured levels.

5.1.3 N14, 17 April 2015

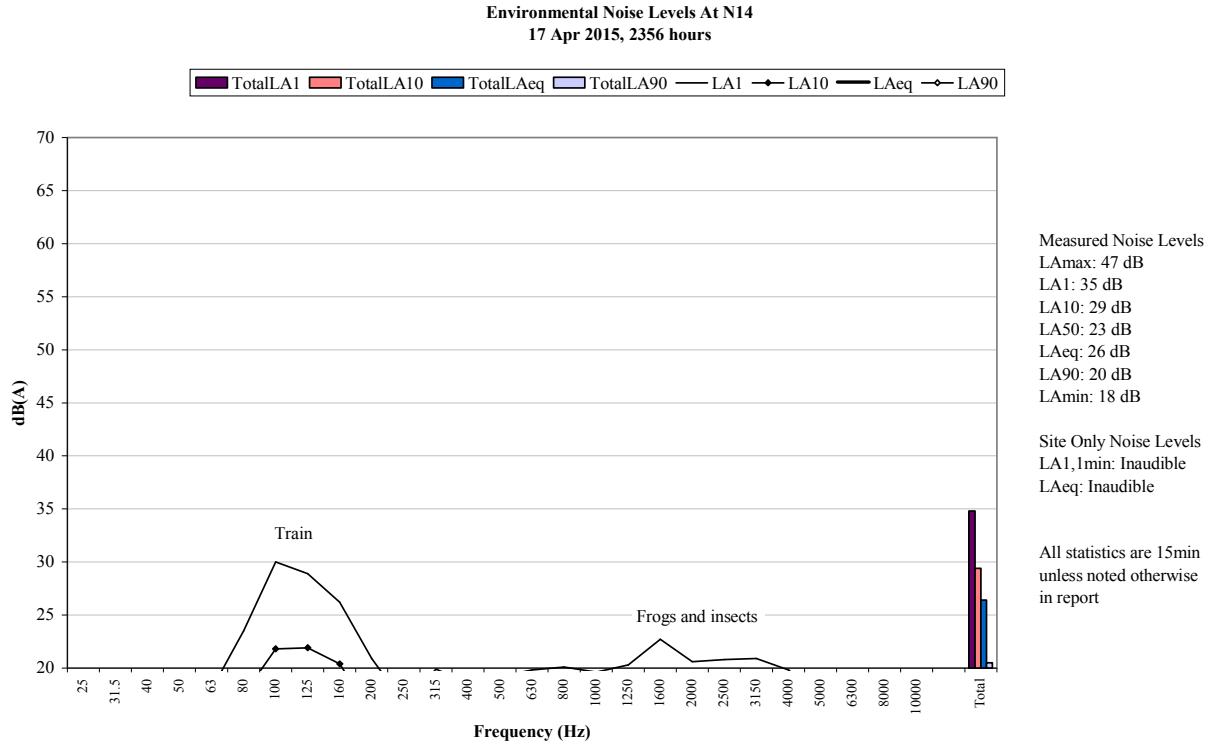

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

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

5.1.4 N15, 17 April 2015

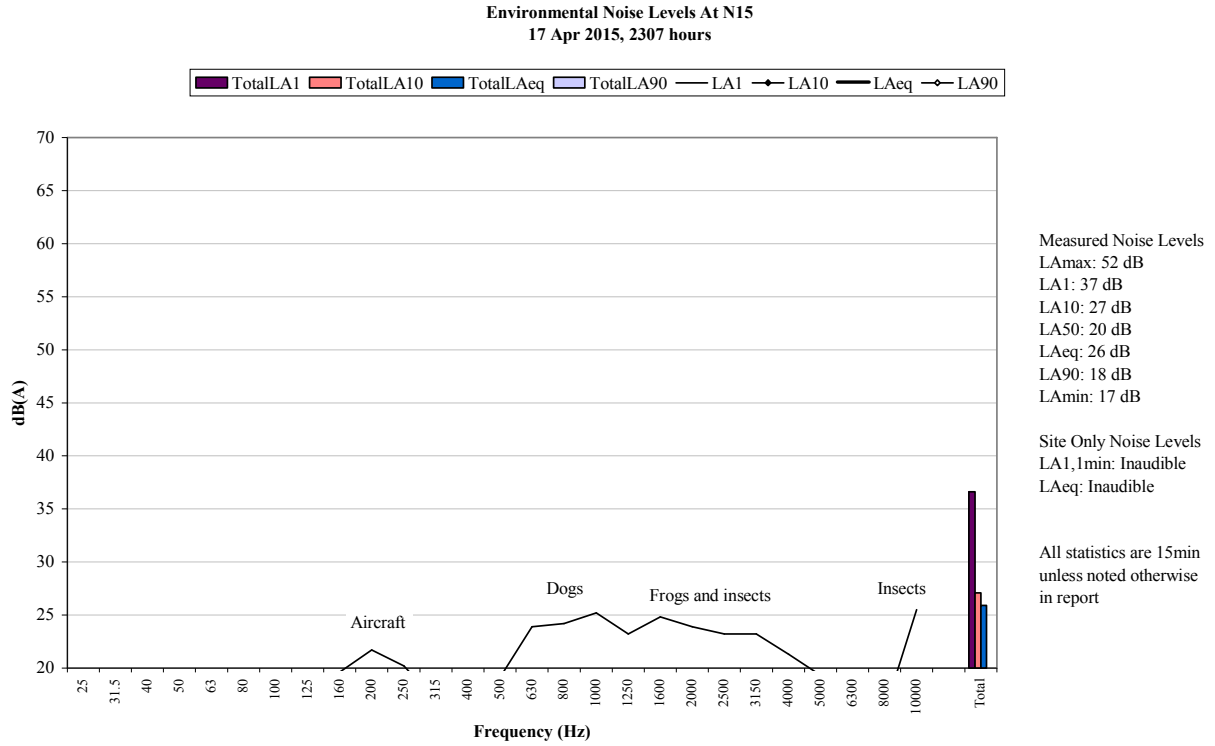

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Insects generated the measured L_{Amax}. Dogs and insects primarily generated the measured L_{A1}. An aircraft and insects generated the measured L_{A10}. Frogs and insects generated the measured L_{A90}.

Birds were also noted.

5.1.5 N16, 17 Aprli 2015

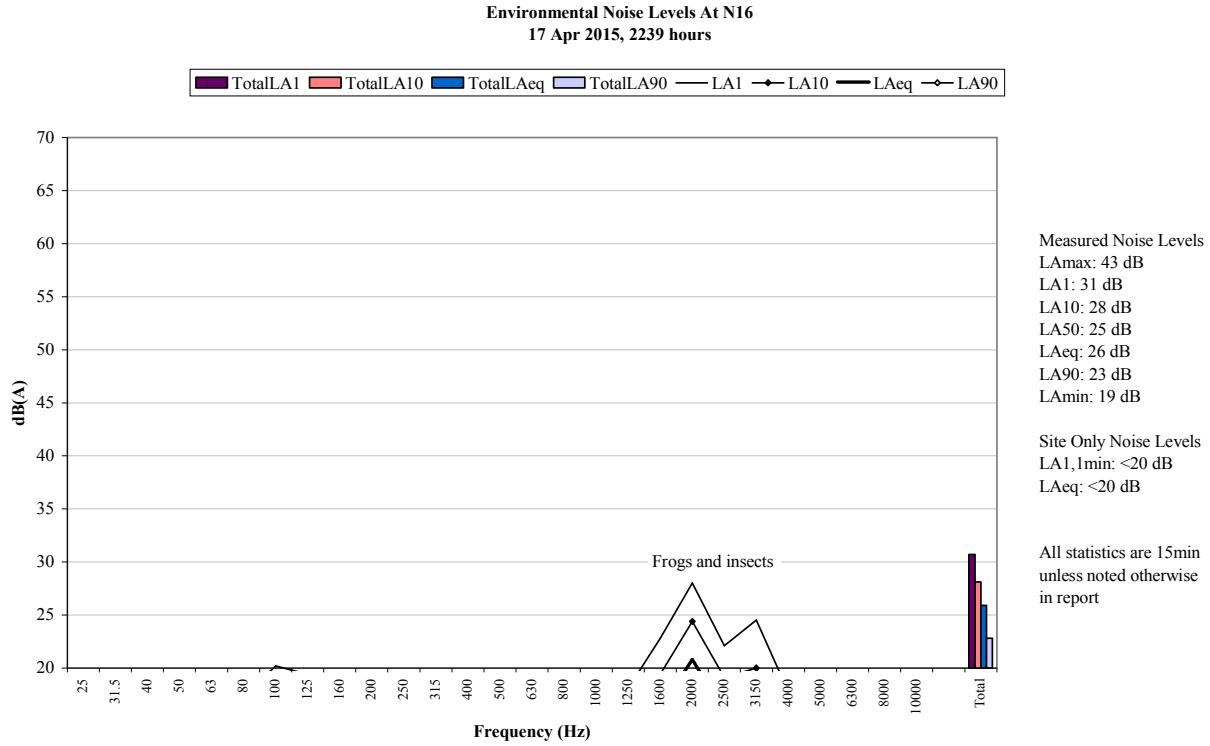

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

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

Insects primarily generated the measured L_{A1}. Insects and an aircraft generated the measured L_{A10} and L_{Aeq}. Frogs and insects generated the measured L_{A90}.

5.1.6 N17, 17 April 2015

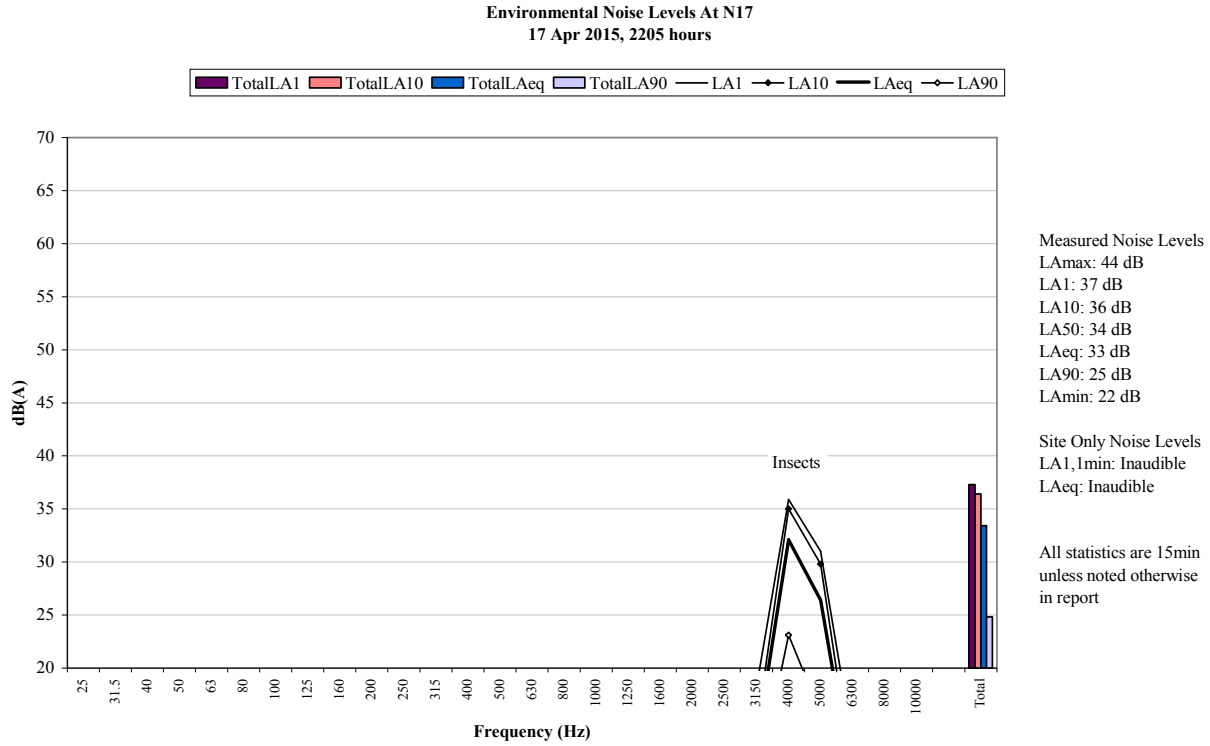

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible.

Insects generated measured levels.

5.1.7 N18, 18 April 2015

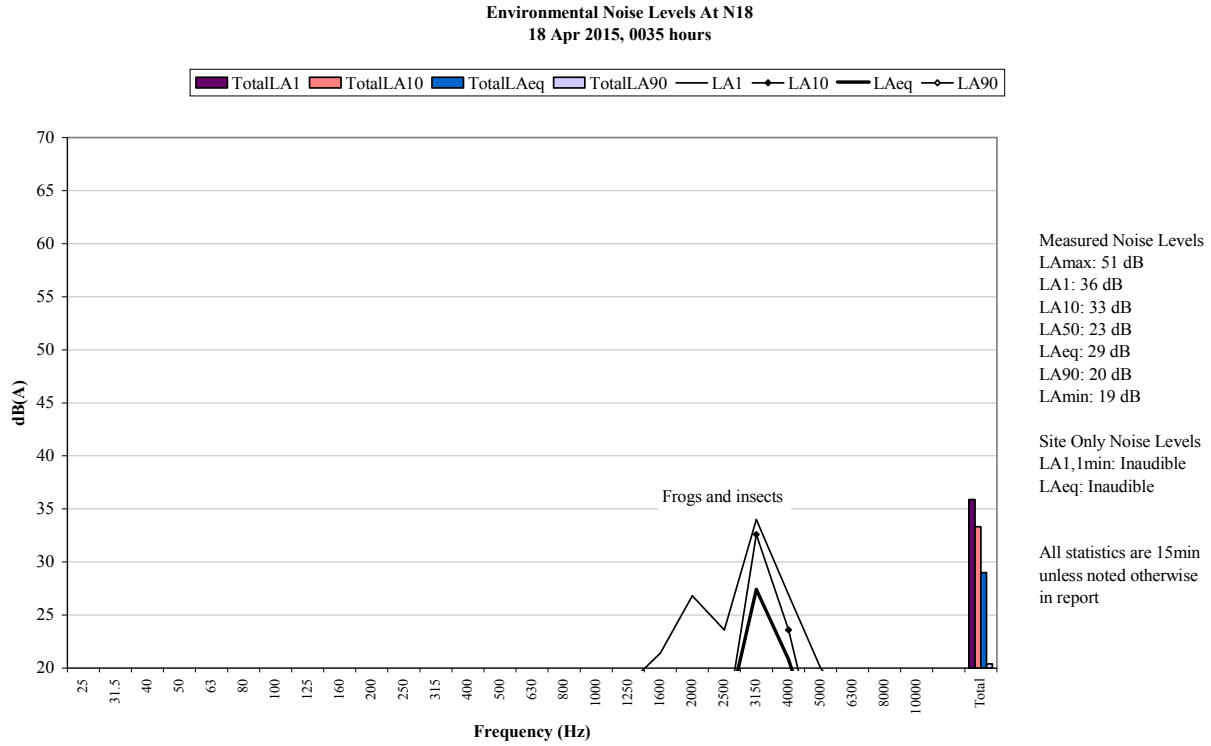

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Birds generated the measured L_{Amax} and L_{A1}. Insects generated measured 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 17/18 April 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

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 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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
125	39	39	39	45

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 ºC and 3ºC/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3ºC/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 October 2014.

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:

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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Calibration Certificate

Number : C13646

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

Preamplifier Serial Number : 70607

Ambient Temperature : 21°C

Relative Humidity : 48%

Barometric Pressure : 101.1 kPa

Calibration Technician : Adrian Walker

Calibration Date : 13-November-2013

Secondary Check by : Luke Hudson

Report Issue Date : 13-November-2013

Approved Signatory :

Tested To : IEC61672-3:2006

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
9: Indication at the calibration check frequency	Pass	14: Level linearity on the reference level range	Pass
10: Self-generated noise	Pass	15: Level linearity incl. the level range control	Pass
11: Acoustical tests of a frequency weighting	Pass	16: Toneburst response	Pass
12: Electrical tests of frequency weightings	Pass	17: Peak C sound level	Pass
13: Frequency and time weightings at 1 kHz	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.

NATA
WORLD RECOGNISED ACCREDITATION

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This document is issued in accordance with NATA's accreditation requirements.
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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C14693

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

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

Atmospheric Conditions
Ambient Temperature : 23.5°C
Relative Humidity : 48%
Barometric Pressure : 99.15kPa

Calibration Technician : Corey Stewart
Calibration Date : 19/12/2014
Secondary Check: Sandra Minto
Report Issue Date : 22/12/2014
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressre 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	*±0.15dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±4.1%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.1kPa*
Distortion	*±0.08%*		

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

NATA
WORLD RECOGNISED ACCREDITATION

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

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

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 2015

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring
May 2015

Reference: 15171_R01
Report date: 12 June 2015

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

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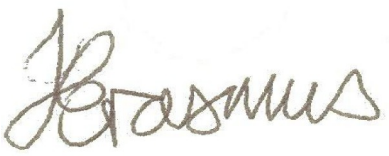

Prepared:	Jonathan Erasmus Acoustics Technician	QA Review:	Katie Weekes Environmental Scientist (Acoustics)

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. Monitoring for May 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 13/14 May 2015. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

WCP complied with relevant noise limits at all monitoring locations during the May 2015 monitoring.

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). As such, no further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

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Appendices

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 13/14 May 2015. 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

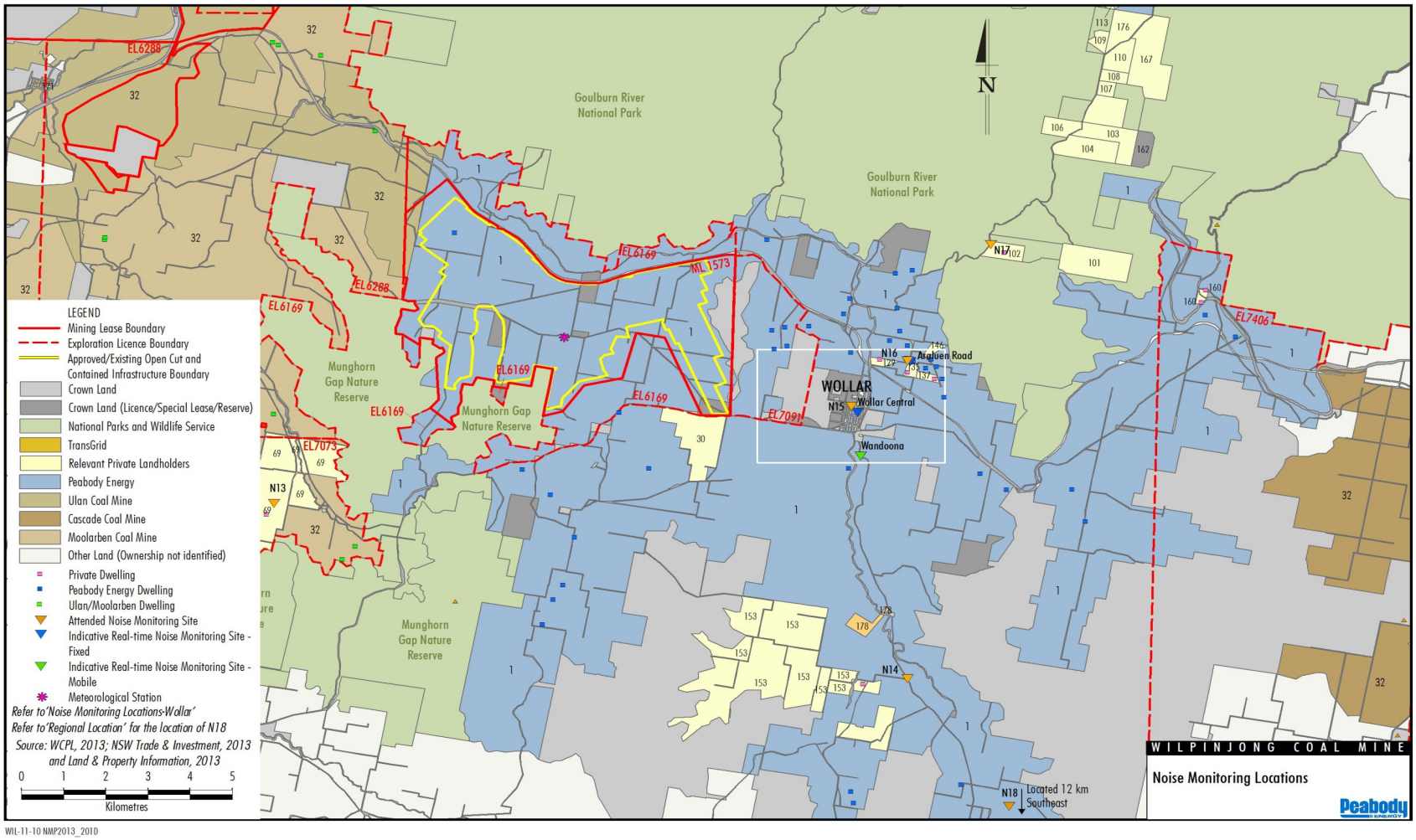

Figure 1: Attended Noise Monitoring Locations

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 (number 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 are 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 C-weighted and 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 total predicted C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to predicted levels.

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	L_{Ceq} to 250 Hz	>60	>65
INP, total	Total L_{Ceq} minus 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), "Not measurable" (NM), "Less than 25 dB" (<25 dB) or "Less than 20 dB" (<20 dB) may be used in this report. When site noise is noted as IA then there was no site noise audible at the monitoring location.

However, if site noise is noted as NM, <25 dB or <20 dB, this means some noise was audible but could not be quantified. This means that noise from the site was either very low, or, being masked by other noise that was relatively loud. In the former case (very low site levels) we consider it not necessary to attempt to accurately quantify site noise as it would be significantly less than any criterion and most unlikely to cause annoyance (and in many cases, to be even noticed).

If site noise were NM, <25 dB or <20 dB due to masking then we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting if deemed necessary. All sites NM, <25 dB or <20 dB in this report are due to low 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	01070590	13/11/2015
Pulsar Model 106 acoustic calibrator	57413	19/12/2016

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 – MAY 2015[1]

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	13/05/2015 23:16	45	36	32	30	30	27	25	46
N13	14/05/2015 01:30	43	32	28	24	26	21	18	46
N14	13/05/2015 23:58	46	38	26	19	26	17	15	38
N15	13/05/2015 22:56	45	43	40	34	36	30	27	48
N16	13/05/2015 22:31	53	48	46	30	40	27	25	54
N17	13/05/2015 22:00	43	34	31	29	29	27	25	47
N18	14/05/2015 00:33	41	28	21	16	19	15	14	27

Note:

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

4.2 Project Approval and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – MAY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	13/05/2015 23:16	1.7	2.6	35	Yes	IA	Nil
N13	14/05/2015 01:30	3.1	0.3	35	No	IA	NA
N14	13/05/2015 23:58	3.3	2.1	35	No	IA	NA
N15	13/05/2015 22:56	1.8	3.1	35	No	IA	Nil
N16	13/05/2015 22:31	1.6	2.2	35	Yes	IA	Nil
N17	13/05/2015 22:00	2.0	2.6	35	No	IA	Nil
N18	14/05/2015 00:33	3.2	1.0	35	No	IA	NA

Notes:

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

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – MAY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	13/05/2015 23:16	1.7	2.6	45	Yes	IA	Nil
N13	14/05/2015 01:30	3.1	0.3	45	No	IA	NA
N14	13/05/2015 23:58	3.3	2.1	45	No	IA	NA
N15	13/05/2015 22:56	1.8	3.1	45	No	IA	Nil
N16	13/05/2015 22:31	1.6	2.2	45	Yes	IA	Nil
N17	13/05/2015 22:00	2.0	2.6	45	No	IA	Nil
N18	14/05/2015 00:33	3.2	1.0	45	No	IA	NA

Notes:

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

4.3 EPL and Weather Conditions

Table 4.4 and Table 4.5 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – MAY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	13/05/2015 23:16	1.7	2.6	35	Yes	IA	Nil
N13	14/05/2015 01:30	3.1	0.3	36	No	IA	NA
N14	13/05/2015 23:58	3.3	2.1	35	No	IA	NA
N15	13/05/2015 22:56	1.8	3.1	35	No	IA	NA
N16	13/05/2015 22:31	1.6	2.2	37	Yes	IA	Nil
N17	13/05/2015 22:00	2.0	2.6	35	No	IA	Nil
N18	14/05/2015 00:33	3.2	1.0	35	No	IA	NA

Notes:

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

Table 4.5: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – MAY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	13/05/2015 23:16	1.7	2.6	45	Yes	IA	Nil
N13	14/05/2015 01:30	3.1	0.3	45	No	IA	NA
N14	13/05/2015 23:58	3.3	2.1	45	No	IA	NA
N15	13/05/2015 22:56	1.8	3.1	45	No	IA	NA
N16	13/05/2015 22:31	1.6	2.2	45	Yes	IA	Nil
N17	13/05/2015 22:00	2.0	2.6	45	No	IA	Nil
N18	14/05/2015 00:33	3.2	1.0	45	No	IA	NA

Notes:

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

4.4 Low Frequency Assessment

Table 4.6 provides statistics for attended noise monitoring undertaken around WCP during the May 2015 survey.

Table 4.6: ATTENDED MEASUREMENT STATISTICS FOR WCP – MAY 2015

Conditions	Total for May 2015
Number of measurements	7
Number of measurements where met applies	2
Number of measurements where WCP is measurable (within 5dB of the criteria) and criteria and met applies in accordance with the project approval and/or EPL	0

None of the seven measurements occurred during which WCP was directly measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of "<30 dB"), within 5 dB of in the impact assessment criteria and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further analysis of low frequency is required.

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 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	13/05/2015 23:16	6	1.2	160	0
N13	14/05/2015 01:30	6	0.6	200	0
N14	13/05/2015 23:58	9	0.0	-	0
N15	13/05/2015 22:56	8	1.6	190	0
N16	13/05/2015 22:31	8	1.2	220	0
N17	13/05/2015 22:00	9	0.0	140	0
N18	14/05/2015 00:33	6	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 DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
13/05/2015 22:00	1.0	315	3.3
13/05/2015 22:15	2.0	300	2.6
13/05/2015 22:30	2.1	319	2.6
13/05/2015 22:45	1.6	296	2.2
13/05/2015 23:00	1.4	253	2.8
13/05/2015 23:15	1.8	238	3.1
13/05/2015 23:30	1.7	234	2.6
13/05/2015 23:45	3.0	240	2.4
14/05/2015 00:00	2.9	237	2.2
14/05/2015 00:15	3.3	230	2.1
14/05/2015 00:30	3.2	228	1.9
14/05/2015 00:45	3.2	214	1.0
14/05/2015 01:00	3.0	212	0.7
14/05/2015 01:15	2.8	212	0.5
14/05/2015 01:30	2.2	214	0.5
14/05/2015 01:45	3.1	223	0.3
14/05/2015 02:00	3.6	224	-0.2

Notes:

1. *Data supplied by WCP; and*
2. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.5 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

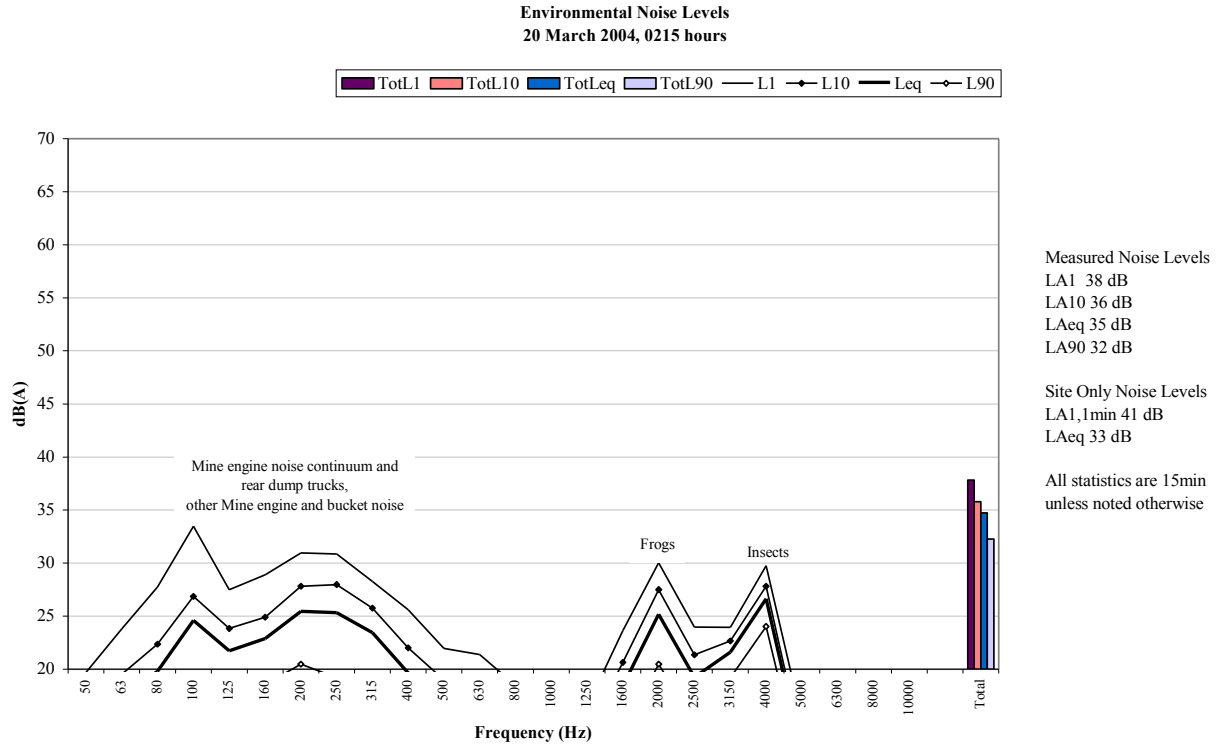

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 13 May 2015

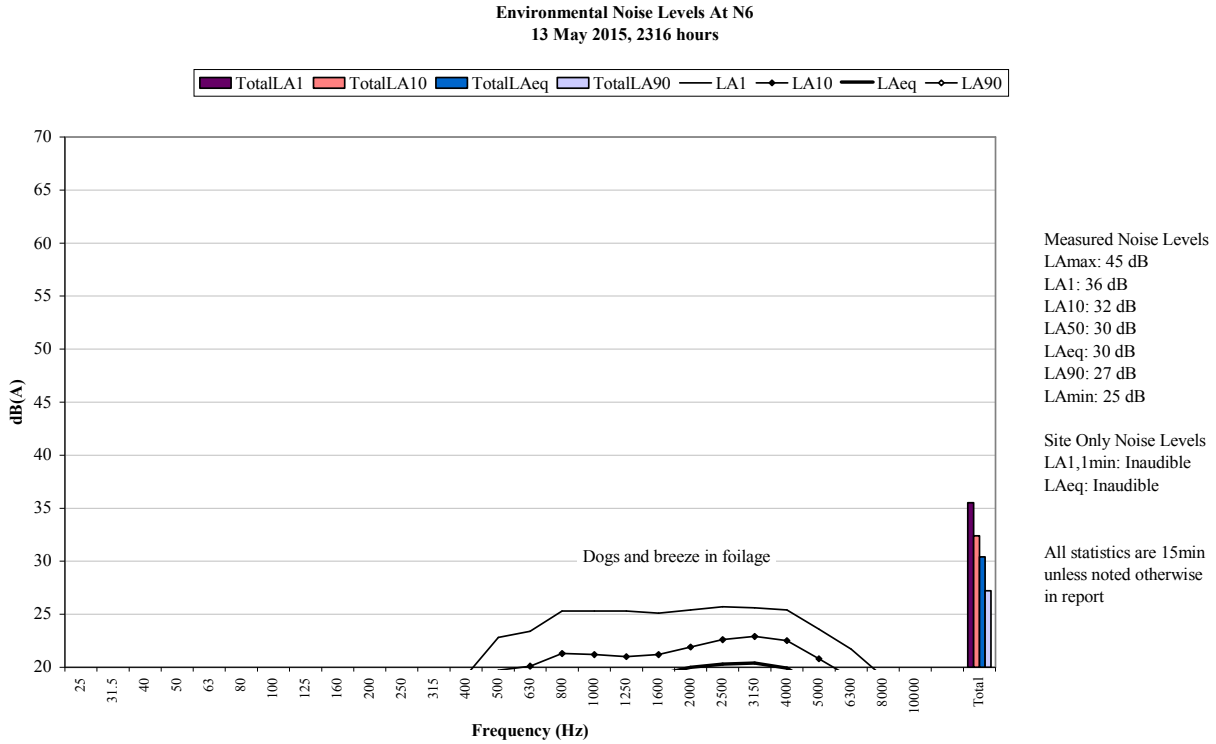

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

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

5.1.2 N13, 14 May 2015

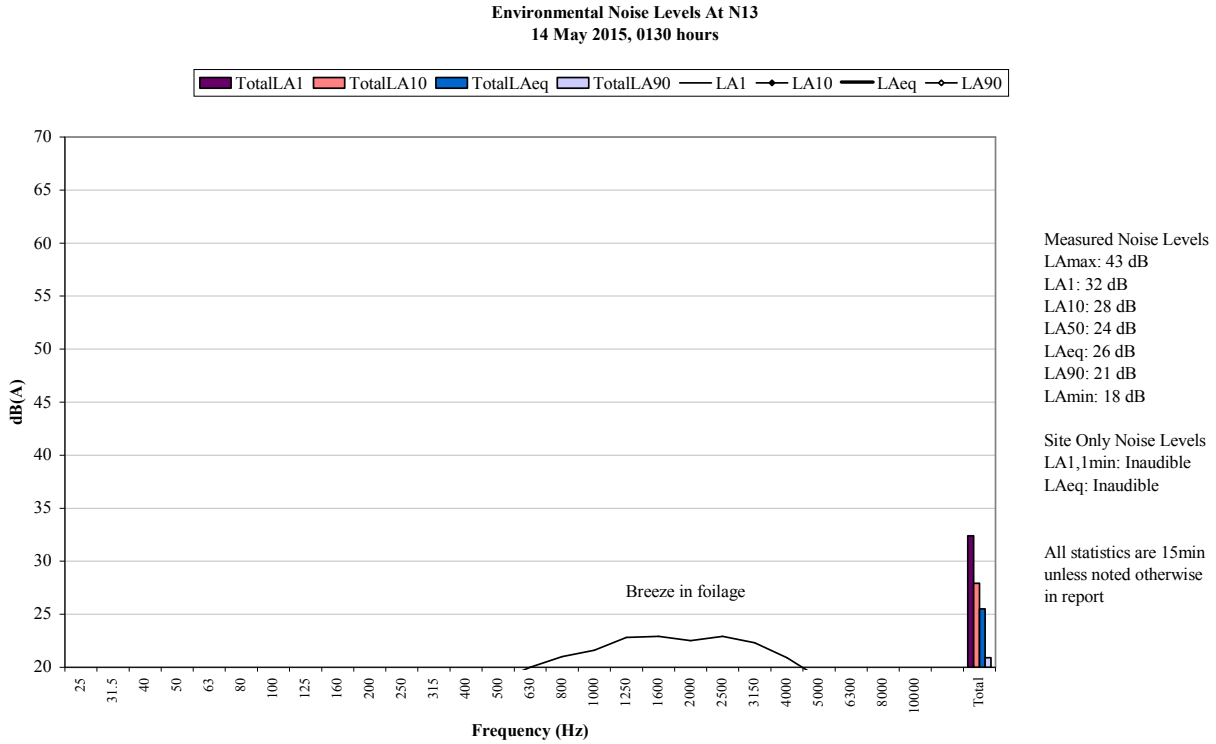

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Breeze in foliage was responsible for measured levels. The floor of the sound levels meter was a minor contributor to the measured L_{A90}.

5.1.3 N14, 13 May 2015

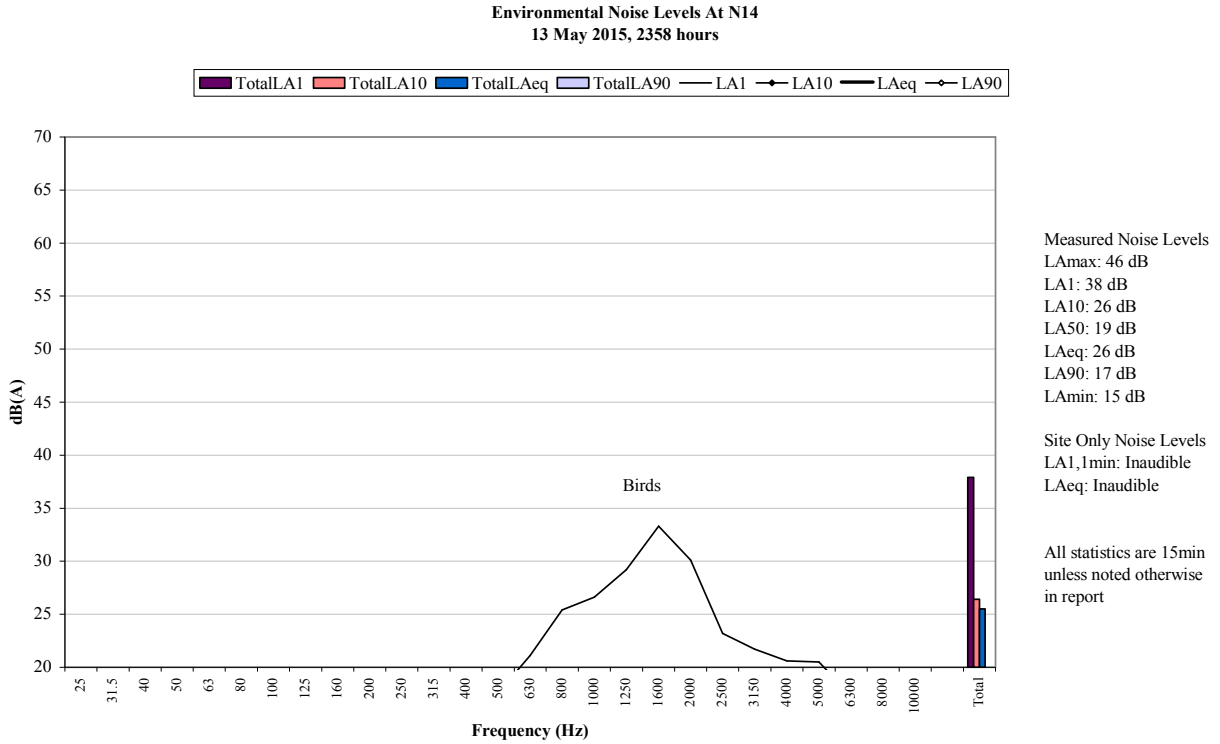

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Birds primarily generated measured levels. The sound level meter noise floor generated the measured L_{A90}.

