

Annual Noise Monitoring Assessment

South Keswick Quarry
Dubbo, NSW
November 2024

Prepared for: Regional Quarries Australia Pty Limited
December 2024
MAC231914-06RP2



Document Information

Annual Noise Monitoring Assessment

South Keswick Quarry

Dubbo, NSW

November 2024

Prepared for: Regional Quarries Australia Pty Limited

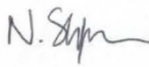

Prepared by: Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

P: +61 2 4920 1833

www.mulleracoustic.com

DOCUMENT ID	DATE	PREPARED	SIGNED	REVIEWED	SIGNED
MAC231914-06RP2	11 December 2024	Nicholas Shipman		Oliver Muller	

DISCLAIMER

All documents produced by Muller Acoustic Consulting Pty Ltd (MAC) are prepared for a particular client's requirements and are based on a specific scope, circumstances and limitations derived between MAC and the client. Information and/or report(s) prepared by MAC may not be suitable for uses other than the original intended objective. No parties other than the client should use or reproduce any information and/or report(s) without obtaining permission from MAC. Any information and/or documents prepared by MAC is not to be reproduced, presented or reviewed except in full.

CONTENTS

1	INTRODUCTION	5
2	ENVIRONMENTAL PROTECTION LICENSE NOISE LIMITS	7
3	METHODOLOGY	11
3.1	LOCALITY	11
3.2	ASSESSMENT METHODOLOGY	11
4	RESULTS	13
4.1	METEOROLOGICAL CONDITIONS	13
4.2	ASSESSMENT RESULTS - LOCATION R3 (EPA 3)	15
4.3	ASSESSMENT RESULTS - LOCATION R7 (EPA 4)	17
4.4	ASSESSMENT RESULTS - LOCATION R10 (EPA 5)	19
4.5	ASSESSMENT RESULTS - LOCATION R31 (EPA 11)	21
5	DISCUSSION	23
5.1	DISCUSSION OF RESULTS - LOCATION R3 (EPA 3)	23
5.2	DISCUSSION OF RESULTS - LOCATION R7 (EPA 4)	23
5.3	DISCUSSION OF RESULTS - LOCATION R10 (EPA 5)	23
5.4	DISCUSSION OF RESULTS - LOCATION R31 (EPA 11)	23
6	CONCLUSION	25

APPENDIX A – GLOSSARY OF TERMS

This page has been intentionally left blank

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Regional Quarries Australia Pty Limited (Regional Quarries) to complete a Noise Monitoring Assessment (NMA) for the South Keswick Quarry (the quarry), Dubbo, NSW.

The NMA involved quantifying the noise contribution of the quarry by direct attended measurements to determine quarry noise emissions so that effective management and controls can be implemented where required. The monitoring has been conducted in general accordance with Conditions L4, R4 and M7 of the EPL #21017 at four representative receiver locations. It is noted that this assessment has been completed to address conditions of the Environmental Protection License (EPL).

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's), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022;
- Environment Protection Licence EPL 21017 (EPL, 2022);
- Standards Australia AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters – Specifications; and
- Standards Australia 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**.

This page has been intentionally left blank

2 Environmental Protection License Noise Limits

Table 1 reproduces the operational noise limits for assessed receivers referenced from condition 4.1 of the EPL #21017 that have been adopted for this NMA and are consistent with historic EPL monitoring locations.

Table 1 Noise Limits, dBA¹				
Receiver Identification	Day ²	Evening ²	Night Shoulder ²	
	L _{Aeq} (15min)	L _{Aeq} (15min)	L _{Aeq} (15min)	L _{Af} (max)
R3	35	35	35	45
R7	39	35	35	45
R10	38	35	35	45
R31	36	35	35	45

Note 1: Noise criteria adopted from EPL 21017.

Note 2: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night Shoulder - the period from 5am to 7am Monday to Saturday as defined from EPL 21017.

The subsequent conditions stated in Section L4 and M7 of the projects EPL (EPL #21017) are reproduced below.

L4.3 Noise-enhancing meteorological conditions.

- a) *The noise limits set out in condition L4.1 apply under the following meteorological conditions, except for the following:*
- b) *For those meteorological conditions referred to in condition L4.3 a), the noise limits that apply are the noise limits in condition L4.1 plus 5dB.*

Assessment Period	Meteorological Conditions
Day	Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level.
Evening	Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level.
Night	Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level.

