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Dunloe Sand Quarry Quarterly Noise Monitoring Assessment

Quarter 3 2025

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Dunloe Sand Quarry Quarterly Noise Monitoring Assessment

Quarter 3 2025

Project name	**NSW Environmental Monitoring 2024-2025**
Project no.	**318001800**
Recipient	**Matt Kelly**
Document type	**Report**
Version	**1**
Date	**24/10/2025**
Prepared by	**Brodie Wood**
Checked by	**Arnold Cho, Jake Bourke**
Approved by	**Gavan Butterfield**
Description	**Data collected on 15 July 2025 for Dunloe Quarry during Quarter 3 2025 at Pottsville, NSW, as part of the routine noise monitoring program**

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Abbreviations and Definitions

	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.
°	Degree
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).
C	Celcius
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.
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.
m	Metre
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.
NATA	National Association of Testing Authorities
NMA	Noise Monitoring Assessment
NMP	Noise Management Plan
NPfI	Noise Policy for Industry 2017
NSW	New South Wales
s	Second
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.
TAPM	The Air Pollution Model

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

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 Dunloe Sands Quarry ("the quarry") at Pottsville, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017)
- Dunloe Sand Quarry Noise Management Plan (NMP) (GHD, 2020)
- Environment Protection Licence (EPL) number 13077 (NSW EPA, 2020)
- Development Consent No. 06_0030, MOD2 (NSW EPA, 2018)
- Australian Standard AS 1055:2018 Acoustics—Description and measurement of environmental noise (Standards Australia, 2018)
- Australian Standard AS/NZS IEC 61672.1:2019 Electroacoustics – Sound level meters, Part 1: Specifications (Standards Australia and Standards New Zealand, 2019)
- International Electrotechnical Commission (IEC) 60942:2017 Electroacoustics - Electroacoustics – Sound calibrators (IEC, 2017).

This NMA has been undertaken for the quarterly period July to September 2025, and forms part of the monitoring program to determine compliance with conditions of the Environmental Protection License (EPL).

1.2 Site Location and Sensitive Receptors

The quarry is approximately 2.5 km south of Pottsville, NSW, a town in the Northern Rivers region in Tweed Shire. Sensitive receptors surrounding the quarry are primarily rural and residential properties in coastal bushland with elevated and undulating topography.

Three monitoring locations have been selected as part of the NMA and in accordance with the EPL and are shown in **Table 1-1**.

Table 1-1: Monitoring locations locality and sensitive receptors

Monitoring Locations	Locality and Sensitive Receptors
R6	West of the quarry and situated at a rural residential property at 157 Warwick Park Road.
R7	West of the quarry and situated at a rural residential property at 129 Warwick Park Road.
R8	Northwest of the quarry and situated at a rural residential property at 679 Pottsville Road.

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**. It should be noted that while the NMP states monitoring locations be measured from the most affected points within surrounding residential property boundaries or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, this has not been possible for this NMA due to access restrictions. Monitoring was completed at the property boundary of each location where accessible and in each case the property dwelling was approximately 40 to 100 metres from the boundary. This would have resulted in a conservative assessment as the monitoring locations were closer to the site.

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Figure 1: Noise monitoring locations

2. Noise Criteria

Table 2-1 summarises the applicable noise criteria outlined in the NMP for residential receivers (R6, R7 and R8) surrounding the quarry. The noise criteria apply when the site is operational within the permitted operating hours Monday to Friday 7am - 5pm, Saturday 7am - 12pm, with no operations on Sunday.

Compliance with the noise criteria below would also determine compliance with the noise limits outlined in the sites EPL (EPL 13077) which requires that the quarry's noise contribution will not exceed 48 dB LAeq(15min) at any of the residential receivers.

