# *Wilpinjong Coal*

*Environmental Noise Monitoring*

*March / April 2014*

*Prepared for*

*Wilpinjong Coal Pty Ltd*

Global Acoustics

Noise and Vibration Analysis and Solutions

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

# Wilpinjong Coal

## March / April 2014
## Environmental Noise Monitoring

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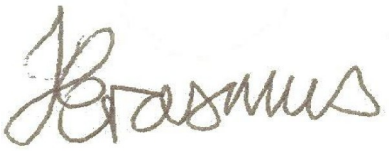
### Prepared for

Wilpinjong Coal Pty Ltd
Locked Bag 2005
Mudgee NSW 2850

### Prepared by

Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322



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|---|---|---|---|
| Prepared: | Jonathan Erasmus<br>Acoustics Technician | QA Review: | Jesse Tribby<br>Scientist (Acoustics) |

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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.

WCP was given approval on 1 February 2006. A modification to the consent was approved in February 2014, which requires that WCP prepare and implement a new noise management plan (NMP) by the end of May 2014. Until that time, attended monitoring and reporting has been undertaken in accordance with the previous NMP approved in September 2011. An environment protection licence (EPL) was issued in early 2006 with subsequent variations approved.

Attended monitoring was conducted in accordance with the documents detailed above, the NSW Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each 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 and night of 9/10 and 10/11 April 2014. 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 / April 2014 monitoring.

**Global Acoustics Pty Ltd**

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# 1 INTRODUCTION

## 1.1 Background

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

Environmental noise monitoring described in this report was undertaken at five locations during the evening and night periods of 9/10 and 10/11 April 2014. 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: ATTENDED 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 | - |
| N7 | Ulan-Wollar Road (East) | Wilpinjong Coal Mine |
| N9 | Slate Gully Road, Wollar | Wilpinjong Coal Mine |
| N12 | Ulan-Wollar Road (West) | Ulan Coal Mines |

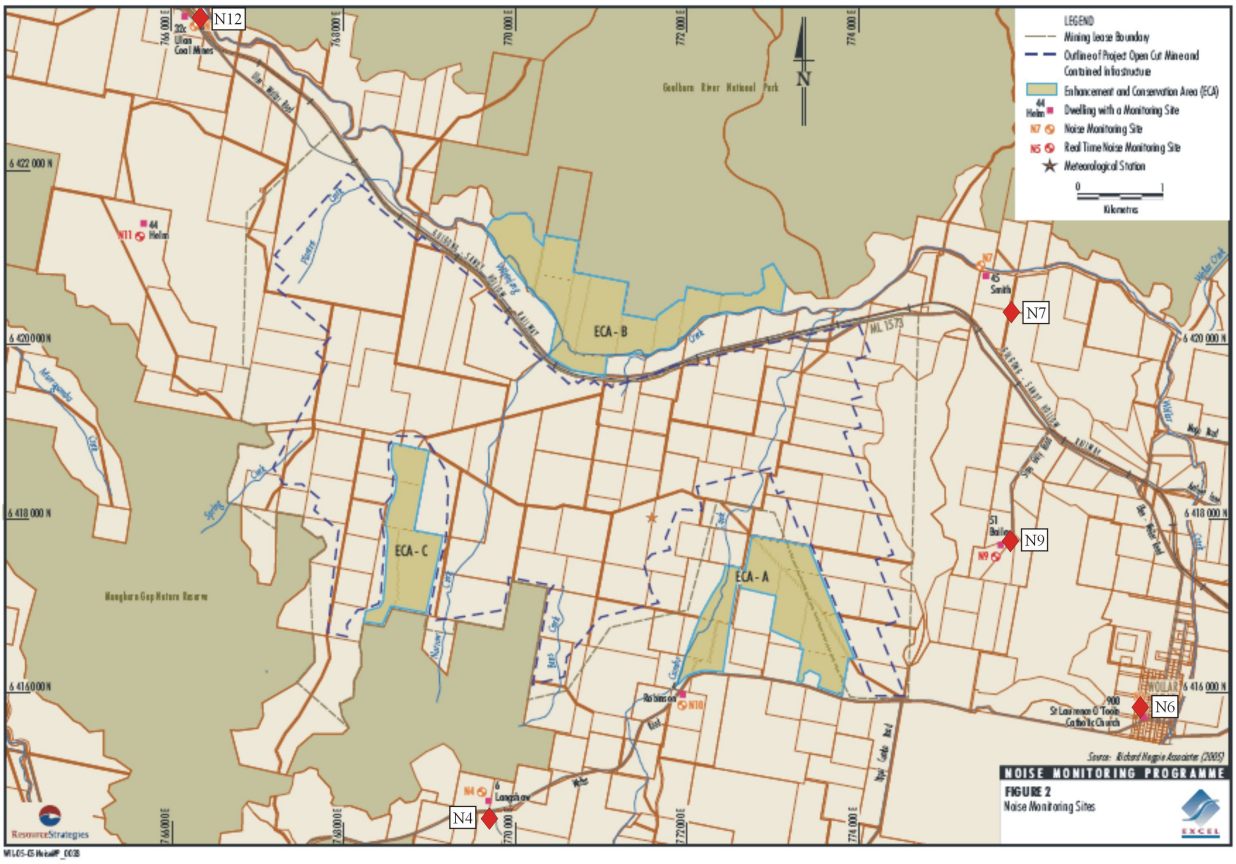


**Figure 1: Attended Noise Monitoring Locations**

## 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 |
| $L_{pk}$ | 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 |
| 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 |
| 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 PROJECT APPROVAL AND CRITERIA

## 2.1 Project Approval

WCP was given approval on 1 February 2006. A modification to the project was approved in February 2014. 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 October 2013. 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 $L_{Aeq,15minute}$ | Evening $L_{Aeq,15minute}$ | Night $L_{Aeq,15minute}$ / $L_{A1,1minute}$ |
|---|---|---|---|---|
| N4 | 'Hillview' Cumbo Road, Wollar[3] | NA | NA | NA/NA |
| N6 / Wollar | Catholic Church representative of Wollar – Residential | 35[1] | 35[1] | 35[1]/45[1] |
| N7 / 45 | Ulan-Wollar Road (East) [3] | NA | NA | NA/NA |
| N9 / 58 | Slate Gully Road, Wollar[3] | NA | NA | NA/NA |
| N12 | Ulan-Wollar Road (West)[2] | NA | NA | NA/NA |

*Notes:* 1. *Limits from Environment Protection Licence No. 12425 and 2014 Modification;*
2. *Property is designated as a non-WPL mining interest in the 2014 Modification, so criteria are NA, 'not applicable'; and*
3. *These properties are owned by WCP, so criteria are 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

Acquisition criteria have been removed in the most recent project approval modification, but have been assessed in accordance with the 2011 NMP. WCP are to consider noise in respect to acquisition 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 ACQUSITION CRITERIA, dB*

| Property | Day/Evening/Night $L_{Aeq,15minute}$ |
|---|---|
| All privately owned land | 40 |

## 2.6 Additional Mitigation Criteria

Additional mitigation criteria have been removed in the most recent project approval modification, but have been assessed in accordance with the 2011 NMP. WCP are to consider noise in respect to the additional mitigation criteria detailed in Table 2.3 for most privately owned land.

*Table 2.3: WILPINJONG COAL ADDITIONAL MITIGATION CRITERIA, dB*

| Property | Day/Evening/Night $L_{Aeq,15minute}$ |
|---|---|
| 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 Factor

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 METHODS AND CRITERIA*

| Method | Assessment/Calculation Method | Night Criterion | Day 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 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 | 370304 | 22/05/2015 |
| Larson Davis CAL-150 acoustic calibrator | 3333 | 23/07/2015 |

# 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/APRIL 2014*

| 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 |
|---|---|---|---|---|---|---|---|---|
| | **Evening** | | | | | | | |
| N4 | 9/04/2014 19:32 | 51 | 42 | 37 | 35 | 36 | 34 | 32 |
| N6 | 9/04/2014 20:00 | 52 | 43 | 36 | 28 | 32 | 26 | 24 |
| N7 | 9/04/2014 20:53 | 72 | 61 | 55 | 32 | 49 | 27 | 22 |
| N9 | 9/04/2014 20:24 | 43 | 30 | 25 | 21 | 23 | 20 | 18 |
| N12 | 9/04/2014 21:26 | 49 | 42 | 41 | 40 | 40 | 39 | 37 |
| | **Night** | | | | | | | |
| N4 | 9/04/2014 23:49 | 44 | 34 | 30 | 26 | 27 | 24 | 22 |
| N6 | 9/04/2014 23:24 | 46 | 39 | 32 | 23 | 28 | 20 | 19 |
| N7 | 9/04/2014 22:32 | 49 | 39 | 34 | 30 | 31 | 26 | 23 |
| N9 | 9/04/2014 22:59 | 48 | 45 | 37 | 21 | 33 | 18 | 16 |
| N12 | 9/04/2014 22:00 | 56 | 42 | 41 | 40 | 40 | 39 | 38 |
| | **Evening** | | | | | | | |
| N4 | 10/04/2014 18:37 | 50 | 42 | 35 | 33 | 34 | 32 | 30 |
| N6 | 10/04/2014 19:03 | 50 | 43 | 32 | 25 | 30 | 23 | 22 |
| N7 | 10/04/2014 19:52 | 67 | 64 | 52 | 32 | 51 | 27 | 23 |
| N9 | 10/04/2014 19:27 | 45 | 38 | 31 | 23 | 28 | 22 | 20 |
| N12 | 10/04/2014 20:26 | 53 | 41 | 40 | 37 | 38 | 35 | 34 |
| | **Night** | | | | | | | |
| N4 | 11/04/2014 0:12 | 75 | 39 | 35 | 31 | 41 | 29 | 27 |
| N6 | 10/04/2014 23:32 | 50 | 42 | 40 | 36 | 37 | 29 | 26 |
| N7 | 10/04/2014 22:33 | 42 | 36 | 33 | 29 | 30 | 26 | 23 |
| N9 | 10/04/2014 23:06 | 47 | 34 | 32 | 29 | 29 | 26 | 24 |
| N12 | 10/04/2014 22:00 | 50 | 41 | 38 | 35 | 36 | 33 | 32 |

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

Table 4.2 and Table 4.3 detail $L_{Aeq,15\ minute}$ 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 IMPACT ASSESSMENT CRITERIA – MARCH/APRIL 2014*

| 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] |
|---|---|---|---|---|---|---|---|
| | **Evening** | | | | | | |
| N4 | 9/04/2014 19:32 | 1.4 | 0.3 | NA | Y | <25 | NA |
| N6 | 9/04/2014 20:00 | 1.2 | 1.0 | 35 | Y | IA | N |
| N7 | 9/04/2014 20:53 | 0.8 | 1.7 | NA | Y | IA | NA |
| N9 | 9/04/2014 20:24 | 0.9 | 1.6 | NA | Y | IA | NA |
| N12 | 9/04/2014 21:26 | 0.8 | 1.0 | NA | Y | 31 | NA |
| | **Night** | | | | | | |
| N4 | 9/04/2014 23:49 | 0.0 | 1.6 | NA | Y | <25 | NA |
| N6 | 9/04/2014 23:24 | 1.0 | 1.2 | 35 | Y | IA | N |
| N7 | 9/04/2014 22:32 | 1.1 | 1.2 | NA | Y | IA | NA |
| N9 | 9/04/2014 22:59 | 1.2 | 0.7 | NA | Y | IA | NA |
| N12 | 9/04/2014 22:00 | 1.2 | 0.3 | NA | Y | 33 | NA |
| | **Evening** | | | | | | |
| N4 | 10/04/2014 18:37 | 1.3 | -0.2 | NA | Y | IA | NA |
| N6 | 10/04/2014 19:03 | 0.0 | 0.5 | 35 | Y | IA | N |
| N7 | 10/04/2014 19:52 | 1.1 | 0.2 | NA | Y | IA | NA |
| N9 | 10/04/2014 19:27 | 1.0 | 0.2 | NA | Y | IA | NA |
| N12 | 10/04/2014 20:26 | 0.0 | 0.3 | NA | Y | 31 | NA |
| | **Night** | | | | | | |
| N4 | 11/04/2014 0:12 | 1.1 | -0.3 | NA | Y | 31 | NA |
| N6 | 10/04/2014 23:32 | 0.0 | 0.2 | 35 | Y | IA | N |
| N7 | 10/04/2014 22:33 | 1.0 | 0.5 | NA | Y | <25 | NA |
| N9 | 10/04/2014 23:06 | 1.1 | 0.7 | NA | Y | 26 | NA |
| N12 | 10/04/2014 22:00 | 0.9 | 0.7 | NA | Y | NM | NA |

