

Document Information

Noise Monitoring Assessment

Wallerawang Quarry

September 2025

Prepared for: Walker Quarries 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	25 September 2025	MAC160392RP18V1
				

Field Officer: Daniel Brown.

DISCLAIMER

All documents produced by Muller Acoustic Consulting Pty Ltd (MAC) are prepared for a particular client's requirements and are based on a specific scope, circumstances and limitations derived between MAC and the client. Information and/or report(s) prepared by MAC may not be suitable for uses other than the original intended objective. No parties other than the client should use or reproduce any information and/or report(s) without obtaining permission from MAC. Any information and/or documents prepared by MAC is not to be reproduced, presented or reviewed except in full.

CONTENTS

1	INTRODUCTION	5
2	NOISE CRITERIA	7
2.1	ENVIRONMENTAL PROTECTION LICENSE NOISE LIMITS	7
2.2	DEVELOPMENT CONSENT NOISE LIMITS.....	7
2.3	VARIANCE IN NOISE LIMITS.....	7
2.4	QUARRY PLANT SOUND POWER NOISE LIMITS	8
3	METHODOLOGY	9
3.1	LOCALITY	9
3.2	ENVIRONMENTAL NOISE ASSESSMENT METHODOLOGY.....	9
4	RESULTS.....	11
4.1	METEOROLOGICAL CONDITIONS.....	11
4.2	ASSESSMENT RESULTS – REFERENCE LOCATION (RL1)	12
4.3	ASSESSMENT RESULTS – LOCATION N1	13
4.4	ASSESSMENT RESULTS – LOCATION N2	14
4.5	ASSESSMENT RESULTS – LOCATION N3	15
4.6	ASSESSMENT RESULTS – SOUND POWER AUDIT	16
5	NOISE VERIFICATION MODELLING METHODOLOGY.....	17
6	DISCUSSION	19
6.1	DISCUSSION OF RESULTS – REFERENCE LOCATION (RL1).....	19
6.2	DISCUSSION OF RESULTS – LOCATION N1	19
6.3	DISCUSSION OF RESULTS – LOCATION N2.....	19
6.4	DISCUSSION OF RESULTS – LOCATION N3.....	20
6.5	DISCUSSION OF RESULTS – SOUND POWER AUDIT	20
7	CONCLUSION	21

APPENDIX A – GLOSSARY OF TERMS

This page has been intentionally left blank

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Walker Quarries Pty Ltd to complete a bi-annual Noise Monitoring Assessment (NMA) for Wallerawang Quarry (the quarry). This assessment has been undertaken as the second bi-annual assessment for 2025 (September 2025).

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 quarry's Environmental Protection License (EPL #13172). An additional measurement at a nearfield reference location was also conducted to verify the operation of quarry plant and to quantify the noise contribution from site.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Environment Protection Authority (EPA), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022;
- Environment Protection Licence EPL #13172 (EPL);
- Development Consent (DA No. 344-11-2001) (Mod 3), February 2020;
- Standards Australia AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures;
- Muller Acoustic Consulting Pty Ltd (MAC), Noise and Vibration Impact Assessment (NVIA), 2019; and
- Umwelt, Wallerawang Quarry Noise Management Plan, Version 6 (NMP), 2024.

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

This page has been intentionally left blank

2 Noise Criteria

2.1 Environmental Protection License Noise Limits

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

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

Note: 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”.

2.2 Development Consent Noise Limits

Schedule 3 of the site’s Development Consent (DA No. 344-11-2001) outlines applicable noise criteria for the operation of the quarry. **Table 2** reproduces the criteria as outlined in the Development Consent.

Table 2 Development Consent Noise Limits, dBA			
Location	Day	Evening	Night
	LAeq(15min)	LAeq(15min)	LAeq(15min)
All privately owned residences	43	39	35

Additionally, Condition 3B of Schedule 3 of the Development Consent states, ‘*The noise criteria in Table 2 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.*’

2.3 Variance in Noise Limits

It is noted that the night-time criteria presented in the Development Consent differs from that outlined in the EPL. This is due to the consent being updated to reflect the recent modification for site. Hence, the more conservative criteria outlined in the consent have been adopted for this assessment. Notwithstanding, as the quarry is not operational during the evening and night period, the variance in the applicable noise criteria is inconsequential.

