

Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW
Quarter 1 Ending March 2019.



Document Information

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Quarter 1 Ending March 2019

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

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Cooma Road Quarry the 'quarry', Googong, NSW.

The monitoring has been conducted in accordance with the quarry Noise Management Plan and in general accordance with Development Consent (SSD-5109); at five representative monitoring locations. This assessment has been undertaken for the Quarterly period ending March 2019 and forms part of the annual noise monitoring program for the quarry.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Cooma Road Quarry, Noise Management Plan (NMP), 2014;
- Development Consent SSD-5109; and
- Australian Standard 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

Schedule 3, Condition 4 of the Cooma Road Quarry Development Consent, approved on 27 September 2013, outlines the applicable noise criteria for residential receivers N1 – N71 surrounding the quarry and are presented in **Table 1**.

Table 1 Noise Criteria			
Receivers	Morning Shoulder	Day	Evening
	6am – 7am	7am – 6pm	6pm – 10pm
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)
N1, N7, N8, N56, N57, N59, N63, N64, N65	40	44	39
N67	36	41	35
All other Receivers between N9 and N71 inclusive	36	38	35
All other Receivers	35	35	35

Note: 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.

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3 Methodology

3.1 Locality

The quarry is located in Googong, NSW approximately 13km south east of Canberra, ACT. The quarry is bounded primarily by rural and residential properties in all directions, with noise from passing road traffic on Old Cooma Road dominating the acoustic environment for receivers to the east of the quarry. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.

3.2 Noise Monitoring Locations

Five monitoring locations have been selected as part of the NMA and in accordance with the Development Consent.

Location N3 is to the west of the quarry situated on a rural property off Copperfield Road. This location represents residential and rural receivers to the west of the quarry.

Location N8 is to the north east of the quarry along Tempe Crescent and is representative of residential receivers in that area.

Location N38 is on Heights Road and is representative of the elevated residential receivers to the east of the quarry.

Location N60 is at 501 Old Cooma Road and represents the residence adjacent to the quarry access road.

Location N67 is situated on a rural property at 732 Old Cooma Road to the south of the quarry. This is representative of rural and residential receivers to the south, with direct line of site into the quarry pit.

3.3 Assessment Methodology

Attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. Measurements were carried out using Svantek Type 1, 971 noise analysers from Wednesday 6 February 2019 to Thursday 7 February 2019. 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 ± 0.5 dBA.

Noise measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. One measurement was conducted at each monitoring location during the day, evening and morning shoulder periods.

Extraneous noise sources were excluded from the analysis to calculate the $L_{Aeq}(15min)$ quarry noise contribution for comparison against the relevant criteria.


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

FIGURE 1

LOCALITY PLAN
REF: MAC180611-03



KEY

 NOISE MONITORING LOCATIONS



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4 Results

4.1 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N3 for the NMA are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location N3						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
07/02/19	06:31	69	46	35	WD: E	Birds 35-62
	(Morning				WS: 1.5m/s	Aircraft 38-40
	Shoulder)				Rain: Nil	Dog bark 36-38
						Holcim quarry hum <35
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35
06/02/19	12:04	68	45	41	WD: E	Traffic 38-41
	(Day)				WS: 1.5m/s	Local residential noise 41-45
					Rain: Nil	Aircraft 44-61
						Quarry Inaudible
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35
06/02/19	19:20	63	43	33	WD: S	Birds 30-41
	(Evening)				WS: 2.1m/s	Wind 30-34
					Rain: Nil	Aircraft 40-57
						Quarry Inaudible
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35

Note: 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.

4.2 Assessment Results - Location N8

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N8 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N8

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
07/02/19	06:37				WD: S	Birds 40-53
	(Morning	71	56	49	WS: 0.5m/s	Traffic 46-65
	Shoulder)				Rain: Nil	Quarry Inaudible
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35
06/02/19	11:33				WD: E	Birds 44-51
	(Day)	70	51	42	WS: 2m/s	Traffic 44-68
					Rain: Nil	Wind in trees <44
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35
06/02/19	19:29				WD: NE	Birds 39-46
	(Evening)	71	52	42	WS: 0.5m/s	Insects <40
					Rain: Nil	Traffic 40-67
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35

Note: 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.

