

<b>Title:</b>	Grass Valley Quarry Environmental Acoustic Assessment		
<b>Project:</b>	Grass Valley Quarry		
<b>Customer:</b>	Resource Group (WA) Pty Limited		
<b>Wood Doc No</b>	AU00088-1-100	<b>Wood Job No.</b>	AU00088

Revision	Description	Prepared	Reviewed	Date
A	Issued for Review	TW	MP	04/03/2021
0	Issued for Use	AS	MP	12/03/2021
1	Issued for Use	AS	MP	15/03/2021

## 1. INTRODUCTION

Wood has been commissioned by Resource Group (WA) Pty Limited to revise the noise impact assessment of the proposed quarry development at Lot 150 Clydesdale Road, Grass Valley within the Shire of Northam, Western Australia.

A previous assessment has been undertaken by SLR Consulting in 2019 of potential noise impacts, 675.11334-R01-V5.0 *Resource Group WA Quarry*, assessing noise impacts at 2 noise sensitive receivers.

A revision to the noise impact assessment is required as result of an appeal to the Environmental Protection Agency (EPA) against the decision in March 2020 to not assess the environmental effects of the proposal against Part IV of the *Environmental Protection Act 1986*.

### 1.1 Project Overview

The development is located at Lot 150 Clydesdale Road, which will be comprised of the following noise emitting localities:

- 2 quarry pits (prior assessment was undertaken for 4 pits); and
- One crushing plant operation area.

The surrounding lands are comprised of agricultural and undeveloped land, with 3 noise sensitive receivers (NSR1, 2 and 3), all located within 2km of the proposed site. Figure 1-1 overleaf outlines the nearby residences and site localities.





**Figure 1-1: Critical Site Locations and Nearby Noise Sensitive Receivers**

The proposed quarry is planned to operate as follows:

- Dump truck (sales truck) movement 7:00 am to 5:00 pm Monday to Friday;
- Crushing Operations 7:00 am to 5:00 pm Monday to Friday for 3 - 4 months per year (Winter)
- Non-Production Sales Period 8-9 months per year (Spring through Autumn);
- Other onsite operations 7:00 am to 5:00 pm Monday to Saturday; and
- No operations on Sunday or public holidays.



## 2. ASSESSMENT CRITERIA

### 2.1 Assigned Levels

Regulation 7 of the Western Australia *Environmental Protection Regulations (Noise) 1997* stipulates that noise emitted from any premises when received at other premises must:

- 1) not cause, or significantly contribute to, a level of noise which exceeds the Assigned Level in respect of noise received at premises of that kind; and,
- 2) be free of noise characteristics such as tonality, impulsiveness and modulation when assessed under Regulation 9.

The Assigned Levels depend on the nature of the premises receiving the noise and the surrounding land use. The default night-time assigned noise levels at residential premises are presented in Table 2-1. Only night-time levels are presented as these are the most stringent. Where results exceed the night-time Assigned Levels by more than 5 dB there is potential for exceedance of the evening time Assigned Levels. This has been noted in the assessment where applicable.

**Table 2-1 Day-Time Regulatory Assigned Levels**

Type of premises receiving noise	Time of day	Assigned Level (dB)		
		L <sub>A10</sub>	L <sub>A1</sub>	L <sub>A max</sub>
Noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	45 + influencing factor	55 + influencing factor	65 + influencing factor

The Assigned Levels are determined from a base (or default) Assigned Level which varies with receiver type and time of day, and an influencing factor. Influencing factors vary from premises to premises depending on the surrounding land use.

Based on the Assigned Levels presented above and the calculated influencing factor, the Assigned Levels at each of the premises is presented in Table 2-2. The L<sub>A10</sub> noise level is used in the assessment of continuous noise emissions and will be used throughout this report.



**Table 2-2 Day-Time Assigned Levels for Individual Noise Sensitive Receivers**

Time of day	Premises receiving noise	Assigned Level (dBA)		
		LA10	L <sub>A</sub> 1	LA max
0700 hours to 1900 hours Monday to Saturday; and 0900 hours to 1900 hours Sunday and public holidays	NSR 1	45	55	65
	NSR 2	45	55	65
	NSR 3	45	55	65

## 2.2 Intrusive Noise Characteristics

Noise levels measured at the nearby sensitive receivers are required to be adjusted if the noise exhibits impulsive, tonal, or modulating characteristics. If the noise is assessed as having tonal, modulating or impulsive characteristics, then the measured noise levels are adjusted, by the amounts given in Table 2-3. The adjusted noise levels must now comply with the assigned noise levels.