5.1.4 N15, 13 May 2015

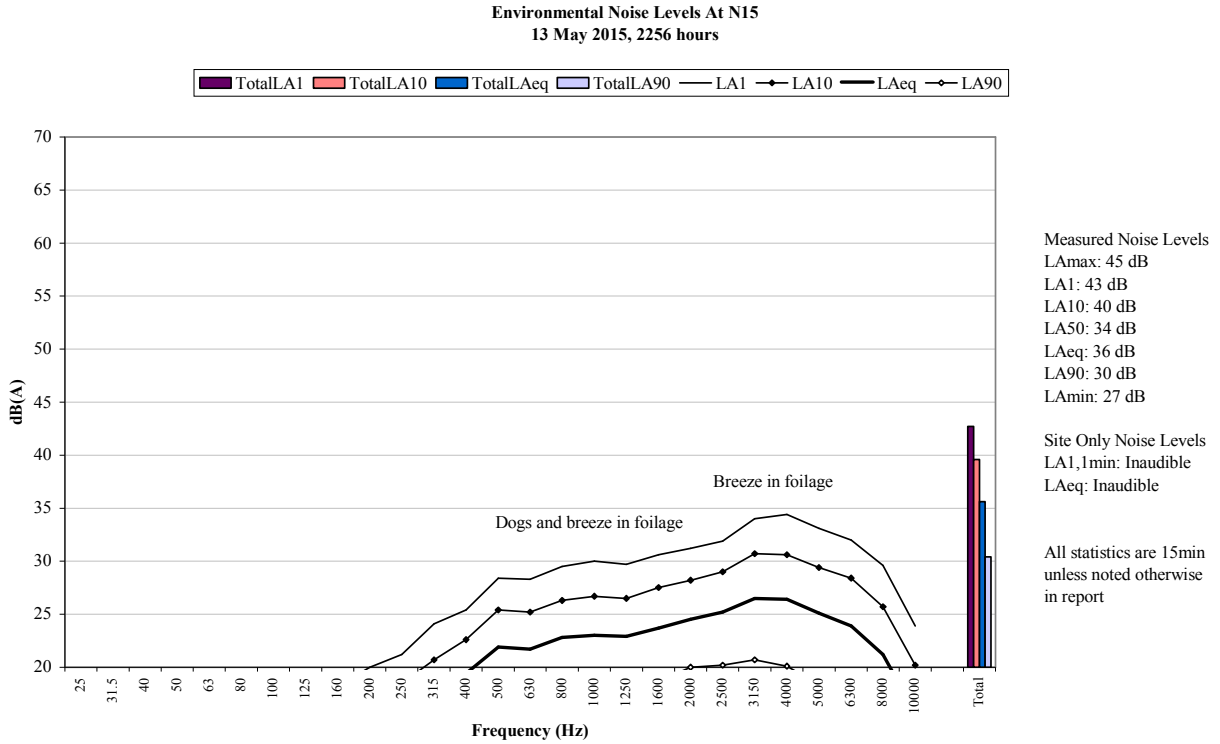

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Breeze in foliage primarily generated measured levels.

Dogs were also noted.

5.1.5 N16, 13 May 2015

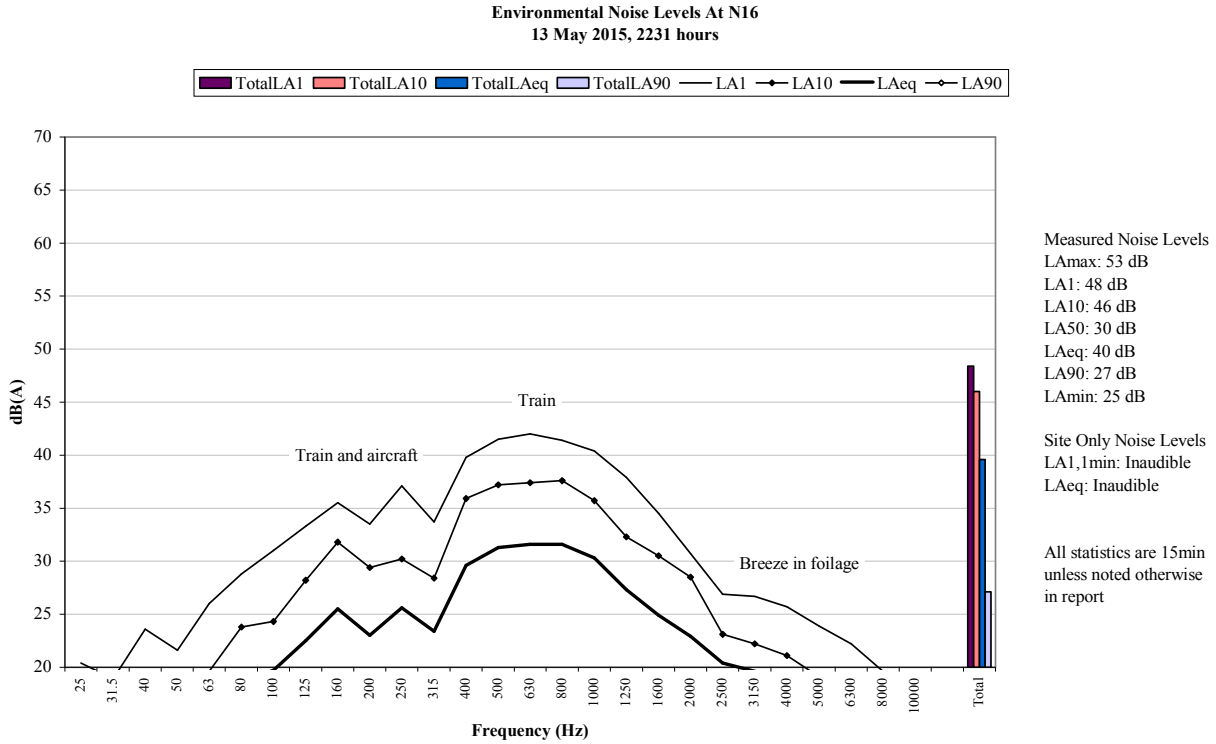

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible.

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

An aircraft, dogs and road traffic tyre noise were also noted.

5.1.6 N17, 13 May 2015

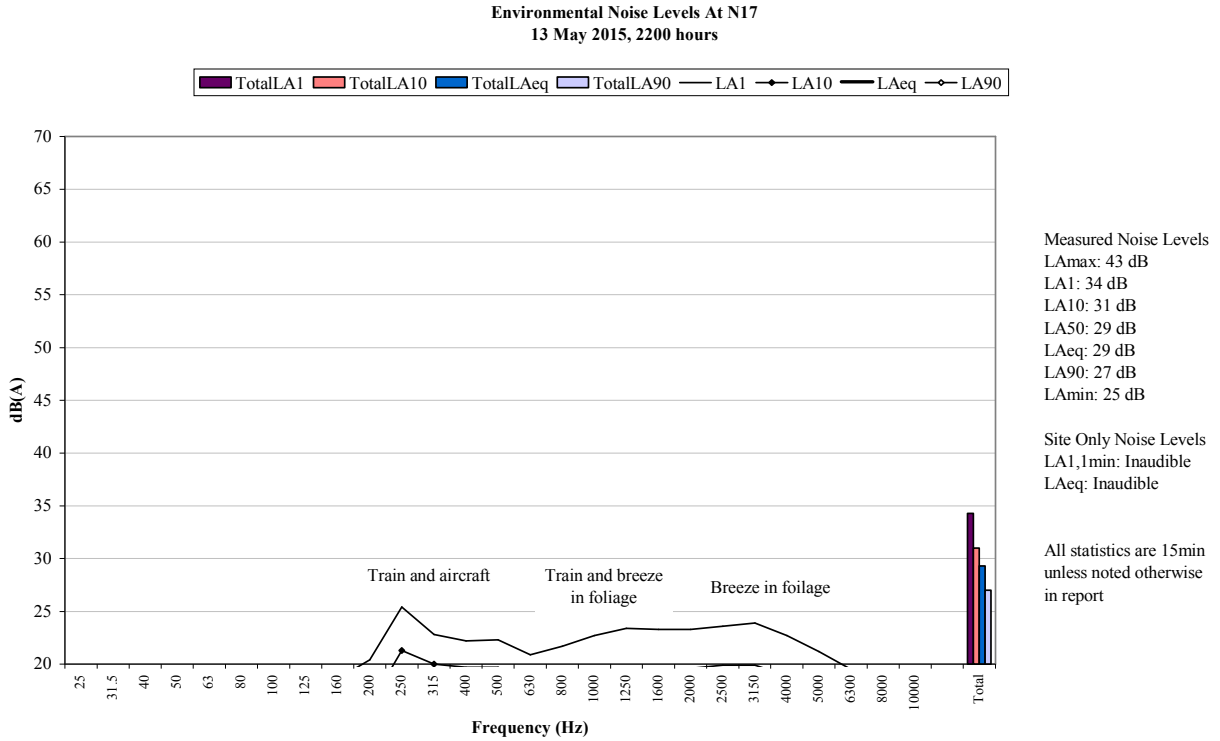

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible.

A train and breeze in foliage primarily generated the measured L_{A1}, L_{A10} and L_{Aeq}. Breeze in foliage generated the measured L_{A90}.

An aircraft was also noted.

5.1.7 N18, 14 May 2015

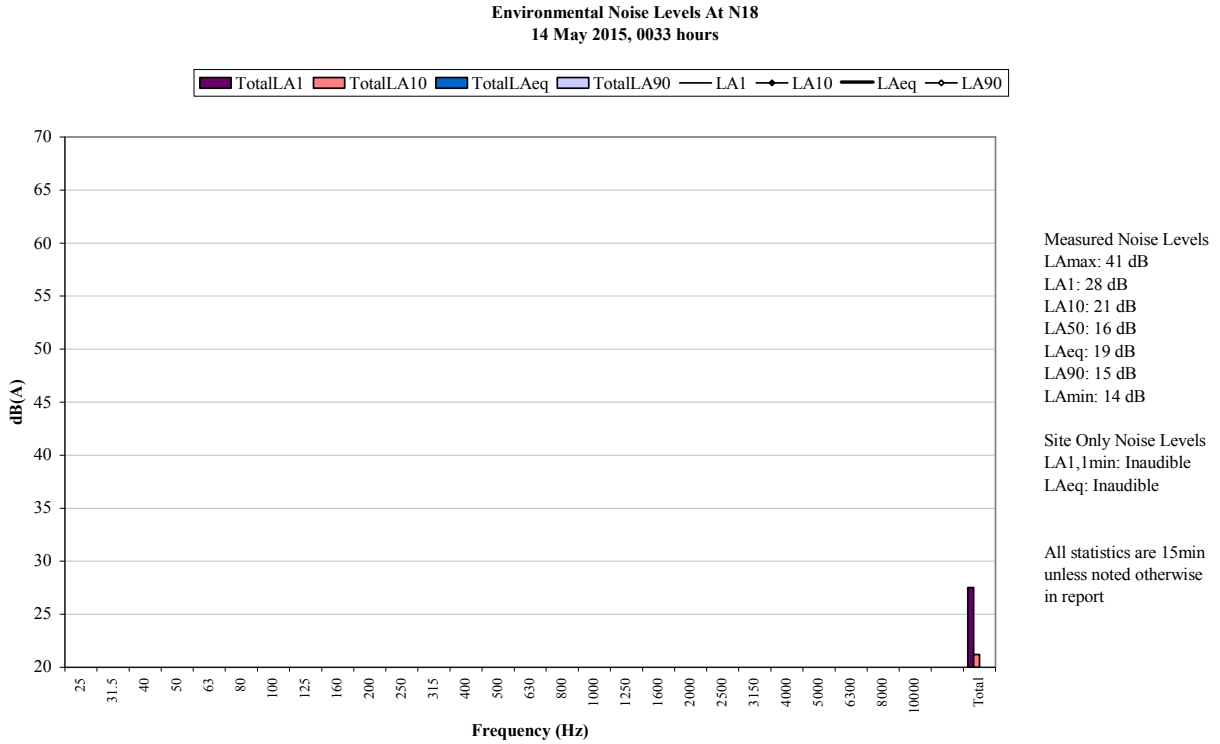

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Birds generated the measured L_{A1} and contributed to the measured L_{Aeq}. The noise floor of the sound level meter generated the measured L_{A90}.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during night period of 13/14 May 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

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 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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church	40 (internal) When in use			-
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

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 ºC and 3ºC/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3ºC/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 October 2014.

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:

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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Calibration Certificate

Number : C13646

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

Preamplifier Serial Number : 70607

Ambient Temperature : 21°C

Relative Humidity : 48%

Barometric Pressure : 101.1 kPa

Calibration Technician : Adrian Walker

Calibration Date : 13-November-2013

Secondary Check by : Luke Hudson

Report Issue Date : 13-November-2013

Approved Signatory :

Tested To : IEC61672-3:2006

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
9: Indication at the calibration check frequency	Pass	14: Level linearity on the reference level range	Pass
10: Self-generated noise	Pass	15: Level linearity incl. the level range control	Pass
11: Acoustical tests of a frequency weighting	Pass	16: Toneburst response	Pass
12: Electrical tests of frequency weightings	Pass	17: Peak C sound level	Pass
13: Frequency and time weightings at 1 kHz	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.

NATA
WORLD RECOGNISED ACCREDITATION

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.
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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C14693

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

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

Atmospheric Conditions
Ambient Temperature : 23.5°C
Relative Humidity : 48%
Barometric Pressure : 99.15kPa

Calibration Technician : Corey Stewart
Calibration Date : 19/12/2014
Secondary Check: Sandra Minto
Report Issue Date : 22/12/2014
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressre 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	*±0.15dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±4.1%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.1kPa*
Distortion	*±0.08%*		

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

NATA WORLD RECOGNISED ACCREDITATION

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

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

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 2015

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring June 2015

Reference: 15201_R01
Report date: 24 June 2015

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322

Prepared: Jesse Tribby
Scientist (Acoustic)

QA Review: Katie Weekes
Environmental Scientist (Acoustic)

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 June 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 14/15 June 2015. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

WCP complied with relevant noise limits at all monitoring locations during the June 2015 monitoring.

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). As such, no further assessment of low frequency noise was undertaken.

Global Acoustics Pty Ltd

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Appendices

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 June 2015. 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

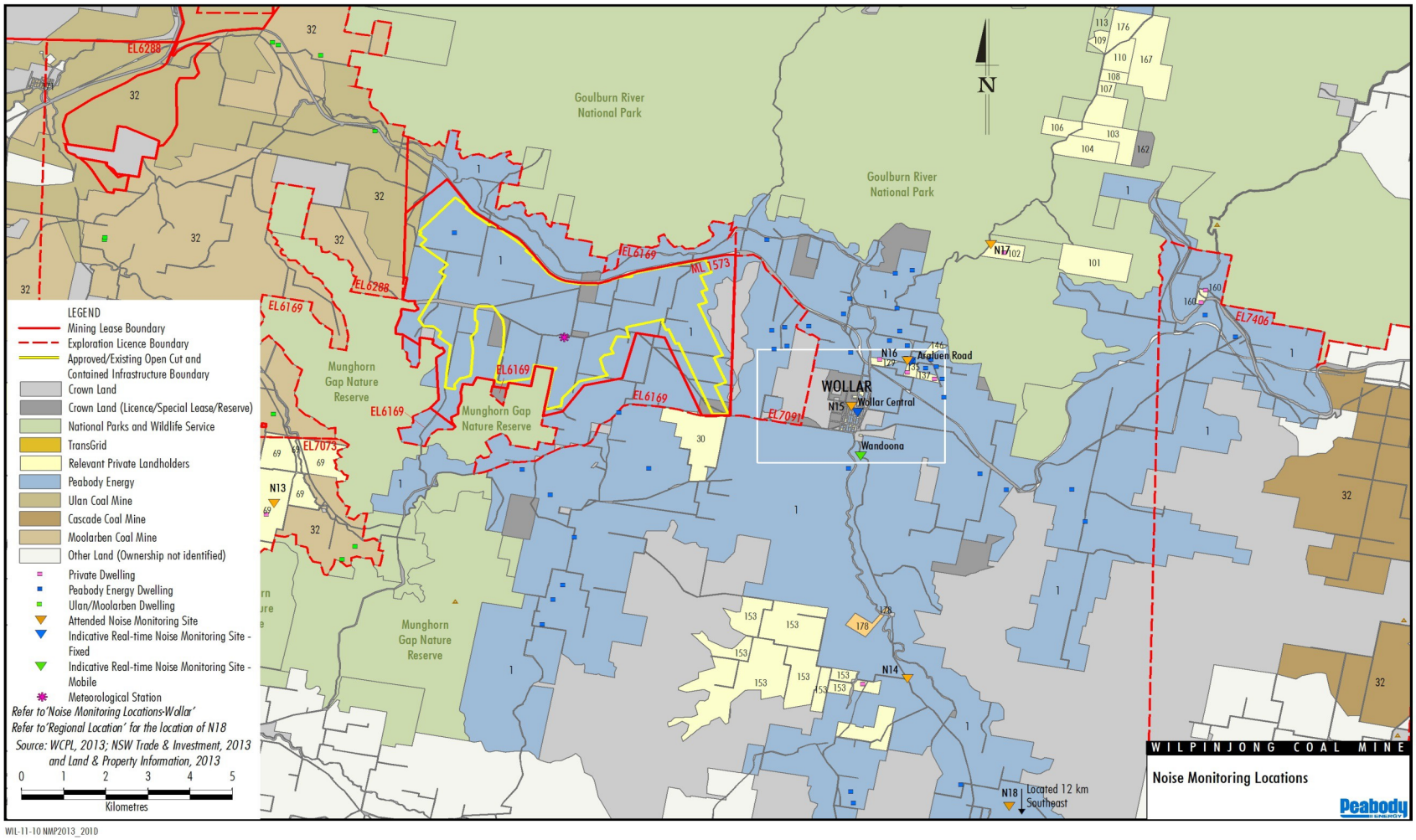

Figure 1: Attended Noise Monitoring Locations

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 are 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 C-weighted and 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 total predicted C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to predicted levels.

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	L_{Ceq} to 250 Hz	>60	>65
INP, total	Total L_{Ceq} minus 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 Jesse Tribby.

The terms "Inaudible" (IA), "Not measurable" (NM), "Less than 25 dB" (<25 dB) or "Less than 20 dB" (<20 dB) may be used in this report. When site noise is noted as IA then there was no site noise audible at the monitoring location.

However, if site noise is noted as NM, <25 dB or <20 dB, this means some noise was audible but could not be quantified. This means that noise from the site was either very low, or, being masked by other noise that was relatively loud. In the former case (very low site levels) we consider it not necessary to attempt to accurately quantify site noise as it would be significantly less than any criterion and most unlikely to cause annoyance (and in many cases, to be even noticed).

If site noise were NM, <25 dB or <20 dB due to masking then we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting if deemed necessary. All sites NM, <25 dB or <20 dB in this report are due to low 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	01070590	13/11/2015
Pulsar Model 106 acoustic calibrator	57413	19/12/2016

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 – JUNE 2015[1]

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	14/06/2015 23:52	54	48	39	23	36	19	17	39
N13	15/06/2015 01:58	45	33	30	28	29	26	24	46
N14	14/06/2015 22:36	45	40	26	18	27	17	16	43
N15	15/06/2015 00:14	51	43	32	18	30	17	16	35
N16	15/06/2015 01:17	41	34	28	24	25	19	17	46
N17	15/06/2015 00:46	33	21	16	14	15	14	14	23
N18	14/06/2015 23:10	30	23	21	19	19	17	16	34

Note:

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

4.2 Project Approval and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JUNE 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	14/06/2015 23:52	0.0	5.7	35	No	IA	NA
N13	15/06/2015 01:58	0.0	4.7	35	No	24	NA
N14	14/06/2015 22:36	0.0	5.5	35	No	IA	NA
N15	15/06/2015 00:14	0.6	5.3	35	No	IA	NA
N16	15/06/2015 01:17	0.0	4.3	35	No	<20	NA
N17	15/06/2015 00:46	0.0	5.0	35	No	IA	NA
N18	14/06/2015 23:10	0.0	5.5	35	No	IA	NA

Notes:

1. *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;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JUNE 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	14/06/2015 23:52	0.0	5.7	45	No	IA	NA
N13	15/06/2015 01:58	0.0	4.7	45	No	30	NA
N14	14/06/2015 22:36	0.0	5.5	45	No	IA	NA
N15	15/06/2015 00:14	0.6	5.3	45	No	IA	NA
N16	15/06/2015 01:17	0.0	4.3	45	No	<20	NA
N17	15/06/2015 00:46	0.0	5.0	45	No	IA	NA
N18	14/06/2015 23:10	0.0	5.5	45	No	IA	NA

Notes:

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

4.3 EPL and Weather Conditions

Table 4.4 and Table 4.5 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – JUNE 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	14/06/2015 23:52	0.0	5.7	35	No	IA	NA
N13	15/06/2015 01:58	0.0	4.7	36	No	24	NA
N14	14/06/2015 22:36	0.0	5.5	35	No	IA	NA
N15	15/06/2015 00:14	0.6	5.3	35	No	IA	NA
N16	15/06/2015 01:17	0.0	4.3	37	No	<20	NA
N17	15/06/2015 00:46	0.0	5.0	35	No	IA	NA
N18	14/06/2015 23:10	0.0	5.5	35	No	IA	NA

Notes:

1. *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 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/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.5: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – JUNE 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	14/06/2015 23:52	0.0	5.7	45	No	IA	NA
N13	15/06/2015 01:58	0.0	4.7	45	No	30	NA
N14	14/06/2015 22:36	0.0	5.5	45	No	IA	NA
N15	15/06/2015 00:14	0.6	5.3	45	No	IA	NA
N16	15/06/2015 01:17	0.0	4.3	45	No	<20	NA
N17	15/06/2015 00:46	0.0	5.0	45	No	IA	NA
N18	14/06/2015 23:10	0.0	5.5	45	No	IA	NA

Notes:

1. *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 including3 °C/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

4.4 Low Frequency Assessment

Table 4.6 provides statistics for attended noise monitoring undertaken around WCP during the June 2015 survey.

Table 4.6: ATTENDED MEASUREMENT STATISTICS FOR WCP – JUNE 2015

Conditions	Total for June 2015
Number of measurements	7
Number of measurements where met applies	0
Number of measurements where WCP is measurable (within 5dB of the criteria) and criteria and met applies in accordance with the project approval and/or EPL	0

None of the seven measurements occurred during which WCP was directly measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of "<30 dB"), within 5 dB of in the impact assessment criteria and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further analysis of low frequency is required.

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 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	14/06/2015 23:52	8	0.0	-	0
N13	15/06/2015 01:58	10	0.9	215	0
N14	14/06/2015 22:36	10	0.5	125	0
N15	15/06/2015 00:14	6	0.0	-	0
N16	15/06/2015 01:17	7	0.0	-	0
N17	15/06/2015 00:46	7	0.0	-	0
N18	14/06/2015 23:10	6	0.3	180	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 DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
14/06/2015 22:00	0.0	0	5.3
14/06/2015 22:15	0.0	0	5.3
14/06/2015 22:30	0.0	0	5.2
14/06/2015 22:45	0.0	0	5.5
14/06/2015 23:00	0.0	0	6.6
14/06/2015 23:15	0.0	0	5.2
14/06/2015 23:30	0.0	0	5.5
14/06/2015 23:45	0.0	0	5.0
15/06/2015 0:00	0.0	0	5.7
15/06/2015 0:15	0.0	0	5.9
15/06/2015 0:30	0.6	1	5.3
15/06/2015 0:45	0.0	0	5.2
15/06/2015 1:00	0.0	0	5.0
15/06/2015 1:15	0.0	0	5.2
15/06/2015 1:30	0.0	0	4.3
15/06/2015 1:45	0.0	0	4.3
15/06/2015 2:00	0.0	0	4.7
15/06/2015 2:15	0.0	0	4.0

Notes:

1. *Data supplied by WCP; and*
2. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.5 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

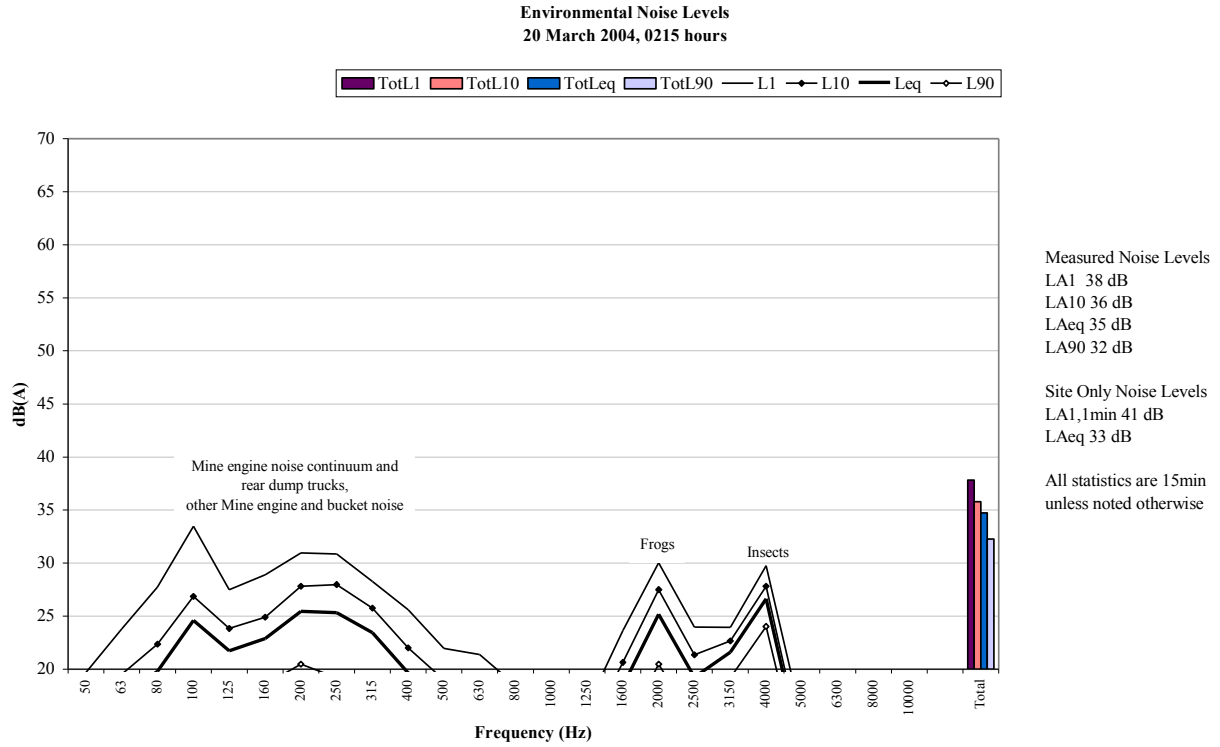

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 14 June 2015

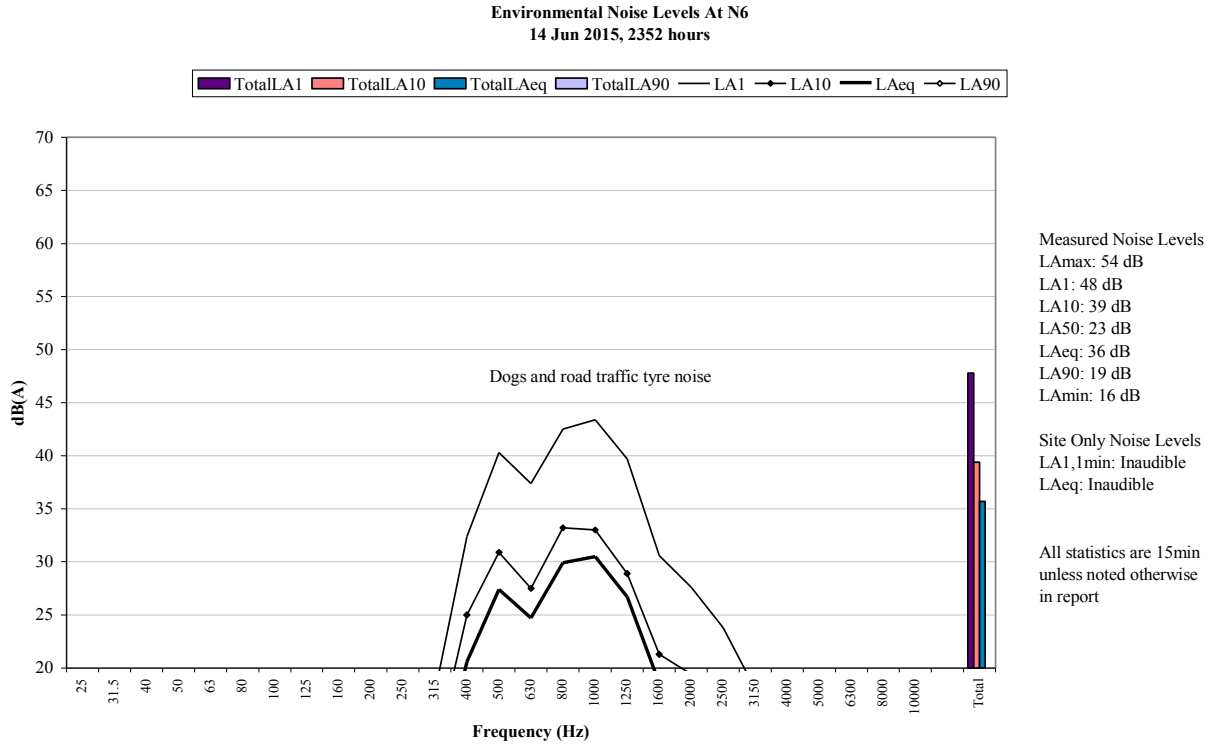

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Dogs and road traffic tyre noise generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Frogs and insects were responsible for the measured L_{A90}.

A pump continuum from a nearby residence was also noted at very low levels.

5.1.2 N13, 15 June 2015

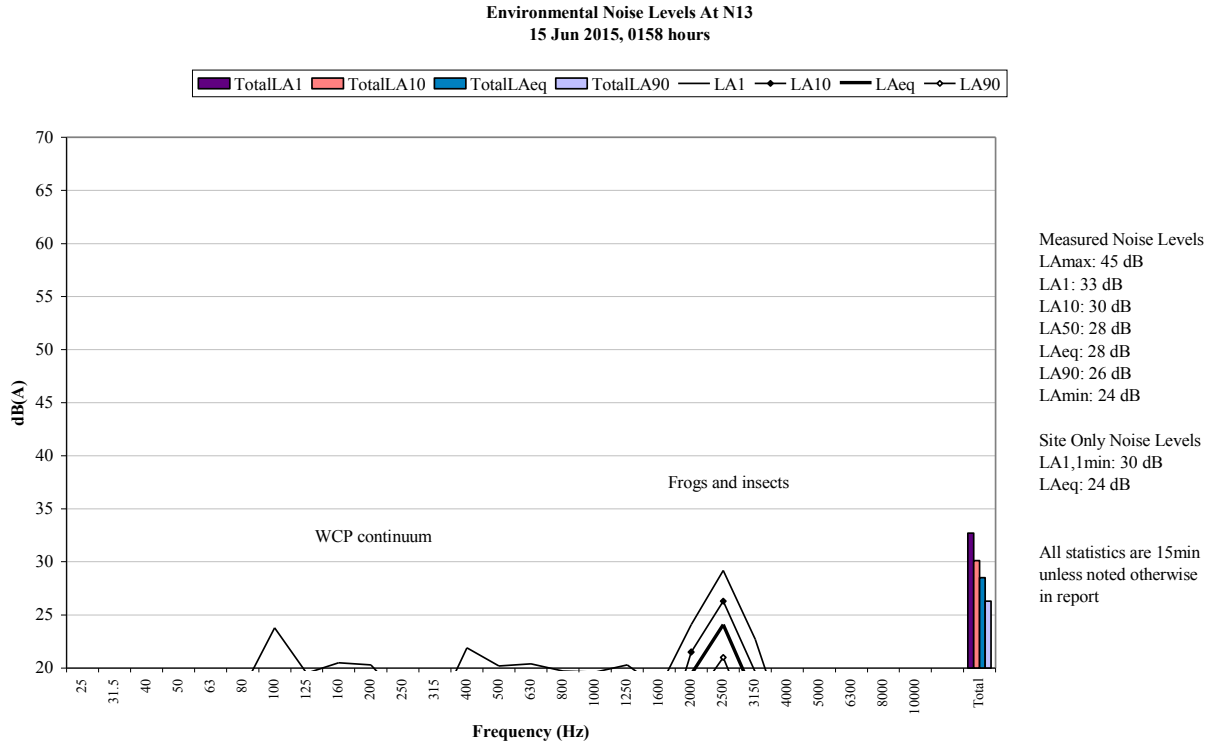

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

A mining continuum from WCP was audible throughout the measurement and generated a site only L_{Aeq} of 24 dB. Engine surges were responsible for the site only $L_{A1,1minute}$ of 30 dB. Horns and track noise were also noted.

Frogs and insects were primarily responsible for measured noise levels. The continuum from WCP was a minor contributor to the measured L_{A10}, L_{Aeq} and L_{A90}.

Birds and distant road traffic tyre noise were also noted.

5.1.3 N14, 14 June 2015

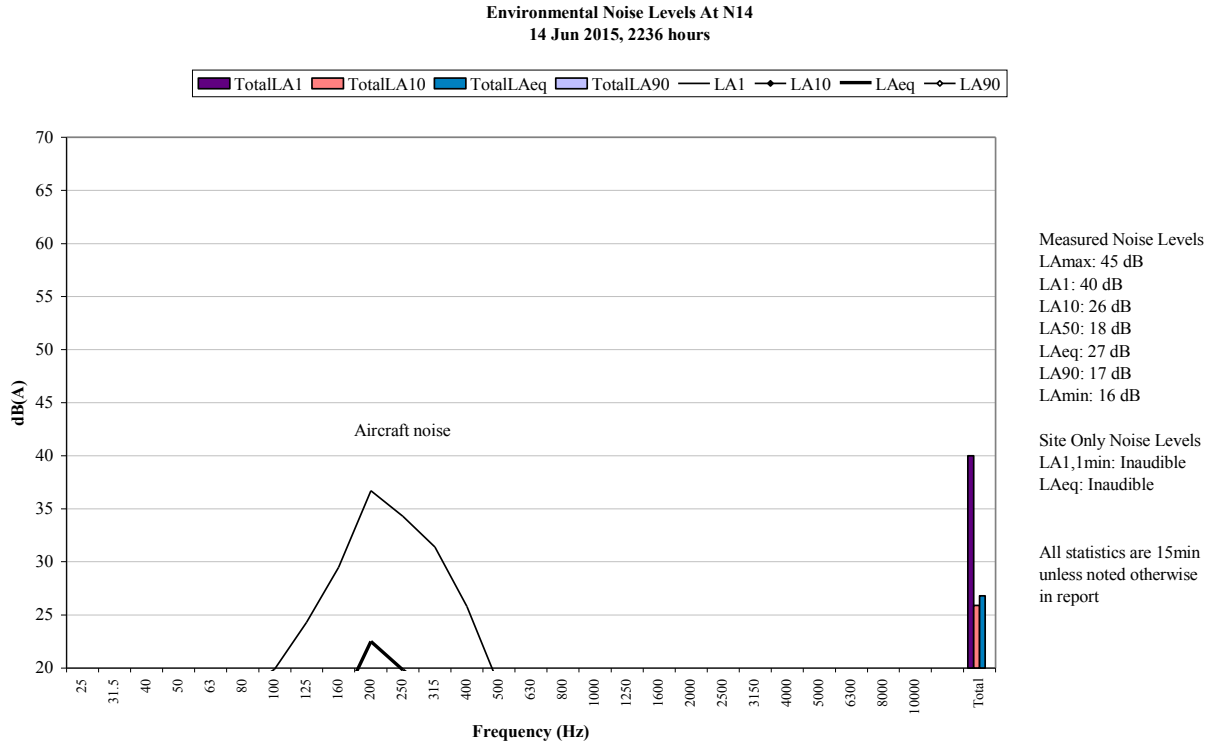

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

An aircraft generated the measured L_{A1}, L_{A10}, and L_{Aeq}. Frogs and insects were responsible for the measured L_{A90}.

Birds and cows were also noted.

5.1.4 N15, 15 June 2015

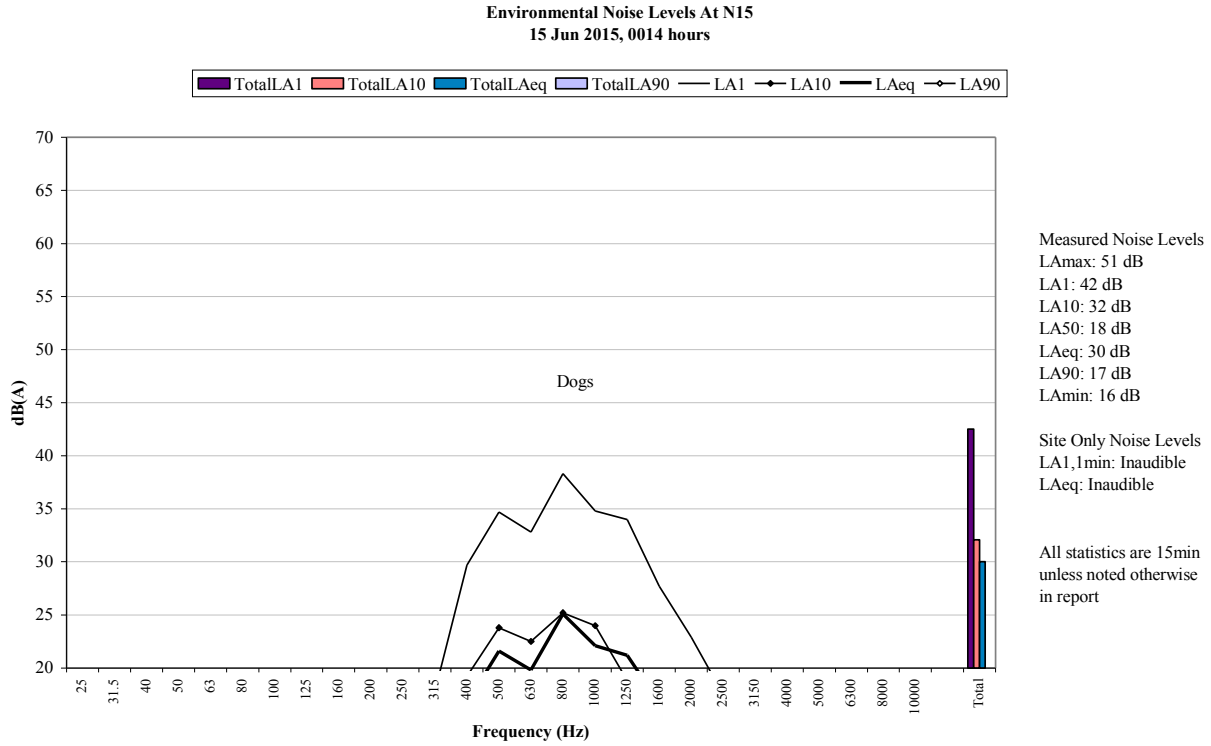

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Dogs were responsible for the measured L_{A1}, L_{A10}, and L_{Aeq}. Frogs and insects generated the measured L_{A90}.

