# *Wilpinjong Coal*

*Environmental Noise Monitoring*

*September 2014*

*Prepared for*

*Wilpinjong Coal Pty Ltd*

Global Acoustics

Noise and Vibration Analysis and Solutions

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# Wilpinjong Coal

## Environmental Noise Monitoring
## September 2014

Reference: 14291_R01
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### Prepared for

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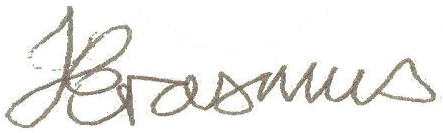

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|---|---|---|---|
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# *EXECUTIVE SUMMARY*

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

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

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

Environmental noise monitoring described in this report was undertaken at seven locations during the night of 11/12 September 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 September 2014 monitoring. 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.

One of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval). This result was analysed for low frequency content as detailed in Table 4.7. Due to another noise source present during the measurement, there was no low frequency penalty applied. As such, no further assessment of low frequency noise was undertaken.

**Global Acoustics Pty Ltd**

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# 1 INTRODUCTION

## 1.1 Background

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

Environmental noise monitoring described in this report was undertaken at seven locations during the evening and night of 11/12 September 2014. Figure 2 shows the regular monitoring locations.

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

## 1.2 Monitoring Locations

There were seven monitoring locations during this survey as listed in Error: Reference source not found and shown on Figure 2. These monitoring locations are detailed in the Noise Monitoring Program (NMP).

*Table 1.1: ATTENDED NOISE MONITORING LOCATIONS*

| NMP Descriptor | Monitoring Location |
|---|---|
| N6 | St Laurence O'Toole Catholic Church, representative of Wollar Village south |
| N13 | 'Coonaroo' off Moolarben Road |
| N14 | "Tichular', intersection of Tichular and Barigan Roads |
| N15 | Track off Barigan Street near Wollar School, Wollar Village |
| N16 | Araluen Road, off Ulan-Wollar Road |
| N17 | Mogo Road, off Araluen Road |
| N18 | Barigan Road, Barigan Valley |

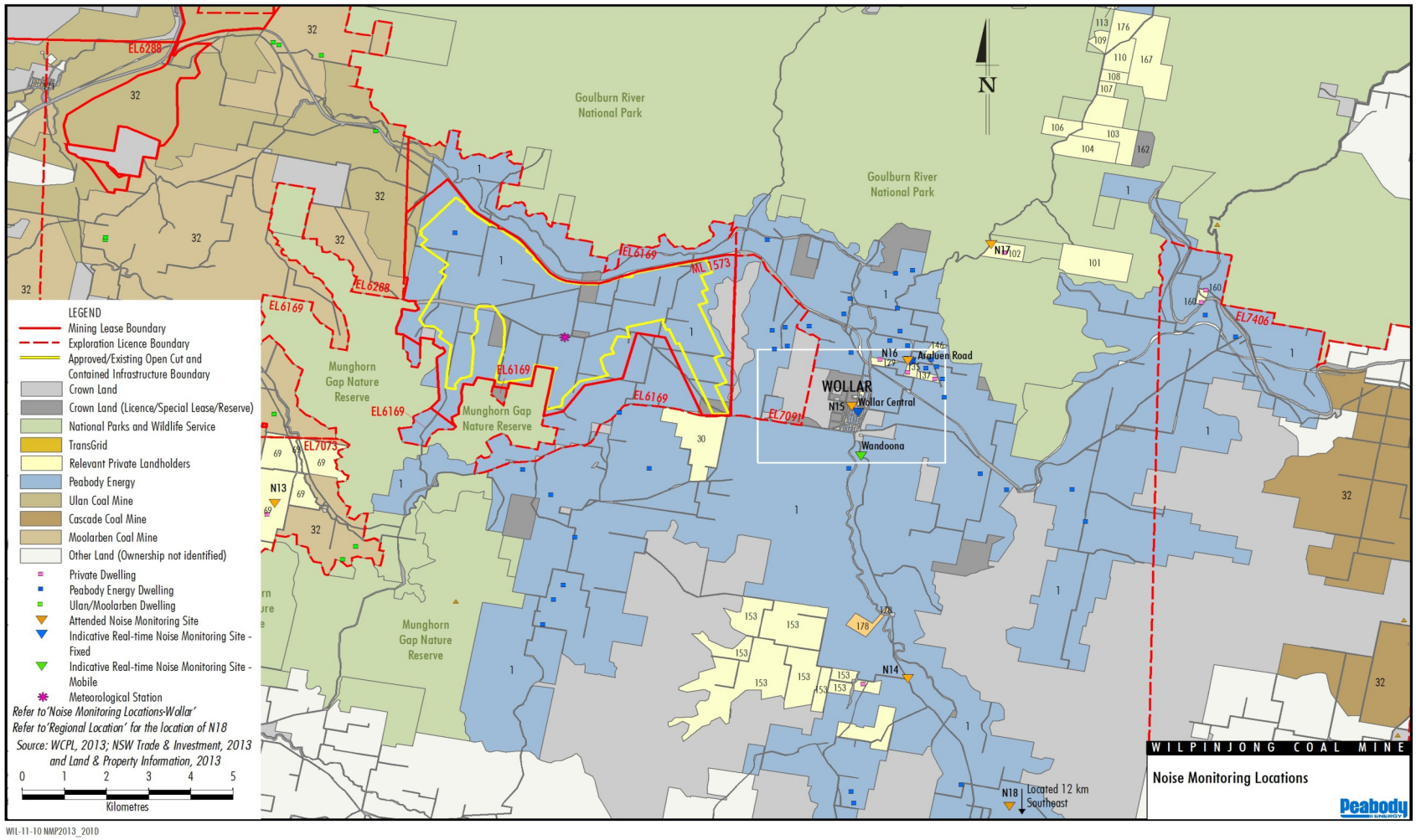


**Figure 1: Monitoring Locations**

## 1.3 Terminology & Abbreviations

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

*Table 1.2: TERMINOLOGY & ABBREVIATIONS*

| Descriptor | Definition |
|---|---|
| $L_A$ | The A-weighted root mean squared (RMS) noise level at any instant |
| $L_{Amax}$ | The maximum A-weighted noise level over a time period or for an event |
| $L_{A1}$ | The noise level which is exceeded for 1 per cent of the time |
| $L_{A10}$ | The noise level which is exceeded for 10 per cent of the time, which is approximately the average of the maximum noise levels |
| $L_{A50}$ | The noise level which is exceeded for 50 per cent of the time |
| $L_{A90}$ | The level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. The $L_{A90}$ level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes |
| $L_{Amin}$ | The minimum A-weighted noise level over a time period or for an event |
| $L_{Aeq}$ | The average noise energy during a measurement period |
| dB(A) | Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise |
| SPL | Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals |
| Hertz (Hz) | Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together |
| VTG | Vertical temperature gradient in degrees Celsius per 100 metres altitude. From Wilpinjong Coal inversion tower data |
| SC | Stability Class. Based on Wilpinjong Coal inversion tower data |
| IA | Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location |
| NM | Not Measurable. If site only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, but could not be quantified |
| Day | This is the period 7:00am to 6:00pm |
| Evening | This is the period 6:00pm to 10:00pm |
| Night | This is the period 10:00pm to 7:00am |

# 2 PROJECT APPROVAL AND CRITERIA

## 2.1 Project Approval

WCP was given approval on 1 February 2006. The most recent modification to the project was approved in February 2014. The relevant noise conditions from Schedule 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 draft noise monitoring program (NMP) for WCP was prepared in March 2014 in response to the February 2014 modification to the project approval. Chapter 6 of the NMP provides details on the noise monitoring program including locations and an attended monitoring methodology. The relevant sections are reproduced in Appendix A.