Table 2-1: Monitoring locations and noise criteria

Receiver	Monitoring Locations	Day[1] LAeq (15min) dB(A)
157 Warwick Park Road	R6	42
129 Warwick Park Road	R7	42
679 Pottsville Road	R8	48
All other residences	-	41

[1] 7 am–6 pm Monday to Saturday

Note: no operations on Sundays and public holidays

3. Methodology

The monitoring program was developed in accordance with the procedures described in AS 1055:2018 (Standards Australia, 2018) and the Approval Documents referenced in **Section 1**. The measurements were completed using a RION Sound Level Meter NL-52 on Tuesday 15 July 2025. The acoustic instrumentation used carried a current National Association of Testing Authorities (NATA) calibration and that complied with AS/NZS IEC 61672-1:2019 (Standards Australia and Standards New Zealand, 2019). Calibration of all instrumentation was checked prior to and following measurements using a Pulsar Acoustic Calibrator 105 which carried a current NATA calibration and complies with IEC 60942:2017 (IEC, 2017). Drift in calibration did not exceed ±0.3 dBA.

Each attended noise measurement was conducted for 15-minutes in duration during the day period over one day at each monitoring location. Where possible, throughout each measurement the operator(s) quantified the contribution of each significant noise source. Where the quarry was not distinctly audible during the attended monitoring, the quarry contribution was estimated to be at least 10 dBA below the ambient noise level, as determined by the LA90.

3.1 Meteorology

Meterology has an important influence on noise monitoring assessment. Where an onsite meterological station with data recorded at 10m height has not been available, the Holcim Teven Quarry onsite meteorological station located approximately 50km south of site has been used to adopt wind direction, wind speed and rain data to inform this assessment. Temperature data has been adopted from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Conformal Cubic Atmospheric Model (CCAM) and modelled using The Air Pollution Model (TAPM) to determine the atmospheric category as outline in **Table 3-1**.

Table 3-1: Classification of atmospheric stability (NSW EPA, 2014)

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. The attended noise monitoring results presented in **Section 4** were not found to be influenced by the following adverse meteorological conditions:

- During periods of rain or hail
- Average wind speed at microphone height exceeding 5 m/s

The following noise enhancing meteorological conditions were encountered during the noise monitoring; however, results still met the criteria outlined in **Table 2-1**.

- Wind speeds greater than 3 m/s measured at 10 m above ground level
- Temperature inversion conditions greater than 3°C/100m.

4. Results and Discussion

4.1 Location R6

Noise monitoring at location R6 was conducted on Tuesday 15 July 2025 with results presented in **Table 4-1**. The quarry was inaudible at R6 during the monitoring period, and the ambient environment was dominated by fauna and background traffic. These results satisfy the noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance during the monitoring period.

Table 4-1: Noise survey results and observations for Location R6

Date	Time	Descriptor (dBA)			Meteorology (handheld at microphone height)	Onsite Met Station (10m height)[1]	Apparent Noise Source, Description and SPL (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90					
15-07-25	1:06pm to 1:21pm (Day)	72.1	42.5	38.4	WD: n/a WS: 0 m/s Rain: Nil	WD: ESE WS: 4 m/s Rain: Nil Stability Category: E[2]	Birds/insects/background traffic 39-45 Cows 45 Myna bird 45-50 Quarry inaudible	<28	42

[1] Data obtained from Holcim Teven Quarry onsite meteorological station, located approximately 50km south of site.

[2] Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

4.2 Location R7

Noise monitoring at location R7 was conducted on Tuesday 15 July 2025 with results presented in **Table 4-2**. The quarry was inaudible during the monitoring period, and the ambient environment was dominated by helicopter, birds, insects and cars passing car on Pottsville Road. These results satisfy the established noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance.

Table 4-2: Noise survey results and observations for Location R7

Date	Time	Descriptor (dBA)			Meteorology (handheld at microphone height)	Onsite Met Station (10m height)[1]	Apparent Noise Source, Description and SPL (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90					
15-07-25	12:44pm to 12:59pm (Day)	67.1	45	39.5	WD: n/a WS: 0 m/s Rain: Nil	WD: ESE WS: 3 m/s Rain: Nil Stability Category: E[2]	Helicopter hum/birds/insects 40-45 Loud banging (resident) 45-50 Cars passing 54-66 Quarry inaudible	<30	42

[1] Data obtained from Holcim Teven Quarry onsite meteorological station, located approximately 50km south of site.

[2] Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

4.3 Location R8

Noise monitoring at location R8 was conducted on Tuesday 15 July 2025 with results presented in **Table 4-3**. The quarry was inaudible at R8 during the monitoring period, and the ambient environment was dominated by a helicopter hum, fauna, resident noise, background traffic and passing cars on Pottsville Road. These results satisfy the established noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance.

