

# Noise Monitoring Assessment

Teven Quarry, Teven, NSW  
Quarter 4 Ending December 2019.



# *Document Information*

## Noise Monitoring Assessment

Teven Quarry, Teven, NSW

Quarter 4 Ending December 2019

Prepared for: Holcim (Australia) Pty Ltd

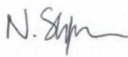

**Prepared by:** Muller Acoustic Consulting Pty Ltd

PO Box 262, Newcastle NSW 2300

ABN: 36 602 225 132

P: +61 2 4920 1833

[www.mulleracoustic.com](http://www.mulleracoustic.com)

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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 Teven Quarry (the 'quarry'), Teven, NSW.

The monitoring has been conducted in accordance with the Teven Noise Management Plan and in general accordance with relevant conditions outlined in the Development Consent (ref: SSD 6422); at five representative monitoring locations. This assessment has been undertaken during quarterly period ending December 2019, and forms part of the 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;
- NSW Department of Planning and Environment, Development Consent (SSD 6422), 2015; 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 of the Teven Quarry Development Consent (2015), outlines the applicable noise criteria for residential receivers surrounding the quarry site.

**Table 1** reproduces relevant criteria for each of the receivers as outlined in the quarry's Development Consent.

Table 1 Noise Criteria		
Location <sup>1</sup>	Quarry Operations	
	Period: Day	Period: Evening
	7am – 6pm	6pm – 10pm
	dB LAeq(15min)	dB LAeq(15min)
R3, R4, R13, R15, R16, R17, R18, R20	38	35
All other receivers	37	35

Note 1: Receiver locations are shown in Figure 1.

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### 3 Methodology

#### 3.1 Locality

The quarry is located in Teven, NSW approximately 7km west of Ballina, NSW. Receivers in the locality surrounding the quarry are primarily rural residential. The surroundings of the quarry include bushland and farming pastures. The monitoring locations with respect to the quarry 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 in accordance with the NMP. The selected monitoring locations are presented in **Table 2** along with the noise sensitive receivers they represent.

Table 2 Monitoring Locations (MGA56)			
Location	Nearest Receiver	Easting, m	Northing, m
N1	R7	547017	6810098
N2	R3/R4	548877	6810290
N3	R2	548642	6810801
N4	R10	547729	6810226
N5	R15	547793	6808998

#### 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 NPI. Measurements were carried out using a Svantek Type 1, 971 noise analyser on Wednesday 27 November 2019. 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  $\pm 0.5$  dBA.

As per the Noise Management Plan, two daytime measurements were conducted at each monitoring location. It is noted that the quarry was not operating during the evening period, however two measurements were conducted at each monitoring location as per the requirements of the EPL.

Measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source.

Extraneous noise sources were excluded from the analysis to determine the  $L_{Aeq}(15min)$  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: MAC180611-06

0 150m



**KEY**



RECEIVER LOCATION



SITE LOCATION



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## 4 Results

### 4.1 Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at Location N1 are presented in **Table 3**.

**Table 3 Operator-Attended Noise Survey Results – Location N1**

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L <sub>A</sub> max	L <sub>A</sub> eq	L <sub>A</sub> 90		
27/11/2019	10:43 (Day)	65	54	44	WD: ESE	Wind 42-65
					WS: 2.5m/s	Construction works <42
					Rain: Nil	Birds <42
						Quarry Inaudible
Teven Quarry L <sub>A</sub> eq(15min) Contribution						<30
27/11/2019	10:58 (Day)	76	59	49	WD: ESE	Wind 46-60
					WS: 2.5m/s	Traffic 52-76
					Rain: Nil	Construction works <42
						Quarry Inaudible
Teven Quarry L <sub>A</sub> eq(15min) Contribution						<30
27/11/2019	18:15 (Evening)	69	48	37	WD: SE	Wind 36-46
					WS: 2m/s	Traffic 36-69
					Rain: Nil	Birds 36-42
						Quarry Inaudible
Teven Quarry L <sub>A</sub> eq(15min) Contribution						Quarry not operational
27/11/2019	18:30 (Evening)	81	54	35	WD: SE	Insects <34
					WS: 2m/s	Traffic 38-81
					Rain: Nil	Wind 34-42
						Local residential noise 36-48
						Quarry Inaudible
Teven Quarry L <sub>A</sub> eq(15min) Contribution						Quarry not operational

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 N2

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at Location N2 are presented in **Table 4**.

