Noise Monitoring Assessment

South Keswick Quarry
Sheraton Road
Dubbo, NSW.

Prepared for: Regional Hardrock Pty Ltd
September 2018
MAC160254NMRP1

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

South Keswick Quarry, Sheraton Road, Dubbo, NSW

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Regional Hardrock Pty Ltd to complete a Noise Monitoring Assessment (NMA) for South Keswick Quarry situated south-east of Dubbo, NSW (the 'quarry').

The monitoring has been conducted in accordance with Conditions L3.1 and M5.1 of the Environmental Protection Licence (EPL) #21017 (EPL). This assessment has been undertaken on Monday 17 September 2018 and Tuesday 18 September 2018, and forms part of the noise monitoring program to address relevant conditions.

The assessment has been conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Environment Protection Licence EPL #21017 (EPL); and
- Australian Standard AS 1055.1:1997 - 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**.

1.1 Operational Noise Criteria

Section L3 of the project's EPL (EPL #21017) identifies that criteria for the project are 35dBA LAeq(15min) for all periods and an LAmax of 45dBA for the morning shoulder/night assessment periods.

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2 Methodology

All attended noise surveys for this assessment were conducted in general accordance with the procedures described in Australian Standard AS 1055-1997, "Acoustics - Description and Measurement of Environmental Noise" and the EPL.

The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

2.1 Operator Attended Noise Measurement Methodology

Monitoring was completed as per condition M5 of the EPL which states :

M5 Noise monitoring

M5.1 To assess compliance with Condition L3.1, attended commissioning noise monitoring must be undertaken in accordance with Condition L3.5 and:

a) at locations R4, R7 and R10 as listed in Condition L3.1;

b) occur within 3 months of commencement of operations;

c) occur during one day, evening and night period (morning shoulder) as defined in the NSW Industrial Noise Policy for a minimum of:

-15 minutes of typical processing activity during the day;

-15 minutes of typical processing activity during the evening; and

-15 minutes of typical night time processing activity during the night.

In addition, two free-field reference locations were assessed to quantify noise levels at the boundary of future residential land developments to the west of the quarry.

The receiver locations and attended noise measurement location are presented in **Figure 1.**

Measurements were carried out using Svantek Type 1, 971 noise analysers, and where possible throughout each survey the operator quantified the contribution of any significant noise sources.

