Noise Monitoring Assessment

Dunloe Quarry, Pottsville, NSW
Quarter 1 Ending March 2022

Prepared for: Holcim (Australia) Pty Ltd
February 2022
MAC180611-07RP15

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Dunloe Quarry, Pottsville, NSW

Quarter 1 Ending March 2022

Prepared for: Holcim (Australia) Pty Ltd

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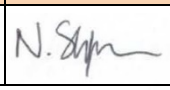
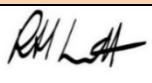
Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC180611-07RP15	Final	10 February 2022	Nicholas Shipman		Rod Linnett	

CONTENTS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for the quarterly period ending March 2022 for Dunloe Quarry (the 'quarry'), Pottsville, NSW.

The monitoring has been conducted in accordance with the Dunloe Project Approval 06_0030, Modification (2018) and Noise Management Plan (2020) at three representative monitoring locations. This assessment represents the operations undertaken during Quarter 1, ending March 2022 and forms part of the annual noise monitoring program to address conditions of the project approval.

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 License (EPL), 13077, 2018;
- NSW Department of Planning, Project Approval 06_0030, Modification 2018;
- GHD, Dunloe Sand Quarry Noise Management Plan (NMP), 2020; and
- Australian Standard AS 1055:2018- Acoustics - Description and measurement of environmental noise - General Procedures.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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2 Noise Criteria

Table 4.1 of Dunloe Sand Quarry's NMP, (2020) outlines the updated applicable noise criteria for residential receivers surrounding the quarry site.

The noise criteria are applicable when the site undertakes quarrying operations within the permitted operating hours Monday to Friday 7am – 5pm, Saturday 7am – 12pm with no operations on Sunday.

Table 1 presents the noise criteria for each of the receivers as outlined in Table 4.1 of the NMP (2020).

Table 1 Noise Criteria

Location	Day Criteria dB $LA_{eq(15min)}$[2]
R6 and R7	42
R8	48
All privately-owned receivers[1]	41

Note 1: Receiver locations are shown in Figure 1.

Note 2: Criteria applicable between Monday to Friday 7am – 5pm, Saturday 7am – 12pm with no operations on Sunday as the Table 4.1 of the NMP (2020)

2.1 Environmental Protection License (EPL 13077)

Compliance with the noise criteria in the NMP would also result in compliance with the EPL noise limits (EPL 13077) which requires noise contribution from the quarry not to exceed 48dB $LA_{eq(15min)}$ at any residential receiver.

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3 Methodology

3.1 Locality

The quarry is approximately 2.5km south west of Pottsville, NSW. Receivers surrounding the quarry are primarily rural/residential situated in coastal bushland with elevated and undulating topography. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1.**

3.2 Noise Monitoring Locations

Three monitoring locations have been selected as part of the NMA and are listed below:

- R6 is located at 157 Warwick Park Road;
- R7 is located at 129 Warwick Park Road; and
- R8 is located at 679 Pottsville Road.

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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 Dunloe Quarry's Project Approval. Measurements were carried out using a Svantek Type 1, 971 noise analyser on 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 ±0.5dBA.

One measurement was conducted at each monitoring location during the daytime period. 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 $LA_{eq(15min)}$ quarry 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.