*Notes:*

1. *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 and wind speed up to 2 m/s;*
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: $L_{A1,1minute}$ GENRATED BY WCP AGAINST IMPACT ASSESSMENT CRITERIA – MARCH/APRIL 2014*

| 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] |
|---|---|---|---|---|---|---|---|
| | **Night** | | | | | | |
| N4 | 9/04/2014 23:49 | 0.0 | 1.6 | NA | Y | <25 | NA |
| N6 | 9/04/2014 23:24 | 1.0 | 1.2 | 45 | Y | IA | N |
| N7 | 9/04/2014 22:32 | 1.1 | 1.2 | NA | Y | IA | NA |
| N9 | 9/04/2014 22:59 | 1.2 | 0.7 | NA | Y | IA | NA |
| N12 | 9/04/2014 22:00 | 1.2 | 0.3 | NA | Y | 37 | NA |
| | **Night** | | | | | | |
| N4 | 11/04/2014 0:12 | 1.1 | -0.3 | NA | Y | 40 | NA |
| N6 | 10/04/2014 23:32 | 0.0 | 0.2 | 45 | Y | IA | N |
| N7 | 10/04/2014 22:33 | 1.0 | 0.5 | NA | Y | <25 | NA |
| N9 | 10/04/2014 23:06 | 1.1 | 0.7 | NA | Y | 26 | NA |
| N12 | 10/04/2014 22:00 | 0.9 | 0.7 | NA | Y | NM | NA |

*Notes:*

1. *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 and wind speed up to 2 m/s;*
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;*
6. *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 March/April 2014 survey.

*Table 4.4: ATTENDED MEASUREMENT STATISTICS FOR WCP – MARCH/APRIL 2014*

| Conditions | Total for March/April 2014 |
|---|---|
| Number of measurements | 20 |
| Number of measurements where criterion applied | 20 |
| Number of measurements where WCP was within 5 dB of the criterion and criterion applied | 0 |

None of the twenty measurements occurred during which RCM 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 consent).

No further low-frequency analysis 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 – MARCH/APRIL 2014*

| Location | Start Date And Time | Temperature °C | Wind Speed m/s | Wind Direction °MN | Cloud Cover eighths |
|---|---|---|---|---|---|
| | **Evening** | | | | |
| N4 | 9/04/2014 19:32 | 17 | 0.5 | 205 | 6 |
| N6 | 9/04/2014 20:00 | 19 | 0.5 | 225 | 5 |
| N7 | 9/04/2014 20:53 | 18 | 0.0 | - | 4 |
| N9 | 9/04/2014 20:24 | 19 | 0.0 | - | 4 |
| N12 | 9/04/2014 21:26 | 18 | 0.0 | - | 3 |
| | **Night** | | | | |
| N4 | 9/04/2014 23:49 | 18 | 0.0 | - | 6 |
| N6 | 9/04/2014 23:24 | 17 | 0.5 | 150 | 6 |
| N7 | 9/04/2014 22:32 | 17 | 0.0 | - | 3 |
| N9 | 9/04/2014 22:59 | 17 | 0.0 | - | 4 |
| N12 | 9/04/2014 22:00 | 19 | 0.0 | - | 1 |
| | **Evening** | | | | |
| N4 | 10/04/2014 18:37 | 22 | 0.0 | - | 8 |
| N6 | 10/04/2014 19:03 | 22 | 0.0 | - | 8 |
| N7 | 10/04/2014 19:52 | 23 | 0.0 | - | 8 |
| N9 | 10/04/2014 19:27 | 22 | 0.0 | - | 8 |
| N12 | 10/04/2014 20:26 | 25 | 0.0 | - | 8 |
| | **Night** | | | | |
| N4 | 11/04/2014 0:12 | 20 | 0.0 | - | 8 |
| N6 | 10/04/2014 23:32 | 21 | 0.0 | - | 8 |
| N7 | 10/04/2014 22:33 | 21 | 0.0 | - | 8 |
| N9 | 10/04/2014 23:06 | 21 | 0.0 | - | 8 |
| N12 | 10/04/2014 22:00 | 27 | 0.0 | - | 8 |

*Notes:* 1. *Wind speed and direction measured at 1.8 metres; and*
2. *NA is data not available.*

*Table 4.6: WCP METEOROLOGICAL STATION DATA[1]*

| End Date and Time | Wind Speed m/s | Wind Direction Degrees | Lapse Rate Degrees / 100 metres[2] |
|---|---|---|---|
| 9/04/2014 19:00 | 1.8 | 122 | 0.0 |
| 9/04/2014 19:15 | 1.8 | 118 | 0.0 |
| 9/04/2014 19:30 | 1.7 | 119 | 0.3 |
| 9/04/2014 19:45 | 1.4 | 113 | 0.3 |
| 9/04/2014 20:00 | 1.1 | 119 | 0.3 |
| 9/04/2014 20:15 | 1.2 | 148 | 1.0 |
| 9/04/2014 20:30 | 0.9 | 112 | 1.9 |
| 9/04/2014 20:45 | 0.9 | 89 | 1.6 |
| 9/04/2014 21:00 | 0.8 | 76 | 1.7 |
| 9/04/2014 21:15 | 0.8 | 79 | 1.6 |
| 9/04/2014 21:30 | 1.1 | 90 | 1.0 |
| 9/04/2014 21:45 | 0.8 | 99 | 1.0 |
| 9/04/2014 22:00 | 1 | 111 | 0.7 |
| 9/04/2014 22:15 | 1.2 | 124 | 0.3 |
| 9/04/2014 22:30 | 0.9 | 109 | 0.3 |
| 9/04/2014 22:45 | 1.1 | 103 | 1.2 |
| 9/04/2014 23:00 | 1.4 | 118 | 0.5 |
| 9/04/2014 23:15 | 1.2 | 105 | 0.7 |
| 9/04/2014 23:30 | 1.2 | 97 | 1.4 |
| 9/04/2014 23:45 | 1 | 94 | 1.2 |
| 10/04/2014 0:00 | 0 | - | 1.6 |
| 10/04/2014 0:15 | 0 | - | 1.9 |
| 10/04/2014 0:30 | 0 | - | 1.2 |
| 10/04/2014 0:45 | 0 | - | 0.5 |
| 10/04/2014 1:00 | 0 | - | 0.5 |
| 10/04/2014 18:00 | 1.6 | 125 | -0.2 |
| 10/04/2014 18:15 | 1.3 | 121 | -0.3 |
| 10/04/2014 18:30 | 1.2 | 129 | -0.2 |
| 10/04/2014 18:45 | 1.3 | 101 | -0.2 |
| 10/04/2014 19:00 | 0.8 | 98 | 0.3 |
| 10/04/2014 19:15 | 0 | - | 0.5 |
| 10/04/2014 19:30 | 0.9 | 77 | 0.7 |
| 10/04/2014 19:45 | 1 | 94 | 0.2 |
| 10/04/2014 20:00 | 1.1 | 96 | 0.2 |
| 10/04/2014 20:15 | 0 | - | 0.3 |
| 10/04/2014 20:30 | 0 | - | 0.2 |

| End Date and Time | Wind Speed m/s | Wind Direction Degrees | Lapse Rate Degrees / 100 metres[2] |
|---|---|---|---|
| 10/04/2014 20:45 | 0 | - | 0.3 |
| 10/04/2014 21:00 | 0 | - | 1.0 |
| 10/04/2014 21:15 | 0 | - | 1.2 |
| 10/04/2014 21:30 | 0 | - | 1.0 |
| 10/04/2014 21:45 | 0.9 | 135 | 0.7 |
| 10/04/2014 22:00 | 0.9 | 107 | 0.5 |
| 10/04/2014 22:15 | 0.9 | 106 | 0.7 |
| 10/04/2014 22:30 | 0.7 | 120 | 1.2 |
| 10/04/2014 22:45 | 1 | 162 | 0.5 |
| 10/04/2014 23:00 | 0 | - | 0.5 |
| 10/04/2014 23:15 | 1.1 | 178 | 0.7 |
| 10/04/2014 23:30 | 0.6 | 191 | 0.2 |
| 10/04/2014 23:45 | 0 | - | 0.2 |
| 11/04/2014 0:00 | 0 | - | 0.0 |
| 11/04/2014 0:15 | 0.8 | 175 | -0.2 |
| 11/04/2014 0:30 | 1.1 | 212 | -0.3 |
| 11/04/2014 0:45 | 0 | - | -0.2 |
| 11/04/2014 1:00 | 0.7 | 178 | -0.2 |
| 11/04/2014 1:15 | 1.3 | 248 | -0.5 |
| 11/04/2014 1:30 | 0.4 | 355 | -0.5 |
| 11/04/2014 1:45 | 0 | - | -0.3 |
| 11/04/2014 2:00 | 1.2 | 281 | -0.7 |

*Notes:* *1. Data supplied by WCP; and*

*2. Sourced from the WCP inversion tower.*

# 5 DISCUSSION

## 5.1 Noted Noise Sources

Table 4.2 and Table 4.3 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 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 $L_{Aeq}$.

