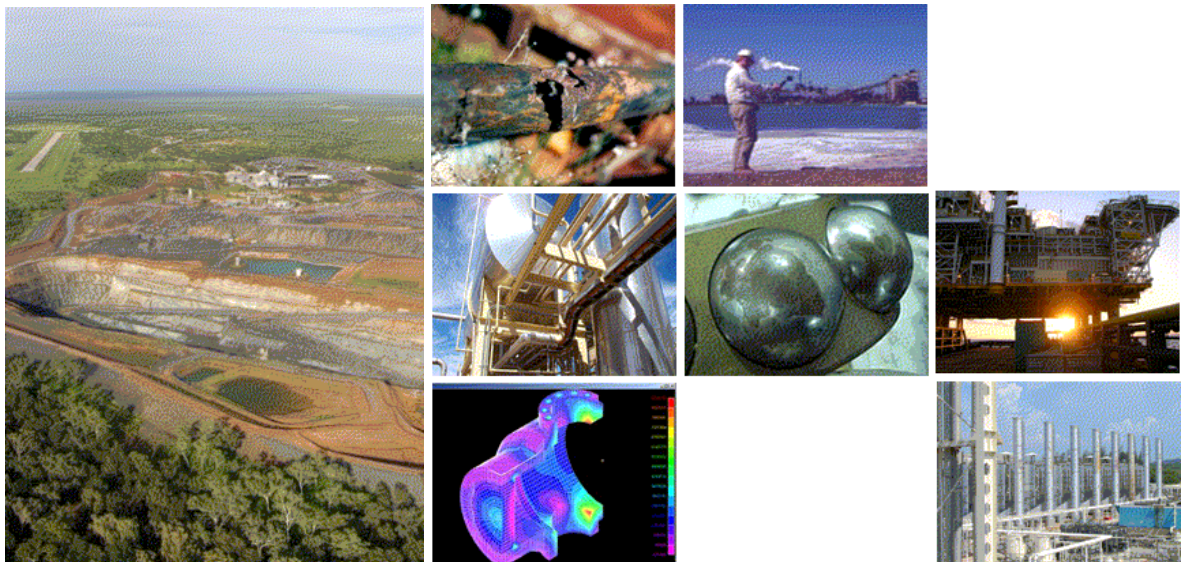


MC ARTHUR RIVER MINE PHASE 3 EXPANSION ENVIRONMENTAL NOISE ASSESSMENT



MET SERVE

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EXECUTIVE SUMMARY

Xstrata Zinc is conducting studies into the third phase of development at McArthur River Mine (MRM). The proposal involves increasing MRM mine production to approximately 5 million tonnes per year resulting in an increase in bulk zinc/lead concentrate volume to 800,000 tonnes per annum. The proposed expansion includes additional and/or larger plant and equipment.

As part of the full environmental impact statement (EIS) for the phase 3 expansion, environmental consultants MET Serve has engaged SVT Engineering Consultants to prepare the environmental noise assessment.

SVT visited MRM to take measurements and observations of the current mining, processing, haulage and ship loading operations. This data was used to:

- Prepare a noise model of the MRM site and the Bing Bong loading facility;
- Review noise emitted by haulage between MRM and Bing Bong; and,
- Predict the noise and vibration impact of blasting.

The noise models were then modified to predict the noise levels for the proposed expansion. Two scenarios were modelled of the proposed MRM site, each with a different power station location.

All the activities included in this study occur in a very remote area, and there are no noise sensitive receivers identified that will be affected. This means that the noise produced will have no foreseen impact on the local communities.

The following conclusions were also made from this study:

- The noise levels in the immediate environment surrounding the MRM site (ie. within 2-3 km), due to the proposed expansion, are likely to increase by 3 to 10 dB depending on the receiver location and the power station location.
- SVT recommends the power station to be located at site 2 (nearby to the current power station) as locating the power station at proposed site 4 (between the processing plant and the mining camp) will raise noise levels at the camp to over 55 dB(A).
- Noise levels from concentrate haulage to Bing bong, and noise levels at Bing Bong, will remain unchanged with the proposed expansion; however frequency of trucks and ship loading events will increase.
- Peak noise and vibration levels from blasting will remain the same, however the frequency of blasting will increase.

GLOSSARY OF TERMS

BB	Bing Bong
CCR	Central Control Room
dB(A)	Sound pressure level (ref 20 μ Pa) or sound power level (ref 10^{-12} W) presented in decibels and A-weighted to approximate the response of the human ear.
dB(L)	Sound pressure level (ref 20 μ Pa) or sound power level (ref 10^{-12} W) presented in decibels and linear weighted (un-weighted).
EIS	Environmental Impact Statement
HMP	Heavy Media Plant
MRM	McArthur River Mine
Mtpa	Mega-Tonnes per Annum
Noise Sensitive Receiver	Non-minesite related premises occupied for residential or accommodation purposes, or other premises where noise is considered intrusive.
SPL	Sound Pressure Level
SWL	Sound Power Level of a noise source.