## 2.4 Project Approval Criteria and Weather Conditions

Criteria are detailed in Table 2.1 have been selected as the most appropriate for each monitoring location and are based on the project approval associated with Wilpinjong Coal Project 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 $L_{Aeq,15minute}$ / $L_{A1,1minute}$ |
|---|---|---|---|---|
| N6 | St Laurence O'Toole Catholic Church | 35 | 35 | 35/45 |
| N13 | 'Coonaroo' | 36 | 36 | 36/45 |
| N14 | 'Tichular' | 35 | 35 | 35/45 |
| N15 | Wollar Village | 35 | 35 | 35/45 |
| N16 | Araluen Road | 37 | 37 | 37/45 |
| N17 | Mogo Road, off Araluen Road | 35 | 35 | 35/45 |
| N18 | Barigan Road, Barigan Valley | 35 | 35 | 35/45 |

Appendix 10, Condition 1 of the project approval states:

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

a) during periods of rain or hail;

b) average wind speeds at microphone height exceeds 5 m/s;

c) wind speeds greater than 3 m/s measured at 10 metres above ground level; or

d) temperature inversion conditions greater than 5.5°C per 100 metres.

## 2.5 EPL Criteria and Weather Conditions

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

*Table 2.2: WILPINJONG COAL PROJECT SPECIFIC CRITERIA, dB*

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

Condition L5.3 in the EPL states:

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

a) Wind speeds greater than 3 metres per second at 10 metres above ground level; or

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

c) Temperature inversion conditions greater than 3°C per 100 metres.

## 2.6 INP Modifying Factor

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

> *Unless the Director-General agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to: (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modification factors apart from adjustment for duration.*

and Condition L5.7 of the EPL:

> *For the purposes of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.*

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

### 2.6.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Impulsive noise has high peaks of short duration or a sequence of such peaks.*
>
> *Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.*

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

### 2.6.2 Low Frequency Noise

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.

## 2.7 Low Frequency Criteria

Low frequency criteria are detailed in Table 2.3.

*Table 2.3: 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. Monitoring is undertaken once per month at each location. The duration of each measurement was 15 minutes.

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

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

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

If site noise were NM, <25 dB or <20 dB due to masking then we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting if deemed necessary. All sites NM, <25 dB or <20 dB in this report are due to low absolute values.

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

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

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

## 3.2 Attended Monitoring

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

*Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT*

| Model | Serial Number | Calibration Due Date |
|---|---|---|
| Rion NA-28 sound level analyser | 01070590 | 13/11/2015 |
| Pulsar 106 acoustic calibrator | 57413 | 10/12/2015 |
| Rion NA-28 sound level analyser | 701424 | 22/04/2016 |
| Rion NC-73 acoustic calibrator | 11248306 | 10/05/2015 |

# 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 – SEPTEMBER 2014[1]*

| Location | Start Date and Time | $L_{Amax}$ dB | $L_{A1}$ dB | $L_{A10}$ dB | $L_{A50}$ dB | $L_{Aeq}$ dB | $L_{A90}$ dB | $L_{Amin}$ dB | $L_{Ceq}$ dB |
|---|---|---|---|---|---|---|---|---|---|
| N6 | 11/09/2014 22:25 | 56 | 48 | 33 | 28 | 34 | 26 | 24 | 48 |
| N13 | 12/09/2014 00:34 | 47 | 36 | 31 | 28 | 29 | 25 | 21 | 30 |
| N14 | 11/09/2014 22:55 | 51 | 42 | 31 | 27 | 30 | 25 | 23 | 49 |
| N15 | 11/09/2014 23:42 | 56 | 51 | 47 | 34 | 42 | 27 | 25 | 58 |
| N16 | 11/09/2014 23:14 | 57 | 48 | 42 | 35 | 39 | 27 | 24 | 56 |
| N17 | 11/09/2014 22:41 | 42 | 28 | 25 | 22 | 23 | 20 | 18 | 45 |
| N18 | 11/09/2014 23:33 | 45 | 32 | 27 | 23 | 25 | 21 | 20 | 30 |

*Note:*

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

## 4.2 Project Approval and Weather Conditions

Table 4.2 and Table 4.3 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines approval. There were no modifying factors applicable to measured noise levels during this survey.

*Table 4.2: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – SEPTEMBER 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] |
|---|---|---|---|---|---|---|---|
| N6 | 11/09/2014 22:25 | 0.0 | 6.0 | 35 | No | IA | NA |
| N13 | 12/09/2014 00:34 | 0.0 | 3.6 | 35 | Yes | IA | No |
| N14 | 11/09/2014 22:55 | 0.7 | 6.7 | 35 | No | IA | NA |
| N15 | 11/09/2014 23:42 | 0.0 | 5.3 | 35 | Yes | 23 | No |
| N16 | 11/09/2014 23:14 | 0.0 | 6.7 | 35 | No | 24 | NA |
| N17 | 11/09/2014 22:41 | 0.8 | 7.1 | 35 | No | 21 | NA |
| N18 | 11/09/2014 23:33 | 0.0 | 6.7 | 35 | No | IA | NA |

*Notes:*

1. *The noise criteria are to apply under all meteorological conditions except: wind speeds greater than 3 m/s at 10 metres above ground level, or, temperature inversion (VTG) greater than 5.5 degrees/100m;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

*Table 4.3: $L_{A1,1minute}$ GENRATED BY WCP AGAINST PROJECT APPROVAL IMPACT ASSESSMENT CRITERIA – SEPTEMBER 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] |
|---|---|---|---|---|---|---|---|
| N6 | 11/09/2014 22:25 | 0.0 | 6.0 | 45 | No | IA | NA |
| N13 | 12/09/2014 00:34 | 0.0 | 3.6 | 45 | Yes | IA | No |
| N14 | 11/09/2014 22:55 | 0.7 | 6.7 | 45 | No | IA | NA |
| N15 | 11/09/2014 23:42 | 0.0 | 5.3 | 45 | Yes | 26 | No |
| N16 | 11/09/2014 23:14 | 0.0 | 6.7 | 45 | No | 27 | NA |
| N17 | 11/09/2014 22:41 | 0.8 | 7.1 | 45 | No | 30 | NA |
| N18 | 11/09/2014 23:33 | 0.0 | 6.7 | 45 | No | IA | NA |

*Notes:*

1. *The noise criteria are to apply under all meteorological conditions except: wind speeds greater than 3 m/s at 10 metres above ground level, or, temperature inversion (VTG) greater than 5.5 degrees/100m;*
2. *These are results for WCP in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable);*
4. *Wind speed is sourced from WCP weather station, Vertical Temperature Gradient (VTG) is sourced from the WCP inversion tower;*
5. *NA in criterion column means the criteria are not applicable at this location, NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable or criterion not specified; and*
6. *Criterion may or may not apply due to rounding of meteorological data values.*

## 4.3 EPL and Weather Conditions

Table 4.4 and Table 4.5 detail $L_{Aeq,15minute}$ and $L_{A1,1minute}$ noise levels from WCP in the absence of other noise sources with impact assessment criteria. Criteria are then applied if weather conditions are in accordance with the mines EPL. There were no modifying factors applicable to measured noise levels during this survey.