Table 4-3: Noise survey results and observations for Location R8

Date	Time	Descriptor (dBA)			Meteorology (handheld at microphone height)	Onsite Met Station[1] (10m height)	Apparent Noise Source, Description and SPL (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90					
15-07-25	12:19pm to 12:34pm (Day)	69.4	53.8	39.8	WD: n/a WS: 0 m/s Rain: Nil	WD: SE WS: 2 m/s Rain: Nil Stability Category: E[2]	Birds/insects/helicopter hum/background traffic 40-47 Cars passing 57-69 Quarry inaudible	<30	48

[1] Data obtained from Holcim Teven Quarry onsite meteorological station, located approximately 50km south of site.

[2] Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

5. Conclusion

This NMA was completed by Ramboll at the Holcim Dunloe Sands Quarry, Pottsville, NSW as a quarterly requirement of the NMP showed compliance with the relevant noise criteria. Monitoring was carried out on Wednesday 15 July 2025 at three locations selected as representative to the sensitive receptors at the surroundings to Dunloe Sands Quarry.

No audible quarry noise was recorded at any of the selected monitoring locations. The results presented in this NMA show compliance with the relevant noise criteria at the Holcim Dunloe Sands Quarry, Pottsville, NSW. It is noted that the monitoring was completed at the property boundary of each location. As each property dwelling was approximately 40 to 100 metres from the boundary, it remains a recommendation that permission from the property owners be sought to access their property to complete future noise monitoring within 30 metres of the property dwellings.

6. References

GHD. (2020). *Dunloe Sand Quarry Noise Management Plan.*

IEC. (2017). *International Electrotechnical Commission. 60942:2017 Electroacoustics - Sound calibrators.*

NSW EPA. (2014). *Discussion Paper. Validation of Inversion Strength Estimation Method.*

NSW EPA. (2017). *Noise Policy for Industry.*

NSW EPA. (2018). *Development Consent No. 06_0030, MOD2.*

Standards Australia. (2018). *AS 1055:2018 Acoustics—Description and measurement of environmental noise.*

Standards Australia and Standards New Zealand. (2019). *AS/NZS IEC 61672.1:2019 Electroacoustics – Sound level meters, Part 1: Specifications.*

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Document type
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Date
August 2025

Dunloe Sand Quarry Quarterly Noise Monitoring Assessment

Quarter 2 2025

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Dunloe Sand Quarry Quarterly Noise Monitoring Assessment

Quarter 2 2025

Project name	**NSW Environmental Monitoring 2024-2025**
Project no.	**318001800**
Recipient	**Matt Kelly**
Document type	**Report**
Version	**1**
Date	**12/08/2025**
Prepared by	**Jake Bourke, Brodie Wood**
Checked by	**Arnold Cho**
Approved by	**Gavan Butterfield**
Description	**Data collected on 16 April 2025 for Dunloe Quarry during Quarter 2 2025 at Pottsville, NSW, as part of the routine noise monitoring program**

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°	Degree
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CCAM	Conformal Cubic Atmospheric Model
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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.
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.
m	Metre
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.
NATA	National Association of Testing Authorities
NMA	Noise Monitoring Assessment
NMP	Noise Management Plan
NPfI	Noise Policy for Industry 2017

	Description
NSW	New South Wales
s	Second
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.
TAPM	The Air Pollution Model

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

1. Overview

1.1 Project Driver

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This NMA was done in accordance with the following documents:

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- Dunloe Sand Quarry Noise Management Plan (NMP) (GHD, 2020)
- Environment Protection Licence (EPL) number 13077 (NSW EPA, 2020)
- Development Consent No. 06_0030, MOD2 (NSW EPA, 2018)
- Australian Standard AS 1055:2018 Acoustics—Description and measurement of environmental noise (Standards Australia, 2018)
- Australian Standard AS/NZS IEC 61672.1:2019 Electroacoustics – Sound level meters, Part 1: Specifications (Standards Australia and Standards New Zealand, 2019)
- IEC 60942:2017 Electroacoustics - Electroacoustics – Sound calibrators (International Standard, 2017).