2.4 Quarry Plant Sound Power Noise Limits

Table 15 of the Noise and Vibration Impact Assessment (NVIA) (Muller Acoustic Consulting Pty Ltd, April 2019) prepared for the Environmental Impact Statement (EIS) (Umwelt (Australia)) sets out the noise targets for mobile plant operating at the quarry. The logarithmic site total sound powers are reproduced in **Table 3**.

Table 3 Quarry Plant Sound Power Levels, dBA (re 10⁻¹² Watts)	
Noise Source/Item	Total dBA
Sandvik Crusher	111
Pugmill	108
Service Vehicle	82
Wirtgen Kleeman Secondary/Tertiary Crusher	111
Wirtgen MR130Z Track Mounted Impact Crusher	113
Wirtgen Kleeman Cone/Sand Plant	110
Wirtgen Kleeman Screen	111
Drill	115
Cat D8 Dozer	111
Komatsu PC450 Excavator	109
Komatsu Loader	99
Komatsu WA500 Loader	105
Komatsu WA480 Wheel Loader	100
Komatsu HM400 Articulated Dump Truck (x3)	106
Volvo 6 Wheeled Water Cart	101
Manitou	96
Standard Road Truck (x3)	102
Total Site Sound Power	121

3 Methodology

3.1 Locality

Wallerawang is located approximately 10km to the northwest 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 **Table 4** and graphically in the locality plan shown in **Figure 1**.

Table 4 Receiver Locations		
ID	Address	Distance to Quarry Boundary, m
RL1	Reference Location (adjacent to site office)	N/A
N1	139 Gemalong, Marrangaroo, NSW	1200
N2	42 Rocky Waterhole Drive, Wallerawang, NSW	980
N3	2 Cypress Close, Wallerawang, NSW	550

3.2 Environmental Noise Assessment Methodology

The attended noise surveys were conducted in general accordance with the procedures described in Standards Australia AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise", the EPL and NMP. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Wednesday 3 September 2025. The 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 ± 0.5 dBA.

Two day-time measurements of 15-minutes in duration were completed at each monitoring location during standard onsite operations. 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 LAeq(15min) quarry noise contribution for comparison against the relevant EPL limits.

