

QUARTERLY NOISE MONITORING ASSESSMENT

Dunloe Quarry

Mooball Rd, Pottsville NSW 2489

ENV250722

For:

HOLCIM (Australia) P/L

By:

ENV Solutions

Date:

21/08/2026

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DOCUMENT CONTROL

Job No:	ENV250722
Client:	HOLCIM (Australia) P/L
Client Reference:	Dunloe Quarry

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Revision:	Date:	Details:
Rev 0	21/08/2026	Submission to Holcim

SCOPE OF ENGAGEMENT AND LIMITATIONS

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ABBREVIATIONS AND DEFINITIONS

Term	Description
ΔT	Vertical Temperature Difference, i.e. the measured difference in ambient temperature between two elevations on the same tower. It is defined as the upper-level temperature measurement minus the lower-level temperature measurement.
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).
$^{\circ}\text{C}$	Celsius
CCAM	Conformal Cubic Atmospheric Model
CSIRO	Commonwealth Scientific and Industrial Research Organisation
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.
DPHI	Department of Planning, Housing, and Infrastructure
EPA	Environment Protection Authority
EPL	Environment Protection Licence
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.
INP	Industrial Noise Policy
LA₁	The noise level, measured in dB(A), which is exceeded for 1 per cent of the measurement period.
LA_{1(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).
LAm_{ax}	The A-weighted sound pressure level that represents the maximum noise level measured over the time that a given sound is measured.
NATA	National Association of Testing Authorities
NMA	Noise Monitoring Assessment
NMP	Noise Management Plan
NPfi	Noise Policy for Industry 2017
NVIA	Noise and Vibration Impact Assessment
NSW	New South Wales
PSNL	Project Specific Noise Level
SPL	The Sound Pressure Level. Sound pressure is the fluctuation in air pressure, from the steady atmospheric pressure, created by sound. The sound pressure level is the sound pressure expressed on a decibel scale.

Source: Noise Guide for Local Government (NSW EPA, 2023)

1. OVERVIEW

1.1 Project Driver

ENV Services has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Dunloe Sand Quarry located at Mooball Road, Dunloe. This NMA has been prepared to address the attended noise monitoring requirements of Development Consent No. 06_0030, Environment Protection Licence (EPL) 13077 and the Dunloe Sand Quarry Noise Management Plan (NMP).

This NMA was completed in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017)
- Environment Protection Licence (EPL) 13077;
- Dunloe Sand Quarry Noise Management Plan (GHD, 2020);
- Development Consent No. 06_0030, including Modification 2 requirements; and
- Australian Standard AS 1055:2018 Acoustics—Description and measurement of environmental noise (Standards Australia, 2018).

1.2 Site Location and Sensitive Receptors

Dunloe Sand Quarry is located within the Tweed Local Government Area, approximately 25 kilometres south of Tweed Heads. Road access to the quarry is via Pottsville Road from the north.

The monitoring locations for the site and assessed receivers are presented in the locality plan in Table 1 and Figure 1.

Table 1: Noise monitoring locations and sensitive receiver details

Monitoring Locations	Locality and Sensitive Receptors
R6	Residential receiver at 157 Warwick Park Road, approximately 970 m south-west of the site activity. Monitoring at this location represents one of the nearest identified noise sensitive receivers from site operations.
R7	Residential receiver at 129 Warwick Park Road, approximately 1,090 m west of the site activity. Monitoring at this location is required under the Noise Management Plan as a representative compliance location.
R8	Residential receiver at 679 Pottsville Road, approximately 1,720 m north-west of the site activity. Monitoring at this location is required under the Noise Management Plan as a representative compliance location.



Noise Monitoring Location



Dunloe Quarry Footprint (Approximate)

0 1 2km

Figure 1 – Dunloe Sands Quarry Noise Monitoring Locations
Dunloe Sands Quarry – Q1 Noise Monitoring
Pottsville, New South Wales, Australia, 2489

Project: 250722

Client: Holcim Australia Pty Ltd

Date Drawn: 19/03/26

2. NOISE CRITERIA

The NMP outlines that quarry noise emissions must comply with the operational noise criteria adopted for Dunloe Sand Quarry. Noise generated by the quarry is required to be monitored and measured in accordance with the relevant procedures and exemptions of the NSW Noise Policy for Industry (EPA, 2017). The EPL also specifies a noise emission criterion of 48 dB(A) LAeq(15 minute), except as expressly provided by the licence.

