

DARGUES GOLD MINE

**Compliance Noise Monitoring
March 2020**

Prepared for:

Big Island Mining Pty Ltd
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BASIS OF REPORT

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
670.10945.00450-R01-v1.0	28 April 2020	Matthew Bryce	Martin Davenport	Matthew Bryce

CONTENTS

1	INTRODUCTION	4
2	PROJECT NOISE LIMIT	4
3	COMPLIANCE MEASUREMENT SURVEY	6
3.1	Methodology	6
3.2	Instrumentation	7
3.3	Results	7
4	CONCLUSIONS	9

DOCUMENT REFERENCES

TABLES

Table 1	Noise Measurement Locations.....	6
Table 2	Acoustic Instrumentation.....	7
Table 3	Noise Measurement Results	8

FIGURES

Figure 1	Noise Monitoring Locations	5
Figure 2	Frequency Analysis – Receptor R20	9

1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has undertaken a noise measurement survey at residential locations in the vicinity of the Dargues Gold Mine, at Majors Creek, NSW. Majors Creek is located 16 km south of Braidwood, NSW.

This report provides the results of measurements undertaken on Wednesday 11 March 2020 to demonstrate compliance with the project noise limits for the site.

The site and its surrounds are shown in **Figure 1**, together with the noise measurement locations.

Previous compliance measurements undertaken in September 2019 by SLR¹ at the selected locations including those specified in the NMP found that site noise levels complied with the project noise limit following frequency analysis to remove dominant ambient and extraneous noise where appropriate.

Compliance noise measurements for December 2019 quarter were abandoned due to safety concerns relating to bushfire activity at that time.

2 Project Noise Limit

The project is classified as a State Significant Development (SSD) (Application no.: MP10-0054). In relation to noise, Condition 1 Schedule 3 states:

Noise from the premises must not exceed the sound pressure level (noise) limits presented in the Table below. Note that the limits apply to the operation of the project and represent the sound pressure level (noise) contribution, at the nominated receiver locations in the Table.

Location	Day dBA LAeq(15minute)	Evening dBA LAeq(15minute)	Night	
			dBA LAeq(15minute)	LA1(1minute)
Any residential premises	35	35	35	45
Majors Creek State Conservation Area (when in use by any person)	35	35	35	45

Notes:

Within 30 metres of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable, within approximately 50 metres of the boundary of a National Park, Nature Reserve or State.

With the LA1(1minute) noise limits in the Table, the noise measurement equipment must be located within 1 metre of a dwelling facade.

With the noise limits in the Table, the noise measurement equipment must be located at the most affected point at a location where there is no dwelling at the location; or at the most affected point within an area at a location prescribed by these conditions.