A pump continuum from a nearby residence was also noted at very low levels.

5.1.5 N16, 15 June 2015

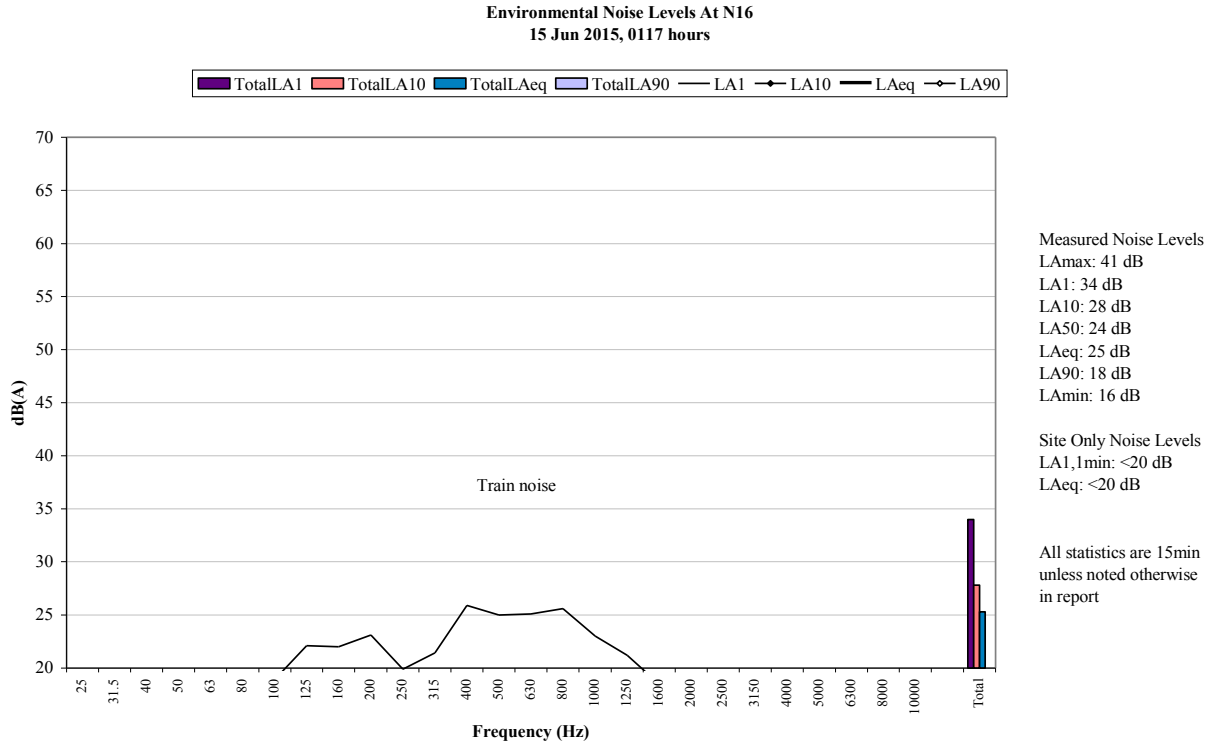

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

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

A train generated the measured L_{A1}, L_{A10} and L_{Aeq}. The continuum from WCP and frogs were responsible for the measured L_{A90}.

Dogs and cows were also noted.

5.1.6 N17, 15 June 2015

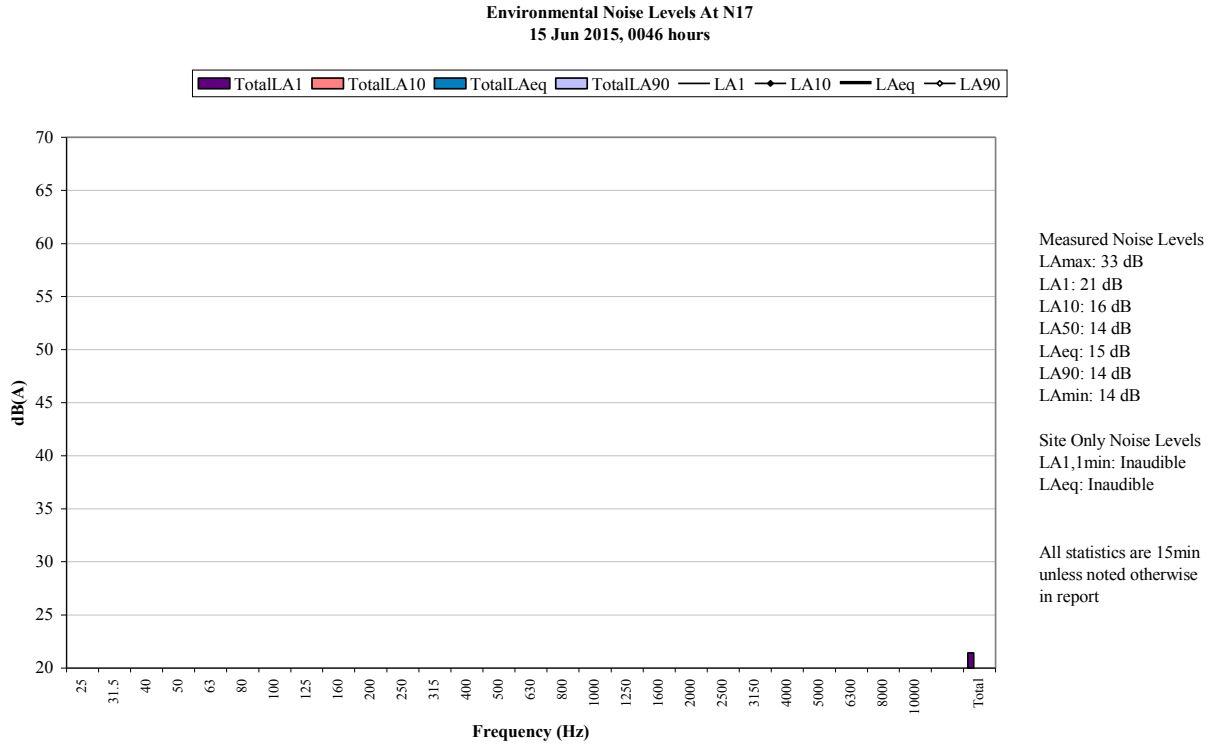

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible.

The noise floor of the measurement instrument was primarily responsible for measured levels.

Birds and cows were also noted.

5.1.7 N18, 14 June 2015

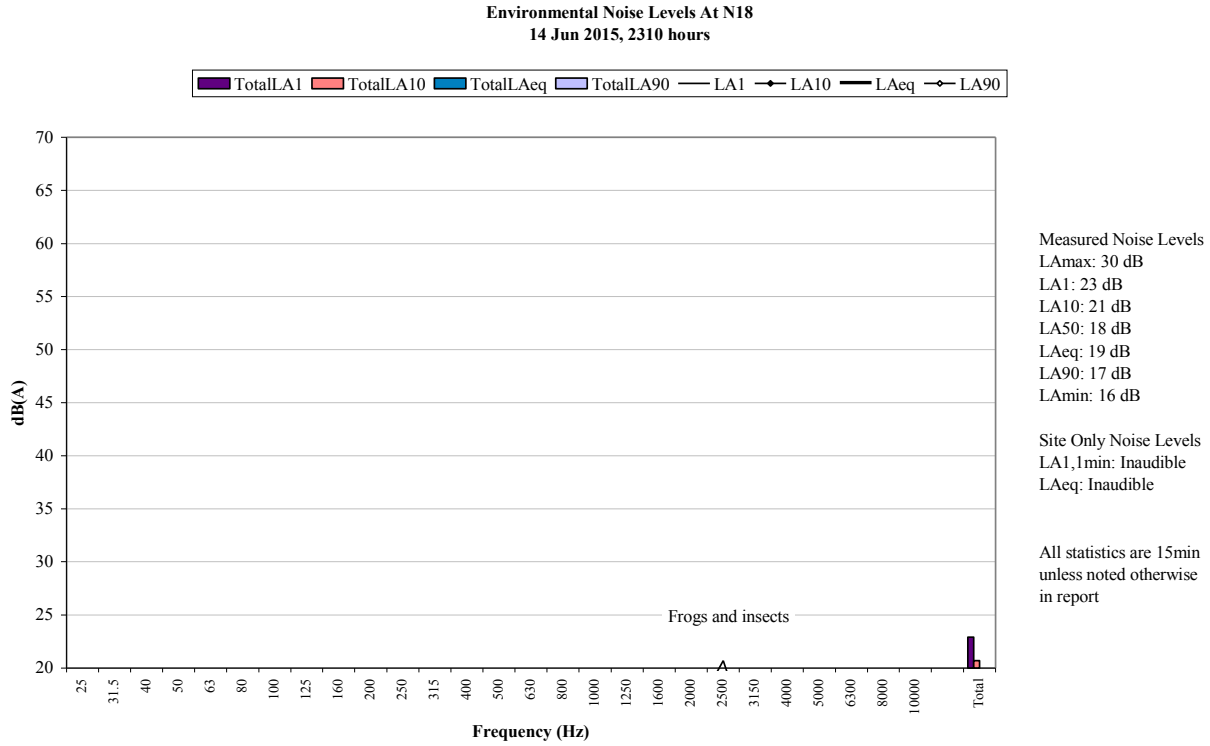

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Frogs and insects were generally responsible for measured noise levels. The noise floor of the measurement instrument contributed to the measured L_{A10}, L_{Aeq} and L_{A90}.

Livestock were also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during night period of 14/15 June 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

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 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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church	40 (internal) When in use			-
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 ºC and 3ºC/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3ºC/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 October 2014.

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:

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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Calibration Certificate

Number : C13646

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

Preamplifier Serial Number : 70607

Ambient Temperature : 21°C

Relative Humidity : 48%

Barometric Pressure : 101.1 kPa

Calibration Technician : Adrian Walker

Calibration Date : 13-November-2013

Secondary Check by : Luke Hudson

Report Issue Date : 13-November-2013

Approved Signatory :

Tested To : IEC61672-3:2006

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
9: Indication at the calibration check frequency	Pass	14: Level linearity on the reference level range	Pass
10: Self-generated noise	Pass	15: Level linearity incl. the level range control	Pass
11: Acoustical tests of a frequency weighting	Pass	16: Toneburst response	Pass
12: Electrical tests of frequency weightings	Pass	17: Peak C sound level	Pass
13: Frequency and time weightings at 1 kHz	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.

NATA
WORLD RECOGNISED ACCREDITATION

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.
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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C14693

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

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

Atmospheric Conditions
Ambient Temperature : 23.5°C
Relative Humidity : 48%
Barometric Pressure : 99.15kPa

Calibration Technician : Corey Stewart
Calibration Date : 19/12/2014
Secondary Check: Sandra Minto
Report Issue Date : 22/12/2014
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressre 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	*±0.15dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±4.1%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.1kPa*
Distortion	*±0.08%*		

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

NATA
WORLD RECOGNISED ACCREDITATION

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

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

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 2015

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring
July 2015

Reference: 15242_R01
Report date: 10 August 2015

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

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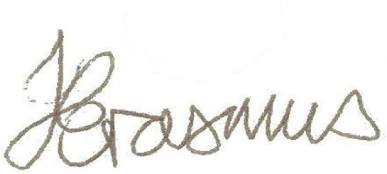

Prepared:	Jonathan Erasmus Acoustic Technician	QA Review:	Katie Weekes Environmental Scientist (Acoustic)

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 July 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 14/15 July 2015. The survey purpose was to quantify and describe the acoustic environment around the site and compare results with specified limits.

WCP complied with relevant noise limits at all monitoring locations during the July 2015 monitoring.

There were no low frequency modifying factor penalties applied to WCP measured levels as detailed in Table 4.6. No further low frequency assessment was required.

Global Acoustics Pty Ltd

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Appendices

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 2015. 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

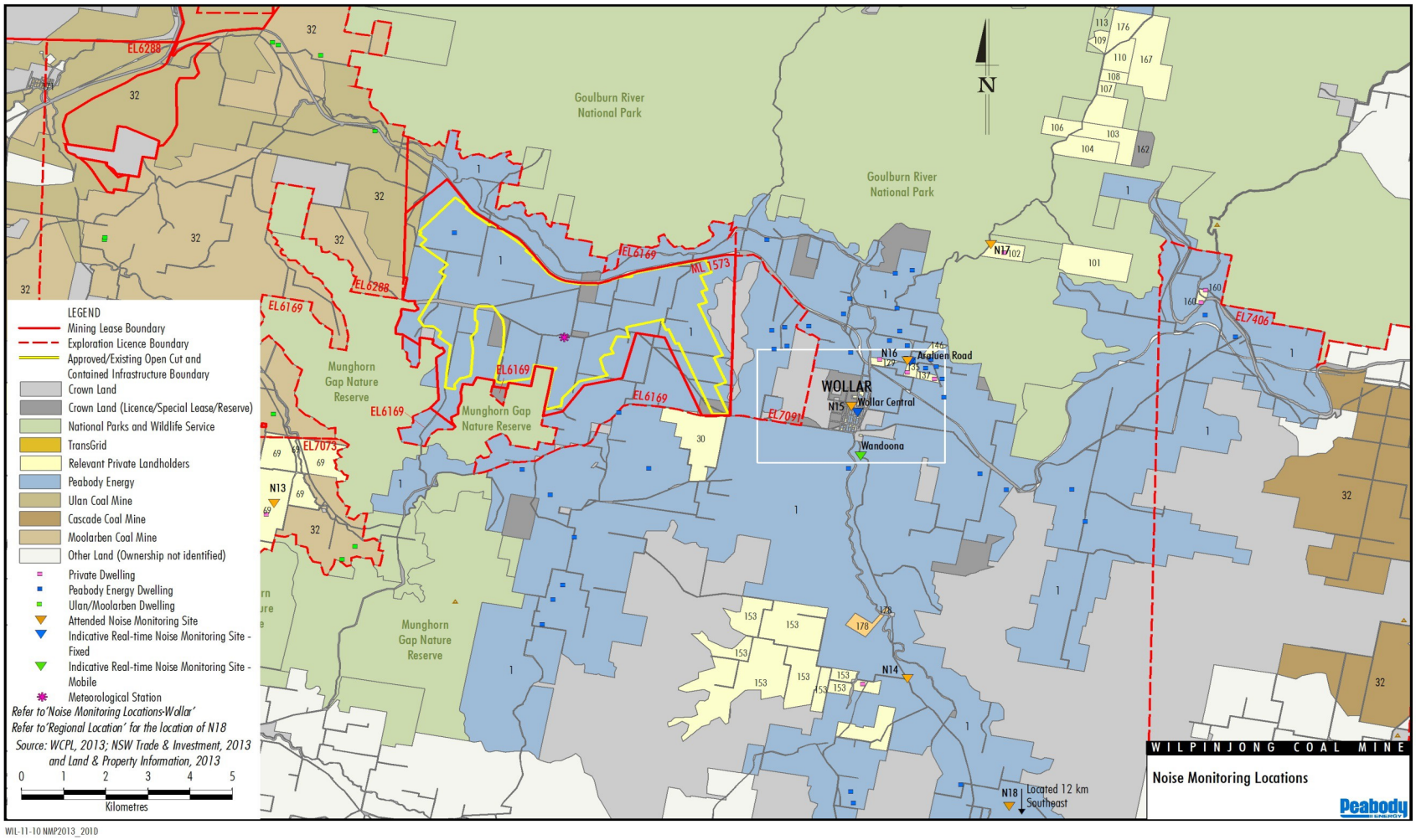

Figure 1: Attended Noise Monitoring Locations

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 are 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 C-weighted and 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 total predicted C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to predicted levels.

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	L_{Ceq} to 250 Hz	>60	>65
INP, total	Total L_{Ceq} minus 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 Jesse Tribby.

The terms "Inaudible" (IA), "Not measurable" (NM), "Less than 25 dB" (<25 dB) or "Less than 20 dB" (<20 dB) may be used in this report. When site noise is noted as IA then there was no site noise audible at the monitoring location.

However, if site noise is noted as NM, <25 dB or <20 dB, this means some noise was audible but could not be quantified. This means that noise from the site was either very low, or, being masked by other noise that was relatively loud. In the former case (very low site levels) we consider it not necessary to attempt to accurately quantify site noise as it would be significantly less than any criterion and most unlikely to cause annoyance (and in many cases, to be even noticed).

If site noise were NM, <25 dB or <20 dB due to masking then we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting if deemed necessary. All sites NM, <25 dB or <20 dB in this report are due to low 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	00370304	29/05/2017
Pulsar Model 106 acoustic calibrator	57413	19/12/2016

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 – JULY 2015[1]

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	15/07/2015 01:01	42	36	31	28	29	25	22	45
N13	15/07/2015 01:38	44	33	26	20	23	18	16	36
N14	14/07/2015 23:40	40	33	29	24	26	22	20	47
N15	14/07/2015 22:59	50	35	33	31	32	30	28	54
N16	14/07/2015 22:31	53	38	34	31	32	29	27	52
N17	14/07/2015 22:00	53	50	46	40	42	33	28	49
N18	15/07/2015 00:15	40	31	23	16	20	15	14	28

Note:

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

4.2 Project Approval and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JULY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies? [1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance [5]
N6	15/07/2015 01:01	0.0	4.7	35	No	29	NA
N13	15/07/2015 01:38	0.0	5.5	36	No	<20	NA
N14	14/07/2015 23:40	0.0	3.8	35	No	<25	NA
N15	14/07/2015 22:59	1.6	1.7	35	Yes	31	Nil
N16	14/07/2015 22:31	2.0	0.7	37	Yes	30	Nil
N17	14/07/2015 22:00	2.8	0.2	35	Yes	IA	Nil
N18	15/07/2015 00:15	0.0	4.8	35	No	IA	NA

Notes:

1. *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;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – JULY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	15/07/2015 01:01	0.0	4.7	45	No	33	NA
N13	15/07/2015 01:38	0.0	5.5	45	No	<25	NA
N14	14/07/2015 23:40	0.0	3.8	45	No	<25	NA
N15	14/07/2015 22:59	1.6	1.7	45	Yes	39	Nil
N16	14/07/2015 22:31	2.0	0.7	45	Yes	33	Nil
N17	14/07/2015 22:00	2.8	0.2	45	Yes	IA	Nil
N18	15/07/2015 00:15	0.0	4.8	45	No	IA	NA

Notes:

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

4.3 EPL and Weather Conditions

Table 4.4 and Table 4.5 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. There were no modifying factors applicable to measured noise levels during this survey.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – JULY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	15/07/2015 01:01	0.0	4.7	35	No	29	NA
N13	15/07/2015 01:38	0.0	5.5	35	No	<20	NA
N14	14/07/2015 23:40	0.0	3.8	35	No	<25	NA
N15	14/07/2015 22:59	1.6	1.7	35	Yes	31	Nil
N16	14/07/2015 22:31	2.0	0.7	35	Yes	30	Nil
N17	14/07/2015 22:00	2.8	0.2	35	No	IA	NA
N18	15/07/2015 00:15	0.0	4.8	35	No	IA	NA

Notes:

1. *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 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/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.5: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – JULY 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	15/07/2015 01:01	0.0	4.7	45	No	33	NA
N13	15/07/2015 01:38	0.0	5.5	45	No	<25	NA
N14	14/07/2015 23:40	0.0	3.8	45	No	<25	NA
N15	14/07/2015 22:59	1.6	1.7	45	Yes	39	Nil
N16	14/07/2015 22:31	2.0	0.7	45	Yes	33	Nil
N17	14/07/2015 22:00	2.8	0.2	45	No	IA	NA
N18	15/07/2015 00:15	0.0	4.8	45	No	IA	NA

Notes:

1. *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 including3 °C/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

4.4 Modifying Factor Assessment

Low frequency results for each monitoring location are presented in Table 4.6. There were no low frequency modifying factor penalties applied to WCP measured levels as detailed in Table 4.6. No further low frequency assessment was required.

Table 4.6: LOW FREQUENCY NOISE MODIFYING FACTOR ASSESSMENT - JULY 2015

Location	Start Date and Time	INP low frequency modifying factor trigger dB[2]	Total L_{Ceq} minus L_{Aeq} dB[3]	Broner low frequency modifying factor trigger dB[4]	L_{Ceq} dB[5]	WCP only L_{Aeq} dB[1]	Met Applies?	Comments
N6	15/07/2015 01:01	>=15	16[7]	>60	45	29	No	WCP continuum
N13	15/07/2015 01:38	>=15	13	>60	36	<20	No	WCP continuum frogs & insects
N14	14/07/2015 23:40	>=15	21[7]	>60	47	<25	No	WCP continuum & aircraft
N15	14/07/2015 22:59	>=15	23[7]	>60	54	31	Yes	WCP continuum, breeze & road traffic
N16	14/07/2015 22:31	>=15	21[7]	>60	52	30	Yes	WCP continuum, breeze & road traffic
N17	14/07/2015 22:00	>=15	7	>60	49	IA	No	Breeze
N18	15/07/2015 00:15	>=15	8	>60	28	IA	No	Frogs & insects

Notes:

1. *WCP only $L_{Aeq,15minute}$ provided as a guide;*
2. *Low frequency modifying factor trigger threshold as detailed in the INP;*
3. *This is the total measured C-weighted noise level less the total measured A-weighted noise level and are not always the result of activity at WCP. Guidance on this is provided in the Comments column;*
4. *Night L_{Ceq} modifying factor trigger threshold as detailed in Broner (2010);*
5. *These are measured C-weighted noise levels (at frequencies less than 250 Hz) and are not always the result of activity at WCP. Guidance on this is provided in the Comments column;*
6. *Bolded results in red are those greater than the relevant trigger; and*
7. *Not considered a low frequency modifying factor trigger due to noise sources other than WCP occurring during the measurement. No further assessment required.*

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 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	15/07/2015 01:01	3	0.0	-	0
N13	15/07/2015 01:38	6	0.0	-	0
N14	14/07/2015 23:40	6	0.0	-	0
N15	14/07/2015 22:59	8	1.0	270	4
N16	14/07/2015 22:31	9	0.0	-	7
N17	14/07/2015 22:00	4	0.5	230	8
N18	15/07/2015 00:15	2	0.5	160	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 DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
14/07/2015 22:00	3.8	272	0.3
14/07/2015 22:15	2.8	273	0.2
14/07/2015 22:30	1.7	259	0.3
14/07/2015 22:45	2.0	278	0.7
14/07/2015 23:00	1.9	288	1.2
14/07/2015 23:15	1.6	299	1.7
14/07/2015 23:30	1.5	306	2.2
14/07/2015 23:45	0.8	280	3.1
15/07/2015 00:00	0.0	-	3.8
15/07/2015 00:15	0.0	-	4.3
15/07/2015 00:30	0.0	-	4.8
15/07/2015 00:45	0.0	-	4.1
15/07/2015 01:00	0.0	-	4.7
15/07/2015 01:15	0.0	-	4.7
15/07/2015 01:30	0.0	-	4.8
15/07/2015 01:45	0.0	-	5.5
15/07/2015 02:00	0.0	-	5.7

Notes:

1. *Data supplied by WCP; and*
2. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.5 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

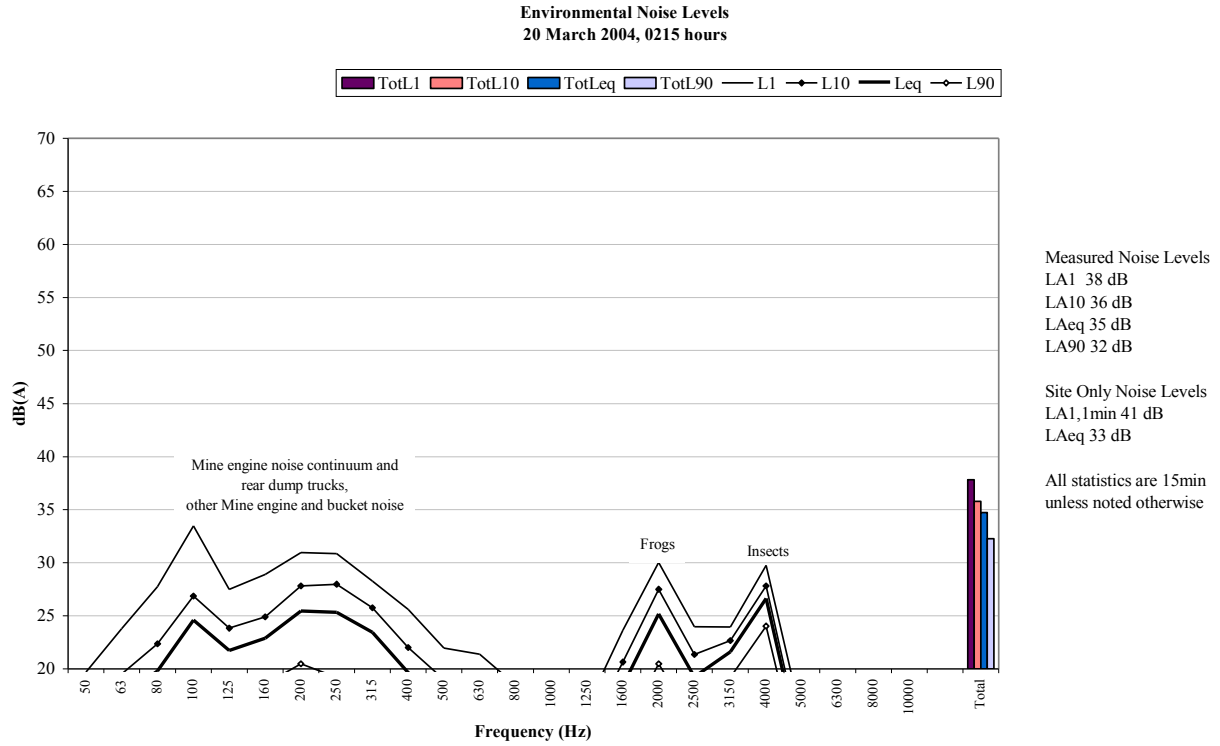

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 15 July 2015

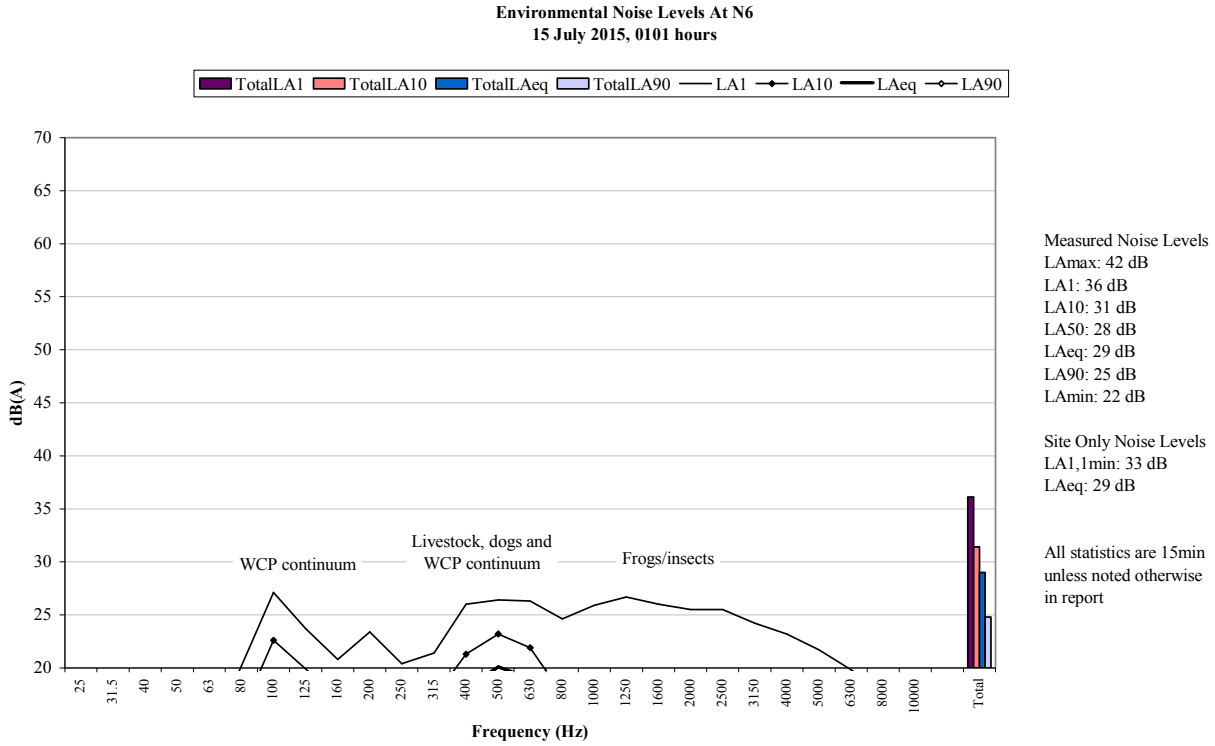

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

A continuum from WCP was audible throughout the measurement generating the site only L_{Aeq} of 29 dB. Surge in continuum generated the site only $L_{A1,1minute}$ of 33 dB.

WCP, dogs and livestock primarily generated the measured L_{A1}. The continuum from WCP generated the measured L_{A10}, L_{Aeq} and L_{A90}.

5.1.2 N13, 15 July 2015

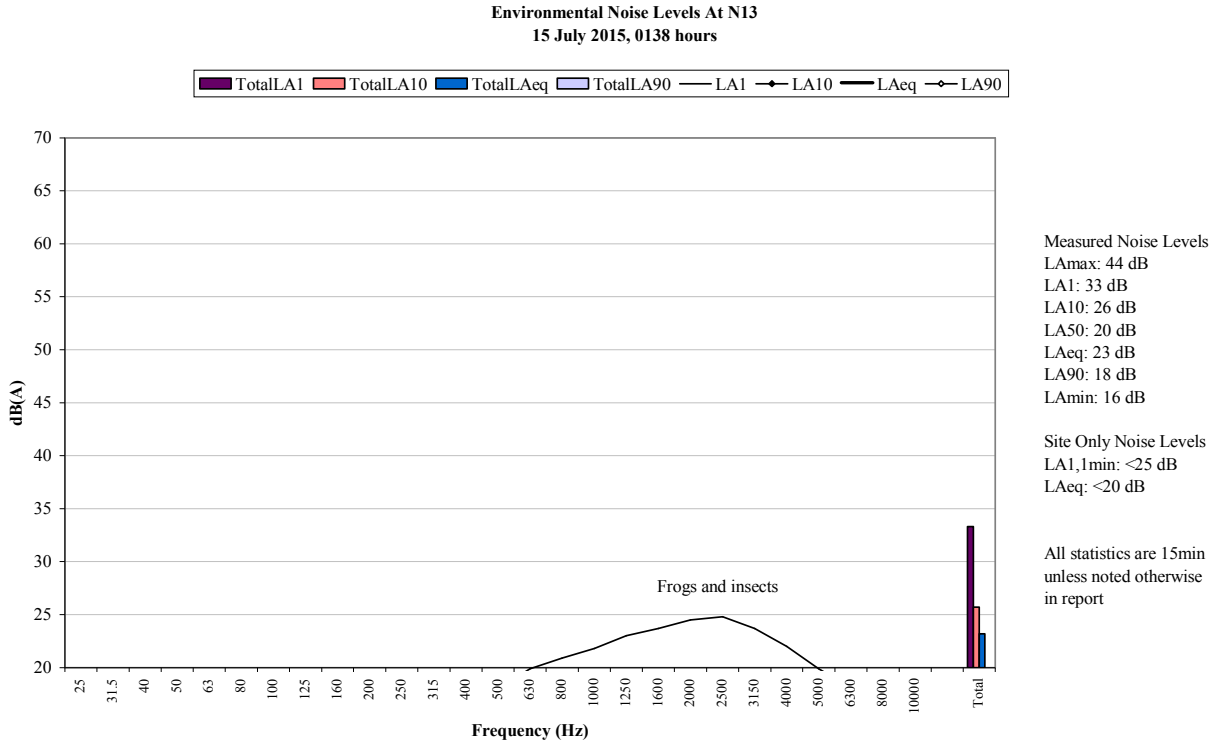

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

A low-level continuum from WCP was audible at times during the measurement generating a site only $L_{A1,1minute}$ of less than 25 dB. The site only L_{Aeq} was less than 20 dB.

Frogs and insects were primarily responsible for measured levels. WCP was a minor contributor to the measured L_{A10}, L_{Aeq} and L_{A90}.

5.1.3 N14, 14 July 2015

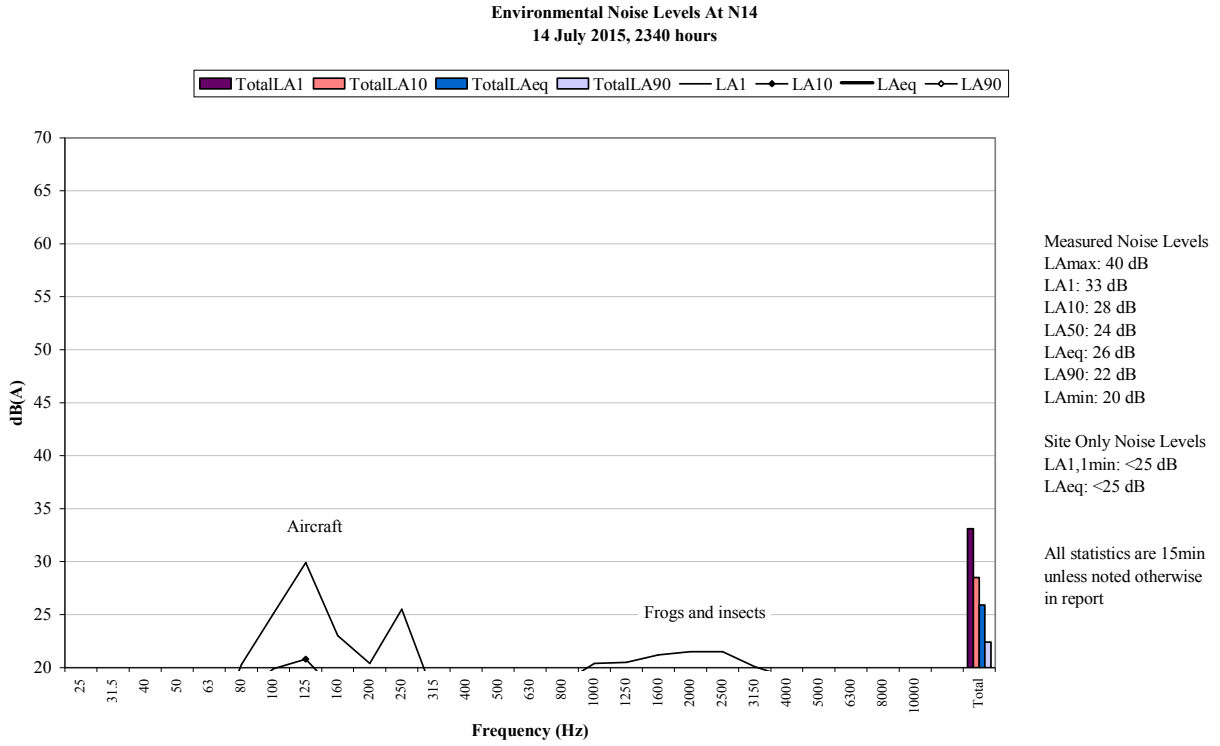

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

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

An aircraft generated the measured L_{A1} and L_{A10}. The continuum from WCP primarily generated the measured L_{Aeq} and L_{A90}.

Birds, frogs and insects were also noted.

5.1.4 N15, 14 July 2015

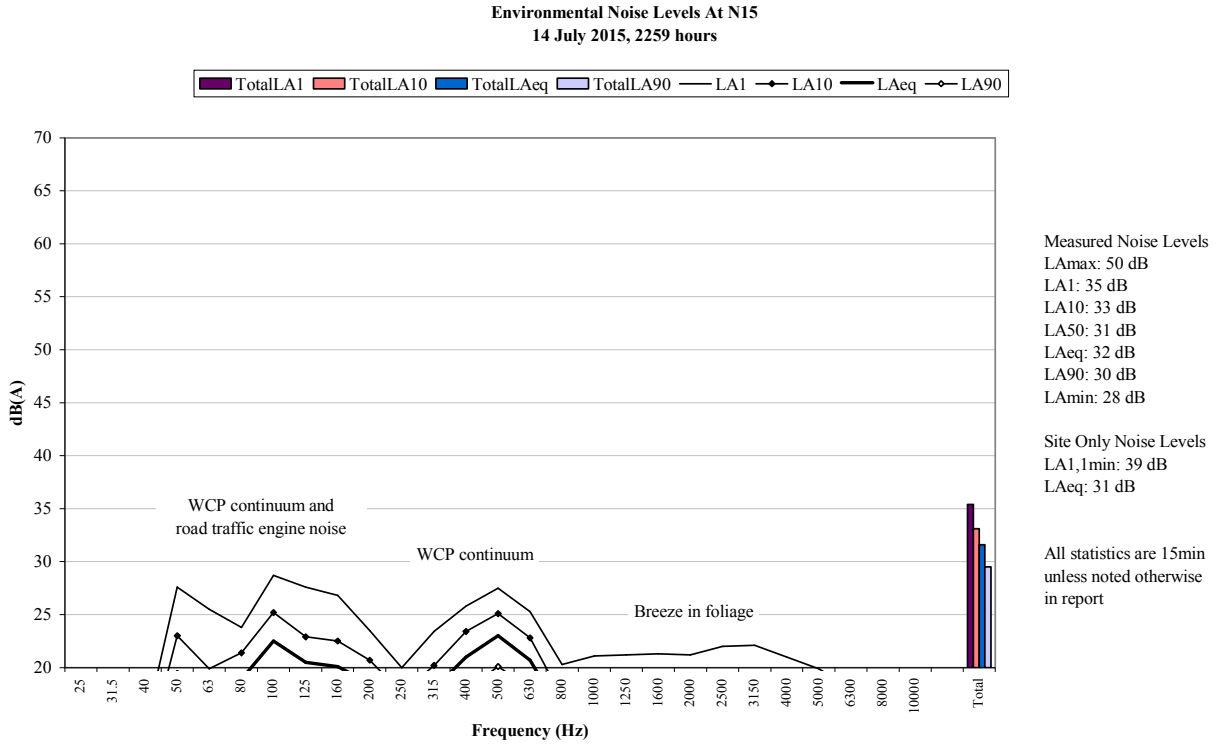

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A continuum from WCP was audible throughout the measurement generating the site only L_{Aeq} of 31 dB. A surge in continuum generated the site only $L_{A1,1minute}$ of 39 dB.

The continuum from WCP was primarily responsible for the measured L_{A1}, L_{A10} and L_{Aeq}. Breeze in foliage and road traffic engine noise were a minor contributor to the measured L_{Aeq}. WCP generated the measured L_{A90}.

Road traffic tyre noise and frogs were also noted.