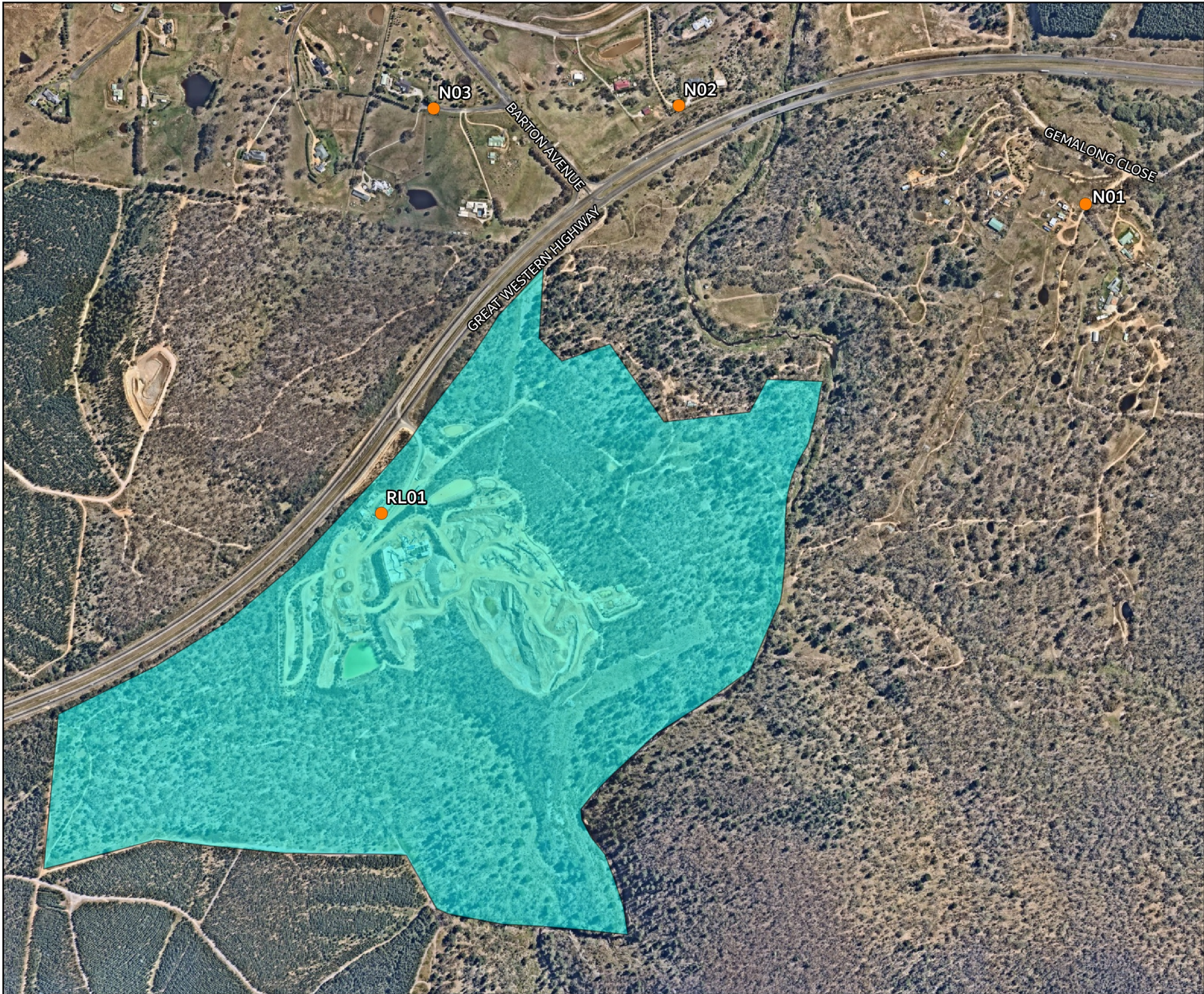


FIGURE 1
LOCALITY PLAN
MAC160392-01
Wallerawang Quarry,
Wallerawang NSW

KEY

- Attended Locations
- Project Boundary



4 Results

4.1 Meteorological Conditions

Weather data for the noise assessment period was sourced from Wallerawang Quarries on-site meteorological station as well as operator measured conditions on site of EPL nominated receiver locations to determine prevailing meteorological conditions at the time of the attended measurements and are presented in **Table 5**.

Table 5 Prevailing Meteorological Conditions

Date & Time	Wallerawang Quarries on-site Meteorological Station		Operator Measured Weather EPL Monitoring Location (1.8m AGL)	
	Wind Direction	Wind (m/s)	Wind Direction	Wind (m/s)
	03/09/2025 09:01	S	1.2	SE
03/09/2025 09:24	SSW	1.6	SE	0.5
03/09/2025 10:21	SSE	2.5	SE	0.5
03/09/2025 11:41	SSW	1.5	SW	0.1
03/09/2025 12:08	W	2.2	SW	0.3
03/09/2025 12:30	WSW	2.0	SE	0.5
03/09/2025 12:51	WSW	3.0	SE	0.3
03/09/2025 13:12	WSW	1.6	SW	2.2

4.2 Assessment Results – Reference Location (RL1)

Operational attended noise monitoring was completed at RL1 on Wednesday 3 September 2025. **Table 6** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 6 Operator-Attended Noise Survey Results – Reference Location 1 (RL1)													
Date	Time (hrs)	Descriptor (dBA re 20µPa)			EPL Limit ¹	Meteorology	Comments						
		L _{Amax}	L _{Aeq}	L _{A90}									
03/09/2025	10:21	80	62	56	N/A	WS: 0.5m/s WD: SE Rain: Nil	Traffic 52-58						
							Quarry processing 53-58 (15 minutes)						
							Quarry light vehicle <54 (30 seconds)						
							Quarry reverse alarm 57-67 (1 minute)						
							Quarry haul truck 58-73 (2 minutes)						
							Quarry workshop 55-75						
							Quarry road trucks 56-80 (10 minutes)						
							Truck wash 57 (1 minute)						
							Quarry Site L _{Aeq} (15min) Contribution						
							62						
03/09/2025	11:43	71	56	49	N/A	WS: 0.1m/s WD: SW Rain: Nil	Traffic 48-58						
							Birds 50-61						
							Quarry processing 48-57 (15 minutes)						
							Quarry road trucks 51-64 (3 minutes)						
							Quarry loader 54-59 (1 minute)						
							Quarry workers 49-71 (3 minutes)						
Quarry light vehicle 55-64 (1 minute)													
Quarry Site L _{Aeq} (15min) Contribution													
56													

Note 1: EPL not applicable for this onsite reference location.

