

# *Wilpinjong Coal*

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*May / June 2013*

*Environmental Noise Monitoring*

*Prepared for*

*ALS Environmental Division*

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# *Wilpinjong Coal*

*May / June 2013*

## *Environmental Noise Monitoring*

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## *EXECUTIVE SUMMARY*

Global Acoustics was engaged by ALS Environmental Division to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine operated by Wilpinjong Coal. WCP was given approval on 1 February 2006. A modification to the consent was approved in August 2010.

An environment protection licence (EPL) was issued in early 2006 with subsequent variations approved. A revised noise-monitoring program (NMP) for WCP was approved in September 2011.

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 evening and night measurement was 15 minutes. Results of two-monthly monitoring have been compared to relevant noise limits.

Environmental noise monitoring described in this report was undertaken at five locations during the evening periods on 17, 18 and 19 June and night periods on 17/18 and 18/19 June 2013. 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 / June 2013 monitoring period. Wind speed and/or estimated temperature inversion conditions resulted in criteria not always being applicable, as indicated in Table 4.2 and Table 4.3.

## Table of Contents

<b>1</b>	<b>INTRODUCTION.....</b>	<b>5</b>
1.1	Background .....	5
1.2	Monitoring Locations.....	5
1.3	Terminology.....	7
<b>2</b>	<b>PROJECT APPROVAL AND CRITERIA.....</b>	<b>8</b>
2.1	Project Approval .....	8
2.2	Environment Protection Licence .....	8
2.3	Noise Monitoring Program.....	8
2.4	Project Specific Criteria .....	8
2.5	Acquisition Criteria.....	9
2.6	Additional Mitigation Criteria.....	9
2.7	INP Modifying Factors .....	10
2.7.1	<i>Tonality, Intermittent and Impulsive Noise</i> .....	10
2.7.2	<i>Low Frequency Noise</i> .....	10
2.8	Low Frequency Criteria .....	11
<b>3</b>	<b>METHODOLOGY.....</b>	<b>12</b>
3.1	Assessment Method .....	12
3.2	Attended Monitoring.....	14
<b>4</b>	<b>RESULTS.....</b>	<b>15</b>
4.1	Attended Noise Monitoring.....	15
4.2	Low Frequency Assessment.....	18
4.3	Atmospheric Conditions.....	19
<b>5</b>	<b>DISCUSSION .....</b>	<b>22</b>
5.1	Noted Noise Sources .....	22
5.1.1	<i>N4, 17 June 2013 - Evening</i> .....	24
5.1.2	<i>N6, 17 June 2013 – Evening</i> .....	25
5.1.3	<i>N7, 19 June 2013 - Evening</i> .....	26
5.1.4	<i>N9, 17 June 2013 - Evening</i> .....	27
5.1.5	<i>N12, 17 June 2013 - Evening</i> .....	28
5.1.6	<i>N4, 17 June 2013 - Night</i> .....	29
5.1.7	<i>N6, 10 June 2013 - Night</i> .....	30
5.1.8	<i>N7, 18 June 2013 - Night</i> .....	31
5.1.9	<i>N9, 17 June 2013 - Night</i> .....	32
5.1.10	<i>N12, 18 June 2013 - Night</i> .....	33
5.1.11	<i>N4, 18 June 2013 - Evening</i> .....	34
5.1.12	<i>N6, 11 June 2013 - Evening</i> .....	35
5.1.13	<i>N7, 18 June 2013 - Evening</i> .....	36

5.1.14	N9, 18 June 2013 - Evening.....	37
5.1.15	N12, 18 June 2013 - Evening.....	38
5.1.16	N4, 18 June 2013 - Night.....	39
5.1.17	N6, 18 June 2013 - Night.....	40
5.1.18	N7, 18 June 2013 - Night.....	41
5.1.19	N9, 18 June 2013 - Night.....	42
5.1.20	N12, 19 June 2013 - Night.....	43
<b>6</b>	<b>SUMMARY OF COMPLIANCE .....</b>	<b>44</b>

## *Appendices*

<b>A.</b>	<b>PROJECT APPROVAL.....</b>	<b>A.1</b>
<b>B.</b>	<b>CALIBRATION CERTIFICATES.....</b>	<b>B.1</b>

# 1 INTRODUCTION

## 1.1 Background

Global Acoustics was engaged by ALS Environmental Division to conduct a noise survey around Wilpinjong Coal Project (WCP), an open cut coal mine operated by Wilpinjong Coal.

Environmental noise monitoring described in this report was undertaken at five locations during the evening periods on 17, 18 and 19 June and night periods on 17/18 and 18/19 June 2013. Figure 1 shows the regular monitoring locations.

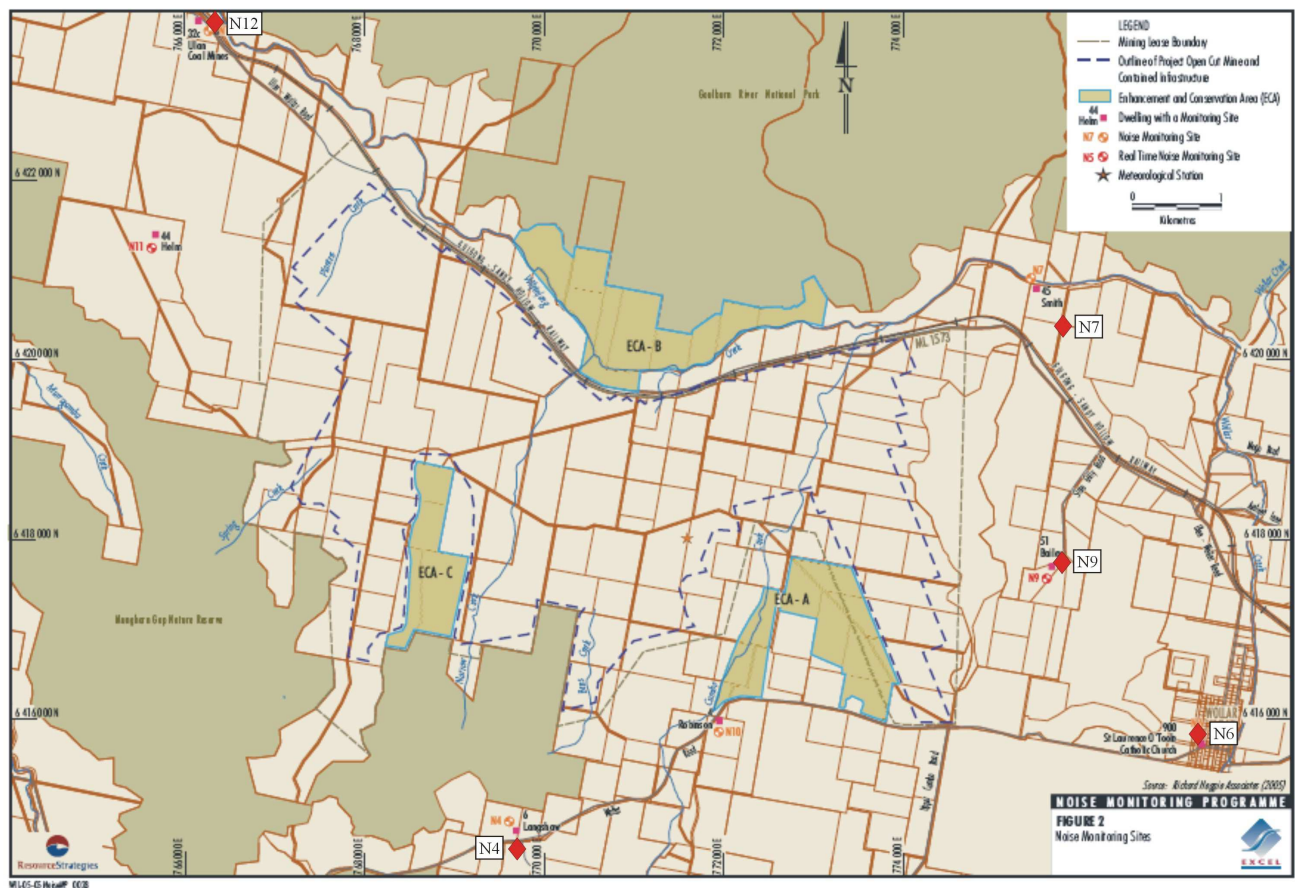
The purpose of the survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

## 1.2 Monitoring Locations

There were five regular 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 NOISE MONITORING LOCATIONS*

NMP Descriptor	Monitoring Location	Owner
N4	'Hillview' Cumbo Road, Wollar	Wilpinjong Coal Mine
N6	St Laurence O'Toole Catholic Church, representative of Wollar - Residential	NA
N7	Ulan-Wollar Road (East)	Smith
N9	Slate Gully Road, Wollar	Wilpinjong Coal Mine
N12	Ulan-Wollar Road (West)	Ulan Coal Mines



**Figure 1      Monitoring Locations**

### 1.3 Terminology

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

*Table 1.2 TERMINOLOGY*

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
$L_{A1,1minute}$	The highest noise level generated for 0.6 second during one minute
$L_{pk}$	The unweighted peak noise level at any instant
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
SEL	Sound exposure level (SEL), the A-weighted noise energy during a measurement period normalised to one second
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
ABL	Assessment background level (ABL), the 10th percentile background noise level for a single period (day, evening or night) of a 24 hour monitoring period
RBL	Rating background level (RBL), the background noise level for a period (day, evening or night) determined from ABL data

## 2 PROJECT APPROVAL AND CRITERIA

### 2.1 Project Approval

WCP was given approval on 1 February 2006. A modification to the project was approved in August 2010. The relevant noise conditions from Section 3 - Specific Environmental 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 December 2012. Section L5 of the licence outlines noise limits and is reproduced in Appendix A.

### 2.3 Noise Monitoring Program

The noise-monitoring program for WCP was revised in September 2011. Section 5.1 details attended monitoring locations and methodology. The relevant sections are reproduced in Appendix A.

### 2.4 Project Specific Criteria

Day, evening and night criteria are detailed in Table 2.1. These have been selected as the most appropriate for each monitoring location and are based on the consolidated consent or environment protection licence associated with Wilpinjong Coal Project operations.

Table 2.1 WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB

NMP Descriptor/ Resident number	Monitoring Location	Day L <sub>Aeq,15 minute</sub>	Evening L <sub>Aeq,15 minute</sub>	Night L <sub>Aeq,15 minute</sub> / L <sub>A1,1 minute</sub>
N4	'Hillview' Cumbo Road, Wollar <sup>3</sup>	NA	NA	NA/NA
N6 / Wollar	Catholic Church representative of Wollar – Residential	35 <sup>1</sup>	35 <sup>1</sup>	35 <sup>1</sup> /45 <sup>1</sup>
N7 / 45	Ulan-Wollar Road (East) <sup>4</sup>	NA	NA	NA/NA
N9 / 58	Slate Gully Road, Wollar <sup>3</sup>	NA	NA	NA/NA
N12	Ulan-Wollar Road (West) <sup>2</sup>	NA	NA	NA/NA

Notes:

1. Limits from Environment Protection Licence No. 12425 and 2010 Modification;
2. Property is designated as a non-WPL mining interest in the 2010 Modification, so criteria are NA, 'not applicable';
3. These properties are owned by WCP, so criteria are NA, 'not applicable'; and
4. Property is listed as acquisition upon request in 2010 modification, so criteria is NA, 'not applicable'.

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.

## 2.5 Acquisition Criteria

As detailed in condition 3 of Schedule 3 of the project approval, acquisition criteria for WCP are to consider noise in respect to the criteria detailed in Table 2.2 for all privately owned land (excluding land owned by Gaffney – 30, Smith – 45, Evans – 48, Thomson & Hopper – 50 and McKenzie – 94).

*Table 2.2 WILPINJONG COAL ACQUISITION CRITERIA, dB*

Property	L <sub>Aeq,15 minute</sub>
All privately owned land	40

## 2.6 Additional Mitigation Criteria

As detailed in condition 4 of Schedule 3 of the project, additional mitigation criteria for WCP are to consider noise in respect to the criteria detailed in Table 2.3 for most privately owned land.

*Table 2.3 WILPINJONG COAL ADDITIONAL MITIGATION CRITERIA, dB*

Property	L <sub>Aeq,15 minute</sub>
All other privately owned land, excluding those listed below	38

Land listed in Table 1 of the consent, or property numbers 23B, 25, 52A, 52B, 53 or 58 will receive mitigation upon request.

## 2.7 INP Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with EPA 'Industrial Noise Policy' (INP). As detailed in Condition 2 of Schedule 3 to the Project Approval:

*Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

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.