5.1.5 N16, 14 July 2015

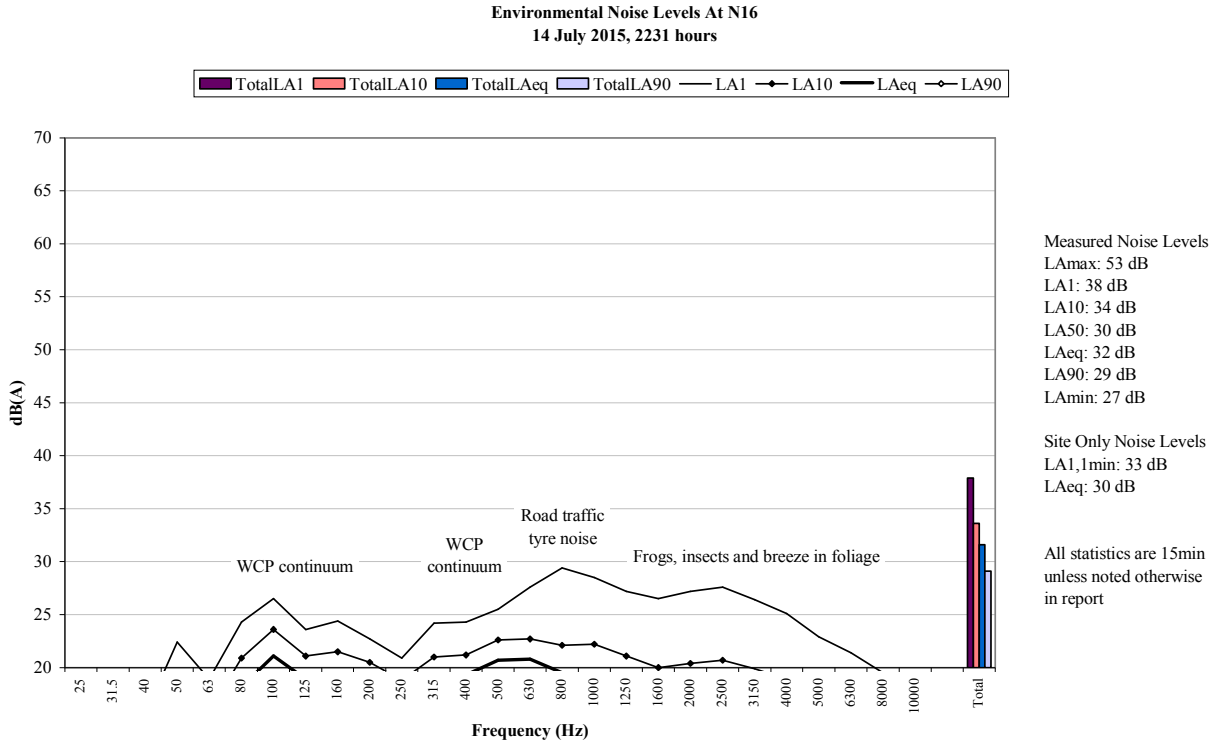

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

A continuum from WCP was audible throughout the measurement generating the site only L_{Aeq} of 30 dB and $L_{A1,1minute}$ of 33 dB.

Road traffic tyre noise and breeze in foliage primarily generated the measured L_{A1}. The continuum from WCP was primarily responsible for the measured L_{A10} and L_{Aeq}. Road traffic contributed to the measured L_{Aeq}. WCP generated the measured L_{A90}.

Frogs and insects were also noted.

5.1.6 N17, 15 July 2015

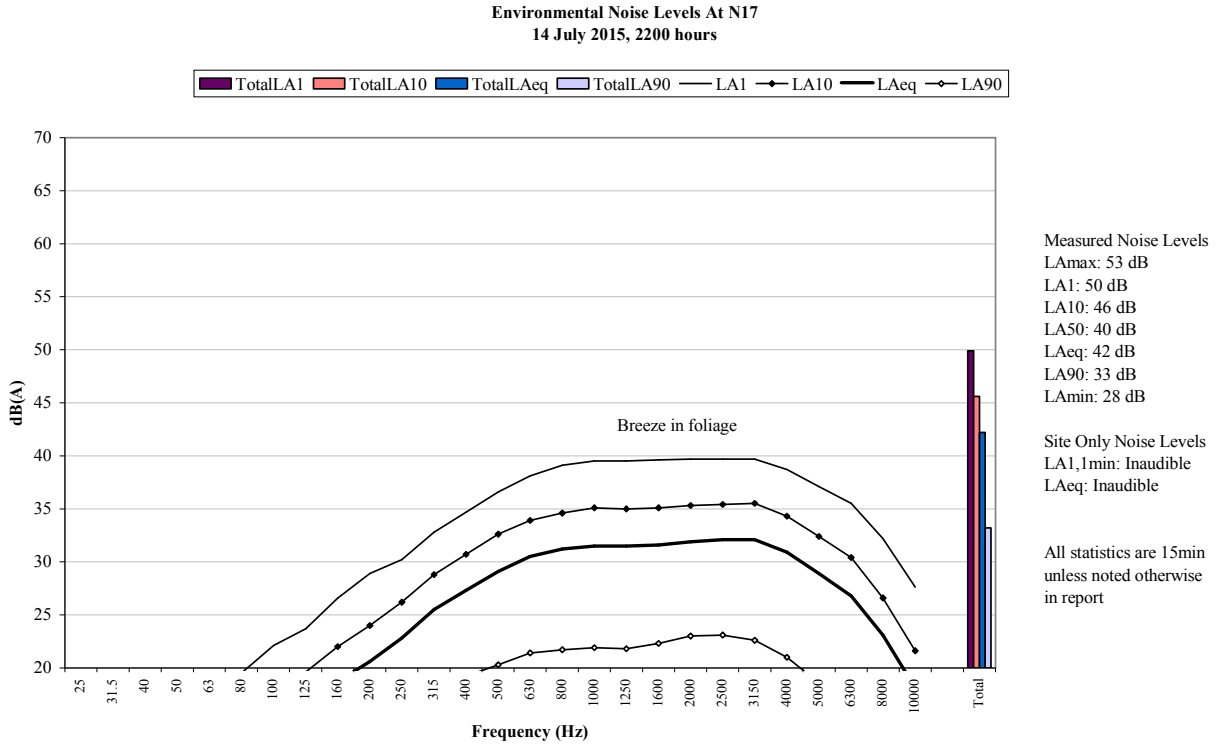

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible.

Breeze in foliage primarily generated measured levels.

5.1.7 N18, 15 July 2015

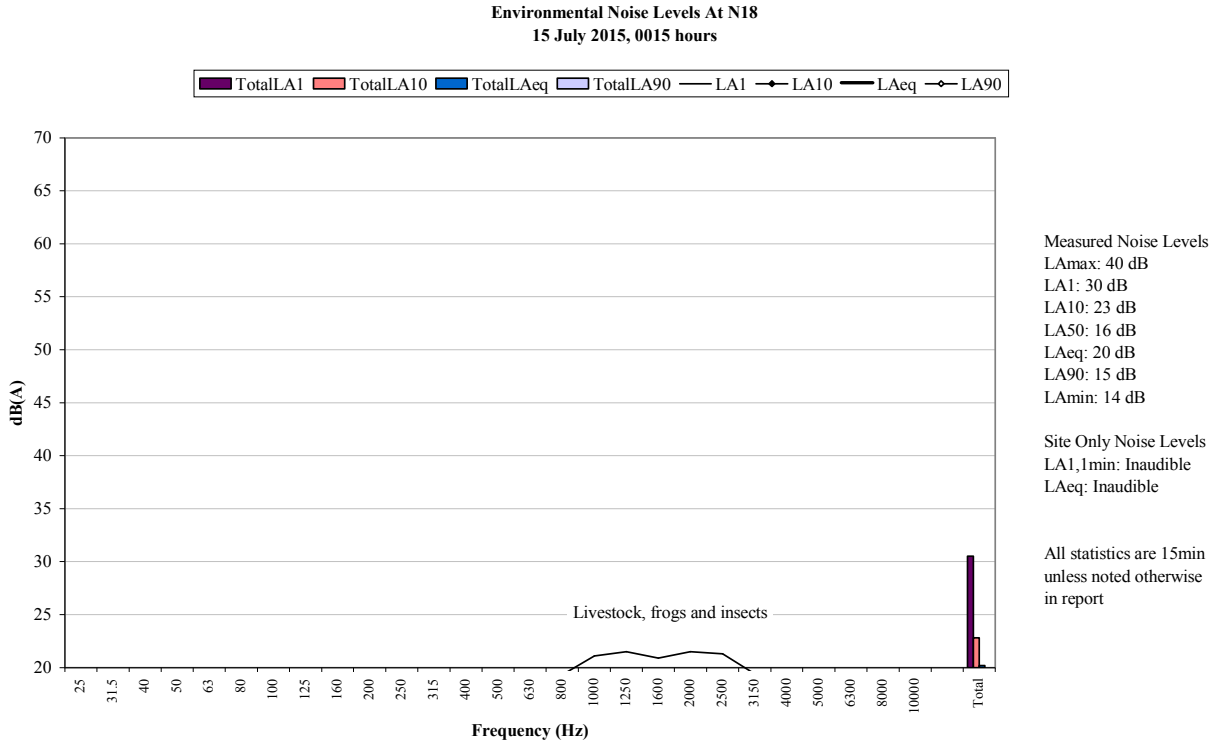

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Livestock primarily generated the measured L_{A1} and L_{Aeq}. Frogs and insects generated the measured L_{A10}. The noise floor of the sound level meter generated the measured L_{A90}.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during night period of 14/15 July 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

There were no low frequency modifying factor penalties applied to WCP measured levels as detailed in Table 4.6. No further low frequency assessment was required.

Global Acoustics Pty Ltd

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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church	40 (internal) When in use			-
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 ºC and 3ºC/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3ºC/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 October 2014.

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:

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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
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		Post-Test Atmospheric Conditions	
Ambient Temperature :	21.2°C	**Ambient Temperature :**	21.6°C
Relative Humidity :	52.5%	**Relative Humidity :**	51.1%
Barometric Pressure :	99.94kPa	**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.

NATA WORLD RECOGNISED ACCREDITATION

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

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

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 C14693

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

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

Atmospheric Conditions
Ambient Temperature : 23.5°C
Relative Humidity : 48%
Barometric Pressure : 99.15kPa

Calibration Technician : Corey Stewart
Calibration Date : 19/12/2014
Secondary Check: Sandra Minto
Report Issue Date : 22/12/2014
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressre 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	*±0.15dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±4.1%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.1kPa*
Distortion	*±0.08%*		

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

NATA WORLD RECOGNISED ACCREDITATION

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

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PAGE 1 OF 1

Wilpinjong Coal

Environmental Noise Monitoring

August 2015

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring
August 2015

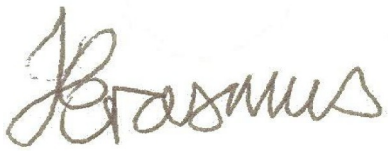
Reference: 15299_R01
Report date: 23 September 2015

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Jonathan Erasmus Acoustic Technician	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. Monitoring for August 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 6/7 August 2015. 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 2015 monitoring.

Low Frequency Assessment

During August 2015, WCP complied with the relevant limits using the INP and Broner methods of assessing low frequency noise at all monitoring locations with the exception of N17.

At N17 the INP low frequency trigger level was exceeded. A 5 dB modifying factor correction was applied to the measured WCP L_{Aeq}. The resulting WCP L_{Aeq} noise level remained in compliance with project approval and EPL impact assessment criteria at this location.

Global Acoustics Pty Ltd

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Appendices

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 August 2015. 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

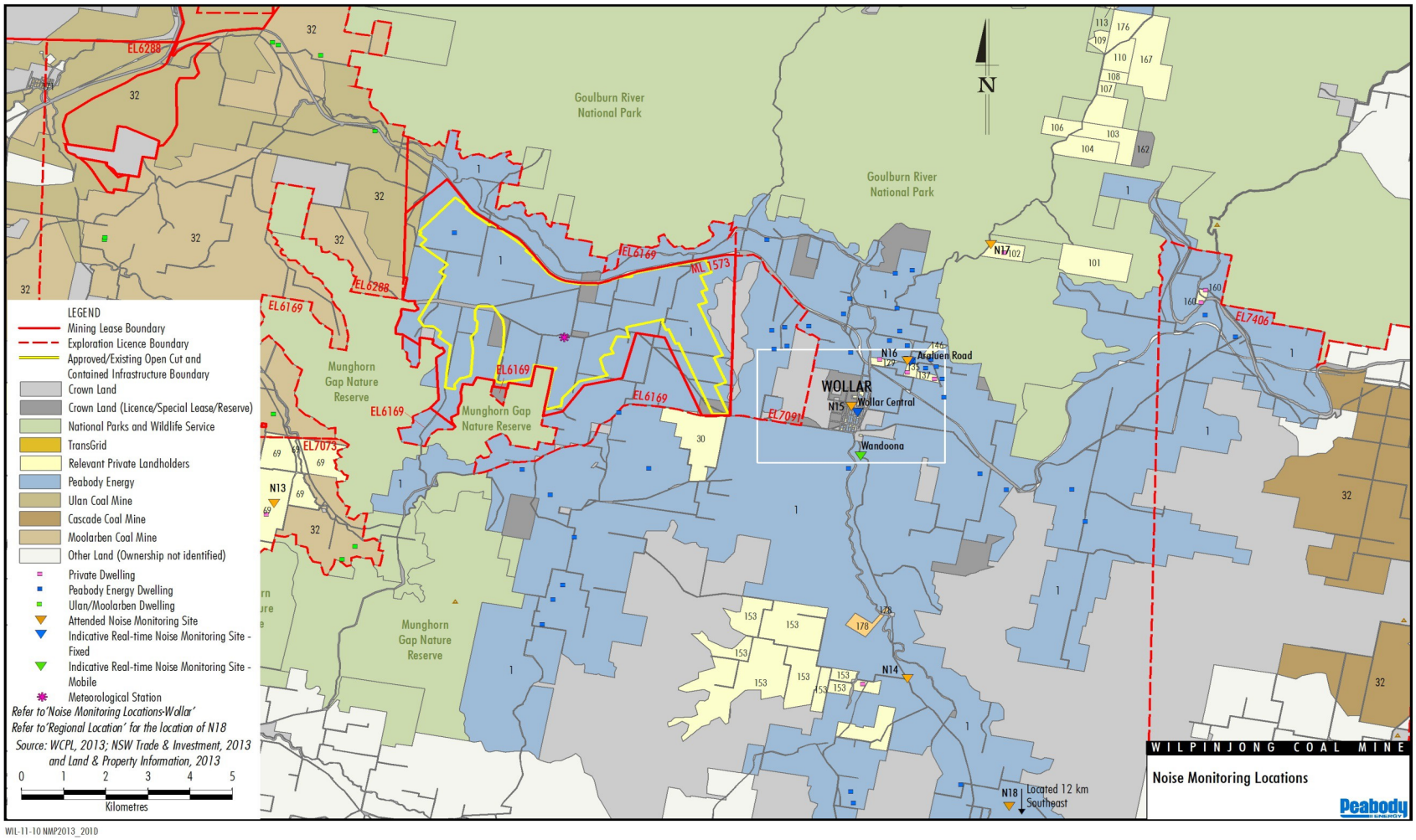

Figure 1: Attended Noise Monitoring Locations

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/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 predicted C – weighted noise level at a receptor exceeds the relevant trigger, a 5 dB penalty (modifying factor) is added to predicted levels.

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} to 250 Hz	>60	>65
INP, total	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 Tony Welbourne.

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	00370304	29/05/2017
Pulsar Model 106 acoustic calibrator	57413	19/12/2016

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 – AUGUST 2015[1]

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	06/08/2015 23:50	45	28	22	21	23	21	20	37
N13	07/08/2015 01:52	57	52	49	44	46	41	38	73
N14	07/08/2015 01:07	37	29	25	21	23	19	18	45
N15	06/08/2015 23:25	36	26	23	21	22	19	18	40
N16	06/08/2015 22:55	34	27	23	21	21	19	18	48
N17	06/08/2015 22:20	31	27	25	23	24	22	20	48
N18	07/08/2015 00:34	50	43	38	32	35	30	28	57

Note:

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

4.2 Project Approval and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. Modifying factors are considered in Section 4.4.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – AUGUST 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies? [1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance [5]
N6	06/08/2015 23:50	0.0	4.3	35	No	IA	NA
N13	07/08/2015 01:52	0.0	6.9	36	No	IA	NA
N14	07/08/2015 01:07	0.0	5.3	35	No	IA	NA
N15	06/08/2015 23:25	1.4	4.0	35	No	<20	NA
N16	06/08/2015 22:55	1.0	5.2	37	No	<20	NA
N17	06/08/2015 22:20	1.2	2.6	35	Yes	23	Nil
N18	07/08/2015 00:34	0.0	4.1	35	No	IA	NA

Notes:

1. *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;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – AUGUST 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	06/08/2015 23:50	0.0	4.3	45	No	IA	NA
N13	07/08/2015 01:52	0.0	6.9	45	No	IA	NA
N14	07/08/2015 01:07	0.0	5.3	45	No	IA	NA
N15	06/08/2015 23:25	1.4	4.0	45	No	25	NA
N16	06/08/2015 22:55	1.0	5.2	45	No	27	NA
N17	06/08/2015 22:20	1.2	2.6	45	Yes	28	Nil
N18	07/08/2015 00:34	0.0	4.1	45	No	IA	NA

Notes:

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

4.3 EPL and Weather Conditions

Table 4.4 and Table 4.5 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. Modifying factors are considered in Section 4.4.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – AUGUST 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	06/08/2015 23:50	0.0	4.3	35	No	IA	NA
N13	07/08/2015 01:52	0.0	6.9	35	No	IA	NA
N14	07/08/2015 01:07	0.0	5.3	35	No	IA	NA
N15	06/08/2015 23:25	1.4	4.0	35	No	<20	NA
N16	06/08/2015 22:55	1.0	5.2	35	No	<20	NA
N17	06/08/2015 22:20	1.2	2.6	35	Yes	23	Nil
N18	07/08/2015 00:34	0.0	4.1	35	No	IA	NA

Notes:

1. *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 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/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.5: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – AUGUST 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	06/08/2015 23:50	0.0	4.3	45	No	IA	NA
N13	07/08/2015 01:52	0.0	6.9	45	No	IA	NA
N14	07/08/2015 01:07	0.0	5.3	45	No	IA	NA
N15	06/08/2015 23:25	1.4	4.0	45	No	25	NA
N16	06/08/2015 22:55	1.0	5.2	45	No	27	NA
N17	06/08/2015 22:20	1.2	2.6	45	Yes	28	Nil
N18	07/08/2015 00:34	0.0	4.1	45	No	IA	NA

Notes:

1. *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 including3 °C/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

4.4 Modifying Factor Assessment

Low frequency results for each monitoring location are presented in Table 4.6.

Table 4.6: LOW FREQUENCY NOISE MODIFYING FACTOR ASSESSMENT – AUGUST 2015

Location	Start Date and Time	INP low frequency modifying factor trigger dB[2]	INP, Site only L_{Ceq} minus site only L_{Aeq} dB[3,6]	Broner low frequency modifying factor trigger dB[4]	Broner, Site only L_{Ceq} dB[5,6]	WCP only L_{Aeq} dB[1]	Met Applies?[7] Project Approval/EPL	Comments
N6	06/08/2015 23:50	>=15	IA	>60	IA	IA	No/No	WCP inaudible
N13	07/08/2015 01:52	>=15	IA	>60	IA	IA	No/No	WCP inaudible
N14	07/08/2015 01:07	>=15	IA	>60	IA	IA	No/No	WCP inaudible
N15	06/08/2015 23:25	>=15	NA	>60	<50	<20	No/No	WCP barely perceptible
N16	06/08/2015 22:55	>=15	NA	>60	<50	<20	No/No	WCP barely perceptible
N17	06/08/2015 22:20	>=15	**24**	>60	47	23	Yes/Yes	WCP continuum
N18	07/08/2015 00:34	>=15	IA	>60	IA	IA	No/No	WCP inaudible

Notes:

1. *WCP only $L_{Aeq,15minute}$ provided as a guide;*
2. *Low frequency modifying factor trigger threshold as detailed in the INP;*
3. *These are measured or calculated site only INP results (site only L_{Ceq} minus site only L_{Aeq}), NM denotes site levels were audible but not measurable, IA denotes site noise was inaudible. Where it is not possible to determine the site only INP result due to the presence of other low frequency noise sources occurring during the measurement, this is noted as NA (not available) and no further assessment is required. Guidance is provided in the Comments column;*
4. *Night L_{Ceq} modifying factor trigger threshold as detailed in Broner (2010);*
5. *These are measured or calculated site only C-weighted noise levels, NM denotes site levels were audible but not measurable, IA denotes site noise was inaudible. Where it is not possible to determine the site only L_{Ceq} due to the presence of other low frequency noise sources occurring during the measurement, this is noted as NA (not available) and no further assessment is required. Guidance is provided in the Comments column;*
6. *Bolded results in red are those greater than the relevant trigger (if applicable; and*
7. *Indicates whether meteorological conditions are within range for which noise emission limits apply.*

Where results in Table 4.6 are greater than the INP or Broner low frequency modifying factor triggers due to activities at WCP, a 5 dB modifying factor correction is applied to the measured noise level. Meteorological conditions at the time of the measurement are also considered in accordance with the relevant project approval and EPL.

Table 4.7: MEASURED NOISE LEVELS FOR WCP AGAINST LOW FREQUENCY NOISE CRITERIA – AUGUST 2015

Location	Start Date and Time	WCP L_{Aeq} dB	Modifying factor correction dB	Project Approval L_{Aeq} impact assessment criteria dB	EPL L_{Aeq} impact assessment criteria dB	Revised site only L_{Aeq} with modifying factor correction applied	Criterion applies? [1, 2] Project Approval/EPL	Exceedance of Project Approval impact assessment criterion dB [3]	Exceedance of EPL impact assessment criterion dB [3]
N17	06/08/2015 22:20	23	5 (INP)	35	35	28	Yes/Yes	NA	NA

Notes:

1. *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;*
2. *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 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/100 metres;*
3. *NA in exceedance column means atmospheric conditions outside those specified in approval and so criterion is not applicable.*

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 4.8. 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 4.8: MEASURED ATMOSPHERIC CONDITIONS – AUGUST 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	06/08/2015 23:50	2	82	0.6	80
N13	07/08/2015 01:52	5	74	4.3	170
N14	07/08/2015 01:07	6	72	0.7	125
N15	06/08/2015 23:25	2	80	0	-
N16	06/08/2015 22:55	5	75	0	-
N17	06/08/2015 22:20	3	73	0	-
N18	07/08/2015 00:34	5	75	1.7	140

Notes:

1. *Wind speed and direction measured at 1.8 metres.*

Data obtained concurrently by the WCP meteorological station is provided in Table 4.9 and is used to determine compliance with specified noise criteria.

Table 4.9: WCP METEOROLOGICAL STATION DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
06/08/2015 22:00	1.9	3.4	2.2
06/08/2015 22:15	2.5	3.6	3.3
06/08/2015 22:30	1.2	2.1	2.6
06/08/2015 22:45	1.0	2.1	3.6
06/08/2015 23:00	0.6	1.7	4.7
06/08/2015 23:15	1.0	2.1	5.2
06/08/2015 23:30	0.9	2.1	4.1
06/08/2015 23:45	1.4	2.9	4.0
07/08/2015 00:00	0.0	0.0	4.3
07/08/2015 00:15	0.9	1.8	4.3
07/08/2015 00:30	0.6	1.8	3.8
07/08/2015 00:45	0.0	0.0	4.1
07/08/2015 01:00	0.0	0.0	4.7
07/08/2015 01:15	0.0	0.0	5.3
07/08/2015 01:30	0.0	0.0	6.0
07/08/2015 01:45	0.0	0.0	6.4
07/08/2015 02:00	0.0	0.0	6.9
07/08/2015 02:15	0.7	1.7	7.2
07/08/2015 02:30	0.0	0.0	7.2

Notes:

1. *Data supplied by WCP; and*
2. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.5 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

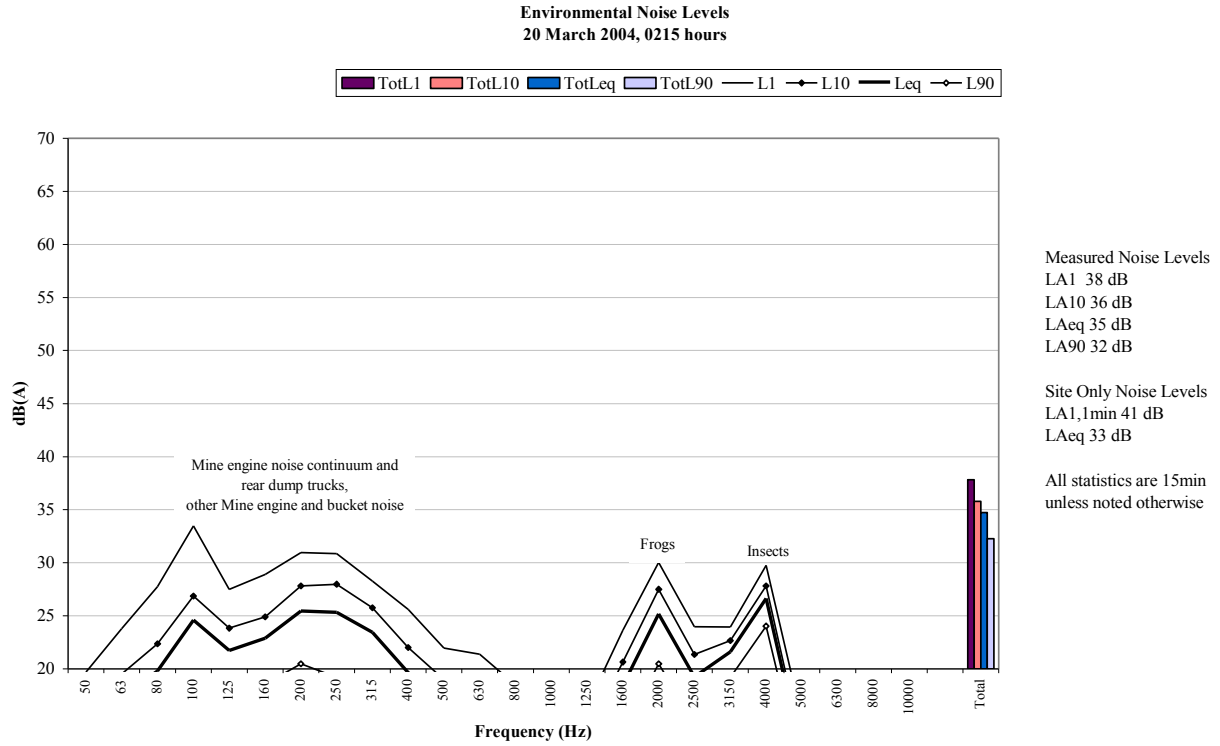

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 6 August 2015

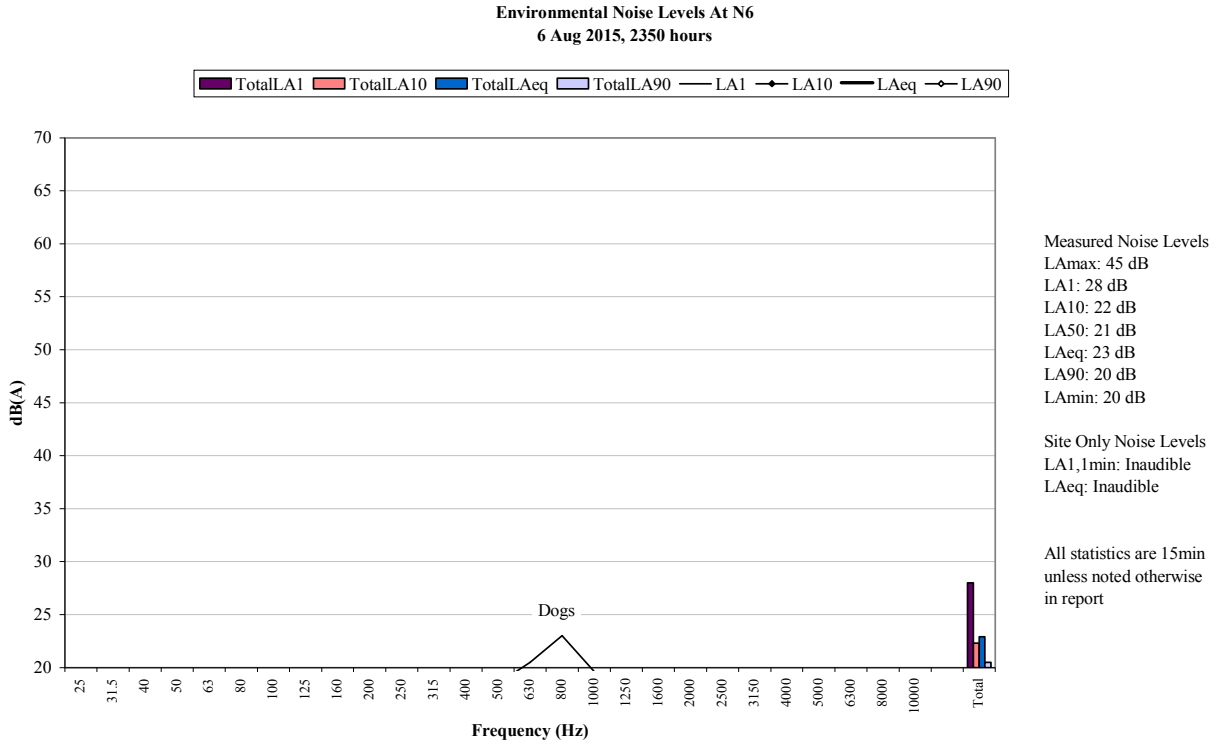

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Dogs generated the measured L_{A1}. Frogs and an air conditioner primarily generated the measured L_{A10}, L_{Aeq} and L_{A90}.

5.1.2 N13, 7 August 2015

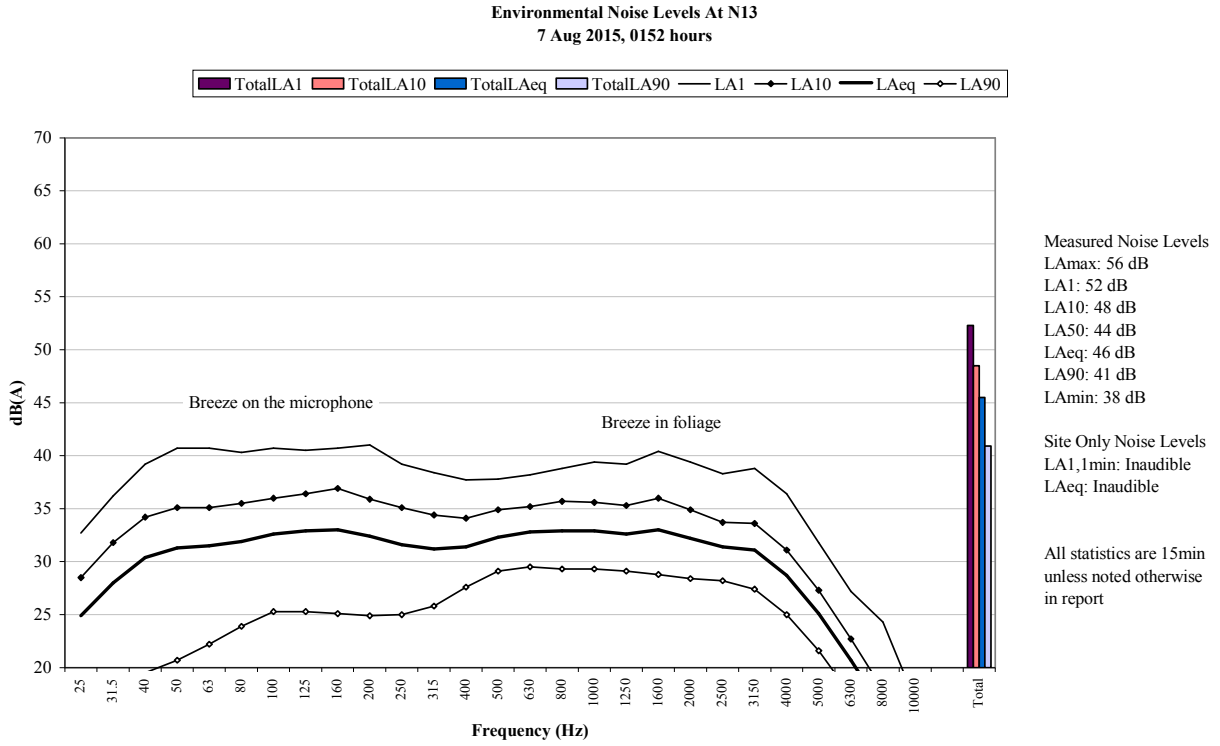

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Breeze in foliage and on the microphone generated measured levels.

5.1.3 N14, 7 August 2015

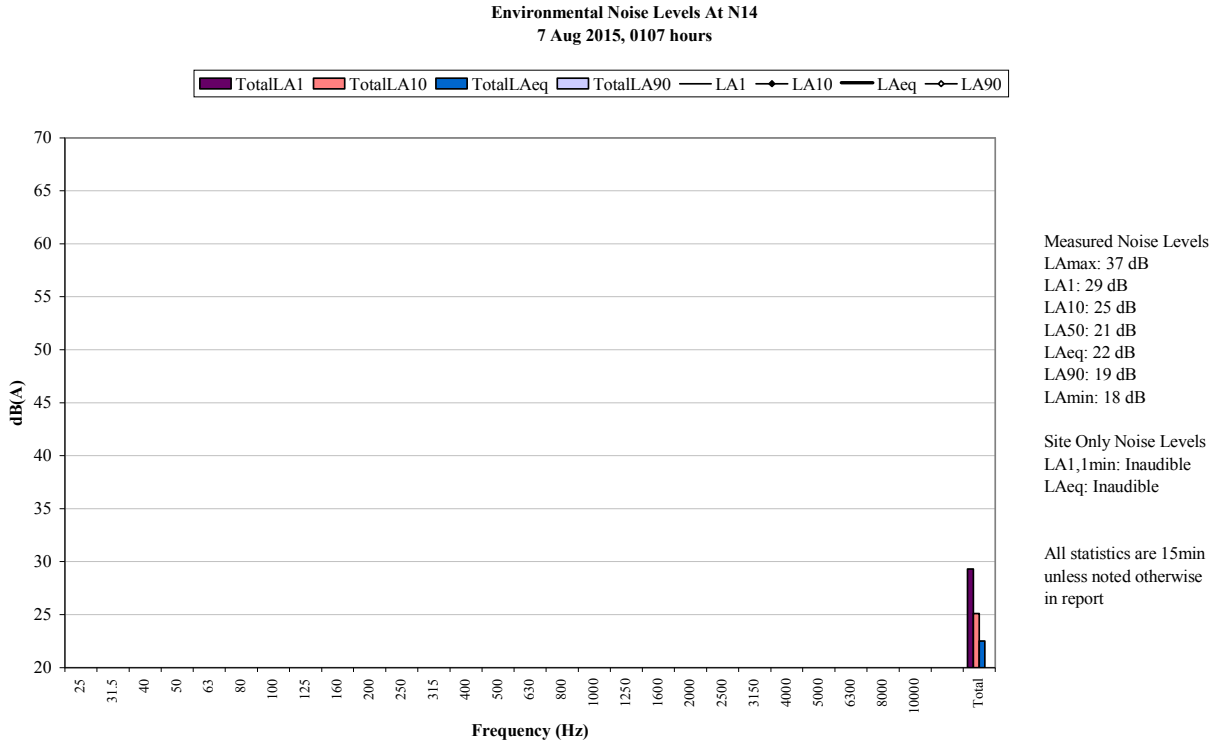

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Breeze in foliage and on the microphone generated measured levels.

Frogs were also noted.

5.1.4 N15, 6 August 2015

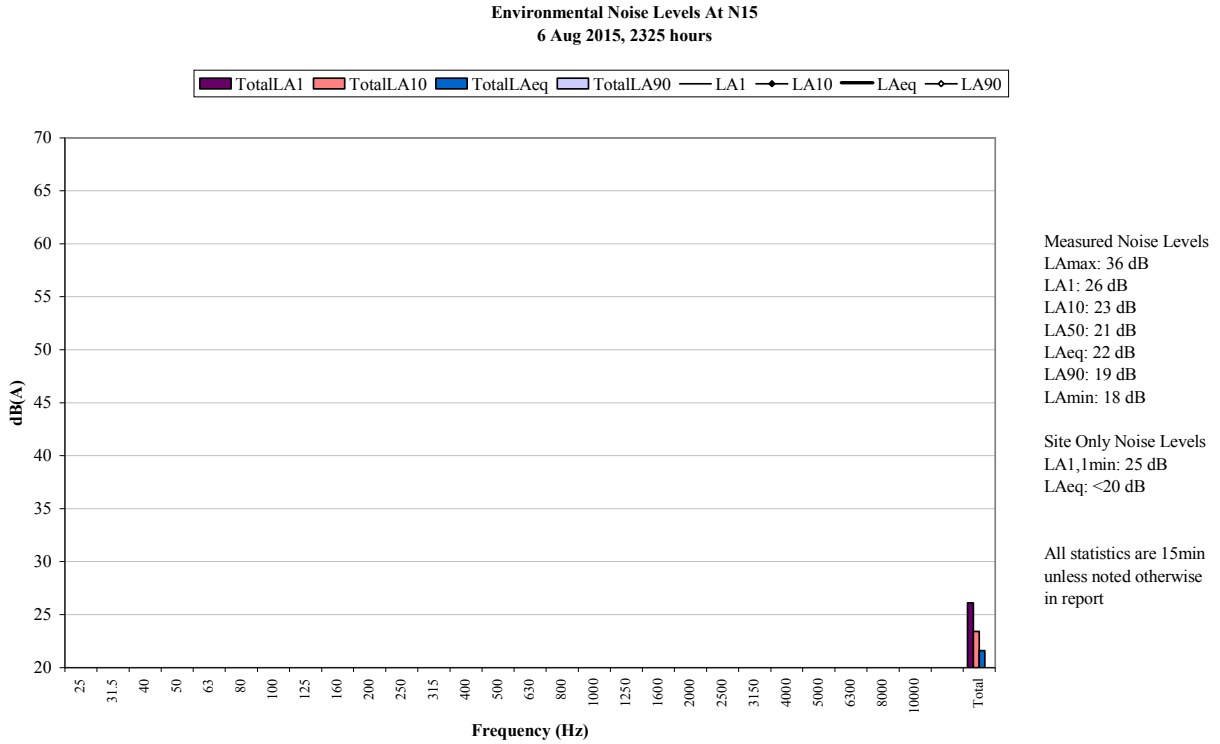

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

Engine noise from WCP was audible during the measurement generating the site only L_{Aeq} of less than 20 dB and $L_{A1,1minute}$ of 25 dB.

Breeze in foliage primarily generated measured levels.

Dogs, frogs and livestock were also noted.