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1. INTRODUCTION

1.1 MRM Phase 3 Expansion

Xstrata Zinc is conducting studies into the third phase of development at McArthur River Mine (MRM) following its commencement as an underground mine in 1995 and later conversion to open pit mining in a project completed in 2009.

The proposal involves increasing MRM mine production to approximately 5 million tonnes per year resulting in an increase in bulk zinc/lead concentrate volume to 800,000 tonnes per annum. Concentrate would continue to be trucked to the Bing Bong (BB) loading facility, with product loaded via the existing offshore barge facility.

The key features of the proposed development comprise:

- Increasing MRM's mineable reserves from 53 million tonnes to 115 million tonnes, extending the life of mine to 2033 at the proposed higher rate of production.
- Increasing the annual capacity from 360,000 tonnes to 800,000 tonnes per year of bulk zinc/silver/lead concentrate.
- Expanding the existing open pit mining operation through an expanded fleet of conventional shovels/excavators and large haul trucks.
- Increasing the capacity of the existing Tailings Storage Facility.
- Generating approximately 500 million tonnes of additional waste rock to be sent to overburden emplacement facilities.
- Upgrading the processing plant.
- Expanding the power station requirements at the mine site from 20 MW to 40 MW.
- No change to the current method of shipment but an approximate doubling of concentrate volume trucked to Bing Bong for shipment.

1.2 Environmental Noise Assessment

As part of the full environmental impact statement (EIS) for the phase 3 expansion, environmental consultants MET Serve has engaged SVT Engineering Consultants to prepare the environmental noise assessment. The scope for the environmental noise assessment comprises:

- Review of available data concerning current mine operations and the proposed development with respect to noise emissions, and the results of any previous assessments and recent noise monitoring exercises;
- Identification of existing or potential noise sensitive receivers exposed to noise from haulage and shipping operations;
- Measurement of noise levels within and around MRM site and Bing Bong port to determine current sound power levels of equipment;
- Measurement of haulage truck noise and observation of the haulage route;

- Modelling/prediction of potential noise emissions from the mine expansion and associated increase in haulage, and comparison with current noise levels;
- If required, provision of general advice on noise mitigation measures.

1.3 Location and Surrounding Environment

MRM is located approximately 90km inland from the Gulf of Carpentaria coastline. Bing Bong Port is located on the coast north of the mine site. The nearest town is Borroloola which is located near the Carpentaria Hwy, between MRM site and Bing Bong Port. The haulage route runs along the Carpentaria Hwy between MRM site and BB Port. A map of the area is shown in Figure 1-1.



Figure 1-1 : Bing Bong Port noise contours under worst case wind conditions

The area surrounding the mine site, port and the haulage route is sparse and typically occupied by large cattle stations. Borroloola has the closest residences near the haulage route; the nearest residence is 1.6km away. MET Serve has advised that other than the residences in Borroloola no noise sensitive receivers are located in the vicinity of any mining related noise sources.

In addition, no other planned developments, mines or industries operate in the area, and therefore there is no requirement to combine noise levels from MRM activities with other sources.

1.4 Noise Regulations

The Northern Territory does not currently have noise limits prescribed by legislation. Typically, projects are assessed on a case by case basis and may reference noise limits from other jurisdictions, such as WA or Queensland.

If the noise levels predicted approach levels that may be of concern the relevant Northern Territory authority should be notified.

2. METHODOLOGY

As there are no noise sensitive receivers identified, including the town of Borroloola, within an audible range of mining related activities, in consultation with MET Serve it was deemed unnecessary to measure the background noise levels at receiver locations. Instead the methodology used in this assessment is based on predicting the noise emissions from the mining activities. The methodology followed is listed below:

Measurement

- 1) Noise levels and frequency spectra were measured in close proximity to major noise emitters.
- 2) Noise levels were measured in the mid field (50-100m from sources). These measurements were used in balancing the sound power between sources in the noise model.
- 3) Noise levels were measured in the far field (>200m from sources). These measurements were used to calibrate noise level predictions in the noise model.
- 4) Drive by noise levels were taken of the haulage trucks passing on the Carpentaria Hwy.

Prediction

- 5) The MRM site and the BB port were modelled for environmental noise in their current state. Fixed plant noise sources as well as heavy mining vehicles were included. The mid and far field measurements taken on site were used to calibrate/validate the model.
- 6) Additional noise sources were inserted into the models where required to predict the noise levels for proposed expansion. Frequencies of shipping events were also reviewed.
- 7) Noise levels of the trucks and the frequency of the trucks, currently and with the proposed expansion, were reviewed.

Assessment

- 8) Noise level contours for the current and proposed expansion situations have been compared to show the predicted noise level increase.

3. MODELLING

3.1 Acoustic Model

An acoustic model has been produced using the SoundPlan 7.0 noise modelling program developed by Braunstein & Berndt GmbH. The SoundPlan program calculates sound pressure levels at nominated receiver locations or produces noise contours over a defined area of interest around the noise sources. SoundPlan provides a range of prediction algorithms that can be selected by the user. The CONCAWE^{1,2} prediction algorithms have been selected for this study. The inputs required are noise source data, ground topographical data, meteorological data and receiver locations. The program produces noise contours or noise levels at specified receiving locations for specific meteorological conditions.