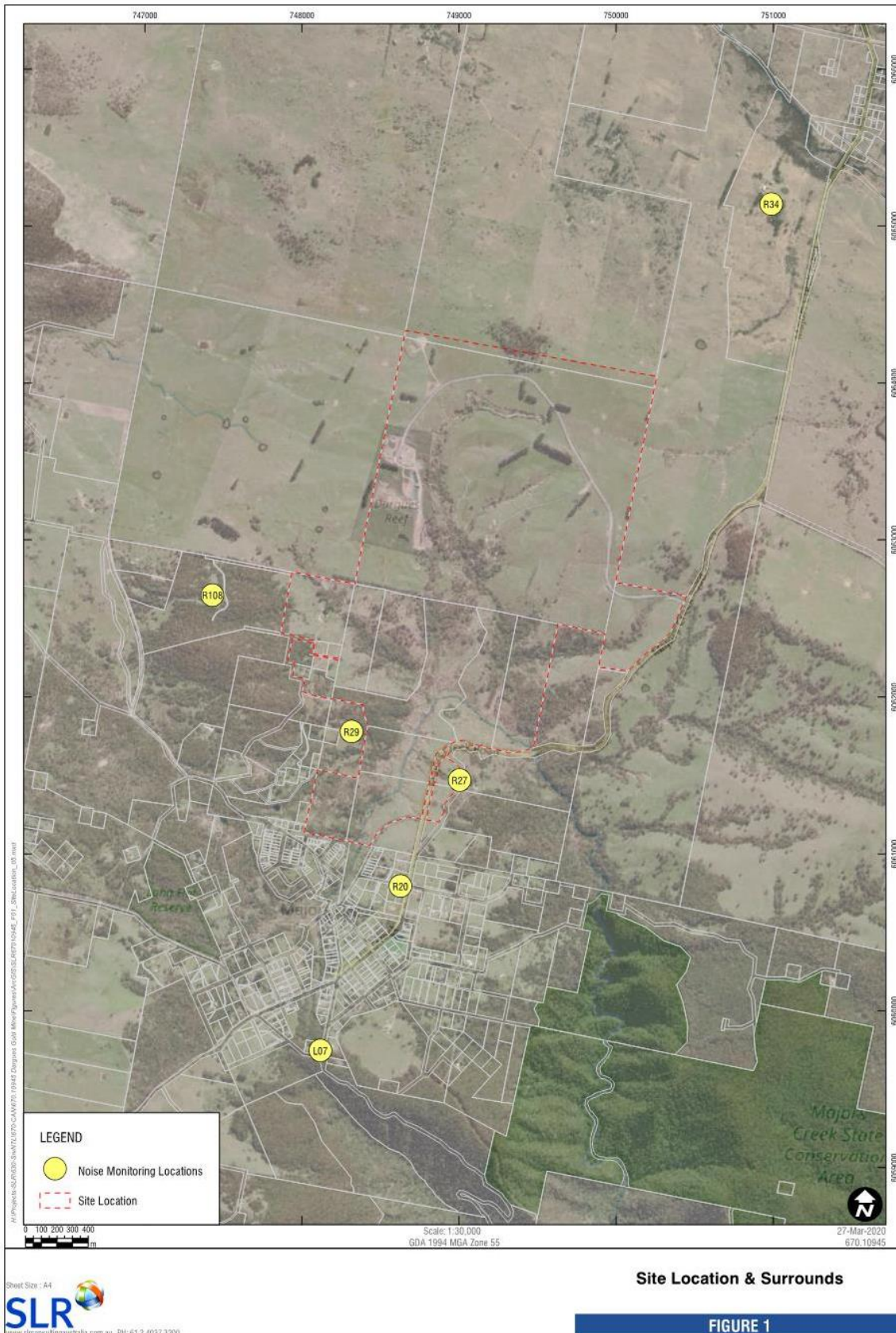
The noise limits in the table apply under the following meteorological conditions:

- wind speed up to 3 m/s at 10 metres above ground level; or
- temperature inversion conditions of up to 3°C/100m and wind speed up to 2 m/s at 10 metres above ground level.

A breach of this licence will still occur where noise generated from the premises in excess of the appropriate limit is measured at a location other than an area prescribed in these notes and/or at a point other than the most affected point at a location.

¹ Dargues Gold Mine – Compliance Noise Monitoring September 2019, Report 670.10945.00350-R02-v3.0, dated 1 October 2019.

Figure 1 Noise Monitoring Locations



3 Compliance Measurement Survey

3.1 Methodology

The measurements were taken in general accordance with Section 8.2 of the Noise Management Plan² (NMP) for the site. That document provides details of the relevant standards and polices required to be considered in relation to the noise measurements and subsequent analysis.

Measurements of the mine noise at the locations described in **Table 1** were conducted between 6:30 am and 10:30 am on Wednesday 11 March 2020. It was understood that mine operations that generate significant noise were limited to the daytime period, meaning that measurements during the evening and night-time periods were not required.

Table 1 Noise Measurement Locations

Measurement Location	Address
R20	12 Bourke Street, Majors Creek
R27	1155 Majors Creek Road, Majors Creek
R29	Cawthornes Lane, Majors Creek
R34	"Mill Pond Farm", 664 Majors Creek Road, Jembaicumbene
R108	Grey Gums Road, Majors Creek
L07	Cnr Seymour Street and Erlington Lane, Majors Creek

It is understood that the activity at the mine site that generated significant noise emissions during the measurements consisted of:

- 1 x bulldozer
- 3 x Moxy articulated haul trucks
- 2 x large excavators
- 3 x 100 kVA generators
- 2 x large cranes
- 1 x grader
- 1 x Moxy articulated water truck cart
- 3 x diesel water pumps

SLR is advised by the mine operator that the level of activities on site during the measurements were higher than normal due to the need to pump water following recent heavy rains. The pumps were located at several locations on the site operated during the daytime and night-time periods.

² Noise Management Plan (DGM – 040508 – NMP, Revision 4, dated 23/01/2017) ("the NMP").

The following weather conditions were recorded at the onsite weather station during the noise measurements:

- Temperature – 9°C to 17°C
- Rainfall – nil
- Wind – calm to less than 2 m/s until 8:30 am, then between 2 m/s and 3 m/s until 10:30 am. The direction was generally from the north and nor-northwest
- Fog – present during the early part of the measurements, indicating probable temperature inversion conditions which enhance the propagation of noise in the atmosphere.

The conditions prior to 8:30 am would be considered excellent for the purpose of conduction environmental noise measurements.