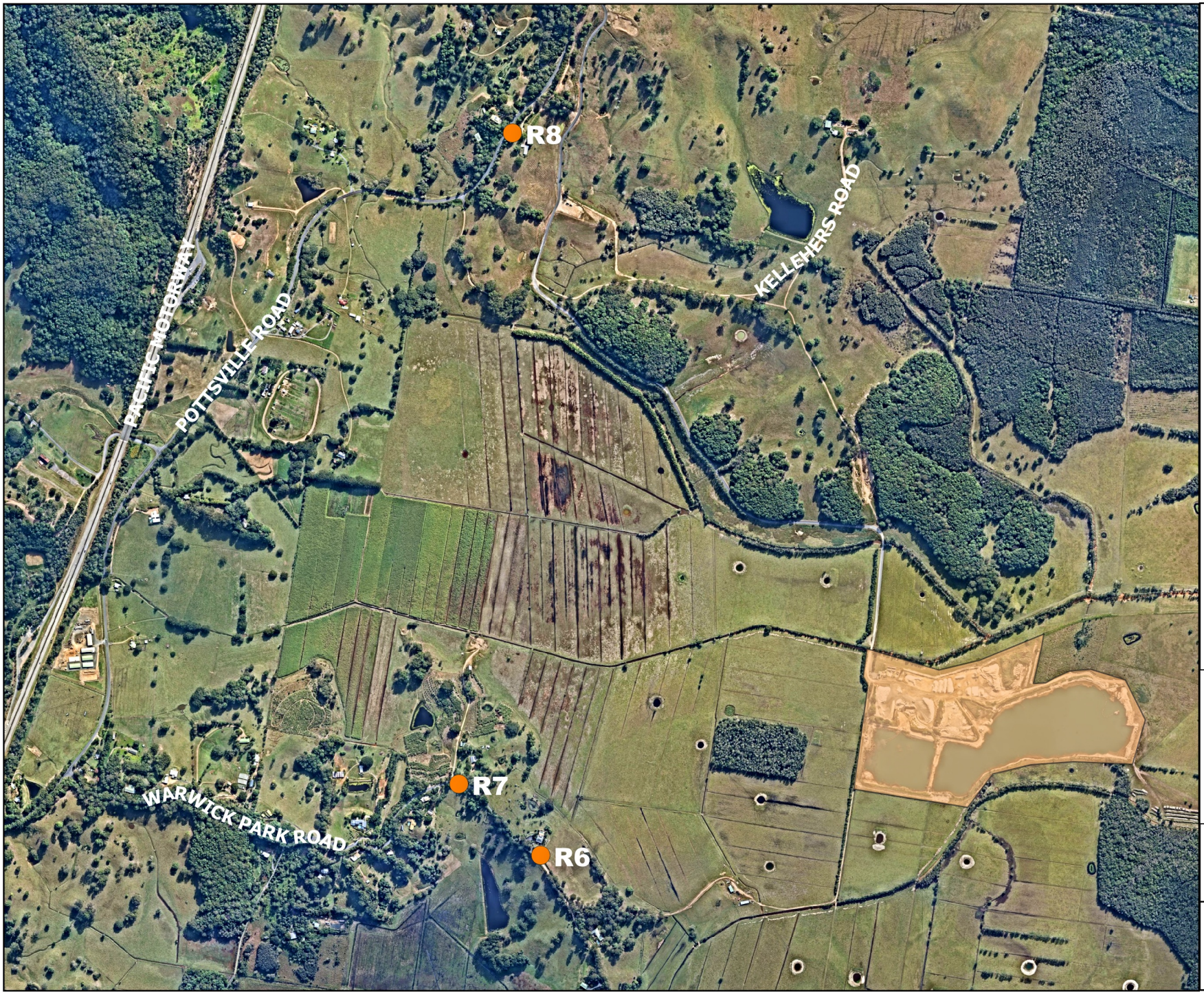

FIGURE 1

Site Locality

MAC180611-07

Holcim Dunloe Quarry

KEY

Receivers

Dunloe Quarry

0 100 200 300 400 500 m

N

MAC
Muller Acoustic Consulting

4 Results

4.1 Assessment Results - Location R6

The monitored noise level contributions and observed meteorological conditions for R6 are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location R6

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
02/02/2022	11:22 (Day)	81	62	41	WD: SW WS: 0.1m/s Rain: Nil	Traffic 37-81 Insects 37-46 Birds 39-44 Quarry inaudible
Dunloe Quarry $L_{Aeq(15min)}$ Contribution						<35

4.2 Assessment Results - Location R7

The monitored noise level contributions and observed meteorological conditions for R7 are presented in **Table 3.**

Table 3 Operator-Attended Noise Survey Results – Location R7

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
02/02/2022	11:42 (Day)	79	57	48	WD: SW WS: 0.1m/s Rain: Nil	Insects 44-46 Birds 44-54 Traffic 44-79 Quarry inaudible
Dunloe Quarry $L_{Aeq(15min)}$ Contribution						<35

4.3 Assessment Results - Location R8

The monitored noise level contributions and observed meteorological conditions for R8 are presented in **Table 4.**

Table 4 Operator-Attended Noise Survey Results – Location R8

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
02/02/2022	11:59 (Day)	58	46	44	WD: SW WS: 0.4m/s Rain: Nil	Insects 42-44 Birds 42-58 Local residential noise 42-43 Aircraft <42 Quarry inaudible
Dunloe Quarry $L_{Aeq(15min)}$ Contribution						<35

5 Discussion

5.1 Discussion of Results - Location R6

Quarry noise emissions were inaudible during monitoring conducted on Wednesday 2 February 2022 at location R6. The (in field) estimated quarry noise contribution satisfied the relevant daytime noise limit of 42dB $LA_{eq(15min)}$. Extraneous noise sources include birds, insects, and traffic during the monitoring period.

5.2 Discussion of Results - Location R7

Quarry noise emissions were inaudible during monitoring conducted on Wednesday 2 February 2022 at location R7. The (in field) estimated quarry noise contribution satisfied the relevant daytime noise limit of 42dB $LA_{eq(15min)}$. Extraneous noise sources include insects, traffic and birds during the monitoring period.

5.3 Discussion of Results - Location R8

Quarry noise emissions were inaudible during monitoring conducted on Wednesday 2 February 2022 at location R8. The (in field) estimated quarry noise contribution satisfied the relevant daytime noise limit of 48dB $LA_{eq(15min)}$. Extraneous noise sources include insects, birds, traffic, aircraft and local residential noise during the monitoring period.

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Holcim (Australia) Pty Ltd at Dunloe Quarry, Pottsville, NSW. The assessment was completed to determine the quarry's compliance with the relevant criteria outlined in the Dunloe Project Approval 06_0030, Modification (2018) at relevant surrounding residential receivers for Quarter 1, ending March 2022.

Attended noise monitoring was undertaken on Wednesday 2 February 2022 at three representative monitoring locations, with quarry noise contributions compared against the relevant criteria. The assessment has identified that noise emissions generated by Dunloe Quarry complies with the relevant noise criteria specified in the NMP (2020) and EPL at all assessed residential receivers.

