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QUARTERLY NOISE MONITORING ASSESSMENT – QUARTER 2 2023

TEVEN QUARRY, TEVEN, NSW

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QUARTERLY NOISE MONITORING ASSESSMENT – QUARTER 2 2023
TEVEN QUARRY, TEVEN, NSW

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Description	**Data collected on 10 May and 13 June 2023 for Teven Quarry during Quarter 2 2023 in Teven, NSW, as part of the noise monitoring program**

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ABBREVIATIONS AND DEFINITIONS

Ambient Noise	The all-encompassing noise within a given environment. It is the composite of sounds from many sources, both near and far.
Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the LA90 descriptor (see below).
dB	Abbreviation for decibel, a measure of sound equivalent to 20 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure, and 10 times the logarithm of a given sound power to a reference power.
dB(A)	A measure of A-weighted sound levels. A Weighting is an adjustment made to the sound level measurement to approximate the response of the human ear.
Extraneous noise	Noise resulting from activities that are not typical of the area. Atypical activities may include construction, and traffic generated by holiday periods. Normal daily traffic is not extraneous noise.
LA1	The noise level, measured in dB(A), which is exceeded for 1 per cent of the measurement period.
LA1(1min)	The noise level, measured in dB(A), which is exceeded for 1 per cent of the time over a 1-minute measurement period, i.e., is exceeded for 0.6 seconds. This measure can approximate to the maximum noise level but may be less if there is more than 1 noise event during this 0.6 second period.
LA10	The noise level, measured in dB(A), which is exceeded for 10 per cent of the time.
LA90	The noise level, measured in dB(A), which is exceeded for 90 per cent of the time, referred to as the background noise level. This is considered to represent the background noise (see above).
LAeq	The level of noise equivalent to the energy average of noise levels occurring over a defined measurement period.
LAeq (period)	The average equivalent noise level, measured in dB(A), during a measurement period (e.g., 15-minute, day, evening, or night).
LAmax	The A-weighted sound pressure level that represents the maximum noise level measured over the time that a given sound is measured.
NMA	Noise Monitoring Assessment
NMP	Noise Management Plan

Source: Noise Guide for Local Government (NSW EPA, 2013)

1. OVERVIEW

1.1 Project Driver

Ramboll Australia Pty Ltd (Ramboll) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Teven Quarry ("the quarry") at Teven, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPI) (NSW EPA, 2017).
- Teven Quarry Noise Management Plan (NMP) (Holcim Australia, 2021).
- Environment Protection Licence (EPL) number 3293 (NSW EPA, 2021).
- Development Consent Application Number SSD_6422 (Minister for Planning and Environment, 2015).
- Australian Standard AS 1055:2018 Acoustics—Description and measurement of environmental noise (Standards Australia, 2018).
- IEC 60942 Ed. 3.0 b:2003 Electroacoustics - Sound calibrators (Standards Australia, 2003).

This NMA has been undertaken in accordance with the NMP for the quarterly period April to June 2023 and forms part of the monitoring program to determine compliance with conditions of the Development Consent.

1.2 Site Location and Sensitive Receptors

The quarry is in Teven, NSW, approximately 7 km west of Ballina. Sensitive receptors surrounding the quarry are primarily rural and residential properties in coastal bushland with elevated and undulating topography. Five monitoring locations have been selected as part of the NMA and in accordance with the EPL and Development Consent and are shown in **Table 1-1**.

Table 1-1: Monitoring locations locality and sensitive receptors

Monitoring Locations	Nearest Receiver	Locality and Sensitive Receptors
NM1	R7	West of the quarry situated at a rural residential property at the end of Leadbeatters Lane
NM2	R3/R4	East of the quarry situated at a rural residential property on Teven Road
NM3	R2	South of the quarry situated at a rural residential property at the end of Wellers Road
NM4	R10	North of the quarry situated at a rural residential property adjacent the site off Stokers Lane
NM5	R14	Northeast of the quarry situated at a rural residential property of Teven Road

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.