L4.4 For the purpose of condition L4.3:

- a) The meteorological conditions are to be determined from the meteorological data obtained from the meteorological weather station identified as EPA monitoring point 2.*
- b) Stability category shall be determined using the following method from Fact Sheet D of the Noise Policy for Industry (NSW EPA 2017).*

Note: Noise Policy for Industry is the document titled "Noise Policy for Industry" published by the NSW Environment Protection Authority in October 2017.

L4.5 To assess compliance:

- a) With the L_{Aeq} (15 minute) or the L_{AFmax} noise limits in condition L4.1 and L4.3, the noise measurement equipment must be located:*
 - *approximately on the property boundary, where any residence is situated 30 metres or less from the property boundary closest to the premises; or where applicable;*
 - *in an area within 30 meters of a residence façade, but not closer than 3 meters where any residence on the property is situated more than 30 meters from the property boundary closest to the premises; or where applicable;*
 - *in an area within 50 meters of the boundary of a National Park or a Nature Reserve;*
or
 - *at any other location identified in condition L4.1.*
- b) With the L_{Aeq} (15 minutes) or the L_{AFmax} noise limits in condition L4.1 and L4.3, the noise measurement equipment must be located:*
 - *at the reasonably most affected point at a location where there is no residence at the location; or*
 - *at the reasonably most affected point within an area at a location prescribed by condition L4.5(a).*

L4.6 A non-compliance of conditions L4.1 and L4.3 will still occur where noise generated from the premises is measured in excess of the noise limit at a point other than the reasonably most affected point at the locations referred to in condition L4.5(a) or L4.5(b).

Note to L4.5 and L4.6: The reasonably most affected point is a point at a location or within an area at a location experiencing or expected to experience the highest sound pressure level from the premises.

4.7 For the purpose of determining the noise generated from the premises, the modifying corrections in Table C1 in Fact Sheet C of the Noise Policy for Industry (NSW EPA, 2017) must be applied, if appropriate, to the noise levels measured by the noise monitoring equipment.

4.8 Noise measurements must not be undertaken where rain or wind speed at microphone level will affect the acquisition of valid measurements.

M7 Noise Monitoring

M7.1 To assess compliance with Condition L4.1, attended commissioning noise monitoring must be undertaken in accordance with Condition L4.5 and:

- a) occur at EPA identification points 3, 4, 5, 11;*
- b) occur within 3 months of commencement of operations;*
- c) occur during one day, evening and night period (morning shoulder) as defined in the Noise Policy for Industry for a minimum of:*
 - *1 hour during the day;*
 - *30 minutes during the evening; and*
 - *1 hour during the night (morning shoulder)*
- d) Occur during a period when the premises is operating in a manner typical of its approved operations.*

R4 Other reporting conditions (Noise monitoring report)

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the monitoring outlined in Condition M7.1. The assessment must be prepared by a suitably qualified and experienced person and include:

- a) an assessment of compliance with noise limits at EPA Identification point 3, 4, 5 and 11.*
- b) an outline of any management actions taken within the monitoring periods to address any exceedances of the limits contained in Condition L4.1 and L4.3.*

It is noted that site emissions remained below relevant criteria at all assessed receivers during the November 2024 assessment, therefore mitigation measures were not implemented.

This page has been intentionally left blank

3 Methodology

3.1 Locality

South Keswick Quarry is located at 20L Sheraton Road, Dubbo, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential and for consistency the naming conventions for each receiver have been retained from Condition L4.1 of the EPL. The monitoring locations with respect to the quarry are presented in the locality plan shown in **Figure 1**.

3.2 Assessment Methodology

The attended noise survey was conducted by two MAC staff members in general accordance with the procedures described in Standards Australia AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. Measurements were carried out using two Svantek Type 1, 971 noise analysers between Monday 18 November 2024 and Wednesday 20 November 2024. The acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) and complies with AS/NZS IEC 61672.1-2019- Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed $\pm 0.5\text{dBA}$.