5.1.5 N16, 6 August 2015

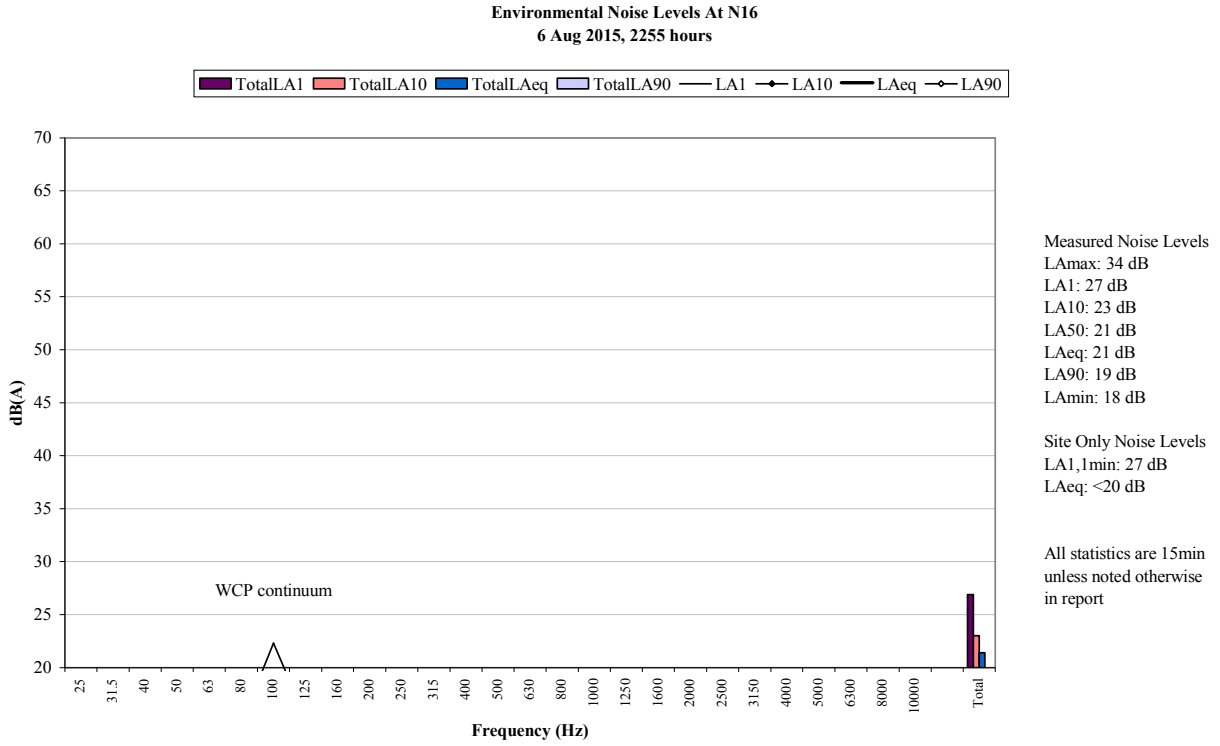

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

Engine noise from WCP was audible during the measurement generating the site only L_{Aeq} of less than 20 dB and $L_{A1,1minute}$ of 27 dB.

Livestock and WCP engine noise primarily generated the measured L_{A1}, L_{A10} and L_{Aeq}. WCP and the sound level meter noise floor primarily generated the measured L_{A90}.

Dogs and frogs were also noted.

5.1.6 N17, 6 August 2015

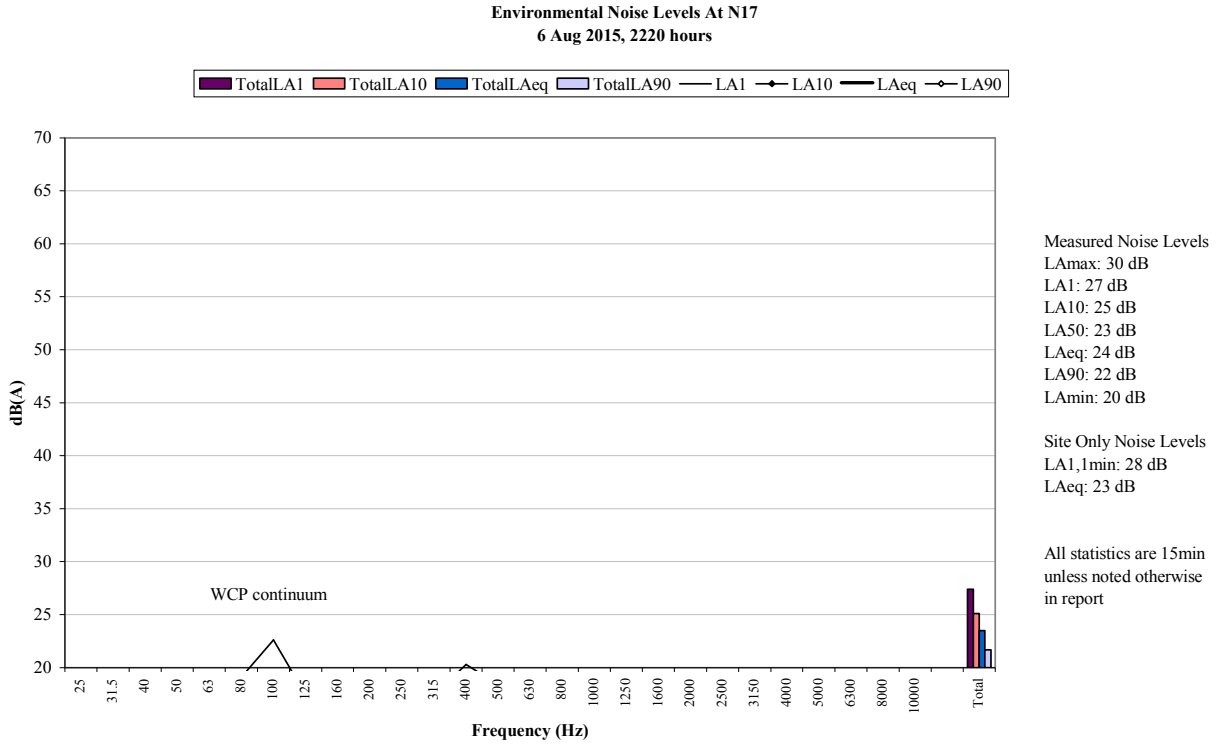

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

An engine continuum from WCP was audible throughout the measurement generating the site only L_{Aeq} of 23 dB and $L_{A1,1minute}$ of 28 dB.

A continuum from WCP primarily generated measured levels.

5.1.7 N18, 7 August 2015

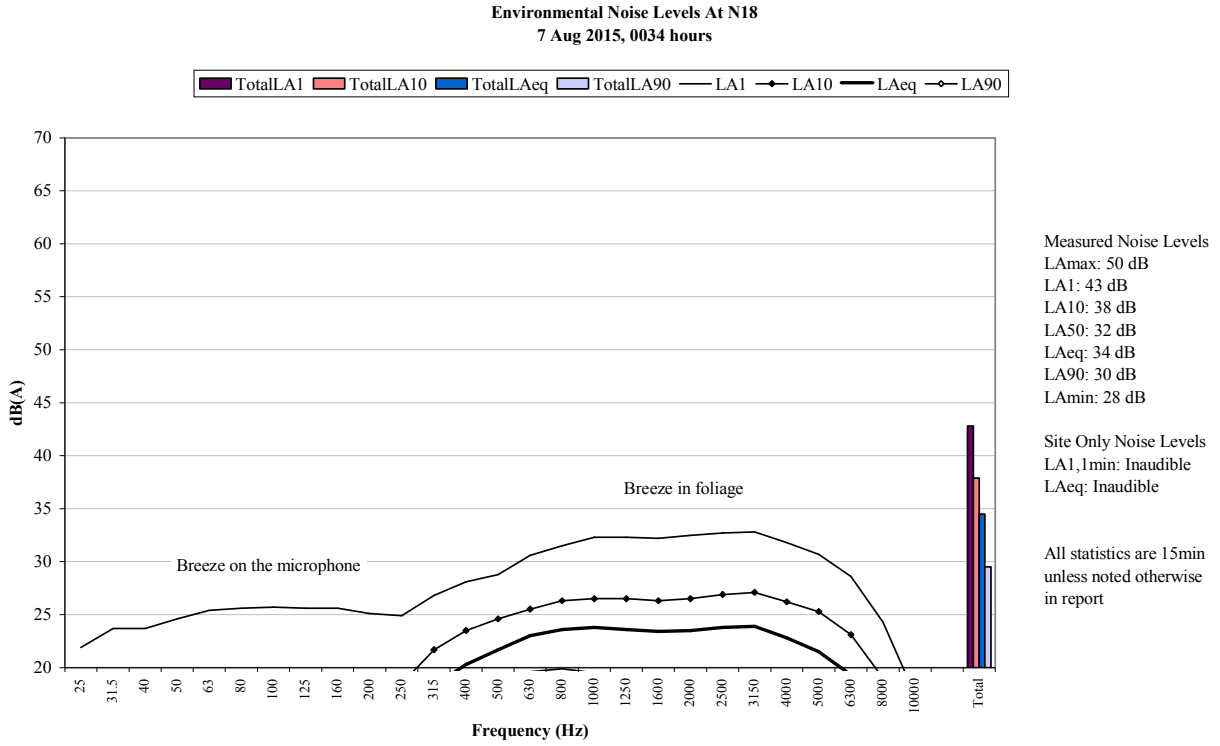

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Breeze in foliage and on the microphone generated measured levels.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 6/7 August 2015. 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 the relevant noise limits at all monitoring locations during the August 2015 monitoring period.

6.2 Low Frequency Assessment

During August 2015, WCP complied with the relevant limits using the INP and Broner methods of assessing low frequency noise at all monitoring locations with the exception of N17.

At N17 the INP low frequency trigger level was exceeded. A 5 dB modifying factor correction was applied to the measured WCP L_{Aeq}. The resulting WCP L_{Aeq} noise level remained in compliance with project approval and EPL impact assessment criteria at this location.

Global Acoustics Pty Ltd

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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church	40 (internal) When in use			-
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 ºC and 3ºC/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3ºC/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 October 2014.

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:

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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
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		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	21.2°C	**Ambient Temperature :**	21.6°C
Relative Humidity :	52.5%	**Relative Humidity :**	51.1%
Barometric Pressure :	99.94kPa	**Barometric Pressure :**	99.94kPa

Calibration Technician :	Dennis Kim	**Secondary Check:**	Sandra Minto
Calibration Date :	29/05/2015	**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.

NATA WORLD RECOGNISED ACCREDITATION

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

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

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

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

Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C14693

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

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

Atmospheric Conditions
Ambient Temperature : 23.5°C
Relative Humidity : 48%
Barometric Pressure : 99.15kPa

Calibration Technician : Corey Stewart
Calibration Date : 19/12/2014
Secondary Check: Sandra Minto
Report Issue Date : 22/12/2014
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressre 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	*±0.15dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±4.1%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.1kPa*
Distortion	*±0.08%*		

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

NATA
WORLD RECOGNISED ACCREDITATION

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

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

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

September 2015

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

Global Acoustics Pty Ltd
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Wilpinjong Coal

Environmental Noise Monitoring
September 2015

Reference: 15336_R01
Report date: 29 September 2015

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:	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. Monitoring for September 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 9/10 September 2015. 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 2015 monitoring.

Low Frequency Assessment

During September 2015, WCP complied with the relevant limits using the INP and Broner methods of assessing low frequency noise at all monitoring locations with the exception of N13.

At N13 the INP low frequency trigger level was exceeded. A 5 dB modifying factor correction was applied to the measured WCP L_{Aeq}. The resulting WCP L_{Aeq} noise level remained in compliance with project approval and EPL impact assessment criteria at this location.

Global Acoustics Pty Ltd

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Appendices

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 9/10 September 2015. 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

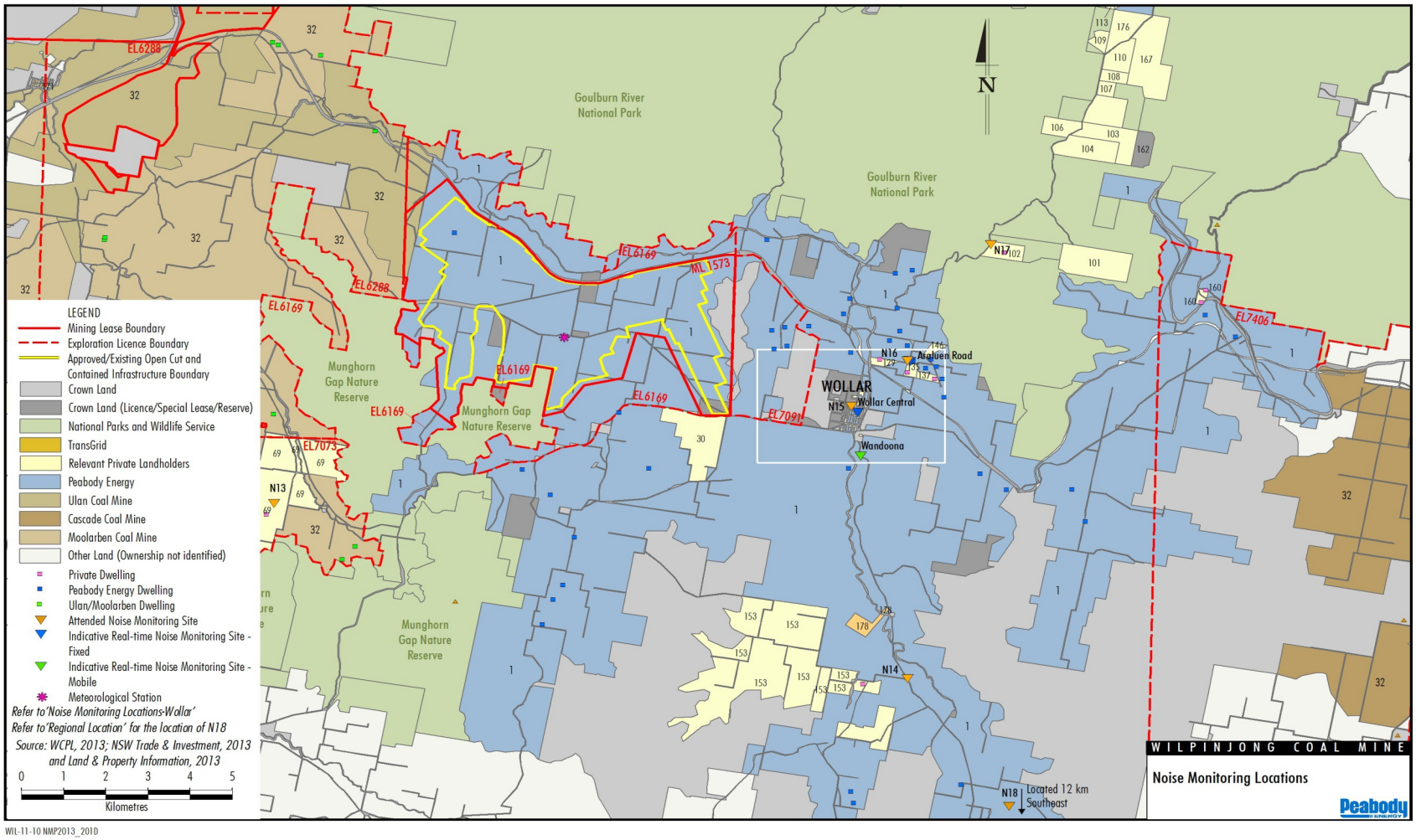

Figure 1: Attended Noise Monitoring Locations

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/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 $L_{A1,1minute}$ 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 LEVELS – SEPTEMBER 2015[1]

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	09/09/2015 23:26	41	33	27	24	25	23	21	39
N13	10/09/2015 01:48	39	27	25	21	22	19	17	41
N14	09/09/2015 22:57	47	44	32	25	31	23	20	47
N15	09/09/2015 23:49	48	44	38	22	33	21	20	38
N16	10/09/2015 01:01	42	28	22	19	20	18	17	39
N17	10/09/2015 00:22	33	19	16	14	15	14	13	29
N18	09/09/2015 22:23	55	42	33	30	33	27	25	54

Note:

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

4.2 Project Approval and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. Modifying factors are considered in Section 4.4.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – SEPTEMBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	09/09/2015 23:26	1.0	5.0	35	No	IA	NA
N13	10/09/2015 01:48	0.0	4.8	36	No	20	NA
N14	09/09/2015 22:57	0.0	5.2	35	No	IA	NA
N15	09/09/2015 23:49	0.0	6.4	35	No	IA	NA
N16	10/09/2015 01:01	0.7	6.9	37	No	IA	NA
N17	10/09/2015 00:22	0.0	6.4	35	No	NM	NA
N18	09/09/2015 22:23	0.0	4.0	35	No	IA	NA

Notes:

1. *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;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.3: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – SEPTEMBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	09/09/2015 23:26	1.0	5.0	45	No	IA	NA
N13	10/09/2015 01:48	0.0	4.8	45	No	28	NA
N14	09/09/2015 22:57	0.0	5.2	45	No	IA	NA
N15	09/09/2015 23:49	0.0	6.4	45	No	IA	NA
N16	10/09/2015 01:01	0.7	6.9	45	No	IA	NA
N17	10/09/2015 00:22	0.0	6.4	45	No	NM	NA
N18	09/09/2015 22:23	0.0	4.0	45	No	IA	NA

Notes:

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

4.3 EPL and Weather Conditions

Table 4.4 and Table 4.5 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. Modifying factors are considered in Section 4.4.

Table 4.4: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – SEPTEMBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	09/09/2015 23:26	1.0	5.0	35	No	IA	NA
N13	10/09/2015 01:48	0.0	4.8	35	No	20	NA
N14	09/09/2015 22:57	0.0	5.2	35	No	IA	NA
N15	09/09/2015 23:49	0.0	6.4	35	No	IA	NA
N16	10/09/2015 01:01	0.7	6.9	35	No	IA	NA
N17	10/09/2015 00:22	0.0	6.4	35	No	NM	NA
N18	09/09/2015 22:23	0.0	4.0	35	No	IA	NA

Notes:

1. *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 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/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.5: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – SEPTEMBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	09/09/2015 23:26	1.0	5.0	45	No	IA	NA
N13	10/09/2015 01:48	0.0	4.8	45	No	28	NA
N14	09/09/2015 22:57	0.0	5.2	45	No	IA	NA
N15	09/09/2015 23:49	0.0	6.4	45	No	IA	NA
N16	10/09/2015 01:01	0.7	6.9	45	No	IA	NA
N17	10/09/2015 00:22	0.0	6.4	45	No	NM	NA
N18	09/09/2015 22:23	0.0	4.0	45	No	IA	NA

Notes:

1. *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 including3 °C/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

4.4 Modifying Factor Assessment

Low frequency results for each monitoring location are presented in Table 4.6.

Table 4.6: LOW FREQUENCY NOISE MODIFYING FACTOR ASSESSMENT – SEPTEMBER 2015

Location	Start Date and Time	INP low frequency modifying factor trigger dB[2]	INP, Site only L_{Ceq} minus site only L_{Aeq} dB[3,6]	Broner low frequency modifying factor trigger dB[4]	Broner, Site only L_{Ceq} dB[5,6]	WCP only L_{Aeq} dB[1]	Met Applies?[7] Project Approval/EPL	Comments
N6	09/09/2015 23:26	>=15	IA	>60	IA	IA	No/No	WCP inaudible
N13	10/09/2015 01:48	>=15	**21**	>60	41	20	No/No	WCP continuum
N14	09/09/2015 22:57	>=15	IA	>60	IA	IA	No/No	WCP inaudible
N15	09/09/2015 23:49	>=15	IA	>60	IA	IA	No/No	WCP inaudible
N16	10/09/2015 01:01	>=15	IA	>60	IA	IA	No/No	WCP inaudible
N17	10/09/2015 00:22	>=15	NM	>60	NM	NM	No/No	WCP not measurable
N18	09/09/2015 22:23	>=15	IA	>60	IA	IA	No/No	WCP inaudible

Notes:

1. *WCP only $L_{Aeq,15minute}$ provided as a guide;*
2. *Low frequency modifying factor trigger threshold as detailed in the INP;*
3. *These are measured or calculated site only INP results (site only L_{Ceq} minus site only L_{Aeq}), NM denotes site levels were audible but not measurable, IA denotes site noise was inaudible. Where it is not possible to determine the site only INP result due to the presence of other low frequency noise sources occurring during the measurement, this is noted as NA (not available) and no further assessment is required. Guidance is provided in the Comments column;*
4. *Night L_{Ceq} modifying factor trigger threshold as detailed in Broner (2010);*
5. *These are measured or calculated site only C-weighted noise levels, NM denotes site levels were audible but not measurable, IA denotes site noise was inaudible. Where it is not possible to determine the site only L_{Ceq} due to the presence of other low frequency noise sources occurring during the measurement, this is noted as NA (not available) and no further assessment is required. Guidance is provided in the Comments column;*
6. *Bolded results in red are those greater than the relevant trigger (if applicable); and*
7. *Indicates whether meteorological conditions are within range for which noise emission limits apply.*

Where results in Table 4.6 are greater than the INP or Broner low frequency modifying factor triggers due to activities at WCP, a 5 dB modifying factor correction is applied to the measured noise level. Meteorological conditions at the time of the measurement are also considered in accordance with the relevant project approval and EPL.

Table 4.7: MEASURED NOISE LEVELS FOR WCP AGAINST LOW FREQUENCY NOISE CRITERIA – SEPTEMBER 2015

Location	Start Date and Time	WCP L_{Aeq} dB	Modifying factor correction dB	Project Approval L_{Aeq} impact assessment criterion dB	EPL L_{Aeq} impact assessment criterion dB	Revised site only L_{Aeq} with modifying factor correction applied	Criterion applies? [1, 2] Project Approval/EPL	Exceedance of Project Approval impact assessment criterion dB [3]	Exceedance of EPL impact assessment criterion dB [3]
N13	06/08/2015 22:20	20	5 (INP)	36	35	25	No/No	NA	NA

Notes:

1. *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;*
2. *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 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/100 metres;*
3. *NA in exceedance column means atmospheric conditions outside those specified in approval or EPL and so criterion is not applicable.*

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 4.8. 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 4.8: MEASURED ATMOSPHERIC CONDITIONS – SEPTEMBER 2015

Location	Start Date And Time	Temperature °C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	09/09/2015 23:26	6	-	-	0
N13	10/09/2015 01:48	6	0.3	220	0
N14	09/09/2015 22:57	6	0.9	100	0
N15	09/09/2015 23:49	5	0.3	205	0
N16	10/09/2015 01:01	10	-	-	0
N17	10/09/2015 00:22	6	-	-	0
N18	09/09/2015 22:23	9	1.4	90	0

Notes:

1. *Wind speed and direction measured at 1.8 metres.*

Data obtained concurrently by the WCP meteorological station is provided in Table 4.9 and is used to determine compliance with specified noise criteria.

Table 4.9: WCP METEOROLOGICAL STATION DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
09/09/2015 22:00	0.6	300	3.4
09/09/2015 22:15	0.0	-	3.4
09/09/2015 22:30	0.0	-	4.0
09/09/2015 22:45	0.0	-	4.7
09/09/2015 23:00	0.0	-	4.5
09/09/2015 23:15	0.0	-	5.2
09/09/2015 23:30	0.9	293	5.5
09/09/2015 23:45	1.0	266	5.0
10/09/2015 00:00	0.0	-	6.4
10/09/2015 00:15	0.9	357	6.7
10/09/2015 00:30	0.0	-	6.4
10/09/2015 00:45	0.0	-	6.9
10/09/2015 01:00	0.0	-	7.4
10/09/2015 01:15	0.7	348	6.9
10/09/2015 01:30	0.0	-	7.6
10/09/2015 01:45	0.0	-	5.7
10/09/2015 02:00	0.0	-	4.8

Notes:

1. *Data supplied by WCP; and*
2. *Lapse rate sourced from the WCP inversion tower.*

5 DISCUSSION

5.1 Noted Noise Sources

Table 4.1 to Table 4.5 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

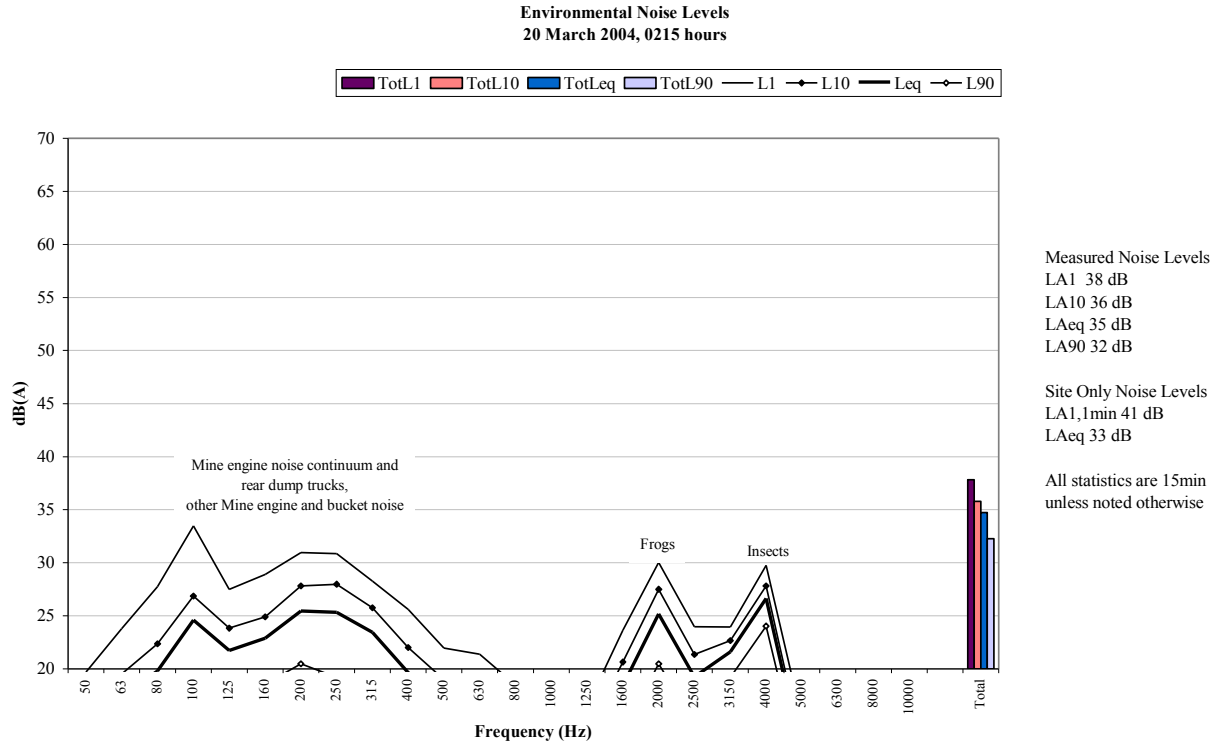

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 9 September 2015

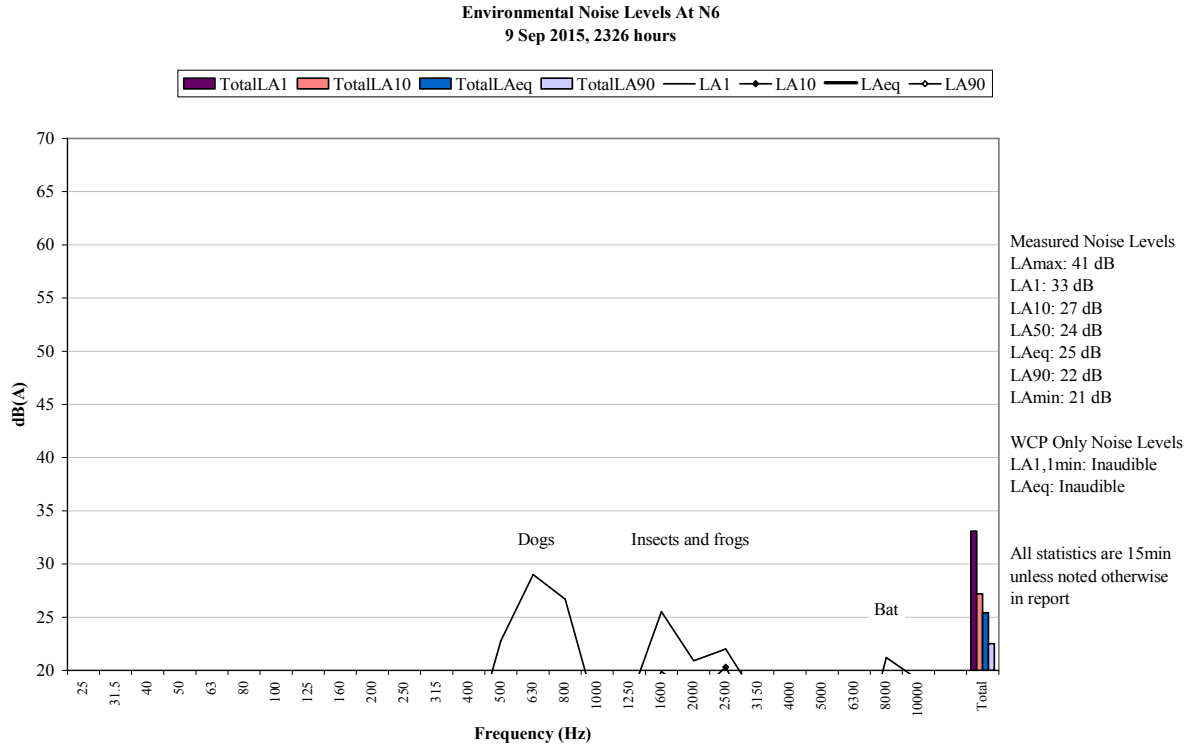

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Dogs generated the L_{Amax}, and combined with insects and frogs to generate the L_{A1}, L_{A10} and L_{Aeq}. Insects and frogs generated the L_{A90}.

Bats were also noted.

5.1.2 N13, 10 September 2015

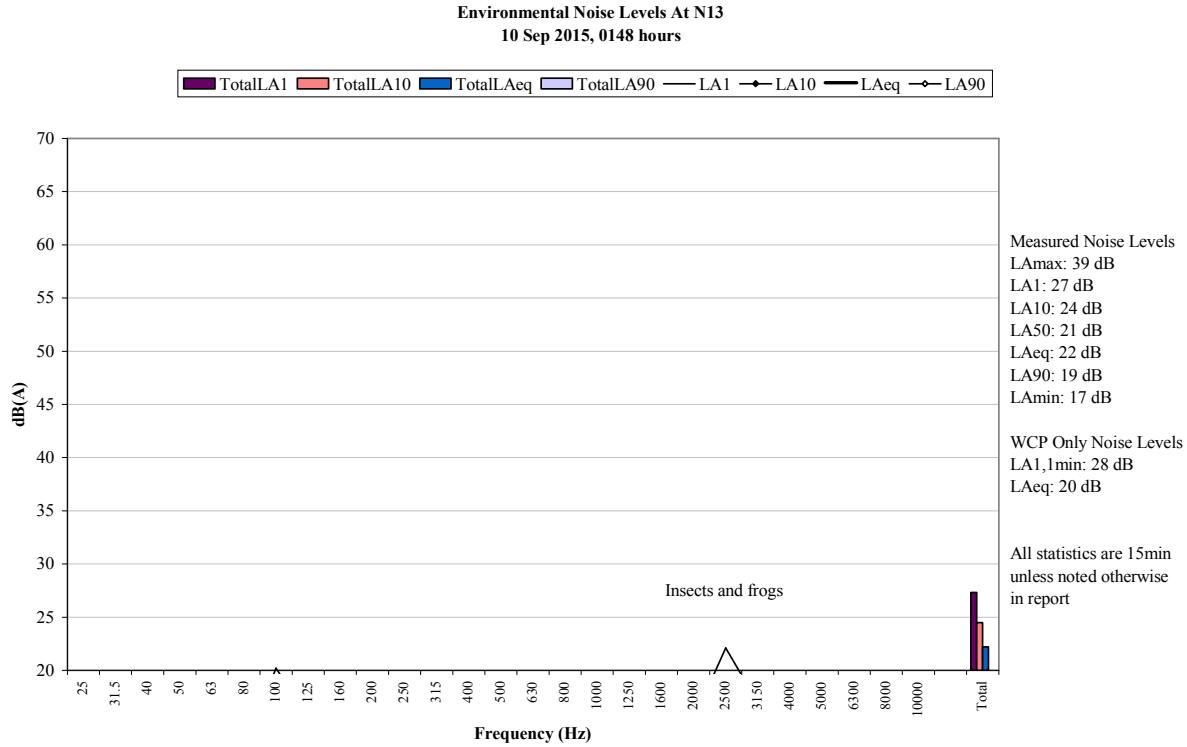

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was audible for an exhaust and engine/fan continuum generating the site only L_{Aeq} of 20 dB. Impact noise generated the site only $L_{A1,1minute}$ of 28 dB.

A noise source close to the microphone generated the L_{Amax}. Insects and frogs combined with WCP to generate all measured levels. The noise floor of the sound level meter contributed to the L_{A90}.

5.1.3 N14, 9 September 2015

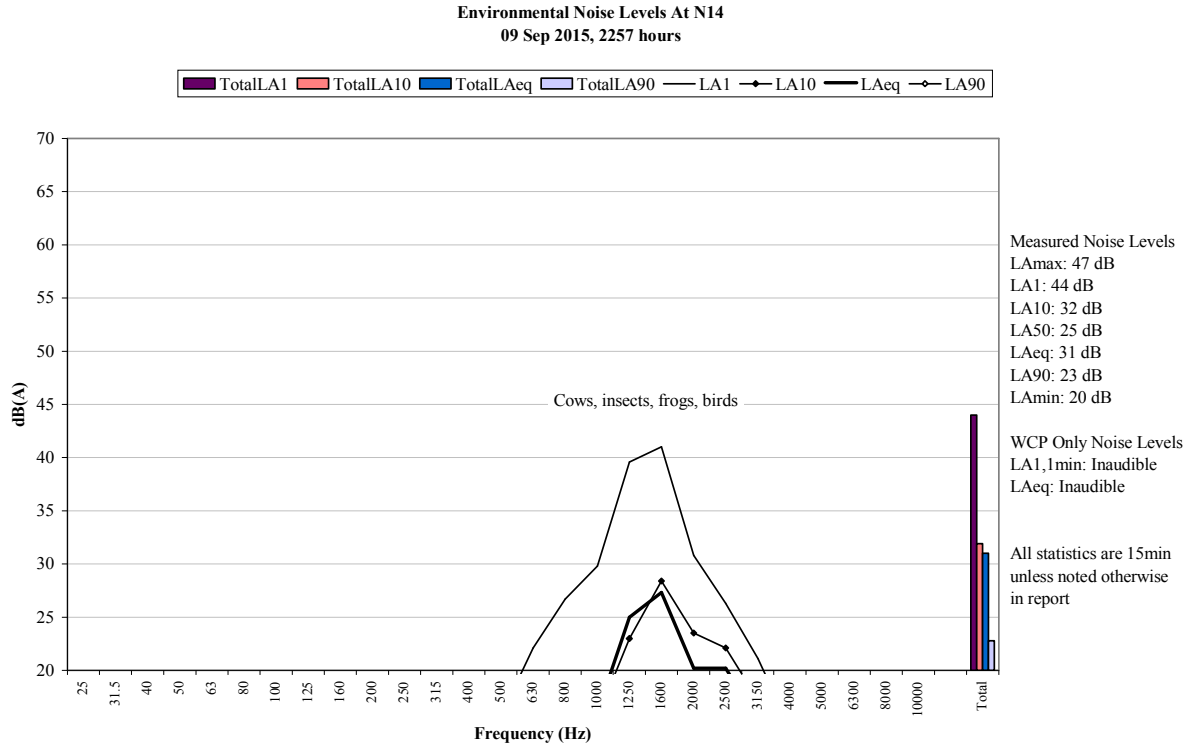

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Insects and frogs generated all measured levels.

Cows and birds were also noted.

5.1.4 N15, 9 September 2015

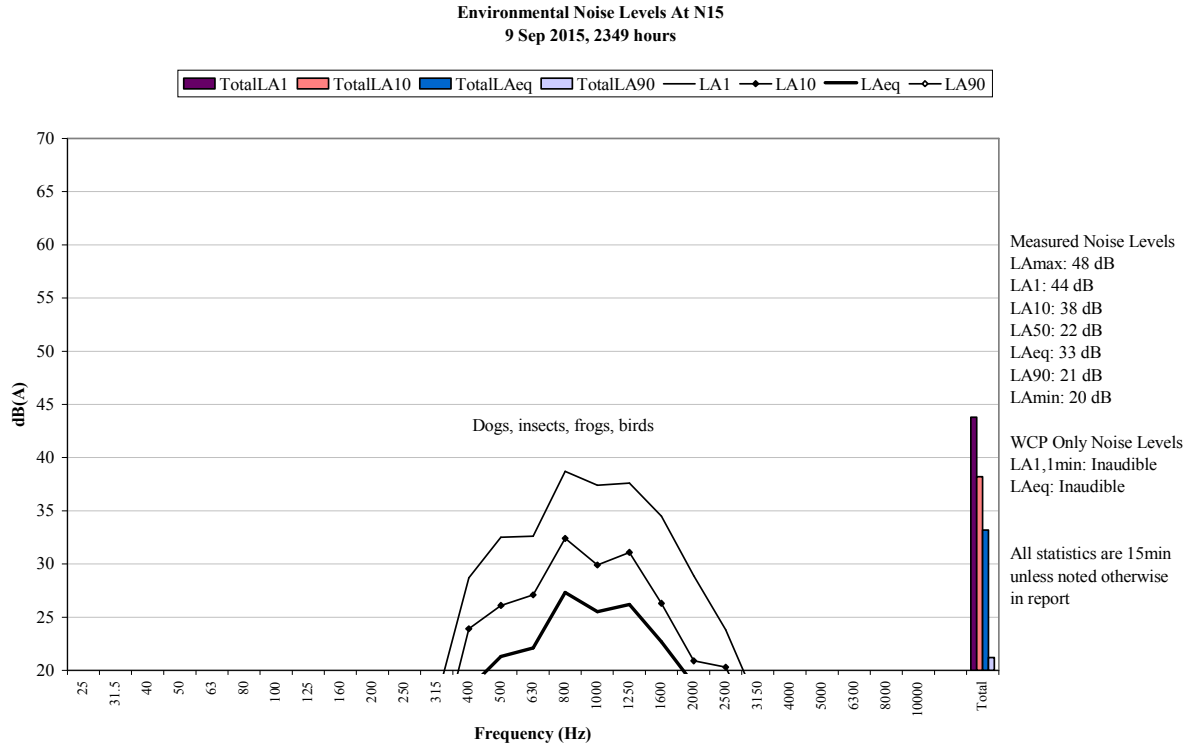

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Dogs generated the L_{Amax}, L_{A1}, L_{A10} and L_{Aeq}. Insects and frogs generated the L_{A90}.