This NMA has been undertaken for the quarterly period April to June 2025, and forms part of the monitoring program to determine compliance with conditions of the Environmental Protection License (EPL).

1.2 Site Location and Sensitive Receptors

The quarry is approximately 2.5 km south of Pottsville, NSW, a town in the Northern Rivers region in Tweed Shire. Sensitive receptors surrounding the quarry are primarily rural and residential properties in coastal bushland with elevated and undulating topography.

Three monitoring locations have been selected as part of the NMA and in accordance with the EPL and are shown in **Table 1-1**.

Table 1-1: Monitoring locations locality and sensitive receptors

Monitoring Locations	Locality and Sensitive Receptors
R6	West of the quarry situated at a rural residential property at 157 Warwick Park Road.
R7	West of the quarry situated at a rural residential property at 129 Warwick Park Road.
R8	Northwest of the quarry situated at a rural residential property at 679 Pottsville Road.

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**. It should be noted that while the NMP states monitoring locations be measured from the most affected points within surrounding residential property boundaries or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, this has not been possible for this NMA due to access restrictions. Monitoring was completed at the property boundary of each location where accessible and in each case the property dwelling was approximately 40 to 100 metres from the boundary. This would have resulted in a conservative assessment as the monitoring locations were closer to the site.

RAMBOLL AUSTRALIA - GIS MAP file - 318000911_GIS_P006_NoiseMonitoring | F005_NoiseMonitoring_Dunloe_V03 | 29/01/2024

Legend

- Noise monitoring location
- Property dwelling

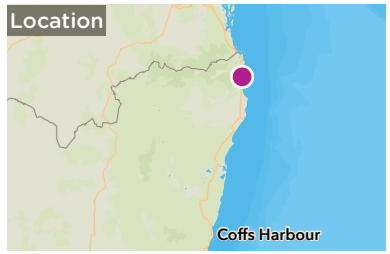

Figure 1 : Noise monitoring locations at Dunloe Sands Quarry

2. Noise Criteria

Table 2-1 summarises the applicable noise criteria outlined in the NMP for residential receivers (R6, R7 and R8) surrounding the quarry. The noise criteria apply when the site is operational within the permitted operating hours Monday to Friday 7am - 5pm, Saturday 7am - 12pm with no operations on Sunday.

Compliance with the noise criteria below would also determine compliance with the noise limits outlined in the sites EPL (EPL 13077) which requires that the quarry's noise contribution will not exceed 48 dB LAeq(15min) at any of the residential receivers.

Table 2-1: Monitoring locations and noise criteria

Receiver	Monitoring Locations	Day[1] LAeq (15min) dB(A)
157 Warwick Park Road	R6	42
129 Warwick Park Road	R7	42
679 Pottsville Road	R8	48
All other residences	-	41

[1] 7 am–6 pm Monday to Saturday

Note: no operations on Sundays and public holidays

3. Methodology

The monitoring program was developed 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 16 April 2025. The acoustic instrumentation used carried a current National Association of Testing Authorities (NATA) calibration and that complied with *AS/NZS IEC 61672-1:2019 class 1*. Calibration of all instrumentation was checked prior to and following measurements using a Pulsar Acoustic Calibrator 105 which carried a current NATA calibration and complies with *IEC 60942:2017.* Drift in calibration did not exceed ±0.3 dBA.

Each attended noise measurement was conducted for 15-minutes in duration during the day period over one day at each monitoring location. Where possible, throughout each measurement the operator(s) quantified the contribution of each significant noise source. Where the quarry was not distinctly audible during the attended monitoring, the quarry contribution was estimated to be at least 10 dBA below the ambient noise level, as determined by the LA90.

3.1 Meteorology

Meterology has an important influence on noise monitoring assessment. Where an onsite meterological station with data recorded at 10m height has not been available, the Holcim Teven Quarry onsite meteorological station located approximately 50km south of site has been used to adopt wind direction, wind speed and rain data to inform this assessment. Temperature data has been adopted from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Conformal Cubic Atmospheric Model (CCAM) and modelled using The Air Pollution Model (TAPM) to determine the atmospheric category as outline in **Table 3-1**.

