

Annual Noise Monitoring Assessment 2025

Dunmore Quarry

Dunmore, NSW

August 2026

Prepared For: Boral Resources (NSW) Pty Ltd

August 2026

MAC180747-15RP1

Document Information

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Prepared for: Boral Resources (NSW) Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

P: +61 2 4920 1833

www.mulleracoustic.com

PROJECT MANAGER	PREPARED BY	REVIEWED BY	DATE	REPORT NO
Nicholas Shipman	Daniel Brown	Oliver Muller	24 August 2026	MAC180747-15RP1
				

Field Officers: Daniel Brown, Kristian Allen

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CONTENTS

1	INTRODUCTION	5
2	NOISE CRITERIA	7
3	METHODOLOGY	9
3.1	LOCALITY	9
3.2	ASSESSMENT METHODOLOGY	10
4	RESULTS.....	13
5	DISCUSSION AND COMPLIANCE ASSESSMENT.....	19
5.1	DISCUSSION OF RESULTS - LOCATION NM1	19
5.2	DISCUSSION OF RESULTS - LOCATION NM2	19
5.3	DISCUSSION OF RESULTS - LOCATION NM3	19
5.4	DISCUSSION OF RESULTS - LOCATION NM4	20
5.5	DISCUSSION OF RESULTS - LOCATION NM5	20
6	CONCLUSION	23

APPENDIX A – GLOSSARY OF TERMS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Boral Resources (NSW) Pty Ltd for Dunmore Quarry (the quarry), Tabbita Road, Dunmore, NSW.

The monitoring has been conducted in accordance with the Dunmore Quarry Noise Management Plan (NMP V4, December 2017) during August 2026 and forms the annual noise monitoring program to address conditions outlined in the Development Consent (Ref: 470-11-2003).

This report summarises the operator-attended noise monitoring results measured at five receivers in comparison to the relevant noise limits contained in the Development Consent and NMP.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Dunmore Quarry Noise Management Plan V4 (NMP), 2017 (EMM Consulting);
- Discussion Paper - Validation of Inversion Strength Estimation Method (EPA) 2014;
- NSW Environment Protection Authority (EPA's), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022; and
- Standards Australia AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

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

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2 Noise Criteria

The Dunmore Quarry Noise Management Plan (NMP) outlines the applicable noise criteria for residential receivers surrounding the quarry and are presented in **Table 1**.

Table 1 Noise Limits						
Description	Day	Evening	Night		Morning Shoulder	
	(7am - 6pm)	(6pm - 10pm)	(10pm - 7am)		(6am - 7am)	
	dB	dB	dB	dB	dB	dB
	LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)	LAeq(15min)	LA1(1min)
Location K Stocker	49	44	38	48	47	55
Location O Dunmore Lakes	49	44	38	48	47	55
Location J Creagan	Negotiated Agreement in place					
Location AA	38	38	38	45	38	45
Location AB and T	36	36	36	45	36	45
Locations D, F, G and Z	40	40	40	45	40	45
Location S	37	37	37	45	37	45

Source: Table 2 of Dunmore Quarry NMP.

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3 Methodology

3.1 Locality

The quarry is located at Dunmore near Shellharbour, NSW. Receivers in the locality surrounding the quarry are primarily considered rural residential. The quarry is surrounded by rural properties to the west, with the Princes Highway situated to the east of the site. Highway traffic is a dominant noise source for those receivers east of the quarry along with rural noise. The representative noise monitoring locations identified in Table 4.1 of the NMP with respect to the quarry are presented in the locality plan in **Figure 1**.

Table 2 presents the noise limits for each receiver as per the EPL.

Table 2 Attended Monitoring Locations and EPL Noise Limits							
ID	Description	Day ¹	Evening ¹	Night ¹		Morning Shoulder ¹	
		dB,	dB,	dB,	dB,	dB,	dB,
		LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)	LAeq(15min)	LA1(1min)
NM1	Location K Stocker						
	40 Swamp Road	49	44	38	48	47	55
	Dunmore						
NM2	Location S						
	86 Croome Vale Road	37	37	37	45	37	45
	Croom						
NM3	Location T						
	1338 Jamberoo Road	36	36	36	45	36	45
	Croom						
NM4	Location G ²						
	318 Croome Road	40	40	40	45	40	45
	Croom						
NM5	Location F ³						
	316 Croome Road	40	40	40	45	40	45
	Croom						

Note 1: Morning Shoulder – the period from 6am to 7am; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Representative location for western residences G, D, Z.

Note 3: Representative location for northwestern residences F, AA, AB.