Daytime measurements were of 1 hour (four 15-minutes) duration, evening measurements were of 30 minutes (two 15-minutes) duration and morning shoulder measurements were of 1 hour (four 15-minutes) duration. Where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis to calculate the $L_{Aeq}(15\text{min})$ quarry noise contribution for comparison against the relevant EPL limit.



Prevailing meteorological conditions for the monitoring period were sourced from the South Keswick quarry's on-site meteorological station. Results obtained during non-prevailing meteorological conditions (ie F Class Stability in conjunction with a 2m/s drainage or G Class Stability) are considered not applicable against the EPL criteria.

Where the quarry is inaudible, the contribution is estimated to be at least 10dBA below the ambient noise level.



FIGURE 1
Locality Plan
MAC231914-06
South Keswick Quarry

KEY

-  Quarry Boundary
-  Attended Monitoring Locations



4 Results

The monitoring and assessment results are presented in individual tables for each assessment location.

4.1 Meteorological Conditions

Weather data for the noise assessment was sourced from South Keswick quarry's on-site meteorological station as well as operator measured conditions on site of EPL nominated receiver locations. The data was used to determine prevailing meteorological conditions at the time of the attended measurements, which are presented in **Table 2**.

Table 2 Prevailing Meteorological Conditions

Date & Time	South Keswick Quarry		Operator Measured Weather	
	Meteorological Station		Monitoring Location	
	Dubbo, NSW		(1.8m AGL)	
	Wind Direction	Wind (m/s)	Wind Direction	Wind (m/s)
18/11/2024 18:00	SSW	3.9	SW	1.3
18/11/2024 18:15	SSW	4.3	SW	1.5
18/11/2024 18:33	SSW	4.4	SW	1.5
18/11/2024 18:48	SSW	4.8	SW	1.5
18/11/2024 19:14	SSW	4.0	SW	2.1
18/11/2024 19:29	SSW	3.4	SW	1.3
18/11/2024 19:57	SSW	2.9	SW	0.3
18/11/2024 20:12	SSW	2.7	SW	0.2
19/11/2024 06:00	SE	2.7	N	0.1
19/11/2024 06:15	SE	2.1	N	0.1
19/11/2024 06:30	SSE	1.1	N	0.1
19/11/2024 06:45	S	0.9	N	0.1
19/11/2024 07:00	S	1.1	SE	0.2
19/11/2024 07:15	S	2.3	SE	1.2
19/11/2024 07:30	S	2.5	SE	1.4
19/11/2024 07:45	SSE	2.6	SE	1.7
19/11/2024 08:27	SE	3.0	SE	1.5
19/11/2024 08:42	ESE	4.2	SE	1.8
19/11/2024 08:57	E	4.4	SE	1.2
19/11/2024 09:12	ESE	4.8	SE	1.2
19/11/2024 09:39	ESE	4.5	SE	1.5
19/11/2024 09:54	ESE	4.1	SE	1.5
19/11/2024 10:09	E	4.6	SE	1.5
19/11/2024 10:24	E	4.1	SE	1.5
19/11/2024 10:45	E	4.4	SE	2.5
19/11/2024 11:00	E	3.3	SE	2.5
19/11/2024 11:15	SE	3.0	SE	2.2
19/11/2024 11:30	ESE	2.8	SE	2.1
20/11/2024 06:00	ENE	1.7	N	0.1
20/11/2024 06:15	ESE	1.8	N	0.1
20/11/2024 06:30	ESE	1.6	N	0.1
20/11/2024 06:45	ESE	1.8	N	0.3

4.2 Assessment Results - Location R3 (EPA 3)

The results of the attended noise measurements at location R3 (EPA 3) for the November 2024 survey are summarised in **Table 3** with the relevant EPL limits, the calculated quarry noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 3 Operator-Attended Noise Survey Results – Location R3