Table 3-1: Classification of Atmospheric Stability (NSW EPA, 2014)

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. The attended noise monitoring results presented in **Section 4** were not found to be influenced by the following adverse meteorological conditions:

- During periods of rain or hail
- Average wind speed at microphone height exceeding 5 m/s.

The following noise enhancing meteorological conditions were encountered during the noise monitoring; however, results still met the criteria outlined in **Table 2-1**.

- Wind speeds greater than 3 m/s measured at 10 m above ground level
- Temperature inversion conditions greater than 3°C/100m.

4. Results and Discussion

4.1 Location R6

Noise monitoring at location R6 was conducted on Wednesday 16 April 2025 with results presented in **Table 4-1**. The quarry was inaudible at R6 during the monitoring period, and the ambient environment was dominated by Wind, trees, insects, and birds. These results satisfy the noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance during the monitoring period.

Table 4-1: Noise survey results and observations for Location R6

Date	Time	Descriptor (dBA)			Meteorology (handheld at microphone height)	Onsite Met Station (10m height)[1]	Apparent Noise Source, Description and SPL (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90					
16-04-25	2:35pm to 2:50pm (Day)	67.8	48.7	40.2	WD: 145° WS: 2.8 m/s Rain: Nil	WD: NW WS: 4 m/s Rain: Nil Stability Category: F[2]	Wind/trees/birds/insects 38-45 Bird 58-64 Quarry inaudible	<30	42

[1] Data obtained from Holcim Teven Quarry onsite meteorological station, located approximately 50km south of site.

[2] Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

4.2 Location R7

Noise monitoring at location R7 was conducted on Wednesday 16 April 2025 with results presented in **Table 4-2**. The quarry was inaudible during the monitoring period, and the ambient environment was dominated by background traffic, wind, trees, birds and a passing car on Pottsville Road. These results satisfy the established noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance.

Table 4-2: Noise survey results and observations for Location R7

Date	Time	Descriptor (dBA)			Meteorology (handheld at microphone height)	Onsite Met Station (10m height)[1]	Apparent Noise Source, Description and SPL (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90					
16-04-25	2:15pm to 2:30pm (Day)	60.8	41.4	37.7	WD: 145° WS: 2.7 m/s Rain: Nil	WD: NW WS: 3.5 m/s Rain: Nil Stability Category: F[2]	Background traffic/wind/trees/birds 38-40 Birds 50-55 Car passing 55-60 Quarry inaudible	<28	42

[1] Data obtained from Holcim Teven Quarry onsite meteorological station, located approximately 50km south of site.

[2] Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

4.3 Location R8

Noise monitoring at location R8 was conducted on Wednesday 16 April 2025 with results presented in **Table 4-3**. The quarry was inaudible at R8 during the monitoring period, and the ambient environment was dominated by background traffic, trees, wind, birds and passing cars on Pottsville Road. These results satisfy the established noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance.

Table 4-3: Noise survey results and observations for Location R8

Date	Time	Descriptor (dBA)			Meteorology (handheld at microphone height)	Onsite Met Station[1] (10m height)	Apparent Noise Source, Description and SPL (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90					
16-04-25	1:44pm to 1:59pm (Day)	73.3	54.8	47.9	WD: 180° WS: 3.1 m/s Rain: Nil	WD: NW WS: 4 m/s Rain: Nil Stability Category: F[2]	Background traffic/wind/trees/birds 48-52 Passing cars 55-60 Quarry inaudible	<38	48

[1] Data obtained from Holcim Teven Quarry onsite meteorological station, located approximately 50km south of site.

[2] Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

5. Conclusion

This NMA was completed by Ramboll at the Holcim Dunloe Sands Quarry, Pottsville, NSW as a quarterly requirement of the NMP showed compliance with the relevant noise criteria. Monitoring was carried out on Wednesday 16 April 2025 at three locations selected as representative to the sensitive receptors at the surroundings to Dunloe Sands Quarry.

No audible quarry noise was recorded at any of the selected monitoring locations. It is noted that the monitoring was completed at the property boundary of each location. As each property dwelling was approximately 40 to 100 metres from the boundary, it is recommended that permission from the property owners be sought to access their property to complete future noise monitoring within 30 metres of the property dwellings.