Birds and an air conditioning unit were also noted.

5.1.5 N16, 10 September 2015

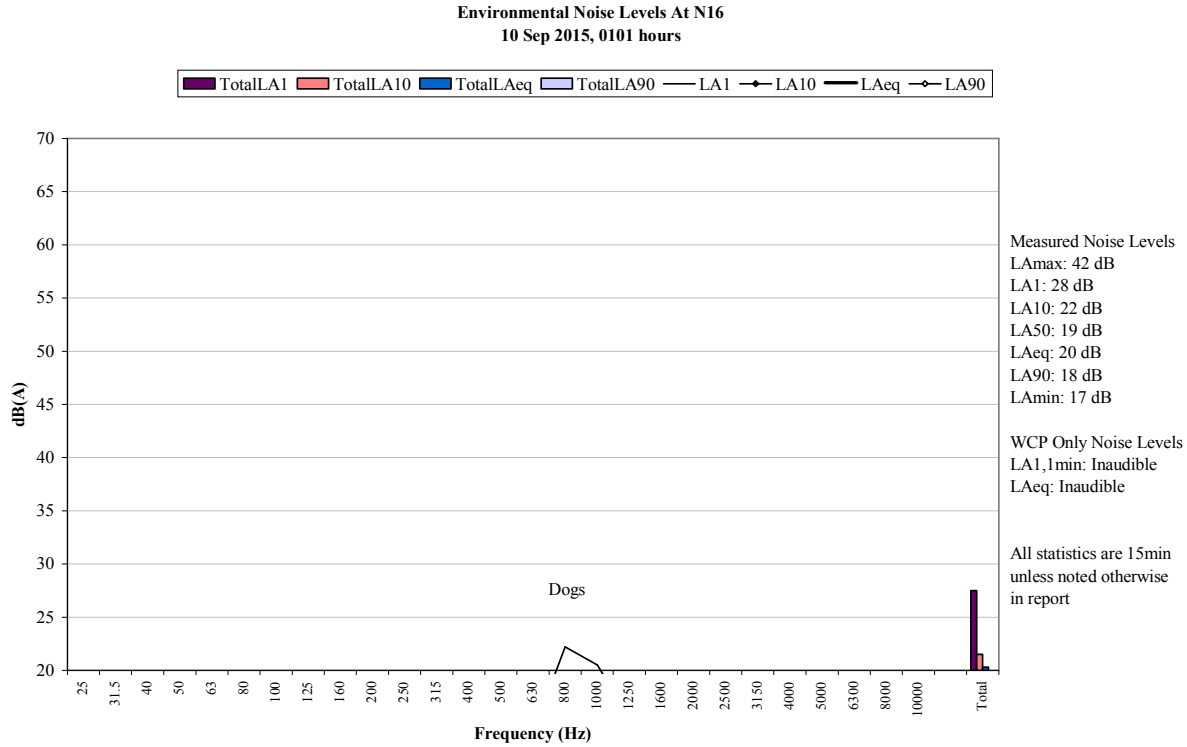

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible.

Bats generated the L_{Amax}. Dogs generated the L_{A1}, L_{A10} and combined with insects and frogs to generate the L_{Aeq}. Insects and frogs generated the L_{A90}.

Distant train noise was also noted.

5.1.6 N17, 10 September 2015

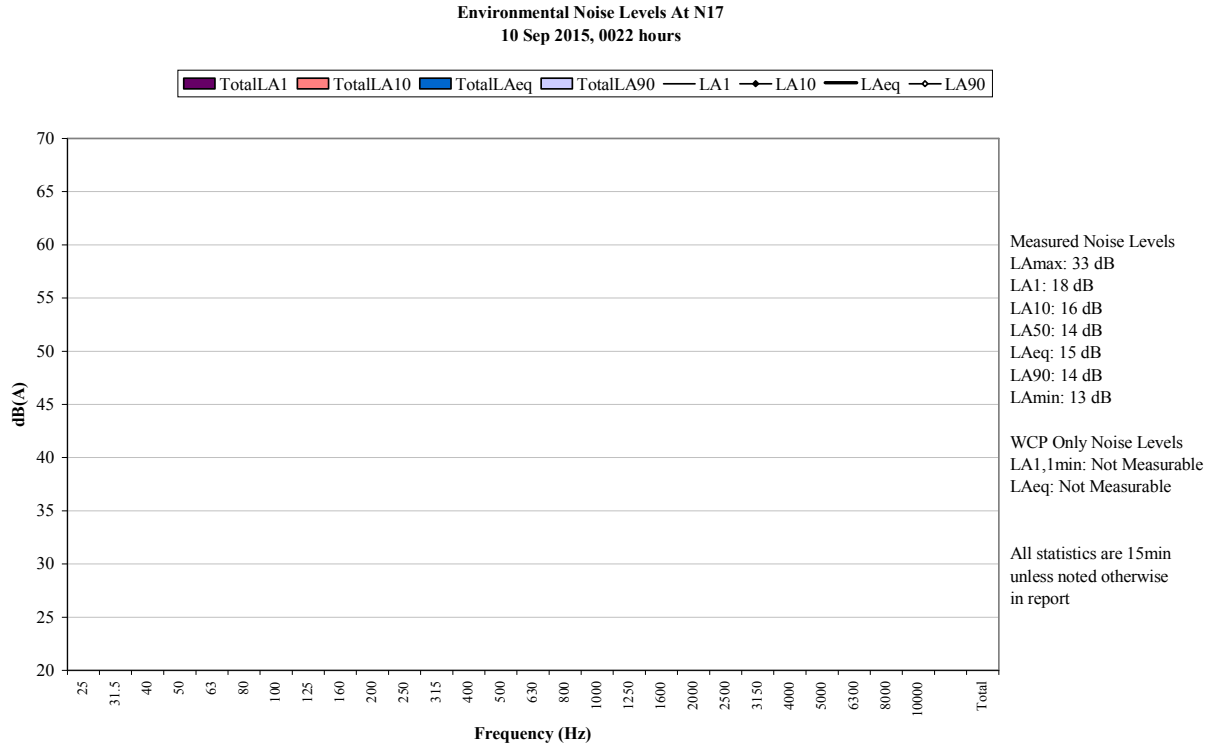

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

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

Birds generated the L_{Amax} and L_{A1}. Insects and frogs combined with the sound level meter noise floor to generate the L_{A10}, L_{Aeq} and L_{A90}.

Dogs were also noted.

5.1.7 N18, 7 August 2015

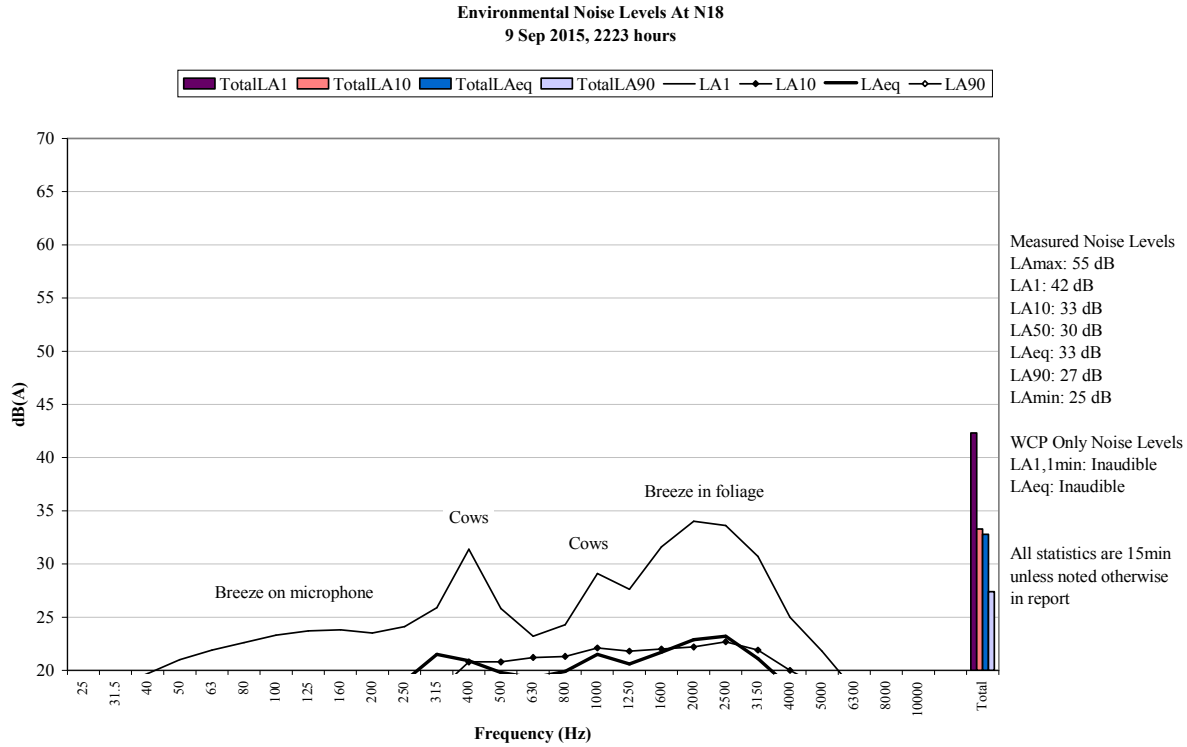

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Cows generated the L_{Amax} and contributed to the L_{A1} and L_{Aeq}. Breeze in the foliage and on the microphone contributed to the L_{A1}, L_{A10} and L_{Aeq}. Breeze in the foliage generated the L_{A90}.

Insects and frogs were also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 9/10 September 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

During September 2015, WCP complied with the relevant limits using the INP and Broner methods of assessing low frequency noise at all monitoring locations with the exception of N13.

At N13 the INP low frequency trigger level was exceeded. A 5 dB modifying factor correction was applied to the measured WCP L_{Aeq}. The resulting WCP L_{Aeq} noise level remained in compliance with project approval and EPL impact assessment criteria at this location.

Global Acoustics Pty Ltd

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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church	40 (internal) When in use			-
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 ºC and 3ºC/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3ºC/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 October 2014.

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:

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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
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 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		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	20.8°C	**Ambient Temperature :**	22.4°C
Relative Humidity :	46.9%	**Relative Humidity :**	43%
Barometric Pressure :	100.47kPa	**Barometric Pressure :**	100.38kPa

Calibration Technician : Dennis Kim
Secondary Check: Kate Alchin
Calibration Date : 23/06/2015
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.

NATA
WORLD RECOGNISED ACCREDITATION

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

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

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

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Acoustic Research Labs Pty Ltd
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Sound Calibrator

IEC 60942-2004

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 Pressre 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.

NATA
WORLD RECOGNISED ACCREDITATION

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

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

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
October 2015

Prepared for
Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring
October 2015

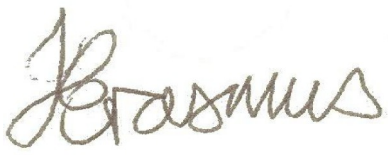
Reference: 15365_R01_iDraft03
Report date: 4 November 2015

Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



Prepared:	Jonathan Erasmus Acoustic Technician	QA Review:	Jeremy Welbourne Acoustics Engineer

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 October 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 6/7 October 2015. 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 2015 monitoring.

Low Frequency Assessment

During the October 2015 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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Appendices

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 October 2015. 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

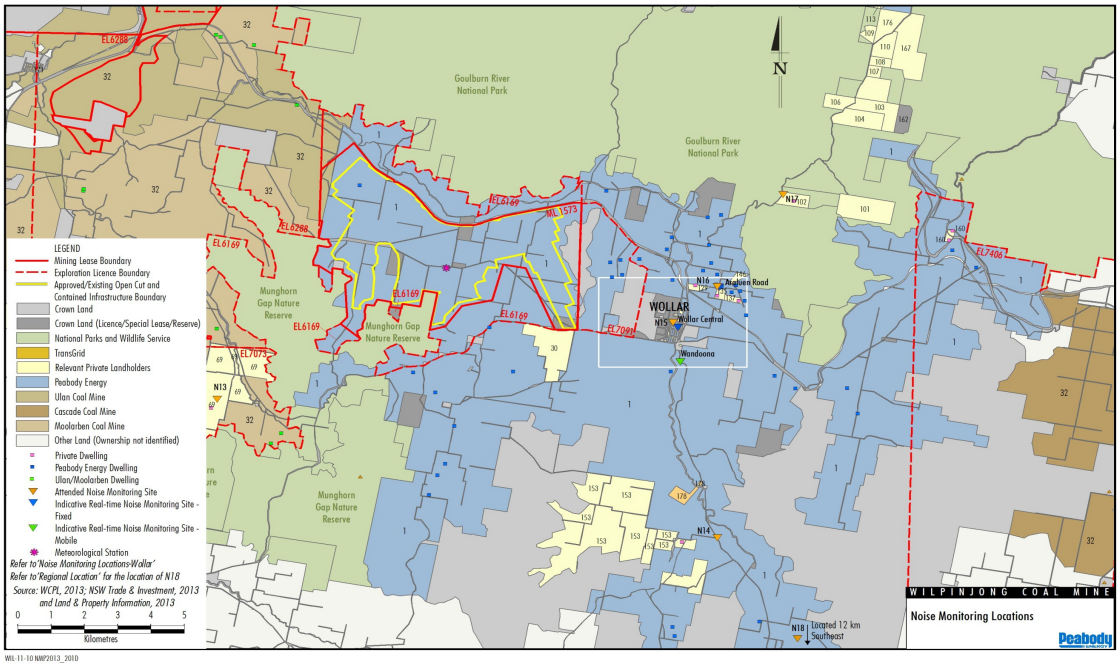

Figure 1: Attended Noise Monitoring Locations

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/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 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 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	1070590	13/11/2015
Pulsar 106 acoustic calibrator	57413	19/12/2016

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 2015[1]

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	06/10/2015 23:01	51	42	34	25	31	21	18	37
N13	07/10/2015 01:09	64	59	29	22	43	20	17	47
N14	06/10/2015 22:34	51	47	42	33	38	22	18	43
N15	06/10/2015 23:22	47	36	27	22	26	20	17	40
N16	07/10/2015 00:28	52	42	31	24	30	21	18	43
N17	06/10/2015 23:58	44	30	22	18	20	17	16	36
N18	06/10/2015 22:00	44	35	30	24	27	22	19	28

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 October 2015.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – OCTOBER 2015

Conditions	Total for October 2015
Number of measurements	7
Number of measurements where met applied (in accordance with EPL and 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. Modifying factors are considered in Section Error: Reference source not found.

Table 4.3: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – OCTOBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	06/10/2015 23:01	0.0	6.0	35	No	<20	NA
N13	07/10/2015 01:09	0.0	7.2	36	No	<20	NA
N14	06/10/2015 22:34	0.0	7.4	35	No	<20	NA
N15	06/10/2015 23:22	0.0	6.2	35	No	<20	NA
N16	07/10/2015 00:28	0.6	7.0	37	No	<19	NA
N17	06/10/2015 23:58	0.0	5.8	35	No	<20	NA
N18	06/10/2015 22:00	0.0	8.8	35	No	IA	NA

Notes:

1. *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;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.4: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – OCTOBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	06/10/2015 23:01	0.0	6.0	45	No	<20	NA
N13	07/10/2015 01:09	0.0	7.2	45	No	<20	NA
N14	06/10/2015 22:34	0.0	7.4	45	No	<20	NA
N15	06/10/2015 23:22	0.0	6.2	45	No	20	NA
N16	07/10/2015 00:28	0.6	7.0	45	No	31	NA
N17	06/10/2015 23:58	0.0	5.8	45	No	<20	NA
N18	06/10/2015 22:00	0.0	8.8	45	No	IA	NA

Notes:

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

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. Modifying factors are considered in Section Error: Reference source not found.

Table 4.5: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – OCTOBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	06/10/2015 23:01	0.0	6.0	35	No	<20	NA
N13	07/10/2015 01:09	0.0	7.2	35	No	<20	NA
N14	06/10/2015 22:34	0.0	7.4	35	No	<20	NA
N15	06/10/2015 23:22	0.0	6.2	35	No	<20	NA
N16	07/10/2015 00:28	0.6	7.0	35	No	<19	NA
N17	06/10/2015 23:58	0.0	5.8	35	No	<20	NA
N18	06/10/2015 22:00	0.0	8.8	35	No	IA	NA

Notes:

1. *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 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/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.6: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – OCTOBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	06/10/2015 23:01	0.0	6.0	45	No	<20	NA
N13	07/10/2015 01:09	0.0	7.2	45	No	<20	NA
N14	06/10/2015 22:34	0.0	7.4	45	No	<20	NA
N15	06/10/2015 23:22	0.0	6.2	45	No	20	NA
N16	07/10/2015 00:28	0.6	7.0	45	No	31	NA
N17	06/10/2015 23:58	0.0	5.8	45	No	<20	NA
N18	06/10/2015 22:00	0.0	8.8	45	No	IA	NA

Notes:

1. *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 including3 °C/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

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 – OCTOB ER 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	06/10/2015 23:01	13	0.9	165	0
N13	07/10/2015 01:09	18	1.7	205	0
N14	06/10/2015 22:34	17	0.7	145	0
N15	06/10/2015 23:22	13	0.0	-	0
N16	07/10/2015 00:28	15	0.6	130	0
N17	06/10/2015 23:58	14	0.0	-	0
N18	06/10/2015 22:00	20	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 DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
06/10/2015 22:00	0	-	7.2
06/10/2015 22:15	0	-	8.8
06/10/2015 22:30	0	-	7.2
06/10/2015 22:45	0	-	7.4
06/10/2015 23:00	0	-	6.8
06/10/2015 23:15	0	-	6.0
06/10/2015 23:30	0	-	6.2
06/10/2015 23:45	0	-	5.8
07/10/2015 00:00	0	-	6.2
07/10/2015 00:15	0	-	5.8
07/10/2015 00:30	0	-	5.6
07/10/2015 00:45	0.6	140	7.0
07/10/2015 01:00	0.7	343	6.0
07/10/2015 01:15	0	-	6.2
07/10/2015 01:30	0	-	7.2
07/10/2015 01:45	0	-	6.2
07/10/2015 02:00	0	-	4.2

Notes:

1. *Data supplied by WCP; and*
2. *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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

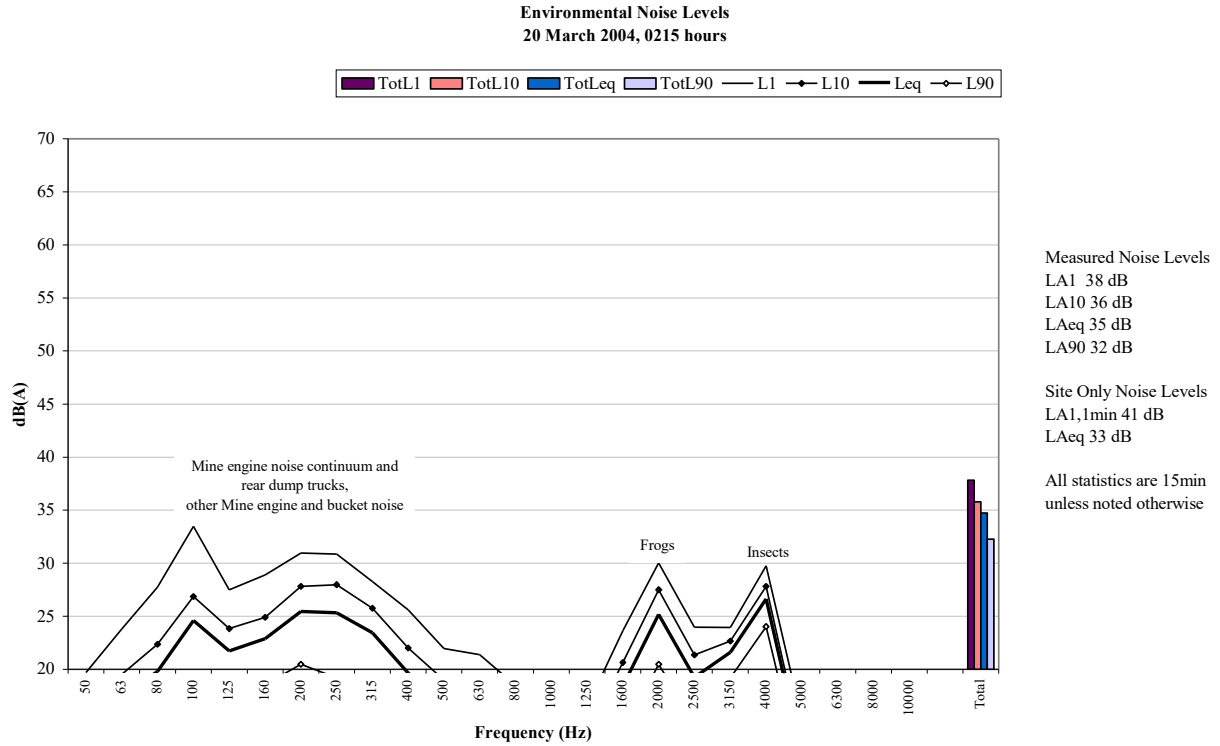

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 6 October 2015

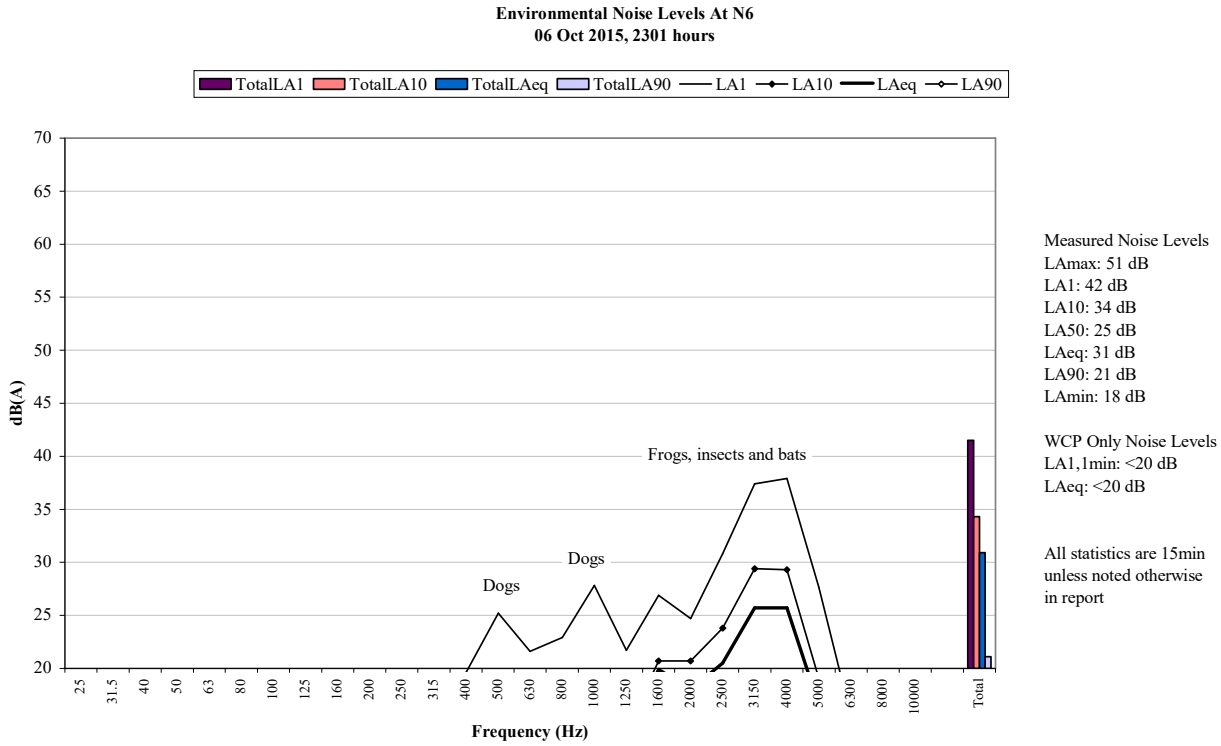

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

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

Frogs, birds and insects generated measured levels. The noise floor of the instrument contributed to the L_{A90} and L_{Amin}.

Bats and dogs were also noted.

5.1.2 N13, 7 October 2015

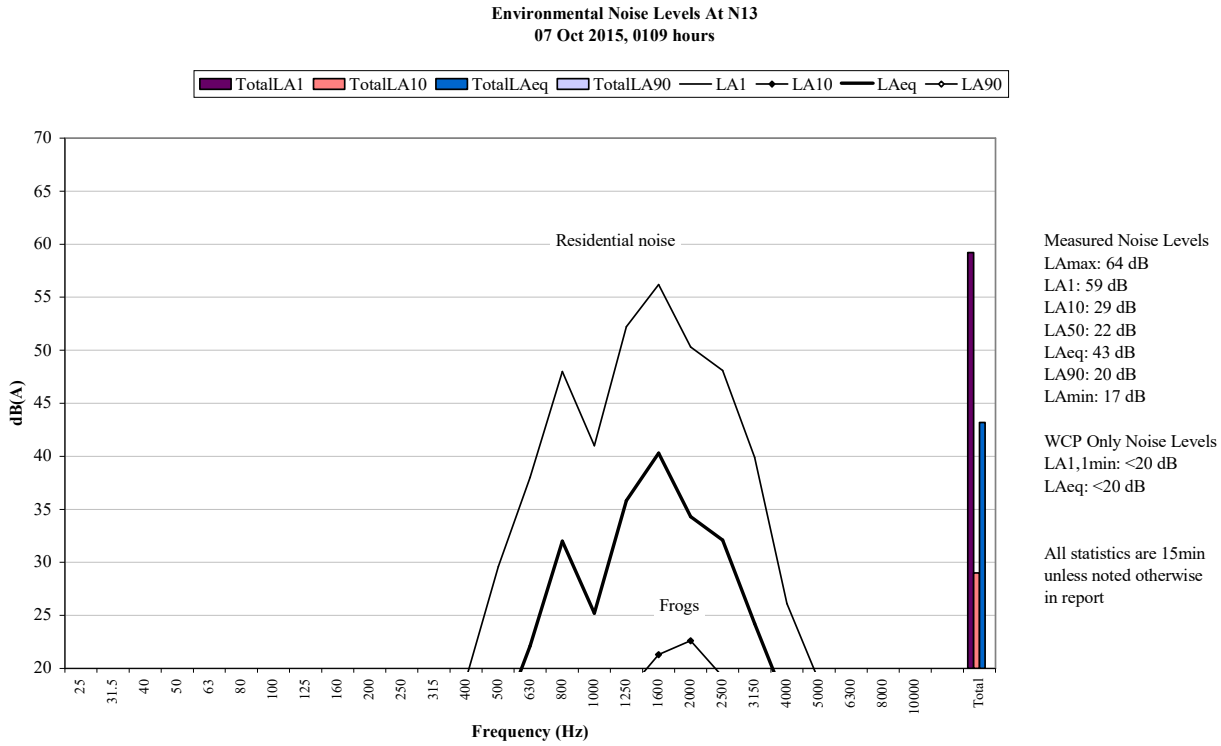

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

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

Residential noise generated the measured L_{Amax}, L_{A1} and L_{Aeq}. Frogs generated the measured L_{A10} and L_{A90}. The noise floor of the instrument contributed to the L_{A90} and L_{Amin}.

Bats and breeze in foliage were also noted.

5.1.3 N14, 7 October 2015

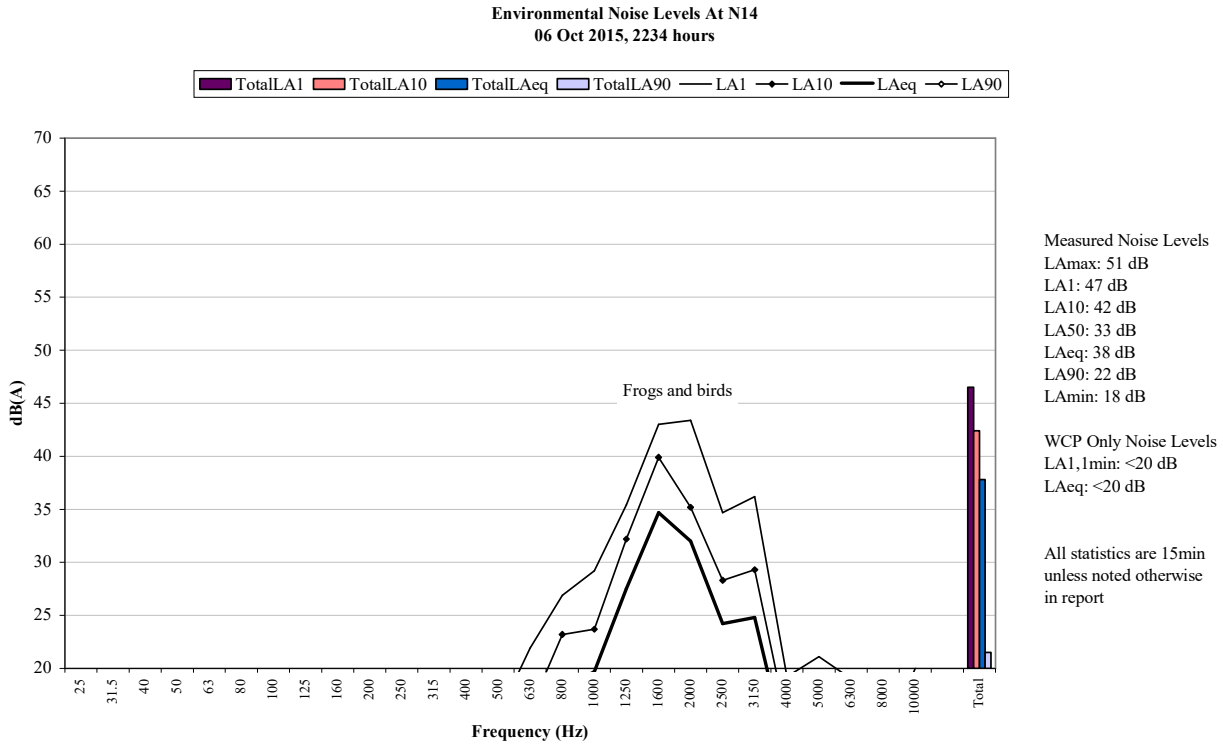

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

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

Frogs and birds generated measured levels. The noise floor of the instrument contributed to the L_{A90} and L_{Amin}.

Bats, a substation and an aircraft were also noted.

5.1.4 N15, 6 October 2015

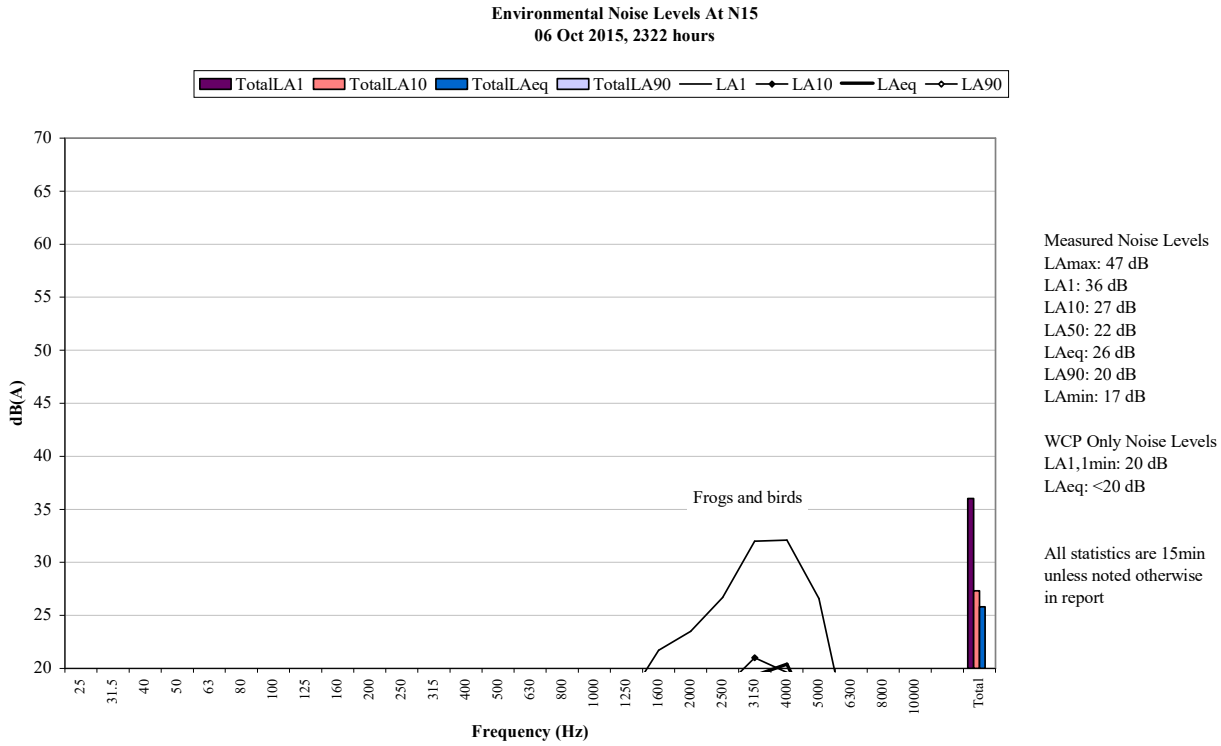

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

A low level continuum from WCP was audible throughout the measurement generating the site only L_{Aeq} of less than 20 dB. Impact and engine noise were also noted. An impact generated the $L_{A1,1minute}$ of 20 dB.

Frogs and birds generated measured levels. The noise floor of the instrument contributed to the L_{A90} and L_{Amin}.

A train, dogs and an aircraft were also noted.

5.1.5 N16, 7 October 2015

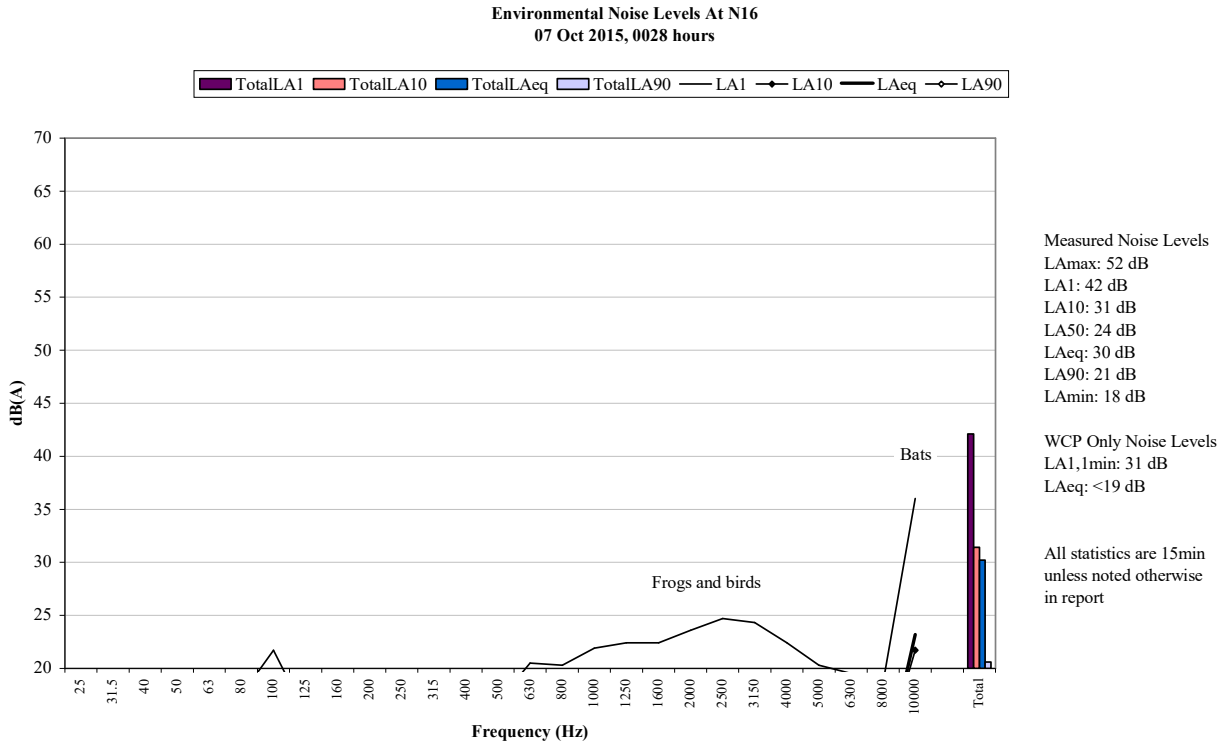

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

A low level continuum from WCP was audible throughout the measurement generating the site only L_{Aeq} of less than 19 dB. Impact noise generated the site only $L_{A1,1minute}$ of 31 dB. Engine noise was also noted.

Bats generated the measured L_{Amax} and L_{A1}. Bats, livestock, frogs and birds generated the measured L_{A10} and L_{Aeq}. Frogs, birds and WCP continuum primarily generated the measured L_{A90}. The noise floor of the instrument contributed to the L_{A90} and L_{Amin}.

5.1.6 N17, 6 October 2015

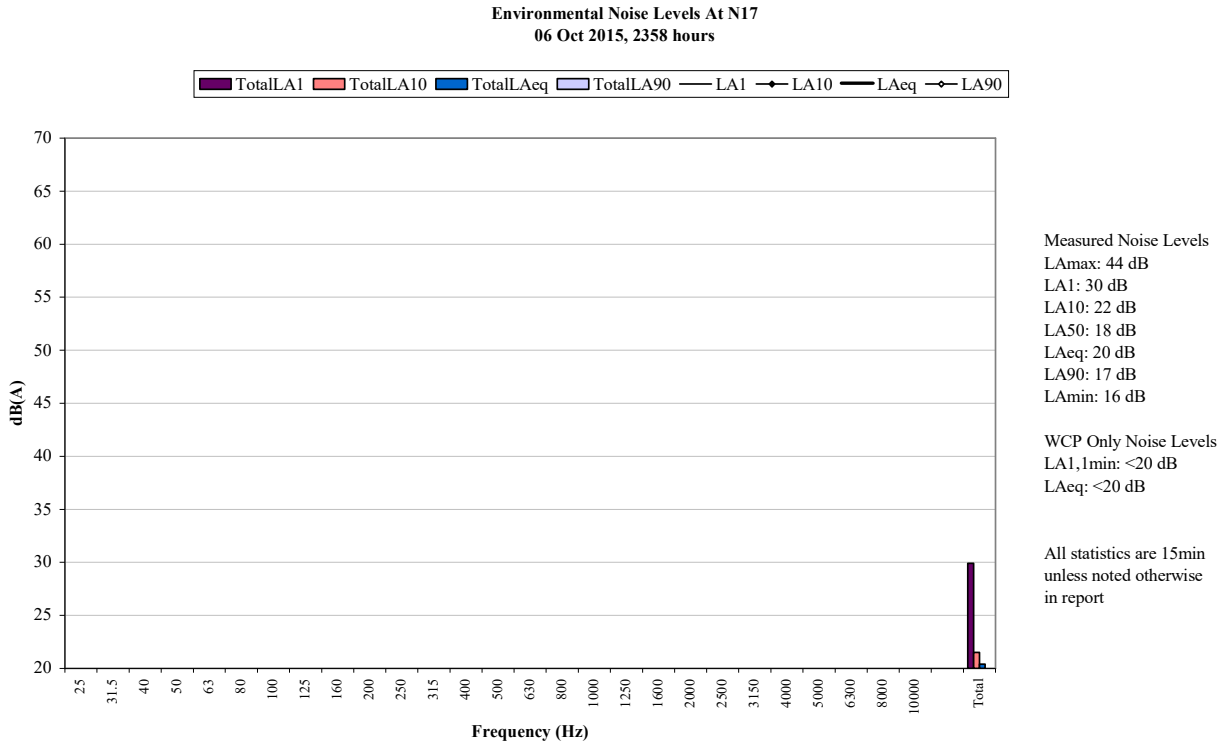

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

A low level continuum from WCP was audible throughout the measurement generating the site only L_{Aeq} and $L_{A1,1minute}$ of less than 20 dB. Engine noise was also noted.

