

Noise Monitoring Assessment

Jandra Quarry, Possum Brush, NSW
Quarter 2 Ending June 2019.

Document Information

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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 the quarterly period ending June 2019 for Jandra Quarry (the 'quarry'), Possum Brush, NSW.

The monitoring has been conducted in accordance with the Jandra Noise and Blast Management Plan and in general accordance with Conditions L4.2 to L4.8 of the EPL2796 (EPL); at three representative monitoring locations. This assessment has been undertaken during Quarter 2 ending June 2019 and forms part of the annual noise monitoring program to address conditions of the EPL.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Environment Protection Licence (EPL), 2796;
- Jandra Quarry Conditions of Consent (CoC), 2015;
- Jandra Quarry Noise and Blast Management Plan (NBMP), 2015; and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures.

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, Section 1 of the Jandra Quarry Conditions of Consent, first approved on 30 March 2000 and modified on 13 March 2015, outlines the applicable noise criteria for residential receivers surrounding the quarry site. Schedule 3 presents noise criteria which are applicable for two different operational activities undertaken onsite, being when the site undertakes quarrying operations during the hours of 6am to 10pm and for 24 hour operations when quarrying operations and asphalt production occur simultaneously.

Furthermore, Section 5 of the Jandra Noise and Blast Management Plan (NBMP) outlines that noise criteria do not apply at R1, R3, R8, R9, R10. Section 5 of the NBMP states:

- *'Holcim has executed a negotiated agreement with the property owner of R1 which excludes this receptor from the approved noise criteria';*
- *'R3 is not included in the approved noise criteria as this receiver represented road noise and the EA concluded that road noise impacts as a consequence of the development were below guideline thresholds and didn't warrant further assessment'; and*
- *'Receivers R8, R9 & R10 are Holcim owned residences and the approved criteria only apply to privately owned land'.*

Table 1 presents the criteria for the receivers R1 – R10 where compliance is required for both quarry operation and combined quarry and asphalt production operations.

Table 1 Noise Criteria				
Location	Quarry Operations		Quarry Operations and Asphalt Plant Production	
	6am – 10pm	6am – 10pm	10pm – 6am	10pm – 6am
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LA1(1min)
R1 ¹	46	48	46	51
R2	36	40	35	48
R3 ¹	N/A	N/A	N/A	N/A
R4	36	40	39	51
R5	40	41	39	51
R6	36	40	35	48
R7	35	36	35	48
R8 ¹	N/A	N/A	N/A	N/A
R9 ¹	N/A	N/A	N/A	N/A
R10 ¹	N/A	N/A	N/A	N/A

Note 1: Noise criteria are not applicable to these receivers as per Section 5 of the NBMP.

3 Methodology

3.1 Locality

The quarry is located at Possum Brush, NSW approximately 16km south of Taree, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential. The Pacific Highway is situated to the west of the site, with highway traffic a dominant noise source at all assessed receivers. To the east, the quarry is bounded by rural properties with noise from Tuncurry Road dominating the acoustic environment. 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

Three monitoring locations have been selected as part of the NMA and in accordance with the NBMP. Location M1 is located adjacent to R1 to the north of the quarry and is used as a reference location for the northern catchment. It is noted that this assessment location has a negotiated agreement with Holcim, hence noise criteria are not mandatory. Location M2 is representative of receivers R2, R6 and R7, to the east of the quarry. Location M3 is situated to the west of the quarry and is representative of receivers R4 and R5.

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. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Wednesday 29 May 2019 and Thursday 30 May 2019. The acoustic instrumentation used carries current NATA calibration 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 $\pm 0.5\text{dBA}$.

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 of the monitoring locations during the daytime period. An additional round of noise measurements was completed during the morning shoulder period.

Extraneous noise sources were excluded from the analysis to determine the $L_{Aeq}(15\text{min})$ noise contribution for comparison against the relevant criteria. Where the quarry was inaudible, the contribution is estimated to be at least 10dB below the ambient noise level.