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Appendix A - Glossary of Terms

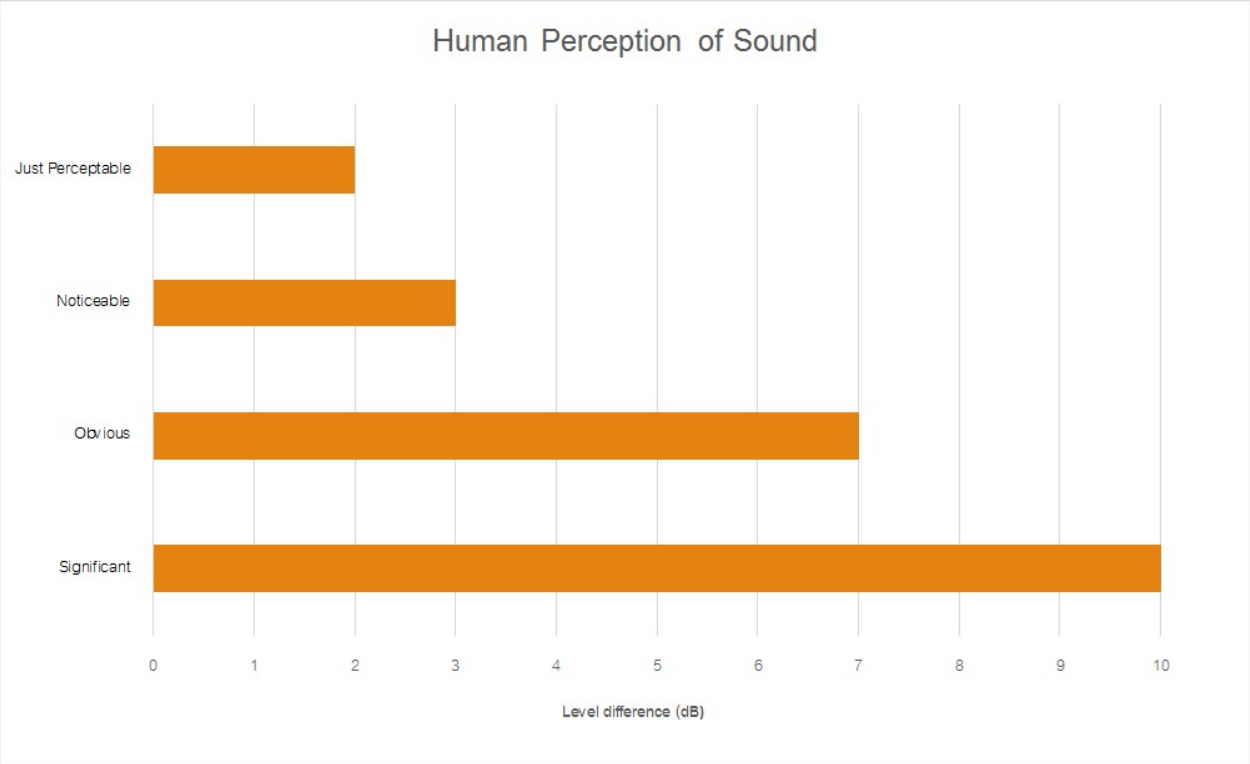
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	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)	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 : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

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



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Noise Monitoring Assessment

Dunloe Quarry, Pottsville, NSW
Quarter 2 Ending June 2022

Prepared for: Holcim (Australia) Pty Ltd
May 2022
MAC180611-07RP16

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Dunloe Quarry, Pottsville, NSW

Quarter 2 Ending June 2022

Prepared for: Holcim (Australia) Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd
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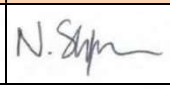
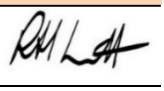
Document ID	Date	Prepared By	Signed	Reviewed By	Signed
MAC180611-07RP16	30 May 2022	Nicholas Shipman		Rod Linnett	

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3 Methodology

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The quarry is approximately 2.5km south west of Pottsville, NSW. Receivers surrounding the quarry are primarily rural/residential situated in coastal bushland with elevated and undulating topography. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.