Frogs and insects primarily generated measured levels. The noise floor of the instrument contributed to the L_{A50}, L_{A90} and L_{Amin}.

Bats were also noted.

5.1.7 N18, 6 October 2015

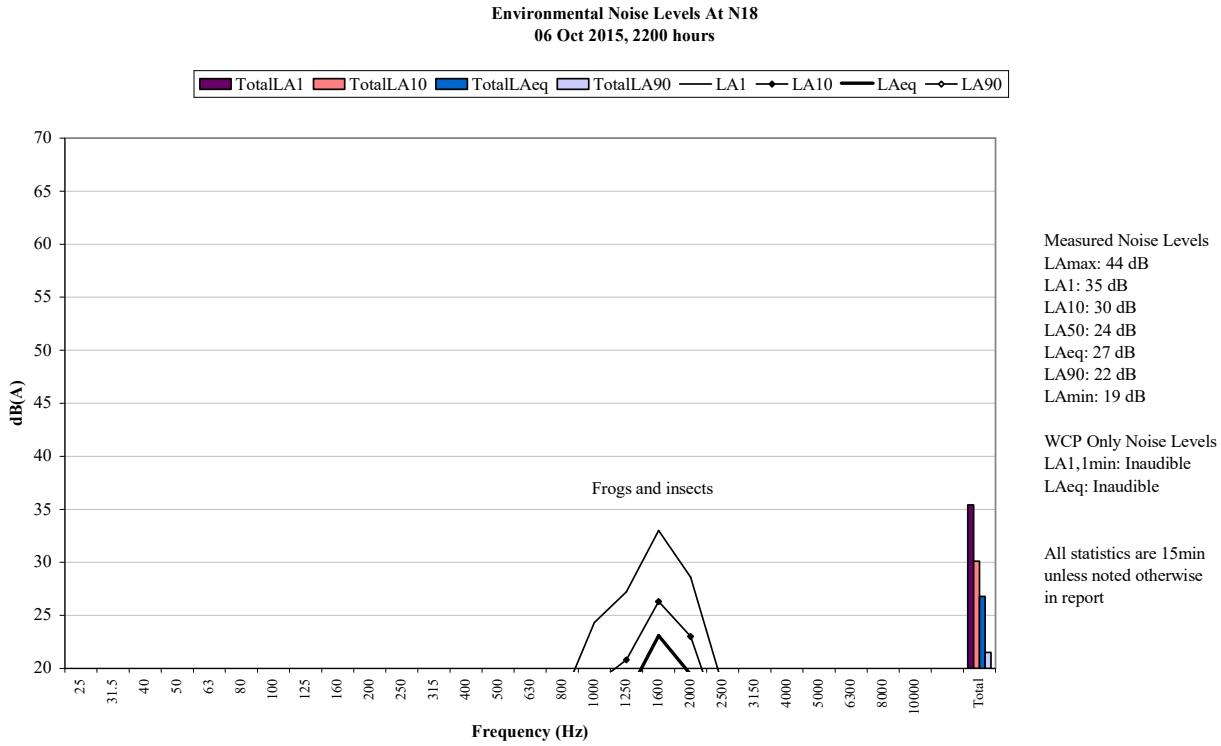

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Frogs and insects generated measured levels. The noise floor of the instrument contributed to the L_{A90} and L_{Amin}.

Livestock and bats were also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 6/7 October 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

During the October 2015 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 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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church		40 (internal) When in use		-
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 ºC and 3ºC/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3ºC/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 October 2014.

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:

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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Calibration Certificate

Number : C13646

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

Preamplifier Serial Number : 70607

Ambient Temperature : 21°C

Relative Humidity : 48%

Barometric Pressure : 101.1 kPa

Calibration Technician : Adrian Walker

Calibration Date : 13-November-2013

Secondary Check by : Luke Hudson

Report Issue Date : 13-November-2013

Approved Signatory :

Tested To : IEC61672-3:2006

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
9: Indication at the calibration check frequency	Pass	14: Level linearity on the reference level range	Pass
10: Self-generated noise	Pass	15: Level linearity incl. the level range control	Pass
11: Acoustical tests of a frequency weighting	Pass	16: Toneburst response	Pass
12: Electrical tests of frequency weightings	Pass	17: Peak C sound level	Pass
13: Frequency and time weightings at 1 kHz	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.

NATA
WORLD RECOGNISED ACCREDITATION

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.

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Sound Calibrator

IEC 60942-2004

Calibration Certificate

Calibration Number C14693

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

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

Atmospheric Conditions

Ambient Temperature : 23.5°C
Relative Humidity : 48%
Barometric Pressure : 99.15kPa

Calibration Technician : Corey Stewart
Calibration Date : 19/12/2014
Secondary Check: Sandra Minto
Report Issue Date : 22/12/2014
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressre 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	*±0.15dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±4.1%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.1kPa*
Distortion	*±0.08%*		

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

NATA WORLD RECOGNISED ACCREDITATION

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

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

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

November 2015

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring
November 2015

Reference: 15405_R01
Report date: 23 December 2015

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:	Jeremy Welbourne Acoustics Engineer	QA Review:	Tony Welbourne Director

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 November 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 2/3 November 2015. 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 2015 monitoring.

Low Frequency Assessment

During the November 2015 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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Appendices

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 2015. 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

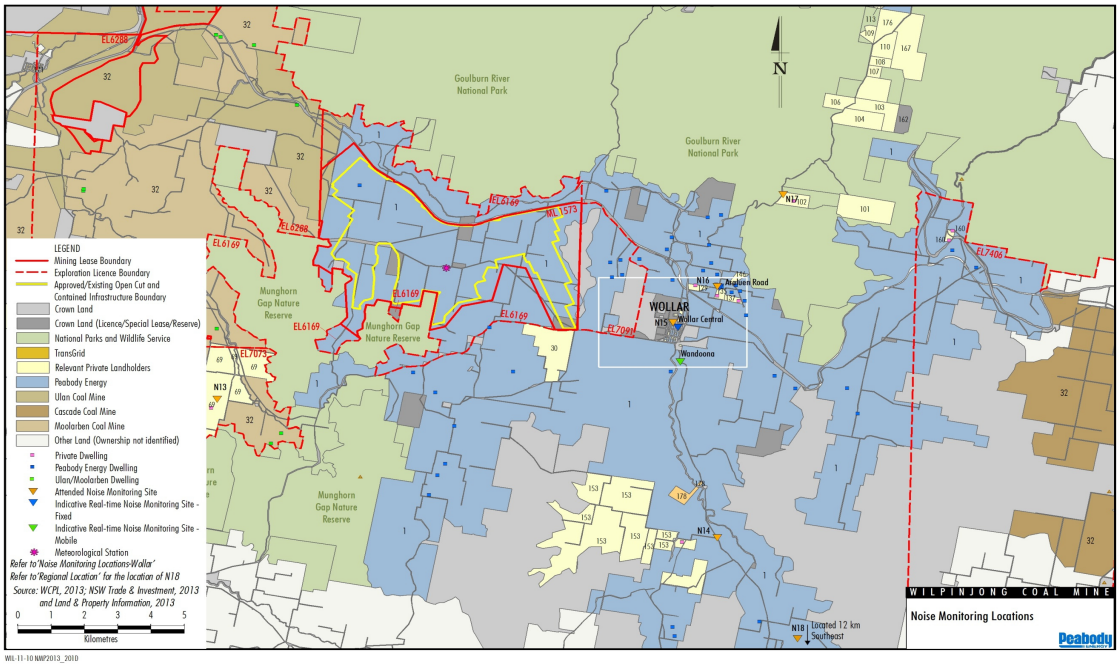

Figure 1: Attended Noise Monitoring Locations

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/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	1070590	13/11/2015
Pulsar 106 acoustic calibrator	57413	19/12/2016

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 2015[1]

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	02/11/2015 23:18	46	44	41	38	39	36	29	38
N13	02/11/2015 22:42	42	36	33	31	32	30	27	38
N14	03/11/2015 01:15	60	59	57	55	55	51	39	54
N15	02/11/2015 23:39	57	50	45	33	39	31	28	57
N16	03/11/2015 00:03	65	60	46	32	47	30	26	49
N17	03/11/2015 00:34	47	44	43	41	41	39	37	44
N18	03/11/2015 01:50	57	37	28	25	27	22	20	36

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 November 2015.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – NOVEMBER 2015

Conditions	Total for November 2015
Number of measurements	7
Number of measurements where met applied (in accordance with EPL and 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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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. Modifying factors are considered in Section Error: Reference source not found.

Table 4.3: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – NOVEMBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	02/11/2015 23:18	1.3	1.4	35	Yes	IA	Nil
N13	02/11/2015 22:42	1.3	1.0	36	Yes	IA	Nil
N14	03/11/2015 01:15	1.5	1.0	35	Yes	IA	Nil
N15	02/11/2015 23:39	1.3	0.8	35	Yes	IA	Nil
N16	03/11/2015 00:03	0.9	1.0	37	Yes	22	Nil
N17	03/11/2015 00:34	0.7	2.2	35	Yes	IA	Nil
N18	03/11/2015 01:50	0.0	1.2	35	Yes	IA	Nil

Notes:

1. *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;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.4: $L_{A1,1minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – NOVEMBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	02/11/2015 23:18	1.3	1.4	45	Yes	IA	Nil
N13	02/11/2015 22:42	1.3	1.0	45	Yes	IA	Nil
N14	03/11/2015 01:15	1.5	1.0	45	Yes	IA	Nil
N15	02/11/2015 23:39	1.3	0.8	45	Yes	IA	Nil
N16	03/11/2015 00:03	0.9	1.0	45	Yes	30	Nil
N17	03/11/2015 00:34	0.7	2.2	45	Yes	IA	Nil
N18	03/11/2015 01:50	0.0	1.2	45	Yes	IA	Nil

Notes:

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

4.4 EPL and Weather Conditions

Table 4.5 and Table 4.6 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – NOVEMBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{Aeq,15min}$ dB [2,3]	Exceedance[5]
N6	02/11/2015 23:18	1.3	1.4	35	Yes	IA	Nil
N13	02/11/2015 22:42	1.3	1.0	35	Yes	IA	Nil
N14	03/11/2015 01:15	1.5	1.0	35	Yes	IA	Nil
N15	02/11/2015 23:39	1.3	0.8	35	Yes	IA	Nil
N16	03/11/2015 00:03	0.9	1.0	35	Yes	22	Nil
N17	03/11/2015 00:34	0.7	2.2	35	Yes	IA	Nil
N18	03/11/2015 01:50	0.0	1.2	35	Yes	IA	Nil

Notes:

1. *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 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/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

Table 4.6: $L_{A1,1minute}$ GENERATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – NOVEMBER 2015

Location	Start Date and Time	Wind Speed m/s [4,6]	VTG °C per 100m [4,6]	Criterion dB [5]	Criterion Applies?[1]	WCP $L_{A1,1min}$ dB [2,3]	Exceedance[5]
N6	02/11/2015 23:18	1.3	1.4	45	Yes	IA	Nil
N13	02/11/2015 22:42	1.3	1.0	45	Yes	IA	Nil
N14	03/11/2015 01:15	1.5	1.0	45	Yes	IA	Nil
N15	02/11/2015 23:39	1.3	0.8	45	Yes	IA	Nil
N16	03/11/2015 00:03	0.9	1.0	45	Yes	30	Nil
N17	03/11/2015 00:34	0.7	2.2	45	Yes	IA	Nil
N18	03/11/2015 01:50	0.0	1.2	45	Yes	IA	Nil

Notes:

1. *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 including3 °C/100 metres;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

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 – NOVEMBER 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	02/11/2015 23:18	20	0	-	4
N13	02/11/2015 22:42	20	0	-	4
N14	03/11/2015 01:15	20	0	-	2
N15	02/11/2015 23:39	20	0	-	4
N16	03/11/2015 00:03	21	1	180	1
N17	03/11/2015 00:34	20	0	-	0
N18	03/11/2015 01:50	19	0	-	4

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 DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
02/11/2015 22:00	2.2	101	0.4
02/11/2015 22:15	1.1	128	0.8
02/11/2015 22:30	1.2	168	0.6
02/11/2015 22:45	1.4	177	0.8
02/11/2015 23:00	1.3	171	1.0
02/11/2015 23:15	1.0	125	1.2
02/11/2015 23:30	1.3	137	1.4
02/11/2015 23:45	1.0	140	0.6
03/11/2015 00:00	1.3	144	0.8
03/11/2015 00:15	0.9	153	1.0
03/11/2015 00:30	1.0	162	1.2
03/11/2015 00:45	0.7	108	2.2
03/11/2015 01:00	1.1	106	1.8
03/11/2015 01:15	1.4	108	0.6
03/11/2015 01:30	1.5	134	1.0
03/11/2015 01:45	0.8	125	1.2
03/11/2015 02:00	0.0	-	1.2
03/11/2015 02:15	0.0	-	1.6

Notes:

1. *Data supplied by WCP; and*
2. *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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

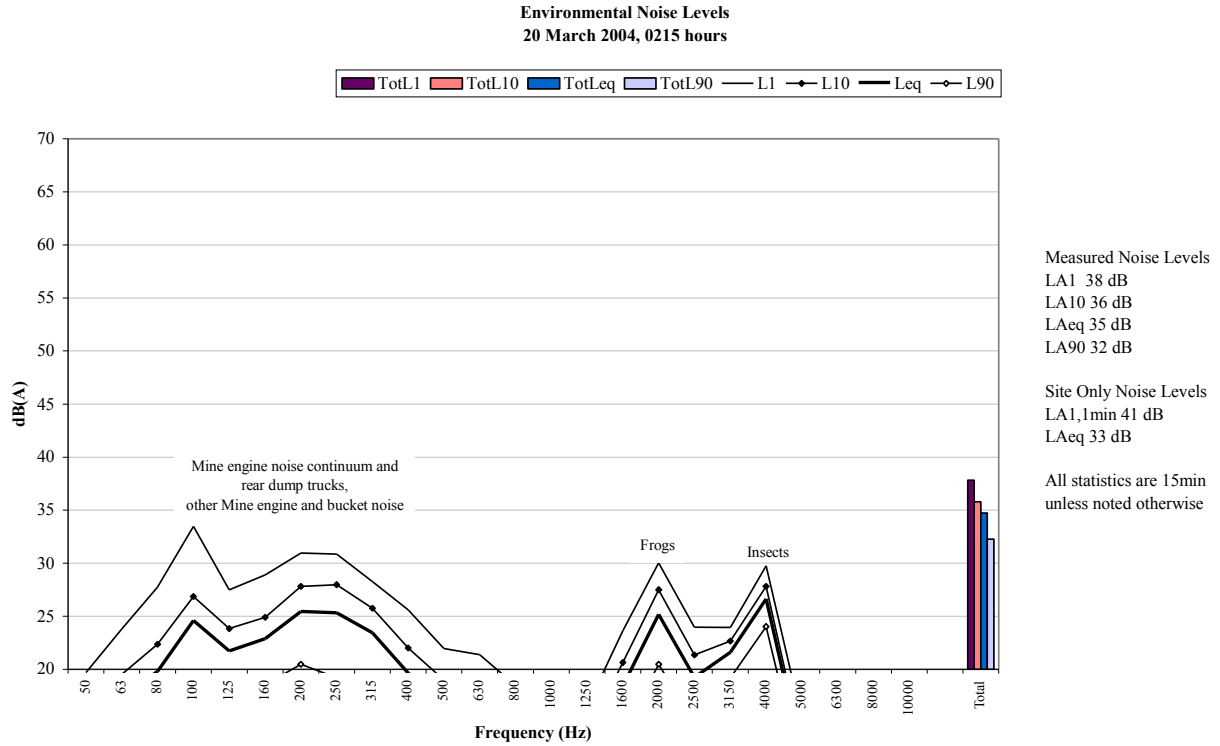

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 2 November 2015

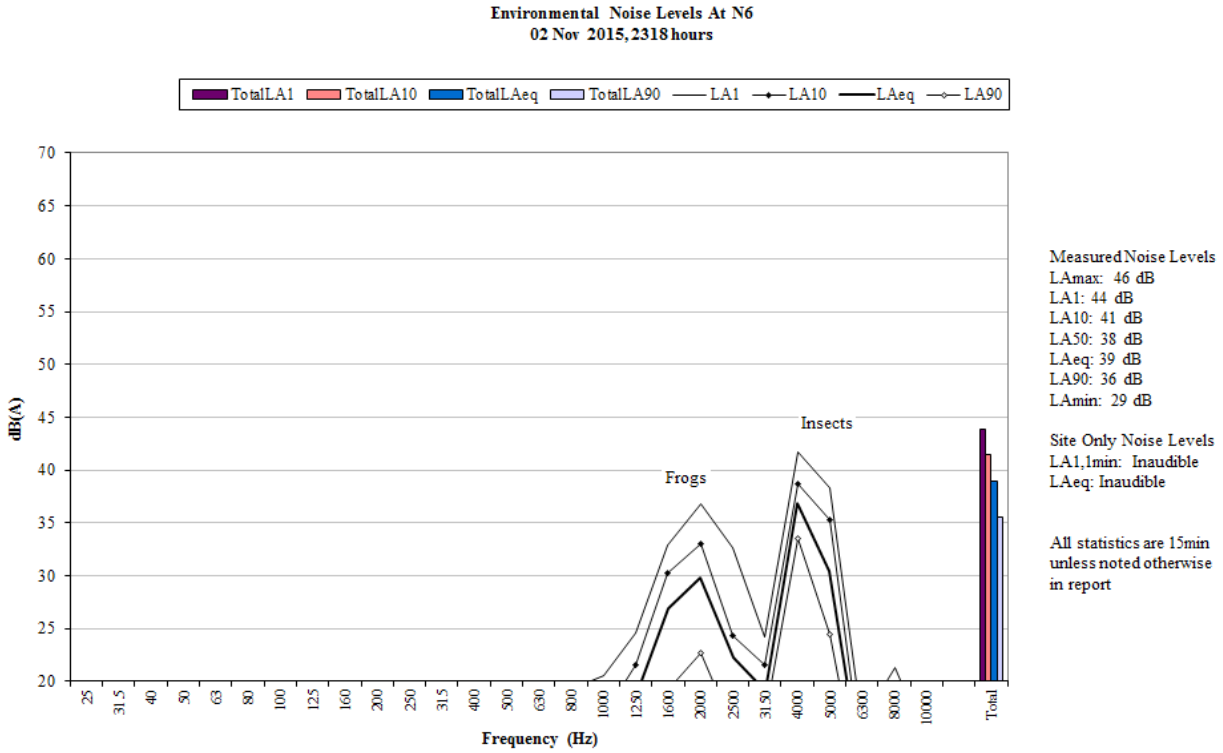

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Frogs and insects generated measured levels.

Bats and dogs were also noted.

5.1.2 N13, 2 November 2015

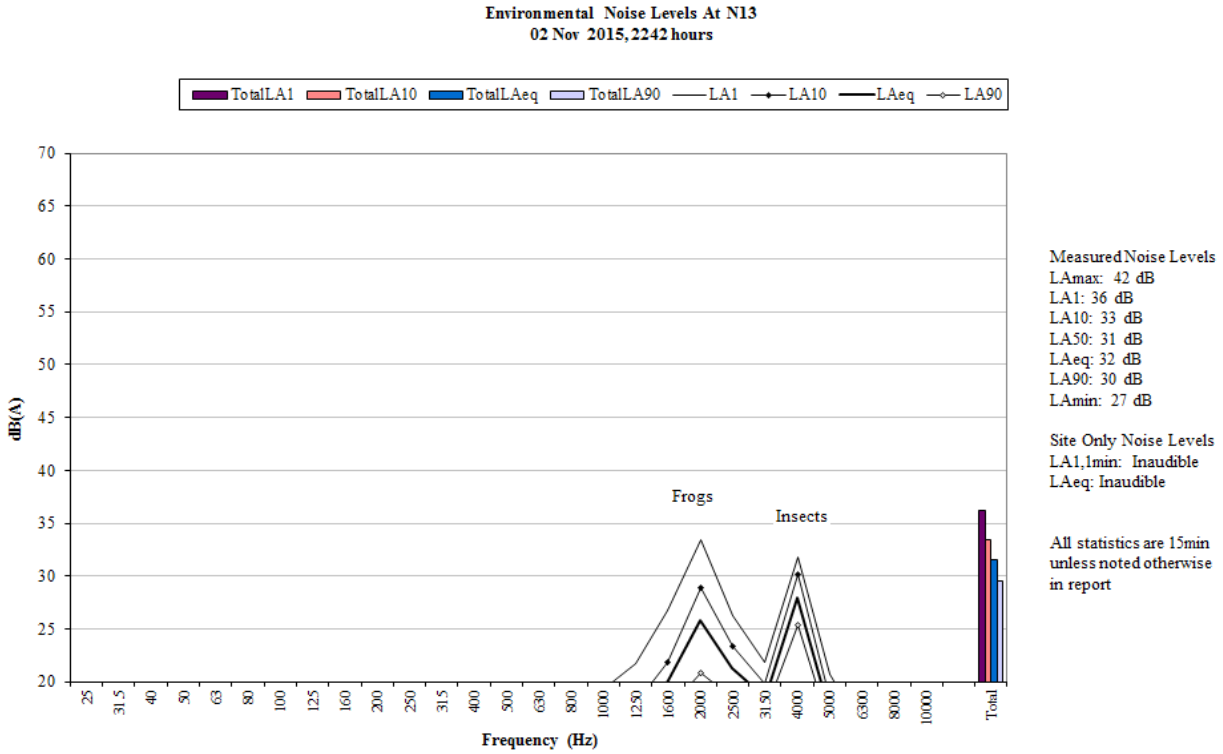

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Frogs and insects generated measured levels.

Thunder was also noted.

5.1.3 N14, 3 November 2015

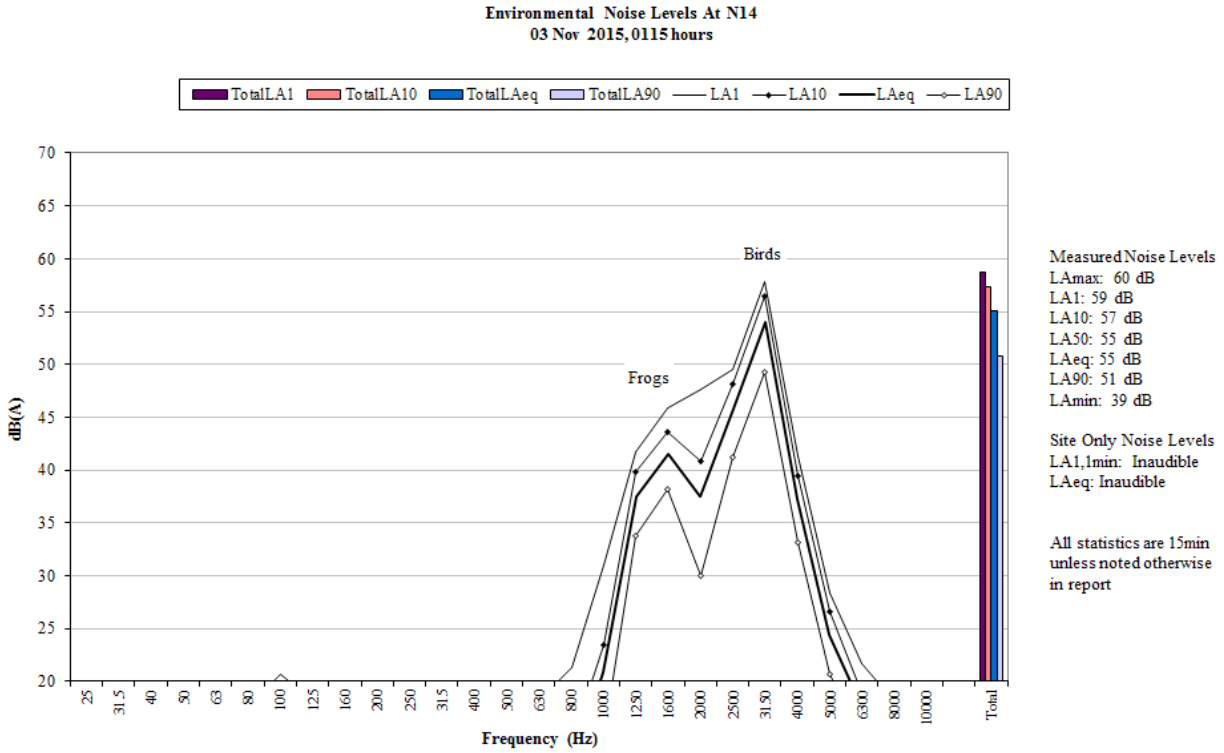

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Frogs and birds generated measured levels.

Insects and a local continuum were also noted.

5.1.4 N15, 2 November 2015

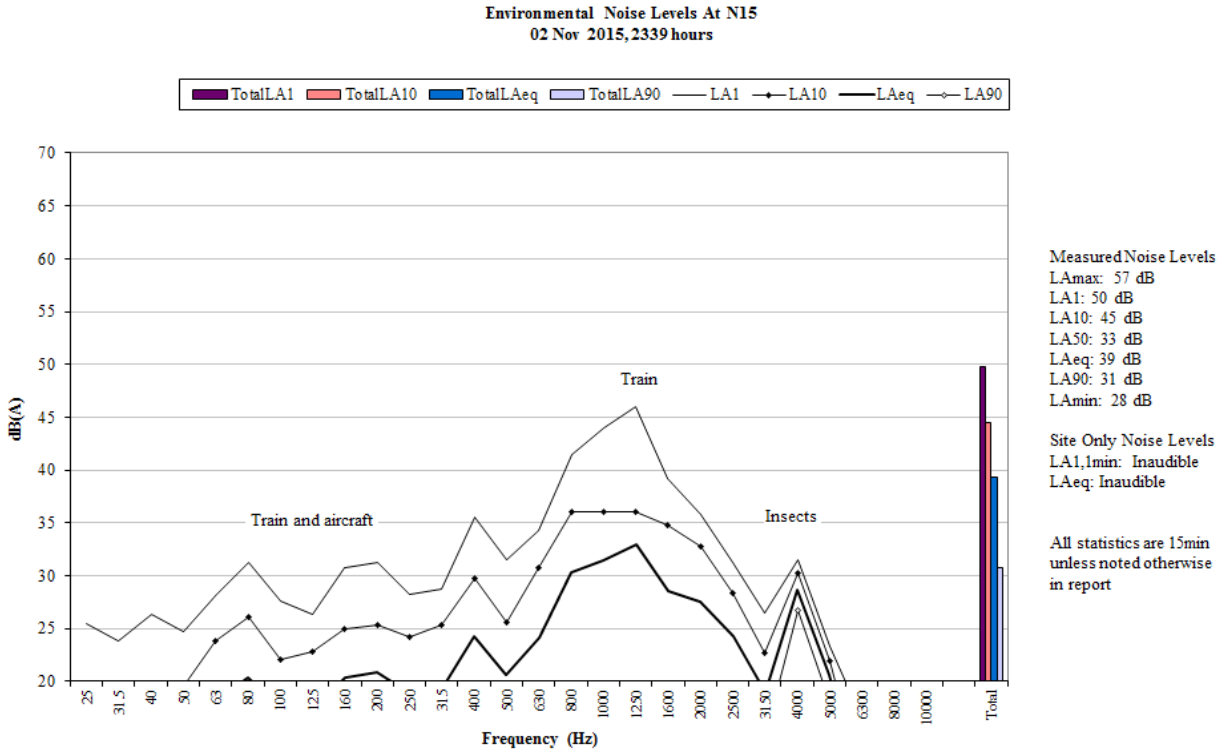

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

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

Frogs, birds and an aircraft were also noted.

5.1.5 N16, 3 November 2015

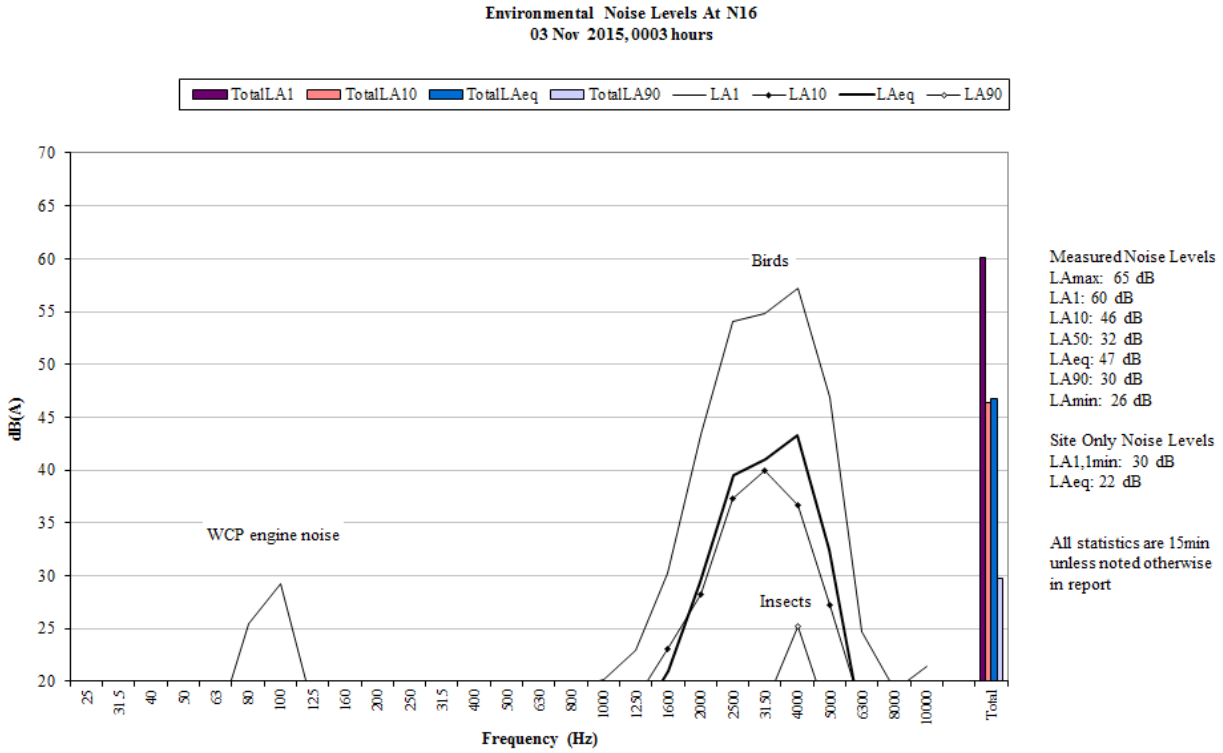

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

Low level engine noise from WCP was audible throughout the measurement generating the site only L_{Aeq} of 22 dB and $L_{A1,1minute}$ of 30 dB.

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

5.1.6 N17, 3 November 2015

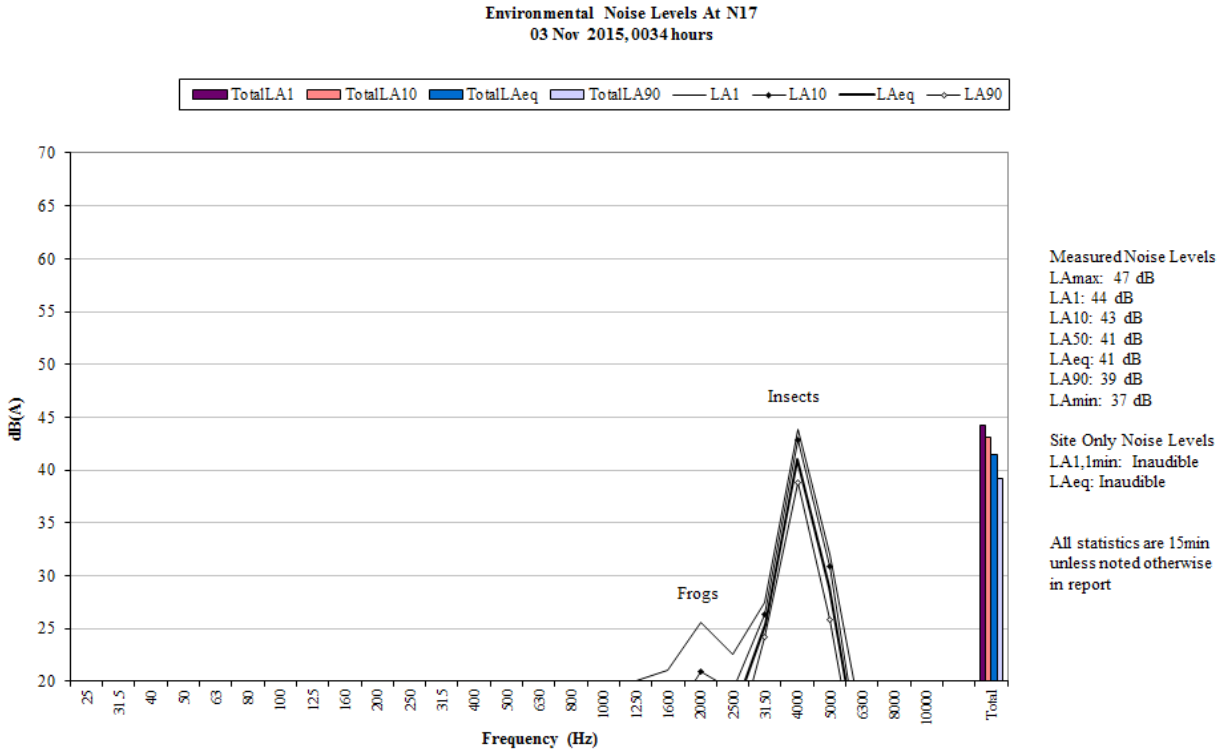

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible.

Birds generated the measured L_{Amax}. Frogs and insects generated other measured levels.

Thunder was also noted.

5.1.7 N18, 3 November 2015

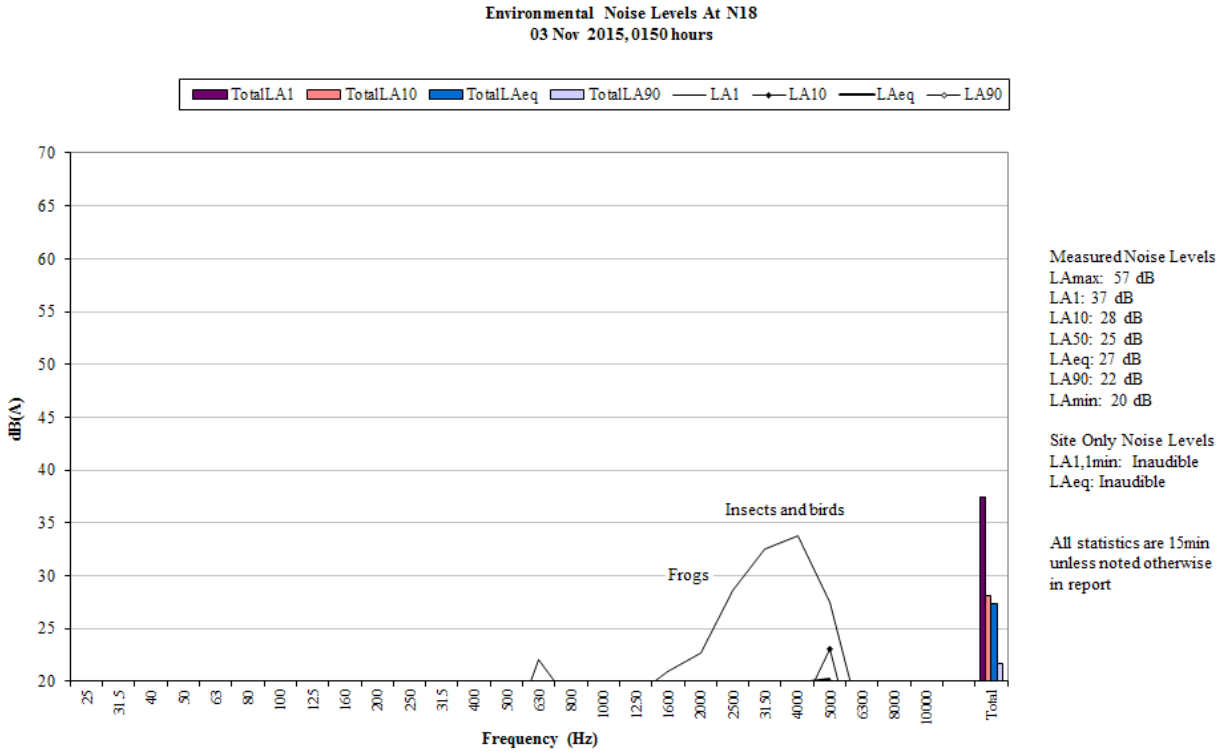

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Birds generated the measured L_{Amax}. Frogs and insects generated other measured levels.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 2/3 November 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

During the November 2015 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 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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church		40 (internal) When in use		-
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 ºC and 3ºC/100m and wind speeds greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3ºC/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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Calibration Certificate

Number : C13646

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

Preamplifier Serial Number : 70607

Ambient Temperature : 21°C

Relative Humidity : 48%

Barometric Pressure : 101.1 kPa

Calibration Technician : Adrian Walker

Calibration Date : 13-November-2013

Secondary Check by : Luke Hudson

Report Issue Date : 13-November-2013

Approved Signatory :

Tested To : IEC61672-3:2006

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
9: Indication at the calibration check frequency	Pass	14: Level linearity on the reference level range	Pass
10: Self-generated noise	Pass	15: Level linearity incl. the level range control	Pass
11: Acoustical tests of a frequency weighting	Pass	16: Toneburst response	Pass
12: Electrical tests of frequency weightings	Pass	17: Peak C sound level	Pass
13: Frequency and time weightings at 1 kHz	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.

NATA
WORLD RECOGNISED ACCREDITATION

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.

