

Noise Monitoring Assessment

Teven Quarry, Teven, NSW
Quarter 1 Ending March 2022



Document Information

Noise Monitoring Assessment

Teven Quarry, Teven, NSW

Quarter 1 Ending March 2022

Prepared for: Holcim (Australia) Pty Ltd

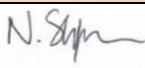

Prepared by: Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

P: +61 2 4920 1833

www.mulleracoustic.com

Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC180611-06RP15	Final	9 February 2022	Nicholas Shipman		Rod Linnett	

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
3	METHODOLOGY	9
3.1	LOCALITY	9
3.2	NOISE MONITORING LOCATIONS	9
3.3	ASSESSMENT METHODOLOGY	9
4	RESULTS	11
4.1	ASSESSMENT RESULTS - LOCATION NM1	11
4.2	ASSESSMENT RESULTS - LOCATION NM2	12
4.3	ASSESSMENT RESULTS - LOCATION NM3	13
4.4	ASSESSMENT RESULTS - LOCATION NM4	14
4.5	ASSESSMENT RESULTS - LOCATION NM5	15
5	DISCUSSION	17
5.1	DISCUSSION OF RESULTS - LOCATION NM1	17
5.2	DISCUSSION OF RESULTS - LOCATION NM2	17
5.3	DISCUSSION OF RESULTS - LOCATION NM3	17
5.4	DISCUSSION OF RESULTS - LOCATION NM4	18
5.5	DISCUSSION OF RESULTS - LOCATION NM5	18
6	CONCLUSION	19
APPENDIX A - GLOSSARY OF TERMS		

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 the quarterly period ending March 2022 for Teven Quarry (the 'quarry'), Teven, NSW.

The monitoring has been conducted in accordance with the Teven Noise Management Plan (NMP) 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 Quarter 1, ending March 2022 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 Environment Protection Authority (EPA), Environmental Protection Licence (EPL 3293);
- NSW Department of Planning and Environment, Development Consent (SSD 6422), 2015;
- Teven Quarry Noise Management Plan Revision 1, 4 May 2016 (EMM); 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 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 ¹	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.

This page has been intentionally left blank

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 are primarily rural. 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 Coordinates)			
Location	Nearest Receiver	Easting, m	Northing, m
NM1	R7	546737	6809918
NM2	R3/R4	548892	6810285
NM3	R2	547781	6808991
NM4	R10	547576	6810379
NM5	R14	548100	6810792

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 Tuesday 1 February 2022 and Wednesday 2 February 2022. 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 $\pm 0.5\text{dBA}$.

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.

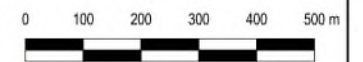
Measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis to determine the $\text{LAeq}(15\text{min})$ noise contribution for comparison against the relevant criteria. Where the quarry was inaudible, the contribution is estimated to be at least 10dB below the ambient noise level.



FIGURE 1
Site Locality
MAC180611-06
Holcim Teven Quarry

KEY

● Noise Monitoring Locations



4 Results

4.1 Assessment Results - Location NM1

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at Location NM1 are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location NM1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _A max	L _A eq	L _A 90		
02/02/2022	07:08 (Day)	74	53	42	WD: SW	Birds 40-74
					WS: 0.1m/s	Insects 40-42
					Rain: Nil	Traffic 40-67
						Quarry inaudible
Teven Quarry L _A eq(15min) Contribution						<35
02/02/2022	07:23 (Day)	78	54	40	WD: SW	Birds 37-71
					WS: 0.1m/s	Insects 37-41
					Rain: Nil	Traffic 37-78
						Quarry inaudible
Teven Quarry L _A eq(15min) Contribution						<35
01/02/2022	18:05 (Evening)	72	57	42	WD: N	Insects 39-72
					WS: 0.6m/s	Wind in trees 39-46
					Rain: Nil	Aircraft 39-54
						Birds <44
Teven Quarry L _A eq(15min) Contribution						Quarry inaudible
Teven Quarry L _A eq(15min) Contribution						Quarry not operational
01/02/2022	18:20 (Evening)	72	59	40	WD: N	Insects 36-72
					WS: 0.6m/s	Birds 36-41
					Rain: Nil	Wind in trees 36-44
						Quarry inaudible
Teven Quarry L _A 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 NM2