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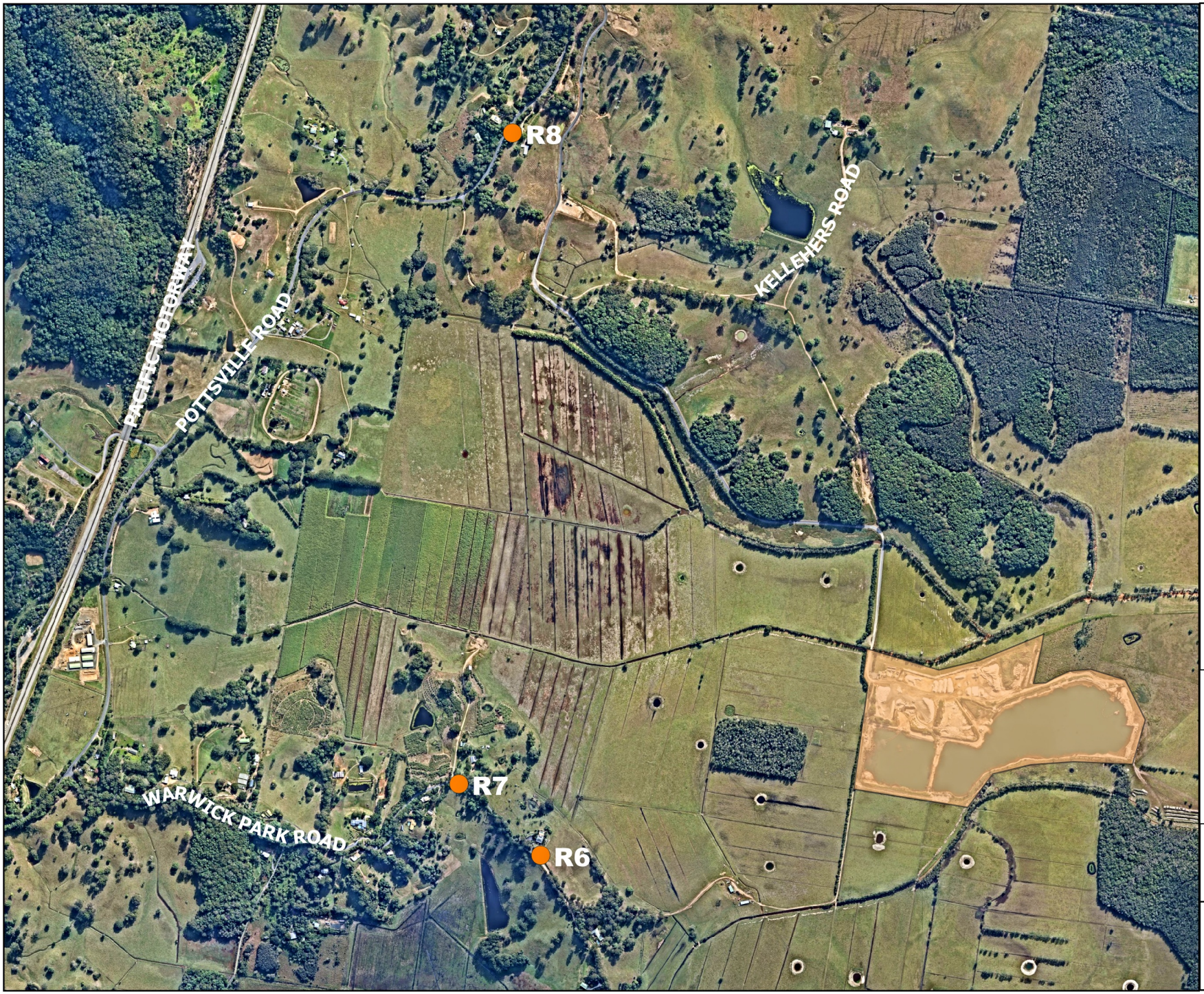

FIGURE 1

Site Locality

MAC180611-07

Holcim Dunloe Quarry

KEY

Receivers

Dunloe Quarry

0 100 200 300 400 500 m

N

MAC
Muller Acoustic Consulting

4 Results

4.1 Assessment Results - Location R6

The monitored noise level contributions and observed meteorological conditions for R6 are presented in **Table 2.**

Table 2 Operator-Attended Noise Survey Results – Location R6

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
19/05/2022	12:50 (Day)	78	58	42	WD: N WS: 1.2m/s Rain: Nil	Traffic 38-78 Birds 45-54 Wind in trees 38-45 Local residential noise 44-46 Aircraft 38-49 Quarry inaudible
Dunloe Quarry $L_{Aeq(15min)}$ Contribution						<35

4.2 Assessment Results - Location R7

The monitored noise level contributions and observed meteorological conditions for R7 are presented in **Table 3.**

Table 3 Operator-Attended Noise Survey Results – Location R7

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
19/05/2022	13:12 (Day)	73	54	39	WD: N WS: 0.5m/s Rain: Nil	Aircraft 44-73 Birds 44-46 Wind in trees 44-46 Traffic 36-68 Dog bark 36-45 Quarry inaudible
Dunloe Quarry $L_{Aeq(15min)}$ Contribution						<35

4.3 Assessment Results - Location R8

The monitored noise level contributions and observed meteorological conditions for R8 are presented in **Table 4.**

Table 4 Operator-Attended Noise Survey Results – Location R8

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
19/05/2022	13:29 (Day)	67	45	36	WD: N WS: 0.4m/s Rain: Nil	Aircraft 38-60 Wind in trees 37-41 Birds 36-48 Traffic 34-67 Quarry inaudible
Dunloe Quarry $L_{Aeq(15min)}$ Contribution						<35

5 Discussion

5.1 Discussion of Results - Location R6

Quarry noise emissions were inaudible during monitoring conducted on Thursday 19 May 2022 at location R6. The (in field) estimated quarry noise contribution satisfied the relevant daytime noise limit of 42dB $LA_{eq(15min)}$. Extraneous noise sources include birds, local residential noise, aircraft, insects, and traffic during the monitoring period.