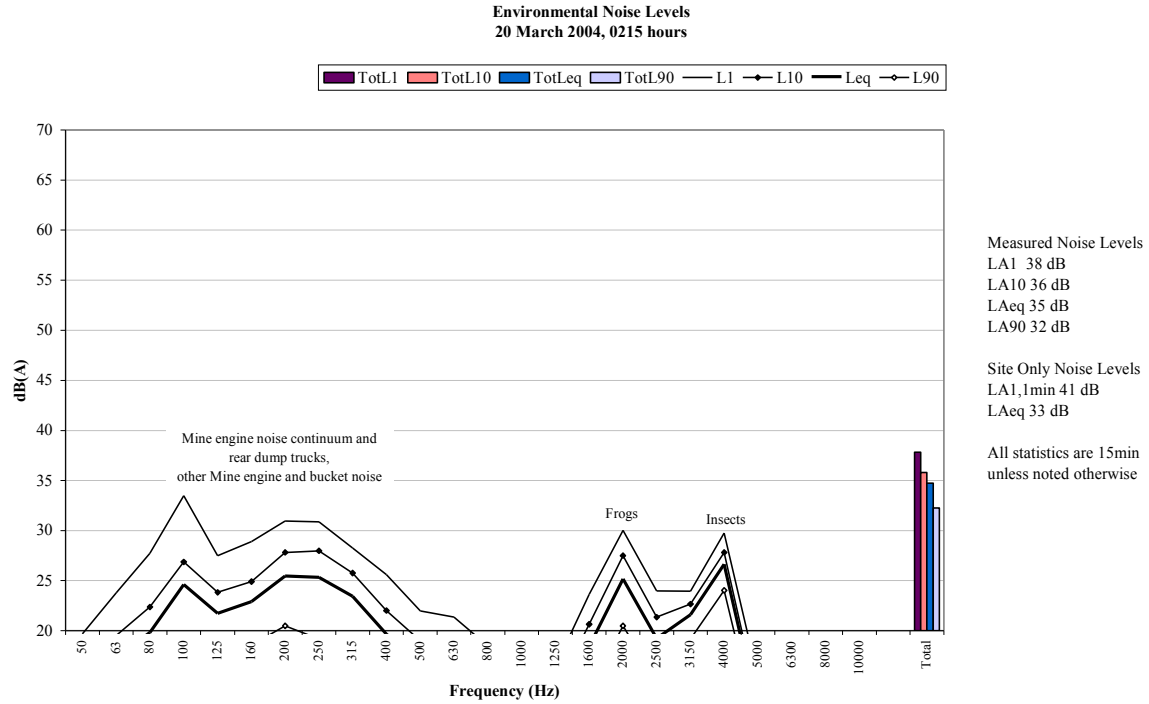


**Figure 2: Example graph (refer to Section 5.1 for explanatory note)**

### 5.1.1 N4, 9 April 2014 – Evening 1

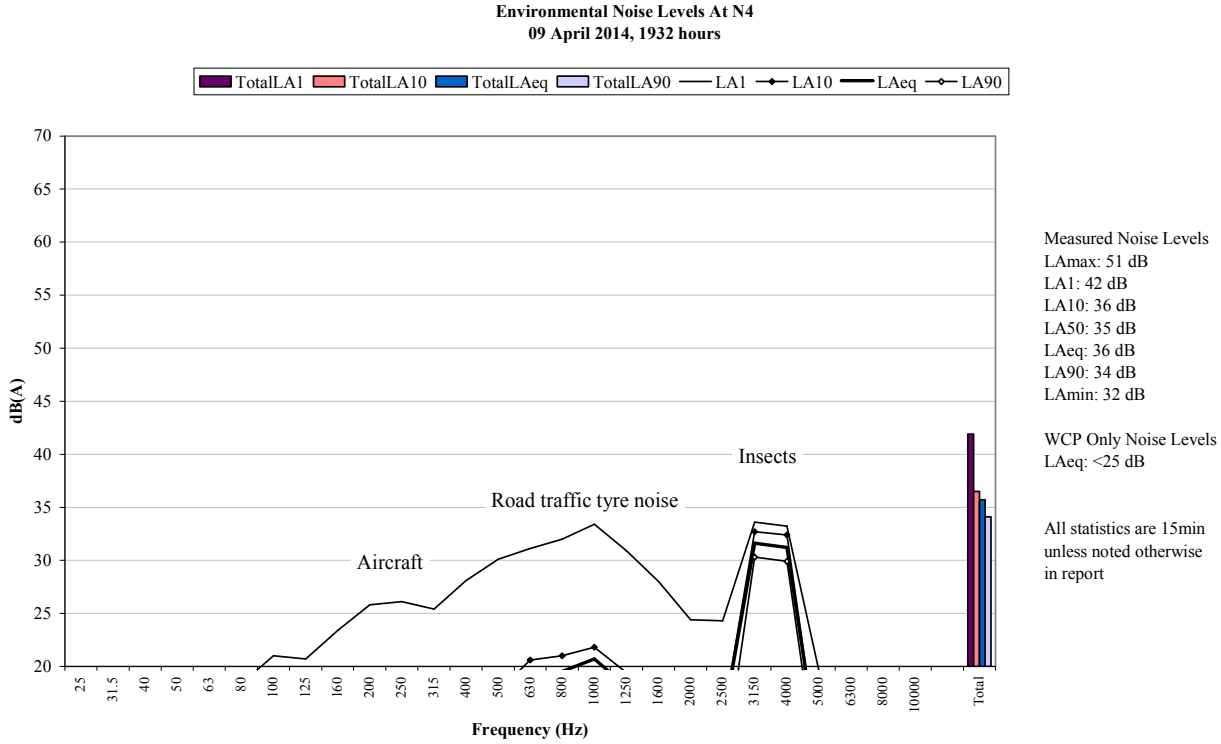


**Figure 3: Environmental Noise Levels, N4 - Cumbo Road**

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

Road traffic tyre noise and insects were responsible for the measured $L_{A1}$. Insects generated the measured $L_{A10}$, $L_{Aeq}$ and $L_{A90}$.

Dogs, aircraft noise, and birds were also noted.

### 5.1.2 N6, 9 April 2014 – Evening 1

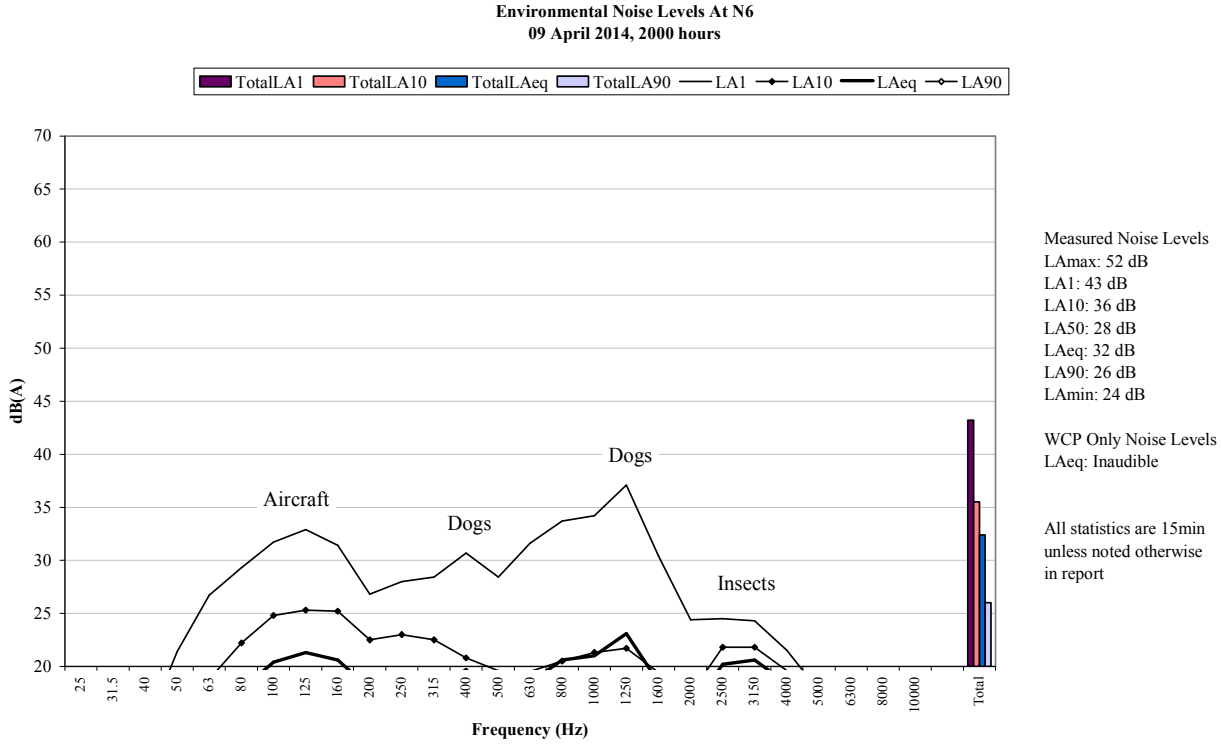


**Figure 4: Environmental Noise Levels, N6 - Wollar Church**

WCP was inaudible during the measurement.

Dogs were responsible for the measured $L_{A1}$. Aircraft and dogs contributed to the measured $L_{A10}$ and $L_{Aeq}$. Insects were responsible for the measured $L_{A90}$.

Livestock and road traffic were also noted.

### 5.1.3 N7, 9 April 2014– Evening 1

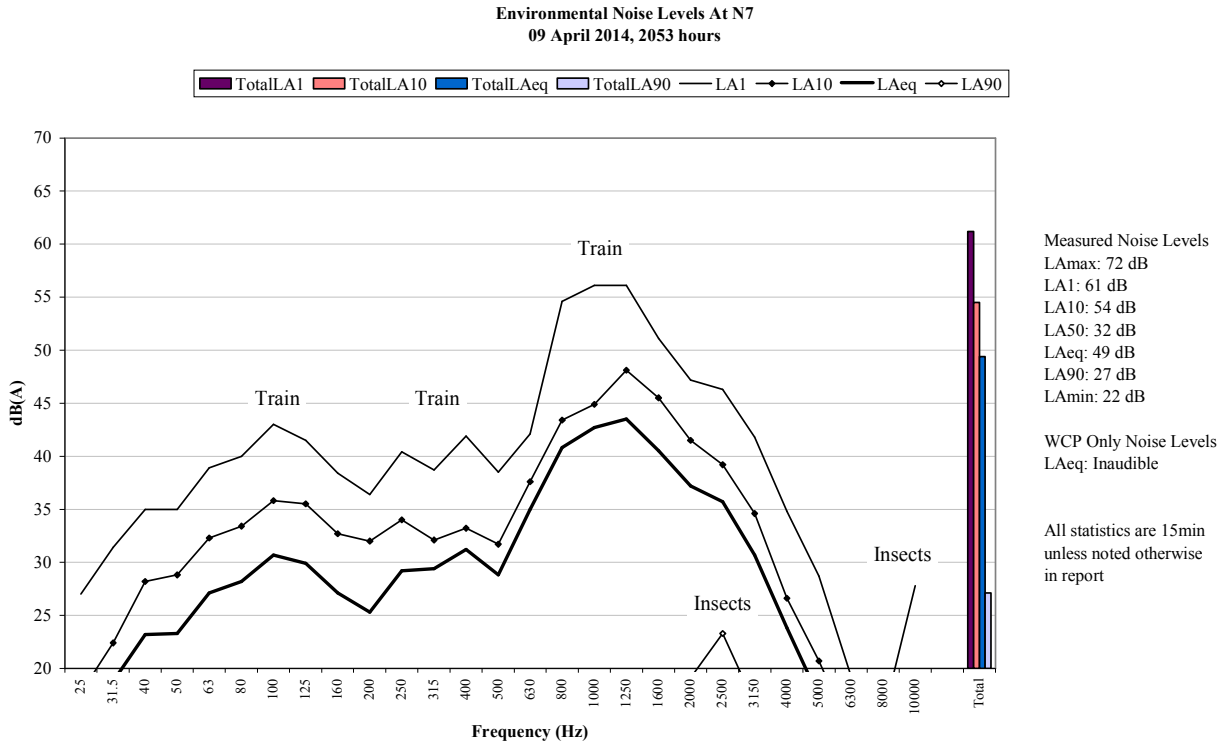


**Figure 5: Environmental Noise Levels, N7 - Ulan Wollar Road (East)**

WCP was inaudible during the measurement.

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

An aircraft was also noted.