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at Location NM2 are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location NM2

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _A max	L _A eq	L _A 90		
02/02/2022	07:51 (Day)	90	67	42	WD: SW WS: 0.1m/s Rain: Nil	Insects 39-52
						Birds 39-62
						Traffic 39-90
						Aircraft 42-67
						Creek flow <39
						Local residential noise 48-56
						Quarry inaudible
Teven Quarry L _A eq(15min) Contribution						<35
02/02/2022	08:06 (Day)	88	67	47	WD: SW WS: 0.1m/s Rain: Nil	Insects 44-48
						Birds 48-56
						Traffic 44-88
						Aircraft 44-49
						Quarry inaudible
Teven Quarry L _A eq(15min) Contribution						<35
01/02/2022	18:47 (Evening)	87	62	36	WD: N WS: 0.3m/s Rain: Nil	Birds 35-48
						Insects 35-41
						Traffic 35-87
						Quarry inaudible
Teven Quarry L _A eq(15min) Contribution						Quarry not operational
01/02/2022	19:02 (Evening)	83	54	35	WD: N WS: 0.3m/s Rain: Nil	Birds 36-49
						Insects 34-39
						Traffic 34-83
						Dog bark 34-46
						Local residential noise 34-45
						Quarry inaudible
Teven Quarry L _A 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.

4.3 Assessment Results - Location NM3

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at Location NM3 are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location NM3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LA _{max}	LA _{eq}	LA ₉₀		
02/02/2022	08:28 (Day)	64	60	59	WD: SW	Insects 57-64
					WS: 0.1m/s	Birds <57
					Rain: Nil	Traffic <57
					Quarry inaudible	
					Teven Quarry LA _{eq} (15min) Contribution	
02/02/2022	08:43 (Day)	62	60	56	WD: SW	Insects 53-62
					WS: 0.1m/s	Birds 53-59
					Rain: Nil	Traffic <53
					Quarry inaudible	
					Teven Quarry LA _{eq} (15min) Contribution	
01/02/2022	19:23 (Evening)	66	58	49	WD: N	Aircraft 47-52
					WS: 0.2m/s	Insects 47-66
					Rain: Nil	Birds 49-52
					Quarry inaudible	
					Teven Quarry LA _{eq} (15min) Contribution	
01/02/2022	19:38 (Evening)	66	61	52	WD: N	Insects 49-66
					WS: 0.2m/s	Birds 49-54
					Rain: Nil	Traffic <49
					Aircraft 49-64	
					Quarry inaudible	
Teven Quarry LA _{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 NM4

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at Location NM4 are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location NM4

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _A max	L _A eq	L _A 90		
02/02/2022	09:04 (Day)	85	65	54	WD: SW	Insects 41-68
					WS: 0.1m/s	Birds 41-58
					Rain: Nil	Traffic 47-85
						Quarry processing 44-53
Teven Quarry L _A eq(15min) Contribution						47
02/02/2022	09:19 (Day)	85	64	52	WD: SW	Insects 48-62
					WS: 0.2m/s	Birds 48-54
					Rain: Nil	Traffic 48-85
						Quarry processing 44-54
Teven Quarry L _A eq(15min) Contribution						47
01/02/2022	19:59 (Evening)	67	65	58	WD: N	Aircraft 50-54
					WS: 0.1m/s	Insects 50-67
					Rain: Nil	Birds 50-56
						Quarry inaudible
Teven Quarry L _A eq(15min) Contribution						Quarry not operational
01/02/2022	20:14 (Evening)	61	54	44	WD: N	Insects 42-58
					WS: 0.1m/s	Birds 42-61
					Rain: Nil	Traffic <42
						Quarry inaudible
Teven Quarry L _A 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.