### 2.7.1 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.

### 2.7.2 Low Frequency Noise

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.*

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 criterion, a 5 dB penalty (modifying factor) is added to predicted levels.

## 2.8 Low Frequency Criteria

Low frequency criteria are detailed in Table 2.4.

*Table 2.4 LOW FREQUENCY CRITERIA (dBC)*

Method	Assessment/Calculation Method	Night-time Criterion	Daytime Criterion
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 criteria presented above.

## 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. The duration of each evening and night measurement was 15 minutes.

Attended monitoring during this reporting period was undertaken by Peter Davies.

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 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  $L_{A1,1\text{minute}}$  corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms this is the highest noise level emitted from the Wilpinjong Coal Project (WCP) noise source during the entire measurement period (i.e. the highest level of the worst minute during the 15-minute measurement).

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

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



### 3.2 *Attended Monitoring*

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

*Table 3.1 MONITORING EQUIPMENT*

<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due Date</b>
Rion NA-28 sound level analyser	00701424	10/05/2015
Rion NC-73 acoustic calibrator	11248306	19/03/2015

## 4 RESULTS

### 4.1 Attended Noise Monitoring

Overall noise levels measured at each location during attended measurement are provided in Table 4.1. Table 4.2 and Table 4.3 detail  $L_{Aeq,15 \text{ minute}}$  and  $L_{A1,1 \text{ minute}}$  noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mine's development consent. There were no modifying factors applicable to measured noise levels during this survey.

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 2013*

Location	Date and Time	$L_{Amax}$ dB	$L_{A1}$ dB	$L_{A10}$ dB	$L_{A50}$ dB	$L_{Aeq}$ dB	$L_{A90}$ dB	$L_{Amin}$ dB
<b>Evening</b>								
N4	17/06/2013 21:50	48	35	32	30	30	28	27
N6	17/06/2013 21:23	43	35	24	19	23	18	18
N7	19/06/2013 18:21	42	36	34	32	32	30	27
N9	17/06/2013 20:47	48	41	38	35	36	32	30
N12	17/06/2013 19:47	42	38	37	36	36	35	33
<b>Night</b>								
N4	17/06/2013 22:05	46	35	28	26	27	23	22
N6	17/06/2013 22:45	43	29	24	21	22	19	18
N7	18/06/2013 00:06	44	40	37	34	35	32	30
N9	17/06/2013 23:21	47	41	38	35	36	32	30
N12	18/06/2013 00:49	49	39	37	34	35	32	29
<b>Evening</b>								
N4	18/06/2013 21:44	43	31	19	16	19	15	14
N6	18/06/2013 21:11	47	28	25	22	23	20	19
N7	18/06/2013 20:00	47	37	33	30	31	28	26
N9	18/06/2013 20:40	42	37	34	31	32	28	26
N12	18/06/2013 18:57	47	44	40	36	37	34	33
<b>Night</b>								
N4	18/06/2013 22:05	37	25	18	16	18	16	15
N6	18/06/2013 22:35	49	45	36	21	32	19	18
N7	18/06/2013 23:35	38	36	34	31	32	30	28
N9	18/06/2013 23:06	44	38	33	29	31	26	23
N12	19/06/2013 00:13	47	43	41	38	39	36	33

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

Table 4.2  $L_{Aeq,15\text{ minute}}$  dB GENERATED BY WCP AGAINST IMPACT ASSESSMENT CRITERIA - JUNE 2013

Location	Date and Time	Wind Speed m/s <sup>8,9</sup>	VTG °C per 100m <sup>6,8,9</sup>	Criterion dB <sup>7</sup>	Criterion Applies? <sup>1,5</sup>	WCP $L_{Aeq,15\text{min}}$ dB <sup>2,3</sup>	Exceedance <sup>4,5,7</sup>
<b>Evening</b>							
N4	17/06/13 21:50	1.3	1.0	NA	N	IA	NA
N6	17/06/13 21:23	1.9	0.0	35	Y	IA	N
N7	19/06/13 18:21	0.8	2.9	NA	N	21	NA
N9	17/06/13 20:47	1.8	-0.2	NA	N	36	NA
N12	17/06/13 19:47	4.0	-0.3	NA	N	20	NA
<b>Night</b>							
N4	17/06/13 22:05	1.4	2.2	NA	N	IA	NA
N6	17/06/13 22:45	2.8	1.7	35	N	IA	NA
N7	18/06/13 00:06	0.0	0.0	NA	N	35	NA
N9	17/06/13 23:21	1.1	2.1	NA	N	36	NA
N12	18/06/13 00:49	0.0	0.0	NA	N	34	NA
<b>Evening</b>							
N4	18/06/13 21:44	0.0	2.2	NA	N	IA	NA
N6	18/06/13 21:11	0.7	2.9	35	Y	IA	N
N7	18/06/13 20:00	2.4	0.9	NA	N	30	NA
N9	18/06/13 20:40	1.1	0.5	NA	N	32	NA
N12	18/06/13 18:57	1.5	-0.5	NA	N	31	NA
<b>Night</b>							
N4	18/06/13 22:05	0.8	2.8	NA	N	IA	NA
N6	18/06/13 22:35	0.0	3.1	35	N	IA	NA
N7	18/06/13 23:35	0.0	2.6	NA	N	32	NA
N9	18/06/13 23:06	0.0	3.3	NA	N	31	NA
N12	19/06/13 00:13	0.0	2.2	NA	N	39	NA

- Notes:
- Noise emission limits apply for winds up to 3 metres per second (at a height of 10 metres, or, vertical temperature gradients of up to 3 degrees/100m with wind speed up to 2 m/s;
  - These are results for WCP in the absence of all other noise sources;
  - NM denotes audible but not measurable, IA denotes inaudible;
  - Bolded results in red are those greater than the relevant criterion (if applicable);
  - Y denotes Yes, N denotes No;
  - Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
  - 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;
  - Atmospheric data is sourced from the WCP weather station; and
  - Criterion may or may not apply due to rounding of meteorological data values.

Table 4.3  $L_{A1,1\text{ minute}}$  dB GENERATED BY WCP AGAINST IMPACT ASSESSMENT CRITERIA – JUNE 2013

Location	Date and Time	Wind Speed m/s <sup>8,9</sup>	VTG °C per 100m <sup>6,8,9</sup>	Criterion dB <sup>7</sup>	Criterion Applies? <sup>1,5</sup>	WCP $L_{A1}$ , 1 min dB <sup>2,3</sup>	Exceedance <sup>4,5,7</sup>
<b>Night</b>							
N4	17/06/13 22:05	1.4	2.2	NA	N	IA	NA
N6	17/06/13 22:45	2.8	1.7	45	N	IA	NA
N7	18/06/13 00:06	0.0	0.0	NA	N	44	NA
N9	17/06/13 23:21	1.1	2.1	NA	N	41	NA
N12	18/06/13 00:49	0.0	0.0	NA	N	38	NA
<b>Night</b>							
N4	18/06/13 22:05	0.8	2.8	NA	N	IA	NA
N6	18/06/13 22:35	0.0	3.1	45	N	IA	NA
N7	18/06/13 23:35	0.0	2.6	NA	N	38	NA
N9	18/06/13 23:06	0.0	3.3	NA	N	44	NA
N12	19/06/13 00:13	0.0	2.2	NA	N	46	NA

- Notes:
1. Noise emission limits apply for winds up to 3 metres per second (at a height of 10 metres, and, vertical temperature gradients of up to 3 degrees/100m with wind speed up to 2 m/s;
  2. These are results for WCP in the absence of all other noise sources;
  3. NM denotes audible but not measurable, IA denotes inaudible;
  4. Bolded results in red are those greater than the relevant criterion (if applicable);
  5. Y denotes Yes, N denotes No;
  6. Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;
  7. 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;
  8. Atmospheric data is sourced from the WCP weather station; and
  9. Criterion may or may not apply due to rounding of meteorological data values.

Where WCP only noise levels are within the impact assessment criteria, it is not necessary to compare these noise levels to acquisition or mitigation criteria, as these levels are higher. Compliance with impact assessment indicates compliance with acquisition or mitigation criteria.

## 4.2 Low Frequency Assessment

Table 4.4 provides statistics for attended noise monitoring undertaken around WCP during the June 2013 survey.

*Table 4.4 ATTENDED MEASUREMENT STATISTICS FOR WCP – JUNE 2013*

Conditions	Total for June 2013
Number of measurements	20
Number of measurements where met applies	15
Number of measurements where WCP is measurable and criteria and met applies	0

None of the 20 measurements occurred during which WCP was directly measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value “<30 dB”) and where meteorological conditions resulted in criteria applying (in accordance with the consent). No further analysis of low frequency content was required.

### 4.3 Atmospheric Conditions

Atmospheric condition data measured at each location are shown in Table 4.5. Data obtained concurrently by the WCP meteorological station is provided in Table 4.6.

*Table 4.5 MEASURED ATMOSPHERIC CONDITIONS – JUNE 2013*

Location	Date And Time	Temperature (° C)	Wind Speed (m/s)	Wind Direction (° MN)	Cloud Cover (eighths)
<b>Evening</b>					
N4	17/06/13 21:50	9	1.3	250	2
N6	17/06/13 21:23	10	0.0	-	6
N7	19/06/13 18:21	8	0.0	-	1
N9	17/06/13 20:47	13	0.0	-	6
N12	17/06/13 19:47	12	0.0	-	6
<b>Night</b>					
N4	17/06/13 22:05	9	1.0	250	2
N6	17/06/13 22:45	8	0.3	240	1
N7	18/06/13 00:06	9	0.0	-	0
N9	17/06/13 23:21	10	0.5	240	0
N12	18/06/13 00:49	6	1.0	250	0
<b>Evening</b>					
N4	18/06/13 21:44	3	0.4	190	1
N6	18/06/13 21:11	6	0.4	10	1
N7	18/06/13 20:00	6	0.0	-	2
N9	18/06/13 20:40	5	0.4	30	1
N12	18/06/13 18:57	6	0.5	10	3
<b>Night</b>					
N4	18/06/13 22:05	3	0.2	190	1
N6	18/06/13 22:35	3	0.0	-	1
N7	18/06/13 23:35	5	0.0	-	7
N9	18/06/13 23:06	3	0.0	-	3
N12	19/06/13 00:13	5	0.0	-	7

Notes: 1. Wind speed and direction measured at 1.8 metres.

*Table 4.6 WCP METEOROLOGICAL STATION DATA*

Date and Time	Wind Speed (m/s)	Wind Direction (Degrees)	Lapse Rate (Degrees / 100 metres)
17/06/2013 18:00	2.5	267	-0.5
17/06/2013 18:15	3.0	273	-0.5
17/06/2013 18:30	3.1	276	-0.5
17/06/2013 18:45	2.2	271	-0.5
17/06/2013 19:00	3.2	259	-0.5
17/06/2013 19:15	4.4	260	-0.7
17/06/2013 19:30	4.4	261	-0.5
17/06/2013 19:45	4.3	262	-0.5
17/06/2013 20:00	4.0	255	-0.3
17/06/2013 20:15	3.2	239	-0.3
17/06/2013 20:30	2.9	235	0.0
17/06/2013 20:45	2.3	231	-0.2
17/06/2013 21:00	1.8	246	-0.2
17/06/2013 21:15	2.2	248	0.0
17/06/2013 21:30	1.9	255	0.0
17/06/2013 21:45	1.6	264	0.9
17/06/2013 22:00	1.3	265	1.0
17/06/2013 22:15	1.4	327	2.2
17/06/2013 22:30	1.9	353	2.1
17/06/2013 22:45	2.4	344	1.4
17/06/2013 23:00	2.8	339	1.7
17/06/2013 23:15	3.1	336	2.2
17/06/2013 23:30	1.1	352	2.1
17/06/2013 23:45	1.4	353	3.3
18/06/2013 00:00	0.0	-	0.0
18/06/2013 00:15	0.0	-	0.0
18/06/2013 00:30	0.0	-	0.0
18/06/2013 00:45	0.0	-	0.0
18/06/2013 01:00	0.0	-	0.0
18/06/2013 18:00	4.9	256	-0.7
18/06/2013 18:15	4.0	257	-0.5
18/06/2013 18:30	3.7	265	-0.7
18/06/2013 18:45	3.9	266	-0.5
18/06/2013 19:00	2.5	255	-0.3
18/06/2013 19:15	1.5	272	-0.5
18/06/2013 19:45	1.9	325	0.7

*Table 4.6 WCP METEOROLOGICAL STATION DATA*

Date and Time	Wind Speed (m/s)	Wind Direction (Degrees)	Lapse Rate (Degrees / 100 metres)
18/06/2013 20:00	2.4	309	1.0
18/06/2013 20:15	2.4	291	0.9
18/06/2013 20:30	1.5	282	0.9
18/06/2013 20:45	1.6	293	0.9
18/06/2013 21:00	1.1	304	0.5
18/06/2013 21:15	0.9	264	1.7
18/06/2013 21:30	0.7	329	2.9
18/06/2013 21:45	0.5	288	2.6
18/06/2013 22:00	0.0	-	2.2
18/06/2013 22:15	0.8	265	2.8
18/06/2013 22:30	0.0	-	3.1
18/06/2013 22:45	0.0	-	3.1
18/06/2013 23:00	0.0	-	3.3
18/06/2013 23:15	0.0	-	3.3
18/06/2013 23:30	0.0	-	3.1
18/06/2013 23:45	0.0	-	2.6
19/06/2013 00:00	0.0	-	0.0
19/06/2013 00:15	0.0	-	0.0
19/06/2013 00:30	0.0	-	2.2
19/06/2013 00:45	0.6	5	2.4
19/06/2013 01:00	0.0	-	2.1

Notes: 1. Data supplied by WCP.

