

# Noise Monitoring Assessment

Wallerawang Quarry, Wallerawang, NSW.



# *Document Information*

## Noise Monitoring Assessment

Wallerawang Quarry, 12 January 2017

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# 1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Walker Quarries Pty Ltd to complete a Noise Monitoring Assessment (NMA) for Wallerawang Quarry ('the quarry').

The NMA involved quantifying the noise contribution of the quarry by direct attended measurements to compare quarry emissions against relevant criteria. Monitoring has been conducted at three representative receiver locations in accordance with the Walker Quarry Noise Management Plan (NMP) and the quarries Environmental Protection License (ref: 13172).

The assessment has been conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Industrial Noise Policy (INP), 2000;
- Environment Protection Licence EPL 13172 (EPL),
- Standards Australia AS 1055.1:1997 - Acoustics - Description and measurement of environmental noise - General Procedures; and
- Wallerawang Quarry Noise Management Plan (NMP).

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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## 2 Environmental Protection License Noise Limits

Table 1 reproduces the noise criteria for the quarry as per Condition L4.1 of EPL 13172.

Table 1 Noise Limits, dBA			
Location	Day	Evening	Night
	LAeq(15min)	LAeq(15min)	LAeq(15min)
All privately owned residences	43	43	39

Note 1: Day Period is 7am to 6pm, Evening Period is 6pm to 10pm, Night Period is 10pm to 7am.

It is noted that Condition L4.3 of EPL 13172 identifies conditions under which the noise criteria do not apply and include:

- a) Wind speeds greater than 3m/s at 10m above ground level;
- b) Temperature inversion conditions greater than 3 degrees Celsius / 100m; or
- c) Under “non-significant weather conditions”

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### 3 Methodology

#### 3.1 Locality

Wallerawang is located approximately 10km to the north west of Lithgow, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential and for consistency the naming conventions for each receiver has been retained from the NMP. The monitoring locations with respect to the quarry are presented in the locality plan shown in **Figure 1**.

#### 3.2 Assessment Methodology

The attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055-1997, "Acoustics - Description and Measurement of Environmental Noise" the EPL and NMP. The measurements were carried out using Svantek Type 1, 971 noise analyser on Thursday 12 January 2017. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed  $\pm 0.5\text{dBA}$ .

Two day time measurements of 15 minutes in duration were completed at each location before and after 12pm on Thursday 12 January 2017. Where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis to calculate the  $L_{Aeq}(15\text{min})$  quarry noise contribution for comparison against the relevant EPL limits.

Prevailing meteorological conditions for the monitoring period were assessed during each attended measurement and analysed in accordance with Appendix E4 of the INP to determine the stability category present at the time of each measured sample. This was undertaken to determine applicability of results in accordance with Condition L4.3 of the EPL.





FIGURE 1

LOCALITY PLAN

REF: MAC160392



KEY

-  N1 RECEIVER / MONITORING LOCATION
-  PROJECT SITE



## 4 Results

The monitoring and assessment results are presented in individual tables for each assessment location.

### 4.1 Assessment Results - Location N1

The results of the attended noise measurements at location N1 for Thursday 12 January 2017 are summarised in **Table 2** along with prevailing meteorological conditions at the time of each survey, relevant EPL limits and the quarry noise contribution.

**Table 2 Operator-Attended Noise Survey Results – Location N1**

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology	Comments
		L <sub>A</sub> max	L <sub>A</sub> eq	L <sub>A</sub> 90			
12/01/2017	8:25	72	45	43	43	Dir: NW 2-3 m/s	Highway traffic
							Birds
							Local residential noise
							Dog barely audible
Quarry Site L <sub>A</sub> eq(15min) Contribution							Quarry Inaudible
12/01/2017	12:42	76	60	59	43	Dir: NW 1-2 m/s	Highway traffic
							Birds
							Local Residential noise
							Aircraft
							Horse
Quarry Site L <sub>A</sub> eq(15min) Contribution							Quarry Inaudible

## 4.2 Assessment Results - Location N2

The results of the attended noise measurements at location N2 for Thursday 12 January 2017 are summarised in **Table 3** along with prevailing meteorological conditions at the time of each survey, relevant EPL limits and the quarry noise contribution.

**Table 3 Operator-Attended Noise Survey Results – Location N2**

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology	Comments
		L <sub>A</sub> max	L <sub>A</sub> eq	L <sub>A</sub> 90			
12/01/2017	9:05	63	47	46	43	Dir: NW 1-2 m/s	Highway traffic
							Birds
							Insects
Quarry Site L <sub>A</sub> eq(15min) Contribution							Quarry Inaudible
12/01/2017	12:00	65	47	46	43	Dir: NW 2-3 m/s	Highway traffic
							Birds
							Insects
Quarry Site L <sub>A</sub> eq(15min) Contribution							Quarry Inaudible

### 4.3 Assessment Results - Location N3

The results of the attended noise measurements at location N3 for Thursday 12 January 2017 are summarised in **Table 4** along with prevailing meteorological conditions at the time of each survey, relevant EPL limits and the quarry noise contribution.