4.3 Assessment Results – Location N1

Operational attended noise monitoring was completed at N1 on Wednesday 3 September 2025. **Table 7** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 7 Operator-Attended Noise Survey Results – Location N1							
Date	Time (hrs)	Descriptor (dBA re 20µPa)			EPL Limit	Meteorology	Comments
		L _{Amax}	L _{Aeq}	L _{A90}			
03/09/2025	12:08	59	46	41	43	WS: 0.3m/s WD: SW Rain: Nil	Traffic 38-57
							Insects <36
							Birds 39-59
							Wind in trees 37-39
							Quarry reverse alarm <35 (10 seconds)
Quarry Site L _{Aeq} (15min) Contribution ¹							<31
03/09/2025	13:12	64	47	41	43	WS: 1.3m/s WD: SW Rain: Nil	Traffic 39-64
							Birds 37-59
							Wind in vegetation 37-47
							Insects <35
							Quarry inaudible
Quarry Site L _{Aeq} (15min) Contribution ¹							<31

Note 1: Quarry Site L_{Aeq}(15min) calculated based on nearfield measurements.

4.4 Assessment Results – Location N2

Operational attended noise monitoring was completed at N2 on Wednesday 3 September 2025.

Table 8 presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 8 Operator-Attended Noise Survey Results – Location N2							
Date	Time (hrs)	Descriptor (dBA re 20µPa)			EPL Limit	Meteorology	Comments
		L _{Amax}	L _{Aeq}	L _{A90}			
03/09/2025	09:24	76	60	51	43	WS: 0.5m/s WD: SE Rain: Nil	Traffic 45-76
							Birds 46-54
							Insects 40-47
							Wind in vegetation <40
Quarry Site L _{Aeq} (15min) Contribution ¹							<41
03/09/2025	12:30	68	56	48	43	WS: 0.3m/s WD: SW Rain: Nil	Traffic 42-68
							Birds 43-64
							Insects <40
							Aircraft 46-66
Quarry Site L _{Aeq} (15min) Contribution ¹							<38

Note 1: Quarry Site L_{Aeq}(15min) calculated based on nearfield measurements.

4.5 Assessment Results – Location N3

Operational attended noise monitoring was completed at N3 on Wednesday 3 September 2025. **Table 9** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 9 Operator-Attended Noise Survey Results – Location N3							
Date	Time (hrs)	Descriptor (dBA re 20µPa)			EPL Limit	Meteorology	Comments
		L _{Amax}	L _{Aeq}	L _{A90}			
03/09/2025	09:01	64	48	41	43	WS: 0.3m/s WD: SE Rain: Nil	Traffic 38-60
							Insects 38-41
							Birds 40-64
							Wind in vegetation 35-40
Quarry Inaudible							
Quarry Site L _{Aeq} (15min) Contribution ¹							<31
03/09/2025	12:51	62	43	39	43	WS: 0.2m/s WD: SW Rain: Nil	Traffic 35-54
							Birds 36-62
							Insects 37-41
							Wind in vegetation 36-43
							Residential noise 38-42
							Dogs Barking 40-47
Quarry processing <35 (just audible on lulls)							
Quarry Site L _{Aeq} (15min) Contribution ¹							<35

Note 1: Quarry Site L_{Aeq}(15min) calculated based on nearfield measurements.

4.6 Assessment Results – Sound Power Audit

Near field measurements of plant and equipment were also completed to determine their operating sound power levels. The measurements were conducted in general accordance with AS 5331:2019 – Acoustics – Determination of sound power levels of noise sources – Guidelines for the use of basic standards. Results of the analysis identify that the overall sound power of items of plant used at the project site are below target sound power levels outlined in the EIS and NVIA and are presented in **Table 10**.

Table 10 Sound Power Levels, LAeq											
Plant	Octave Band Centre Frequency, Lw Spectrum									Sound Power Lw	Goal ¹
	32	63	125	250	500	1k	2k	4k	8k		
Komatsu HM400 Articulated Dump Truck	64	89	89	91	99	98	95	88	80	103	106
Sand Processing Plant	83	88	92	93	97	98	98	95	90	104	N/A
Wirtgen Kleeman Secondary/Tertiary Crusher	76	91	97	100	105	104	105	99	91	111	111
Komatsu PC450 Excavator	67	85	88	90	94	95	94	90	81	101	109
Komatsu WA500 Loader	66	82	90	93	93	100	98	91	78	104	105
Standard Road Truck	69	82	86	92	95	98	95	92	86	102	102
Total Site Sound Power										113	121²

Note 1: These are the SWLs of individual plant modelled in the EIS / NVIA.