3.2 Assessment Methodology

The attended noise measurements were conducted in general accordance with the procedures described in Standards Australia AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the Dunmore Quarry NMP. Noise measurements of 15-minutes in duration were conducted at five locations (NM1-NM5) using a Svantek Type 1, 971 noise analyser between Wednesday 5 August 2026 and Friday 7 August 2026 to satisfy the requirements of the NMP. All acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) and complies with AS/NZS IEC 61672.1-2019- Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed $\pm 0.5\text{dBA}$.

To understand meteorological conditions during calm conditions, direct measurement of temperature profile was undertaken at James Road, Dunmore on Wednesday 5 August 2026 and Thursday 6 August 2026 and Croome Vale Road, Croome on Friday 7 August 2026, at 2m above ground level and at 50m above ground level with a calibrated temperature device.

The results of the temperature measurements were used to determine the temperature lapse rate in general accordance with the Validation of Inversion Strength Estimation Method (2014). These measurements, in combination with the onsite weather station provide a reference to validate the relevant meteorological conditions under which compliance is assessed.

Extraneous noise sources were excluded from the analysis to determine the $\text{dB LA}_{\text{eq}(15\text{min})}$ quarry noise contribution for comparison against the relevant criteria. In the event of quarry attributed noise being above criteria, prevailing meteorological conditions for the monitoring period are sourced from the onsite meteorological station and analysed in accordance with Fact Sheet A4 of the NPI to determine the stability category present at the time of each attended measurement.

Where the quarry is inaudible, the contribution is estimated to be at least 10dBA below the ambient noise level.



FIGURE 1
Locality Plan
MAC180747
Dunmore Quarry

KEY

- Noise Monitoring Locations
- Weather Monitoring Location
- Dunmore Quarry



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4 Results

A summary of the operator attended measurements at location NM1 to NM5 are presented **Table 3** to **Table 7** and provide the following information:

- Monitoring location;
- Date, time and assessment period;
- Observed Wind Speed (WS, m/s), Wind Direction (WD) and Temperature (Temp) in °C at 1.5m above the ground measured at the monitoring location;
- Measured Temperature (Temp) in °C at 2m and 50m above ground level at a representative location;
- Average Wind Speed (WS, m/s), Wind Direction (WD) and Temperature (Temp) in °C at 10m above ground level at the on-site weather station;
- Atmospheric stability class derived from the on-site weather station;
- Calculated temperature inversion strength;
- Ambient measured noise levels LAeq(15min) and LA90(15min) in dB re 20µPa;
- Quarry LAeq(15min) and LA1(1min) noise level contribution; and
- Noise Limit LAeq(15min) and LA1(1min).

Results of the attended noise survey identified that the quarry was generally inaudible during the measurement periods at all but one location (NM4) during the day measurement period, however extraneous sources such as traffic, insects, aircraft, birds, livestock and frogs were audible during the survey period and dominated the results.

Table 3 NM1 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m	Descriptor		EPL Limits	Observed Meteorology							Description and SPL, dBA
		WS WD Temp °C ³	LAeq	LA90	LAeq (15min)/ LA1 (1min)	WS (m/s) ¹	WD ¹	2m Temp °C	50m Temp °C	Delta Temp °C	Lapse Rate °C/100m ²	Stability Class	
06/08/2026	06:00 (Morning Shoulder)	0.4m/s	54	45	47/55	2.9	W	10.3	10.9	0.6	1.2	E	Traffic 42-79
		NW											Birds 46-50
		11 °C											Quarry – Reverse Alarm 41-45 (3 minutes)
													Quarry – Processing 43-45 (10 minutes)
		Quarry Contribution											
05/08/2026	08:45 (Day)	1.2m/s	63	47	49	1.2	W	N/A	N/A	N/A	N/A	E	Traffic 44-80
		W											Birds 45-68
		12 °C											Quarry – Reverse Alarm <44 (30 seconds)
													Quarry – Processing <42
		Quarry Contribution											
05/08/2026	18:04 (Evening)	0.7m/s	60	43	44	1.2	W	N/A	N/A	N/A	N/A	E	Traffic 41-80
		W											Windblown vegetation 42-48
		14 °C											Quarry Inaudible
		Quarry Contribution											
Quarry Contribution													

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 50m temperature.

Note 3: At operator position as per AS1055.