FIGURE 1

LOCALITY PLAN

REF: MAC180611-04



KEY

-  **R7** RECEIVER / MONITORING LOCATION
-  PROJECT SITE



*Imagery Source : nearmap

4 Results

4.1 Assessment Results - Location M1

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M1 are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location M1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _A max	L _A eq	L _A 90		
29/05/2019	16:51 (Day)	69	49	43	WD: W	Wind in Trees 40-44
					WS: 0.5m/s	Traffic 42-53
					Rain: Nil	Birds 49-69
						Quarry Inaudible
Jandra Quarry Contribution						<35dB L _A eq(15min)
29/05/2019	18:54 (Evening)	64	48	42	WD: W	Traffic 40-57
					WS: 0.2m/s	Wind in Tree 40-47
					Rain: Nil	Quarry Inaudible
					Jandra Quarry Contribution	
30/05/2019	06:26 (Morning shoulder)	66	49	44	WD: NE	Traffic 40-53
					WS: 0.2m/s	Birds 50-66
					Rain: Nil	Holcim Operations 30-35
					Jandra Quarry Contribution	
						<45dB L _A 1(1min)

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 M2

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M2 for are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location M2

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	LAeq	LA90		
30/05/2019	07:14 (Day)	65	41	36	WD: E	Traffic Hum 30-35
					WS: 0.4m/s	Birds 40-65
					Rain: Nil	Quarry Inaudible
Jandra Quarry Contribution						<35dB LAeq(15min)
29/05/2019	18:23 (Evening)	60	38	34	WD: W	Traffic Hum 30-36
					WS: 1.2m/s	Wind in Trees 32-37
					Rain: Nil	Birds and Insects 29-60
Jandra Quarry Contribution						Quarry Inaudible
Jandra Quarry Contribution						<35dB LAeq(15min)
30/05/2019	06:00 (Morning shoulder)	54	36	32	WD: N	Traffic 30-38
					WS: 0.1m/s	Birds 34-54
					Rain: Nil	Quarry Inaudible
Jandra Quarry Contribution						<35dB LAeq(15min)
						<45dB LA1(1min)

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 M3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M3 are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location M3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
29/05/2019	16:28	81	62	49	WD: W	Traffic 50-81
					WS: 0.2m/s	Birds 45-55
					Rain: Nil	Aircraft 55-60
						Quarry Inaudible
Jandra Quarry Contribution						<35dB L _{Aeq} (15min)
29/05/2019	19:14 (Evening)	83	64	40	WD: W	Traffic 44-83
					WS: 0.1m/s	Insects 27-36
					Rain: Nil	Quarry Inaudible
					Jandra Quarry Contribution	
30/05/2019	06:44 (Morning shoulder)	79	61	47	WD: NE	Traffic 50-79
					WS: 0.1m/s	Birds 40-45
					Rain: Nil	Quarry Inaudible
					Jandra Quarry Contribution	
						<45dB L _{A1} (1min)

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 residential receiver R2, R4, R5, R6 and R7 are presented in **Table 5** to **Table 7** for day, evening and morning shoulder/night assessment periods.

Table 5 Daytime Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying Noise		Quarrying & Asphalt	
	Contribution	Criteria		Production Criteria	
	dB LAeq(15min)	dB LAeq(15min)	Compliant	dB LAeq(15min)	Compliant
R2	<35	36	✓	40	✓
R4	<35	36	✓	40	✓
R5	<35	40	✓	41	✓
R6	<35	36	✓	40	✓
R7	<35	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.

Table 6 Evening Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying Noise		Quarrying & Asphalt	
	Contribution	Criteria		Production Criteria	
	dB LAeq(15min)	dB LAeq(15min)	Compliant	dB LAeq(15min)	Compliant
R2	<35	36	✓	40	✓
R4	<35	36	✓	40	✓
R5	<35	40	✓	41	✓
R6	<35	36	✓	40	✓
R7	<35	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.

Table 7 Morning Shoulder/Night Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying & Asphalt		Quarry Noise	Quarrying & Asphalt	
	Contribution	Production Criteria		Contribution	Production Criteria	
	dB LAeq(15min)	dB LAeq(15min)	Compliant	dB LA1(1min)	dB LA1(1min)	Compliant
R2	<35	35	✓	<45	48	✓
R4	<35	39	✓	<45	51	✓
R5	<35	39	✓	<45	51	✓
R6	<35	35	✓	<45	48	✓
R7	<35	35	✓	<45	48	✓

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 M1

It is noted that M1 is a reference location only, and criteria is not applicable under the EPL for this receiver. Monitoring during the June 2019 quarter identified that quarry noise was audible during the morning shoulder period, however, was inaudible during the day and evening periods.

The monitored noise levels demonstrate compliance with the EPL at R1 and receivers situated to the north of this location.