## 5 DISCUSSION

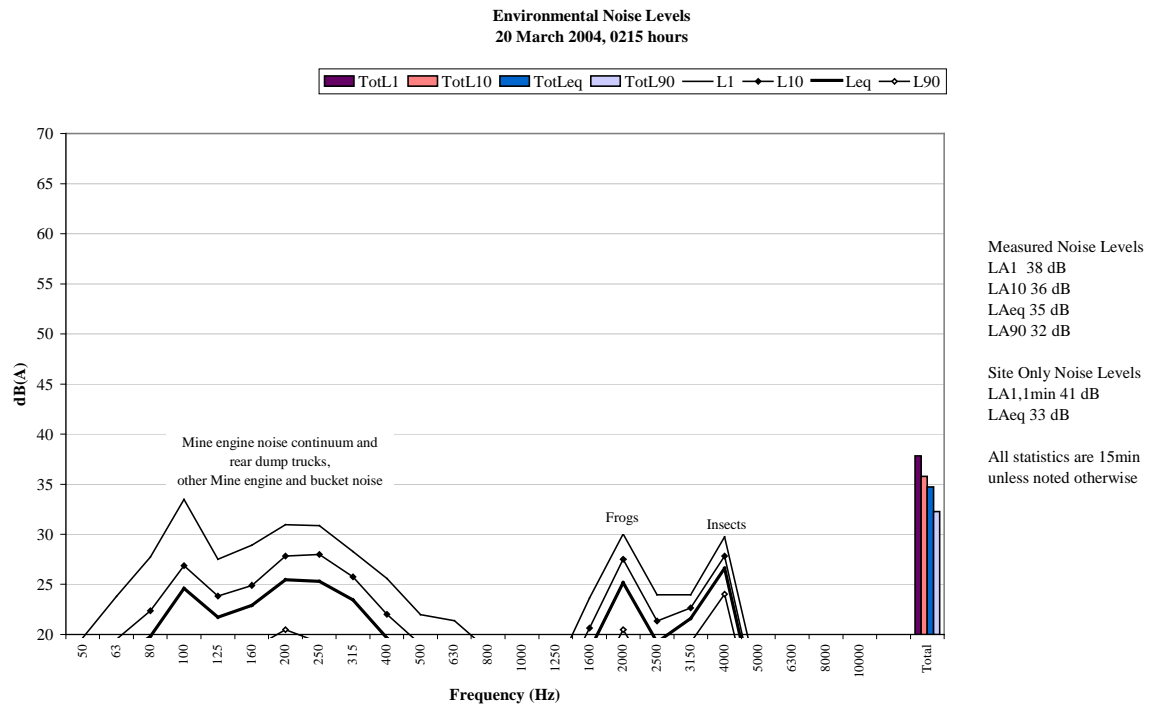
### 5.1 Noted Noise Sources

Table 4.1 and Table 4.2 present data gathered during attended monitoring. These noise levels are the result of many sounds reaching the sound level meter microphone during monitoring. Received levels from various noise sources were noted during attended monitoring and particular attention was paid to the extent of WCP's contribution, if any, to measured levels. At each receptor location, WCP's  $L_{Aeq,15 \text{ minute}}$  and  $L_{A1,1 \text{ minute}}$  (in the absence of any other noise) was, where possible, measured directly, or, determined by frequency analysis. Time variations of noise sources in each measurement, their temporal characteristics, are taken into account via statistical descriptors.

From these observations summaries have been derived for each location. The following chapter sections provide these summaries. Statistical 1/3 octave band analysis of environmental noise was undertaken, and Figures 3 to 22 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.

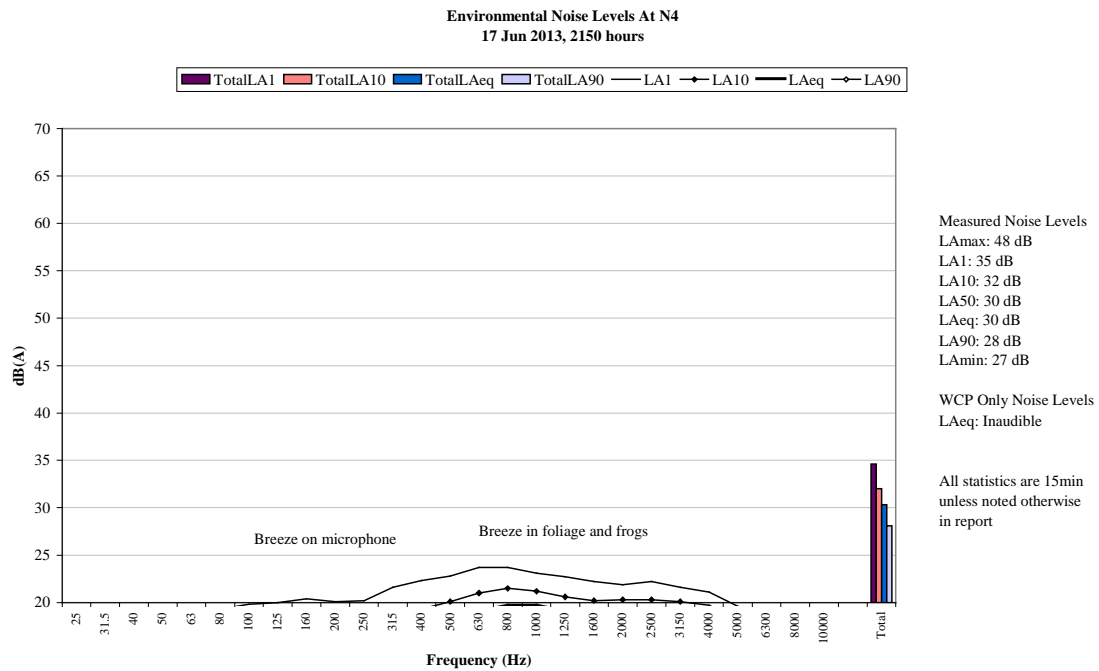
An example is provided as Figure 2 where it can be seen that frogs and insects are generating noise at frequencies above 1000 Hz; mining noise is at frequencies less than 1000 Hz (this is typical). Adding levels at frequencies that relate to mining only allows separate statistical results to be calculated. 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 cutoff 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 N4, 17 June 2013 - Evening

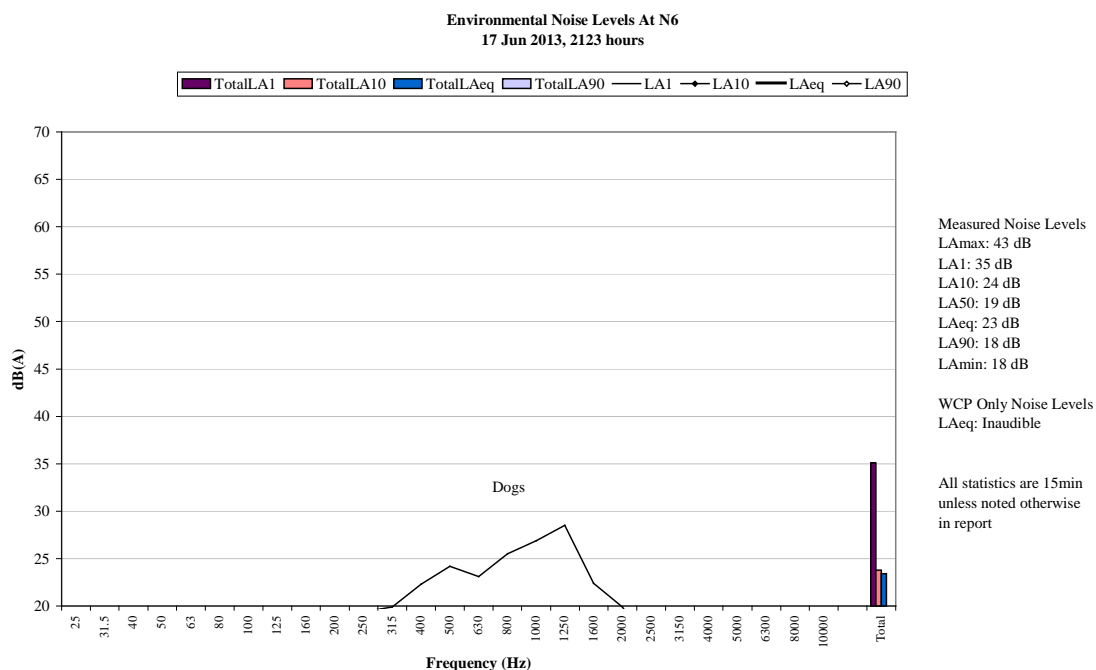


**Figure 3 Environmental Noise Levels, N4 – Cumbo Road**

WCP was inaudible.

Breeze on the microphone, breeze in foliage and frogs were responsible for measured levels.

### 5.1.2 N6, 17 June 2013 – Evening

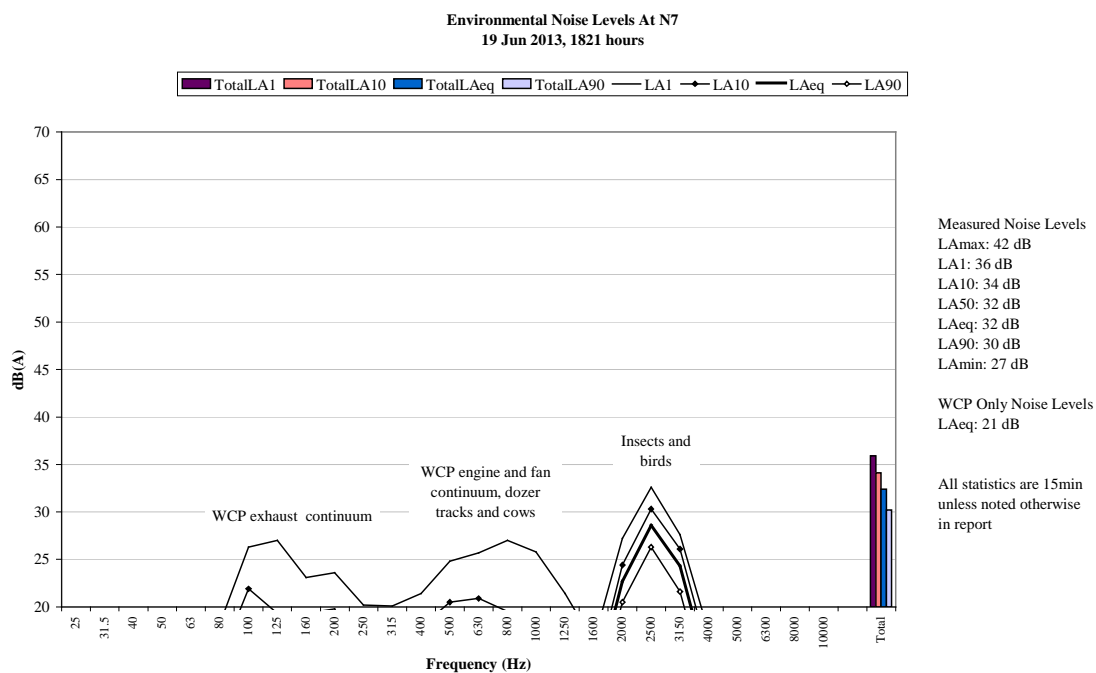


**Figure 4 Environmental Noise Levels, N6 – Wollar Church**

WCP was inaudible.

Dogs were primarily responsible for the measured  $L_{Amax}$ ,  $L_{A1}$ ,  $L_{A10}$  and  $L_{Aeq}$ . All other levels represent the floor of the sound level meter.