5.2 Discussion of Results - Location R7

Quarry noise emissions were inaudible during monitoring conducted on Thursday 19 May 2022 at location R7. The (in field) estimated quarry noise contribution satisfied the relevant daytime noise limit of 42dB $LA_{eq(15min)}$. Extraneous noise sources include dog bark, aircraft, wind in trees, traffic and birds during the monitoring period.

5.3 Discussion of Results - Location R8

Quarry noise emissions were inaudible during monitoring conducted on Thursday 19 May 2022 at location R8. The (in field) estimated quarry noise contribution satisfied the relevant daytime noise limit of 48dB $LA_{eq(15min)}$. Extraneous noise sources include birds, traffic, aircraft and wind in trees during the monitoring period.

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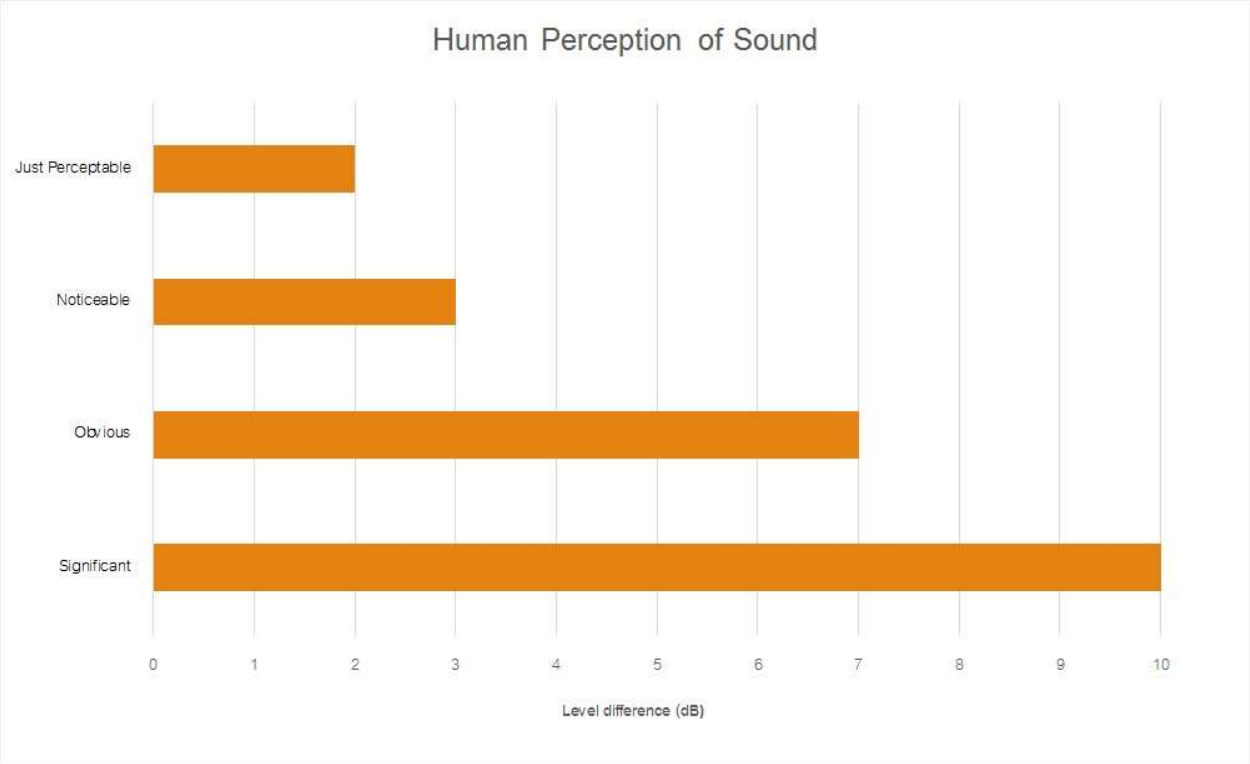
Figure A1 – Human Perception of Sound



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Noise Monitoring Assessment

Dunloe Quarry, Pottsville, NSW
Quarter 3 Ending September 2022

Prepared for: Holcim (Australia) Pty Ltd
September 2022
MAC180611-07RP17

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Dunloe Quarry, Pottsville, NSW

Quarter 3 Ending September 2022

Prepared for: Holcim (Australia) Pty Ltd

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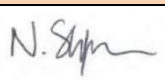
MAC180611-07RP17	7 September 2022	Nicholas Shipman		Rod Linnett	

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Table 1 presents the noise criteria for each of the receivers as outlined in Table 4.1 of the NMP (2020).

Table 1 Noise Criteria

Location	Day Criteria dB $LA_{eq(15min)}$ [2]
R6 and R7	42
R8	48
All privately-owned receivers [1]	41

Note 1: Receiver locations are shown in Figure 1.

Note 2: Criteria applicable between Monday to Friday 7am – 5pm, Saturday 7am – 12pm with no operations on Sunday as the Table 4.1 of the NMP (2020)

2.1 Environmental Protection License (EPL 13077)

Compliance with the noise criteria in the NMP would also result in compliance with the EPL noise limits (EPL 13077) which requires noise contribution from the quarry not to exceed 48dB $LA_{eq(15min)}$ at any residential receiver.