Legend

- Noise monitoring location

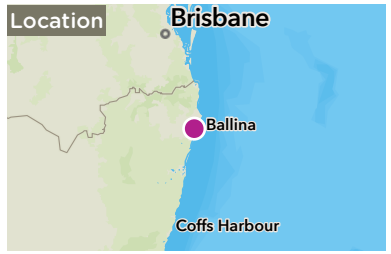

Figure 1 : Noise monitoring locations at Teven Quarry

2. NOISE CRITERIA

Table 2-1 summaries the applicable onsite noise criteria outlined in the NMP and Development Consent for residential receivers (NM1, NM2, NM3, NM4, NM5) surrounding the quarry.

Table 2-1: Monitoring locations and noise criteria

Receivers	Monitoring Locations	Day[1]	Evening[2]
		LAeq (15min)	LAeq (15min)
		dB(A)	
R3, R4, R13, R15, R16, R17, R18, R20	NM2	38	35
All other receivers	NM1, NM3, NM4, NM5	37	35
[1] 7 am–6 pm Monday to Saturday and 8 am–6 pm Sunday and public holidays [2] 6 pm–10 pm Monday to Sunday			

Table 2-2 summaries the applicable offsite noise criteria for vehicles traveling to and from site, as presented in the State Significant Development Assessment (SSD 6422) and as established by the NSW Road Noise Policy (RNP).

Table 2-2: Monitoring locations and noise criteria

Road Catergory	Type of Project/Land Use	Assessment Criteria dB(A)	
		Day (7.00am – 10.00pm)	Night (10.00pm – 7.00am)
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,\ 15\ hour}$ 60 (external)	$L_{Aeq,\ 9\ hour}$ 55 (external)
Local Roads	Existing residences affected by noise by additional traffic on existing local roads generated by land use development	$L_{Aeq,\ 15\ hour}$ 55 (external)	$L_{Aeq,\ 9\ hour}$ 50 (external)

Per the RNP, Teven Road is considered to be sub-arterial, and Stokers Lane is considered to be a local road. Accordingly, offsite noise from vehicles traveling to and from site should not exceed day/night noise levels of 60/55 dBA at NM2 and 55/50 dBA at NM4.

3. METHODOLOGY

The monitoring program was created in accordance with the procedures described in *Australian Standard AS 1055:2018* and the Approval Documents referenced in Section 1. The measurements were completed using a RION Sound Level Meter NL-52 on Wednesday 10 May and Tuesday 13 June 2023. The acoustic instrumentation used carries current NATA calibration and complies with *AS/NZS IEC 61672-1:2013/2002 class 1*. Calibration of all instrumentation was checked prior to and following measurements using a Pulsar Acoustic Calibrator 105 which also carried a current NATA calibration and complies with IEC 60942:2003. Drift in calibration did not exceed ±0.3 dBA.

Attended noise monitoring was conducted for 15-minute periods at each location over two days. As per the NMP, two sets of measurements were completed during the day, and two sets of measurements were completed during the evening, at each monitoring location. It is noted that the quarry was not operational during the evening periods, however, monitoring was conducted as per requirements of the EPL.

Where the quarry was not distinctly audible during the attended monitoring, the quarry contribution is estimated to be at least 10 dBA below the ambient noise level, as determined by the LA90, or estimated to be less than criteria value.

4. RESULTS AND DISCUSSION

4.1 Location NM1

Noise monitoring at location NM1 was completed on Wednesday 10 May 2023. The quarry was not audible during any monitored period during the day and evening, with the ambient noise environment dominated by insects, aircraft, and distant traffic. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring event at Location NM1 are presented in **Table 4-1**.