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

6. References

GHD (2020). Dunloe Sand Quarry Noise Management Plan.
NSW EPA (2018). Development Consent No. 06_0030, MOD2 (November 2018)

International Electrotechnical Commission *IEC 60942:2017 Electroacoustics – Sound calibrators*

NSW EPA (2020). Environment Protection Licence number 13077.

NSW EPA (2013) *Noise Guide for Local Government*. Sydney NSW: NSW Environment Protection Authority. Available at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/noise/20130127nglg.pdf (Accessed: 25 October 2022).

NSW EPA (2014) Discussion Paper. Validation of Inversion Strength Estimation Method.

NSW EPA (2017) *Noise Policy for Industry (NPfI)*. Sydney NSW: NSW Environment Protection Authority. Available at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/noise/17p0524-noise-policy-for-industry.pdf (Accessed: 25 October 2022).

Standards Australia (2018) *AS 1055:2018 Acoustics—Description and measurement of environmental noise*. Australian Standard. Available at: https://infostore.saiglobal.com/preview/825367946534.pdf?sku=1131503_SAIG_AS_AS_2626154 (Accessed: 19 January 2023).

Standards Australia and Standards New Zealand (2019) *AS/NZS IEC 61672.1:2019 Electroacoustics—Sound level meters, Part 1: Specifications*. Australian/New Zealand Standard. Available at: https://infostore.saiglobal.com/preview/825343328243.pdf?sku=1142059_SAIG_AS_AS_2705644 (Accessed: 28 September 2022).

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Dunloe Sand Quarry Quarterly Noise Monitoring Assessment

Quarter 1 2025

RAMBOLL

Bright ideas.
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Dunloe Sand Quarry Quarterly Noise Monitoring Assessment

Quarter 1 2025

Project name	**NSW Environmental Monitoring 2024-2025**
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Version	**1**
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Prepared by	**Jake Bourke, Brodie Wood**
Checked by	**Arnold Cho**
Approved by	**Gavan Butterfield**
Description	**Data collected on 11 February 2025 for Dunloe Quarry during Quarter 1 2025 at Pottsville, NSW, as part of the routine noise monitoring program**

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Abbreviations and Definitions

	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.
°	Degree
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).
C	Celcius
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.
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.
m	Metre
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.
NATA	National Association of Testing Authorities
NMA	Noise Monitoring Assessment
NMP	Noise Management Plan
NPfI	Noise Policy for Industry 2017

	Description
NSW	New South Wales
s	Second
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.
TAPM	The Air Pollution Model

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

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 Dunloe Sands Quarry ("the quarry") at Pottsville, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017)
- Dunloe Sand Quarry Noise Management Plan (NMP) (GHD, 2020)
- Environment Protection Licence (EPL) number 13077 (NSW EPA, 2020)
- Development Consent No. 06_0030, MOD2 (NSW EPA, 2018)
- Australian Standard AS 1055:2018 Acoustics—Description and measurement of environmental noise (Standards Australia, 2018)
- Australian Standard AS/NZS IEC 61672.1:2019 Electroacoustics – Sound level meters, Part 1: Specifications (Standards Australia and Standards New Zealand, 2019)
- IEC 60942:2017 Electroacoustics - Electroacoustics – Sound calibrators (International Standard, 2017).

This NMA has been undertaken for the quarterly period January to March 2025, and forms part of the monitoring program to determine compliance with conditions of the Environmental Protection License (EPL).

1.2 Site Location and Sensitive Receptors

The quarry is approximately 2.5 km south of Pottsville, NSW, a town in the Northern Rivers region in Tweed Shire. Sensitive receptors surrounding the quarry are primarily rural and residential properties in coastal bushland with elevated and undulating topography.

Three monitoring locations have been selected as part of the NMA and in accordance with the EPL and are shown in **Table 1-1**.

Table 1-1: Monitoring locations locality and sensitive receptors

Monitoring Locations	Locality and Sensitive Receptors
R6	West of the quarry situated at a rural residential property at 157 Warwick Park Road.
R7	West of the quarry situated at a rural residential property at 129 Warwick Park Road.
R8	Northwest of the quarry situated at a rural residential property at 679 Pottsville Road.