### 5.1.4 N9, 9 April 2014 – Evening 1

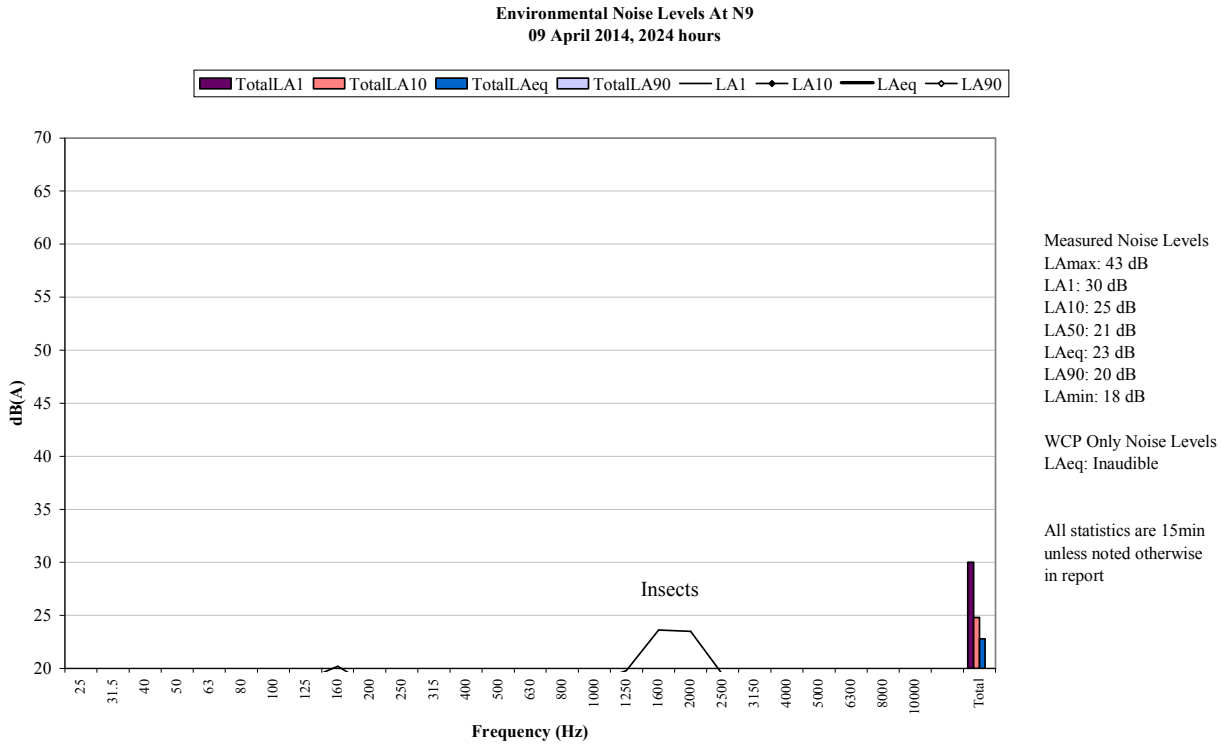


**Figure 6: Environmental Noise Levels, N9 - Slate Gully Road**

WCP was inaudible during the measurement.

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

An aircraft was also noted.

### 5.1.5 N12, 9 April 2014 – Evening 1

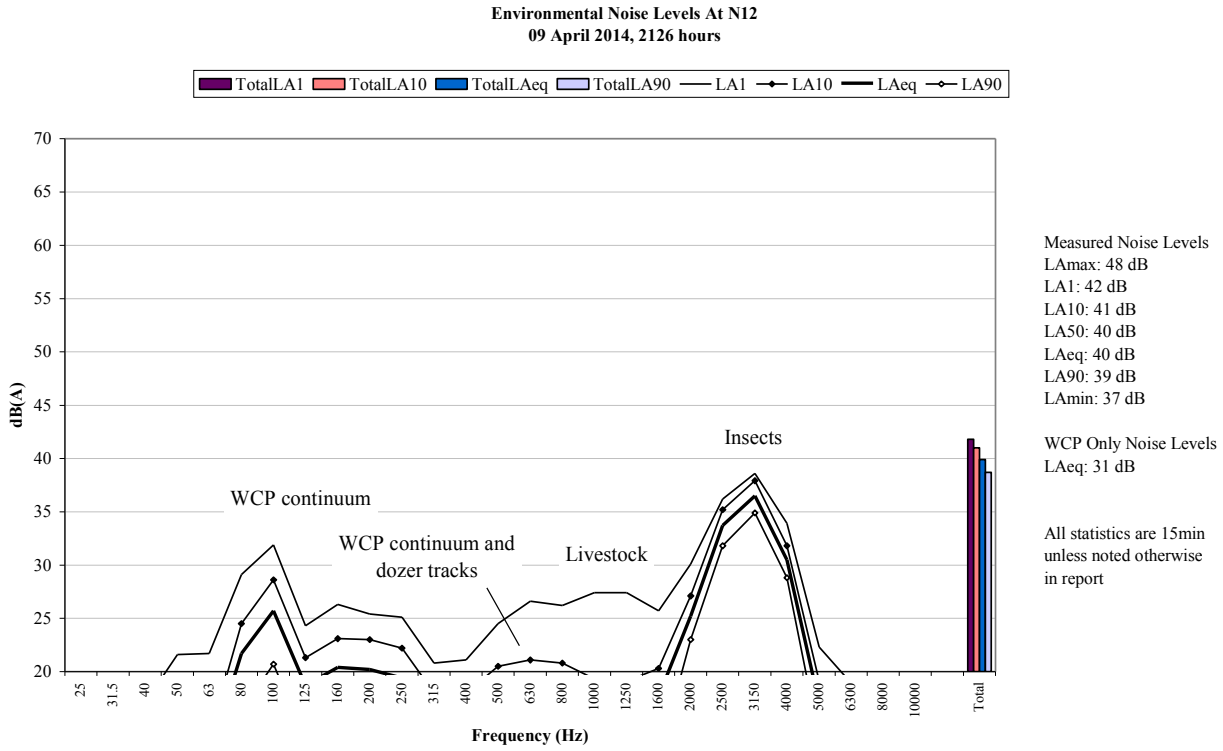


**Figure 7: Environmental Noise Levels, N12 - Ulan Wollar Road (West)**

A continuum from WCP was audible during the measurement generating the site-only $L_{Aeq}$ of 31 dB. Dozer tracks and reverse alarms were also noted.

Insects were responsible for measured levels.

Livestock were also noted.

### 5.1.6 N4, 9 April 2014 – Night 1

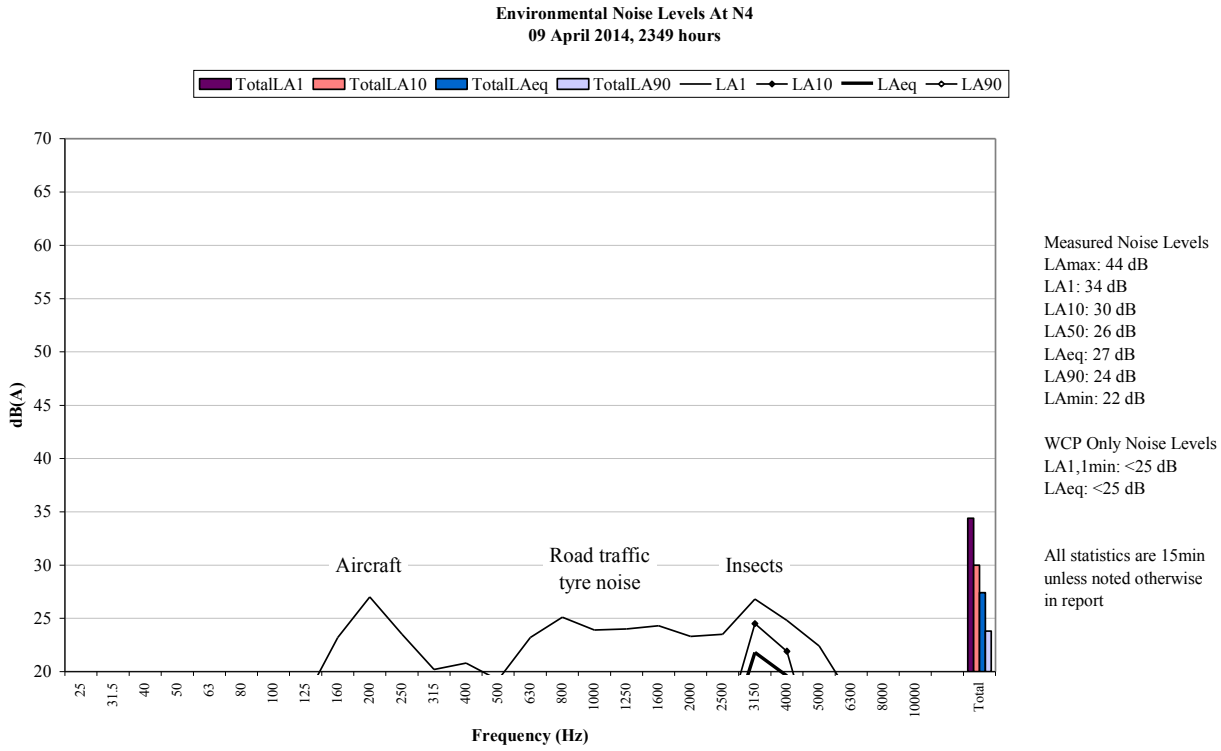


**Figure 8: Environmental Noise Levels, N4 - Cumbo Road**

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

Aircraft and insects generated the measured $L_{A1}$. Insects were primarily responsible for the measured $L_{A10}$, $L_{Aeq}$ and $L_{A90}$. Road traffic tyre noise and aircraft were minor contributors to the measured $L_{A10}$ and $L_{Aeq}$.

Birds were also noted.

### 5.1.7 N6, 9 April 2014 – Night 1

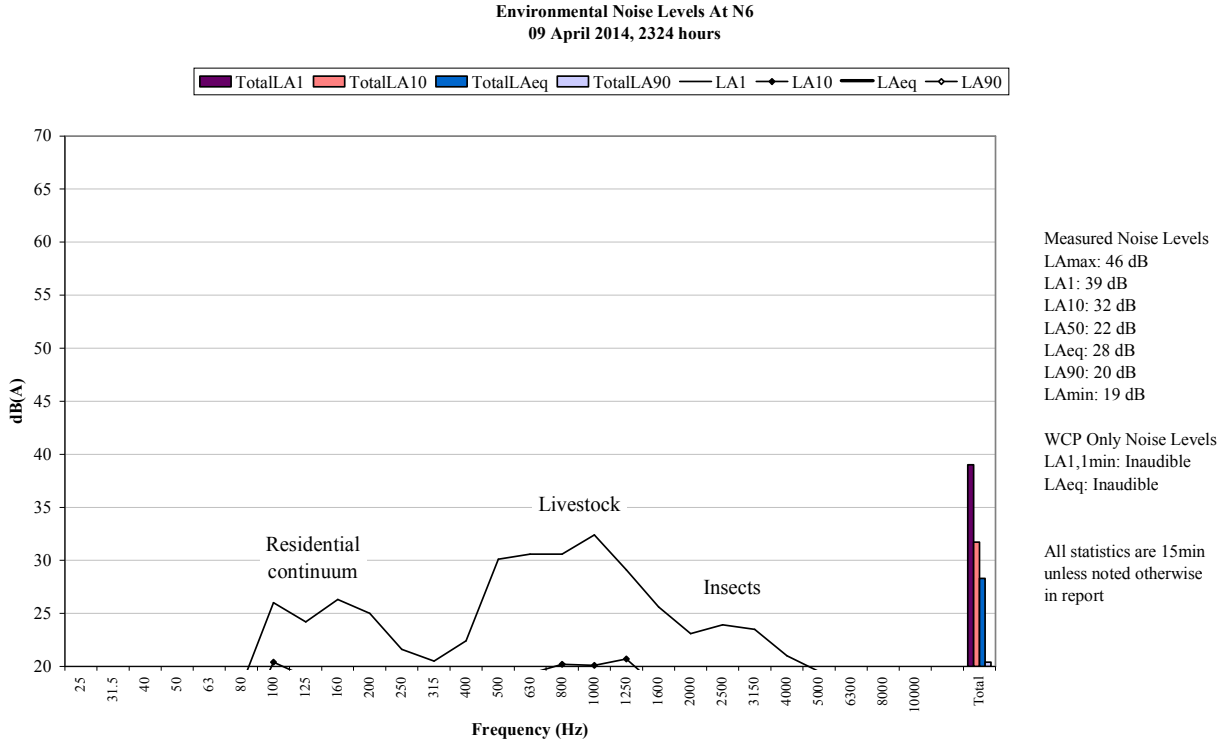


**Figure 9: Environmental Noise Levels, N6 - Wollar Church**

WCP was inaudible during the measurement.