The model has been used to generate noise contours for the area surrounding the McArthur River Minesite and the Bing Bong port for the current scenario and phase 3 upgrade scenario.

3.2 Meteorology

SoundPlan calculates noise levels for defined meteorological conditions. In particular, temperature, relative humidity, wind speed and direction data are required as input to the model.

For the noise modelling, SVT has used the worst case night time meteorological conditions suggested by the WA EPA (*Environmental Protection Act 1986*) Guidance No 8 (2007) for assessing noise impact from new developments as the upper limit of the meteorological conditions investigated. Table 3-1 below presents the worst-case meteorological conditions for noise propagation.

Table 3-1 : Worst-case meteorological conditions for noise propagation

Time of day	Temperature Celsius	Relative Humidity	Wind speed	Pasquill Stability Category
Night Time	15° Celsius	50%	3 m/s	F

3.3 Topographical Data

Topographical data for an area encompassing the McArthur River Mine Site and the Bing Bong Port was provided by MET Serve, and is based on a survey completed in 2006. The data was supplied as x, y and z coordinates, and was converted to elevation contours using SoundPlan.

Newer elevation data taken in 2009 for the area in close proximity to the MRM site was also provided and has been incorporated into the model.

¹ CONCAWE (Conservation of Clean Air and Water in Europe) was established in 1963 by a group of oil companies to carry out research on environmental issues relevant to the oil industry.

² *The propagation of noise from petroleum and petrochemical complexes to neighbouring communities*, CONCAWE Report 4/81, 1981

3.4 MRM site

3.4.1 Ground surface

The ground surface has been modelled according to the table below:

Table 3-2 : Ground factors used in the MRM site model

Area	Description	Ground factor ³
Immediate area around mill, re-grinders and float floor	Concrete with spilled product, water puddles	0.1
All areas other than above	Hard packed mud, rock	0.5

3.4.2 Barriers, buildings

Large buildings and barriers have been included in the model including:

- Filter press building
- Plant CCR building
- Regrind mill building (roof only)
- M10,000 mills building (roof only)
- Rougher building (roof only)
- Float building (roof only)
- Reagent storage shed
- Tailings and thickener tanks
- Concentrate shed
- Water storage tanks
- Sand blasting building

Smaller buildings such as offices and workshops have not been included as their size will have a negligible effect on the noise in the far field.

3.4.3 Fixed Noise Source Details

Measurements were taken on the McArthur River Mine site and the Bing Bong port between the 17th and 19th May 2011. Measurements were taken in the near field, mid field and far field, which were all used to predict the sound power levels of the major noise sources in the current scenario.

For the proposed expansion, noise levels were estimated as follows:

³ The ground factor is a basic indication of how noise absorbative the ground is. 0.0 is a hard ground surface and is highly reflective (such as bare concrete). 1.0 is a soft ground surface and is highly absorptive (such as grass).

- The crushing and screening plant noise is typically proportional to the amount of product going through it, so noise levels were increased based on the expected production increase. Annual mining production is expected to increase from 2.5 Mtpa to 5.5 Mtpa, a 120% increase. Thus, a noise increase of 120% (or 3.4 dB) has been used.
- The current 4 MW mill is going to be replaced with an 11 MW version, a 175% increase. Thus, a noise increase of 175% (or 4.4 dB) has been used.
- The main noise sources in the new Heavy Media Plant (HMP) are expected to be the four large screens. The noise levels in the HMP are therefore based on the noise levels measured at screen 2, increased by 120% (as mentioned above) and multiplied by four.
- The sound power levels of the new power station have been calculated using the provided noise spectrum of the turbine and exhaust. Attenuation was applied on these spectra based on typical enclosure and attenuator characteristics. Finally, the sound power spectra were normalised based on the suppliers specification of 85 dB(A) at 1m.

The sound power levels used for each fixed plant source in the current and proposed situations are shown in Table 3-3, while Appendix B shows the octave band sound power levels. Figure 3-1 and Figure 3-2 show the location of the sources for the current and proposed situations respectively.

Table 3-3 : Sound power levels of sources used in the MRM current and proposed expansion noise models

Source		Current Situation		Proposed Expansion		Comments
		Quantity	Sound Power [dB(A)]	Quantity	Sound Power [dB(A)]	
Crushing	Primary crusher	1	114.5	1	117.9	Production increase of 120%
	Secondary crusher	1	111.4	1	114.8	
	Tertiary crusher	1	104.6	1	108.0	
	Screen 1	1	112.6	1	116.0	
	Screen 2	1	106.2	1	109.7	
Heavy Media Plant (whole building)		N/A		1	115.7	New
Milling	Mill	1	117.8	1	122.2	Increase from 4 MW to 11 MW
	Float floor (whole building)	1	120.8	No change		
	Roughers (whole building)	1	117.1	No change		
	Regrinders	6	112.6	No change		
	M10,000 Regrinders	1	108.5	4	108.5	Increase in qty
Power Generation, Gas turbine (inc. stack)		6	114.2	16	114.8	Whole new power station
Total Sound Power			127.6		130.6	

Two different scenarios of the proposed expansion were modelled, each with a different location of the new power station. These were:

- New power station located at proposed site 2. This is an area immediately south of the existing power station.
- New power station located at proposed site 4. This is an area located between the MRM processing plant and the village.