### 5.1.3 N7, 19 June 2013 - Evening



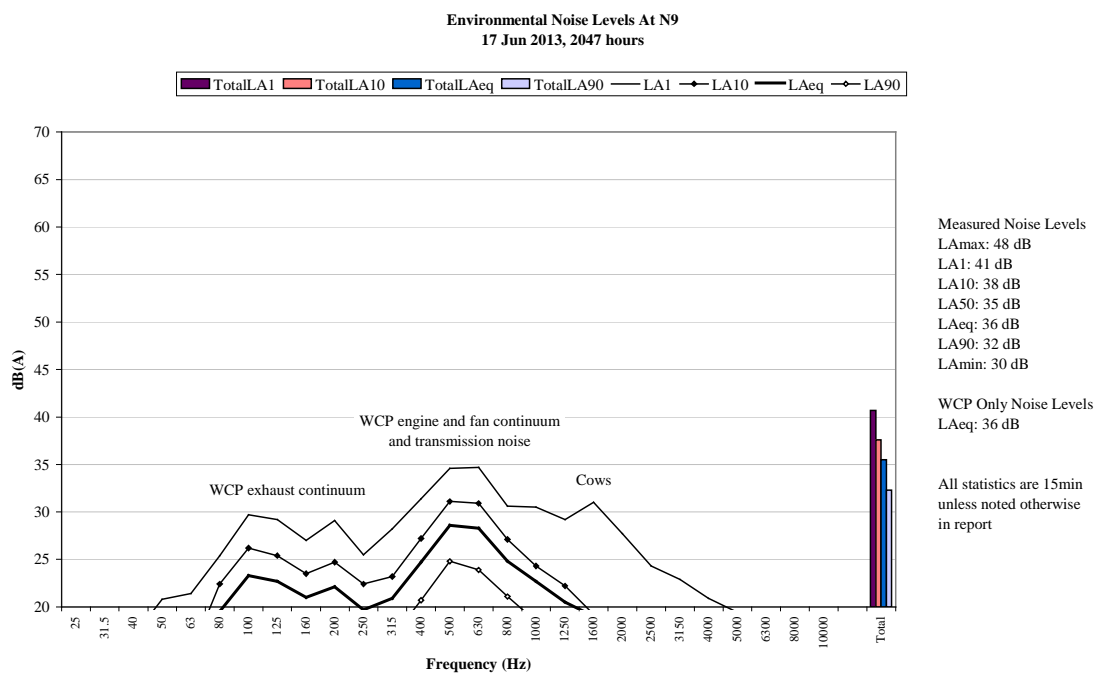
**Figure 5 Environmental Noise Levels, N7 – Ulan-Wollar Road (East)**

An exhaust, engine and fan continuum, dozer tracks and brake squeal from WCP was audible during the measurement. These noise sources combined to generate the site only  $L_{Aeq}$  of 21 dB. A horn was also noted once.

Insects and birds were responsible for measured levels.

Low-level aircraft noise was also noted.

### 5.1.4 N9, 17 June 2013 - Evening



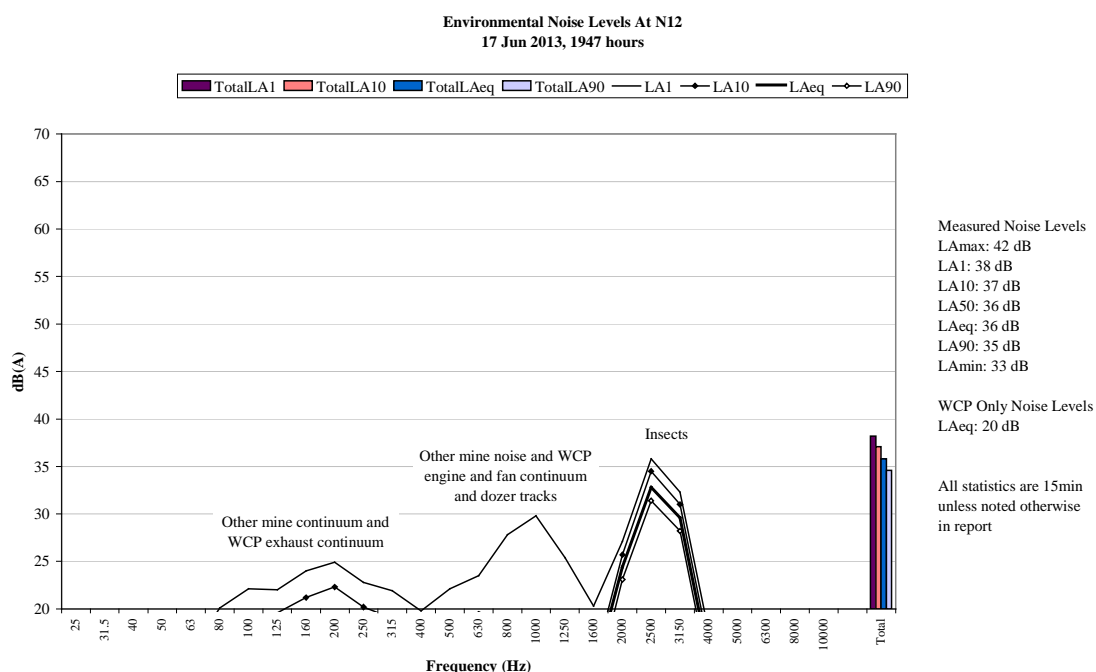
**Figure 6 Environmental Noise Levels, N9 – Slate Gully Road**

An exhaust, engine and fan continuum, alarms and transmission noise from WCP was audible during the measurement. These sources combined to generate the site only  $L_{Aeq}$  of 36 dB. Impact noise was also noted once.

WCP was responsible for measured levels.

Cows were also noted.

### 5.1.5 N12, 17 June 2013 - Evening



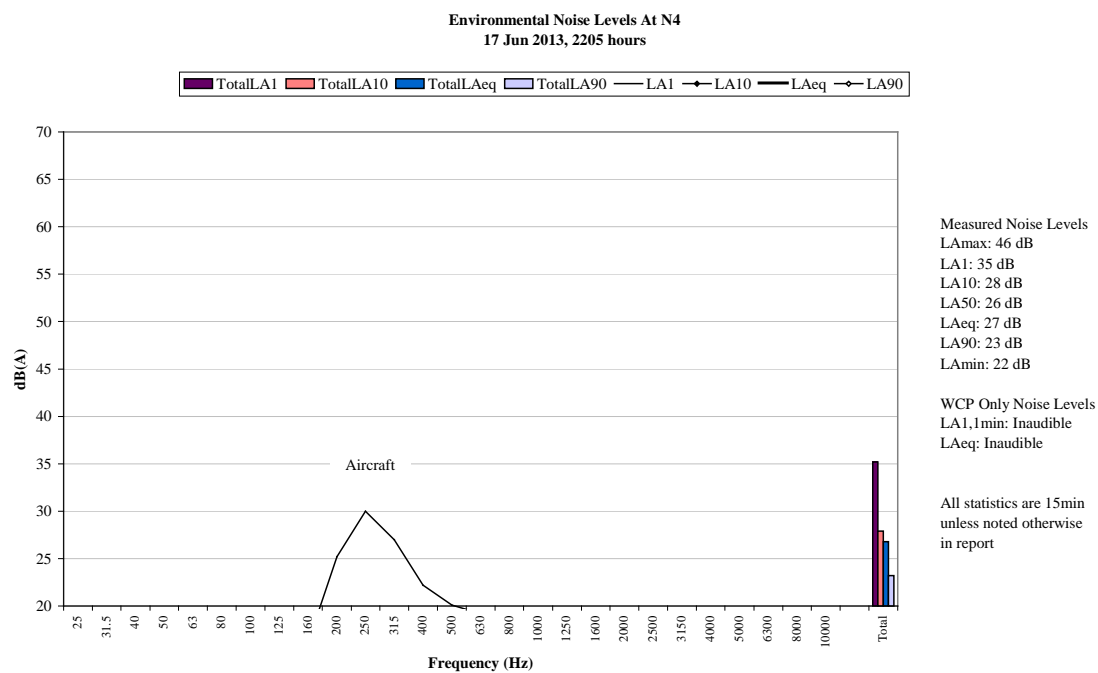
**Figure 7 Environmental Noise Levels, N12 - Ulan-Wollar Road (West)**

A low-level exhaust, engine and fan continuum and three instances of dozer track noise from WCP were audible during the measurement. These noise sources combined to generate the site only  $L_{Aeq}$  of 20 dB.

Insects were primarily responsible for measured levels.

A continuum from another mine was also audible during the measurement.

### 5.1.6 N4, 17 June 2013 - Night

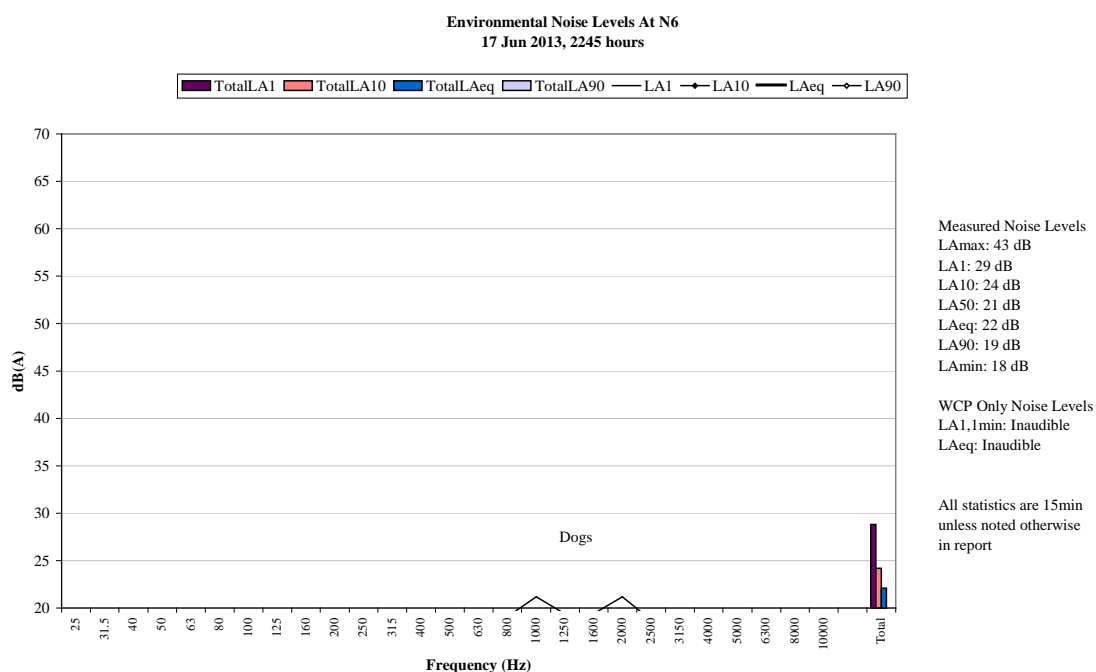


**Figure 8 Environmental Noise Levels, N4 – Cumbo Road**

WCP was inaudible.

Aircraft and breeze in foliage were responsible for measured levels.

### 5.1.7 N6, 10 June 2013 - Night



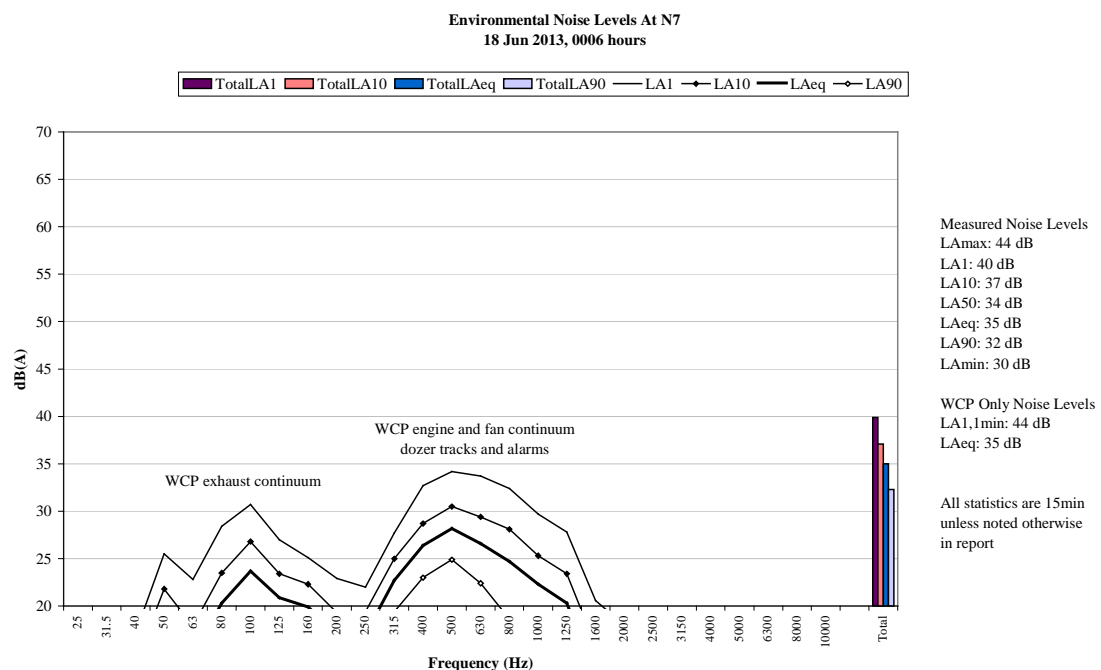
**Figure 9 Environmental Noise Levels, N6 – Wollar Church**

WCP was inaudible.