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3 Methodology

3.1 Locality

The quarry is approximately 2.5km south west of Pottsville, NSW. Receivers surrounding the quarry are primarily rural/residential situated in coastal bushland with elevated and undulating topography. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1.**

3.2 Noise Monitoring Locations

Three monitoring locations have been selected as part of the NMA and are listed below:

- R6 is located at 157 Warwick Park Road;
- R7 is located at 129 Warwick Park Road; and
- R8 is located at 679 Pottsville Road.

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 Dunloe Quarry's Project Approval. Measurements were carried out using a Svantek Type 1, 971 noise analyser on Wednesday 31 August 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 ±0.5dBA.

One measurement was conducted at each monitoring location during the daytime period. 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 $LA_{eq(15min)}$ quarry 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.

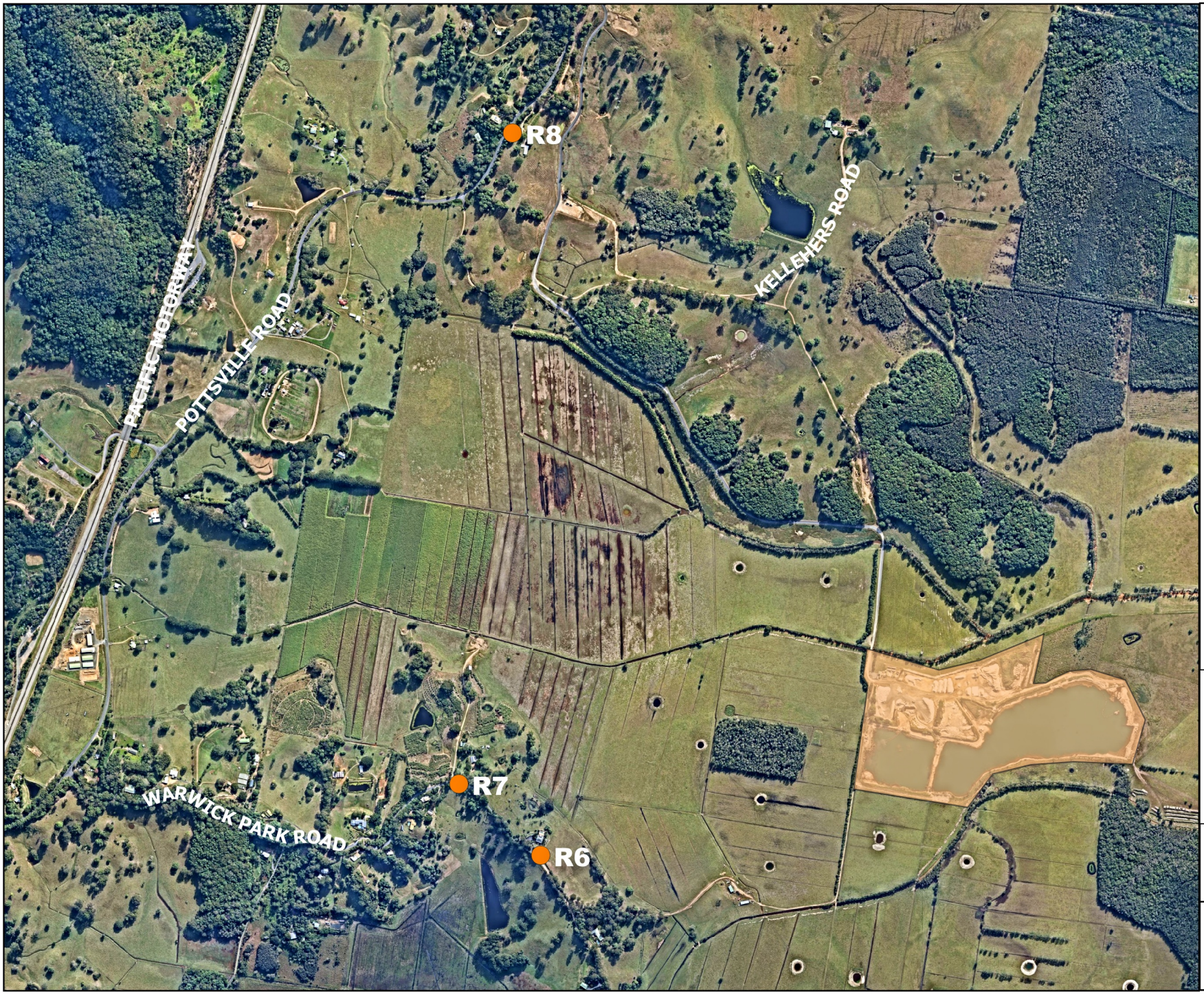

FIGURE 1

Site Locality

MAC180611-07

Holcim Dunloe Quarry

KEY

Receivers

Dunloe Quarry

0 100 200 300 400 500 m

N

MAC
Muller Acoustic Consulting

4 Results

4.1 Assessment Results - Location R6

The monitored noise level contributions and observed meteorological conditions for R6 are presented in **Table 2.**