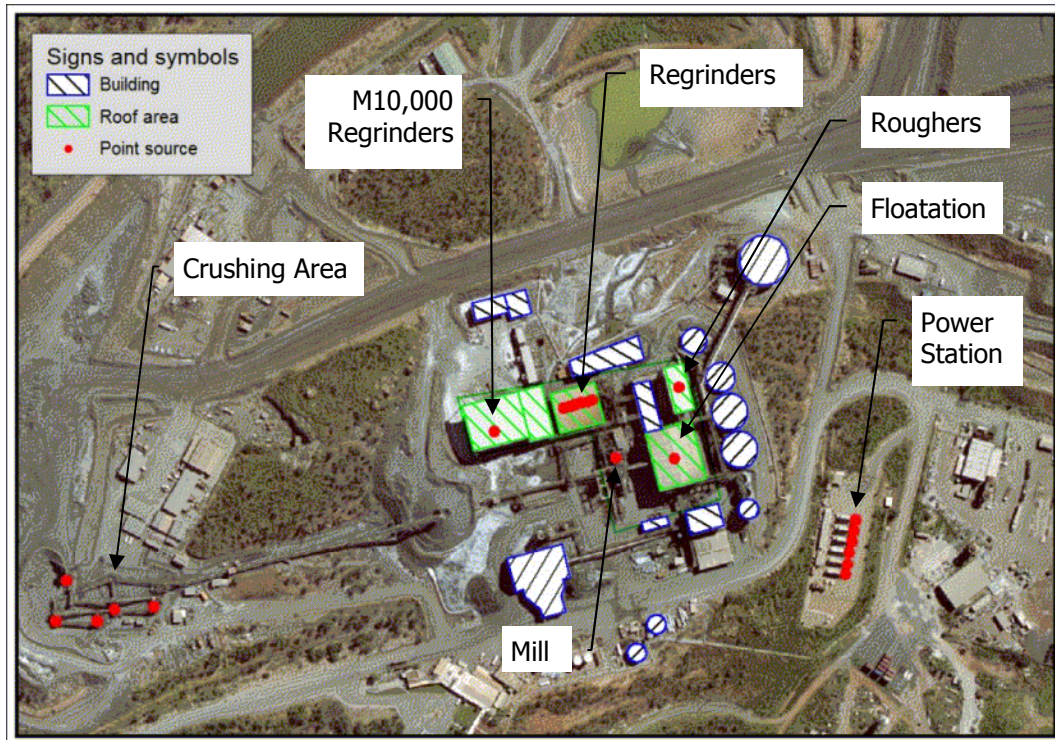


Figure 3-1 : Layout of fixed noise sources for McArthur River Mine Site current situation

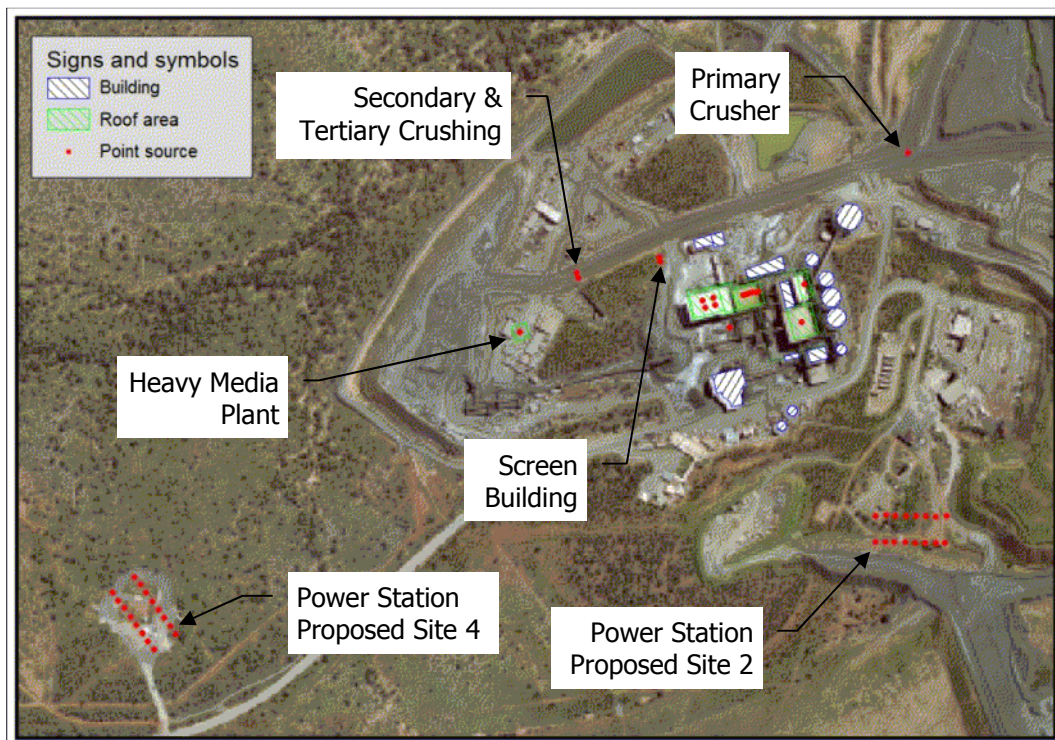


Figure 3-2 : Layout of fixed noise sources for McArthur River Mine site under proposed expansion