Table 2: Adopted NMP operational noise criteria for quarterly monitoring

Receivers	Time Period	Parameter	NMP Trigger Level
R6 and R7	Day ¹	dB LAeq(15min)	42
R8	Day ¹	dB LAeq(15min)	48
All other residences	Day ¹	dB LAeq(15min)	41

¹ Operating hours are 7:00 am to 5:00 pm Monday to Friday and 7:00 am to 12:00 pm Saturday. No operations are permitted on Sundays or public holidays, except for maintenance that is inaudible at neighbouring residences or emergency work permitted by EPL 13077.

3. METHODOLOGY

The monitoring program was developed in accordance with the procedures described in Australian Standard AS 1055:2018 and the documents referenced in Section 1. The measurements were carried out using a Svantek SV 973 Class 2 Sound Level Meter on 30 March 2026. The acoustic instrumentation used carries current National Association of Testing Authorities (NATA) calibration and complies with AS/NZS IEC 61672-1:2019.

Calibration of all instrumentation was checked prior to and following measurements using a Svantek SV 34B Class 2 Acoustic Calibrator which also carried a current NATA calibration and complies with IEC 60942:2017. Drift in calibration did not exceed ± 0.3 dBA.

Attended noise monitoring was conducted for 15-minute periods at the representative monitoring locations identified in the NMP, including R6, R7 and R8. Where possible, throughout each measurement the operator quantified the contribution of each significant noise source. Where Dunloe Quarry was not distinctly audible during attended monitoring, the Dunloe Quarry contribution was estimated to be below the measured ambient LAeq(15min) noise level.

3.1 Meteorological Conditions

Meteorology has an important influence on noise monitoring assessments. For this assessment, 9:00 am meteorological data for 30 March 2026 was adopted from the Bureau of Meteorology Coolangatta weather station data. The adopted 9:00 am data included a temperature of 22.8°C, relative humidity of 71%, cloud cover of 8 eighths, wind direction from the SSW, wind speed of 15 km/h, mean sea level pressure of 1022 hPa and rainfall of 0.4 mm. These data were used to inform the meteorological conditions presented in the monitoring results tables.

Table 3: Classification of atmospheric stability

Stability Classification	Pasquill Stability Category	Ambient temperature change with height (°C/100m)
Extremely unstable	A	$\Delta T \leq -1.9$
Moderately unstable	B	$-1.9 < \Delta T \leq -1.7$
Slightly unstable	C	$-1.7 < \Delta T \leq -1.5$
Neutral	D	$-1.5 < \Delta T \leq -0.5$
Slightly stable	E	$-0.5 < \Delta T \leq 1.5$
Moderately stable	F	$1.5 < \Delta T \leq 4.0$
Extremely stable	G	$\Delta T > 4.0$

The meteorological conditions recorded at the time of the noise monitoring were reviewed. Handheld observations at microphone height recorded nil rainfall and light to strong wind conditions during the attended measurements. Bureau of Meteorology Coolangatta weather station data was adopted as representative meteorological data for screening purposes. The 9:00 am observation recorded a wind speed of 15 km/h and neutral atmospheric stability conditions for the purposes of this assessment.

4. RESULTS AND DISCUSSION

4.1 Location R6 (157 Warwick Road)

Noise monitoring at location R6 was conducted on 30 March 2026, with results presented in Table 4.1. The measured ambient LAeq(15min) level was 49.4 dBA. During attended monitoring, only a brief truck noise event associated with quarry operations was audible, with ambient noise sources otherwise dominating the acoustic environment. Predominant ambient noise sources included birds, traffic, trees and insects. While the measured ambient noise level exceeded the applicable criterion, the elevated level was attributed predominantly to extraneous noise sources and does not indicate a significant contribution from quarry operations.