**Table 2-3 Adjustments for Intrusive or Dominant Noise Characteristics**

Situation	Adjustment to Measured Level
Where tonality is present	+5 dB
Where modulation is present	+5 dB
Where impulsiveness is present	+10 dB

Based upon the types of noise sources proposed to operate at the quarry, intrusive characteristics have not been considered within this assessment.

## 3. NOISE MODELLING METHODOLOGY

The environmental noise model has been built using the sound modelling software SoundPlan 8.2.

This program calculates predicted sound pressure levels at nominated receiver locations or produces noise contours over a defined area of interest around the noise sources. SoundPlan can be used to model different sources of environmental noise such as industrial noise, road traffic and rail noise and aircraft noise. It has been accepted by WA Department of Water and Environment Regulation as appropriate for environmental noise prediction.



The CONCAWE algorithms has been selected as it is recommended by the WA Department of Water and Environment *Draft Guideline on Environmental Noise for Prescribed Premises*<sup>1</sup>.

The inputs required in SoundPlan are noise source data, barriers/screens, ground topographical and absorption type data, assessed meteorological conditions and receiver point locations.

### 3.1 Ground Absorption

The acoustic properties of the ground surface can have a considerable effect on the propagation of noise. Flat non-porous surfaces such as concrete, asphalt, and calm water reflect noise, while porous surfaces such as loam and soft grass absorb noise.

The surrounding lands of the proposed quarry is farmland and native bushland which has been modelled relatively absorbent ground (ground factor 0.8).

### 3.2 Meteorological Conditions

Predictions have been calculated for both the worst-case noise levels as suggested by the WA DER Draft Guideline as the Worst Case conditions<sup>2</sup> and for 'neutral' meteorological conditions (no enhancement on received noise levels). These are shown in Table 3-1 below:

*Table 3-1: Noise Modelling Day-time Meteorological Conditions*

Scenario	Temperature	Relative Humidity	Wind Speed	Wind Direction	Pasquil Stability Class
Worst Case	20°C	50%	4 m/s	Source to Receiver	E
Neutral			0 m/s		D

### 3.3 Modelled Scenarios

Noise levels have been assessed based upon the worst-case plant and machine locations, with all equipment operating simultaneously. Thus, equipment is modelled operating in the Southern corner of Pit 3. Table 3-2 outlines operating equipment locations.

<sup>1</sup> Draft Guideline on Environmental Noise for Prescribed Premises, May 2016, DER2015/001319, Department of Environment Regulation



### 3.4 Source Inputs

Source sound power levels have been taken from 675.11334-R01-V5.0 Resource Group WA\_Quarry and equipment quantities have been altered as correspondence with Resource Group (WA) accounting for the change in the proposed quarry. Modelled source levels are shown in Table 3-2. Equipment sound power spectra are presented in Appendix A.

**Table 3-2: Modelled Source Equipment Sound Power Levels, Quantity and Location**

Noise Source	Location	Quantity	Sound Power Level, dBA
CAT 980 Wheel Loader	Pit 3	1	110
	Crushing Plant Operations Area	1	
Water Cart	Crushing Plant Operations Area	1	85
Cone Crusher	Crushing Plant Operations Area	2	114
Primary Crusher	Crushing Plant Operations Area	1	116
Deck Screen	Crushing Plant Operations Area	2	112
Drill Rig	Pit 3	1	113
Dump Trucks	Pit 3	1	108
	Crushing Plant Operations Area	1	





## 4. RESULTS & DISCUSSION

The predicted noise levels at the nearest 3 noise sensitive receivers with no mitigation is shown below in Table 4-1, where exceedances of the Assigned Level are shown in **bold red**.

*Table 4-1: Predicted Noise Levels at Noise Sensitive Receivers with No Mitigation*

Receiver	Assigned Noise Level, dBA	Overall Noise Level, dBA	
		Neutral Meteorological Conditions	Worst Case Meteorological Conditions
NSR 1	45	44.5	<b>49.8</b>
NSR 2		39.2	44.7
NSR 3		39.4	45.0

Under worst case meteorological conditions, the noise model predicts an exceedance at only NSR1 of 4.8 dB. The following noise sources dominate noise levels at nearby receivers:

- Drill Rig;
- Primary Crusher;
- Cone crushers; and
- Wheel Loaders.

Meteorological conditions will not usually fall within the parameters of 'Worst Case' conditions. Neutral meteorological conditions have been predicted to determine the normal received levels. The noise levels modelled for neutral conditions fall below the noise limit for all three noise sensitive receivers.

### 4.1 Noise Controls

#### 4.1.1 Current Noise Controls

Wood has assessed noise controls as per recommendations made in the previous assessment, *675.11334-R01-V5.0 Resource Group WA\_Quarry*, as below:

- 3m+ bunding at the edges of the mining pit; and
- 3m+ bunding surrounding the Crushing Plant Operations Area.