Table 4 NM2 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m	Descriptor		EPL Limits		Observed Meteorology						Description and SPL, dBA
		WS WD	LAeq	LA90	LAeq (15min)/	WS	WD ¹	2m	50m	Delta	Lapse Rate	Stability	
		Temp °C ³			LA1 (1min)	(m/s) ¹		Temp °C	Temp °C	Temp °C	°C/100m ²	Class	
07/08/2026	06:03 (Morning Shoulder)	0.5m/s	35	32	37/45	1.1	WNW	6.7	8.6	1.9	3.8	G	Traffic 27-43
		W											Birds 27-47
		7 °C											Insects 27-36
													Operator noise 59
													Quarry Inaudible
Quarry Contribution													<37dB LAeq(15min)
													<45dB LA1(1min)
05/08/2026	13:25 (Day)	1.5m/s	43	36	37	4.0	W	n/a	n/a	n/a	n/a	B	Traffic 30-39
		SW											Aircraft 30-56
		19 °C											Windblown vegetation 32-50
													Insects 30-38
													Quarry Inaudible
Quarry Contribution													<37dB LAeq(15min)
05/08/2026	19:36 (Evening)	1.5m/s	41	34	37	3.9	W	n/a	n/a	n/a	n/a	E	Insects 30-35
		SW											Traffic 30-39
		9 °C											Windblown vegetation 32-50
													Aircraft 30-56
													Quarry Inaudible
Quarry Contribution													<37dB LAeq(15min)

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 50m temperature.

Note 3: At operator position as per AS1055.

Table 5 NM3 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m	Descriptor		EPL Limits		Observed Meteorology						Description and SPL, dBA
		WS WD Temp °C ³	LAeq	LA90	LAeq (15min)/ LA1 (1min)	WS (m/s) ¹	WD ¹	2m Temp °C	50m Temp °C	Delta Temp °C	Lapse Rate °C/100m ²	Stability Class	
07/08/2026	06:24	0.5m/s											Traffic 27-60
	(Morning	W	48	34	36/45	1.5	W	8.5	9.8	1.3	2.6	F	Birds 25-66
	Shoulder)	7°C											Aircraft 25-51
													Quarry Inaudible
Quarry Contribution													<36dB LAeq(15min)
													<45dB LA1(1min)
05/08/2026	13:06	2.0m/s											Traffic 30-71
	(Day)	SW	60	43	36	2.8	WSW	n/a	n/a	n/a	n/a	D	Birds 30-78
		17°C											Windblown vegetation 33-56
													Quarry Inaudible
Quarry Contribution													<36dB LAeq(15min)
05/08/2026	09:19	2.0m/s											Traffic 30-69
	(Evening)	W	54	34	36	3.8	W	n/a	n/a	n/a	n/a	E	Aircraft 30-69
		10°C											Windblown vegetation 31-60
													Quarry Inaudible
Quarry Contribution													<36dB LAeq(15min)

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 50m temperature.

Note 3: At operator position as per AS1055.

Table 6 NM4 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m	Descriptor		EPL Limits	Observed Meteorology							Description and SPL, dBA	
		WS WD Temp °C ³	LAeq	LA90	LAeq (15min)/ LA1 (1min)	WS (m/s) ¹	WD ¹	2m Temp °C	50m Temp °C	Delta Temp °C	Lapse Rate °C/100m ²	Stability Class		
07/08/2026	06:00	0.1m/s											Birds 27-47	
	(Morning Shoulder)	NW	34	29	40/45	1.3	W	6.7	8.6	1.9	3.8	G	Traffic 26-37	
													Insects 26-32	
													Livestock 30-40	
			10 °C											Quarry Inaudible
Quarry Contribution													<40dB LAeq(15min)	
													<45dB LA1(1min)	
05/08/2026	14:11	1.0m/s											Birds 27-38	
	(Day)	SW	38	32	40	2.9	W	n/a	n/a	n/a	n/a	C	Traffic 30-58	
													Aircraft 30-41	
			19 °C											Livestock 30-39
														Windblown vegetation 27-43
Quarry Inaudible														
Quarry Contribution													<40dB LAeq(15min)	
05/08/2026	20:24	3.0m/s											Traffic 30-35	
	(Evening)	SW	43	36	40	5.3	W	n/a	n/a	n/a	n/a	D	Aircraft 30-51	
														Windblown vegetation 33-66
			8 °C											Quarry Inaudible
Quarry Contribution													<40dB LAeq(15min)	

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 50m temperature.

Note 3: At operator position as per AS1055.