Dogs and distant road traffic generated most measured levels.

Frogs were also noted at low levels.

### 5.1.8 N7, 18 June 2013 - Night



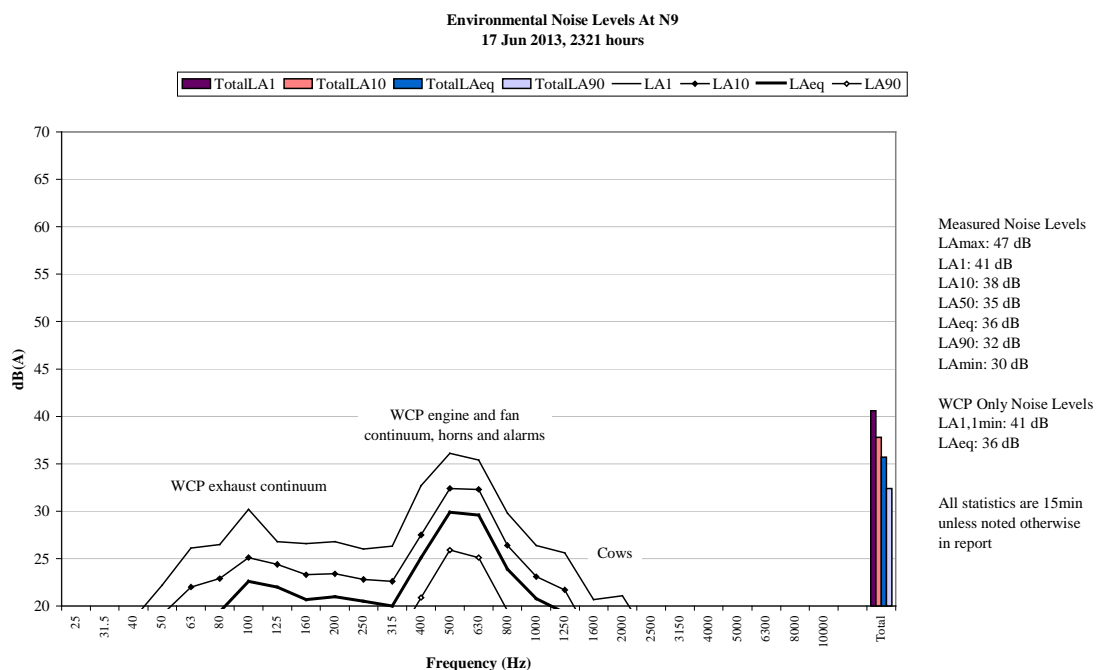
**Figure 10 Environmental Noise Levels, N7 – Ulan Wollar Road (East)**

An exhaust, engine and fan continuum, regular dozer tracks and alarms from WCP were audible and responsible for the site only  $L_{Aeq}$  of 35 dB. Dozer tracks generated the site only  $L_{A1,1minute}$  of 44 dB.

WCP was responsible for measured levels.

Frogs were also noted at low-levels.

### 5.1.9 N9, 17 June 2013 - Night



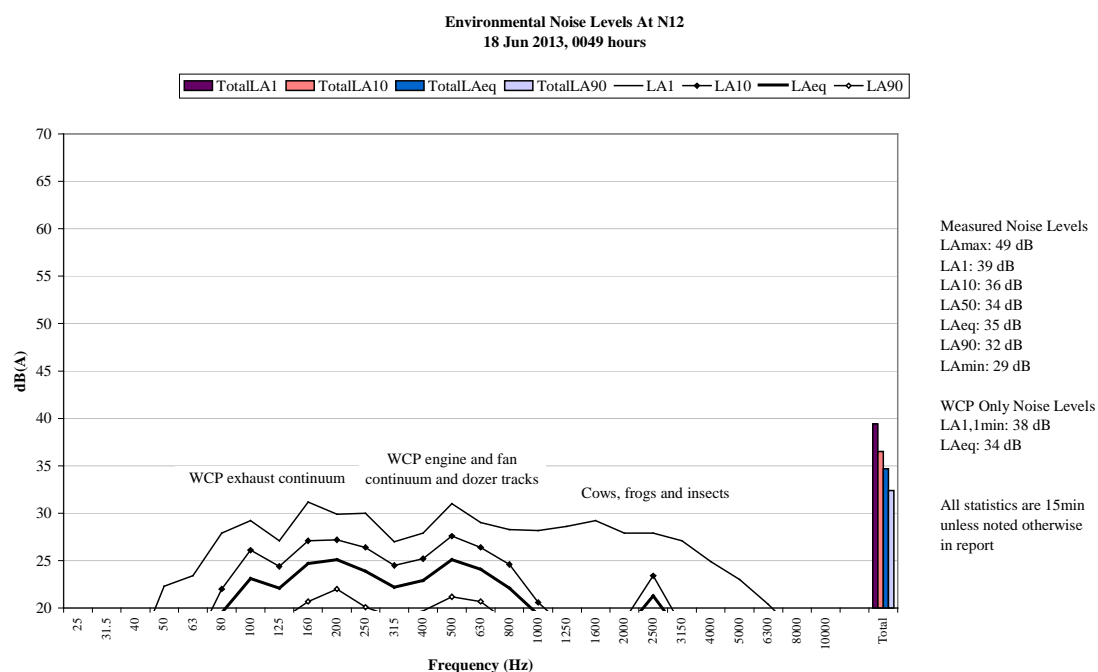
**Figure 11 Environmental Noise Levels, N9 - Slate Gully Road**

An exhaust, engine and fan continuum and several instances of horns, alarms and impact noise from WCP were audible, generating the site only  $L_{Aeq}$  of 36 dB. A surge in engine noise generated the site only  $L_{A1,1minute}$  of 41 dB.

WCP was responsible for measured levels.

Cows and a distant train were also noted.

### 5.1.10 N12, 18 June 2013 - Night



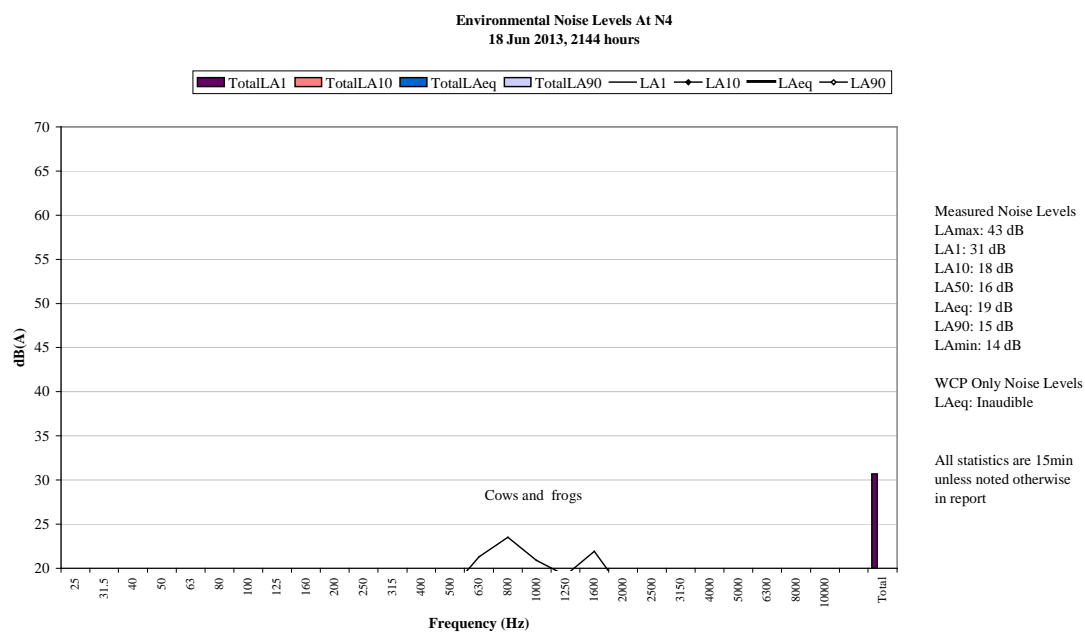
**Figure 12 Environmental Noise Levels, N12 - Ulan Wollar Road (West)**

An exhaust, engine and fan continuum and regular dozer track noise from WCP was audible, generating the site only  $L_{Aeq}$  of 34 dB. A surge in engine noise generated the site only  $L_{A1,1minute}$  of 41 dB.

WCP was primarily responsible for measured levels with the exception of  $L_{Amax}$ , which was generated by insects and frogs.

Cows were also noted.

### 5.1.11 N4, 18 June 2013 - Evening

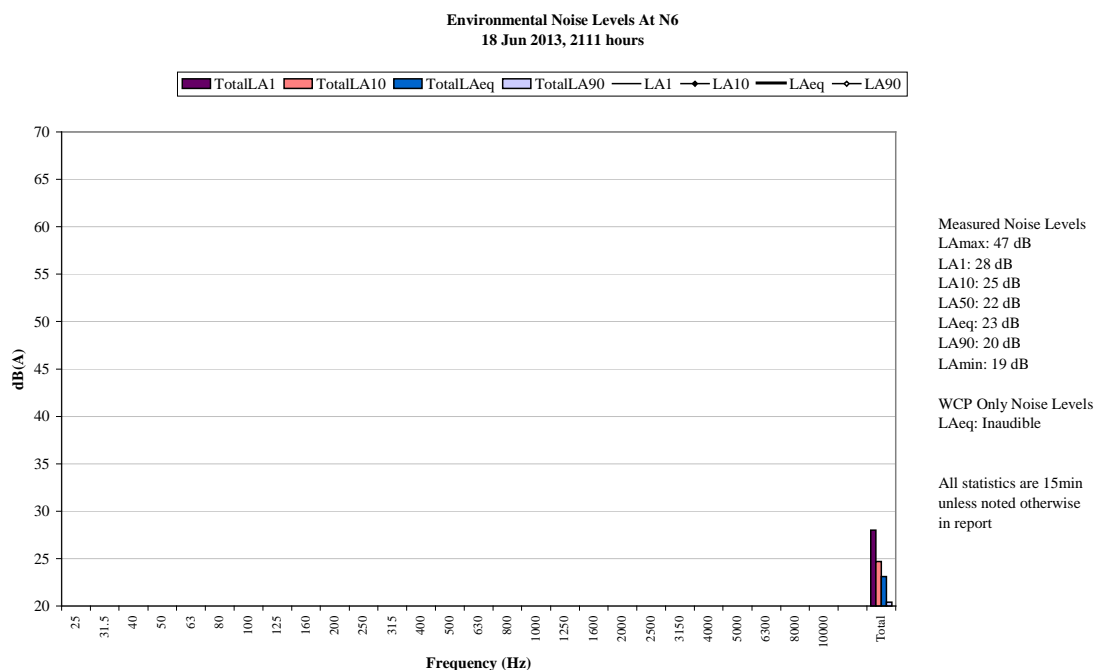


**Figure 13 Environmental Noise Levels, N4 – Cumbo Road**

WCP was inaudible.

Cows and frogs were responsible for the measured  $L_{Amax}$  and  $L_{A1}$ . All other measured levels are generally indicative of the noise floor of the sound level meter.