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**. It should be noted that while the NMP states monitoring locations be measured from the most affected points within surrounding residential property boundaries or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, this has not been possible for this NMA due to access restrictions. Monitoring was completed at the property boundary of each location where accessible and in each case the property dwelling was approximately 40 to 100 metres from the boundary. This would have resulted in a conservative assessment as the monitoring locations were closer to the site.

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Figure 1: Noise monitoring locations

2. Noise Criteria

Table 2-1 summarises the applicable noise criteria outlined in the NMP for residential receivers (R6, R7 and R8) surrounding the quarry. The noise criteria apply when the site is operational within the permitted operating hours Monday to Friday 7am - 5pm, Saturday 7am - 12pm with no operations on Sunday.

Compliance with the noise criteria below would also determine compliance with the noise limits outlined in the sites EPL (EPL 13077) which requires that the quarry's noise contribution will not exceed 48 dB LAeq(15min) at any of the residential receivers.

Table 2-1: Monitoring locations and noise criteria

Receiver	Monitoring Locations	Day[1] LAeq (15min) dB(A)
157 Warwick Park Road	R6	42
129 Warwick Park Road	R7	42
679 Pottsville Road	R8	48
All other residences	-	41

[1] 7 am–6 pm Monday to Saturday

Note: no operations on Sundays and public holidays

3. Methodology

The monitoring program was developed 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 11 December 2024. The acoustic instrumentation used carried a current National Association of Testing Authorities (NATA) calibration and that complied with *AS/NZS IEC 61672-1:2019 class 1*. Calibration of all instrumentation was checked prior to and following measurements using a Pulsar Acoustic Calibrator 105 which carried a current NATA calibration and complies with *IEC 60942:2017.* Drift in calibration did not exceed ±0.3 dBA.

Each attended noise measurement was conducted for 15-minutes in duration during the day period over one day at each monitoring location. Where possible, throughout each measurement the operator(s) quantified the contribution of each significant noise source. Where the quarry was not distinctly audible during the attended monitoring, the quarry contribution was estimated to be at least 10 dBA below the ambient noise level, as determined by the LA90.

3.1 Meteorology

Meterology has an important influence on noise monitoring assessment. Where an onsite meterological station with data recorded at 10m height has not been available, the Holcim Teven Quarry onsite meteorological station located approximately 50km south of site has been used to adopt wind direction, wind speed and rain data to inform this assessment. Temperature data has been adopted from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Conformal Cubic Atmospheric Model (CCAM) and modelled using The Air Pollution Model (TAPM) to determine the atmospheric category as outline in **Table 3-1**.

Table 3-1: Classification of Atmospheric Stability (NSW EPA, 2014)

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. The attended noise monitoring results presented in **Section 4** were not found to be influenced by the following adverse meteorological conditions:

- During periods of rain or hail
- Average wind speed at microphone height exceeding 5 m/s

The following noise enhancing meteorological conditions were encountered during the noise monitoring; however, results still met the criteria outlined in **Table 2-1**.

- Wind speeds greater than 3 m/s measured at 10 m above ground level
- Temperature inversion conditions greater than 3°C/100m.

4. Results and Discussion

4.1 Location R6

Noise monitoring at location R6 was conducted on Tuesday 11 February 2025 with results presented in **Table 4-1**. The quarry was inaudible at R6 during the monitoring period, and the ambient environment was dominated by background traffic, trees, insects, and birds. These results satisfy the noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance during the monitoring period.

Table 4-1: Noise survey results and observations for Location R6

Date	Time	Descriptor (dBA)			Meteorology (handheld at microphone height)	Onsite Met Station (10m height)[1]	Apparent Noise Source, Description and SPL (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90					
11-02-25	12:02pm to 12:17pm (Day)	64.8	47.4	41.3	WD: 60° WS: 0.5 m/s Rain: Nil	WD: S WS: 10 m/s Rain: Nil Stability Category: G[2]	Background traffic/trees/insects and birds 39-58 Loud bird 60-64 Quarry inaudible	<31	42

[1] Data obtained from Holcim Teven Quarry onsite meteorological station, located approximately 50km south of site.