Table 2 Operator-Attended Noise Survey Results – Location R6

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
31/08/2022	12:36 (Day)	81	63	42	WD: NW WS: 0.2m/s Rain: Nil	Insects <38 Birds 41-54 Traffic 38-81 Aircraft 38-46 Quarry inaudible
Dunloe Quarry $L_{Aeq(15min)}$ Contribution						<30

4.2 Assessment Results - Location R7

The monitored noise level contributions and observed meteorological conditions for R7 are presented in **Table 3.**

Table 3 Operator-Attended Noise Survey Results – Location R7

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
31/08/2022	13:00 (Day)	64	42	37	WD: NW WS: 0.2m/s Rain: Nil	Traffic 34-38 Birds 34-64 Aircraft 34-42 Quarry inaudible
Dunloe Quarry $L_{Aeq(15min)}$ Contribution						<30

4.3 Assessment Results - Location R8

The monitored noise level contributions and observed meteorological conditions for R8 are presented in **Table 4.**

Table 4 Operator-Attended Noise Survey Results – Location R8

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
31/08/2022	13:19 (Day)	64	45	38	WD: NW WS: 0.8m/s Rain: Nil	Wind in trees 36-44 Traffic 36-64 Birds 37-45 Dog bark 38-42 Aircraft 36-46 Quarry inaudible
Dunloe Quarry $L_{Aeq(15min)}$ Contribution						<30

5 Discussion

5.1 Discussion of Results - Location R6

Quarry noise emissions were inaudible during monitoring conducted on Wednesday 31 August 2022 at location R6. The (in field) estimated quarry noise contribution satisfied the relevant daytime noise limit of 42dB $LA_{eq(15min)}$. Extraneous noise sources include insects, birds, traffic and aircraft during the monitoring period.

5.2 Discussion of Results - Location R7

Quarry noise emissions were inaudible during monitoring conducted on Wednesday 31 August 2022 at location R7. The (in field) estimated quarry noise contribution satisfied the relevant daytime noise limit of 42dB $LA_{eq(15min)}$. Extraneous noise sources include traffic, birds and aircraft during the monitoring period.

5.3 Discussion of Results - Location R8

Quarry noise emissions were inaudible during monitoring conducted on Wednesday 31 August 2022 at location R8. The (in field) estimated quarry noise contribution satisfied the relevant daytime noise limit of 48dB $LA_{eq(15min)}$. Extraneous noise sources include wind in trees, traffic, birds, dog bark and aircraft during the monitoring period.

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Holcim (Australia) Pty Ltd at Dunloe Quarry, Pottsville, NSW. The assessment was completed to determine the quarry's compliance with the relevant criteria outlined in the Dunloe Project Approval 06_0030, Modification (2018) at relevant surrounding residential receivers for Quarter 3, ending September 2022.

Attended noise monitoring was undertaken on Wednesday 31 August 2022 at three representative monitoring locations, with quarry noise contributions compared against the relevant criteria. The assessment has identified that noise emissions generated by Dunloe Quarry complies with the relevant noise criteria specified in the NMP (2020) and EPL at all assessed residential receivers.

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Appendix A - Glossary of Terms

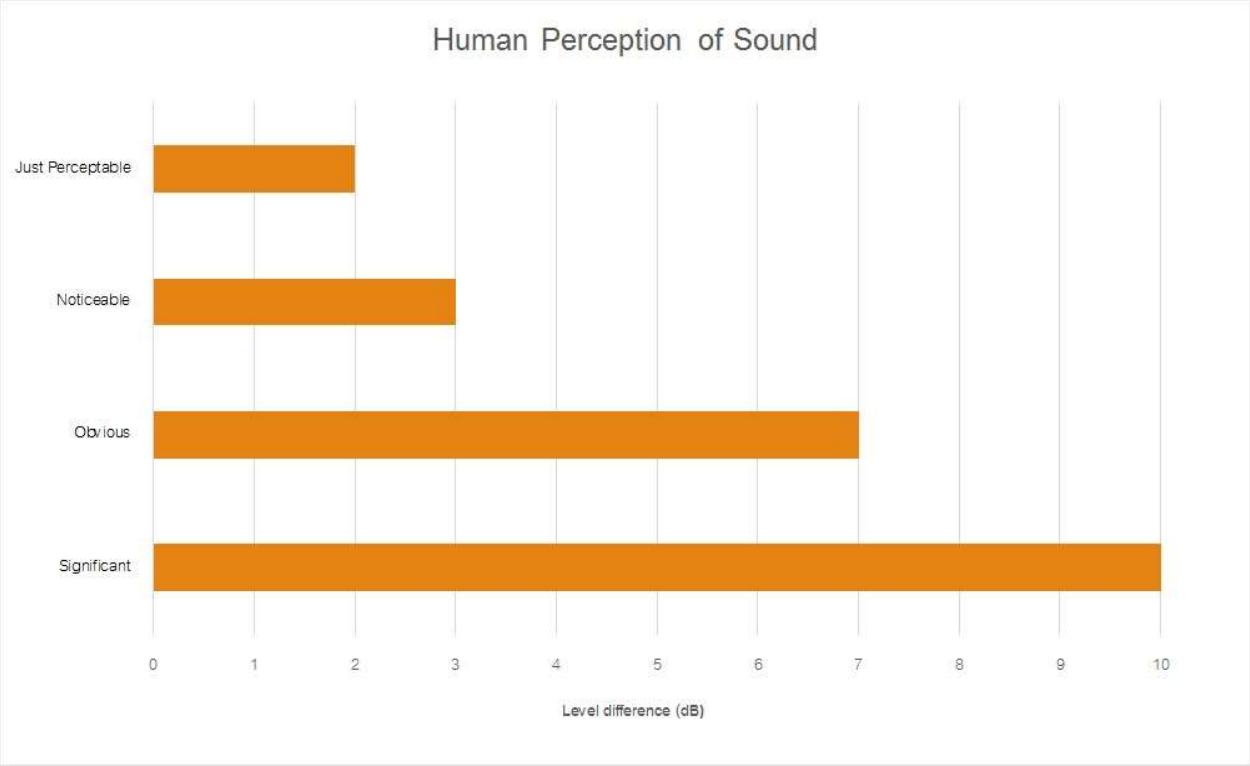
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	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)	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 : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

