Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW
Quarter 3 Ending September 2019.

Prepared for: Holcim (Australia) Pty Ltd
September 2019
MAC180611-03RP5

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW

Quarter 3 Ending September 2019

Prepared for: Holcim (Australia) Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd
PO Box 262, Newcastle NSW 2300
ABN: 36 602 225 132
P: +61 2 4920 1833
www.mulleracoustic.com

Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC180611-03RP5	Final	2 September 2019	Robin Heaton		Rod Linnett	

CONTENTS

This page has been intentionally left blank

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 September 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**.

This page has been intentionally left blank

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 6am – 7am	Day 7am – 6pm	Evening 6pm – 10pm
	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$
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.

This page has been intentionally left blank

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 Place. 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 Monday 12 August 2019 to Wednesday 14 August 2019. The acoustic instrumentation used carries current NATA calibration and complies with AS 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 ±0.5dBA.

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 $LA_{eq(15min)}$ 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

0 350m

MAC
Muller Acoustic Consulting

This page has been intentionally left blank

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}		
14/08/2019	06:29 (Morning Shoulder)	65	48	42	WD: SE WS: 0.1m/s Rain: Nil	Urban Hum 40-48 Birds 49-65 Aircraft 44-48 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<32
13/08/2019	08:45 (Day)	69	46	36	WD: SE WS: 0.3m/s Rain: Nil	Urban Hum 30-37 Aircraft 48-53 Birds 33-69 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<30
12/08/2019	19:29 (Evening)	60	42	34	WD: SSW WS: 0.1m/s Rain: Nil	Urban Hum 30-41 Aircraft 37-52 Birds 50-60
	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}		
13/08/2019	06:43 (Morning Shoulder)	80	56	47	WD: SW WS: 0.6m/s Rain: Nil	Traffic 50-80 Birds 53-60 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<37
13/08/2019	08:17 (Day)	80	58	48	WD: SW WS: 0.4m/s Rain: Nil	Traffic 50-80 Birds 48-57 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<38
12/08/2019	19:02 (Evening)	72	57	43	WD: SSW WS: 0.1m/s Rain: Nil	Traffic 40-70 Dogs Barking 41-72
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<39

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 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
13/08/2019	06:25 (Morning Shoulder)	61	52	46	WD: SW WS: 0.1m/s Rain: Nil	Traffic 45-53 Birds 40-61 Aircraft 40-50 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<36
13/08/2019	08:00 (Day)	77	56	49	WD: W WS: 0.2m/s Rain: Nil	Traffic 50-77 Birds 40-51 Quarry Inaudible during lulls in traffic ~38-40
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
12/08/2019	18:45 (Evening)	74	53	45	WD: SW WS: 0.1m/s Rain: Nil	Traffic 40-74 Aircraft 35-40
	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}		
14/08/2019	06:00 (Morning Shoulder)	68	58	44	WD: SE WS: 1.7m/s Rain: Nil	Traffic 49-68 Birds 40-49 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<34
13/08/2019	07:38 (Day)	73	62	57	WD: SW WS: 0.5m/s Rain: Nil	Traffic 30-55 Road Works 60-73 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
12/08/2019	18:25 (Evening)	69	62	53	WD: SSW WS: 1.3m/s Rain: Nil	Traffic 50-69
	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 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
13/08/2019	06:00 (Morning Shoulder)	44	34	27	WD: SW WS: 0.6m/s Rain: Nil	Traffic 29-34 Birds 30-44 Aircraft Rumble 35-38 Quarry Inaudible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<25
13/08/2019	07:10 (Day)	63	42	36	WD: SW WS: 1.0m/s Rain: Nil	Birds 30-63 Aircraft 45-49 Quarry Plant 40-43 (15 secs)
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<30
12/08/2019	18:01 (Evening)	67	39	28	WD: SW WS: 1.4m/s Rain: Nil	Aircraft 39-50 Car Click 62-67 Urban Hum 39-46
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.

This page has been intentionally left blank

5 Discussion

5.1 Discussion of Results - Location N3

Quarry noise was inaudible during all three measurements conducted at location N3 which 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 per the EPL. Extraneous sources audible during the three attended surveys included birds, aircraft, and urban hum noise.

5.2 Discussion of Results - Location N8

Noise levels were dominated by local traffic that was generally constant during all three attended measurements at the N8 monitoring location. Quarry emissions were inaudible during all three measurements. Estimated quarry contributions were below the relevant morning shoulder and daytime criteria.

The quarry was not operational during the evening period therefore satisfying the evening noise limit of 39dB $LA_{eq(15min)}$. Extraneous sources noted during the measurements include birds, traffic, and dogs barking.

5.3 Discussion of Results - Location N38

Measurements conducted at the N38 monitoring location were dominated by traffic noise and aircraft noise. Quarry noise was inaudible during all three measurements. Estimated quarry contributions were below 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 and traffic.

5.4 Discussion of Results - Location N60

Quarry noise emissions remained inaudible during all three measurements. Estimated quarry contributions were below the relevant morning shoulder however due to the elevated ambient noise levels during the daytime, an accurate estimation of quarry contribution could not be made at the monitoring location. However, to determine the quarry contribution, consideration was given to the quarry contribution at Location N8 (<38dB) and N67 (<30dB) which are closer to the quarry and experience lower ambient noise levels from nearby road traffic. The contributions were used to calculate a quarry emitted sound power level which was then calculated to Location N60, resulting in a quarry contribution of less than 35dBA.