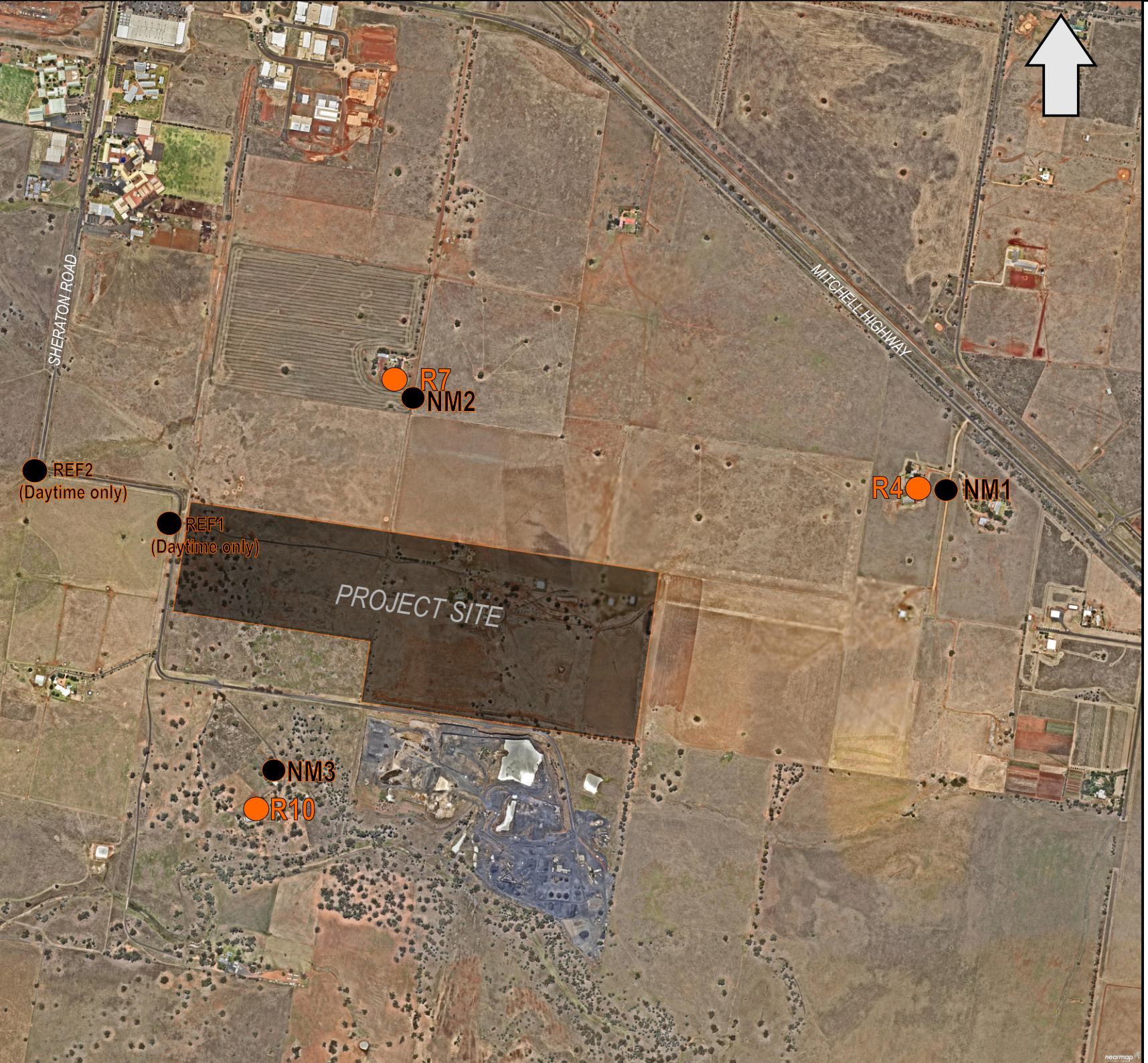

FIGURE 1

LOCALITY PLAN

REF: MAC160254

0 250m

KEY

R1	RECEIVER LOCATIONS
NM1	MONITORING LOCATIONS
	PROJECT SITE

MAC
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3 Results

3.1 Operator Attended Noise Results

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

3.1.1 Noise Monitoring Results NM1 (R4)

The results of the 15 minute attended noise measurements for Monday 17 September 2018 and Tuesday 18 September 2018 for NM1 (R4) are summarised in **Table 1**.

Table 1 Operator-Attended Noise Survey Results – NM1 (R4)

Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
18/09/18 06:43 (Morning Shoulder)	79	56	47	Wind: 0.5m/s Dir: N Rain: Nil	Traffic 49-57 Livestock 44-46 Birds <54
Quarry Site $L_{Aeq(15min)}$ Contribution					N/A (quarry inaudible)
17/09/18 10:48 (Day)	78	51	39	Wind: 0.5m/s Dir: W Rain: Nil	Traffic 40-49 Livestock 42-76 Birds 42-46
Quarry Site $L_{Aeq(15min)}$ Contribution					N/A (quarry inaudible)
17/09/18 18:30 (Evening)	59	46	35	Wind: 0.5m/s Dir: N Rain: Nil	Traffic 30-52 Dog 26-38 Aircraft 38-53
Quarry Site $L_{Aeq(15min)}$ Contribution					N/A (quarry inaudible)

3.1.2 Noise Monitoring Results NM2 (R7)

The results of the 15 minute attended noise measurements for Monday 17 September 2018 and Tuesday 18 September 2018 for NM2 (R7) are summarised in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – NM2 (R7)

Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
18/09/18 06:23 (Morning Shoulder)	65	48	45	Wind: 0.5m/s Dir: N Rain: Nil	Traffic 42-50 Birds 43-48
	Quarry Site $L_{Aeq(15min)}$ Contribution				N/A (quarry inaudible)
17/09/18 16:26 (Day)	60	42	33	Wind: 0.5m/s Dir: W Rain: Nil	Processing 30-34 Mobile Plant 33-34 Birds 32-38 Aircraft 48-58 Local residential noise to 41
	Quarry Site $L_{Aeq(15min)}$ Contribution				34
17/09/18 18:54 (Evening)	44	33	28	Wind: 0.5m/s Dir: N Rain: Nil	Traffic 28-36
	Quarry Site $L_{Aeq(15min)}$ Contribution				N/A (quarry inaudible)

3.1.3 Noise Monitoring Results NM3 (R10)

The results of the 15 minute attended noise measurements for Monday 17 September 2018 and Tuesday 18 September 2018 for NM3 (R10) are summarised in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – NM3 (R10)

Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
18/09/18 06:00 (Morning Shoulder)	81	58	42	Wind: 0.1m/s Dir: N Rain: Nil	Dogs 41-44 Birds 45-63 Local traffic/trucks 46-81
Quarry Site $L_{Aeq(15min)}$ Contribution					N/A (quarry inaudible)
17/09/18 15:11 (Day)	77	51	39	Wind: 0.5m/s Dir: SW Rain: Nil	Industrial noise 39-52 Birds 43-51 Aircraft 43-56 Local residential noise to 46-71
Quarry Site $L_{Aeq(15min)}$ Contribution					N/A (quarry inaudible)
17/09/18 18:07 (Evening)	62	42	28	Wind: 0.5m/s Dir: N Rain: Nil	Traffic 36-41 Birds 28-42 Aircraft 34-61 Dogs 30-33
Quarry Site $L_{Aeq(15min)}$ Contribution					N/A (quarry inaudible)

3.1.4 Noise Monitoring Results REF1 and REF2

The results of the 15 minute attended noise measurements for Monday 17 September 2018 for REF1 and REF2 are summarised in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – NM3 (R10)

Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
REF1					
17/09/18 15:37 (Day)	76	58	37	Wind: 0.1m/s Dir: N Rain: Nil	Trucks (not site) 42 Birds 43-51 Aircraft 46-61 Local traffic 44-75 Industrial noise 33-35
Quarry Site $L_{Aeq(15min)}$ Contribution					N/A (quarry inaudible)
REF2					
17/09/18 15:57 (Day)	82	57	34	Wind: 1m/s Dir: W Rain: Nil	Birds 42-45 Construction noise (residential) 33-48 Local traffic 38-82
Quarry Site $L_{Aeq(15min)}$ Contribution					N/A (quarry inaudible)

4 Discussion

4.1 Operator Attended Noise Discussion

4.1.1 Discussion of Results - NM1 (R4)

Operator attended measurement results at NM1 (R4), on Monday 17 September 2018 and Tuesday 18 September 2018 identified that quarry noise was inaudible during all assessment periods. Generally, birds, and offsite road traffic were dominant sources throughout all three monitoring periods with noise emissions from the quarry inaudible. The noise contribution from the quarry satisfied the relevant noise criterion for the attended measurements during all assessment periods.

4.1.2 Discussion of Results – NM2 (R7)

Monitoring results at NM2 (R7), identified that the noise emissions from the quarry were audible during the daytime assessment period. Generally, the three measurements at this location were dominated by extraneous offsite noise sources such as local traffic and bird noise. The onsite processing plant was audible with occasional truck noise also audible. Notwithstanding, quarry noise emissions satisfied the daytime, evening and morning shoulder noise criteria.

4.1.3 Discussion of Results – NM3 (R10)

Noise emissions from the quarry were inaudible during the day, evening and morning shoulder periods on Monday 17 September 2018 and Tuesday 18 September 2018 at NM3. Therefore, quarrying operations satisfied relevant operational noise limits. Noise levels at the monitoring location were dominated by ambient sources not associated with the quarry such as highway traffic, aircraft and bird noise.