3.2 Instrumentation

Details of the acoustic instrumentation used for the noise measurements are shown in **Table 2**.

Table 2 Acoustic Instrumentation

Instrument	Serial Number
RION Type NA-28 precision Sound Level Meter	01060054
RION Type NA-72 Acoustic Calibrator	34873142

The sound level meter was configured to record unweighted, fast response, 1/3 octave sound pressure levels and A-weighted overall noise levels. The microphone was fitted with an acoustic windscreen and positioned about 1.6 m above the ground.

The calibration of the instrumentation was checked before and after the monitoring period and was found to be within an acceptable margin of ± 1 dBA of the reference signal.

All items of acoustic instrumentation were designed to comply with Australian Standard (AS) IEC 61672.1 2004 *Electroacoustics – Sound Level Meters* and AS IEC 60942 2004 *Electroacoustics – Sound calibrators* and carried current NATA calibration certificates.

3.3 Results

This section provides the results of the noise measurements together with comments and observations for each of the measurement locations.

Attempts have been made to remove the contributions of ambient and extraneous, non-mine sources from the measured samples by using frequency analysis in order to establish the level of noise attributable to the mine. The resultant noise level following frequency analysis is referred to as the “Maximum Mine Noise” level, ie the $L_{Aeq,adj}(15\text{minute})$ noise level.

It should be noted that the maximum mine noise level is likely to still include noise contributions from non-mine sources that cannot be reliably removed from the measurement. In general, frequency analysis is not performed where the overall measured noise level, ie inclusive of mine noise and ambient/extraneous noise, is less than the project noise limit.

It is difficult to remove the influence of “wind-in-tree” noise as it is relatively “bland” (ie lacks a particular or identifiable noise character), which tends to be the most frequent ambient noise, and so the adjusted “maximum mine noise” level may still include contributions from ambient/extraneous noise sources.

Similarly, the effects of wind on the microphone, even when fitted with an acoustic wind diffuser, can be particularly significant at mid- and low- frequencies, and generally cannot be reliably separated from the measurement sample.

The adjusted “maximum mine noise” level also includes “penalties” where applicable and required in accordance with the NSW *Noise Policy for Industry* (NPfI) to account for “annoying characteristics” including tonal and/or intermittent character and/or a low frequency component.

The results of the survey are summarised in **Table 3**.

Table 3 Noise Measurement Results

Location	Time	Noise Level, dBA			Comments
		LAeq(15minute)		LA90	
		Measured	Maximum Mine Noise		
R27	6:40 am	35	--	26	Site noise inaudible, bird noise most dominant but infrequent.
R108	7:10 am	39	36	34	Birds and other ambient noise dominant. Low-frequency site noise just audible and reverse alarms and a horn audible at times but not directly measurable.
R29	7:45 am	42	32	30	Site noise inaudible, bird noise dominant. Traffic noise (not mine-related)
L07	8:20 am	43	31	28	Site noise was inaudible. Birds and other ambient noise dominant.
R20	8:45 am	43	33	32	Birds and other ambient noise dominant. Low-frequency site noise audible during lulls of bird noise but not directly measurable.
R34	9:20 am	50	--	29	No site noise audible. Vegetation noise caused by the breeze rustling the leaves, together with birds and cows, dominated noise levels. Several vehicle pass-bys occurred but were eliminated where possible.

The mine noise, when audible, was deemed free of tonal and low frequency characteristics when analysed in accordance with the NPfI. Therefore, no modifying factor adjustments were necessary to be applied to the mine noise level.

It can be seen in **Table 3** that the maximum noise levels, once the known contributions of ambient and extraneous noise have been removed, where possible, would comply with the project noise limit of 35 dBA LAeq(15minute) at all measurement locations, with the exception of R108 where an exceedance of 1 dB was recorded.. In accordance with Section 11.1.3 of the NPfI:

A development will be deemed to be in non-compliance with a noise consent or licence if the monitored noise level is more than 2 dB above the statutory noise limit specified in the consent of licence condition.