Table 4-1: Noise survey results and observations for Location NM1

Date	Time	Descriptor (dBA)			Meteorology	Apparent Noise Source, Description and LAeq (dBA)	Teven Quarry LAeq(15min) Contribution	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90				
10-05-23	5:32pm to 5:47pm (Day)	60.4	53.9	37.6	WD: n/a WS: 0 m/s Rain: Nil	Insects 55 Quarry inaudible	<28	37
10-05-23	5:44pm to 5:59pm (Day)	68.6	53.6	39.8	WD: n/a WS: 0 m/s Rain: Nil	Insects 55 Quarry inaudible	<30	37
10-05-23	6:10pm to 6:25pm (Evening)	59.2	41.4	40.1	WD: n/a WS: 0 m/s Rain: Nil	Aircraft 59 Cars in distance 40-45 Quarry inaudible	<30	35
10-05-23	6:33pm to 6:48pm (Evening)	71.8	42.2	40.1	WD: n/a WS: 0 m/s Rain: Nil	Quarry inaudible	<30	35

4.2 Location NM2

Noise monitoring at location NM2 was completed on Wednesday 10 May 2023 and Tuesday 13 June 2023. The quarry was not audible during the evening monitored period however offsite quarry vehicles entering and existing the site as well as onsite reverse squawkers were audible during the day. A single truck entering and existing the site was observed and measured during each day monitored period. We note that noise emission from trucks is considered to be below the $L_{Aeq,\ 15\ hour}$ day criteria of 60 dBA using sound level exposure calculations included in **Appendix 1**. Additionally, a reverse squawker was observed and measured during both day monitoring periods for no more than 5 second durations. Noise emission from onsite squawkers has been determined to be well below the 15min L_{Aeq} criteria using sound level exposure calculations also included in **Appendix 1**. The ambient noise environment was dominated by passing cars on Teven Road, fish in adjacent river, and an aircraft. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM2 are presented in **Table 4-2**.

Table 4-2: Noise survey results and observations for Location NM2

Date	Time	Descriptor (dBA)			Meteorology	Apparent Noise Source, Description and LAeq (dBA)	Teven Quarry LAeq(15min) Contribution	LAeq(15min) Criteria (dBA)	Roadway Noise LAeq (15min) Contribution	LAeq (15hr) (external) Criteria (dBA)
		LAmax	LAeq	LA90						
10-05-23	2:33pm to 2:48pm (Day)	86.0	66.1	43.7	WD: 205° WS: 1.9 m/s Rain: Nil	Cars passing 61-81 Trucks entering/exiting site 56-83 Holcim reverse squawkers 50-51 Quarry vehicles audible	<34	38	<60	60
10-05-23	2:53pm to 3:08pm (Day)	90.2	67.5	44.8	WD: 205° WS: 1.9 m/s Rain: Nil	Cars passing 61-84 Trucks entering/exiting site 56-81 Holcim reverse squawkers 50-51 Quarry vehicles audible	<35	38	<58	60
13-06-23	6:41pm to 6:56pm (Evening)	50.0	37.1	34.5	WD: - WS: 1.4 m/s Rain: Nil	Aircraft 37-40 Distant traffic hum 34-37 Quarry inaudible	<25	35	n/a	n/a
13-06-23	7:00pm to 7:15pm (Evening)	56.7	37.8	34.8	WD: - WS: 1.4 m/s Rain: Nil	Fish 36-40 Quarry inaudible	<25	35	n/a	n/a

'-' indicates not recorded

4.3 Location NM3

Noise monitoring at location NM3 was completed on Wednesday 10 May 2023 and Tuesday 13 June 2023. The quarry was not audible during any monitored period during the day and evening periods, with the ambient noise environment dominated by wind, trees, birds, aircraft, and traffic noise. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM3 are presented in **Table 4-3**.

Table 4-3: Noise survey results and observations for Location NM3

Date	Time	Descriptor (dBA)			Meteorology	Apparent Noise Source, Description and LAeq (dBA)	Teven Quarry LAeq(15min) Contribution	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90				
10-05-23	12:20pm to 12:35pm (Day)	61.0	44.3	38.3	WD: 202° WS: 3.5 m/s Rain: Nil	Work on nearby residence 40-49 Wind/trees 43-56 Birds 45-46 Quarry inaudible	<28	37
10-05-23	12:36pm to 12:51pm (Day)	65.0	44.6	38.4	WD: 202° WS: 3.5 m/s Rain: Nil	Work on nearby residence 40-49 Wind/trees 43-56 Birds 45-46 Aircraft 64 Quarry inaudible	<28	37
13-06-23	6:01pm to 6:16pm (Evening)	51.1	36.1	33.6	WD: - WS: 0.9 m/s Rain: Nil	Insects 33-34 Distant traffic hum 32-35 Quarry inaudible	<24	35
13-06-23	6:18pm to 6:33pm (Evening)	52.3	35.2	32.9	WD: - WS: 0.9 m/s Rain: Nil	Insects 33-34 Distant traffic hum 32-38 Aircraft 48-50 Loud car 37-38 Quarry inaudible	<23	35