**Table 4 Operator-Attended Noise Survey Results – Location N2**

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L <sub>A</sub> max	L <sub>A</sub> eq	L <sub>A</sub> 90		
27/11/2019	11:28 (Day)	85	64	45	WD: E	Traffic 46-84
					WS: 2m/s	Birds 42-50
					Rain: Nil	Wind 42-51
						Aircraft 44-48
						Quarry Inaudible
Teven Quarry L <sub>A</sub> eq(15min) Contribution						<30
27/11/2019	11:43 (Day)	83	60	43	WD: E	Traffic 44-82
					WS: 2m/s	Birds 38-46
					Rain: Nil	Wind 38-46
						Local residential noise 46-51
						Quarry Inaudible
Teven Quarry L <sub>A</sub> eq(15min) Contribution						<30
27/11/2019	19:03 (Evening)	81	56	33	WD: SE	Insects <35
					WS: 1m/s	Birds 36-50
					Rain: Nil	Traffic 35-81
						Wind 34-38
						Quarry Inaudible
Teven Quarry L <sub>A</sub> eq(15min) Contribution						Quarry not operational
27/11/2019	19:18 (Evening)	83	57	35	WD: SE	Birds 46-52
					WS: 1m/s	Insects <34
					Rain: Nil	Traffic 36-83
						Quarry Inaudible
						Quarry not operational

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 N3

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at Location N3 are presented in **Table 5**.

**Table 5 Operator-Attended Noise Survey Results – Location N3**

Date	Time (hrs)	Descriptor (dBA re 20 μPa)			Meteorology	Description and SPL, dBA
		L <sub>A</sub> max	L <sub>A</sub> eq	L <sub>A</sub> 90		
27/11/2019	12:09 (Day)	66	50	43	WD: E	Wind 38-58
					WS: 2.5m/s	Traffic <36
					Rain: Nil	Aircraft 38-48
						Birds 36-66
						Quarry Inaudible
Teven Quarry L <sub>A</sub> eq(15min) Contribution						<30
27/11/2019	12:24 (Day)	71	50	42	WD: E	Birds 44-46
					WS: 2.5m/s	Wind 44-61
					Rain: Nil	Aircraft 42-48
						Insects <42
						Quarry Inaudible
Teven Quarry L <sub>A</sub> eq(15min) Contribution						<30
27/11/2019	19:40 (Evening)	51	46	41	WD: S	Dog bark 38-41
					WS: 0.5m/s	Traffic 36-40
					Rain: Nil	Insects 36-45
						Quarry Inaudible
						Quarry not operational
27/11/2019	19:55 (Evening)	65	47	42	WD: S	Traffic 43-46
					WS: 1m/s	Insects 43-45
					Rain: Nil	Birds 43-55
						Aircraft 38-61
						Quarry Inaudible
Teven Quarry L <sub>A</sub> eq(15min) Contribution						Quarry not operational

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 N4

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at Location N4 are presented in **Table 6**.