A review of the one-third octave band data was undertaken to assess potential low-frequency and tonal characteristics. The monitoring period recorded an LCEq–LAeq difference of 20.2 dB (69.6 dBC – 49.4 dBA), exceeding the 15 dB low-frequency screening threshold. However, the one-third octave band spectrum did not demonstrate a dominant low-frequency noise characteristic, with the highest sound energy occurring within the mid-frequency bands between approximately 1250 Hz and 2000 Hz. The spectrum also did not identify a dominant tonal characteristic requiring correction. Given quarry operations were only briefly audible during the monitoring period and ambient noise sources otherwise dominated the acoustic environment, the measured spectrum was considered representative of the broader ambient environment rather than quarry operations. Accordingly, no low-frequency or tonal modifying factor correction was applied.

These results indicate that quarry-related noise emissions were not the dominant contributor to the measured ambient noise level at R6 and did not exceed the applicable NMP noise criterion at the assessed receiver location.

Table 4: Attended noise monitoring results and observations for Location R6

Date	Time	Descriptor (dBA) LAeq(15min)	Observed Meteorological Conditions	Recorded Meteorological Conditions ¹	Apparent Noise Source	Quarry Activities LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
30-03-2026	10:56–11:25 (Day)	49.4	WD: SE WS: Not recorded Rain: nil	Temp: 22.8°C RH: 71% Cloud: 8/8 WD: SSW WS: 15 km/h Rain: 0.4 mm Stability: D (Neutral)	Quarry generally inaudible; one truck noise heard briefly ²	<49.4	42

Note:

- Meteorological data was sourced from the Bureau of Meteorology Coolangatta weather station data for 30 March 2026 at 9:00 am. The 9:00 am observation was used for the attended monitoring row presented in this table.
- Stability Category D was adopted based on the Bureau of Meteorology Coolangatta weather station data, which indicated neutral conditions for the purposes of this assessment. As quarry noise was only briefly audible and the measured spectrum was considered representative of the broader ambient environment, no site-related low-frequency or tonal modifying factor correction was applied.

4.2 Location R7 (129 Warwick Park Road)

Noise monitoring at location R7 was conducted on 30 March 2026, with results presented in Table 4.2. Quarry operations were not distinctly audible during the monitoring period. Predominant ambient noise sources included birds, traffic, trees and insects. While the measured ambient $LAeq_{(15min)}$ level of 49.9 dBA exceeded the applicable criterion, the elevated noise level was attributed to ambient environmental noise sources rather than quarry operations. Accordingly, the results do not indicate that Dunloe Quarry contributed to the measured ambient noise level.

A review of the one-third octave band data was undertaken to assess potential low-frequency and tonal characteristics. The monitoring period recorded an L_{Ceq} – $LAeq$ difference of 10.6 dB (60.5 dBC – 49.9 dBA), which is below the 15 dB low-frequency screening threshold. The one-third octave band spectrum did not identify a dominant low-frequency noise characteristic or a tonal characteristic requiring correction. Accordingly, no low-frequency or tonal modifying factor correction was applied.

These results indicate that quarry-related noise emissions were not the dominant contributor to the measured ambient noise level at R7 and did not exceed the applicable NMP noise criterion at the assessed receiver location.

Table 5: Attended noise monitoring results and observations for Location R7

Date	Time	Descriptor (dBA) $LAeq_{(15min)}$	Observed Meteorological Conditions	Recorded Meteorological Conditions ¹	Apparent Noise Source	Quarry Activities $LAeq_{(15min)}$ Contribution (dBA)	$LAeq_{(15min)}$ Criteria (dBA)
30-03-2026	11:40–12:08 (Day)	49.9	WD: SE WS: Strong to Gusty Rain: nil	Temp: 22.8°C RH: 71% Cloud: 8/8 WD: SSW WS: 15 km/h Rain: 0.4 mm Stability: D (Neutral)	Quarry inaudible ²	<49.9	42

Note:

1. Meteorological data was sourced from the Bureau of Meteorology Coolangatta weather station data for 30 March 2026 at 9:00 am. The 9:00 am observation was used for the attended monitoring row presented in this table.
2. Stability Category D was adopted based on the Bureau of Meteorology Coolangatta weather station data, which indicated neutral conditions for the purposes of this assessment. As quarry operations were not distinctly audible, a site-related modifying factor assessment was not required for this monitoring period.