Note 2: This is the total SWL of all plant modelled in the EIS / NVIA.

It's noted that the recently constructed sand processing plant does not have a specified goal. Several mobile plant items were not operating during the September 2025 assessment, therefore other mobile and fixed plant items will be measured in the first round of monitoring for 2026.

5 Noise Verification Modelling Methodology

Due to the high ambient noise levels attributed to passing traffic on the Great Western Highway, site operations are often masked at the noise monitoring locations. To verify the offsite noise levels from the quarry and correlate the established noise contributions from attended noise monitoring, predictive noise modelling was undertaken.

Noise modelling utilised the DGMR (iNoise, Version 2025) noise modelling software. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Where relevant, modifying factors in accordance with Fact Sheet C of the NPI have been applied to calculations.

The model calculation method used to predict noise levels was in accordance with ISO 9613:1 and ISO 9613:2 including corrections for meteorological conditions using CONCAWE¹. The ISO 9613 standards are the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

Site mobile and fixed equipment were positioned in locations representative of the areas in which they were operating during the attended noise monitoring survey (Wednesday 3 September 2025). The results of the predictive modelling are presented in **Section 6** and compared to the measured site contribution from the attended monitoring.

¹ Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

This page has been intentionally left blank

6 Discussion

6.1 Discussion of Results – Reference Location (RL1)

Noise measurements were conducted on Wednesday 3 September 2025 when Wallerawang Quarry was operating at normal production levels, which included use of crusher train, mobile screen, front-end loader, road trucks, excavator and haul trucks.

The noise contribution from the quarry at the reference location was 62dB LAeq(15min) and 56dB LAeq(15min) respectively. The noise environment at the reference location was primarily dominated by mobile screens, mobile plant and highway traffic.

The predicted quarry site contribution at RL1, which included distance loss, the surrounding topography and air absorption, was 59dBA, which is consistent with the site being just audible or inaudible at the EPL measurement locations.

6.2 Discussion of Results – Location N1

Measurements conducted Wednesday 3 September 2025 identified that quarry plant alarm noise was audible during the first measurement round and the quarry remained inaudible during the second measurement round conducted at N1, with contributions measured at <31dB LAeq(15min) and <31dB LAeq(15min) respectively. and satisfied the relevant noise limits of 43dB LAeq(15min) for this location. Extraneous non-quarry related sources included highway traffic, birds, insects and wind in vegetation, that were significant contributors to the ambient noise environment.

The predicted quarry site contribution at N1, which included distance loss, the surrounding topography and air absorption, was 25dBA, which is consistent with the site contribution at this location during the attended noise monitoring. This level is also significantly lower than the ambient dominant sources which generally masks site noise emissions.

6.3 Discussion of Results – Location N2

Measurements conducted on Wednesday 3 September 2025 for N2 were dominated by local and highway traffic. Quarry operations were inaudible during both measurements conducted at this location with estimated contributions measured between <41dB LAeq(15min) and <38dB LAeq(15min) respectively, demonstrating that quarry contributions remained below the relevant criteria of 43dB LAeq(15min) for both measurements conducted at the location. Extraneous non-quarry related sources included traffic, insects

and birds, aircraft and wind in vegetation that were significant contributors to the ambient noise environment.

The predicted quarry site contribution at N2, which included distance loss, the surrounding topography and air absorption, was 31dBA, which correlates with the site being inaudible at this location during the attended noise monitoring. This level is also significantly lower than the ambient dominant sources which generally masks site noise.

6.4 Discussion of Results – Location N3

Measurements conducted on Wednesday 3 September 2025 identified that Wallerawang Quarry noise was inaudible during the first measurement conducted at N3. Quarry processing noise was just audible during ambient lulls during the second measurement with contributions measured between <31dB LAeq(15min) and <35dB LAeq(15min) respectively. Therefore, the relevant noise limit of 43dB LAeq(15min) was satisfied. Extraneous non-quarry related sources included traffic, insects, dogs barking and birds that were significant contributors to the ambient noise environment.