Livestock were responsible for the measured $L_{A1}$. A local continuum, livestock and insects generated the measured $L_{A10}$ and $L_{Aeq}$. Insects were responsible for the measured $L_{A90}$.

### 5.1.8 N7, 9 April 2014– Night 1

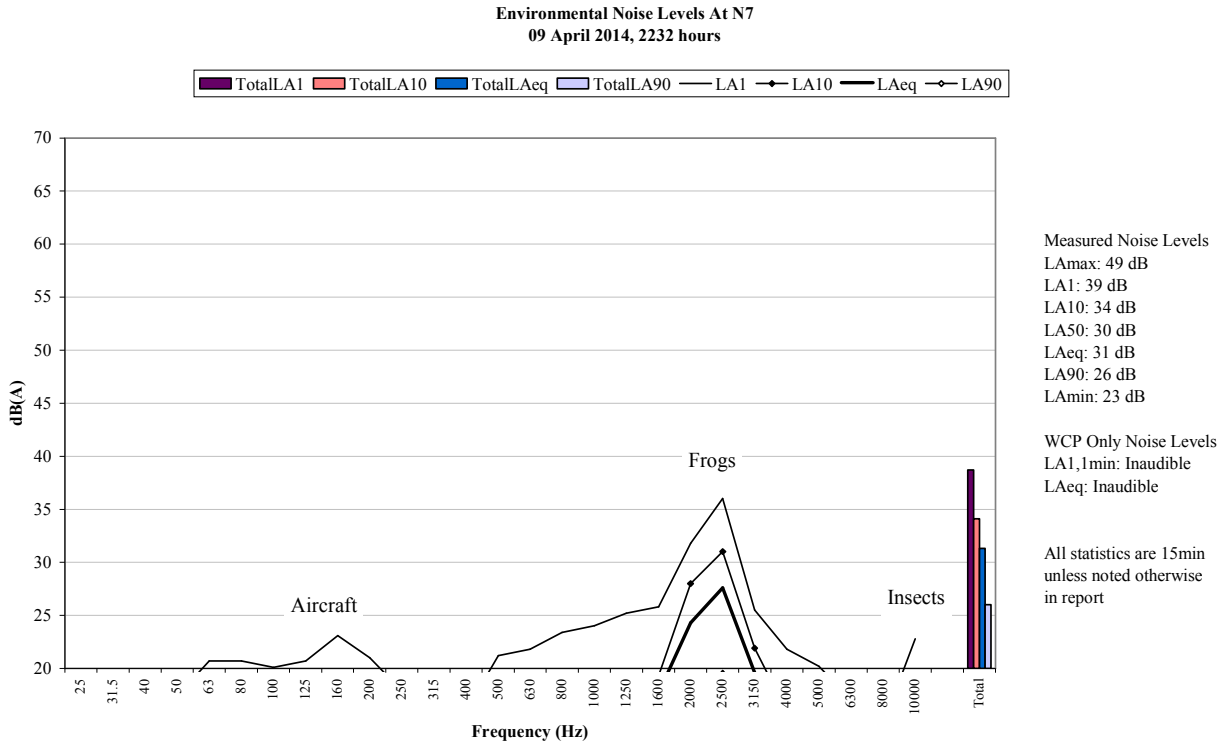


**Figure 10: Environmental Noise Levels, N7 - Ulan-Wollar Road (East)**

WCP was inaudible during the measurement.

Frogs were responsible for measured levels.

An aircraft and insects were also noted.

### 5.1.9 N9, 9 April 2014– Night 1

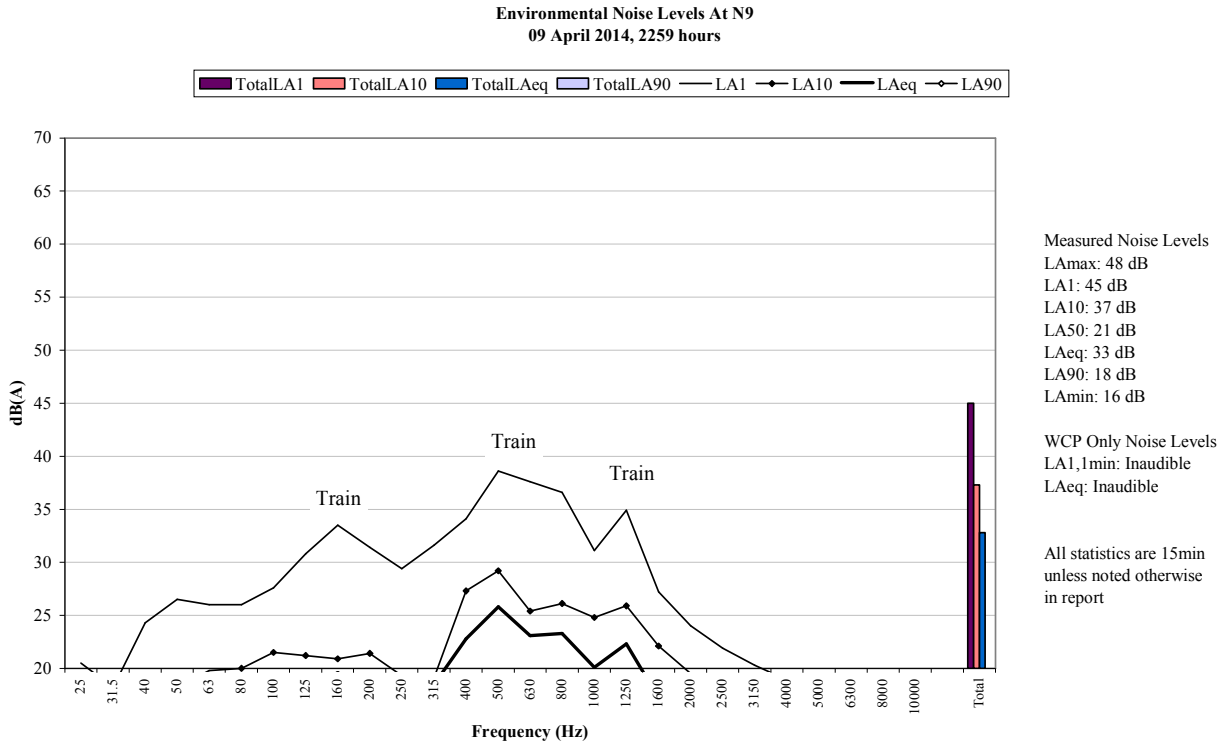


**Figure 11: Environmental Noise Levels, N9 - Slate Gully Road**

WCP was inaudible during the measurement.

A train was responsible for the measured $L_{A1}$, $L_{A10}$ and $L_{Aeq}$. Insects and the noise floor of the measurement instrument generated the measured $L_{A90}$.

### 5.1.10 N12, 9 April 2014 – Night 1

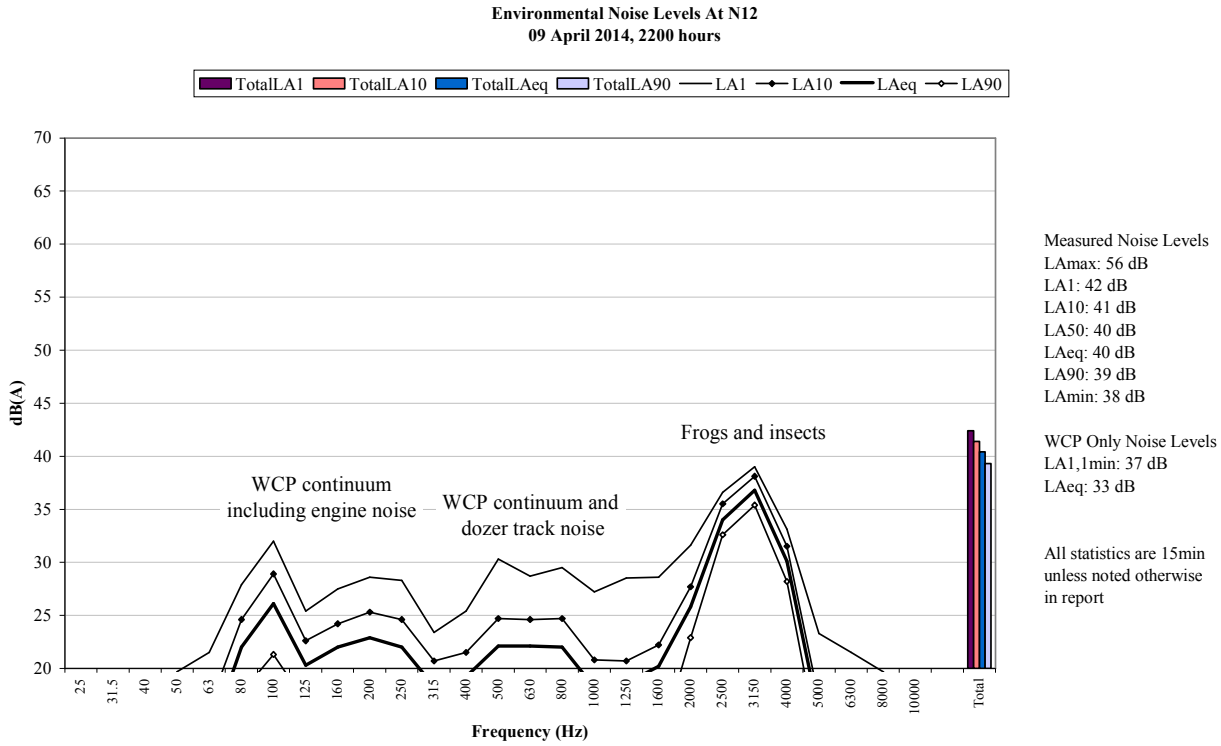


**Figure 12: Environmental Noise Levels, N12 - Ulan-Wollar Road (West)**

A continuum from WCP was audible throughout the measurement generating the site-only $L_{Aeq}$ of 33 dB. Dozer tracks were responsible for the site-only $L_{A1,1minute}$ of 37 dB. Horn noise and engine surges were also noted.