4.3 Assessment Results - Location N38

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N38 for the NMA are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N38						
Date	Time (hrs)	Descriptor (dBA re 20 μ Pa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
07/02/19	06:19	75	53	45	WD: S	Aircraft <53
	(Morning				WS: 0.1m/s	Birds 46-51
	Shoulder)				Rain: Nil	Traffic 46-56
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35
06/02/19	11:13	68	52	44	WD: E	Insects <44
	(Day)				WS: 0.5m/s	Birds 44-51
					Rain: Nil	Traffic 44-61
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35
06/02/19	19:11	70	50	45	WD: NE	Traffic 42-64
	(Evening)				WS: 0.5m/s	Birds 41-46
					Rain: Nil	Construction 43-46
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35

Note: 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.

4.4 Assessment Results - Location N60

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N60 for the NMA are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N60

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
07/02/19	06:00				WD: S	Birds 39-44
	(Morning	70	59	43	WS: 0.1m/s	Traffic 39-70
	Shoulder)				Rain: Nil	Quarry Inaudible
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35
06/02/19	10:53				WD: E	Lawn mowing 42-50
	(Day)	77	59	44	WS: 1m/s	Insects <42
					Rain: Nil	Traffic 42-71
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35
06/02/19	18:48				WD: NE	Traffic 46-71
	(Evening)	72	62	49	WS: 2m/s	Wind in trees <46
					Rain: Nil	Birds <46
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35

Note: 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.

4.5 Assessment Results - Location N67

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N67 for the NMA are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location N67						
Date	Time (hrs)	Descriptor (dBA re 20 μ Pa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
07/02/19	06:00	60	38	33	WD: E	Birds 30-50
	(Morning				WS: 1.8m/s	Aircraft 30-38
	Shoulder)				Rain: Nil	Traffic 36-40
						Quarry Inaudible
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35
06/02/19	10:29	62	42	38	WD: E	Birds 36-40
	(Day)				WS: 1m/s	Traffic 34-38
					Rain: Nil	Aircraft 36-55
						Quarry Inaudible
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35
06/02/19	18:29	61	44	42	WD: NE	Wind in trees 41-49
	(Evening)				WS: 0.5m/s	Birds 41-46
					Rain: Nil	Traffic 38-44
						Quarry Inaudible
Cooma Road Quarry L _{Aeq} (15min) Contribution						<35

Note: 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.

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5 Noise Compliance Assessment

The compliance assessment for each monitoring location N3, N8, N38, N60 and N67 are presented in **Table 7** to **Table 9** for day, evening and morning shoulder assessment periods.

Table 7 Daytime Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, LAeq(15min)	dB, LAeq(15min)	
N3	<35	35	✓
N8	<35	44	✓
N38	<35	38	✓
N60	<35	38	✓
N67	<35	41	✓

Note: 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.

Table 8 Evening Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, LAeq(15min)	dB, LAeq(15min)	
N3	<35	35	✓
N8	<35	39	✓
N38	<35	35	✓
N60	<35	35	✓
N67	<35	35	✓

Note: 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.

Table 9 Morning Shoulder Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, LAeq(15min)	dB, LAeq(15min)	
N3	<35	35	✓
N8	<35	40	✓
N38	<35	36	✓
N60	<35	36	✓
N67	<35	36	✓

Note: 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.

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6 Discussion

6.1 Discussion of Results - Location N3

Quarry noise was audible during the morning shoulder period on one out of three measurements. Estimated quarry contributions were <35dBA and therefore satisfied the morning shoulder and daytime criteria. It is noted that the quarry was not operational during the evening period however background measurements were undertaken for completeness and as per the EPL. Extraneous sources audible during the three attended surveys included birds, aircrafts, dog bark, traffic, wind and local residential noise.

6.2 Discussion of Results - Location N8

Noise levels were dominated by local traffic that was generally constant during all three attended measurements. Quarry emissions were inaudible during all three measurements. Estimated quarry contributions were <35dBA, therefore satisfying the relevant morning shoulder and daytime criteria. The quarry was not operational during the evening period therefore satisfying the evening noise limit of 39dB LAeq(15min). Extraneous sources noted during the measurements include birds, traffic, wind in trees, local residential noise and insects.

6.3 Discussion of Results - Location N38

Quarry noise was inaudible during all three measurements. Estimated quarry contributions were <35dBA, therefore satisfying the relevant morning shoulder and daytime criteria. The quarry was not operational during the evening period therefore satisfying the evening criteria. Non-quarrying noise sources included aircrafts, birds, traffic, insects and construction noise.

6.4 Discussion of Results - Location N60

Quarry noise emissions remained inaudible during all three measurements. Estimated quarry contributions were <35dBA for day, evening and morning shoulder measurements therefore satisfying the relevant morning shoulder and daytime criteria. It is noted that the quarry was not operational during the evening period, therefore satisfying the evening noise criteria. Extraneous sources noted during the measurements include birds, traffic, lawn mowing, insects and wind in trees.