### 5.1.12 N6, 11 June 2013 - Evening

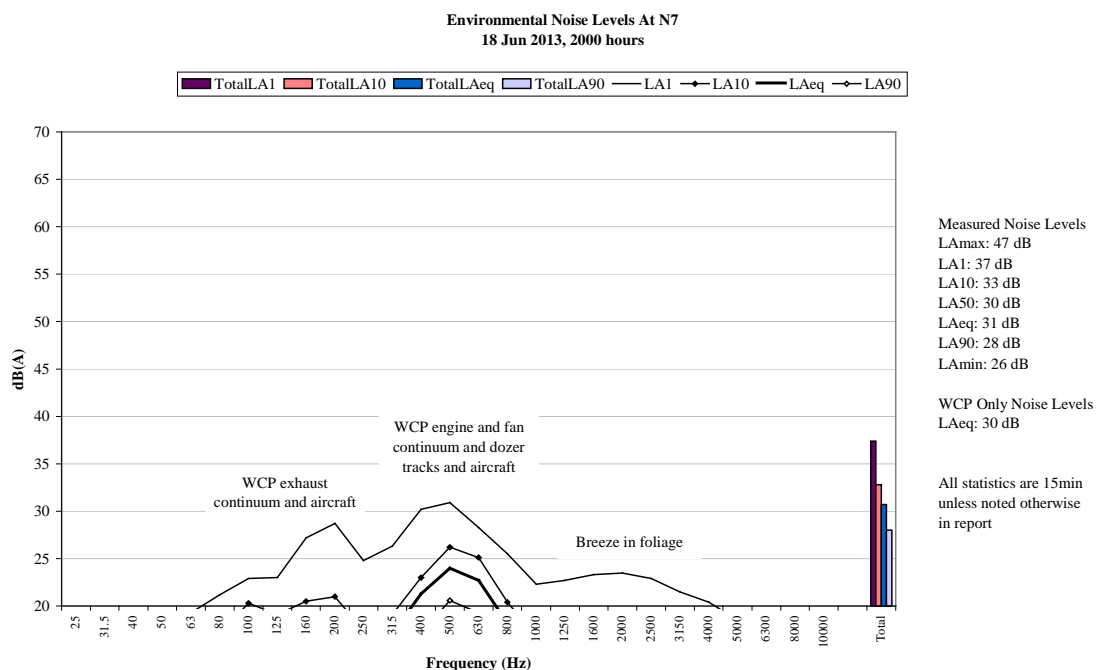


**Figure 14 Environmental Noise Levels, N6 – Wollar Church**

WCP was inaudible.

Aircraft, sheep and dogs were primarily responsible for measured levels.

### 5.1.13 N7, 18 June 2013 - Evening



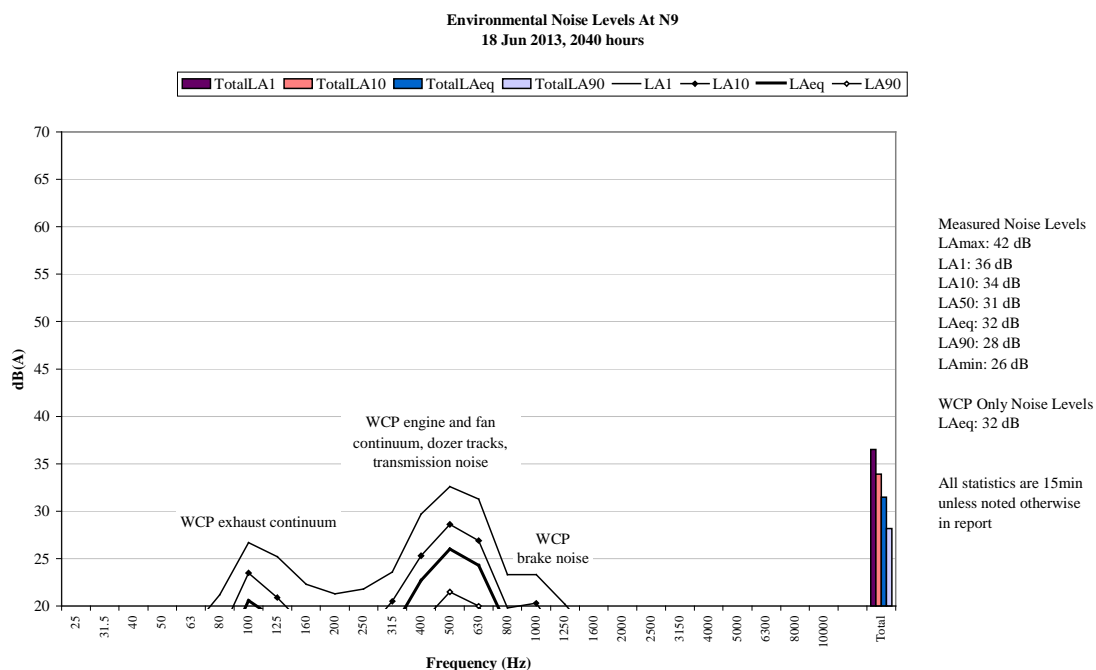
**Figure 15 Environmental Noise Levels, N7 – Ulan-Wollar Road (East)**

An exhaust, engine and fan continuum and dozer track noise from WCP was audible, generating the site only  $L_{Aeq}$  of 30 dB. One instance of impact noise was also noted.

WCP was responsible for measured levels with the exception of  $L_{Amax}$ , which was generated by an aircraft.

Breeze in foliage was also noted.

### 5.1.14 N9, 18 June 2013 - Evening



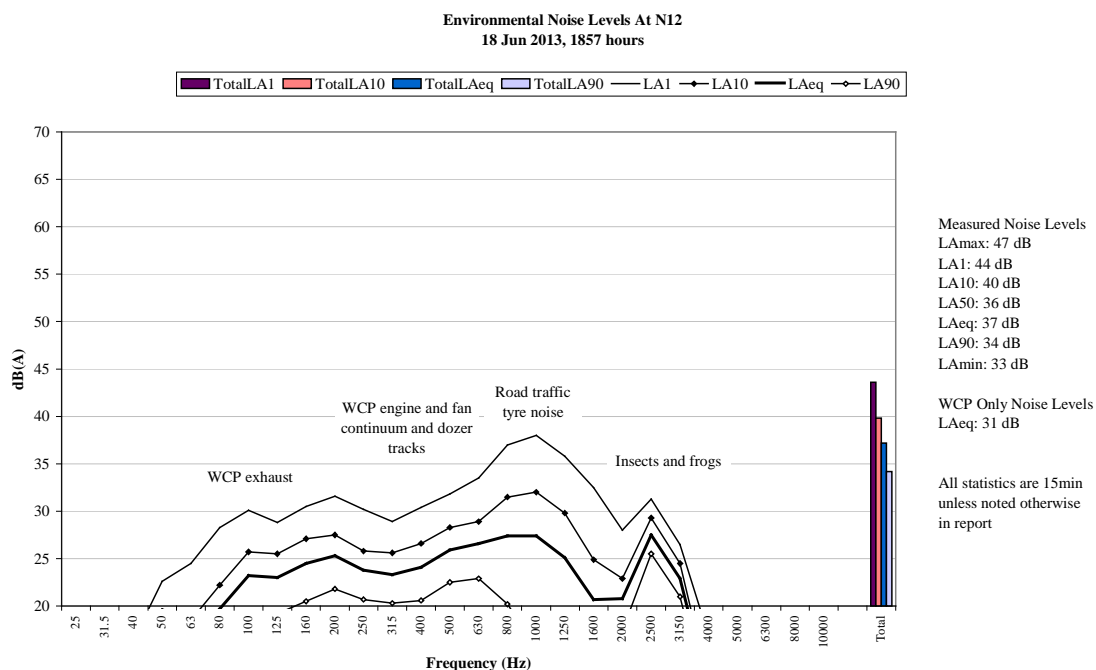
**Figure 16 Environmental Noise Levels, N9 – Slate Gully Road**

An exhaust, engine and fan continuum, dozer tracks and transmission noise from WCP was audible, generating the site only  $L_{Aeq}$  of 32 dB. Brake noise, horns and quackers were also audible.

WCP was responsible for measured levels.

Dogs were also noted at low-levels.

### 5.1.15 N12, 18 June 2013 - Evening



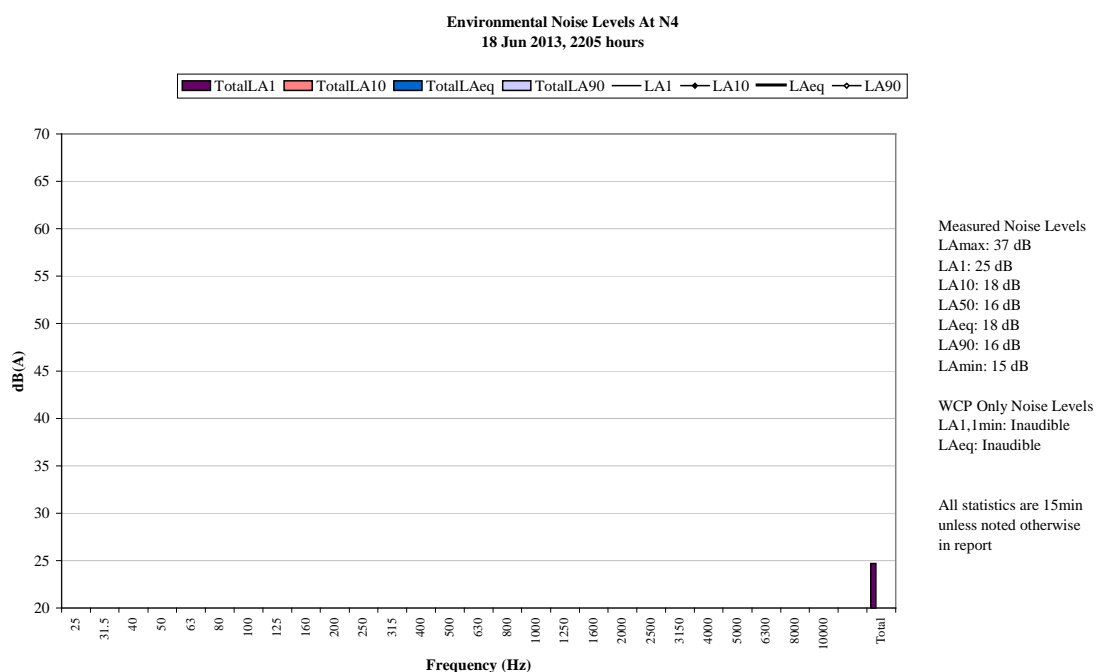
**Figure 17 Environmental Noise Levels, N12 - Ulan-Wollar Road (West)**

An exhaust, engine and fan continuum and dozer tracks from WCP were audible, generating the site only  $L_{Aeq}$  of 31 dB.

Road traffic generated the measured  $L_{Amax}$ . WCP combined with road traffic, insects and frogs to generate the remaining measured levels.

Cows and a distant aircraft were also noted.

### 5.1.16 N4, 18 June 2013 - Night

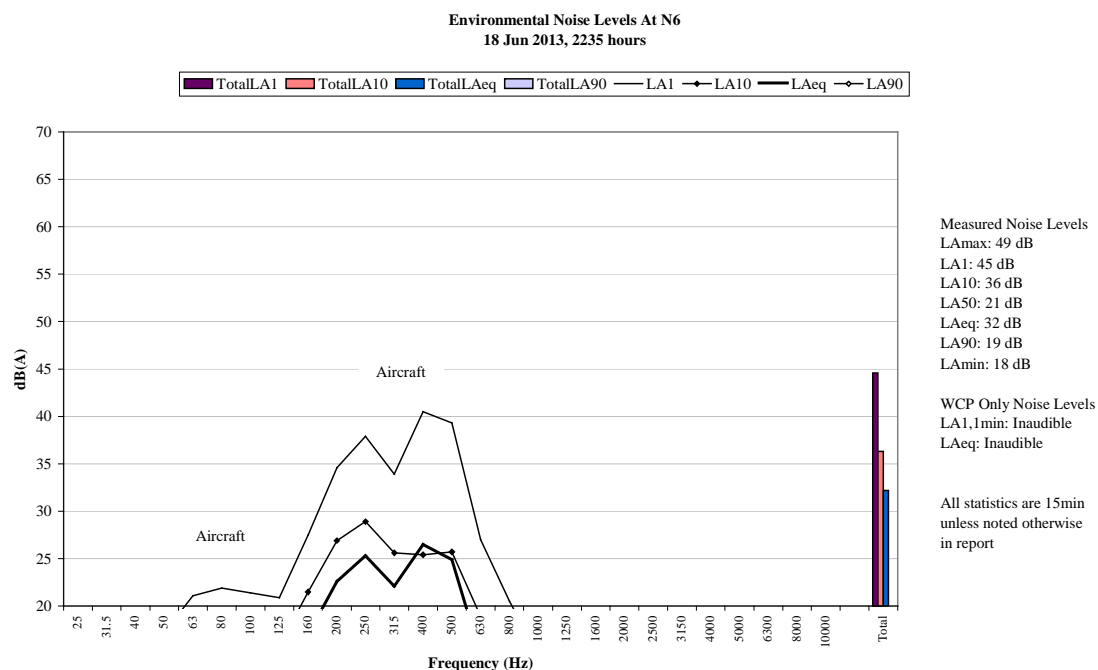


**Figure 18 Environmental Noise Levels, N4 – Cumbo Road**

WCP was inaudible.