4.3 Location R8 (679 Pottsville Road)

Noise monitoring at location R8 was conducted on 30 March 2026, with results presented in Table 4.3. Quarry operations were not operating during the monitoring period. Predominant ambient noise sources included birds, traffic, trees and insects. While the measured ambient $LA_{eq(15min)}$ level of 52.8 dBA exceeded the applicable criterion, the elevated noise level was attributed to ambient environmental noise sources rather than quarry operations. Accordingly, the results do not indicate that Dunloe Quarry contributed to the measured ambient noise level.

A review of the one-third octave band data was undertaken to assess potential low-frequency and tonal characteristics. The monitoring period recorded an LC_{eq} – LA_{eq} difference of 23.9 dB (76.7 dBC – 52.8 dBA), exceeding the 15 dB low-frequency screening threshold. However, the one-third octave band spectrum did not demonstrate a dominant low-frequency noise characteristic, with the highest sound energy occurring within the mid-frequency bands between approximately 800 Hz and 1250 Hz. The spectrum also did not identify a dominant tonal characteristic requiring correction. As quarry operations were not operating during the monitoring period, the measured spectrum was considered representative of the ambient acoustic environment rather than quarry operations. Accordingly, no low-frequency or tonal modifying factor correction was applied.

These results indicate that quarry-related noise emissions were not the dominant contributor to the measured ambient noise level at R8 and did not exceed the applicable NMP noise criterion at the assessed receiver location.

Table 6: Attended noise monitoring results and observations for Location R8

Date	Time	Descriptor (dBA) $LA_{eq(15min)}$	Observed Meteorological Conditions	Recorded Meteorological Conditions ¹	Apparent Noise Source	Quarry Activities $LA_{eq(15min)}$ Contribution (dBA)	$LA_{eq(15min)}$ Criteria (dBA)
30-03-2026	12:28–13:02 (Day)	52.8	WD: S WS: 0 m/s Rain: nil	Temp: 22.8°C RH: 71% Cloud: 8/8 WD: SSW WS: 15 km/h Rain: 0.4 mm Stability: D (Neutral)	Quarry inaudible; road traffic approximately every 30 seconds on average ²	<52.8	48

Note:

1. Meteorological data was sourced from the Bureau of Meteorology Coolangatta weather station data for 30 March 2026 at 9:00 am. The 9:00 am observation was used for the attended monitoring row presented in this table.
2. Stability Category D was adopted based on the Bureau of Meteorology Coolangatta weather station data, which indicated neutral conditions for the purposes of this assessment. As quarry operations were not distinctly audible, a site-related modifying factor assessment was not required for this monitoring period.

5. CONCLUSION

This NMA was completed by ENV Services at Dunloe Quarry, Pottsville NSW, as a quarterly requirement of the NMP, EPL 13077 and Development Consent No. 06_0030. Monitoring was undertaken during the day period on 30 March 2026 at three locations representative of the nearest residential receivers surrounding Dunloe Quarry.

At R6, a brief truck noise event associated with quarry operations was audible during attended monitoring; however, ambient noise sources otherwise dominated the acoustic environment. While the measured $L_{Ceq}-L_{Aeq}$ difference exceeded the low-frequency screening threshold, a review of the one-third octave band spectrum did not identify a dominant low-frequency or tonal characteristic requiring the application of a modifying factor correction.

At R7 and R8, quarry operations were not audible during the monitoring period. The measured ambient noise environment was dominated by local environmental noise sources, including birds, traffic, trees and insects.

Based on the attended monitoring observations and assessment results, quarry-related noise emissions were not the dominant contributor to the measured ambient noise levels at the monitored receiver locations and did not exceed the applicable noise criteria specified in the Dunloe Quarry Noise Management Plan during the monitoring period.

The results of this assessment should be used to inform Dunloe Quarry's ongoing environmental reporting requirements and future noise monitoring programs at the site.

6. REFERENCES

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