6.5 Discussion of Results - Location N67

Quarry noise emissions were inaudible during the daytime and morning shoulder measurements at N67 during the March Quarter for 2019. Quarry emissions were estimated at <35dBA for all measurements at this location, therefore, satisfying relevant morning shoulder and daytime noise limits. It is noted that the quarry was not operational during the evening period, therefore satisfying the evening noise limit of 35dB LAeq(15min). Birds, aircraft noise, traffic and wind in trees were the dominant noise sources at this receiver during the survey.

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Holcim (Australia) Pty Ltd at the Cooma Road Quarry, Googong, NSW. The assessment was completed to assess the quarry's compliance with the relevant noise criteria outlined in their Development Consent for residential receivers surrounding the quarry.

Attended noise monitoring was undertaken between Wednesday 6 February 2019 to Thursday 7 February 2019 at five representative monitoring locations. The assessment has identified that noise emissions generated by Cooma Road Quarry comply with relevant noise criteria specified in the Development Consent at all assessed residential receivers for the Quarterly period ending March 2019.

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Appendix A - Glossary of Terms

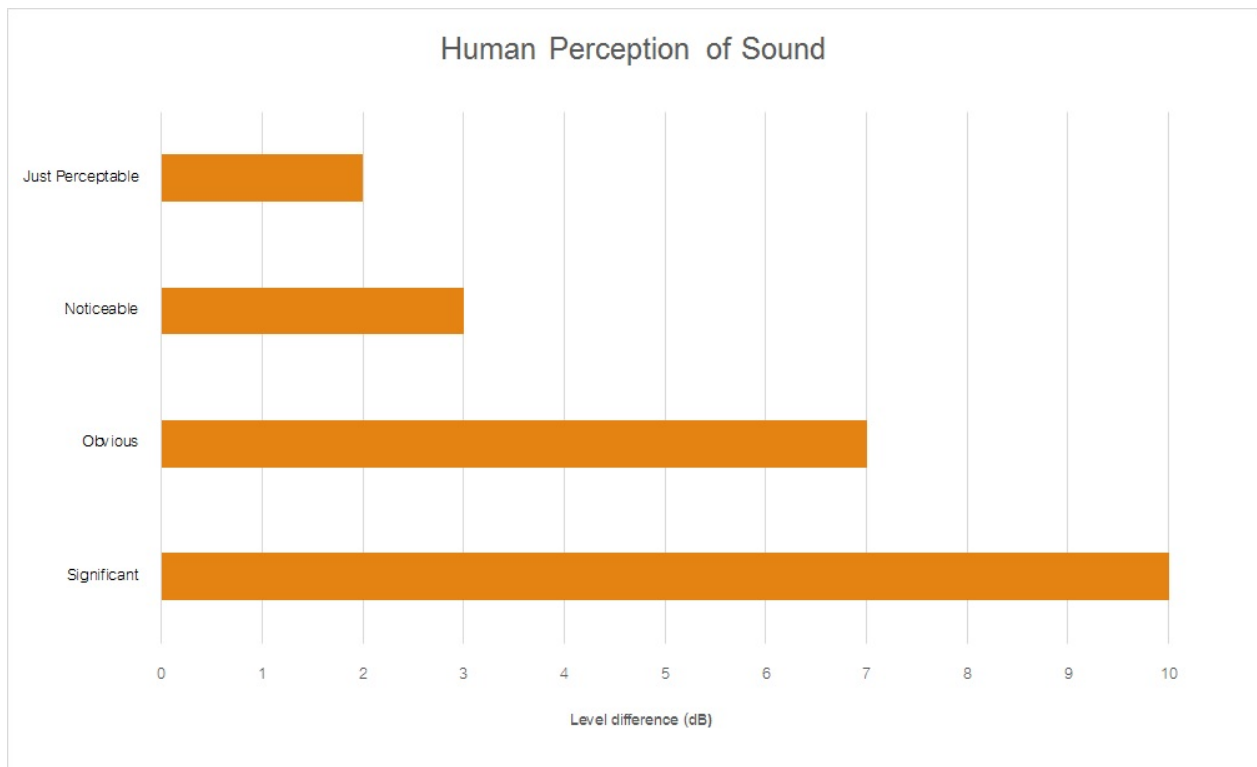
Table A1 provides a number of technical terms have been used in this report.

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 NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
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), dB(L)	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 _{ax}	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 (LW)	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 : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W ₀ is the sound reference power at 10-12 watts.

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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