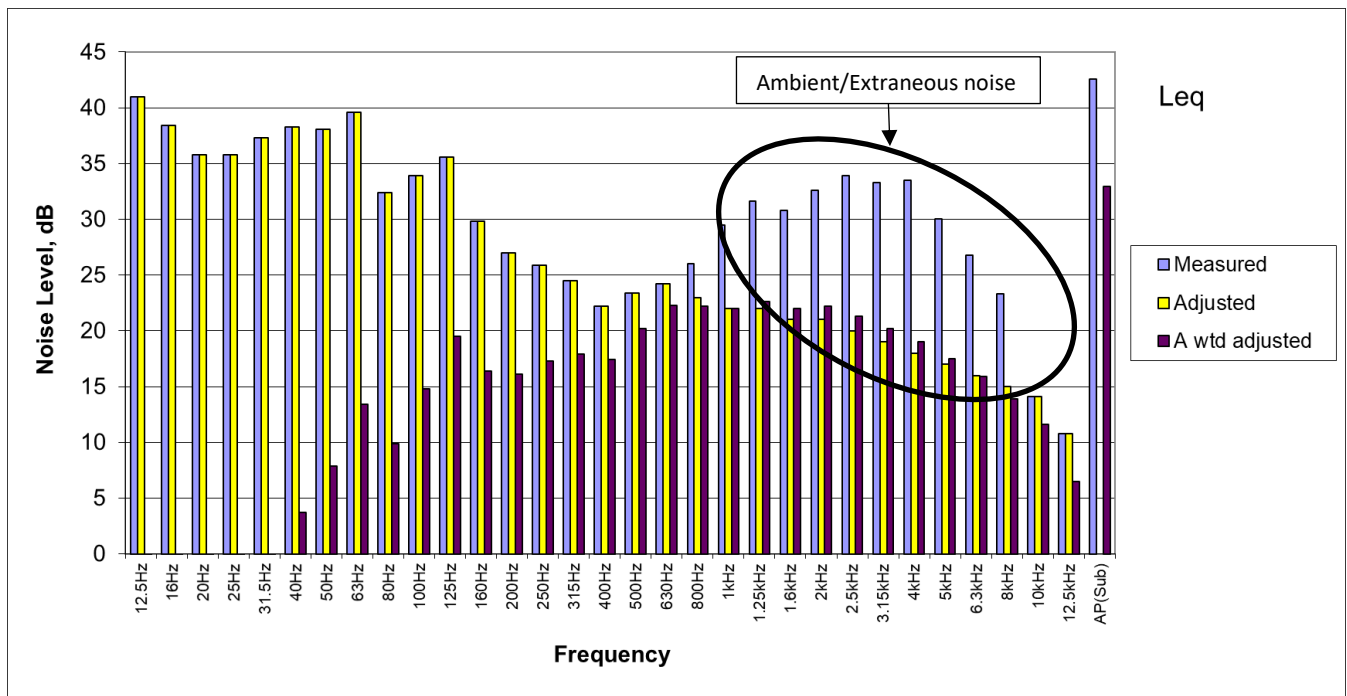
Accordingly, measured noise levels at R108 are considered to be compliant given that measured noise levels at all locations are within 2 dB of the project noise limit of 35 dBA LAeq(15minute) and the “maximum mine noise” level is also likely to include contributions from other ambient/non-mine related sources. Further to this, it is noted that Receptor R108 is associated with the mine operator, ie it is “project-related”.

Site noise was generally either inaudible or just audible at all locations. When audible, the site noise included low frequency noise, most likely associated with the pumps, however the level was low and not able to be reliably measured.

An example of the frequency analysis to remove non-site noise (ie ambient and extraneous sources) is shown in **Figure 2**.

The lower frequencies are likely to include site noise such as engines and pumps while the upper frequencies are predominantly birds and other ambient sources including vegetation noise. Noise energy in the upper frequencies from the site sources is more readily reduced over distance due to ground interactions and atmospheric absorption.

Figure 2 Frequency Analysis – Receptor R20



In addition, the site noise from pumps and engines tends to be relatively constant. Therefore, the LA90 parameter, which is less influenced by short-term noise compared to the LAeq for example, becomes a useful descriptor. It can be seen in **Table 3** that the LA90 is always below 35 dBA, which would indicate that the site noise sources that are constant in emission would comply with the project noise limits. Site noise sources with variable or intermittent emissions, such as reverse alarms, intermittent rock crushing or truck accelerations, were observed and only audible during the ‘lulls’ in ambient/extraneous noise.

4 Conclusions

SLR conducted compliance noise measurements at six locations in the vicinity of the Dargues Gold Mine Majors Creek on Wednesday 11 March 2020.

Site activities were atypical at the time of the measurements due to the need to operate water pumps following recent heavy rains.

Ambient and extraneous noise, such as birds and "wind-in-trees", was the dominant noise at the measurement locations, resulting in the noise from the mine site being inaudible or not directly measurable.

Frequency analysis has therefore been used to remove the influence of the non-mine related noise sources from the measured levels, in order to establish the level of mine noise.

The analysis has shown that the adjusted mine noise levels would comply with the project noise limit of 35 dBA LAeq(15minute) at all measurement locations.

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