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

### 5.1.11 N4, 10 April 2014 – Evening 2

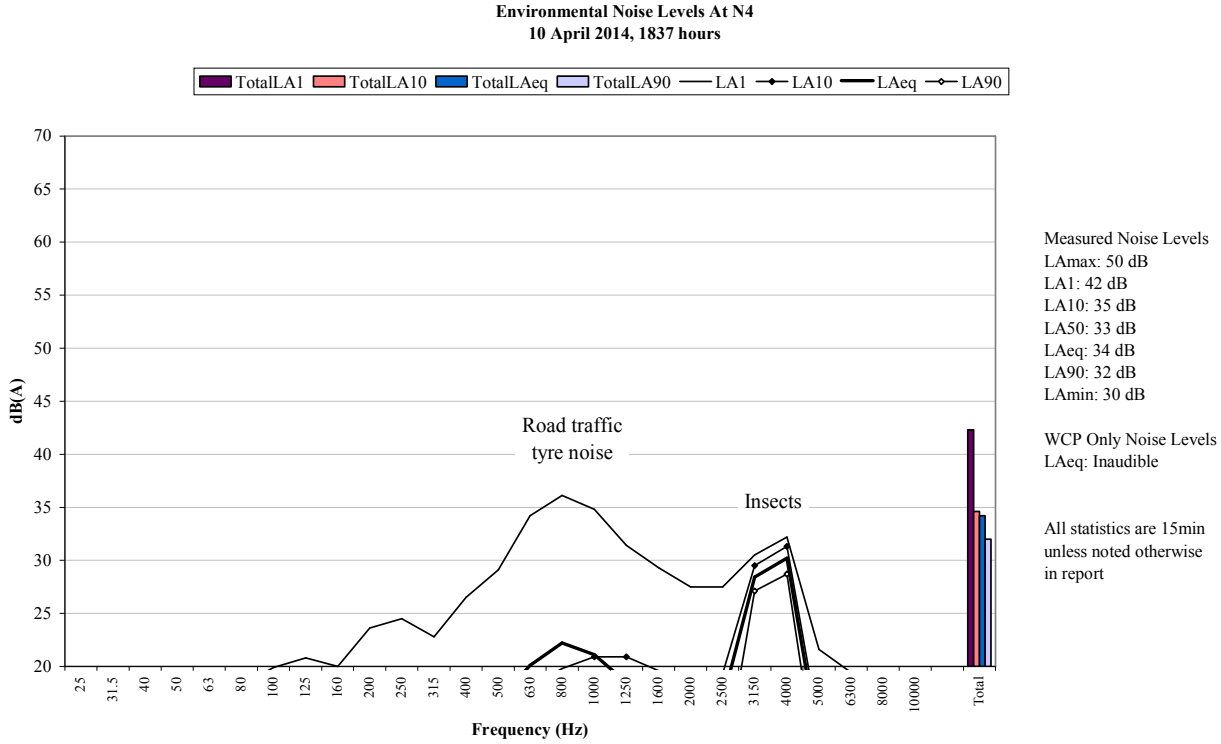


**Figure 13: Environmental Noise Levels, N4 - Cumbo Road**

WCP was inaudible during the measurement.

Road traffic tyre noise was responsible for the measured $L_{A1}$. Insects were responsible for the measured $L_{A10}$, $L_{Aeq}$ and $L_{A90}$.

Livestock were also noted.

### 5.1.12 N6, 10 April 2014 – Evening 2

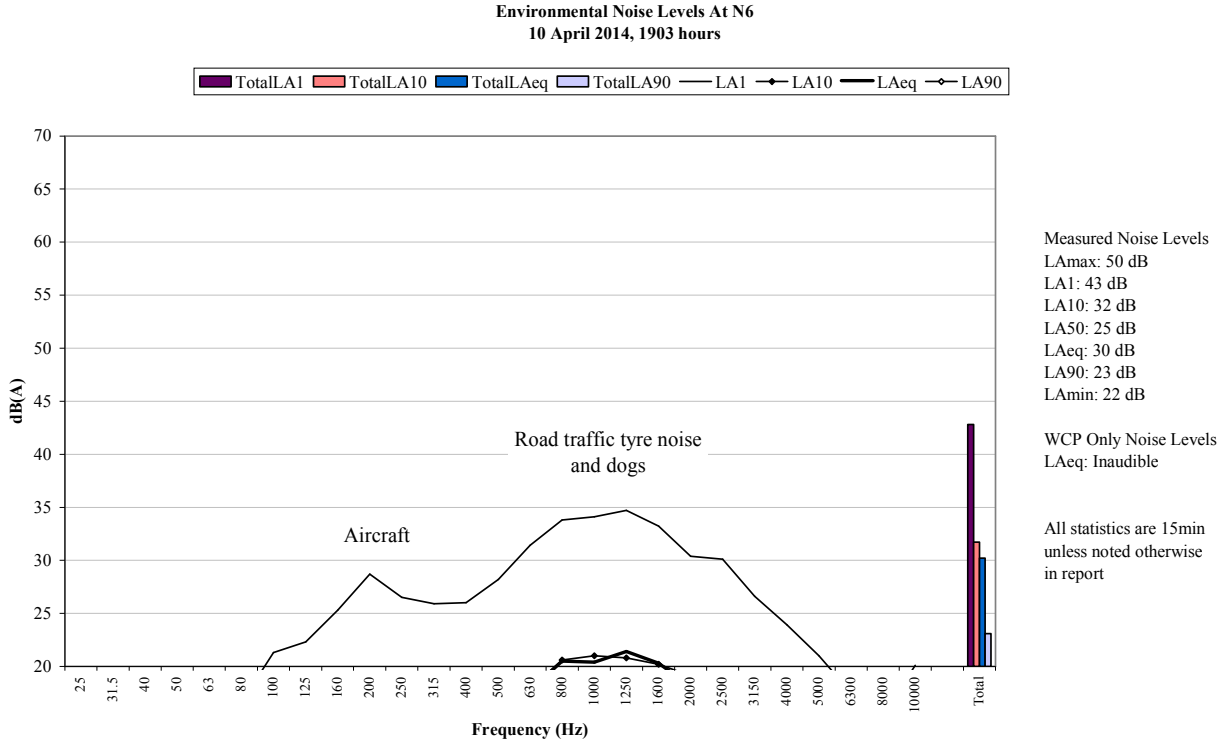


**Figure 14: Environmental Noise Levels, N6 - Wollar Church**

WCP was inaudible during the measurement.

Road traffic tyre noise and dogs were responsible for the measured $L_{A1}$. Road traffic and insects were primarily responsible for the measured $L_{A10}$. Road traffic, insects and dogs generated the measured $L_{Aeq}$. Insects were responsible for the measured $L_{A90}$.

An aircraft was also noted.

### 5.1.13 N7, 10 April 2014 – Evening 2

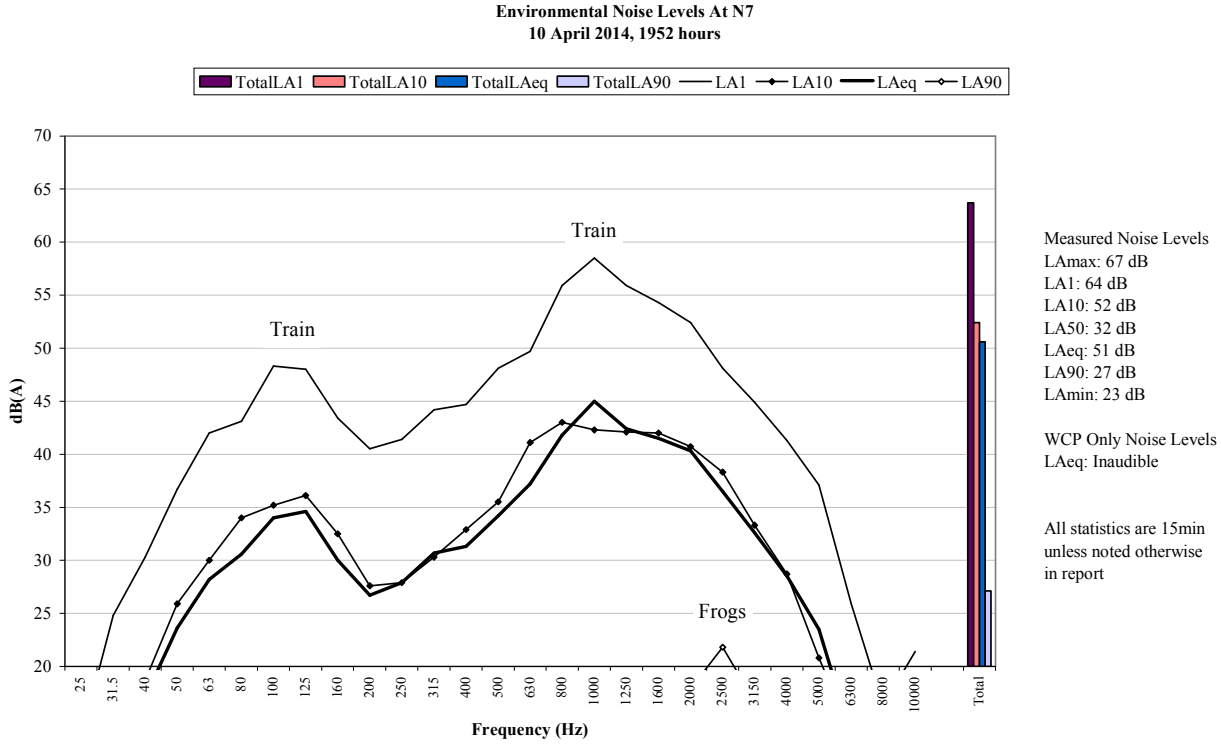


**Figure 15: Environmental Noise Levels, N7 - Ulan-Wollar Road (East)**

WCP was inaudible during the measurement.

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

Aircraft, insects and birds were also noted.

### 5.1.14 N9, 10 April 2014 – Evening 2

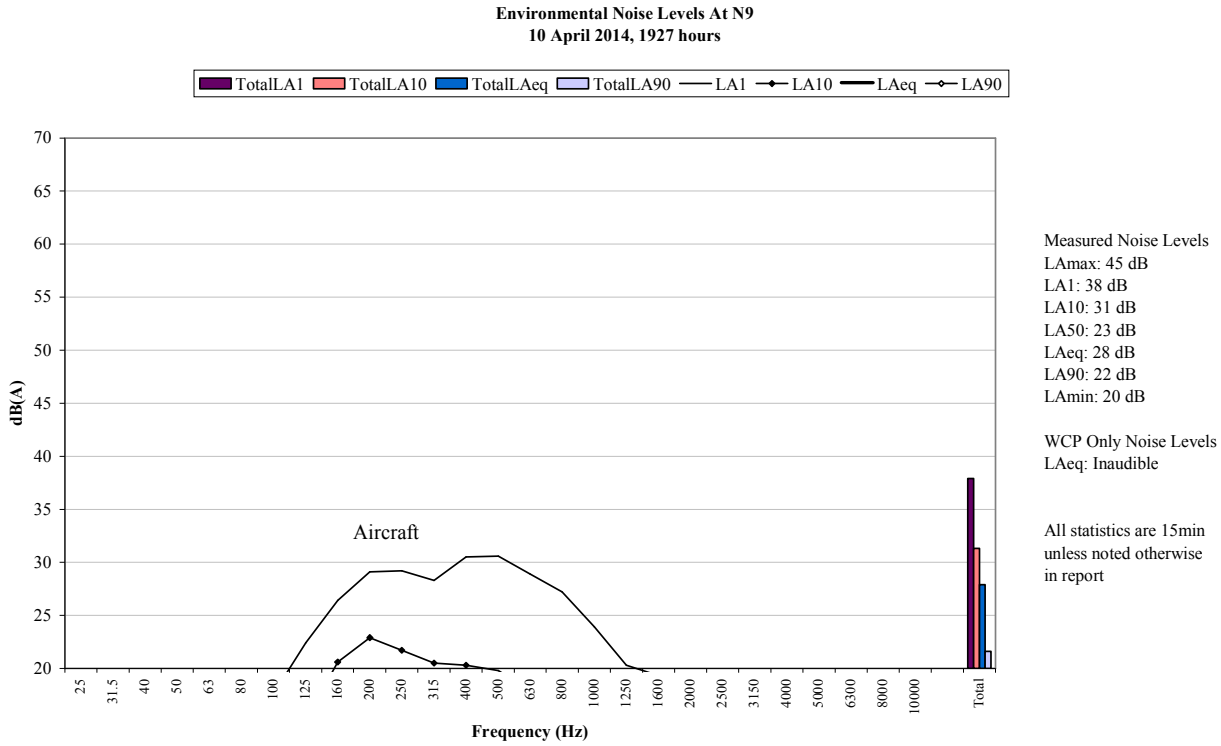


**Figure 16: Environmental Noise Levels, N9 - Slate Gully Road**

WCP was inaudible during the measurement.