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



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Intended for
Holcim (Australia) Pty Ltd

Document type
Report

Date
January 2023

Project number
318000911

QUARTERLY NOISE MONITORING ASSESSMENT – QUARTER 4 2022 DUNLOE SANDS QUARRY, POTTSVILLE, NSW

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Project name	**Quarterly Noise Monitoring Assessment for Dunloe Sands Quarry – Quarter 4 2022**
Project no.	**318000911**
Recipient	**Matt Kelly**
Document type	**Report**
Version	**1**
Date	**24/01/2023**
Prepared by	**Jake Bourke**
Checked by	**Patrick Murray**
Approved by	**Greer Laing**
Description	**Data collected on 15 December 2022 for the quarterly period ending December 2022 at Pottsville, NSW, as part of the noise monitoring program**

Ramboll Australia Pty Ltd.
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CONTENTS

Tables

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

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPI) (NSW EPA, 2017).
- Dunloe Sand Quarry Noise Management Plan (NMP) (GHD, 2020).
- Environment Protection Licence (EPL) number 13077 (NSW EPA, 2020).
- Notice of Modification (Draft) (NSW EPA, 2018).
- 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 for the quarterly period October to December 2022, 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**.

Figure 1 : Noise monitoring locations at Dunloe Sands Quarry

2. NOISE CRITERIA

Table 2-1 brings the applicable noise criteria outlined in the NMP for residential receivers (R6, R7 and R8) surrounding the quarry. The noise criteria are applicable 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 result in compliance with the noise limits outlined in the sites EPL (EPL 13077) which requires the quarry's noise contribution to 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	48
679 Pottsville Road	R8	41
[1] 7 am–6 pm Monday to Saturday Note: no operations on Sundays and public holidays		

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 carried out using a RION Sound Level Meter NL-52 on Thursday 15 December 2022. 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-minutes at each location during the day period over one day. 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 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 R6

Noise monitoring at location R6 conducted on Thursday 15 December 2022 resulted in inaudible quarry noise during the day. These results meet the established noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring event at Location R6 are presented in Table 4-1**.**

Noise sources measured included birds. No vehicle traffic occurred on Warwick Park Road during the measurement period.

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

Date	Time	Descriptor (dBA)			Meteorology	Apparent Noise Source, Description and LAeq (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90				
15-12-22	7:28 (Day)	69.6	45.9	38	WD: n/a WS: 0 Rain: Nil	Birds 40 Quarry inaudible	<42	42

4.2 Location R7

Noise monitoring at location R7 conducted on Thursday 15 December 2022 resulted in inaudible quarry noise during the day. These results meet the established noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location R7 are presented in Table 4-2**.**

Noise sources measured included birds and a passing car on Warwick Park Road.

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

Date	Time	Descriptor (dBA)			Meteorology	Apparent Noise Source, Description and LAeq (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90				
15-12-22	7:45 (Day)	78.9	57.3	42	WD: n/a WS: 0 Rain: Nil	Car passing 57-67 Birds 50 Quarry inaudible	<48	48

4.3 Location R8

Noise monitoring at location R8 conducted on Thursday 15 December 2022 resulted in inaudible quarry noise during the day. These results meet the established noise criteria and indicate that noise emissions from Dunloe Sands Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location R8 are presented in Table 4-3**.**

Noise sources measured included birds, highway traffic and a passing car on Pottsville Road.

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

Date	Time	Descriptor (dBA)			Meteorology	Apparent Noise Source, Description and LAeq (dBA)	Dunloe Quarry LAeq(15min) Contribution (dBA)	LAeq(15min) Criteria (dBA)
		LAmax	LAeq	LA90				
15-12-22	8:09 (Day)	77.6	59.6	50	WD: n/a WS: 0 Rain: Nil	Birds Highway traffic 48 Car passing 70-78 Quarry inaudible	<41	41

5. CONCLUSION

Monitoring was carried out on Thursday 15 December 2022 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.

This NMA completed by Ramboll at the Holcim Dunloe Sands Quarry, Pottsville, NSW as a quarterly requirement of the NMP showed compliance to the relevant noise criteria.

6. REFERENCES

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

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