**Table 6 Operator-Attended Noise Survey Results – Location N4**

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA						
		L <sub>A</sub> max	L <sub>A</sub> eq	L <sub>A</sub> 90								
27/11/2019	12:51 (Day)	93	67	46	WD: ESE WS: 2.5m/s Rain: Nil	Wind 42-52						
						Quarry 42-44 (5-10sec)						
						Birds <50						
						Traffic 48-92						
						Insects <46						
						Aircraft 46-54						
Teven Quarry L <sub>A</sub> eq(15min) Contribution						36						
27/11/2019	13:06 (Day)	87	62	48	WD: E WS: 2.5m/s Rain: Nil	Traffic 39-84						
						Quarry 42-44 (5-10sec)						
						Wind 38-54						
						Birds 38-44						
						Insects <38						
						Teven Quarry L <sub>A</sub> eq(15min) Contribution						36
27/11/2019	20:18 (Evening)	53	47	45	WD: S WS: 1m/s Rain: Nil	Insects 44-46						
						Traffic 45-53						
						Quarry Inaudible						
						Teven Quarry L <sub>A</sub> eq(15min) Contribution						Quarry not operational
						27/11/2019	20:33 (Evening)	50	44	43	WD: S WS: 1m/s Rain: Nil	Insects 44-45
												Traffic <43
Aircraft 38-50												
Quarry Inaudible												
Teven Quarry L <sub>A</sub> eq(15min) Contribution												Quarry not operational

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 N5

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at Location N5 are presented in **Table 7**.

**Table 7 Operator-Attended Noise Survey Results – Location N5**

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>		
27/11/2019	13:32 (Day)	87	63	43	WD: SE	Traffic 42-84
					WS: 2.5m/s	Wind 36-46
						Birds 36-54
						Aircraft 42-57
						Quarry Inaudible
Teven Quarry L <sub>Aeq</sub> (15min) Contribution						<30
27/11/2019	13:47 (Day)	81	58	41	WD: SE	Traffic 42-81
					WS: 2.5m/s	Wind 38-48
						Birds 36-44
						Quarry Inaudible
						Teven Quarry L <sub>Aeq</sub> (15min) Contribution
27/11/2019	20:56 (Evening)	83	55	38	WD: SE	Traffic 37-83
					WS: 0.5m/s	Insects 36-38
						Quarry Inaudible
						Teven Quarry L <sub>Aeq</sub> (15min) Contribution
27/11/2019	21:11 (Evening)	84	58	37	WD: S	Traffic 38-83
					WS: 0.5m/s	Insects <38
						Local residential noise 38-46
						Quarry Inaudible
						Teven Quarry L <sub>Aeq</sub> (15min) Contribution

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 Discussion

### 5.1 Discussion of Results - Location N1

Quarry noise emissions were inaudible during the two daytime noise measurements conducted on Wednesday 27 November 2019. Quarry noise contributions were estimated to satisfy the daytime noise limits. The quarry was not operational during the evening period which satisfied the relevant evening noise limits, however background measurements were completed as per the requirements of the EPL.

Non quarry noise sources observed during the measurements included wind in trees, construction works, birds, traffic and local residential noise.

### 5.2 Discussion of Results - Location N2

Quarry noise emissions were inaudible during the two daytime noise measurements conducted on Wednesday 27 November 2019. Quarry noise contributions were estimated to satisfy the daytime noise limits. The quarry was not operational during the evening period which satisfied the relevant evening noise limits, however background measurements were completed as per the requirements of the EPL.

Non quarry noise sources observed during the measurements included traffic, birds, wind in trees, aircraft, local residential noise and insects.

### 5.3 Discussion of Results - Location N3

Quarry noise emissions were inaudible during the two daytime noise measurements conducted on Wednesday 27 November 2019. Quarry noise contributions were estimated to satisfy the daytime noise limits. The quarry was not operational during the evening period which satisfied the relevant evening noise limits, however background measurements were completed as per the requirements of the EPL.

Non quarry noise sources observed during the measurements included wind in trees, traffic, aircraft, birds, dog bark and insects.

#### 5.4 Discussion of Results - Location N4

Quarry noise emissions were audible during the two daytime measurements conducted on Wednesday 27 November 2019. The processing plant and truck loading activities were audible during the two daytime measurements with a measured contribution of 36dBA, therefore satisfying the daytime criteria. The quarry was not operational during the evening period which satisfied the relevant evening noise limits, however background measurements were completed as per the requirements of the EPL.

Non-quarrying sources observed during the measurements included wind in trees, birds, traffic, insects and aircraft.

#### 5.5 Discussion of Results - Location N5

Quarry noise emissions were inaudible during the two daytime measurements conducted on Wednesday 27 November 2019, therefore satisfying the relevant daytime and evening noise limits. The quarry was not operational during the evening period which satisfied the relevant evening noise limits, however background measurements were completed as per the requirements of the EPL.