*Table 4.4: $L_{Aeq,15minute}$ GENERATED BY WCP AGAINST EPL ASSESSMENT CRITERIA – SEPTEMBER 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] |
|---|---|---|---|---|---|---|---|
| N6 | 11/09/2014 22:25 | 0.0 | 6.0 | 35 | No | IA | NA |
| N13 | 12/09/2014 00:34 | 0.0 | 3.6 | 35 | No | IA | NA |
| N14 | 11/09/2014 22:55 | 0.7 | 6.7 | 35 | No | IA | NA |
| N15 | 11/09/2014 23:42 | 0.0 | 5.3 | 35 | No | 23 | NA |
| N16 | 11/09/2014 23:14 | 0.0 | 6.7 | 35 | No | 24 | NA |
| N17 | 11/09/2014 22:41 | 0.8 | 7.1 | 35 | No | 21 | NA |
| N18 | 11/09/2014 23:33 | 0.0 | 6.7 | 35 | No | IA | NA |

*Notes:*

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

*Table 4.5: $L_{A1,1minute}$ GENRATED BY WCP AGAINST EPL IMPACT ASSESSMENT CRITERIA – SEPTEMBER 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] |
|---|---|---|---|---|---|---|---|
| N6 | 11/09/2014 22:25 | 0.0 | 6.0 | 45 | No | IA | NA |
| N13 | 12/09/2014 00:34 | 0.0 | 3.6 | 45 | No | IA | NA |
| N14 | 11/09/2014 22:55 | 0.7 | 6.7 | 45 | No | IA | NA |
| N15 | 11/09/2014 23:42 | 0.0 | 5.3 | 45 | No | 26 | NA |
| N16 | 11/09/2014 23:14 | 0.0 | 6.7 | 45 | No | 27 | NA |
| N17 | 11/09/2014 22:41 | 0.8 | 7.1 | 45 | No | 30 | NA |
| N18 | 11/09/2014 23:33 | 0.0 | 6.7 | 45 | No | IA | NA |

*Notes:*

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

## 4.4 Low Frequency Assessment

Table 4.6 provides statistics for attended noise monitoring undertaken around WCP during the September 2014 survey.

*Table 4.6: ATTENDED MEASUREMENT STATISTICS FOR WCP – SEPTEMBER 2014*

| Conditions | Total for September 2014 |
|---|---|
| Number of measurements | 7 |
| Number of measurements where met applies | 7 |
| Number of measurements where WCP is measurable (within 5dB of the criteria) and criteria and met applies in accordance with the project approval and/or EPL | 1 |

One of the seven measurements occurred during which WCP was directly measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of "<30 dB"), within 5 dB of in the impact assessment criteria and where meteorological conditions resulted in criteria applying (in accordance with the project approval). This result was analysed further in Table 4.7.

*Table 4.7: MEASURED NOISE LEVELS FOR HVO WCP AGAINST LOW FREQUENCY NOISE CRITERIA – SEPTEMBER 2014*

| Location | Start Date and Time | WCP only $L_{Aeq}$ dB[1] | INP $L_{Ceq}$ Criterion[2] | Total $L_{Ceq}$ minus $L_{Aeq}$ dB[3,6] | Broner $L_{Ceq}$ Criterion[4] | $L_{Ceq}$ (less than 250 Hz) dB[5,6] | Penalty applies | Comments |
|---|---|---|---|---|---|---|---|---|
| N15 | 11/09/2014 23:42 | 23 | 15 | 16[7] | 60 | 58 | No | Train and WCP continuum |

*Notes:*

1. *WCP only $L_{Aeq,15minute}$ provided as a guide;*
2. *Low frequency criterion as detailed in the INP;*
3. *Total C-weighted and A-Weighted noise levels are detailed in Table 4.3 and are not always the result of activity at WCP. Guidance on this is provided in the Comments column. Slight variations due to rounding may occur;*
4. *Night $L_{Ceq}$ criterion as detailed in Broner (2010);*
5. *These are measured C-weighted noise levels (at frequencies less than 250 Hz, 500 Hz and WCP only) and are not always the result of activity at WCP. Guidance on this is provided in the Comments column;*
6. *Bolded results in red are those greater than the relevant criterion; and*
7. *Not considered an exceedance due to other contributing noise sources occurring during the measurement. Not applying the penalty.*

As detailed in Table 4.7, there were no penalties applied. As such, no further analysis was required.

## 4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location using a Kestrel hand-held weather meter is shown in Table 2.2. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres.

*Table 4.8: MEASURED ATMOSPHERIC CONDITIONS – SEPTEMBER 2014*

| Location | Start Date And Time | Temperature ° C | Wind Speed m/s | Wind Direction °MN | Cloud Cover eighths |
|---|---|---|---|---|---|
| N6 | 11/09/2014 22:25 | 7 | 1.1 | 210 | 0 |
| N13 | 12/09/2014 00:34 | 13 | 0.0 | - | 0 |
| N14 | 11/09/2014 22:55 | 8 | 1.1 | 130 | 0 |
| N15 | 11/09/2014 23:40 | 7 | 0.0 | - | 0 |
| N16 | 11/09/2014 23:14 | 7 | 0.7 | 265 | 0 |
| N17 | 11/09/2014 22:41 | 10 | 0.0 | - | 0 |
| N18 | 11/09/2014 23:33 | 6 | 0.0 | - | 0 |

*Notes:*

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

Data obtained concurrently by the WCP meteorological station is provided in Table 4.4 and is used to determine compliance with specified noise criteria.

*Table 4.9: WCP METEOROLOGICAL STATION DATA[1]*

| End Date and Time | Wind Speed m/s | Wind Direction Degrees | Lapse Rate Degrees / 100 metres[2] |
|---|---|---|---|
| 11/09/2014 22:00 | 0.0 | - | 5.5 |
| 11/09/2014 22:15 | 0.0 | - | 4.8 |
| 11/09/2014 22:30 | 0.0 | - | 5.0 |
| 11/09/2014 22:45 | 0.0 | - | 6.0 |
| 11/09/2014 23:00 | 0.8 | 285 | 7.1 |
| 11/09/2014 23:15 | 0.7 | 318 | 6.7 |
| 11/09/2014 23:30 | 0.0 | - | 6.7 |
| 11/09/2014 23:45 | 0.0 | - | 6.7 |
| 12/09/2014 00:00 | 0.0 | - | 5.3 |
| 12/09/2014 00:15 | 0.0 | - | 4.5 |
| 12/09/2014 00:30 | 0.0 | - | 3.6 |
| 12/09/2014 00:45 | 0.0 | - | 3.6 |
| 12/09/2014 01:00 | 0.0 | - | 4.8 |

*Notes:*

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

# 5 DISCUSSION

## 5.1 Noted Noise Sources

Table 4.1 to Table 4.3 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 9 display the frequency ranges for various noise sources at each location for $L_{A1}$, $L_{A10}$, $L_{A90}$, and $L_{Aeq}$. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 2 where it can be seen that frogs and insects are generating noise at frequencies above 1000 Hz; mining noise is at frequencies less than 1000 Hz (this is typical). Adding levels at frequencies that relate to mining only allows separate statistical results to be calculated. This analysis cannot always be performed if there are significant levels of other noise at the same frequencies as mining; this can be dogs, cows, or, most commonly, road traffic.

It should be noted that the method of summing statistical values up to a cut-off frequency can overstate the $L_{A1}$ result by a small margin but is entirely accurate for $L_{Aeq}$.