Breeze in foliage generated the measured  $L_{Amax}$  and  $L_{A1}$ . All other measured levels are generally indicative of the noise floor of the sound level meter.

### 5.1.17 N6, 18 June 2013 - Night



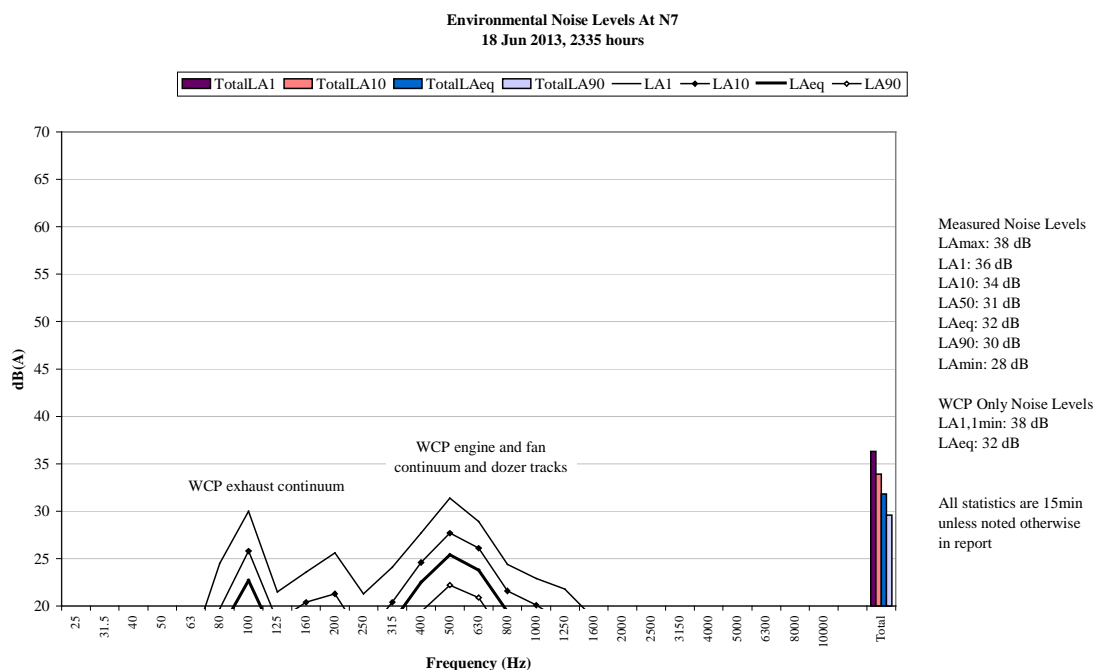
**Figure 19 Environmental Noise Levels, N6 – Wollar Church**

WCP was inaudible.

Aircraft were responsible for the measured  $L_{Amax}$ ,  $L_{A1}$ ,  $L_{A10}$  and  $L_{Aeq}$ . All other levels are indicative of the noise floor of the sound level meter.

Birds were also noted at low levels.

### 5.1.18 N7, 18 June 2013 - Night



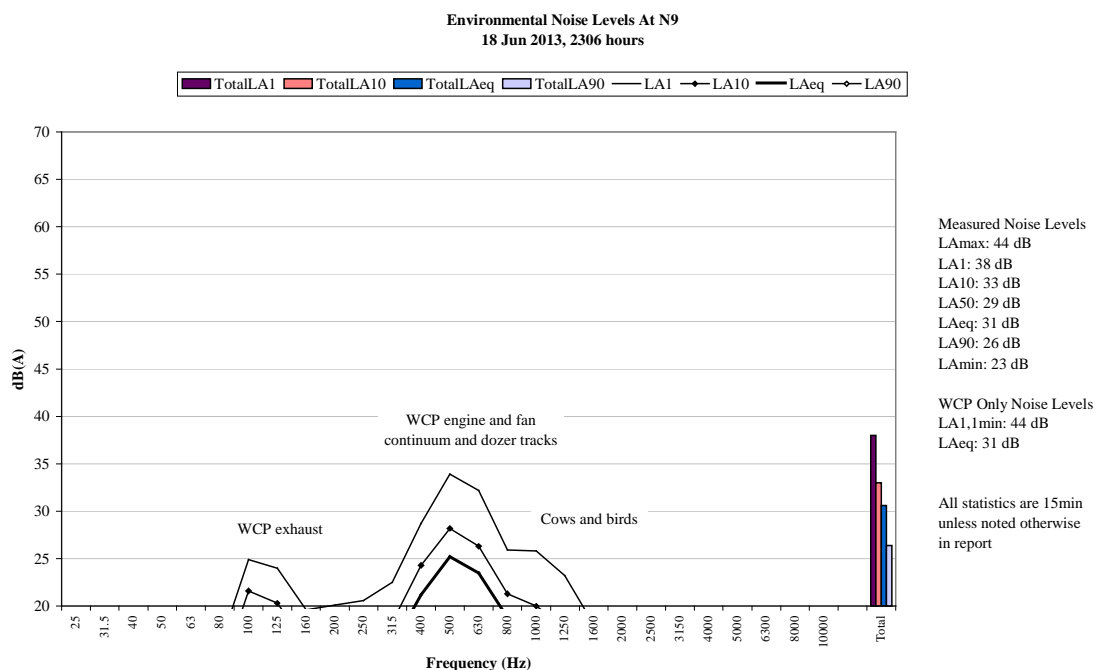
**Figure 20 Environmental Noise Levels, N7 - Ulan Wollar Road (East)**

An exhaust, engine and fan continuum and regular dozer track noise from WCP was audible, generating the site only  $L_{Aeq}$  of 32 dB. A surge in engine noise generated the site only  $L_{A1,1minute}$  of 38 dB.

WCP was responsible for measured levels.

Insects were also noted at low-levels.

### 5.1.19 N9, 18 June 2013 - Night



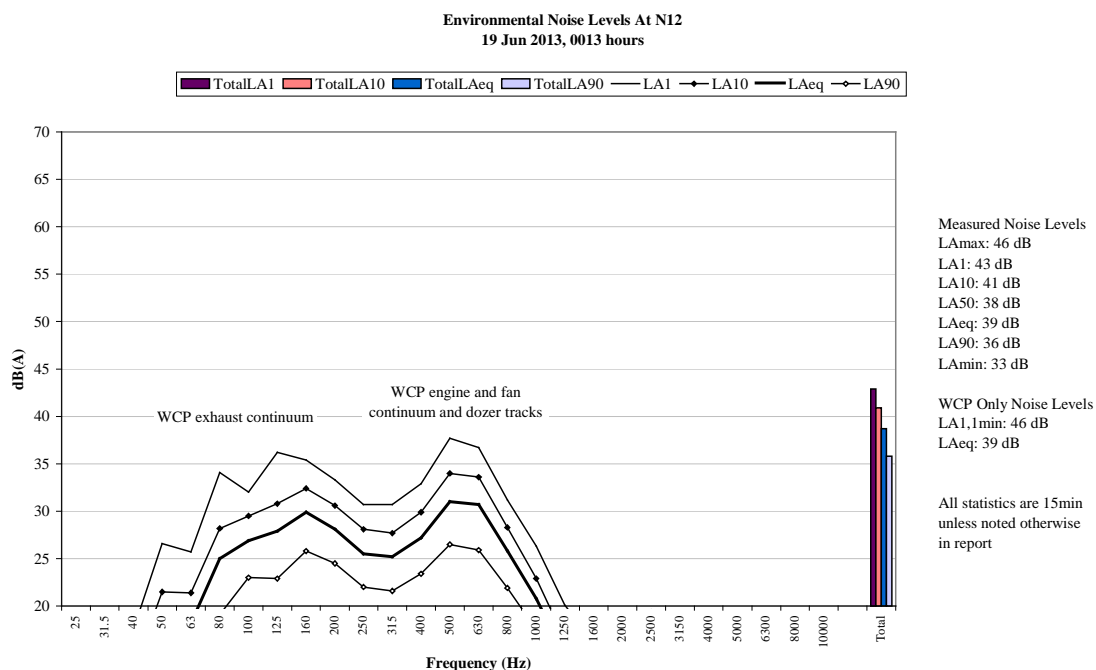
**Figure 21 Environmental Noise Levels, N9 – Slate Gully Road**

An exhaust, engine and fan continuum and regular dozer track noise from WCP was audible, generating the site only  $L_{Aeq}$  of 31 dB. Impact noise generated the site only  $L_{A1,1minute}$  of 44 dB. Alarms and horns were also audible at low-levels.

WCP was responsible for measured levels.

Cows and birds were also noted.

### 5.1.20 N12, 19 June 2013 - Night



**Figure 22 Environmental Noise Levels, N12 - Ulan Wollar Road (West)**

An exhaust, engine and fan continuum and regular instances of dozer track noise from WCP was audible, generating the site only  $L_{Aeq}$  of 39 dB. Impact noise generated the site only  $L_{A1,1minute}$  of 46 dB. Alarms and horns were also audible at low-levels.

WCP was responsible for measured levels.

## 6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the evening periods on 17, 18 and 19 June and night periods on 17/18 and 18/19 June 2013. Attended noise monitoring was conducted at five sites. The duration of all measurements was 15 minutes.

Wind speed and/or estimated temperature inversion conditions resulted in criteria not always being applicable, as indicated in Table 4.2 and Table 4.3.

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the May / June 2013 monitoring period.

**Global Acoustics Pty Ltd**

## APPENDIX

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### A.PROJECT APPROVAL

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

Wilpinjong Coal Project was given approval on 1 February 2006. A modification was approved in August 2010.

The relevant noise conditions from Schedule 3 - Specific Environmental Conditions of the modified project approval is reproduced below.

### 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 6 – 7 of schedule 4.

Table 1: Land subject to acquisition upon request

30 – Gaffney	45 – Smith
48 – Evans	50 – Thompson & Hopper
94 – McKenzie	

Note:

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

### Noise Impact Assessment 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 on more than 25 per cent of any privately-owned land.

Table 2: Noise Impact assessment criteria dB(A)

Location	Day	Evening	Night	
	L <sub>Aeq</sub> (15 minute)	L <sub>Aeq</sub> (15 minute)	L <sub>Aeq</sub> (15 minute)	L <sub>A1</sub> (1 minute)
58 – Maher				
52A – Long				
52B – Long	35	39	39	45
53 – Reynolds				
23B – Bishop	35	39	37	45
25 – Pettit	35	39	36	45
31A – Conradt	35	37	37	45
31B – Conradt	35	36	36	45
100 – Rheinberger				
125 – Roberts	35	37	35	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		-

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.

11.

**Notes:**

- To interpret the locations referred to in Table 2, see the applicable figures in Appendix 7.
- Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.
- 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.

**Noise Acquisition Criteria**

3. If the noise generated by the project exceeds the criteria in Table 3 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land, the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 6 – 7 of schedule 4.

Table 3: Land acquisition criteria dB(A)

Day/Evening/Night <i>L<sub>Aeq</sub>(15 minute)</i>	Land
40	All privately owned land, excluding the land listed in Table 1

**Note:**

- Noise generated by the project is to be measured in accordance with the notes presented below Table 2. For the condition to apply, the exceedances must be systemic.

**Additional Noise Mitigation Measures**

4. Upon receiving a written request from the owner of any residence:
  - (a) on the land listed in Table 1; or
  - (b) on the land listed 23B, 25, 52A, 52B, 53, or 58 in the applicable figures in Appendix 7; or
  - (c) where subsequent noise monitoring shows that the noise generated by the project is greater than, or equal to, *L<sub>Aeq</sub>(15 minute)* 38 dB(A),
 the Proponent shall implement reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the landowner.

If within 3 months of receiving this request from the landowner, the Proponent and the landowner 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.

5. By 30 November 2010, or within 1 month of obtaining monitoring results showing an exceedance of the relevant criteria listed in condition 4(c) above, the Proponent shall notify all applicable owners that they are entitled to ask for additional noise mitigation measures to be installed at their residence.

**Operating Conditions**

6. The Proponent shall:
  - (a) implement all reasonable and feasible noise mitigation measures;
  - (b) ensure that the real-time noise monitoring and meteorological forecasting data are assessed regularly, and that operations on site are relocated, modified, and/or stopped to ensure compliance with the relevant criteria in conditions 2 to 4 of this schedule; and
  - (c) regularly investigate ways to reduce the operational, low frequency, rail, and road traffic noise generated by the project; and report on these investigations in the annual review (see condition 2 of schedule 5),
 to the satisfaction of the Director-General.