Date	Time (hrs) ¹	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology ²	Description and SPL, dBA
		L _A max	L _A eq	L _A 90			
20/11/2024	06:00					WD: E	Traffic 36-57
	(Morning	67	49	43	35/45	WS: 0.2m/s	Birds 36-67
	Shoulder)					Stab: D	Quarry inaudible
	South Keswick Quarry L _A eq(15min) Contribution						<33
	South Keswick Quarry L _A max Contribution						<33
20/11/2024	06:15					WD: E	Traffic 39-61
	(Morning	71	50	44	35/45	WS: 0.2m/s	Birds 41-71
	Shoulder)					Stab: D	Quarry inaudible
	South Keswick Quarry L _A eq(15min) Contribution						<34
	South Keswick Quarry L _A max Contribution						<34
20/11/2024	06:30					WD: E	Traffic 40-57
	(Morning	70	50	44	35/45	WS: 0.4m/s	Birds 42-70
	Shoulder)					Stab: D	Aircraft 45-55
							Quarry alarms <35 (30 seconds)
	South Keswick Quarry L _A eq(15min) Contribution						<30
20/11/2024	06:45					WD: E	Traffic 40-57
	(Morning	57	48	44	35/45	WS: 0.4m/s	Birds 42-55
	Shoulder)					Stab: D	Quarry inaudible
	South Keswick Quarry L _A eq(15min) Contribution						<34
	South Keswick Quarry L _A max Contribution						<34
19/11/2024	08:27					WD: SE	Traffic 42-59
	(Day)	66	49	44	35	WS: 1.5m/s	Birds 42-66
							Aircraft 43-60
							Wind in vegetation 40-44
							Quarry reverse alarms <35 (10 seconds)
South Keswick Quarry L _A eq(15min) Contribution							<30

Table 3 Operator-Attended Noise Survey Results – Location R3

Date	Time (hrs) ¹	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology ²	Description and SPL, dBA
		L _A max	L _A eq	L _A 90			
19/11/2024	08:42 (Day)	56	48	44	35	WD: SE WS: 1.8m/s Stab: D	Traffic 38-54
							Birds 40-56
							Wind in vegetation 38-42
							Aircraft 43-52
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							
19/11/2024	08:57 (Day)	70	50	44	35	WD: SE WS: 1.2m/s Stab: E	Traffic 39-58
							Birds 40-70
							Aircraft 42-57
							Wind in vegetation <40
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							
19/11/2024	09:12 (Day)	65	49	43	35	WD: SE WS: 1.2m/s Stab: E	Traffic 38-54
							Birds 39-65
							Aircraft 42-57
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							
18/11/2024	19:57 (Evening)	68	64	49	35	WD: SW WS: 0.3m/s Stab: E	Insects 47-68
							Dogs barking <55
							Traffic 45-50
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							
18/11/2024	20:12 (Evening)	50	45	43	35	WD: SW WS: 0.2m/s Stab: E	Insects 39-50
							Traffic 39-47
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night Shoulder - the period from 5am to 7am Monday to Saturday as defined from EPL 21017.

Note 2: Meteorological data obtained from direct measurement by the operator and by South Keswick on-site MET station.

4.3 Assessment Results - Location R7 (EPA 4)

The results of the attended noise measurements at location R7 (EPA 4) for the November 2024 survey are summarised in **Table 4** with the relevant EPL limits, the calculated quarry noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 4 Operator-Attended Noise Survey Results – Location R7

Date	Time (hrs) ¹	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology ²	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}			
19/11/2024	06:00					WD: SE	Birds 38-68
	(Morning					WS: 0.2m/s	Traffic 38-52
	Shoulder)	68	49	42	35/45	Stab: F	Dogs barking 40-44
							Quarry alarms <35 (1 minute)
		South Keswick Quarry L _{Aeq} (15min) Contribution					<30
		South Keswick Quarry L _{Amax} Contribution					<35
19/11/2024	06:15					WD: SE	Birds 36-69
	(Morning					WS: 0.2m/s	Traffic 36-58
	Shoulder)	69	51	42	35/45	Stab: F	Dogs barking 42-48
							Quarry trucks <35 (2 minutes)
		South Keswick Quarry L _{Aeq} (15min) Contribution					<30
		South Keswick Quarry L _{Amax} Contribution					<35
19/11/2024	06:30					WD: SE	Birds 38-78
	(Morning					WS: 0.2m/s	Traffic 37-58
	Shoulder)	78	50	44	35/45	Stab: E	Other industry <35
							Dogs barking 44-54
							Quarry alarms <35 (30 seconds)
		South Keswick Quarry L _{Aeq} (15min) Contribution					<30
		South Keswick Quarry L _{Amax} Contribution					<35
19/11/2024	06:45					WD: SE	Traffic 42-55
	(Morning					WS: 0.3m/s	Birds 42-72
	Shoulder)	72	50	45	35/45	Stab: E	Other industry 40-43
							Quarry trucks 38-40 (3 minutes)
							Quarry alarms <35 (30 seconds)
		South Keswick Quarry L _{Aeq} (15min) Contribution					33
		South Keswick Quarry L _{Amax} Contribution					40