Non quarry noise sources observed during the measurements included traffic, wind in trees, birds, aircraft, insects and local residential noise.

## 6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Holcim (Australia) Pty Ltd at the Teven Quarry, Teven, NSW. The assessment was completed to determine the quarry's compliance with the relevant criteria outlined in their Development Consent for relevant surrounding residential receivers during Quarter 4, period ending December 2019.

Attended noise measurements were undertaken on Wednesday 27 November 2019 at representative monitoring locations with quarry noise contributions compared against the relevant criteria. The assessment has identified that noise emissions generated by Teven Quarry comply with relevant noise criteria specified in the Development Consent at all assessed residential receivers.

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# Appendix A - Glossary of Terms

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

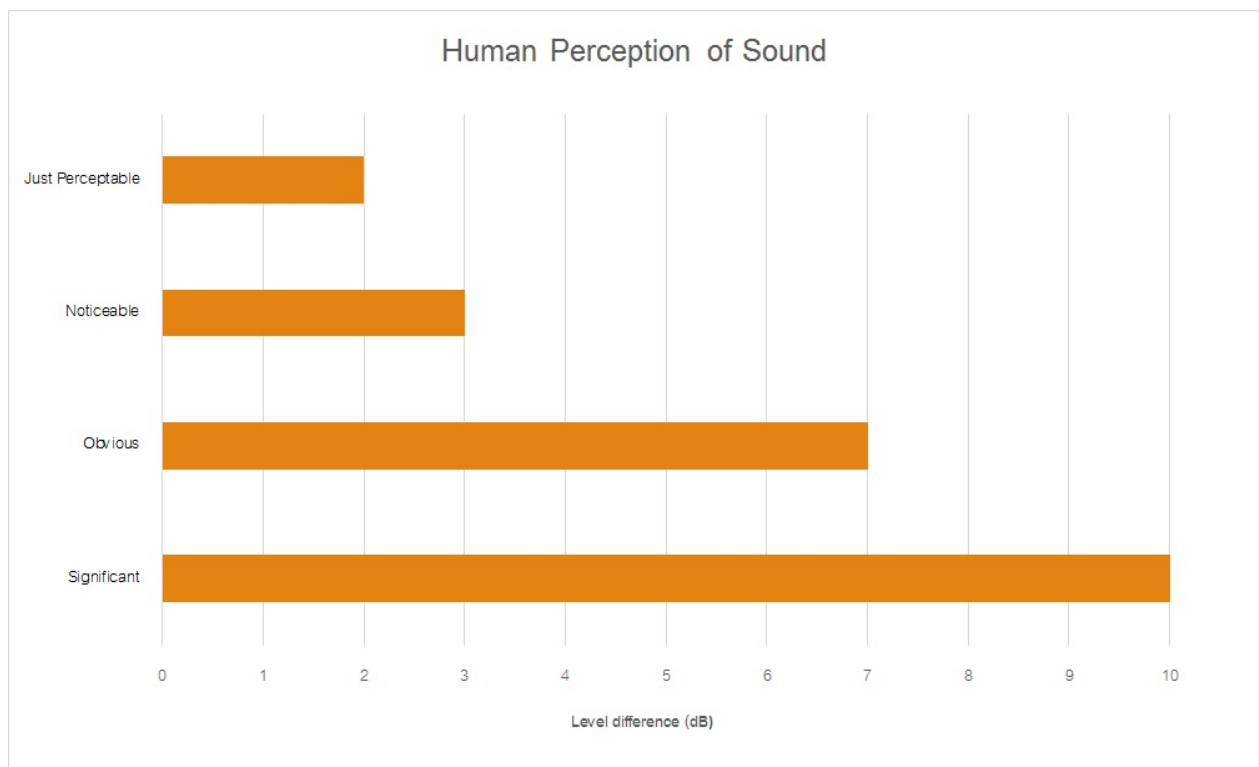
Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single 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 <sub>ax</sub>	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 W<sub>0</sub> 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



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