3.4.4 Mobile Equipment Noise Source Details

Sound power levels for heavy mining vehicles have been included and are based on SVT's prior measurement and sound power level calculation for similarly sized vehicles. Approximately 75% of mine vehicle utilisation has been incorporated into each model. The total numbers of vehicles incorporated in each of the models, along with their sound power levels is shown in Table 3-4. Appendix B shows the octave band sound power data for each source.

Mining vehicles have been distributed around the pit, the haul roads and the waste dump. In some cases, especially for the proposed expansion, the pit topography is not available for modelling, so vehicles, while in position, are not actually below the average ground level as they would be with the developed pit. The approach is considered worst case, and will occur when the vehicles are operating during the early stage of the new pit developments. Figure 3-3 and Figure 3-4 show the distribution of mining vehicles around the pit for the current and proposed situations respectively.

Table 3-4 : Heavy mining vehicles integrated into the noise model

Mobile Equipment Type	Quantity of Vehicles		Sound Power (per Vehicle) [dB(A)] ⁴
	Current Situation	Proposed Expansion	
Water Cart	2	3	105.1
Haul Truck 100T	3		105.1
Haul Truck 150-175T	12	14	106.7
Haul Truck 220T		14	118.7
Excavator	3	4	109.9
Track Dozer	3	3	125.5
Wheel Loader	3	3	110.6
Grader	2	3	105.3
Drill Rig	3	5	115.3
Total Sound Power [dB(A)]	131.1	133.9	

⁴ Sound power levels for heavy mobile equipment are based on SVT's previous experience with similar types of equipment.

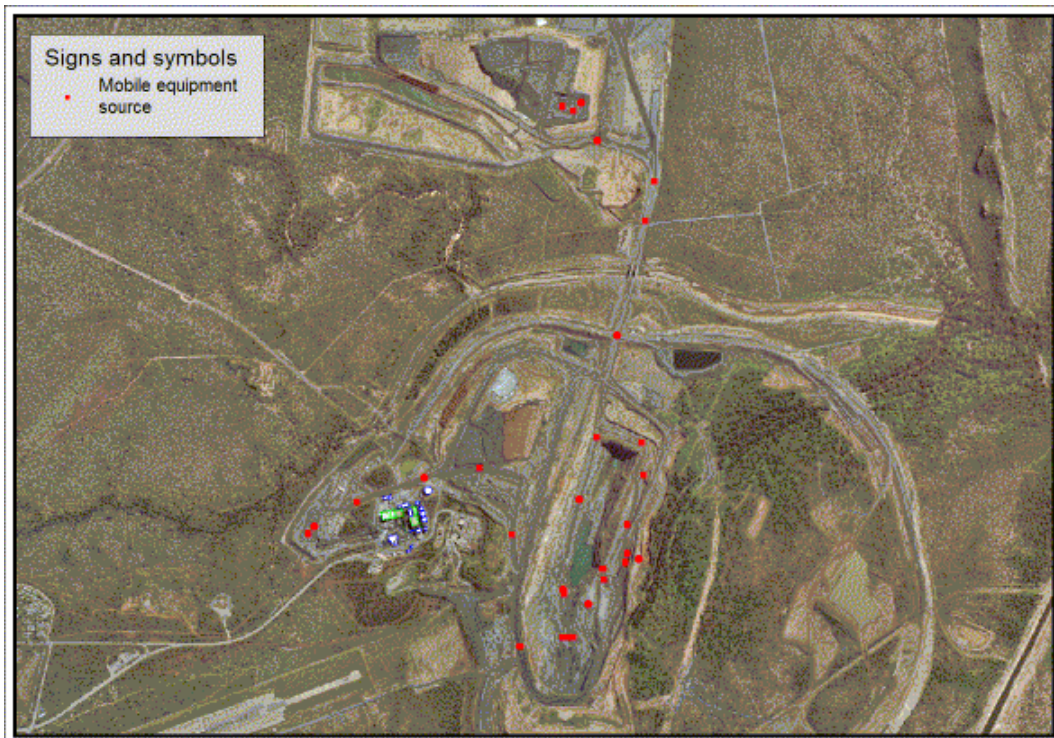


Figure 3-3 : Distribution of mobile equipment noise sources for McArthur River Mine site under current operation