Table 4 Operator-Attended Noise Survey Results – Location R7

Date	Time (hrs) ¹	Descriptor (dBA re 20 µPa)			EPL	Meteorology ²	Description and SPL, dBA
		L _A max	L _A eq	L _A 90	Limit		
19/11/2024	07:00 (Day)	64	48	43	39	WD: SE WS: 0.2m/s Stab: E	Traffic 38-63
							Aircraft 43-54
							Birds 38-64
							Other industry 40-44
							Quarry mobile plant 38-45
							(7 minutes)
South Keswick Quarry L _A eq(15min) Contribution							36
19/11/2024	07:15 (Day)	74	47	40	39	WD: SE WS: 1.2m/s Stab: E	Traffic 38-55
							Birds 39-74
							Other industry <37
							Quarry processing 37-40
							(13 minutes)
							South Keswick Quarry L _A eq(15min) Contribution
19/11/2024	07:30 (Day)	66	46	39	39	WD: SE WS: 1.4m/s Stab: E	Traffic 38-53
							Birds 40-66
							Aircraft 43-58
							Quarry processing 37-41
							(constant)
							South Keswick Quarry L _A eq(15min) Contribution
19/11/2024	07:45 (Day)	75	46	39	39	WD: SE WS: 1.7m/s Stab: E	Traffic 37-52
							Birds 38-75
							Wind in vegetation <37
							Quarry processing 36-41
							(constant)
							South Keswick Quarry L _A eq(15min) Contribution
18/11/2024	19:14 (Evening)	58	44	42	35	WD: SW WS: 2.1m/s Stab: E	Insects 40-44
							Birds 40-48
							Traffic 41-58
							Dogs barking 40-43
							Aircraft 40-49
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							<32
18/11/2024	19:29 (Evening)	60	47	45	35	WD: SW WS: 1.3m/s Stab: E	Insects 43-48
							Traffic 43-48
							Residential noise 45-60
							Quarry inaudible
							South Keswick Quarry L _A eq(15min) Contribution

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night Shoulder - the period from 5am to 7am Monday to Saturday as defined from EPL 21017.

Note 2: Meteorological data obtained from direct measurement by the operator and by South Keswick on-site MET station.

4.4 Assessment Results - Location R10 (EPA 5)

The results of the attended noise measurements at location R10 (EPA 5) for the November 2024 survey are summarised in **Table 5** with the relevant EPL limits, the calculated quarry noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 5 Operator-Attended Noise Survey Results – Location R10

Date	Time (hrs) ¹	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology ²	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}			
20/11/2024	06:00					WD: N	Birds 38-82
	(Morning	82	57	42	35/45	WS: 0.1m/s	Traffic 38-46
	Shoulder)					Stab: D	Dogs barking 44-78
							Quarry inaudible
		South Keswick Quarry L _{Aeq} (15min) Contribution					<32
		South Keswick Quarry L _{Amax} Contribution					<32
20/11/2024	06:15					WD: N	Birds 37-52
	(Morning	87	52	40	35/45	WS: 0.1m/s	Traffic 37-44
	Shoulder)					Stab: D	Dogs barking 37-87
							Quarry inaudible
		South Keswick Quarry L _{Aeq} (15min) Contribution					<30
		South Keswick Quarry L _{Amax} Contribution					<30
20/11/2024	06:30					WD: N	Birds 41-46
	(Morning	79	49	40	35/45	WS: 0.1m/s	Traffic 41-44
	Shoulder)					Stab: D	Dogs barking 41-79
							Aircraft 44-58
							Other industry <41
		South Keswick Quarry L _{Aeq} (15min) Contribution					<30
		South Keswick Quarry L _{Amax} Contribution					<30
20/11/2024	06:45					WD: N	Birds 37-67
	(Morning	67	45	40	35/45	WS: 0.3m/s	Traffic 37-44
	Shoulder)					Stab: D	Dogs barking 37-56
							Other industry 37-42
							Quarry inaudible
		South Keswick Quarry L _{Aeq} (15min) Contribution					<30
		South Keswick Quarry L _{Amax} Contribution					<30
19/11/2024	09:39					WD: SE	Birds 43-67
	(Day)	67	50	46	38	WS: 1.5m/s	Aircraft 42-64
						Stab: E	Insects 41-44
							Other industry 43-49
							Quarry inaudible
		South Keswick Quarry L _{Aeq} (15min) Contribution					<36