Table 7 NM5 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m	Descriptor		EPL Limits	Observed Meteorology							Description and SPL, dBA
		WS WD	LAeq	LA90	LAeq (15min)/ LA1 (1min)	WS (m/s) ¹	WD ¹	2m Temp °C	50m Temp °C	Delta Temp °C	Lapse Rate °C/100m ²	Stability Class	
		Temp °C ³											
7/08/2026	06:19	0.2m/s											Birds 33-69
	(Morning Shoulder)	NW	51	35	40/45	0.6	W	8.5	9.8	1.3	2.6	F	Traffic 32-44
		10 °C											Aircraft 35-43
Quarry Contribution													<40dB LAeq(15min)
													<45dB LA1(1min)
05/08/2026	13:53 (Day)	1.0m/s											Traffic 34-44
		SW	44	37	40	3.7	W	n/a	n/a	n/a	n/a	E	Birds 30-45
		19 °C											Residential noise 30-73
													Windblown vegetation 30-40
Quarry Inaudible													
Quarry Contribution													<40dB LAeq(15min)
05/08/2026	20:06 (Evening)	2.0m/s											Traffic 35-73
		SW	48	39	40	4.8	W	n/a	n/a	n/a	n/a	E	Windblown vegetation 37-61
		8 °C											Livestock 35-40
													Quarry Inaudible
Quarry Contribution													<40dB LAeq(15min)

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 50m temperature.

Note 3: At operator position as per AS1055.

5 Discussion and Compliance Assessment

The compliance assessment summary for each monitoring location is presented in **Table 8** for all assessment periods.

5.1 Discussion of Results - Location NM1

The noise monitoring survey identified that the acoustic environment at this location is dominated by road traffic noise from the Princes Highway, approximately 350m to the east. During the survey, quarry reverse alarms and processing noise was audible during the morning shoulder and day monitoring periods. Quarry noise remained inaudible during the evening period. Quarry noise contributions were estimated (during short breaks in traffic) to be at or below the relevant noise criteria for all periods.

Extraneous sources audible during the survey included traffic, windblown vegetation and birds.

5.2 Discussion of Results - Location NM2

The noise monitoring survey identified that the acoustic environment at this location is dominated by natural sounds such as insects and bird noise, windblown vegetation and agricultural noise such as livestock. Occasional aircraft or local traffic on Jamberoo Road, approximately 350m to the west was audible for short periods. During the survey, quarry noise emissions were inaudible, and quarry contributions were calculated to be below the relevant noise criteria for all periods.

5.3 Discussion of Results - Location NM3

Due to access restrictions at the NM3 location, measurements were conducted at the front fence line of the location approximately 300m to the west of the receiver. The noise monitoring survey identified that the acoustic environment at this location is dominated by natural sounds such as insects, and bird noise, and agricultural noise such as livestock. Aircraft or occasionally traffic on Jamberoo Road, to the west was audible for short to medium periods. During the survey, quarry noise emissions were inaudible during all measurement periods. Quarry contributions were calculated to be below the relevant noise criteria for all periods.

5.4 Discussion of Results - Location NM4

The noise monitoring survey identified that the quarry remained inaudible during all monitoring periods. The acoustic environment at these locations is dominated by natural sounds such as insects, windblown vegetation and birds, and agricultural noise such as livestock. Aircraft and occasional distant traffic on the East-West Link Road, approximately 2km to the north was audible for short periods. During the survey, quarry contributions were calculated to be below the relevant noise criteria for all periods.

5.5 Discussion of Results - Location NM5

The noise monitoring survey identified that the acoustic environment at these locations is dominated by natural sounds such as bird noise, and agricultural noise such as livestock and residential noise. Aircraft and occasional distant traffic on the East-West Link Road, approximately 2km to the north was audible for short periods. During the survey, quarry noise emissions were inaudible, and quarry contributions were calculated to be below the relevant noise criteria for all periods.

Table 8 Noise Compliance Assessment Summary

Location	Estimated Quarry Noise Contribution ¹				Noise Limit ¹				Demonstrated Compliance			
	Day	Evening	Morning Shoulder		Day	Evening	Morning Shoulder		Day	Evening	Morning Shoulder	
			L _{Aeq} (15min)	L _{A1} (1min)			L _{Aeq} (15min)	L _{A1} (1min)			L _{Aeq} (15min)	L _{A1} (1min)
NM1	<42	<44	44	45	49	44	47	55	Yes	Yes	Yes	Yes
NM2	<37	<37	<37	<45	37	37	37	45	Yes	Yes	Yes	Yes
NM3	<36	<36	<36	<45	36	36	36	45	Yes	Yes	Yes	Yes
NM4	<40	<40	<40	<45	40	40	40	45	Yes	Yes	Yes	Yes
NM5	<40	<40	<40	<45	40	40	40	45	Yes	Yes	Yes	Yes

Note 1: All levels are dBA.