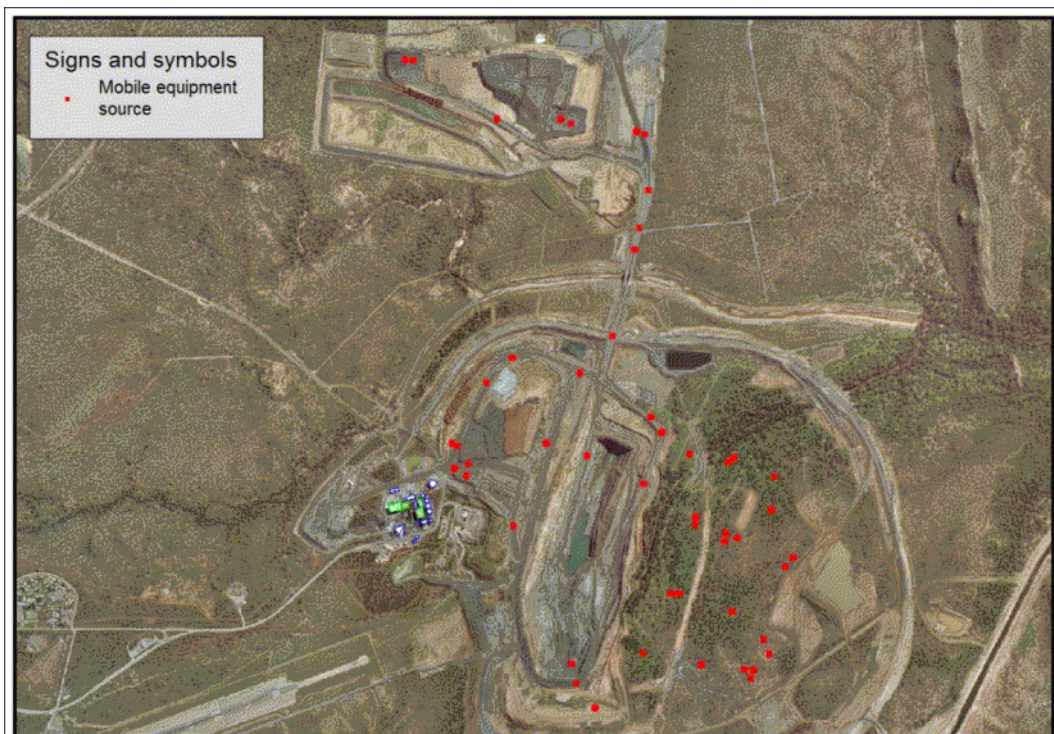


Figure 3-4 : Distribution of mobile equipment noise sources for McArthur River Mine site under proposed expansion

3.5 Bing Bong Port

3.5.1 Ground surface

The ground surface has been modelled according to Table 3-5 below:

Table 3-5 : Ground factors used in the Bing Bong Port model

Area	Description	Ground factor
Shipping channel and tidal flats	Water	0.0
Immediate area around concentrate shed	Gravel	0.5
All areas other than above	Sand, grass	0.75

3.5.2 Barriers, buildings

The only buildings included in the model of the Bing Bong port are the concentrate shed and the power generator enclosure. Other buildings in the area are small and will have a negligible effect on the noise propagation.

3.5.3 Source Details

Measurements were taken at Bing Bong port between the 17th and 19th May 2011. Measurements taken in the near field and mid field were used to predict the sound power levels of the major noise sources. The sound power levels used for each source are shown in Table 3-6.

Table 3-6 : Sound power levels of sources used in the Bing Bong Port noise model

Source	Sound Power [dB(A)]
Diesel gensets (combined)	105.8
Conveyor 1	94.3

4. RESULTS AND ASSESSMENT

4.1 MRM site

4.1.1 Current Situation

The modelling of the MRM site under current operating conditions has produced the noise contours shown in Figure 4-1 (repeated in a larger format in Appendix A).