[2] Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

4.2 Location R7

Noise monitoring at location R7 was conducted on Tuesday 11 February 2025 with results presented in **Table 4-2**. The quarry was inaudible during the monitoring period, and the ambient environment was dominated by birds, trees, cicadas and passing cars on Warwick Park Road. These results satisfy the established noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance.

Table 4-2: Noise survey results and observations for Location R7

Date	Time	Descriptor (dBA)			Meteorology (handheld at microphone height)	Onsite Met Station (10m height)[1]	Apparent Noise Source, Description and SPL (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90					
11-02-25	1:52pm to 2:07pm (Day)	71.3	53.1	41.3	WD: n/a WS: 0 m/s Rain: Nil	WD: S WS: 12 m/s Rain: Nil Stability Category: G[2]	Birds/trees/cicadas 40-57 Passing cars 52-71 Quarry inaudible	<31	42

[1] Data obtained from Holcim Teven Quarry onsite meteorological station, located approximately 50km south of site.

[2] Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

4.3 Location R8

Noise monitoring at location R8 was conducted on Tuesday 11 February 2025 with results presented in **Table 4-3**. The quarry was inaudible at R8 during the monitoring period, and the ambient environment was dominated by background traffic, trees, cicadas, birds and passing cars on Pottsville Road. These results satisfy the established noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance.

Table 4-3: Noise survey results and observations for Location R8

Date	Time	Descriptor (dBA)			Meteorology (handheld at microphone height)	Onsite Met Station[1] (10m height)	Apparent Noise Source, Description and SPL (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90					
11-02-25	2:15pm to 2:30pm (Day)	80.7	61.9	41.4	WD: n/a WS: 0 m/s Rain: Nil	WD: S WS: 12 m/s Rain: Nil Stability Category: G[2]	Background traffic/trees/cicadas/birds 38-62 Passing cars 64-80 Quarry inaudible	<31	48

[1] Data obtained from Holcim Teven Quarry onsite meteorological station, located approximately 50km south of site.

[2] Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

5. Conclusion

This NMA was completed by Ramboll at the Holcim Dunloe Sands Quarry, Pottsville, NSW as a quarterly requirement of the NMP showed compliance with the relevant noise criteria. Monitoring was carried out on Tuesday 11 February 2025 at three locations selected as representative to the sensitive receptors at the surroundings to Dunloe Sands Quarry.

No audible quarry noise was recorded at any of the selected monitoring locations. It is noted that the monitoring was completed at the property boundary of each location. As each property dwelling was approximately 40 to 100 metres from the boundary, it is recommended that permission from the property owners be sought to access their property to complete future noise monitoring within 30 metres of the property dwellings.

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

6. References

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NSW EPA (2018). Development Consent No. 06_0030, MOD2 (November 2018)

International Electrotechnical Commission *IEC 60942:2017 Electroacoustics – Sound calibrators*

NSW EPA (2020). Environment Protection Licence number 13077.

NSW EPA (2013) *Noise Guide for Local Government*. Sydney NSW: NSW Environment Protection Authority. Available at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/noise/20130127nglg.pdf (Accessed: 25 October 2022).

NSW EPA (2014) Discussion Paper. Validation of Inversion Strength Estimation Method.

NSW EPA (2017) *Noise Policy for Industry (NPfI)*. Sydney NSW: NSW Environment Protection Authority. Available at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/noise/17p0524-noise-policy-for-industry.pdf (Accessed: 25 October 2022).

Standards Australia (2018) *AS 1055:2018 Acoustics—Description and measurement of environmental noise*. Australian Standard. Available at: https://infostore.saiglobal.com/preview/825367946534.pdf?sku=1131503_SAIG_AS_AS_2626154 (Accessed: 19 January 2023).

Standards Australia and Standards New Zealand (2019) *AS/NZS IEC 61672.1:2019 Electroacoustics—Sound level meters, Part 1: Specifications*. Australian/New Zealand Standard. Available at: https://infostore.saiglobal.com/preview/825343328243.pdf?sku=1142059_SAIG_AS_AS_270564 4 (Accessed: 28 September 2022).