**Table 4 Operator-Attended Noise Survey Results – Location N3**

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology	Comments
		LAmax	LAeq	LA90			
12/01/2017	9:26	58	45	43	43	Dir: NW 1-2 m/s	Highway traffic
							Aircraft
							Birds
Quarry Site LAeq(15min) Contribution							Quarry Inaudible
12/01/2017	12:24	61	43	41	43	Dir: NW 1-2 m/s	Birds
							Highway traffic
							Insects
							Lawn mower
Quarry Site LAeq(15min) Contribution							Quarry Inaudible

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## 5 Discussion

### 5.1 Discussion of Results – Location N1

Monitoring on Thursday 12 January 2017, identified that Wallerawang Quarry noise was inaudible for both attended measurements. Therefore, the noise contribution from the quarry satisfied the relevant noise limits of 43dBA LAeq(15min). Extraneous non-quarry related noise sources included highway traffic, birds, local residential noise, dogs, aircraft and livestock.

### 5.2 Discussion of Results – Location N2

Monitoring results for N2 were dominated by highway traffic that was constantly audible during all measurements. Quarry emissions were inaudible on all occasions. Furthermore, quarry contributions remained below the relevant noise limit of 43dBA LAeq(15min). Extraneous sources were also dominant throughout the 12 January 2017 survey with highway traffic, birds and insects all constantly audible.

### 5.3 Discussion of Results – Location N3

Monitoring results for N3 were dominated by highway traffic that was constantly audible during all measurements. Quarry emissions were not audible. Therefore, quarry contributions remained below the relevant criteria of 43dBA LAeq(15min). Extraneous sources were dominant during measurements with highway traffic, aircraft, local residential noise, birds and insects audible.

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## 6 Conclusion

MAC has completed a Noise Monitoring Assessment on behalf of Walker Quarries Pty Ltd. The assessment was completed to assess Wallerawang Quarry noise emissions against relevant criteria presented in EPL13172.

Attended monitoring for 12 January 2017 identified that noise emissions generated by Wallerawang Quarry comply with relevant statutory noise limits specified in NMA & EPL at all assessed locations. In summary, quarry noise was inaudible during all measurements and was dominated by extraneous noises unrelated to quarry operations.

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## Appendix A - Glossary of Terms

Several technical terms have been used in this report and are explained in **Table A1**.

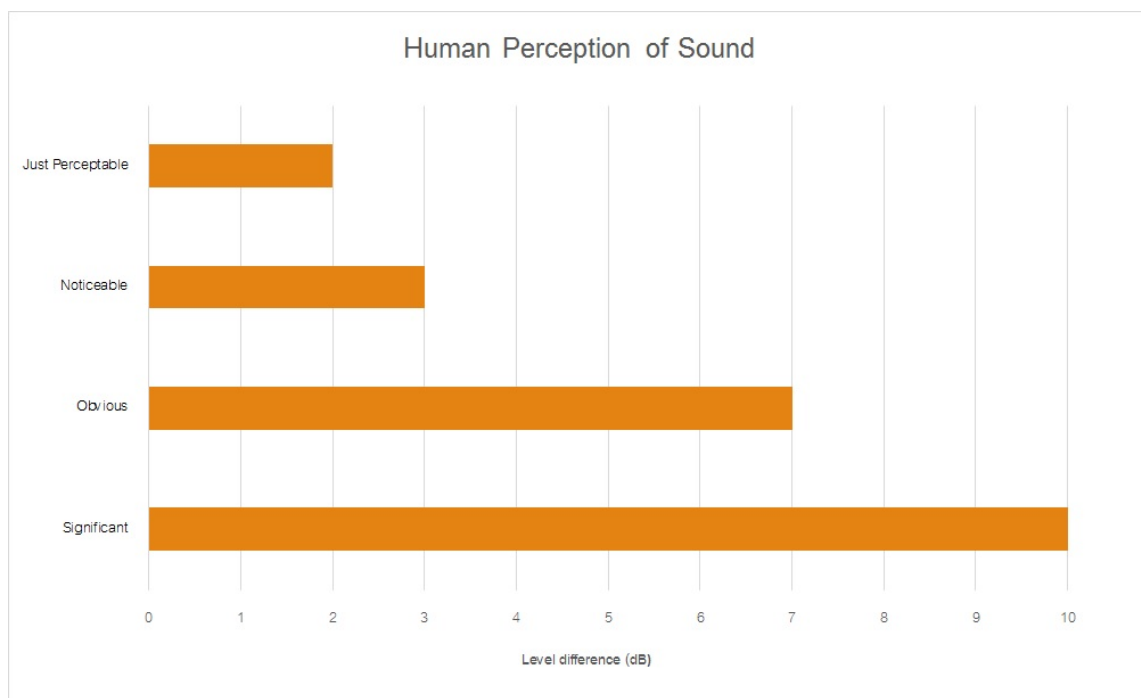
Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the INP as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAm <sub>ax</sub>	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (SWL)	<p>This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by :</p> $= 10 \cdot \log_{10} (W/W_0)$ <p>Where : W is the sound power in watts and W<sub>0</sub> is the sound reference power at 10-12 watts.</p>

Table A2 provides a list of common noise sources and their typical sound level.

**Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA**

Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

**Figure A1 – Human Perception of Sound**



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