Extraneous sources audible during the three attended surveys included insects, birds, highway traffic and wind in trees.

6.2 Discussion of Results - Location M2

Quarry noise emissions were inaudible during all three measurements conducted for the quarter ending June 2019 and satisfy the relevant daytime, evening and morning shoulder noise limits.

Extraneous noise sources included birds, traffic in the distance and leaves rustling.

6.3 Discussion of Results - Location M3

Quarry noise emissions were inaudible during all three measurements conducted for the quarter ending June 2019, satisfying the morning shoulder, daytime and evening criteria.

Non-quarry noise sources included highway traffic, insects and birds.

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7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Holcim (Australia) Pty Ltd at the Jandra Quarry, Possum Brush, NSW. The assessment was completed to determine compliance with the relevant noise criteria during Quarter 2, period ending June 2019.

Attended noise monitoring was completed on Wednesday 29 May 2019 and Thursday 30 May 2019 at representative monitoring locations with quarry noise contributions compared against the relevant criteria. The assessment has identified that noise emissions generated by Jandra Quarry comply with relevant noise criteria specified in the Conditions of Consent at all assessed locations.

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Appendix A - Glossary of Terms

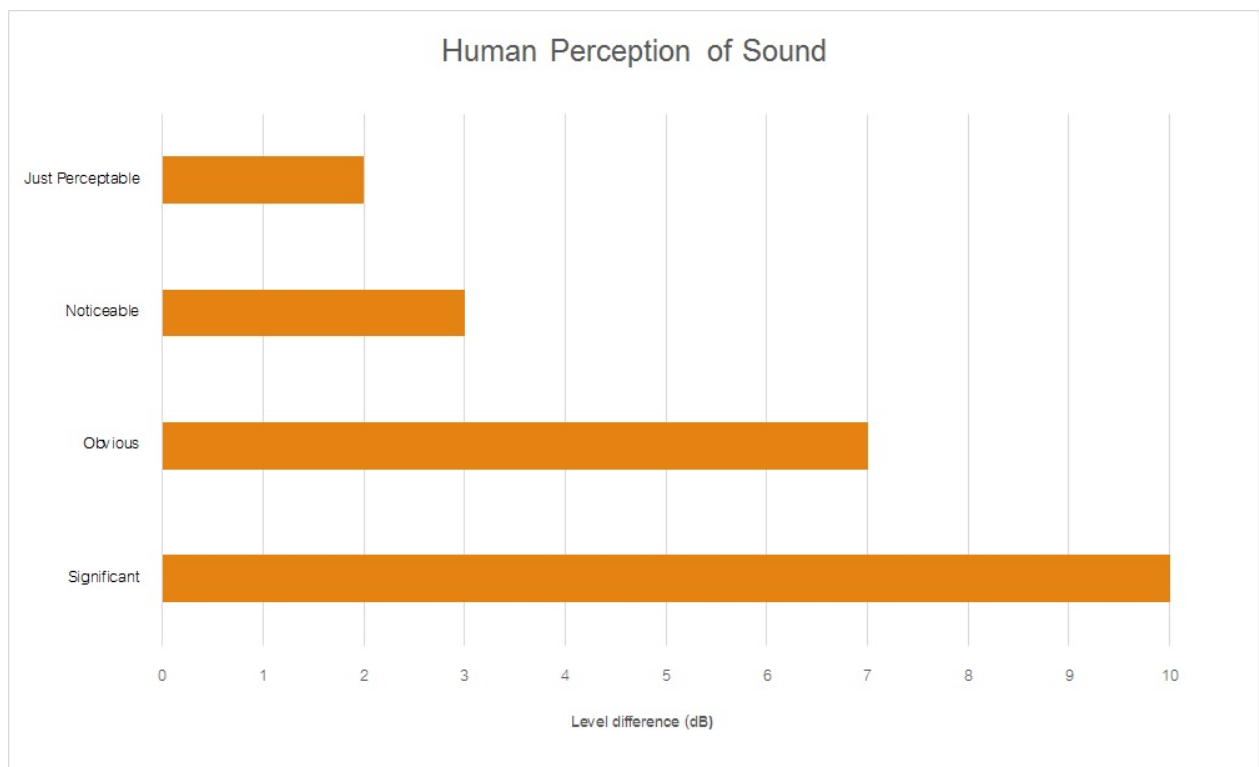
Table A1 provides a number of technical terms have been used in this report.

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)	<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 W₀ 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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