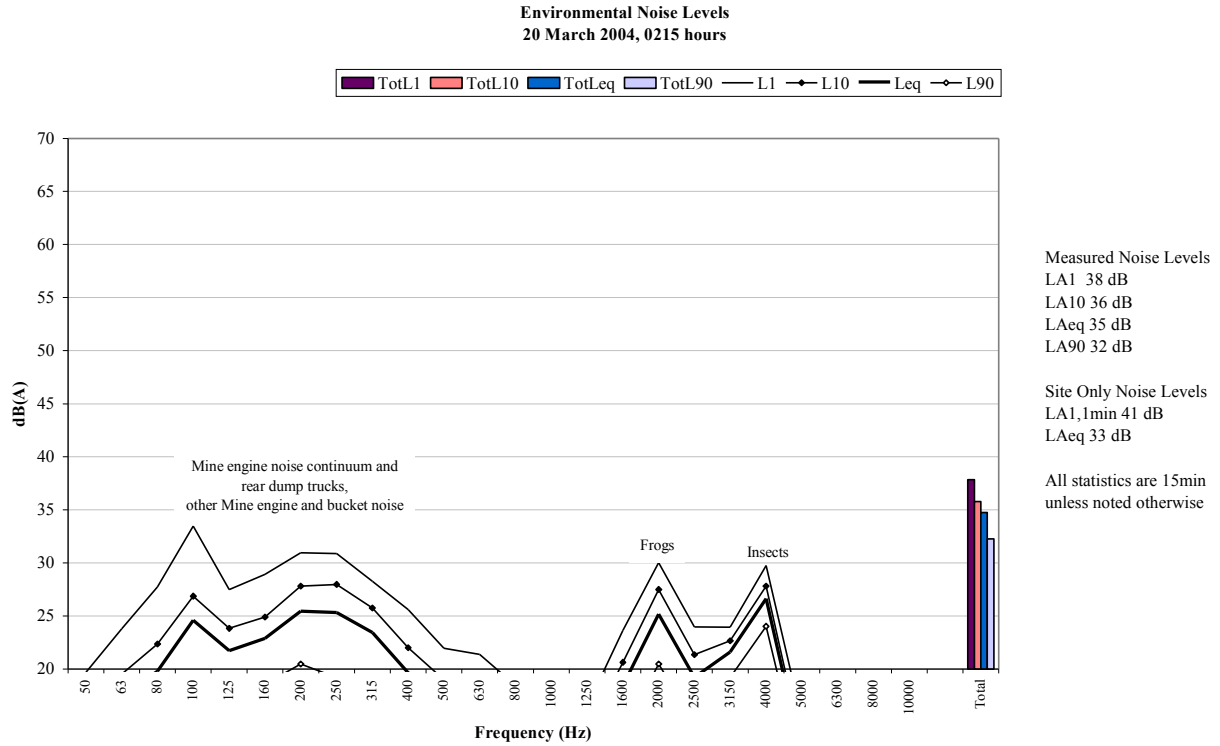


**Figure 2: Example graph (refer to Section 5.1 for explanatory note)**

### 5.1.1 N6, 11 September 2014

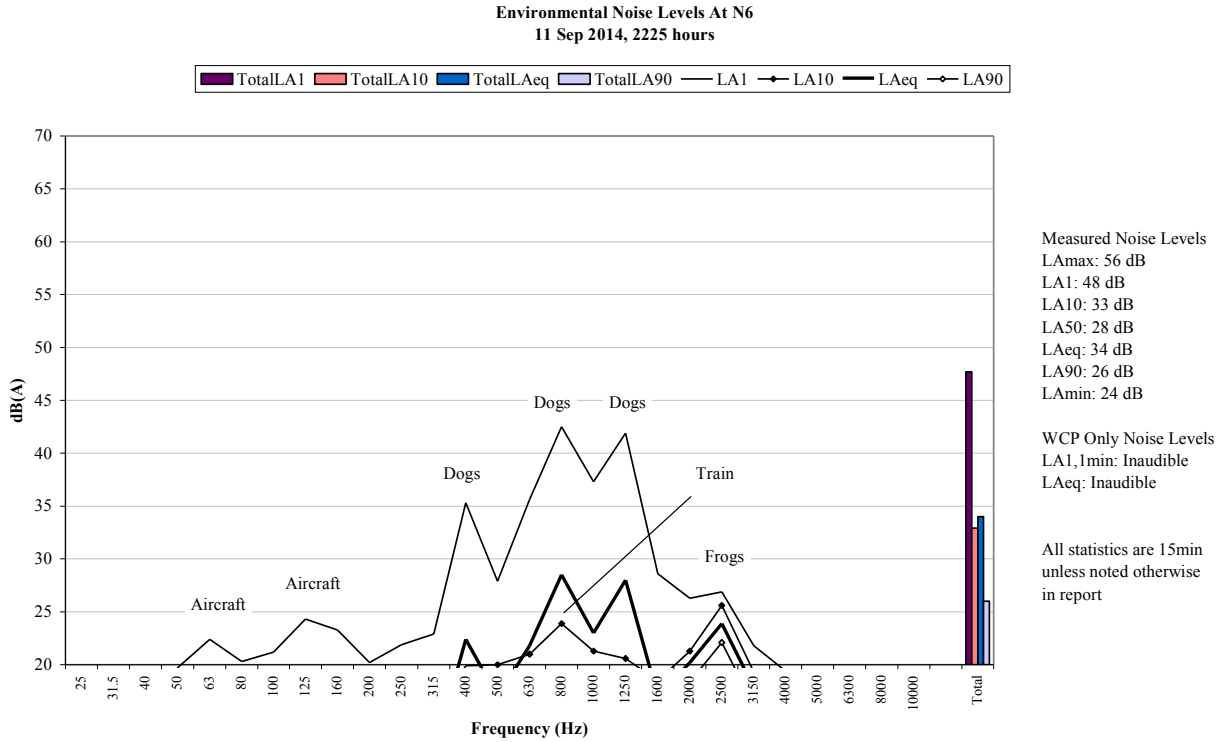


**Figure 3: Environmental Noise Levels - N6, St Laurence O'Toole Catholic Church, Wollar Village**

WCP was inaudible.

Dogs were responsible for the measured $L_{A1}$ and primarily responsible for the $L_{Aeq}$. Frogs and a train generated the measured $L_{A10}$. Frogs were responsible for the measured $L_{A90}$.

Livestock and an aircraft were also noted.