Note 1: Contribution calculated at 108 Stockers Lane.

4.5 Assessment Results - Location NM5

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at Location NM5 are presented in **Table 7**.

Table 7 Operator-Attended Noise Survey Results – Location NM5

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _A max	L _A eq	L _A 90		
02/02/2022	09:38 (Day)	81	57	39	WD: SW	Traffic 38-81
					WS: 0.1m/s	Insects 38-41
					Rain: Nil	Birds 40-52
						Quarry inaudible
Teven Quarry L _A eq(15min) Contribution						<35
02/02/2022	09:53 (Day)	82	58	40	WD: SW	Insects 39-42
					WS: 0.2m/s	Birds 40-51
					Rain: Nil	Traffic 39-82
						Quarry inaudible
Teven Quarry L _A eq(15min) Contribution						<35
01/02/2022	20:32 (Evening)	58	50	48	WD: N	Insects 45-52
					WS: 0.1m/s	Aircraft 45-58
					Rain: Nil	Traffic <45
						Quarry inaudible
Teven Quarry L _A eq(15min) Contribution						Quarry not operational
01/02/2022	20:47 (Evening)	53	50	48	WD: N	Insects 44-49
					WS: 0.1m/s	Traffic 44-53
					Rain: Nil	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.

This page has been intentionally left blank

5 Discussion

5.1 Discussion of Results - Location NM1

Quarry noise emissions were inaudible during the daytime measurements conducted on Wednesday 2 February 2022. 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 birds, insects, traffic, aircraft and wind in trees.

5.2 Discussion of Results - Location NM2

Quarry noise emissions were inaudible during the daytime measurements conducted on Wednesday 2 February 2022. 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.

Quarry noise sources observed during the measurements included the processing plant. Non quarry noise sources observed during the measurements included insects, birds, traffic, aircraft, creek flow, dog bark and local residential noise.

5.3 Discussion of Results - Location NM3

Quarry noise emissions were inaudible during the daytime measurements conducted on Wednesday 2 February 2022. 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 insects, birds, traffic and aircraft.

5.4 Discussion of Results - Location NM4

Quarry noise emissions were audible during the daytime noise measurements conducted on Wednesday 2 February 2022. Quarry noise contributions were estimated at 47dBA for both measurements and therefore are above the daytime noise limits.

It was observed that the stockpiles to the north of the processing area were significantly reduced compared to previous surveys where compliance was achieved. The stockpiles reduce line of site between the plant and receiver NM4 and as a result provide a significant amount of noise attenuation for the project site. Due to a recent high demand the stockpile has been significantly reduced. Typically, it takes three to four weeks to replenish the stockpile to full capacity. The plant manager was notified of the exceedance and will investigate other potential factors such as the integrity of plant enclosures and whether access doors are being closed. Over the next quarterly period, stockpile levels will be monitored more frequently, and potential permanent solutions will be investigated.

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.

Quarry noise sources observed during the measurements included the processing plant. Non quarry noise sources included insects, birds, traffic and aircraft.

5.5 Discussion of Results - Location NM5

Quarry noise emissions were inaudible during the daytime measurements conducted on Wednesday 2 February 2022. 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.

It is noted that due to excessive rainfall access to receiver NM5 was not available. An intermediate location on Stokers Lane closer to the quarry was assessed.

Non quarry noise sources observed during the measurements included traffic, birds and insects.

6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Holcim (Australia) Pty Ltd at Teven Quarry, Teven, NSW. The assessment was completed to determine the quarry's compliance with the relevant criteria outlined in their Development Consent for the relevant surrounding residential receivers during Quarter 1, ending March 2022.