'-' indicates not recorded

4.4 Location NM4

Noise monitoring at location NM4 was completed on Wednesday 10 May 2023 and Tuesday 13 June 2023. The quarry was inaudible during the evening period. However offsite quarry vehicles entering and existing the site and onsite reverse squawkers were audible during the day. Up to two trucks entering and existing the site was observed and measured during each day monitoring period. Noise emission from trucks is considered to be well below the $L_{Aeq,\ 15\ hour}$ day criteria of 55 dBA as calculated using sound level exposure calculations included in **Appendix 1**. Additionally, a reverse squawker was observed and measured during both day monitoring periods for no more than 7 second durations. Noise emission from onsite squawkers is considered well below the 15min L_{Aeq} criteria using sound level exposure calculations also included in **Appendix 1**. It should be noted that the monitoring was completed close to Stokers Lane at the entrance to the residence as to not disturb the resident, however, this places the attended noise monitoring location in direct line-of-sight of the quarry rather than near the sensitive receptor, i.e., the resident. The results and observations taken during the monitoring events at Location NM4 are presented in **Table 4-4**.

Table 4-4: Noise survey results and observations for Location NM4

Date	Time	Descriptor (dBA)			Meteorology	Apparent Noise Source, Description and LAeq (dBA)	Teven Quarry LAeq (15min) Criteria Contribution	LAeq (15min) Criteria (dBA)	Roadway Noise LAeq (15min) Contribution	LAeq (15 hr) (external) Criteria (dBA)
		LAmax	LAeq	LA90						
10-05-23	1:53pm to 2:08pm (Day)	71.1	56.0	43.5	WD: 205° WS: 3.0 m/s Rain: Nil	Trucks entering/exiting site 55-56 Holcim reverse squawkers 47-50 Quarry vehicles audible	<34	37	<41	55
10-05-23	2:08pm to 2:23pm (Day)	74.2	54.0	44.0	WD: 205° WS: 3.0 m/s Rain: Nil	Trucks entering/exiting site 55-56 Holcim reverse squawkers 47-50 Quarry vehicles audible	<34	37	<38	55
13-06-23	7:22pm to 7:37pm (Evening)	55.6	39.2	35.6	WD: n/a WS: 0 m/s Rain: Nil	Aircraft 38-49 Quarry inaudible	<26	35	n/a	n/a
13-06-23	7:41pm to 7:56pm (Evening)	57.5	36.9	35.5	WD: n/a WS: 0 m/s Rain: Nil	Quarry inaudible	<26	35	n/a	n/a

4.5 Location NM5

Noise monitoring at location NM5 was completed on Wednesday 10 May 2023 and Tuesday 13 June 2023. The quarry was inaudible during any monitored period during the day and evening. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance during this time. The results and observations taken during the monitoring events at Location NM5 are presented in **Table 4-5**.

Noise sources measured included insects, wind, and cars.

Table 4-5: Noise survey results and observations for Location NM5

Date	Time (hrs)	Descriptor (dBA)			Meteorology	Description and SPL, dBA	Teven Quarry LAeq(15min) Contribution	LAeq(15min) Criteria
		LAmax	LAeq	LA90				
10-05-23	3:35pm to 3:50pm (Day)	61.3	47.7	42.2	WD: n/a WS: 0 m/s Rain: Nil	Insects 46-47 Wind 48-51 Quarry inaudible	<32	37
10-05-23	3.50pm to 4:05pm (Day)	61.8	46.5	41.2	WD: n/a WS: 0 m/s Rain: Nil	Insects 46-47 Wind 48-56 Quarry inaudible	<31	37
13-06-23	8:03pm to 8:18pm (Evening)	67.2	47.1	36.7	WD: - WS: 1.2 m/s Rain: Nil	Car 53-60 Quarry inaudible	,27	35
13-06-23	8:23pm to 8:38pm (Evening)	60.8	40.3	33.9	WD: - WS: 1.2 m/s Rain: Nil	Cars 51-56 Insects 34-36 Quarry inaudible	<24	35