Table 5 Operator-Attended Noise Survey Results – Location R10

Date	Time (hrs) ¹	Descriptor (dBA re 20 µPa)			EPL	Meteorology ²	Description and SPL, dBA
		L _A max	L _A eq	L _A 90	Limit		
19/11/2024	09:54 (Day)	64	49	45	38	WD: SE WS: 1.5m/s Stab: D	Birds 41-64
							Insects 40-45
							Aircraft 45-56
							Other industry 42-51
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							<35
19/11/2024	10:09 (Day)	71	52	46	38	WD: SE WS: 1.5m/s Stab: D	Birds 42-71
							Insects 42-45
							Aircraft 44-55
							Other industry 42-50
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							<36
19/11/2024	10:24 (Day)	79	54	45	38	WD: SE WS: 1.5m/s Stab: E	Birds 42-79
							Insects 40-44
							Dogs barking 43-52
							Other industry 43-49
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							<35
18/11/2024	18:00 (Evening)	70	46	37	35	WD: SW WS: 0.3m/s Stab: E	Dogs barking 38-44
							Birds 34-70
							Traffic <36
							Aircraft 33-37
							Residential noise 40-42
South Keswick Quarry L _A eq(15min) Contribution							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							<30
18/11/2024	18:15 (Evening)	73	47	38	35	WD: SW WS: 1.5m/s Stab: E	Birds 36-73
							Wind in vegetation 36-44
							Dogs barking 39-52
							Traffic <34
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							<30

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night Shoulder - the period from 5am to 7am Monday to Saturday as defined from EPL 21017.

Note 2: Meteorological data obtained from direct measurement by the operator and by South Keswick on-site MET station.

4.5 Assessment Results - Location R31 (EPA 11)

The results of the attended noise measurements at location R31 (EPA 11) for the November 2024 survey are summarised in **Table 6** with the relevant EPL limits, the calculated quarry noise contribution and prevailing meteorological conditions at the time of each measurement.

Table 6 Operator-Attended Noise Survey Results – Location R31

Date	Time (hrs) ¹	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology ²	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}			
19/11/2024	06:00					WD: N	Birds 38-56
	(Morning	67	54	41	35/45	WS: 0.1m/s	Traffic 38-67
	Shoulder)					Stab: F	Quarry vehicles <39
							(2 minutes)
							South Keswick Quarry L _{Aeq} (15min) Contribution
							30
							South Keswick Quarry L _{Amax} Contribution
							39
19/11/2024	06:15					WD: N	Birds 38-52
	(Morning	76	61	44	35/45	WS: 0.1m/s	Traffic 38-76
	Shoulder)					Stab: F	Quarry vehicles 38-44
							(2 minutes)
							South Keswick Quarry L _{Aeq} (15min) Contribution
							32
							South Keswick Quarry L _{Amax} Contribution
							44
19/11/2024	06:30					WD: N	Birds 37-56
	(Morning	73	57	42	35/45	WS: 0.1m/s	Traffic 37-73
	Shoulder)					Stab: E	Quarry vehicles 37-42
							(2 minutes)
							South Keswick Quarry L _{Aeq} (15min) Contribution
							30
							South Keswick Quarry L _{Amax} Contribution
							42
19/11/2024	06:45					WD: N	Traffic 41-84
	(Morning	84	62	44	35/45	WS: 0.1m/s	Birds 41-56
	Shoulder)					Stab: E	Quarry vehicles <41-45
							(2 minutes)
							South Keswick Quarry L _{Aeq} (15min) Contribution
							33
							South Keswick Quarry L _{Amax} Contribution
							45
19/11/2024	10:45					WD: SE	Traffic 37-83
	(Day)	83	57	40	36	WS: 2.5m/s	Birds 36-61
						Stab: C	Insects 34-37
							Quarry mobile plant 36-38
							(4 minutes)
							South Keswick Quarry L _{Aeq} (15min) Contribution
							31