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Boral Resources (NSW) Pty Ltd for Dunmore Quarry (the quarry), Tabbita Road, Dunmore, NSW.

Attended noise monitoring was undertaken between Wednesday 5 August 2026 and Friday 7 August 2026 at five representative monitoring locations. The assessment has identified that noise emissions generated by Dunmore Quarry were generally just audible during the morning shoulder and day period at NM1. The quarry was inaudible during all other remaining measurements. Notwithstanding, quarry contributed noise emissions were below the relevant noise criteria at all locations during all measurement periods, thus satisfying the relevant noise limits.

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Appendix A – Glossary of Terms

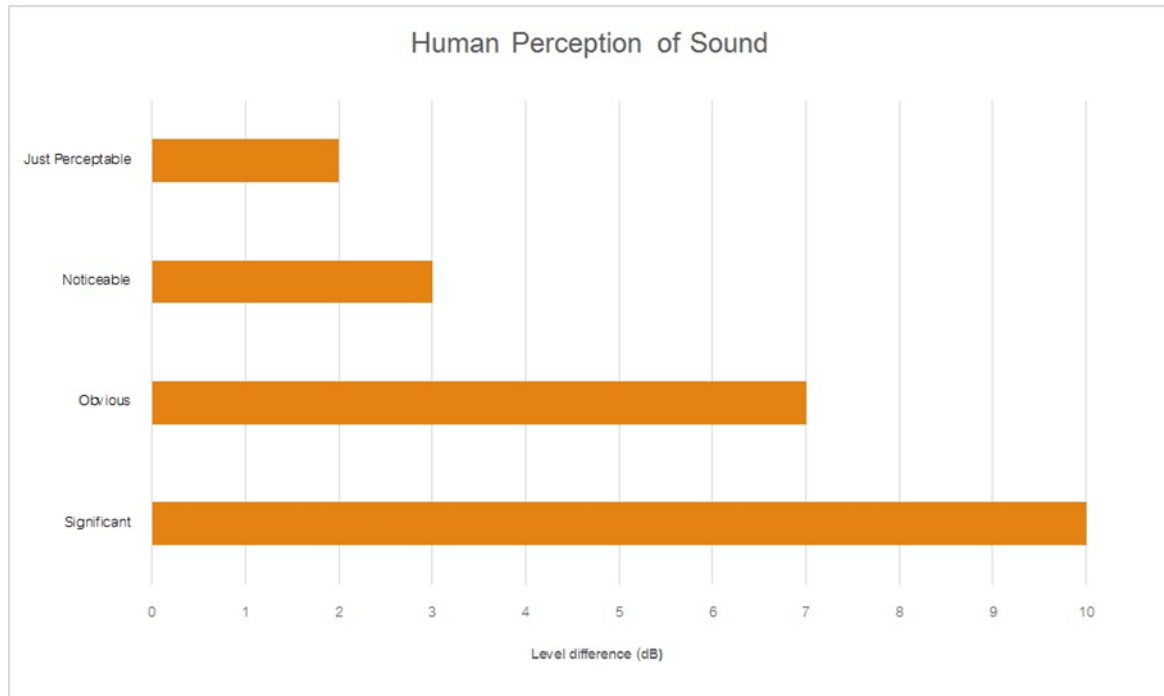
A number of technical terms have been used in this report and are explained in **Table A1**.

Table A1 Glossary of Acoustical 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 NPI 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 total noise associated with a given environment. Typically, a composite of sounds from all 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 sound.
Background Noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is usually represented by the LA90 descriptor
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), dB(L)	Decibels Z-weighted or decibels Linear (unweighted).
Extraneous Noise	Sound resulting from activities that are not typical of the area.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A sound level which is exceeded 10% of the time.
LA90	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
LAeq	Represents the average noise energy or equivalent sound pressure level over a given period.
LAmx	The maximum sound pressure level received at the microphone during a measuring interval.
Masking	The phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.
RBL	The Rating Background Level (RBL) as defined in the NPI, is an overall single figure representing the background level for each assessment period over the whole monitoring period. The RBL, as defined is the median of ABL values over the whole monitoring period.
Sound power level (Lw or SWL)	This is a measure of the total power radiated by a source in the form of sound and is given by $10 \cdot \log_{10} (W/W_0)$. Where W is the sound power in watts to the reference level of 10^{-12} watts.
Sound pressure level (Lp or SPL)	the level of sound pressure; as measured at a distance by a standard sound level meter. This differs from Lw in that it is the sound level at a receiver position as opposed to the sound 'intensity' of the source.

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 Pressure 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





Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
Ph: +61 2 4920 1833

mulleracoustic.com