4.1.4 Discussion of Results – REF1 and REF2

REF1 and REF2 are intermediate measurement locations selected to quantify quarry noise contributions at offsets representative of future residential development and are not related to requirements of the EPL. Noise emissions from the quarry were inaudible during the day period on Monday 17 September 2018 at both reference locations. Therefore, quarrying operations satisfied relevant operational noise limits which infers compliance with criteria for future residential developments at these offsets. Noise levels at the monitoring location were dominated by ambient sources not associated with the quarry such as highway traffic, aircraft, bird noise, residential construction noise and adjoining industry (not the project site).

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5 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Regional Hardrock Pty Ltd at South Keswick Quarry situated south-east of Dubbo, NSW (the 'quarry').

Attended monitoring has identified that operational noise emissions generated by the quarry comply with relevant noise limits at all receivers and satisfy criteria at offset distances representative of future residential land use development.

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Appendix A – Glossary of Terms

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

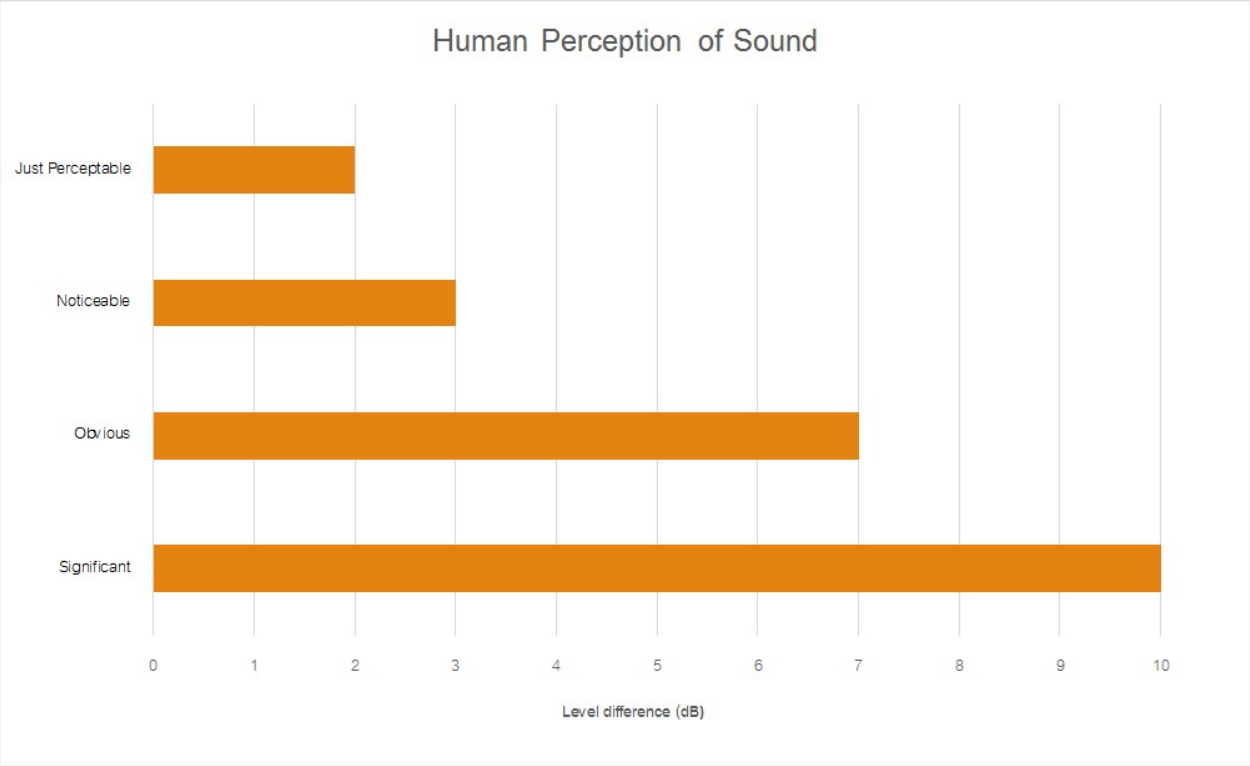
Table A1 Glossary of Terms

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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