### 5.1.2 N13, 12 September 2014

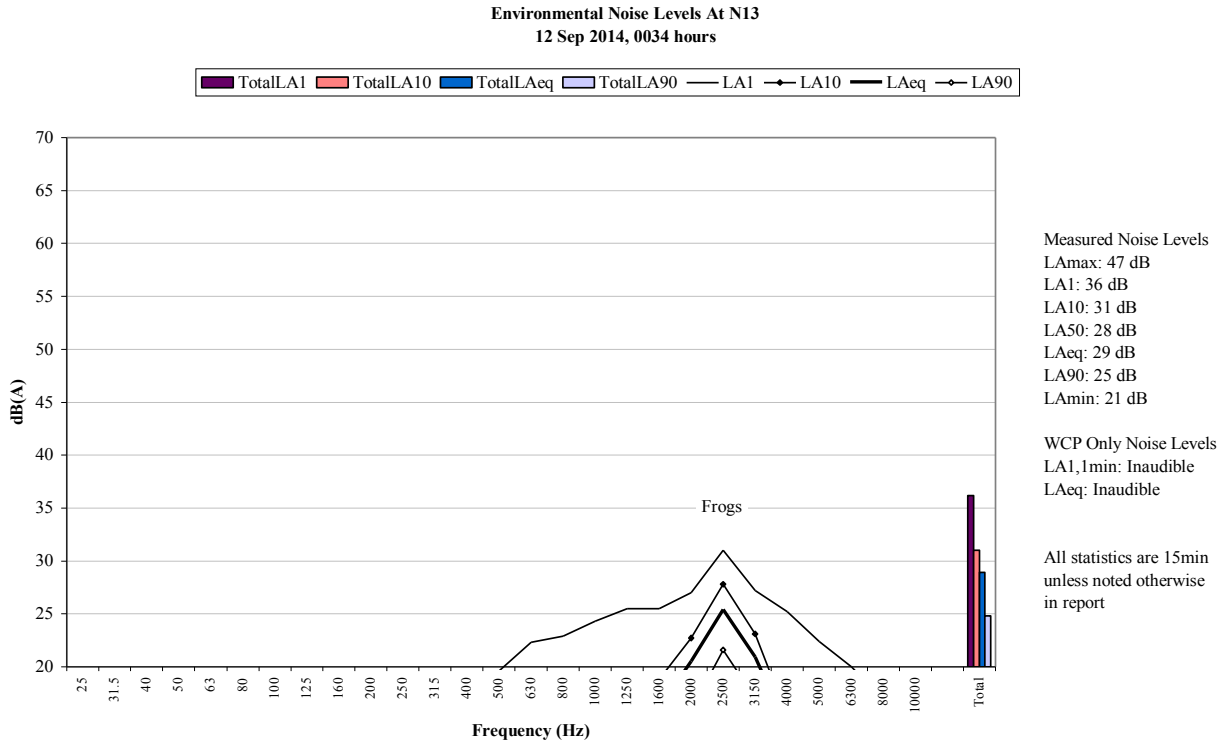


**Figure 4: Environmental Noise Levels – N13, 'Coonaroo' off Moolarben Road**

WCP was inaudible.

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

Birds were also noted.

### 5.1.3 N14, 11 September 2014

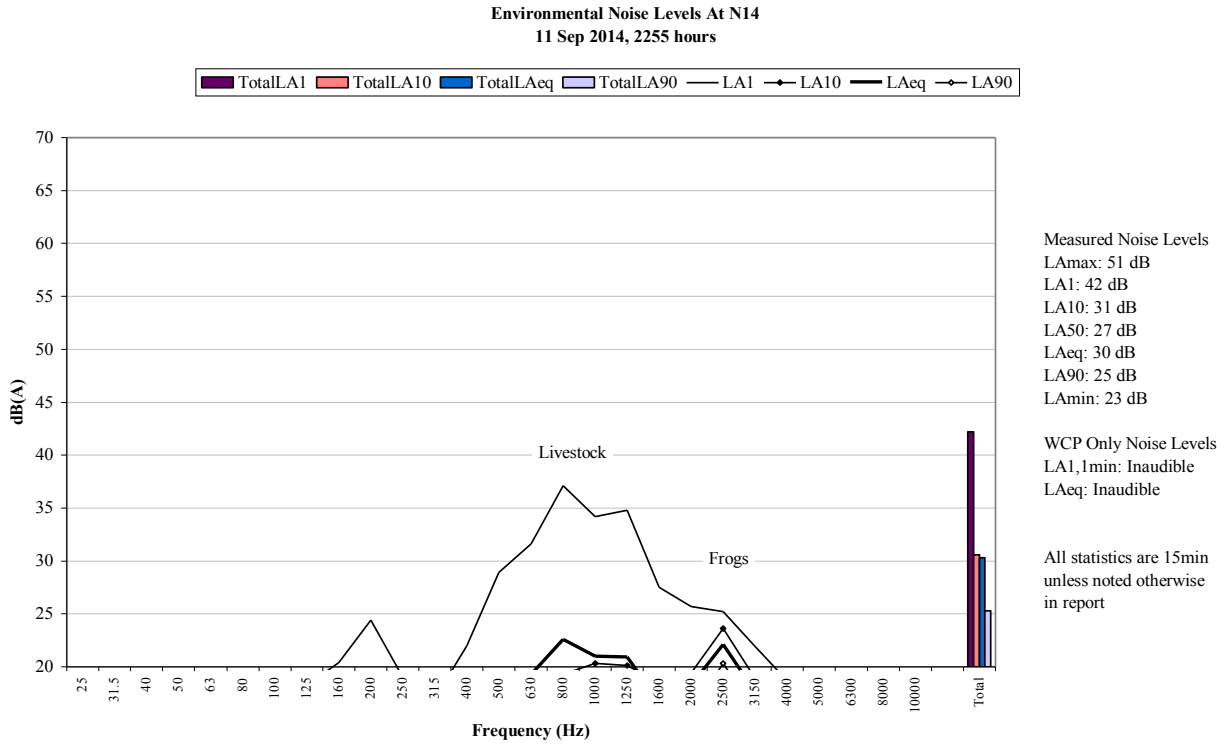


**Figure 5: Environmental Noise Levels - N14, 'Tichular', intersection of Tichular and Barigan Roads**

WCP was inaudible.

Livestock were responsible for the measured $L_{A1}$ and were primarily responsible for the measured $L_{Aeq}$. Frogs were minor contributors to the measured $L_{Aeq}$. Frogs generated the measured $L_{A10}$ and $L_{A90}$.

Birds were also noted.

### 5.1.4 N15, 11 September 2014

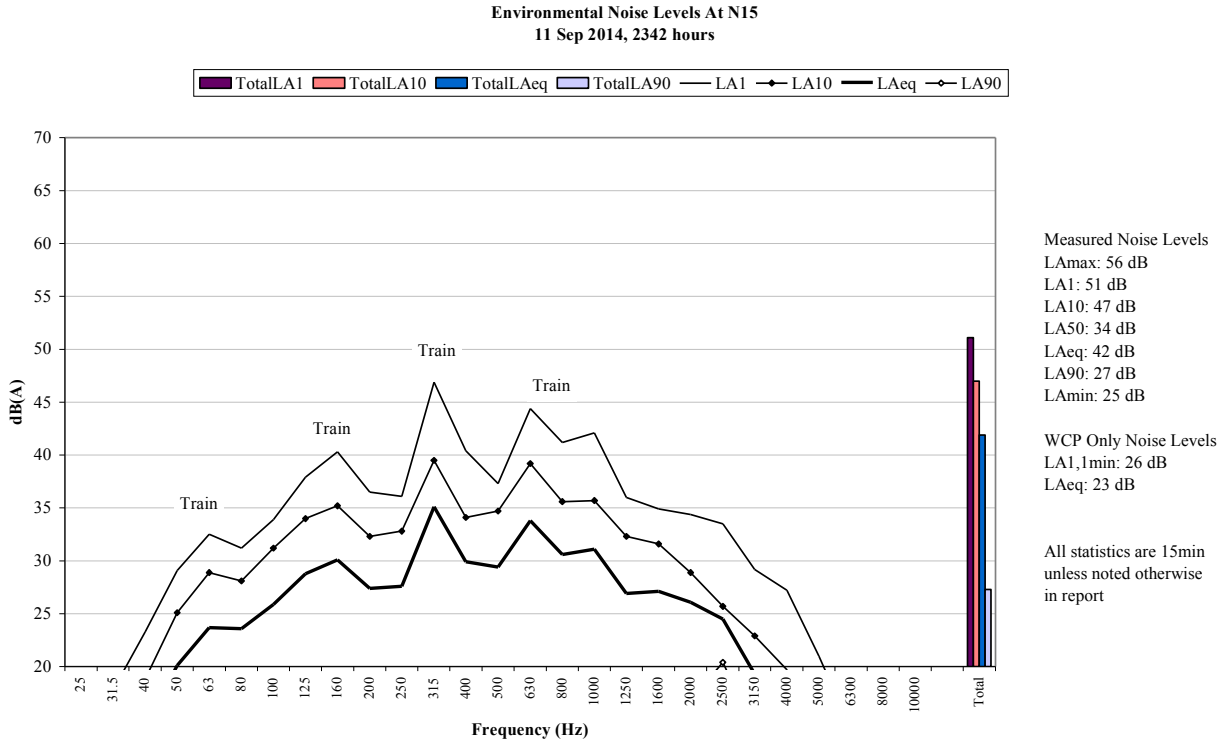


**Figure 6: Environmental Noise Levels - N15, Wollar Village near Wollar School**

A low-level continuum and engine noise from WCP were audible during the measurement generating the site only $L_{Aeq}$ of 23 dB and $L_{A1,1minute}$ of 26 dB.