Noise levels at the receiver with the inclusion of bunding predicts exceedances at only NSR 1, as presented in Table 4-2.



**Table 4-2: Predicted Noise Levels at Noise Sensitive Receivers with Bunding**

Receiver	Assigned Noise Level, dBA	Overall Noise Level, dBA	
		Neutral Meteorological Conditions	Worst Case Meteorological Conditions
NSR 1	45	44.4	<b>49.6</b>
NSR 2		38.7	44.2
NSR 3		38.4	44.0

#### 4.1.2 Additional Noise Controls

To achieve compliance at all receivers during the worst-case meteorological conditions requires additional controls, including:

- Sound power level of 6 dB below the level stated in Appendix A for the drill rig;
- Sound power level reduction of 10 dB below the level stated in Appendix A for the Primary Crusher and Cone Crushers; and
- 5 dB below the level stated in Appendix A for the Wheel Loaders.

Noise controls required may include:

Drill Rig:

- High-spec muffler;
- Radiator Silencer;
- Upgraded Cooling fan; and
- Acoustically treated enclosure of the top drive or acoustically treated shroud over the derrick.

Crushers:

- Additional noise barriers close to the equipment; or
- Acoustic cladding.

Wheel Loaders:

- High-spec muffler.

Noise monitoring should be undertaken after start-up of the quarry operation to determine the actual level noise emissions relative to the Assigned Levels, and additional noise controls implemented if exceedances are identified.





Table 4-3 outlines the predicted noise levels at the nearest 3 noise sensitive receivers with the implementation of additional noise controls. These controls include:

- Acoustically treated drill rig;
- Noise barriers near the primary and cone crushers; and
- Low noise wheel loader.

**Table 4-3 Predicted Noise Levels at Noise Sensitive Receivers with Additional Noise Controls**

Receiver	Assigned Noise Level, dBA	Overall Noise Level, dBA	
		Neutral Meteorological Conditions	Worst Case Meteorological Conditions
NSR 1	45	39.7	44.9
NSR 2		33.6	38.9
NSR 3		32.8	38.3



## 5. CONCLUSIONS & RECOMMENDATIONS

Wood has been commissioned by Resource Group (WA) Pty Limited to revise the noise impact assessment of the proposed quarry development at Lot 150 Clydesdale Road, Grass Valley within the Shire of Northam, Western Australia.

Several changes to the mining methods/plan have now been implemented from previous iterations of the environmental acoustic assessment. These include:

- Moving mining operations to pits further away from noise sensitive receivers;
- Installation and increasing the height of temporary noise bunds;
- Use of quieter equipment; and
- Limiting the number of equipment in operation.

The updated modelling and analysis presented in this File Note show that, under worst-case meteorological conditions noise levels exceeded the Assigned Level at NSR2 by 4.8 dB. For worst-case meteorological conditions, the following noise sources were found to dominate noise emissions:

- Drill Rig;
- Primary Crusher; and
- Wheel Loaders.

It is demonstrated that the proposed quarry can operate its crushing operations in compliance with the *Environmental Protection Regulations (Noise) 1997* by implementing the following noise controls as advised by Wood:

- As proposed, implement 3m+ Bunding around the edges of the mining pit and crushing plant operations area;

Implement noise controls that result in the following:

- Sound power level reduction of 6 dB below the level stated in Appendix A for the drill rig;
- Sound power level reduction of 10 dB below the level stated in Appendix A for the Primary Crusher and Cone Crushers; and
- 5 dB below the level stated in Appendix A for the Wheel Loaders.

It is recommended that Resource Group WA conduct noise monitoring at the commencement of operations to validate noise modelled results and to determine if further mitigation is to be required.



## APPENDIX A EQUIPMENT SOUND POWER LEVELS

Equipment Item	Overall SWL, dBA	Octave Band Sound Power Level, dBL							
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Cat 980 Wheel Loaders	110.3	99.0	109.0	104.0	105.0	106.0	105.0	95.0	89.0
Cone Crushers	114.1	115.0	115.0	112.0	111.0	109.0	107.0	102.0	92.0
Deck Screens	111.6	94.0	95.0	104.0	106.0	104.0	105.0	104.0	105.0
Drill Rig	113.1	83.0	99.0	99.0	108.0	107.0	107.0	102.0	99.0
Dump Trucks	107.5	106.0	99.0	99.0	99.0	99.0	104.0	99.0	80.0
Primary Crusher	116.1	117.0	117.0	114.0	113.0	111.0	109.0	104.0	94.0
Water Cart	84.6	88.0	83.0	85.0	80.0	80.0	77.0	73.0	64.0