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

### 5.1.15 N12, 10 April 2014– Evening 2

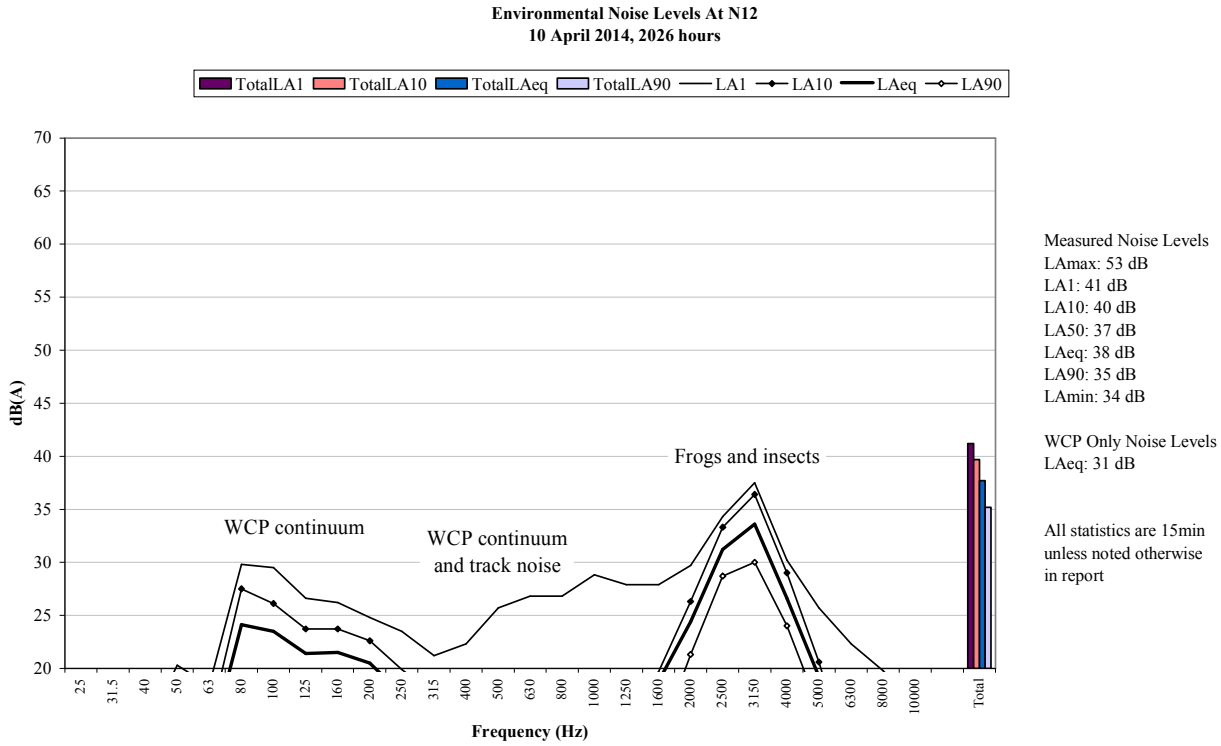


**Figure 17: Environmental Noise Levels, N12 - Ulan-Wollar Road (West)**

A continuum from WCP were audible throughout the measurement generating the site-only $L_{Aeq}$ of 31 dB. Dozer track and engine surges were also noted.

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

A very low-level continuum from another mine was also noted.

### 5.1.16 N4, 11 April 2014 – Night 2

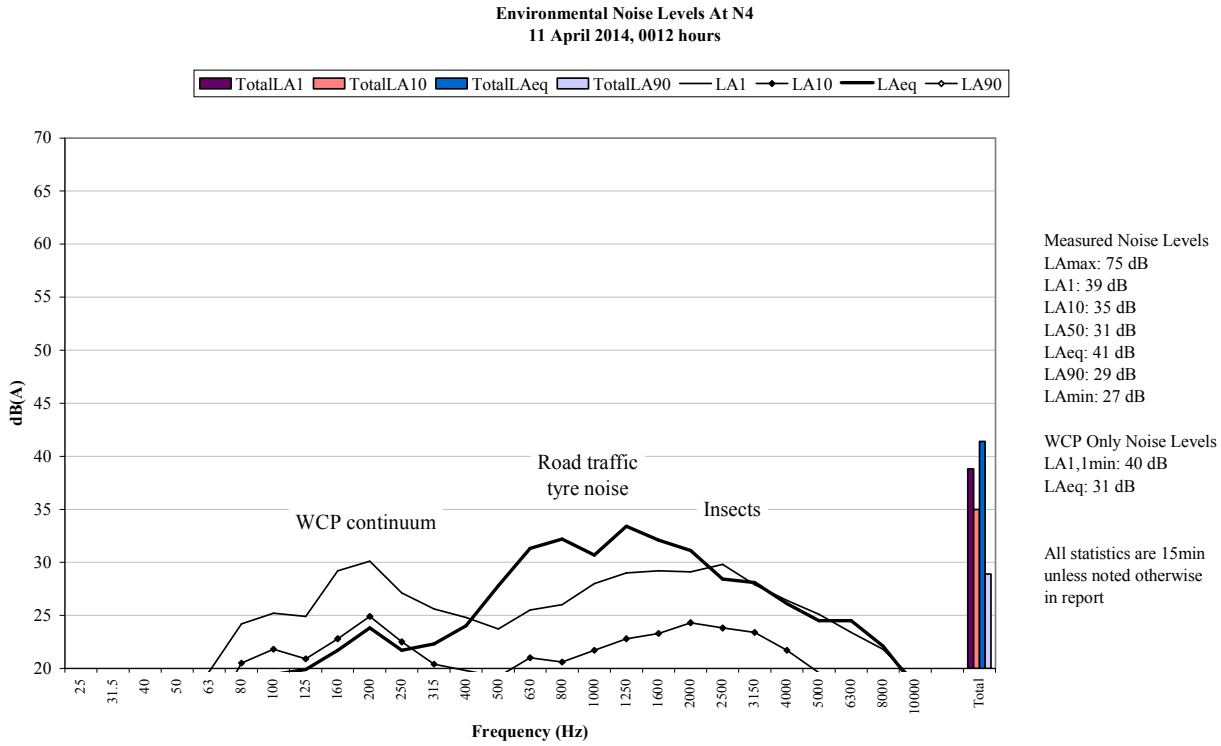


**Figure 18: Environmental Noise Levels, N4 - Cumbo Road**

A continuum from WCP was audible throughout the measurement generating the site-only $L_{Aeq}$ of 31 dB. Horn noise was responsible for the site-only $L_{A1,1minute}$ of 40 dB. Engine surges were also noted.

Road traffic tyre noise generated the measured $L_{Amax}$ and was primarily responsible for the measured $L_{Aeq}$. Insects and WCP continuum were responsible for the measured $L_{A1}$ and $L_{A10}$. Insects were responsible for the measured $L_{A90}$.

### 5.1.17 N6, 10 April 2014 – Night 2

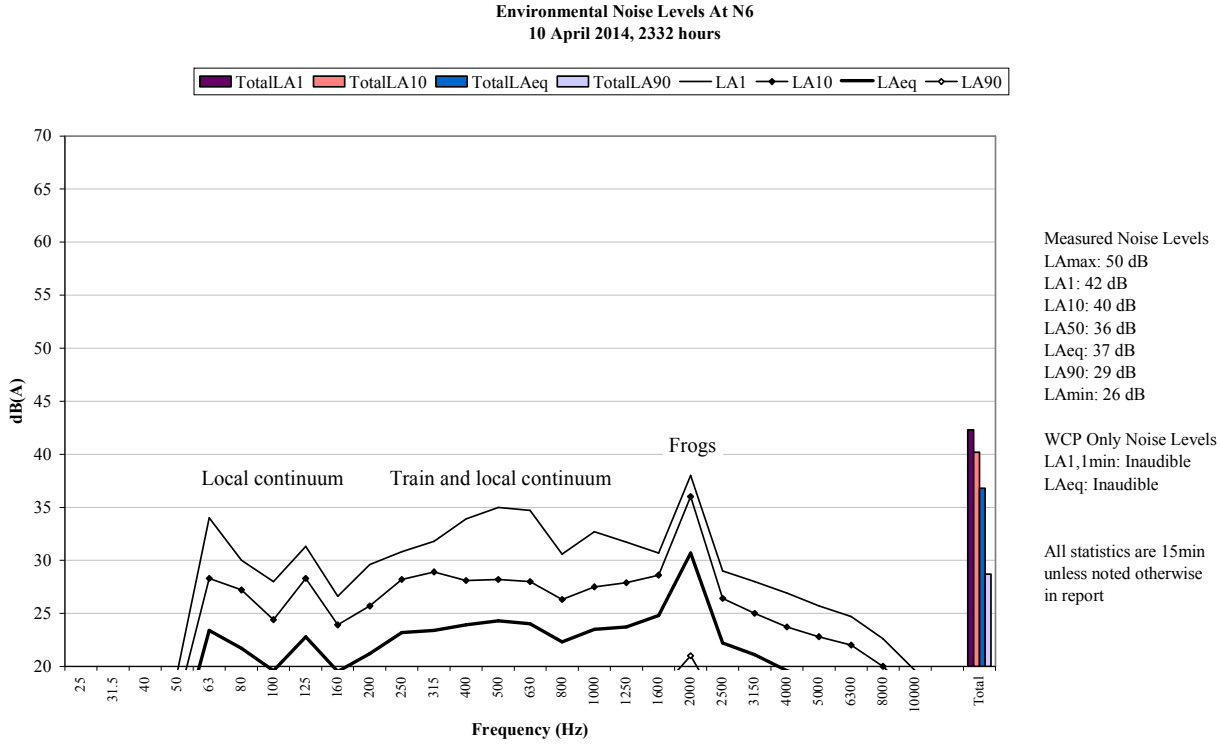


**Figure 19: Environmental Noise Levels, N6 - Wollar Church**

WCP was inaudible during the measurement.

A local continuum, frogs, and a train were responsible for the measured $L_{A1}$, $L_{A10}$ and $L_{Aeq}$. Frogs were responsible for the measured $L_{A90}$.