A train was responsible for the measured $L_{A1}$, $L_{A10}$ and $L_{Aeq}$. Frogs and insects were primarily responsible for the measured $L_{A90}$. The continuum from WCP was a minor contributor to the measured $L_{A90}$.

Livestock, road traffic tyre noise, birds and bats were also noted.

### 5.1.5 N16, 11 September 2014

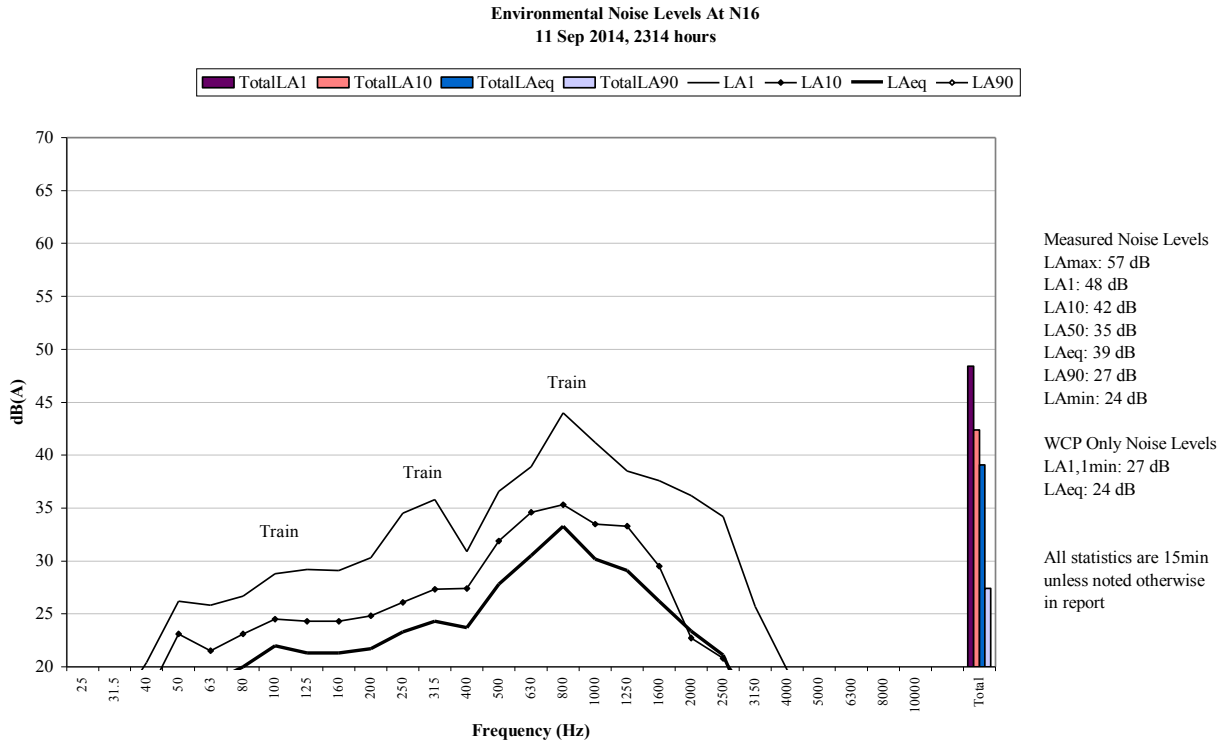


**Figure 7: Environmental Noise Levels – N16, Araluen Road, off Ulan-Wollar Road**

A low-level continuum and track noise from WCP were audible during the measurement, generating the site only $L_{Aeq}$ of 24 dB and $L_{A1,1minute}$ of 27 dB.

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

Dogs, a local residential continuum and livestock were also noted.

### 5.1.6 N17, 11 September 2014

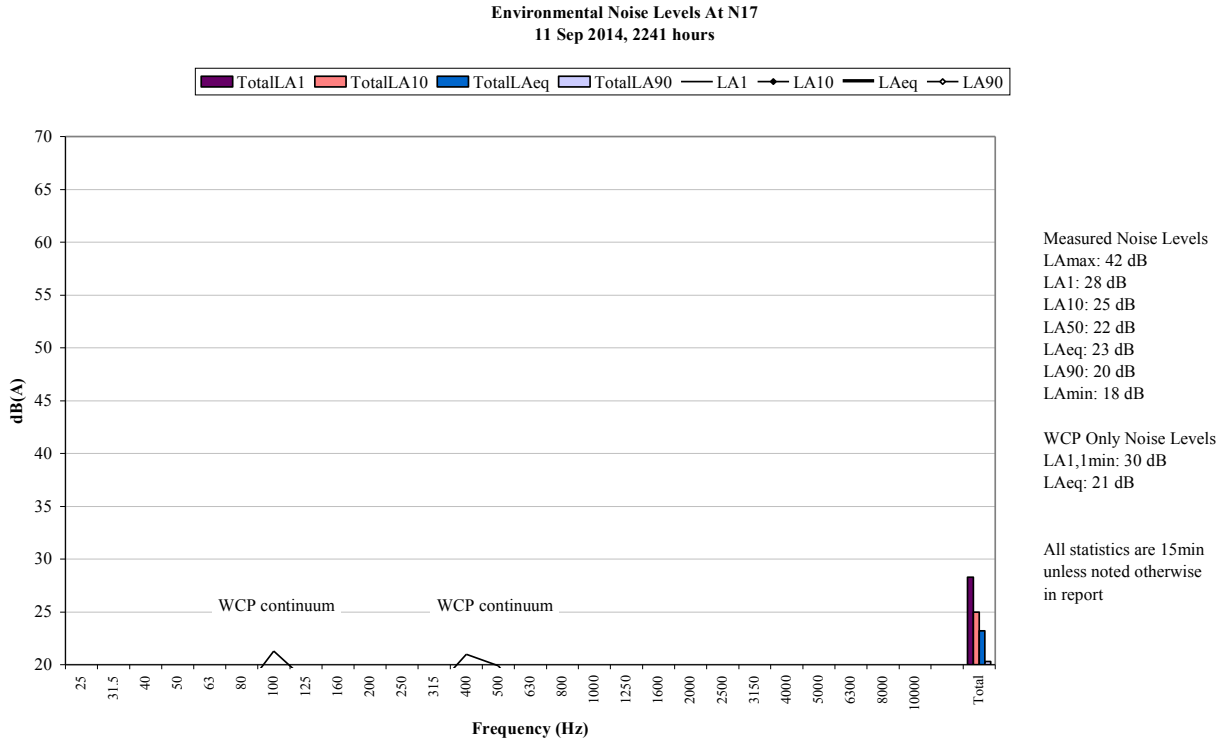


**Figure 8: Environmental Noise Levels – N17, Mogo Road, off Araluen Road**

A low-level continuum and track noise from WCP were audible during the measurement, generating the site only $L_{Aeq}$ of 21 dB. Fan noise was audible once and generated the site only $L_{A1,1minute}$ of 30 dB. Engine noise was also noted.

WCP was responsible for most measured levels.

A train and bats were also noted.