**Noise Management Plan**

7. The Proponent shall prepare and implement a Noise Management Plan for the project, in consultation with DECCW, and to the satisfaction of the Director-General. This plan must:
  - (a) describe the noise mitigation measures that would be implemented to ensure compliance with the relevant noise impact assessment criteria in this approval, including the proposed real-time noise management system and associated meteorological forecasting; and
  - (b) include a noise monitoring program, that uses a combination of real-time and supplementary attended monitoring measures to evaluate the performance of the project, and includes a protocol for determining exceedances with the relevant conditions of this approval.

## A.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 December 2011.

The relevant section is reproduced below.

### L5 Noise limits

- L5.1 Noise generated at the premises must not exceed the noise limits presented in the table below. The locations referred to in the table below are indicated 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)
25 Pettit - Lot 16 DP250053	35	39	36	45
52A Long - Lot 8 DP250053	35	39	39	45
52B Long - Lot 8 DP250053	35	39	39	45
51 Bailey - Lot 5, 6 & 7 DP250053	35	39	39	45
58 Maher	35	39	39	45
31A Conradt - Lot 10, 11 & 12 DP250053 & Lot 160 DP723767	35	37	37	45
31B Conradt - Lot 10, 11 & 12 DP250053 & Lot 160 DP723767	35	36	36	45
Wollar village	35	35	35	45
Goulburn River National Park	50	50	50	-
Munhorn Gap Nature Reserve	50	50	50	-
125 E & K Roberts	35	37	35	45

- 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 Programme**

The noise monitoring program for WCP was revised in September 2011 and the relevant sections are reproduced below.

### **5 MONITORING AND INTERPRETATION**

The noise monitoring programme comprises both attended and real-time monitoring (Sections 5.1 and 5.2, respectively). Integrated protocols for both monitoring methodologies are outlined in Sections 5.1.4 and 5.2.4, respectively. Meteorological monitoring will also be conducted as described in Section 5.3.

Attended monitoring will be used for demonstrating compliance with noise criteria (Section 3.3), whilst real-time monitoring will be used as a management tool to assist WCPL to take pre-emptive management actions to avoid potential non-compliances.

#### **5.1 ATTENDED NOISE MONITORING**

##### **5.1.1 Purpose**

The main aim of attended noise monitoring is to determine compliance with Project Approval and EPL noise criteria.

Results from the attended monitoring programme will be used to verify data collected from the real-time noise monitors. This will be undertaken where attended monitoring is conducted directly adjacent to real-time monitors. The attended monitoring data will also be used to determine whether there is a consistent relationship between real-time continuous noise levels and long-term attended monitoring data. For example if there is a consistent correlation between a real-time monitor and an attended monitoring site, then the real-time monitoring results could reasonably be used to predict noise levels at the attended site when attended monitoring is not being undertaken. This will be done annually to complement the regular maintenance and calibration of the real-time monitors.

##### **5.1.2 Monitoring Locations**

The attended noise monitoring programme will be conducted at sites adjacent to the Mine on non-Mine owned land to measure noise levels at nearby residences. Operational experience and investigations (Section 7.1) have shown that the Mine noise effects are experienced predominantly to the south and east of the Mine. Attended noise monitoring is presently concentrated in these areas, however this does not exclude monitoring to the west of the Mine.

Attended noise monitoring locations are shown on Figures 4. These locations provide good coverage in all directions from the Mine and are a combination of compliance sites and population centres. These locations include:

- N4 – W&V Langshaw dwelling 'Hillview';
- N6 – St Laurence O'Toole Catholic Church;
- N7 – Road reserve adjacent the Smith property;
- N9 – Maher dwelling; and
- N12 – Ulan Coal Mine Limited-owned dwelling.

### 5.1.3 Methodology

Attended noise monitoring will be carried out by an independent expert (i.e. not by mine staff) and will be conducted every 2 months. Monitoring will be conducted in accordance with Australian Standard (AS) 1055:1997 *Acoustics – Description and Measurement of Environmental Noise* and the INP (EPA, 2000). These operator-attended noise measurements will be conducted during normal operations to quantify the intrusive noise emissions from the Mine as well as the overall level of ambient noise.

Following the completion of the attended noise monitoring by the independent expert, the two monthly monitoring reports will be submitted to OEH and DP&I and will be made publically available on the Peabody website (Section 8.2).

#### *Timing*

Attended noise monitoring will be conducted for 15 minute periods day, evening and night. Day is defined as between 7am and 6pm, evening is described as being between 6pm and 10pm and night is between 10pm and 7am.

The monitoring will be carried out on two consecutive nights resulting in 2 x 15 minute samples for each location every two months. By sampling two consecutive nights, it is likely that different meteorological conditions are sampled for each site, providing more useful information.

Particular attention will be given to monitoring between 7pm and 2am (i.e. evening/night-time periods). Experience has shown that it is during these periods that noise can be at its most intrusive and results in more complaints. This is due to the very low background noise levels experienced during these periods and the presence of temperature inversions that are a relatively common phenomenon in this area, particularly during winter months.

#### *Measurement*

Acoustic instrumentation used in attended monitoring will comply with AS 1259.2:1990 *Sound Level Meters*.

The intrusive noise level ( $L_{Amax}$ ,  $L_{A1}$ ,  $L_{A10}$  and  $L_{Aeq}$ ) contribution from mine operation activities will be quantified over a 15 minute measurement period. In addition, the overall levels of ambient noise (i.e.  $L_{Amax}$ ,  $L_{A1}$ ,  $L_{A10}$ ,  $L_{A50}$ ,  $L_{A90}$ ,  $L_{Amin}$  and  $L_{Aeq}$ ) over the 15 minute period will be quantified and characterised.

A measurement of  $L_{A1(1\text{ minute})}$  corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms this is the highest noise level emitted from the Mine during the entire measurement period (i.e. the highest level of the maximum minute during the 15 minute measurement).

The  $L_{A1}$  measurement should be undertaken at 1 m from the dwelling façade and the  $L_{Aeq}$  measurement within 30 m of the dwelling. However, the direct measurement of noise at 1 m from the façade is not always practical. In most cases monitoring near the residence is impractical due to barking dogs or issues with obtaining access. In these cases measurements are undertaken at a suitable and representative location as close to the dwelling as practicable. Modifying factors from section 4 of the INP are used where applicable. Tonality and low frequency are assessed by analysis of the measured  $L_{Aeq}$  spectrum.

## Recording

An example of an attended monitoring recording sheet is provided in Attachment 5. During attended monitoring, the following information will be recorded:

- operator's name;
- locations of attended and unattended noise instruments;
- recording intervals;
- meteorological conditions (i.e. temperature, humidity, cloud cover, and wind speed and direction);
- statistical noise level descriptors together with notes identifying the principle noise sources; and
- instrument calibration details.

The meteorological conditions listed above will be recorded local to the noise measurement as well as on-site at the Mine Automatic Weather Station (AWS) (Section 5.3). Prevailing weather conditions determined from the AWS (in the first instance) to be outside of the meteorological constraints stipulated in the Project Approval will be excluded from further analysis.

Additional information (such as general mobile and fixed plant locations) will be collected at the time of (or soon after) monitoring to enable correlation between Mine noise, meteorological conditions, general plant locations, plant operating conditions and topography.

### 5.1.4 Compliance Assessment

As discussed in Section 5.1.1, the results of attended noise monitoring will be compared against the relevant noise criteria set out in Section 3.3 of this NMP. The comparison will be undertaken following the exclusion of data using meteorological conditions described as part of Table 2 as well as observations of non-Mine noise by the person undertaking the attended noise monitoring programme.

In the event of an exceedance of the noise criteria, an assessment will be conducted to determine:

- Timing of the exceedance.
- Location of the exceedance.
- Exclusion of non-mine related noise and noise from non-WCPL mining activities (e.g. can the exceedance be attributed directly to the Mine). This will include consideration of:
  - the methods and type of equipment being used by WCPL at the time of the exceedance and proximity to the locations at which the exceedance was recorded; and
  - the location of non-WCPL mining activities or agricultural activities and proximity to the locations at which the exceedance was recorded.
- Meteorological conditions at the time of the exceedance – including confirmation that meteorological conditions are in accordance with Condition 2, Schedule 3 of the Project Approval.

If the above assessment determines that an exceedance is due to Mine noise then management strategies detailed in Sections 6 and 7 to help prevent recurrence will be implemented in an effort to reduce noise levels below those set out in Table 2.

Exceedances of criteria will be determined in consideration of Table 2 of the Project Approval (e.g. the meteorological conditions under which they apply) and the INP. Section 11.1.3 of the INP states the following in relation to when a development is in non-compliance with a noise condition:

*A development will be deemed to be in non-compliance with a noise consent or licence condition if the monitored noise level is more than 2 dB above the statutory noise limit specified in the consent or licence condition. This may occur for two reasons:*

- The noise from the development is excessive, in which case the development is truly not complying with its consent or licence condition.*
- The noise was increased by extreme, nonstandard weather effects—in which case the development is not considered to be in noncompliance with its consent or licence condition. Non-standard weather effects can be considered to be present during monitoring if the cloud cover is less than 40 per cent and the wind speed (at 10 m height) is less than 1.0 m/s (represents an extremely adverse weather condition for noise)—during the period from 6 pm to 7 am in non-arid areas (see Section 9.2).*

*In this latter case, further monitoring at a later date is required to determine compliance under the meteorological conditions specified in the consent/licence condition.*

For the purposes of the NMP, the monitored noise level is the attended noise monitoring results at the locations listed in Section 5.1.2.

In accordance with Condition 7, Schedule 5 of the Project Approval, The Proponent shall notify the Director-General and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Director-General and any relevant agencies with a detailed report on the incident.

In accordance with Condition 2, Schedule 4 of the Project Approval, the proponent shall notify the Director-General, the affected landowners and tenants (including tenants of mine-owned properties) accordingly, and provide monitoring results to each of these parties until the results show that the project is complying with the criteria in schedule 3.

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## APPENDIX

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### B. CALIBRATION CERTIFICATES



**Acoustic  
Research  
Labs** Pty Ltd

Level 7 Building 3 433 Pennant Hills Rd  
Pennant Hills NSW AUSTRALIA 2120  
Ph: +61 2 9484 0800 A.B.N. 65 160 399 339  
www.acousticresearch.com.au

## Calibration Certificate

Number : C13233

Client Details : Global Acoustics Pty Ltd

12/16 Huntingdale Drive  
Thornton NSW 2322

Equipment Tested/ Model Number : Rion NA-28

Instrument Serial Number : 00701424

Microphone Serial Number : 01916

Preamplifier Serial Number : 01436

Ambient Temperature : 23°C

Relative Humidity : 39%

Barometric Pressure : 103 kPa

Calibration Technician : Adrian Walker

Calibration Date : 10-May-2013

Secondary Check by : Kirsten Gillies

Report Issue Date : 13-May-2013

Approved Signatory :

Tested To : AS1259.1:1990

AS1259.2:1990

Comments : All tests passed for type 1

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.4.2: Time weighting characteristics F and S	Pass
10.2.3: Frequency weighting	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.2: Overload indications	Pass	10.4.4: Time weighting characteristic P	Pass
8.9: Detector-indicator linearity	Pass	10.4.5: R.M.S performance	Pass
8.10: Differential level linearity	Pass	9.3.2: Time averaging	Pass
10.1.1: Accuracy of level range control	Pass	9.2.5: Overload indication	Pass
10.3.4: Inherent weighted system noise level	Pass		



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## Calibration Certificate

Number : C13127

**Client Details :** Global Acoustics Pty Ltd

12/16 Huntingdale Drive

Thornton NSW 2322

**Equipment Tested/ Model Number :** Rion NC-73

**Instrument Serial Number :** 11248306

**Ambient Temperature :** 23°C

**Relative Humidity :** 43%

**Barometric Pressure :** 102.56 kPa

**Tested and Checked by :** Luke Hudson

**Calibration Date :** 19-March-2013

**Secondary Check by :** Kirsten Gillies

**Report Issue Date :** 20-March-2013

**Approved Signatory :**

**Tested To :** IEC60942:2004

**Comments :** All tests passed for type 2

Reference	Property	Measured Value	Result
94 dB at 1000 Hz	SPL	94.09 dB	Pass
	Frequency	990.67 Hz	Pass
	Short term fluctuation	0.08 dB	Pass
	Distortion	0.60%	Pass



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