'-' indicates not recorded

5. CONCLUSION

This NMA completed by Ramboll at the Holcim Teven Quarry, Teven, NSW as a quarterly requirement of the NMP. Noise monitoring was completed on Wednesday 10 May 2023 and Tuesday 13 June 2023 at five locations selected as representative to the sensitive receptors at the surroundings to Teven Quarry. No audible quarry noise was recorded at any of the selected monitoring locations.

Noise was audible during the day periods at NM2 and NM4 but was in compliance with offsite noise requirements of the Road Noise Policy and onsite noise requirements of the NMP and Development Consent for residential receivers. Monitoring at NM4 was completed at the gate of the residence, in direct line-of-sight of the quarry. Moving this location within closer proximity of the residence for subsequent monitoring periods is recommended to better capture the noise impacts at the receptor, however it is acknowledged that resident approval will be required to gain access onto the property. The quarry was not audible at any other location or period during the monitoring campaign.

The results presented in this NMA show compliance with the relevant noise criteria at the Holcim Teven Quarry, Teven, NSW.

6. REFERENCES

Holcim Australia (2021) *Teven Quarry, Noise Management Plan*.

Minister for Planning and Environment (2015) 'Development Consent SSD_6422, Teven Quarry Project'.

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Standards Australia (2003) *AS 60942:2003 Electroacoustics - Sound calibrators.* Australian Standard.

APPENDIX 1
SOUND EXPOSURE LEVEL CALCULATIONS

Project No: 318000911
Client Name: Holcim Australia Pty Ltd
Project Name: NSW Environmental Monitoring
Project Site: Teven Quarry
9/08/2023

Sound Level Exposure Calculations
NM2 and NM4

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NM2 Holcim reverse squawkers

Monitoring period	2:33PM to 2:48 PM and 2:53PM to 3:08PM
Meas. Dist from source (m)	1230
Meas. Time (s)	5
Meas. LAeq dB	51
Calc Sel dB	58
No. Events in 15min	1
Total LAeq (15min)	**28**

NM4 Holcim reverse squawkers

Monitoring period	1:53 to 2:08 PM, and 2:08 to 2:23 PM
Meas. Dist from source (m)	260
Meas. Time (s)	7
Meas. LAeq dB	50
Calc Sel dB	58
No. Events in 15min	1
Total LAeq (15min)	**29**

NM2 Holcim trucks entering/exiting site

Monitoring period	2:33 to 2:48 PM
Meas. Dist from source (m)	10
Meas. Time (s)	5
Meas. LAeq dB	83
Calc Sel dB	90
No. Events in 15 hrs	60
No. seconds in 15hrs	54000
Total LAeq (15hrs)	**60**

NM4 Holcim trucks entering/exiting site

Monitoring period	2:33 to 2:48 PM
Meas. Dist from source (m)	30
Meas. Time (s)	15
Meas. LAeq dB	56
Calc Sel dB	68
No. Events in 15 hrs	120
No. seconds in 15hrs	54000
Total LAeq (15hrs)	**41**

NM2 Holcim trucks entering/exiting site

Monitoring period	2:53PM to 3:08PM
Meas. Dist from source (m)	10
Meas. Time (s)	5
Meas. LAeq dB	81
Calc Sel dB	88
No. Events in 15 hrs	60
No. seconds in 15hrs	54000
Total LAeq (15hrs)	**58**

NM4 Holcim trucks entering/exiting site

Monitoring period	2:53PM to 3:08PM
Meas. Dist from source (m)	30
Meas. Time (s)	15
Meas. LAeq dB	56
Calc Sel dB	68
No. Events in 15 hrs	60
No. seconds in 15hrs	54000
Total LAeq (15hrs)	**38**