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Sound Calibrator

IEC 60942-2004

Calibration Certificate

Calibration Number C14693

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

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

Atmospheric Conditions

Ambient Temperature : 23.5°C
Relative Humidity : 48%
Barometric Pressure : 99.15kPa

Calibration Technician : Corey Stewart
Calibration Date : 19/12/2014
Secondary Check: Sandra Minto
Report Issue Date : 22/12/2014
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressre 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	*±0.15dB*	*Temperature*	*±0.3°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±4.1%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.1kPa*
Distortion	*±0.08%*		

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

NATA WORLD RECOGNISED ACCREDITATION

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

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

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

December 2015

Prepared for

Wilpinjong Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Wilpinjong Coal

Environmental Noise Monitoring
December 2015

Reference: 15449_R01
Report date: 1 February 2016

Prepared for

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Locked Bag 2005
Mudgee NSW 2850

Prepared by

Global Acoustics Pty Ltd
PO Box 3115
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. 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 5/6 December 2015. 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 December 2015 monitoring.

Low Frequency Assessment

During the December 2015 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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Appendices

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 5/6 December 2015. 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

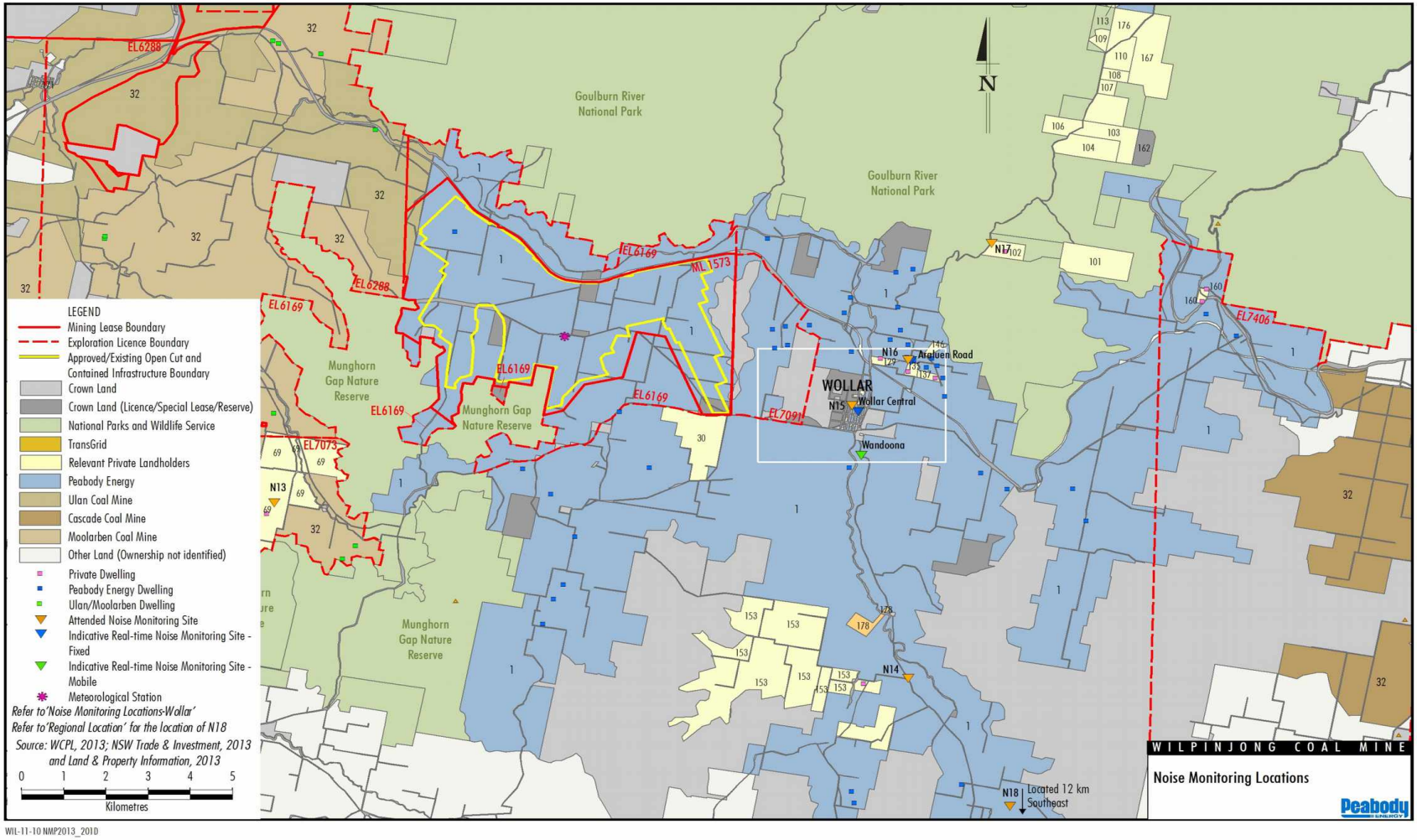

Figure 1: Attended Noise Monitoring Locations

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/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 Tony Welbourne.

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	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 LEVELS – DECEMBER 2015[1]

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	06/12/2015 00:24	46	39	34	31	32	29	25	34
N13	06/12/2015 00:56	41	37	34	29	31	26	23	38
N14	05/12/2015 22:33	62	58	56	52	53	45	32	53
N15	06/12/2015 00:03	43	37	36	35	35	33	30	38
N16	05/12/2015 23:39	41	28	25	23	23	21	19	28
N17	05/12/2015 23:09	55	54	54	52	53	52	51	50
N18	05/12/2015 22:03	48	38	35	34	34	33	32	36

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 2015.

Table 4.2: ATTENDED MEASUREMENT STATISTICS FOR WCP – DECEMBER 2015

Conditions	Total for December 2015
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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – DECEMBER 2015

Location	Start Date and Time	Wind Speed m/s [1,2]	VTG °C per 100m [1,2]	Criterion dB	Criterion Applies? [2,3]	WCP $L_{Aeq,15min}$ dB [4,5]	Exceedance [6]
N6	06/12/2015 00:24	1.9	-0.2	35	Yes	IA	Nil
N13	06/12/2015 00:56	0.0	1.0	36	Yes	IA	Nil
N14	05/12/2015 22:33	2.3	-0.8	35	Yes	IA	Nil
N15	06/12/2015 00:03	1.8	-0.4	35	Yes	IA	Nil
N16	05/12/2015 23:39	2.1	-0.6	37	Yes	IA	Nil
N17	05/12/2015 23:09	1.3	-0.4	35	Yes	IA	Nil
N18	05/12/2015 22:03	2.8	-0.8	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 2015

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	06/12/2015 00:24	1.9	-0.2	45	Yes	IA	Nil
N13	06/12/2015 00:56	0.0	1.0	45	Yes	IA	Nil
N14	05/12/2015 22:33	2.3	-0.8	45	Yes	IA	Nil
N15	06/12/2015 00:03	1.8	-0.4	45	Yes	IA	Nil
N16	05/12/2015 23:39	2.1	-0.6	45	Yes	IA	Nil
N17	05/12/2015 23:09	1.3	-0.4	45	Yes	IA	Nil
N18	05/12/2015 22:03	2.8	-0.8	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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ 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: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – DECEMBER 2015

Location	Start Date and Time	Wind Speed m/s [1,2]	VTG °C per 100m [1,2]	Criterion dB	Criterion Applies? [2,3]	WCP $L_{Aeq,15min}$ dB [4,5]	Exceedance [6]
N6	06/12/2015 00:24	1.9	-0.2	35	Yes	IA	Nil
N13	06/12/2015 00:56	0.0	1.0	35	Yes	IA	Nil
N14	05/12/2015 22:33	2.3	-0.8	35	Yes	IA	Nil
N15	06/12/2015 00:03	1.8	-0.4	35	Yes	IA	Nil
N16	05/12/2015 23:39	2.1	-0.6	35	Yes	IA	Nil
N17	05/12/2015 23:09	1.3	-0.4	35	Yes	IA	Nil
N18	05/12/2015 22:03	2.8	-0.8	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 – DECEMBER 2015

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	06/12/2015 00:24	1.9	-0.2	45	Yes	IA	Nil
N13	06/12/2015 00:56	0.0	1.0	45	Yes	IA	Nil
N14	05/12/2015 22:33	2.3	-0.8	45	Yes	IA	Nil
N15	06/12/2015 00:03	1.8	-0.4	45	Yes	IA	Nil
N16	05/12/2015 23:39	2.1	-0.6	45	Yes	IA	Nil
N17	05/12/2015 23:09	1.3	-0.4	45	Yes	IA	Nil
N18	05/12/2015 22:03	2.8	-0.8	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 – DECEMBER 2015

Location	Start Date And Time	Temperature ° C	Wind Speed m/s	Wind Direction °MN	Cloud Cover eighths
N6	06/12/2015 00:24	21	0.0	-	0
N13	06/12/2015 00:56	19	0.8	210	0
N14	05/12/2015 22:33	23	1.6	95	0
N15	06/12/2015 00:03	21	0.0	-	0
N16	05/12/2015 23:39	22	0.6	65	0
N17	05/12/2015 23:09	23	0.0	-	0
N18	05/12/2015 22:03	22	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 DATA[1]

End Date and Time	Wind Speed m/s	Wind Direction Degrees	Lapse Rate Degrees / 100 metres[2]
05/12/2015 22:00	3.2	91	-0.8
05/12/2015 22:15	2.8	94	-0.8
05/12/2015 22:30	2.1	104	-0.8
05/12/2015 22:45	2.3	101	-0.8
05/12/2015 23:00	2.5	101	-1.0
05/12/2015 23:15	2.1	107	-0.8
05/12/2015 23:30	1.3	107	-0.4
05/12/2015 23:45	2.0	115	-0.6
06/12/2015 00:00	2.1	114	-0.6
06/12/2015 00:15	1.8	115	-0.4
06/12/2015 00:30	1.8	114	0.0
06/12/2015 00:45	1.9	116	-0.2
06/12/2015 01:00	1.2	118	0.2
06/12/2015 01:15	0.0	-	1.0
06/12/2015 01:30	0.7	138	1.0
06/12/2015 01:45	0.0	-	1.0
06/12/2015 02:00	0.0	-	0.8
06/12/2015 02:15	0.5	345	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 $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (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}.

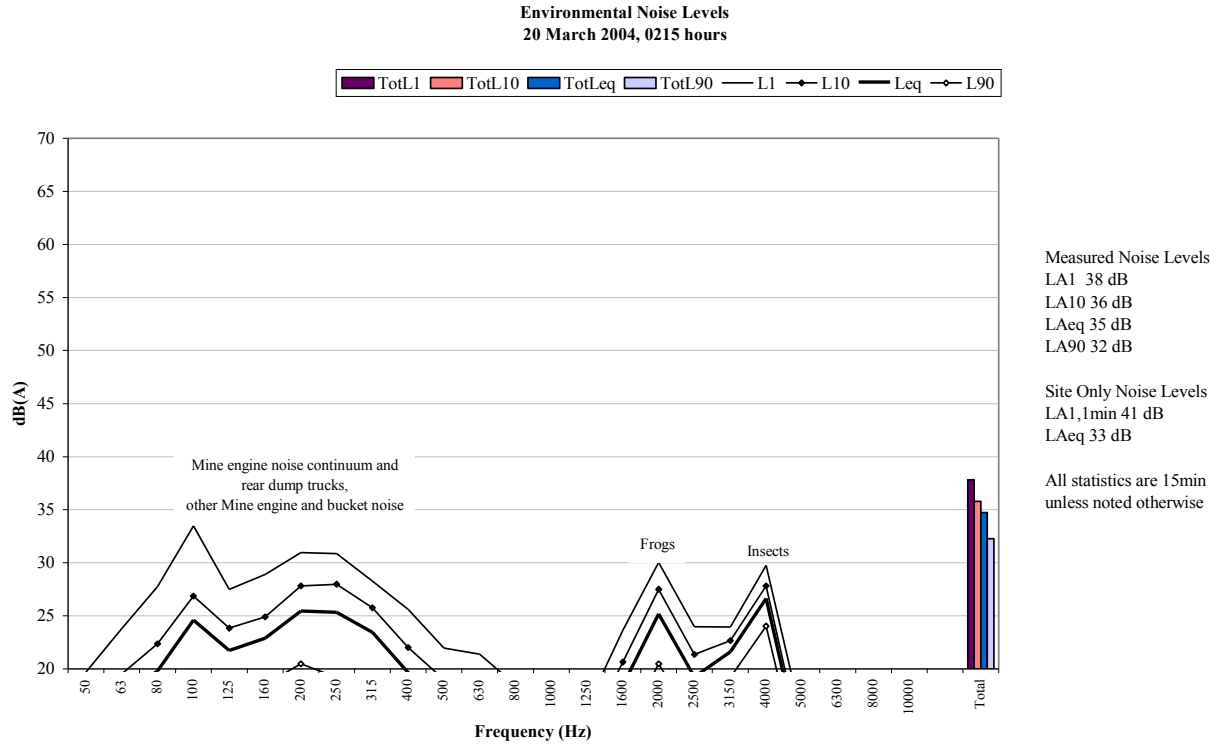

Figure 2: Example graph (refer to Section 5.1 for explanatory note)

5.1.1 N6, 6 December 2015

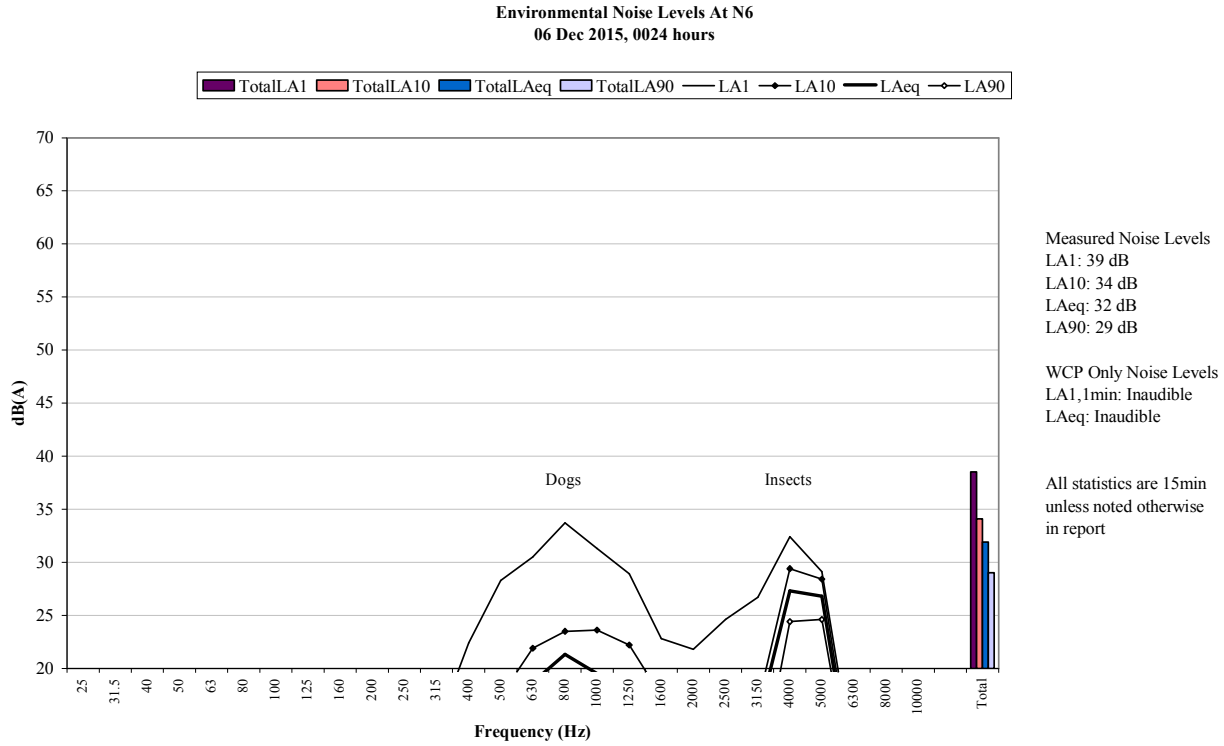

Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village

WCP was inaudible.

Dogs primarily generated the measured L_{A1}. Insects contributed to the measured L_{A1} and generated the measured L_{A10}, L_{Aeq} and L_{A90}.

Bats, road traffic tyre noise and birds were also noted.

5.1.2 N13, 6 December 2015

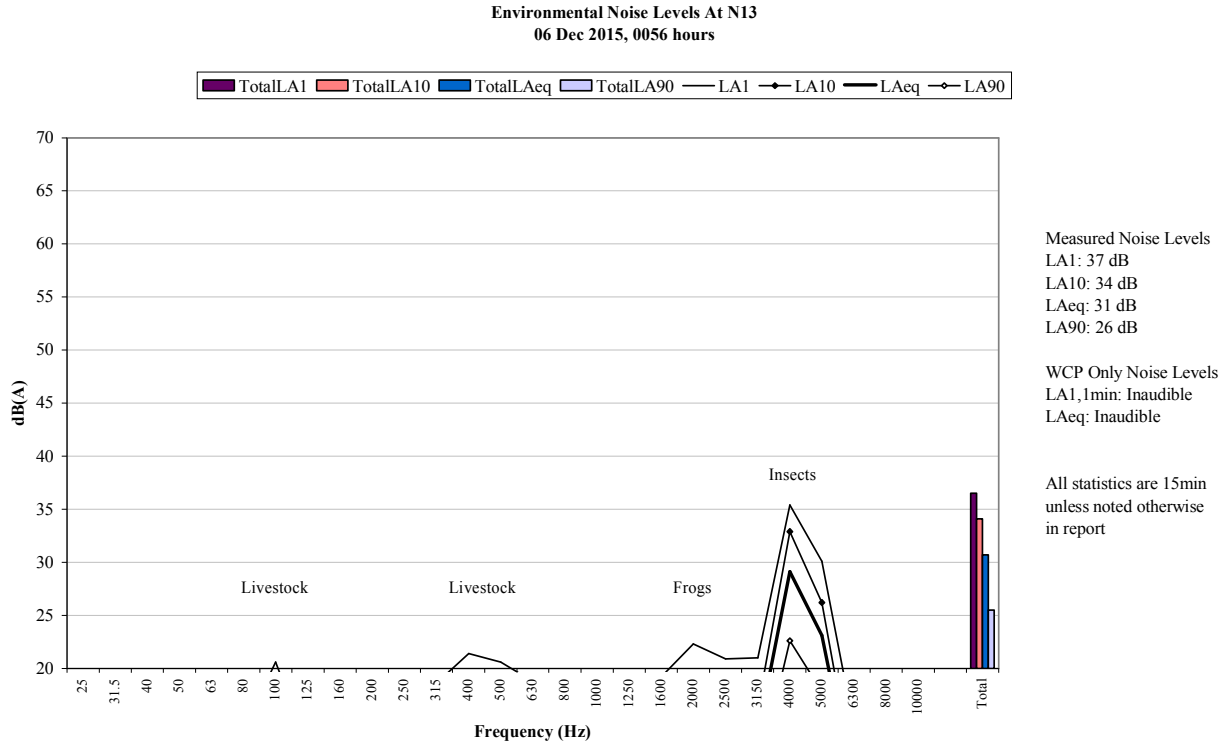

Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road

WCP was inaudible.

Insects generated measured levels.

Frogs and livestock were also noted.

5.1.3 N14, 5 December 2015

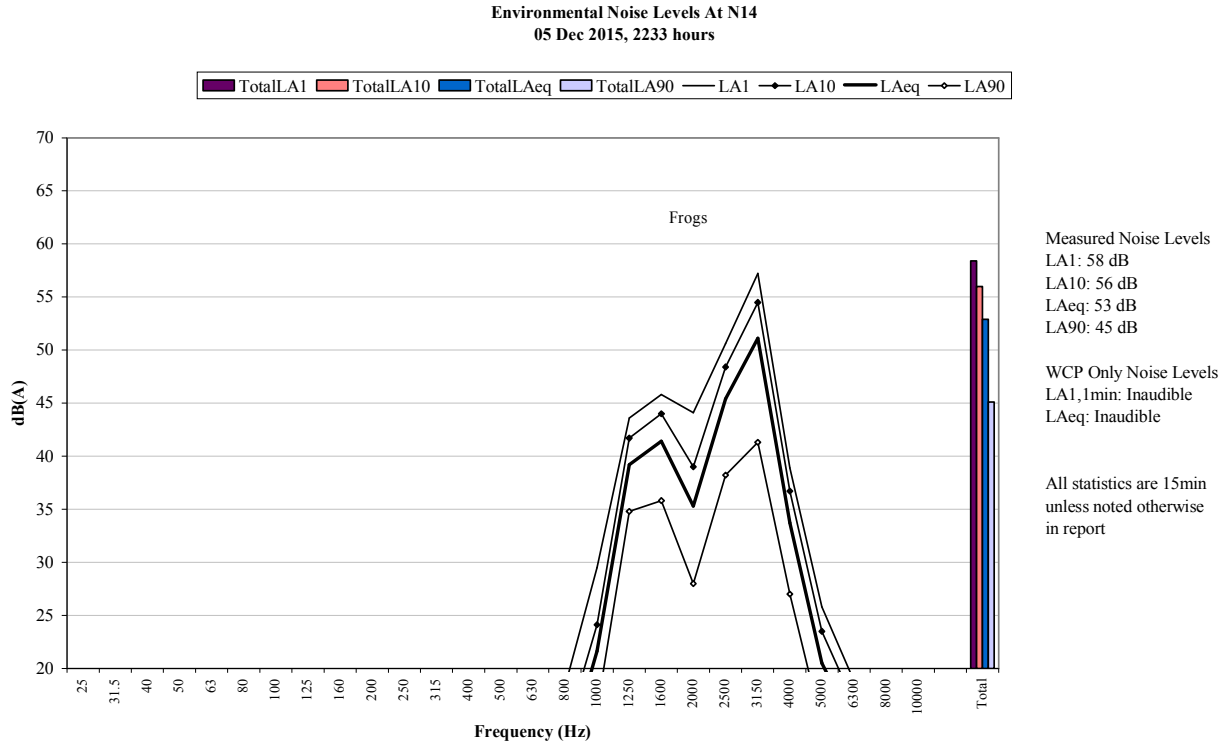

Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads

WCP was inaudible.

Frogs generated measured levels.

Breeze on the microphone was also noted.

5.1.4 N15, 6 December 2015

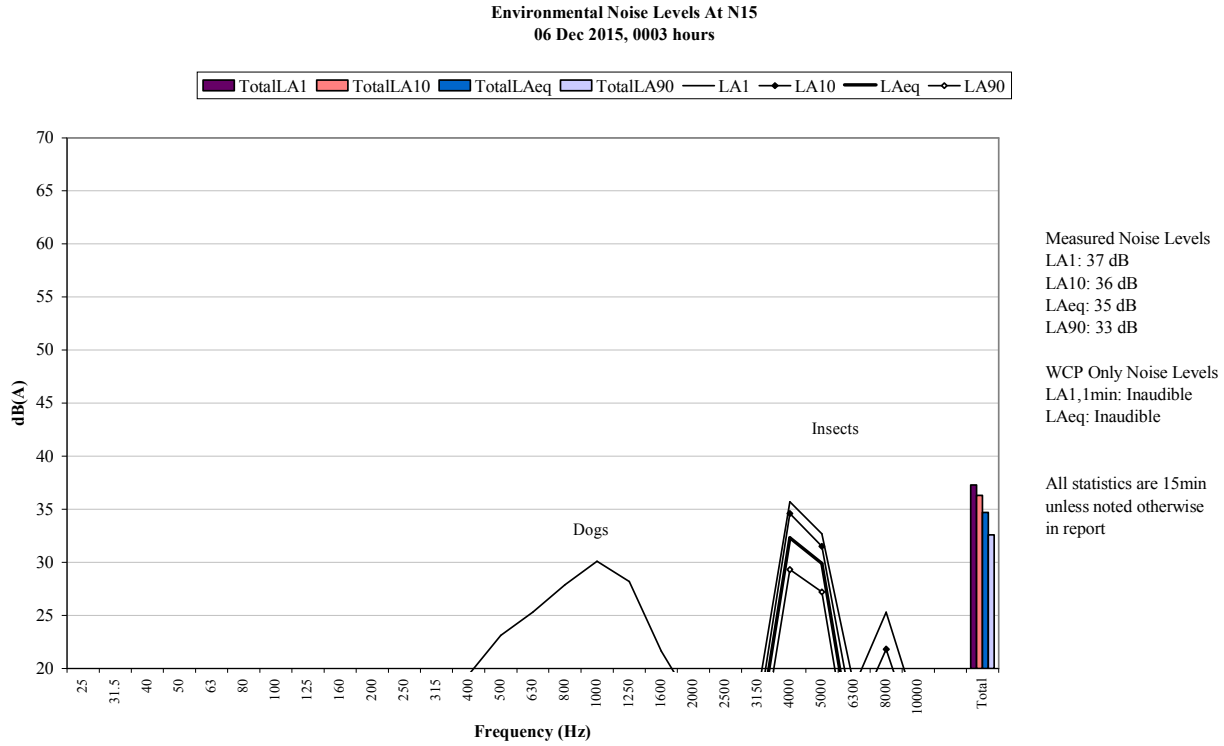

Figure 6: Environmental Noise Levels - N15, Track off Barigan Street near Wollar School, Wollar Village

WCP was inaudible.

Insects primarily generated the measured levels. Dogs contributed to the measured L_{A1}.

A train and train horn were also noted.

5.1.5 N16, 5 December 2015

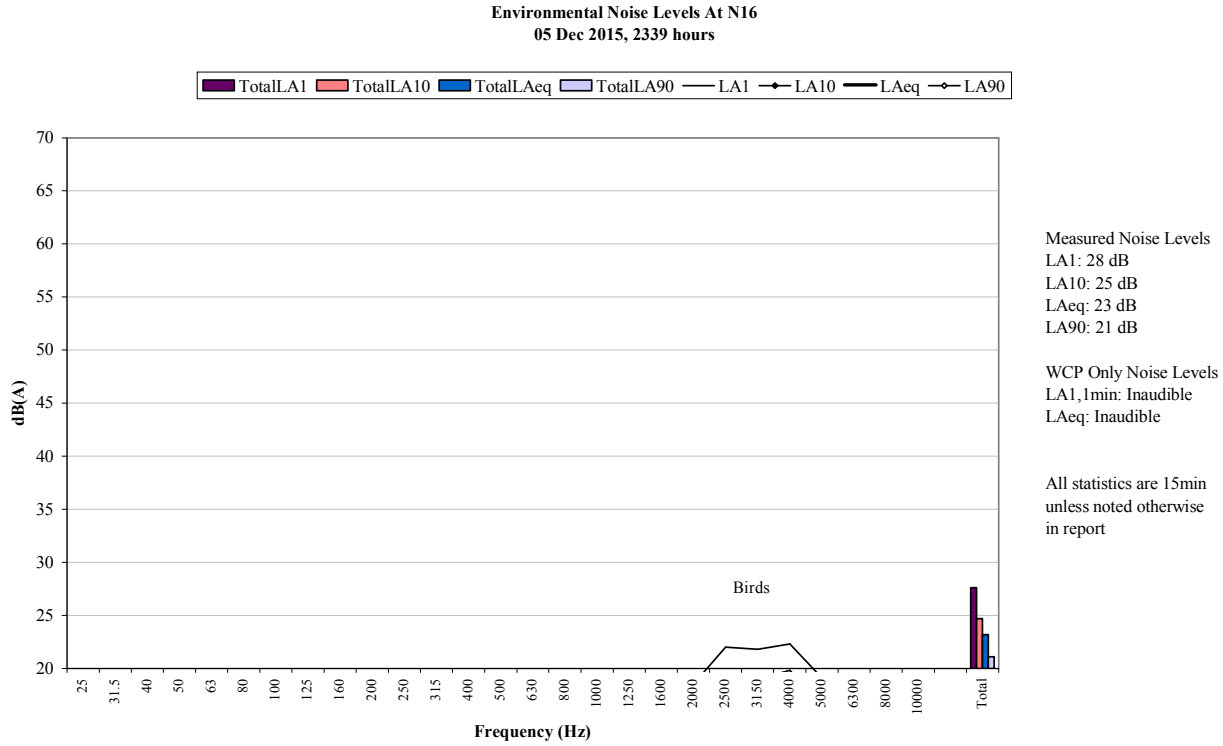

Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road

WCP was inaudible.

Birds primarily generated the measured L_{A1}. Insects and frogs generated the measured L_{A10}, L_{Aeq} and L_{A90}.

Kangaroos were also noted.

5.1.6 N17, 5 December 2015

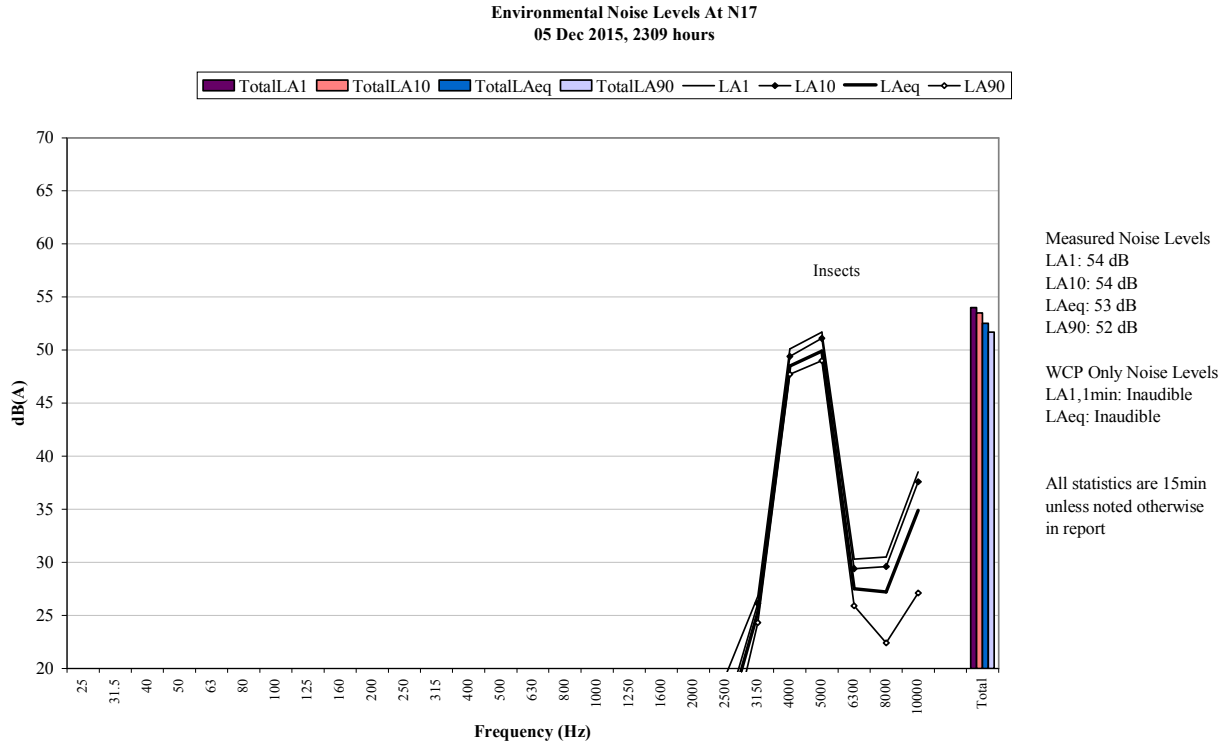

Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road

WCP was inaudible.

Insects generated measured levels.

Birds and breeze in foliage were also noted.

5.1.7 N18, 5 December 2015

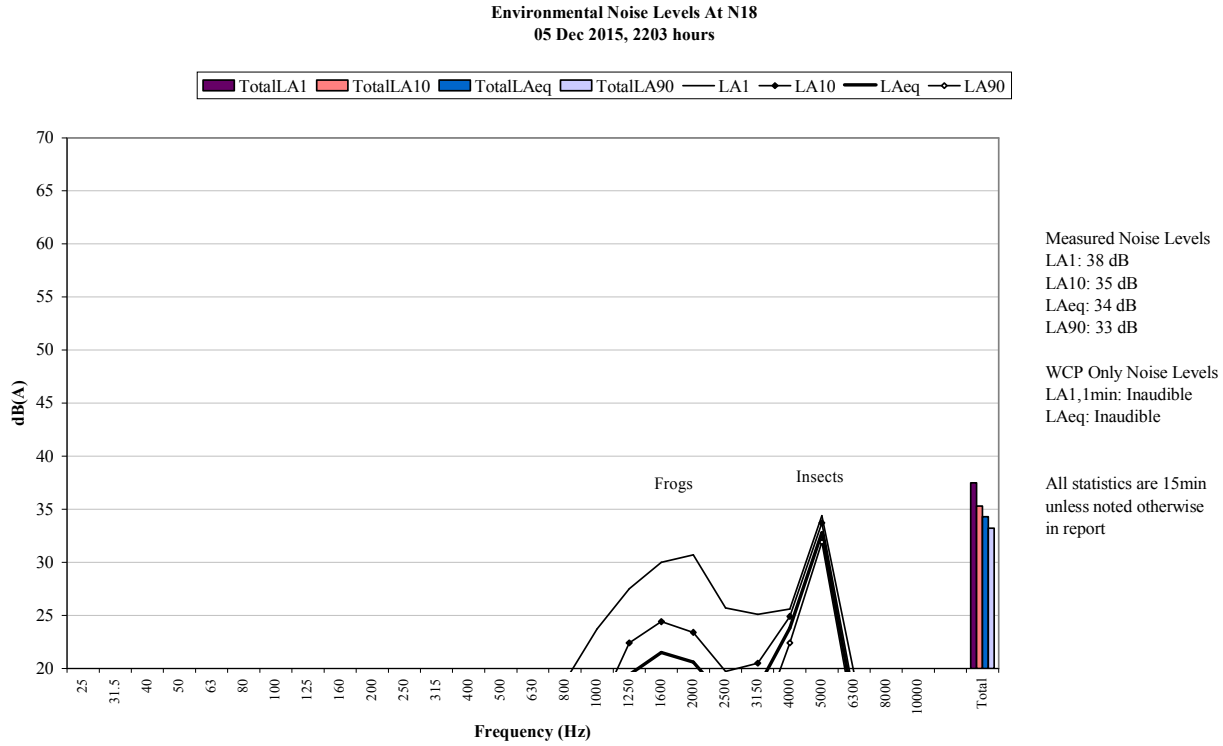

Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley

WCP was inaudible.

Insects primarily generated measured levels. Frogs contributed to the measured L_{A1}.

Livestock were also noted.

6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the night period of 5/6 December 2015. 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 2015 monitoring period.

6.2 Low Frequency Assessment

During the December 2015 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 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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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 900 – St Laurence O'Toole Catholic Church	40 (internal) When in use			-
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
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 (LAmax, LA1, LA10, LA50, LA90, LAmin, LAeq) are measured in A weighting.

Where practicable, the LA_1 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 5.5ºC/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
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		Post-Test Atmospheric Conditions	
Ambient Temperature :	21.2°C	**Ambient Temperature :**	21.6°C
Relative Humidity :	52.5%	**Relative Humidity :**	51.1%
Barometric Pressure :	99.94kPa	**Barometric Pressure :**	99.94kPa

Calibration Technician : Dennis Kim **Secondary Check:** Sandra Minto
Calibration Date : 29/05/2015 **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.

NATA WORLD RECOGNISED ACCREDITATION

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

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

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
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 Pressre 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.

NATA WORLD RECOGNISED ACCREDITATION

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

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

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Figure 10 – Noise Monitoring Locations

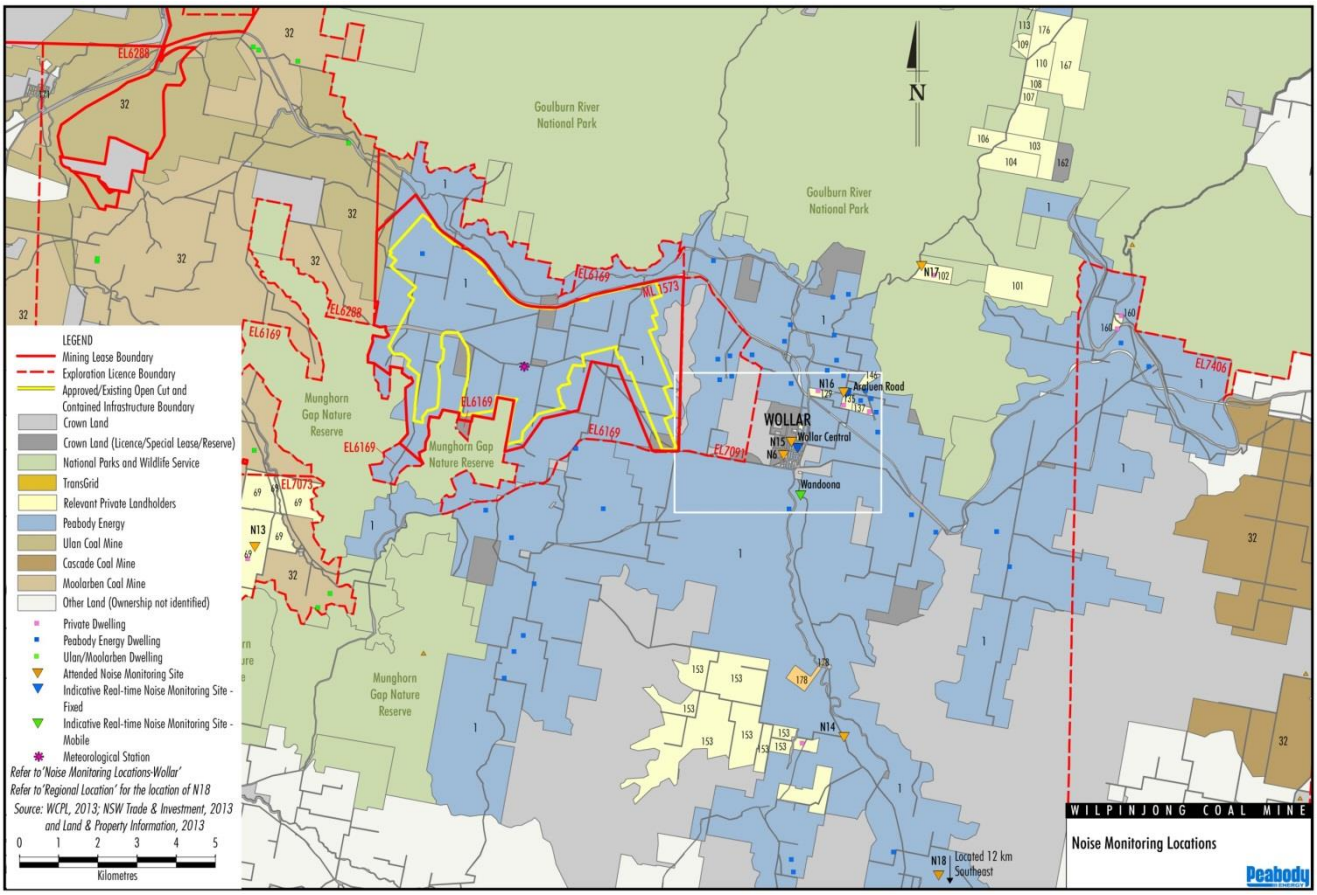

Figure 11 – Noise Monitoring Locations (Wollar)