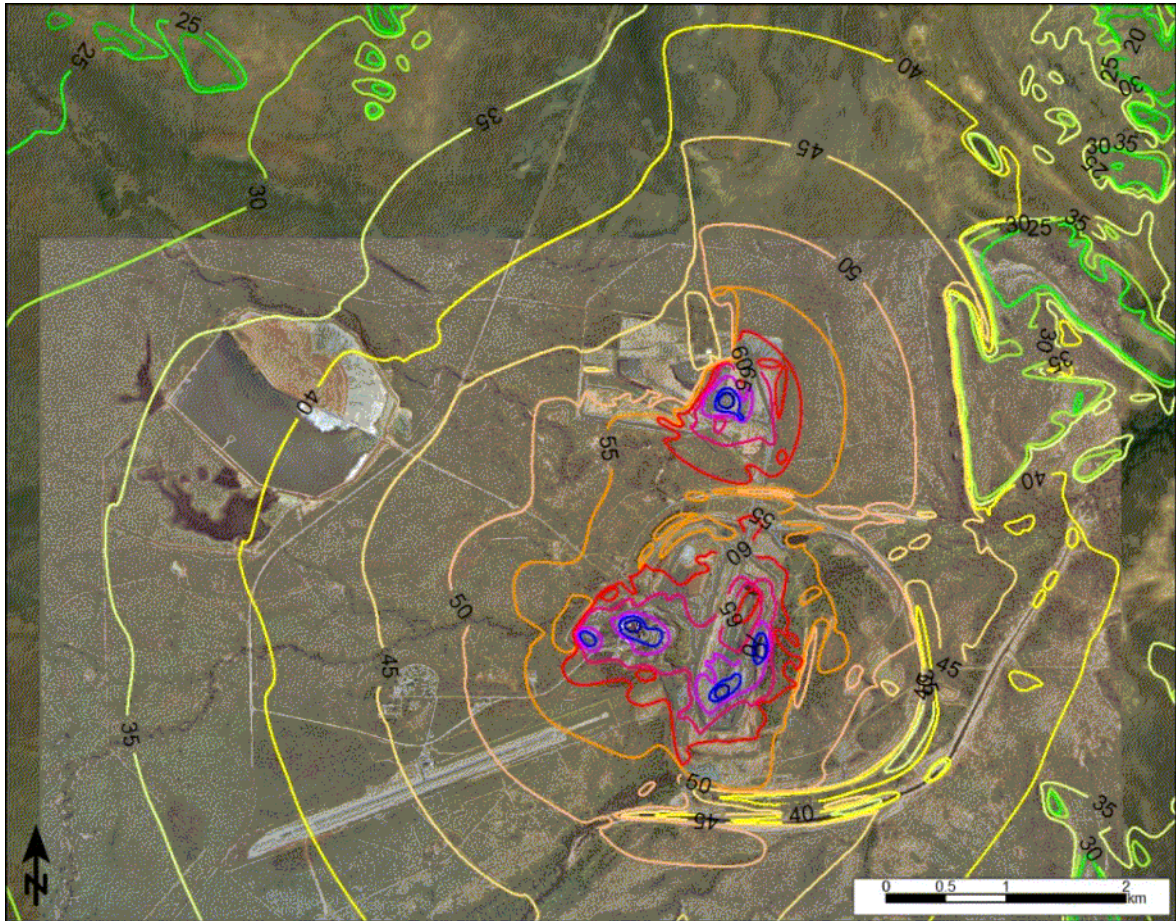
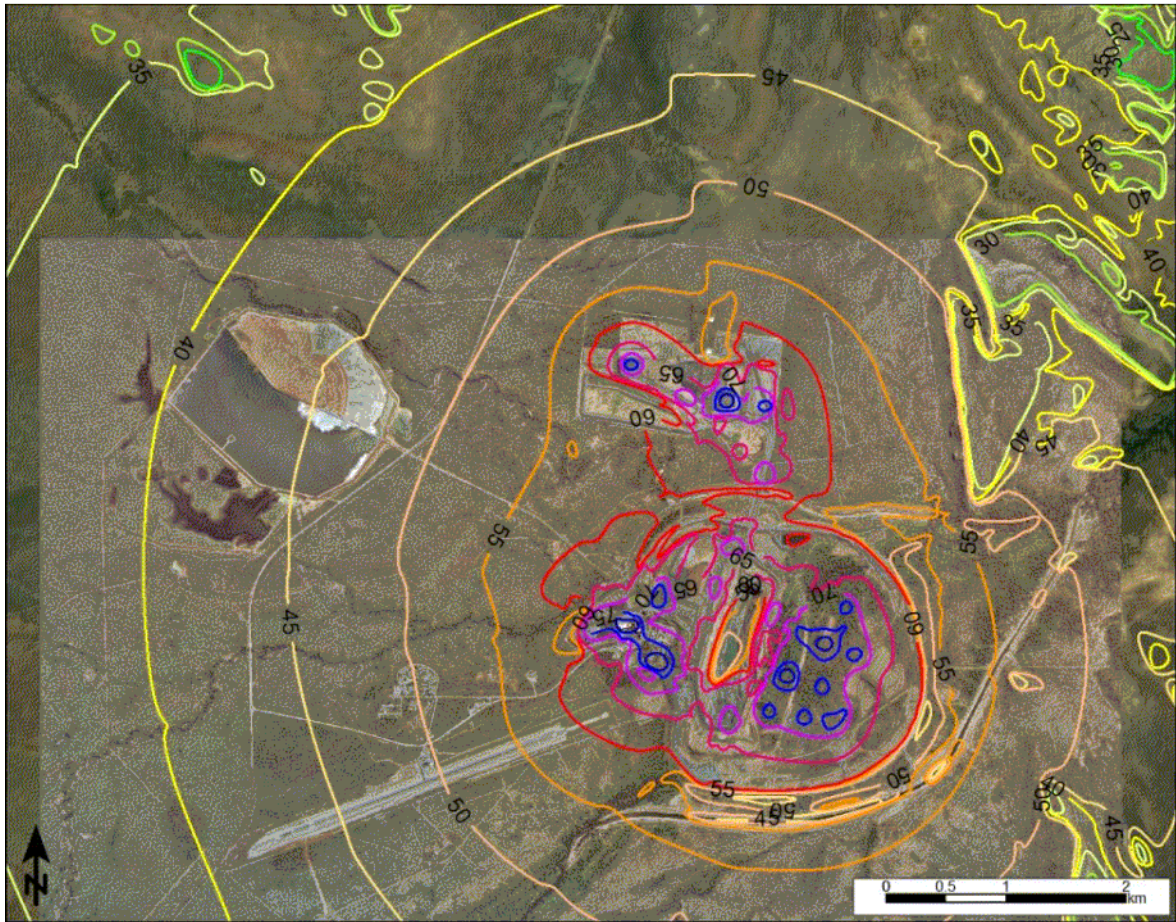