Table 6 Operator-Attended Noise Survey Results – Location R31

Date	Time (hrs) ¹	Descriptor (dBA re 20 µPa)			EPL	Meteorology ²	Description and SPL, dBA
		L _A max	L _A eq	L _A 90	Limit		
19/11/2024	11:00 (Day)	88	62	40	36	WD: SE WS: 2.5m/s Stab: C	Traffic 38-88
							Birds 37-71
							Wind in vegetation 35-38
							Train passby 40-55
							Quarry mobile plant 35-38 (5 minutes)
South Keswick77 Quarry L _A eq(15min) Contribution							32
19/11/2024	11:15 (Day)	77	59	39	36	WD: SE WS: 2.2m/s Stab: D	Traffic 37-77
							Birds 36-72
							Insects 36-42
							Quarry mobile plant 35-45 (2 minutes)
							South Keswick Quarry L _A eq(15min) Contribution
19/11/2024	11:30 (Day)	82	59	37	36	WD: SE WS: 2.1m/s Stab: C	Traffic 36-82
							Birds 33-65
							Insects 35-40
							Aircraft 37-50
							Quarry mobile plant 33-37 (6 minutes)
South Keswick Quarry L _A eq(15min) Contribution							31
18/11/2024	18:33 (Evening)	72	49	37	35	WD: SW WS: 1.5m/s Stab: E	Traffic 37-66
							Birds 35-72
							Insects 34-38
							Wind in vegetation 35-38
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							<30
18/11/2024	18:48 (Evening)	65	47	39	35	WD: SW WS: 1.5m/s Stab: E	Birds 37-63
							Insects 336-40
							Traffic 40-65
							Dogs barking 38-43
							Quarry inaudible
South Keswick Quarry L _A eq(15min) Contribution							<30

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night Shoulder - the period from 5am to 7am Monday to Saturday as defined from EPL 21017.

Note 2: Meteorological data obtained from direct measurement by the operator and by South Keswick on-site MET station.

5 Discussion

5.1 Discussion of Results - Location R3 (EPA 3)

Monitoring conducted between Monday 18 November 2024 and Wednesday 20 November 2024 identified that quarry mobile plant noise emissions were audible on two occasions during the assessment period at location R3. The estimated quarry contribution remained below relevant criteria during the measurement period. Extraneous sources such as traffic, birds, aircraft, wind in vegetation and dogs barking were audible during the measurement period.

5.2 Discussion of Results - Location R7 (EPA 4)

Monitoring conducted between Monday 18 November 2024 and Wednesday 20 November 2024 identified that quarry mobile plant and processing noise emissions were audible on eight occasions during the assessment period at location R7. The estimated quarry contribution remained below relevant criteria during the measurement period. Extraneous sources such as birds, traffic, dogs barking, aircraft, wind in vegetation, insects, local residential noise and other industry were audible during the measurement period.

5.3 Discussion of Results - Location R10 (EPA 5)

Monitoring conducted between Monday 18 November 2024 and Wednesday 20 November 2024 identified that noise emissions remained inaudible during the assessment period at location R10. Therefore, quarry emissions remained below the relevant noise limits for each measurement period. Extraneous sources such as birds, traffic, dogs barking, aircraft, other industry, insects and residential noise were audible during the measurement period.

5.4 Discussion of Results - Location R31 (EPA 11)

Monitoring conducted between Monday 18 November 2024 and Wednesday 20 November 2024 identified that quarry related vehicles entering and exiting the site along with onsite mobile plant were audible on eight occasions during the assessment period at location R31. The estimated quarry contribution remained below relevant criteria during the measurement period. Extraneous sources such as birds, traffic, insects, wind in vegetation, aircraft, dogs barking and train passby were audible during the measurement period.

This page has been intentionally left blank

6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Regional Quarries Australia Pty Limited. Monitoring was conducted in accordance with Conditions L4 and M7 of the Environmental Protection Licence (EPL #21017, 2022). The assessment was completed to provide annual monitoring data so that South Keswick Quarry can actively quantify and manage site noise emissions.