The quarry was not operational during the evening period, therefore satisfying the evening noise criteria. Extraneous sources noted during the measurements include birds, traffic, and road works noise.

5.5 Discussion of Results - Location N67

Quarry noise emissions were audible during the daytime measurement at N67. Audible quarry sources included truck movements. Quarry emissions were estimated at <30dBA for the daytime measurement at this location, therefore, satisfying relevant daytime noise limits. The quarry was inaudible during the morning shoulder period satisfying the applicable noise limit. It is noted that the quarry was not operational during the evening period, therefore satisfying the evening noise limit of 35dB $LA_{eq(15min)}$. Birds, aircraft noise, traffic and urban hum were other noise sources audible at this receiver during the survey.

6 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, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<30	35	✓
N8	<38	44	✓
N38	<35	38	✓
N60	<35	38	✓
N67	<30	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, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<35	35	✓
N8	<39	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, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<32	35	✓
N8	<37	40	✓
N38	<36	36	✓
N60	<34	36	✓
N67	<25	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.

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 September 2019 during the daytime and morning shoulder period.

As the quarry was not operating during the evening period, the site was deemed to comply with the applicable noise criteria for each monitoring location during the evening period.

This page has been intentionally left blank

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 monitoring was undertaken from Monday 12 August 2019 to Wednesday 14 August 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 September 2019.

This page has been intentionally left blank

Appendix A - Glossary of Terms

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

Table A1 Glossary of Terms

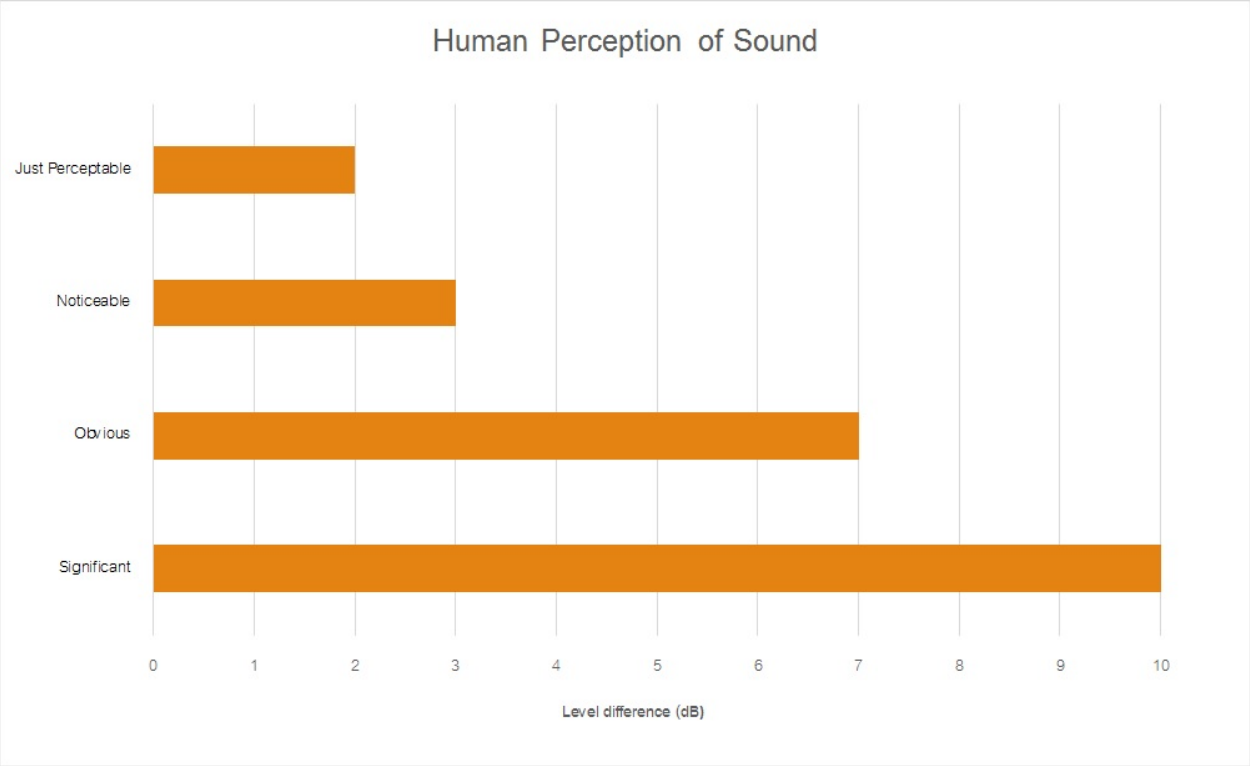
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for 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.
LAmax	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.log10 (W/Wo) Where : W is the sound power in watts and Wo 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



Muller Acoustic Consulting Pty Ltd
PO Box 262, Newcastle NSW 2300
ABN: 36 602 225 132
P: +61 2 4920 1833
www.mulleracoustic.com

MAC
Muller Acoustic Consulting