### 5.1.7 N18, 11 September 2014

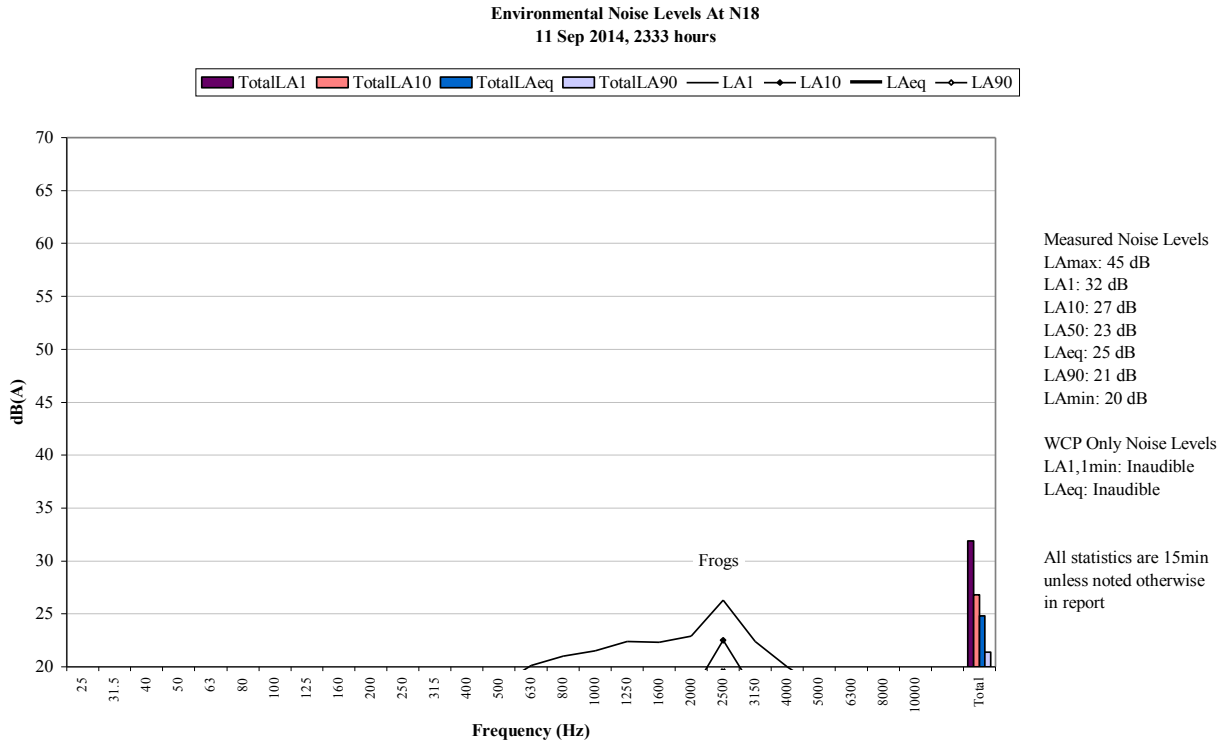


**Figure 9: Environmental Noise Levels, N18 - Barigan Road, Barigan Valley**

WCP was inaudible.

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

Birds were also noted.

# 6 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during night period of 11/12 September 2014. Attended noise monitoring was conducted at seven sites. The duration of all measurements was 15 minutes.

## 6.1 Operational Noise Assessment

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 September 2014 monitoring period.

## 6.2 Low Frequency Assessment

One of the measurements occurred during which WCP was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval). This result was analysed for low frequency content as detailed in Table 4.7. Due to another noise source present during the measurement, there was no low frequency penalty applied. As such, no further assessment of low frequency noise was undertaken.

**Global Acoustics Pty Ltd**

# APPENDIX

## *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

**SCHEDULE 3**
**SPECIFIC ENVIRONMENTAL CONDITIONS**

**ACQUISITION UPON REQUEST**

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

*Table 1: Land subject to acquisition upon request*

| |
|---|
| 30 – Gaffney |

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

**NOISE**

**Noise Criteria**

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

*Table 2: Noise Impact assessment criteria dB(A)*

| Location | Day | Evening | Night | |
|---|---|---|---|---|
| | $L_{Aeq(15\ minute)}$ | $L_{Aeq(15\ minute)}$ | $L_{Aeq(15\ minute)}$ | $L_{A1(1\ minute)}$ |
| 135 | 38 | 38 | 38 | 45 |
| 129 and 137 | 37 | 37 | 37 | 45 |
| 69 | 36 | 36 | 36 | 45 |
| Wollar Village – Residential | 36 | 35 | 35 | 45 |
| All other privately owned land | 35 | 35 | 35 | 45 |
| 901 – Wollar School | 35(internal)<br>45 (external)<br>When in use | | | - |
| 150A – St Luke's Anglican Church<br>900 – St Laurence O'Toole Catholic Church | 40 (internal)<br>When in use | | | - |
| 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 |
|---|

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

**Operating Conditions**

4. The Proponent shall:
   (a) implement best management practice to minimise the operational, road, and rail noise of the project;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this approval;
   (c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 11);
   (d) only use locomotives and rolling stock that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL;
   (e) co-ordinate noise management at the site with the noise management at Moolarben and Ulan mines to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the project is complying with the relevant conditions of this approval, and publish these monitoring results on its website,

   to the satisfaction of the Director-General.

**Noise Management Plan**

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
   (a) be prepared in consultation with the EPA, and submitted to the Director-General for approval by the end of May 2014;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
   (c) describe the proposed noise management system in detail; and
   (d) include a monitoring program that:
      - evaluates and reports on:
        - the effectiveness of the noise management system;
        - compliance against the noise criteria in this approval; and
        - compliance against the noise operating conditions;
      - includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this approval and trigger for further attended monitoring); and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

## APPENDIX 8
## STATEMENT OF COMMITMENTS

***Operational Noise***

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

## APPENDIX 10
## NOISE COMPLIANCE ASSESSMENT

**Applicable Meteorological Conditions**

1. The noise criteria in Table 2 of the conditions are to apply under all meteorological conditions except the following:
   (a) during periods of rain or hail;
   (b) average wind speed at microphone height exceeds 5 m/s;
   (c) wind speeds greater than 3 m/s measured at 10 m above ground level; or
   (d) temperature inversion conditions greater than 5.5°C/100 m.

**Determination of Meteorological Conditions**

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

**Compliance Monitoring**

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.

4. This monitoring must be carried out at least 12 times a year, unless the Director-General directs otherwise.

5. Unless the Director-General agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
   (a) monitoring locations for the collection of representative noise data;
   (b) meteorological conditions during which collection of noise data is not appropriate;
   (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

## A.2 Environmental Protection Licence

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

i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or

ii) within 30 metres of a dwelling façade, but not closer than 3 metres where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable

iii) within approximately 50 metres of the boundary of a National Park or Nature Reserve

b) With the LA1(1 minute) noise limits in condition L5.1, the noise measurement equipment must be located within 1 metre of a dwelling façade.

c) With the noise limits in condition L5.1, the noise measurement equipment must be located:

i) at the most affected point at a location where there is no dwelling at the location; or

ii) at the most affected point within an area at a location prescribed by conditions L5.5(a) or L5.5(b).

L5.6 A non-compliance of condition L5.1 will still occur where noise generated from the premises in excess of the appropriate limit is measured:

a) at a location other than an area prescribed by conditions L5.5(a) and L5.5(b); and/or
b) at a point other than the most affected point at a location.

L5.7 For the purpose of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

## A.3 Noise Monitoring Program

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

### 6.0 NOISE MONITORING PROGRAM

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

### 6.1 Monitoring Locations

Attended noise monitoring locations have been chosen considering the following criteria:

- In any given direction, the site is as close as reasonably practical to the nearest Private Receiver;
- There is no closer Private Receiver that is not monitored;
- The site is unlikely to cause concern to any person residing on nearby private property; and
- The site can be safely accessed by the persons carrying out the noise monitoring.