Attended monitoring conducted between Monday 18 November 2024 and Wednesday 20 November 2024 identified that South Keswick Quarry noise emissions were audible on several occasions during the attended measurement period. A review of monitoring data and operator attended observations determined that South Keswick Quarry contributions remained below relevant limits during the monitoring period.

This page has been intentionally left blank

Appendix A – Glossary of Terms

A number of technical terms have been used in this report and are explained in **Table A1**.

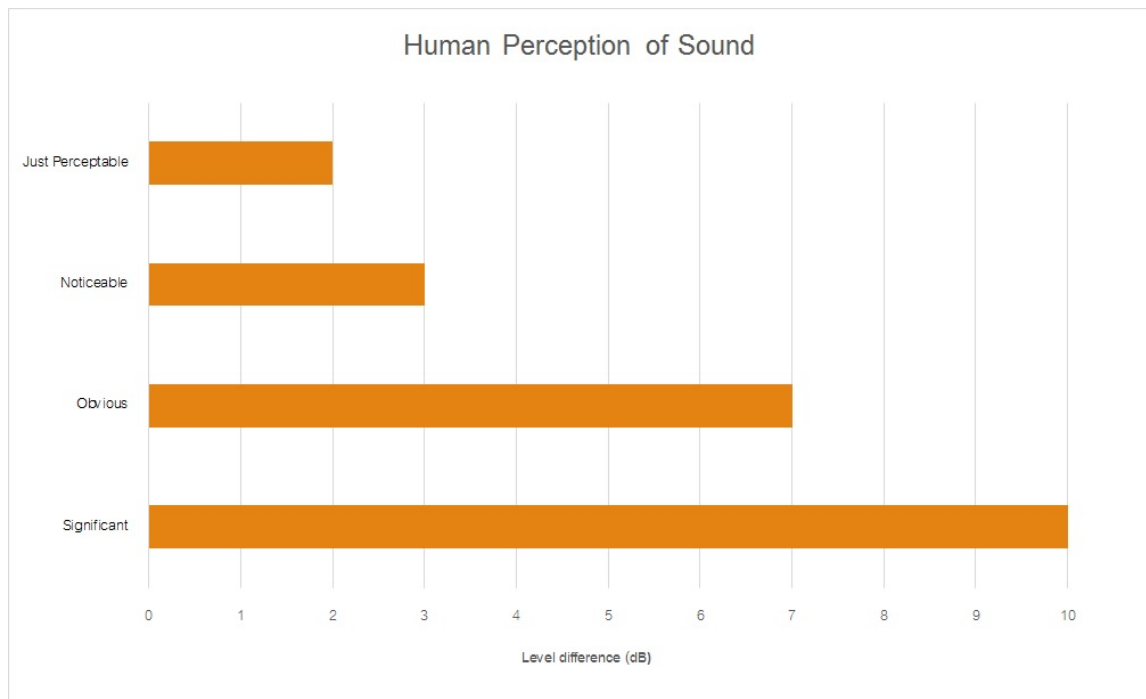
Table A1 Glossary of Acoustical Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The total noise associated with a given environment. Typically, a composite of sounds from all 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 sound.
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 usually represented by the LA90 descriptor
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 Z-weighted or decibels Linear (unweighted).
Extraneous Noise	Sound resulting from activities that are not typical of the area.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A sound level which is exceeded 10% of the time.
LA90	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
LAeq	Represents the average noise energy or equivalent sound pressure level over a given period.
LAmx	The maximum sound pressure level received at the microphone during a measuring interval.
Masking	The phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.
RBL	The Rating Background Level (RBL) as defined in the NPI, is an overall single figure representing the background level for each assessment period over the whole monitoring period. The RBL, as defined is the median of ABL values over the whole monitoring period.
Sound power level (Lw or SWL)	This is a measure of the total power radiated by a source in the form of sound and is given by $10 \cdot \log_{10} (W/W_0)$. Where W is the sound power in watts to the reference level of 10^{-12} watts.
Sound pressure level (Lp or SPL)	the level of sound pressure; as measured at a distance by a standard sound level meter. This differs from Lw in that it is the sound level at a receiver position as opposed to the sound 'intensity' of the source.

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 Pressure Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

Ph: +61 2 4920 1833

www.mulleracoustic.com