### 5.1.18 N7, 10 April 2014 – Night 2

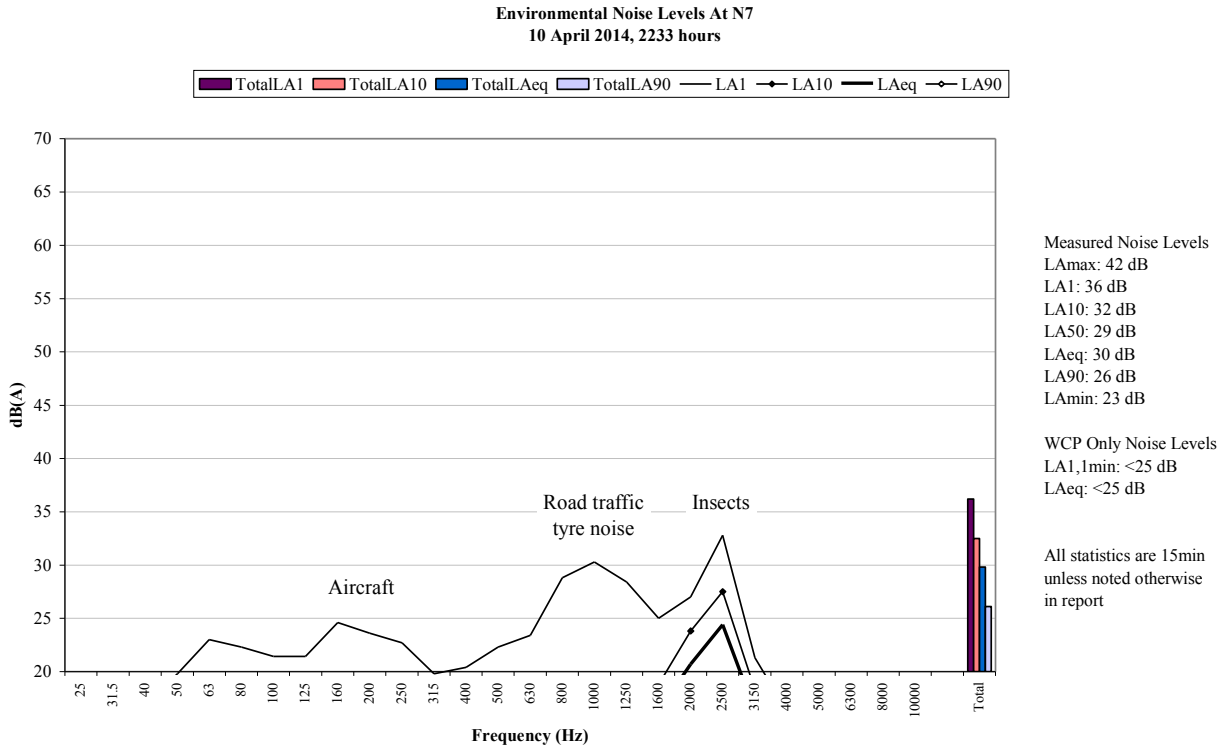


**Figure 20: Environmental Noise Levels, N7 - Ulan Wollar Road (East)**

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

Insects were primarily responsible for all measured levels. Road traffic and aircraft were minor contributors to the measured $L_{A10}$ and $L_{Aeq}$.

### 5.1.19 N9, 10 April 2014– Night 2

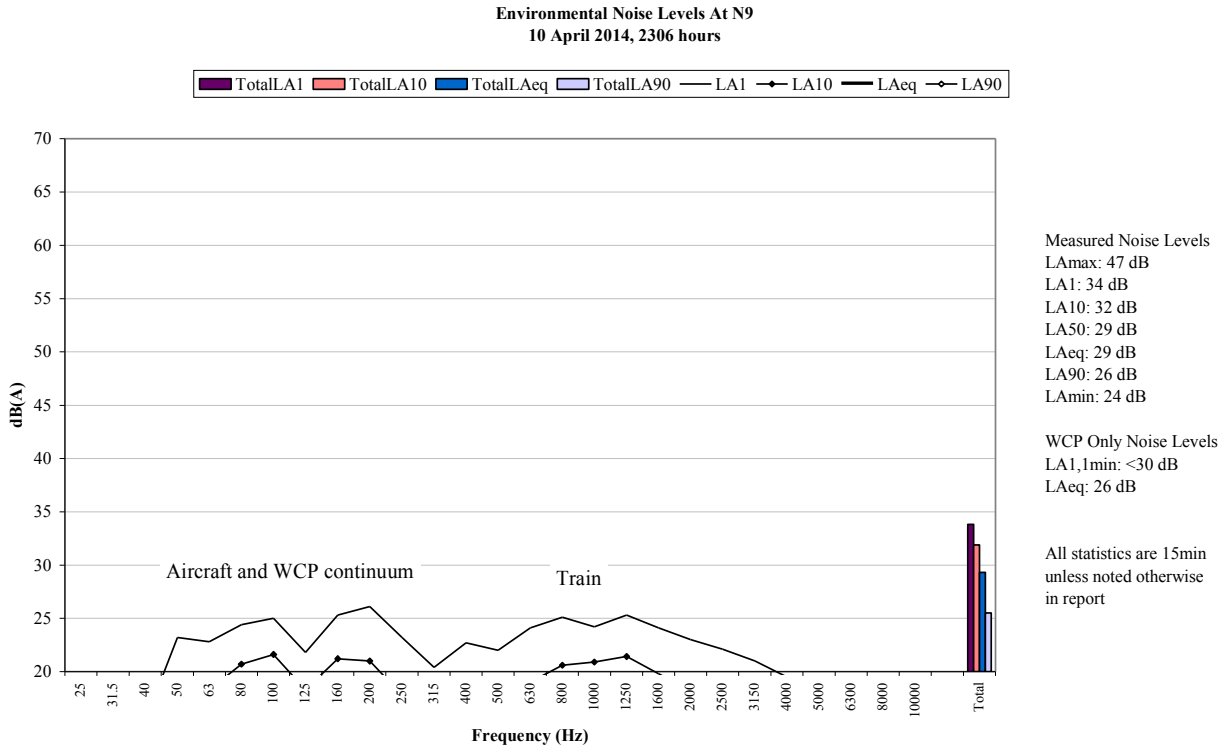


**Figure 21: Environmental Noise Levels, N9 - Slate Gully Road**

A continuum from WCP was audible during the measurement generating the site-only $L_{Aeq}$ of 26 dB and $L_{A1,1minute}$ of less than 30 dB.

Train noise, aircraft noise, and WCP continuum generated the measured $L_{A1}$, $L_{A10}$ and $L_{Aeq}$. WCP continuum was responsible for the measured $L_{A90}$.

Insects were also noted.

### 5.1.20 N12, 10 April 2014 – Night 2

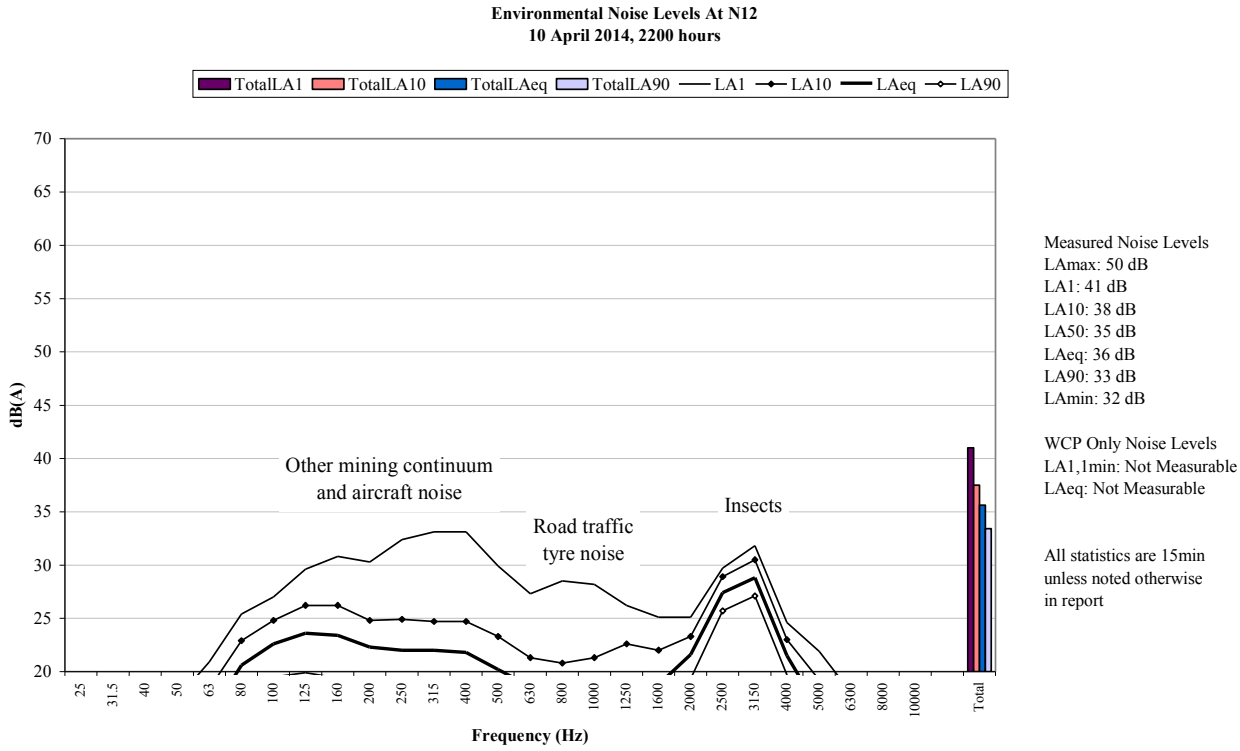


**Figure 22: Environmental Noise Levels, N12 – Ulan Wollar Road (West)**

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

An aircraft was responsible for the measured $L_{A1}$. Insects were primarily responsible for the measured $L_{A10}$ and $L_{Aeq}$. Other mining continuum was a minor contributor to the measured $L_{A10}$ and $L_{Aeq}$. Insects were responsible for the measured $L_{A90}$.

Road traffic tyre noise was also noted.

# 6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the evening and night periods of 9/10 and 10/11 April 2014. Attended noise monitoring was conducted at five sites. The duration of all measurements was 15 minutes.

Wilpinjong Coal Project (WCP) complied with noise limits at the monitoring locations during the March / April 2014 monitoring period.

**Global Acoustics Pty Ltd**

# APPENDIX

## A CONSENTS

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

The WCP project approval was granted in 2006. The most recent modification occurred in February 2014.

## A.1 Wilpinjong Coal Project Approval

**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)<br>45 (external)<br>When in use | | | - |
| 150A – St Luke's Anglican Church | 40 (internal)<br>When in use | | | - |
| 900 – St Laurence O'Toole Catholic Church | | | | |
| Goulburn River National Park/Munghorn Gap Nature Reserve | 50<br>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.

## 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 2013.

**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 relevant section is reproduced below.

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 $L_{A1(1\ minute)}$ 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.

# 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 : C13256A

| | |
|---|---|
| **Client Details :** | Global Acoustics Pty Ltd<br>12/16 Huntingdale Drive<br>Thornton NSW 2322 |
| **Equipment Tested/ Model Number :** | **Rion NA-28** |
| **Instrument Serial Number :** | 00370304 |
| **Microphone Serial Number :** | 480505 |
| **Preamplifier Serial Number :** | 60313 |
| **Ambient Temperature :** | 23°C |
| **Relative Humidity :** | 36% |
| **Barometric Pressure :** | 100.88 kPa |
| **Tested and Checked by :** | Alan Rutherford |
| **Calibration Date :** | 22-May-2013 |
| **Secondary Check by :** | Sandra Minto |
| **Report Issue Date :** | 24-May-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 |

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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

# Calibration Certificate

Number : C13410

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

**Equipment Tested/ Model Number :** **Larson Davis CAL150**

**Instrument Serial Number :** 3333

**Ambient Temperature :** 24°C

**Relative Humidity :** 31%

**Barometric Pressure :** 101.82 kPa

**Tested and Checked by :** Luke Hudson

**Calibration Date :** 23-July-2013

**Secondary Check by :** Sandra Minto

**Report Issue Date :** 24-July-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 | 93.95 dB | Pass |
| | Frequency | 1,000.10 Hz | Pass |
| | Short term fluctuation | 0.10 dB | Pass |
| | Distortion | 0.64% | Pass |
| 114 dB at 1000 Hz | SPL | 113.87 dB | Pass |
| | Frequency | 1,000.10 Hz | Pass |
| | Short term fluctuation | 0.00 dB | Pass |
| | Distortion | 0.59% | Pass |

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