Attended noise measurements were undertaken on Tuesday 1 February 2022 and Wednesday 2 February 2022 at five representative monitoring locations with quarry noise contributions compared against the relevant criteria.

The assessment has identified that noise emissions generated by Teven Quarry exceeded relevant noise criteria specified in the Development Consent at receiver NM4 during the day period. **Section 5.4** of the discussion outlines recommendations to help reduce noise emissions as demonstrated in historical assessments. At all other receiver locations, quarry noise was inaudible and therefore complied with relevant criteria.

This page has been intentionally left blank

Appendix A - Glossary of Terms

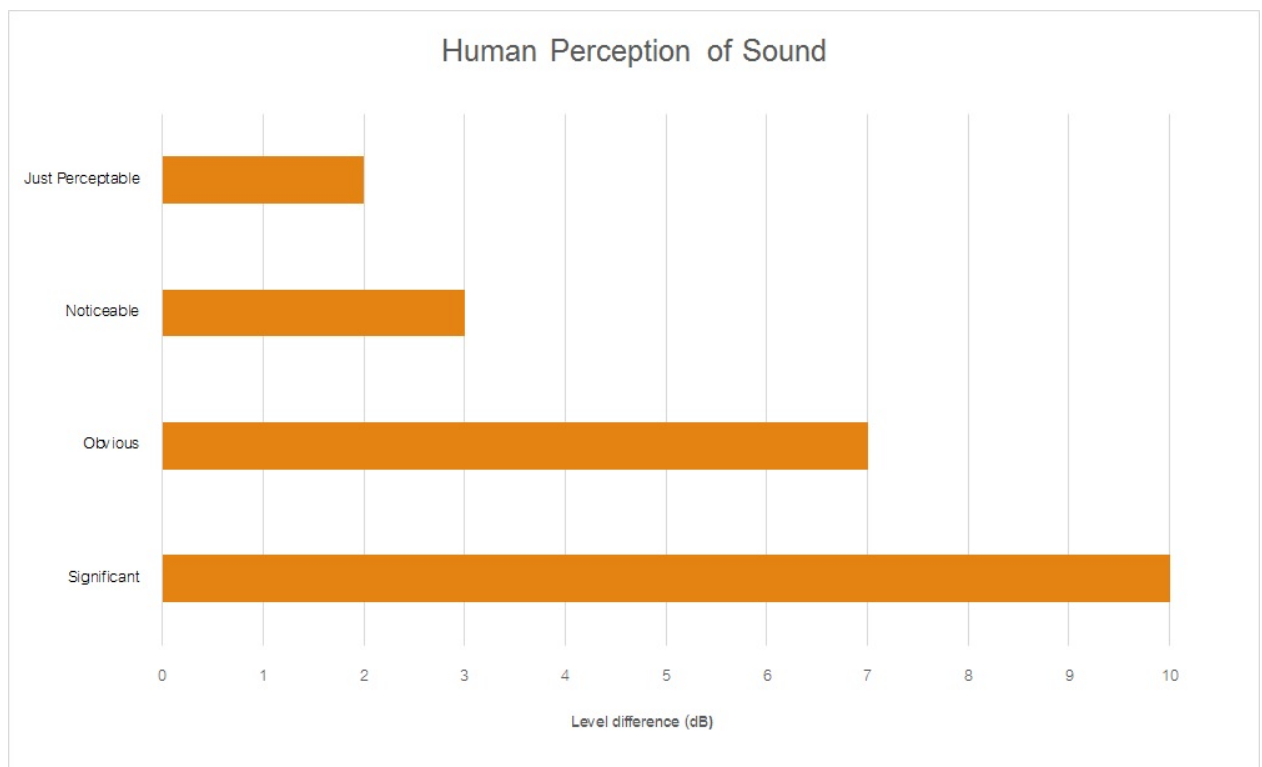
Table A1 provides a number of technical terms have been used in this report.

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.
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



Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

Ph: +61 2 4920 1833

www.mulleracoustic.com