The predicted quarry site contribution at N3 which included distance loss, the surrounding topography and air absorption, was 31dBA, which is consistent with the measured site contribution at this location during the attended noise monitoring.

6.5 Discussion of Results – Sound Power Audit

The results of the sound power audit demonstrate that the mobile plant measured onsite comply with the combined total logarithmic sound power goal as outlined in the NVIA. Other fixed and mobile plant used on site will be assessed and included in the first bi-annual 2026 assessment.

7 Conclusion

Muller Acoustic Consulting Pty Ltd (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 EPL #13172 and DA No. 344-11-2001.

Quarry noise remained inaudible or just audible at all residential locations conducted on Wednesday 3 September 2025, and therefore satisfied the specified noise limits in the Noise Management Plan and Environmental Protection Licence at all locations. All monitoring locations were dominated by extraneous sources such as traffic generally masked quarry operations.

Hence, predictive noise modelling results are consistent with the findings of the attended noise monitoring, confirming the site complied with the applicable noise criteria at all assessed locations and also confirmed the site was inaudible or just audible when compared against extraneous ambient noise sources (ie masked by ambient levels).

The results of the sound power audit demonstrate that the operational fixed and mobile plant used onsite comply with the combined total logarithmic sound power goal as outlined in the NVIA.

This page has been intentionally left blank

Appendix A – Glossary of Terms

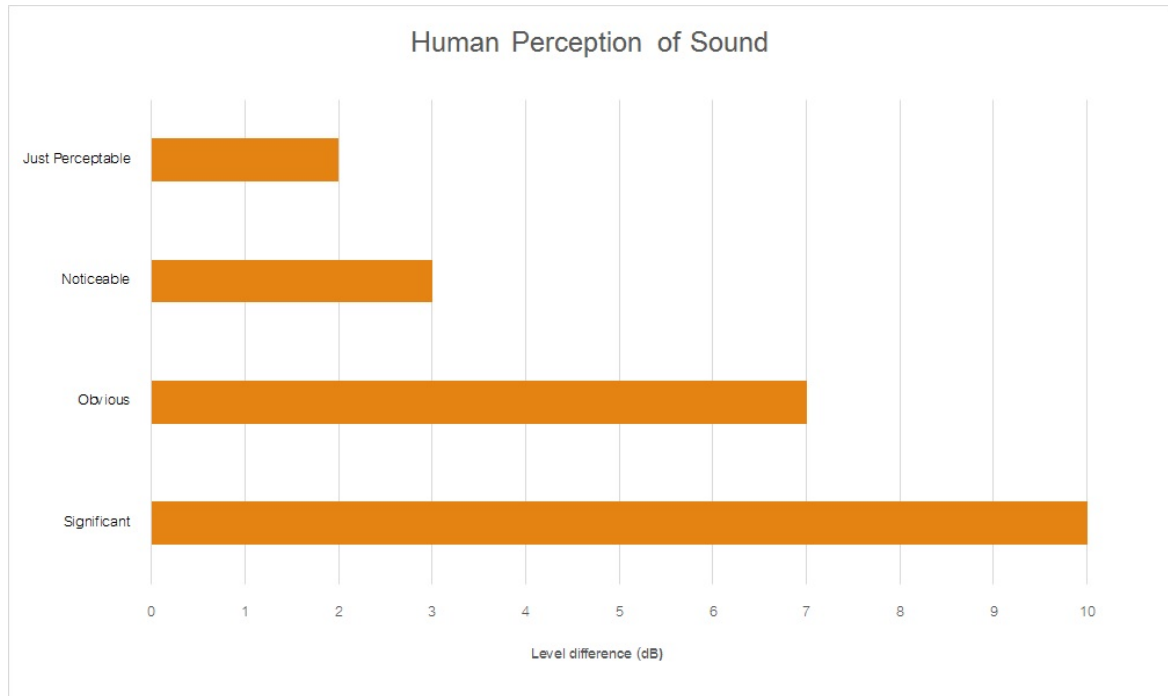
A number of technical terms have been used in this report and are explained in **Table A1**.

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





□ □□□□□□□□□□ □□□□□□□□ □□ □□
□□ □□□□□□□□□□ □□□ □□□□
□□□□□□ □□□ □□□ □□□
□□□□□□□ □□□□ □□□□

□ □□□□□□□□□□□□□□□□