WCPL will undertake attended monitoring at seven locations (**Table 4, Figure 3** and **Figure 4**). Real-time units are relocated from time to time, to assist with additional targeted noise monitoring and in response to community complaints. Real-time noise monitoring locations will be reviewed and modified as necessary in response to monitoring results, changes to the operation, or as a result of community consultation.

**Table 4: Noise Related Monitoring Locations**

| Location | Site | Type | Easting[1] | Northing[1] | Justification |
|---|---|---|---|---|---|
| St Laurence O'Toole Church | N6 | Attended Noise | 777299.9 | 6415716.9 | Location based on the nearest non-mine owned residence to the West of the Mine |
| Coonaroo | N13 | Attended Noise | 763758.9 | 6413471.9 | Location based on the nearest non-mine owned residence to the West of the Mine |
| Tichular | N14 | Attended Noise | 778791.9 | 6408624.7 | Location based on the nearest non-mine owned residence to the South of the Mine |
| Wollar Village | N15 | Attended Noise | 777452.0 | 6416158.9 | Location based on the nearest non-mine owned residence to the South-East of the Mine |
| Araluen Rd | N16 | Attended Noise | 778787.4 | 6417418.7 | Location based on the nearest non-mine owned residence to the East of the Mine |
| Mogo Rd | N17 | Attended Noise | 780771.0 | 6420641.0 | Location based on the nearest non-mine owned residence to the North-East of the Mine |
| Barrigan Valley[2] | N18 | Attended Noise | 780033.3 | 6398618.1 | DP&I Recommendation (MOD5) – Location approximately 20 km to the south of the Mine |
| WCPL Rail Loop | | Meteorology & Inversion | 770630.9 | 6418085.1 | Location based on consideration of prevailing meteorological conditions |
| Wollar Village | | Real-Time Noise - Fixed | 777608.9 | 6415996.8 | Location based on the nearest non-mine owned residence to the South-East of the Mine |
| Araluen Rd | | Real-Time Noise - Fixed | 778856.4 | 6417401.3 | Location based on the nearest non-mine owned residence to the East of the Mine |
| Wandoona[3] | | Real-Time Noise - Mobile | 777684.4 | 6414786.2 | Location based on the nearest non-mine owned residence to the South-East of the Mine |

Notes to **Table 4**:

1. MGA94, Zone 55
2. Monitoring will be undertaken at this location until it can be demonstrated that the noise contribution from the Mine is negligible. At this point, WCPL will notify DP&I and OEH of the results of this monitoring and advise if and when the monitoring at this location will be scaled back or discontinued.
3. The real-time noise monitor at Wandoona may be relocated in response to a complaint or identified noise issue at another location.

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

### 6.3.3 Methodology

Attended noise monitoring will be undertaken one night per month by an independent acoustic consultant in accordance with the INP (EPA, 2000) and AS 1055.1-1997 'Acoustics – Description and measurement of environmental noise – General procedures'. Routine attended noise monitoring will be undertaken during night-time periods (10 pm-7 am).

If any of the noise criteria are exceeded, a second measurement will be taken at the same location within 75 minutes of the first measurement. If the second measurement does not exceed the Noise Criteria, as defined in **Table 3**, then the result will be recorded and the regular monitoring program resumed.

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

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

WCPL will:

a) Take immediate action in accordance with the NMS;
b) Arrange for additional attended noise monitoring to occur at that site within 1 week; and
c) Deploy the mobile real-time noise monitor to measure and record the noise at that site for at least a 1 week period.

WCPL will also investigate any changes to the mine operations, and may revisit the noise model on the basis of the noise measurements recorded at the site.

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

### 6.3.4 Data Collection

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

Where practicable, the $LA_1$ measurement will be undertaken at 1 m from the dwelling façade and the $LA_{eq}$ measurement within 30 m of the dwelling. Where impracticable, measurements will be undertaken at a suitable and representative location as close to the dwelling as practicable.

### 6.3.5 Evaluation of Compliance

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

**Table 6: Definition of an Exceedance**

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

Favourable meteorological conditions means:

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

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

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

### 6.3.6 Response to Exceedance

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

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

to the satisfaction of the Director-General.

# APPENDIX

## *B CALIBRATION CERTIFICATES*

Acoustic Research Labs Pty Ltd
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# Calibration Certificate

Number : C13646

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

**Equipment Tested/ Model Number :** **Rion NA-28**

**Instrument Serial Number :** 01070590

**Microphone Serial Number :** 00533

**Preamplifier Serial Number :** 70607

**Ambient Temperature :** 21°C

**Relative Humidity :** 48%

**Barometric Pressure :** 101.1 kPa

**Calibration Technician :** Adrian Walker

**Calibration Date :** 13-November-2013

**Secondary Check by :** Luke Hudson

**Report Issue Date :** 13-November-2013

**Approved Signatory :**

**Tested To :** IEC61672-3:2006

| Clause and Characteristic Tested | Result | Clause and Characteristic Tested | Result |
|---|---|---|---|
| 9: Indication at the calibration check frequency | Pass | 14: Level linearity on the reference level range | Pass |
| 10: Self-generated noise | Pass | 15: Level linearity incl. the level range control | Pass |
| 11: Acoustical tests of a frequency weighting | Pass | 16: Toneburst response | Pass |
| 12: Electrical tests of frequency weightings | Pass | 17: Peak C sound level | Pass |
| 13: Frequency and time weightings at 1 kHz | Pass | 18: Overload indication | Pass |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

NATA
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# Calibration Certificate

Number : C13681

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

**Equipment Tested/ Model Number :** **Pulsar 106**

**Instrument Serial Number :** 57413

**Ambient Temperature :** 24°C

**Relative Humidity :** 45%

**Barometric Pressure :** 100.09 kPa

**Tested and Checked by :** Adrian Walker

**Calibration Date :** 10-December-2013

**Secondary Check by :** Tim Williams

**Report Issue Date :** 10-December-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 | 1,000.35 Hz | Pass |
| | Short term fluctuation | 0.12 dB | Pass |
| | Distortion | 0.50% | Pass |

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# Calibration Certificate

Number : C13233

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|---|---|
| **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 :** | 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<br>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 |
| 10.3.3: Accuracy of level range control | Pass | 9.3.5: Overload indication | Pass |
| 10.3.4: Inherent weighted system noise level | Pass | | |

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# Calibration Certificate

Number : C14215

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|---|---|
| **Client Details :** | Global Acoustics Pty Ltd<br>12/16 Huntingdale Drive<br>Thornton NSW 2322 |
| **Equipment Tested/ Model Number :** | **Rion NC-73** |
| **Instrument Serial Number :** | 11248306 |
| **Ambient Temperature :** | 25.8°C |
| **Relative Humidity :** | 36.7% |
| **Barometric Pressure :** | 99.49 kPa |
| **Tested and Checked by :** | Jeff Yu |
| **Calibration Date :** | 22-April-2014 |
| **Secondary Check by :** | Tim Williams |
| **Report Issue Date :** | 22-April-2014 |
| **Approved Signatory :** | |
| **Tested To :** | IEC60942:2004 |
| **Comments :** | All tests passed for type 2 |

| Reference | Property | Measured Value | Result |
|---|---|---|---|
| 94 dB at 1000 Hz | **SPL** | 94.05 dB | Pass |
| | **Frequency** | 990.26 Hz | Pass |
| | **Short term fluctuation** | 0.02 dB | Pass |
| | **Distortion** | 0.40% | Pass |

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