Figure 4-1 : McArthur River Mine site current situation noise contours under worst case wind conditions [dB(A)]

The modelling of the MRM site under operating conditions of the proposed expansion has produced the noise contours shown in Figure 4-2 (repeated in a larger format in Appendix A). These contours have the power station located at proposed site 2.



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4.1.3 Proposed Expansion, Power Station Site 4

The modelling of the MRM site under operating conditions of the proposed expansion has produced the noise contours shown in Figure 4-3 (repeated in a larger format in Appendix A). These contours have the power station located at proposed site 4.

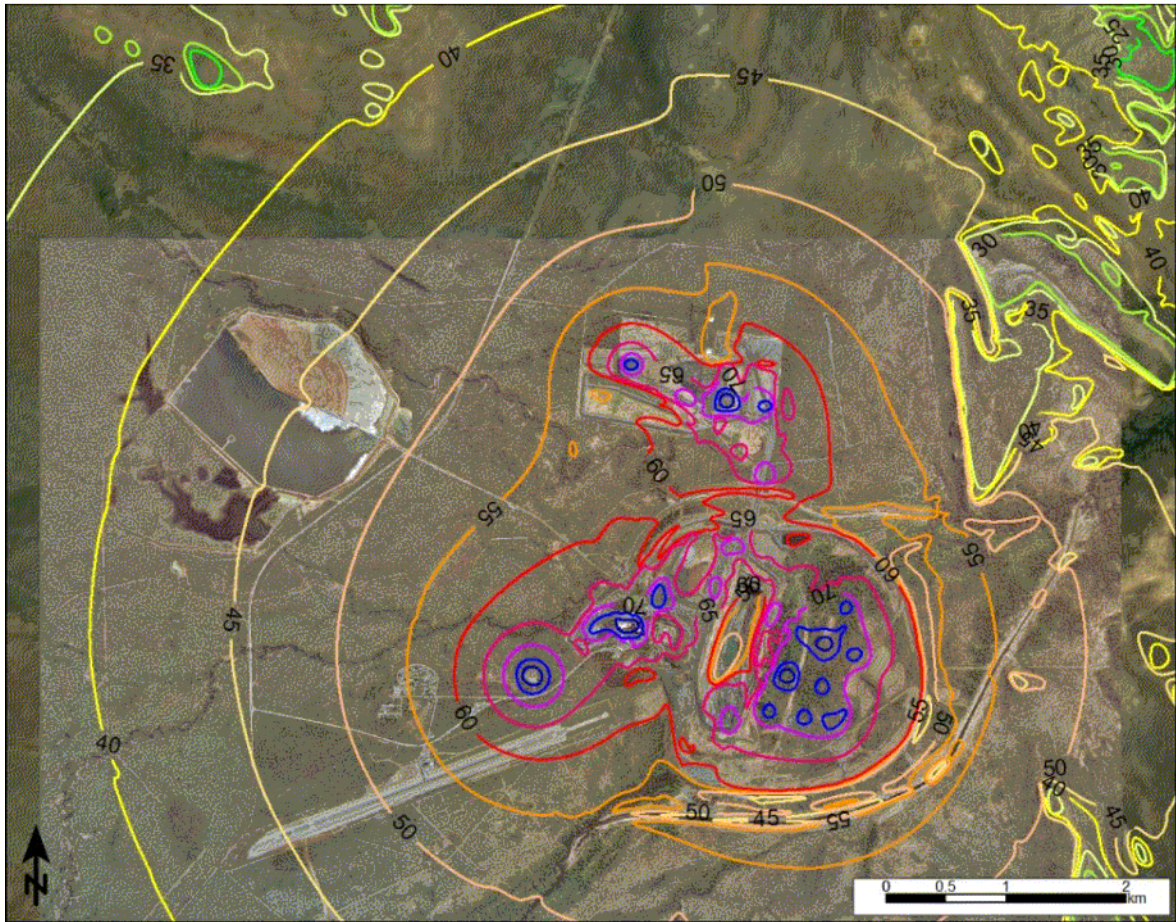


Figure 4-3 : McArthur River Mine Site proposed expansion, power station site 4, noise contours under worst case wind conditions [dB(A)]

4.2 Bing Bong Port

The modelling of Bing Bong port has produced the noise contours shown in Figure 4-4 (repeated in a larger format in Appendix A). The noise levels around the port are not expected to change with the proposed expansion; however shipments will become more frequent.

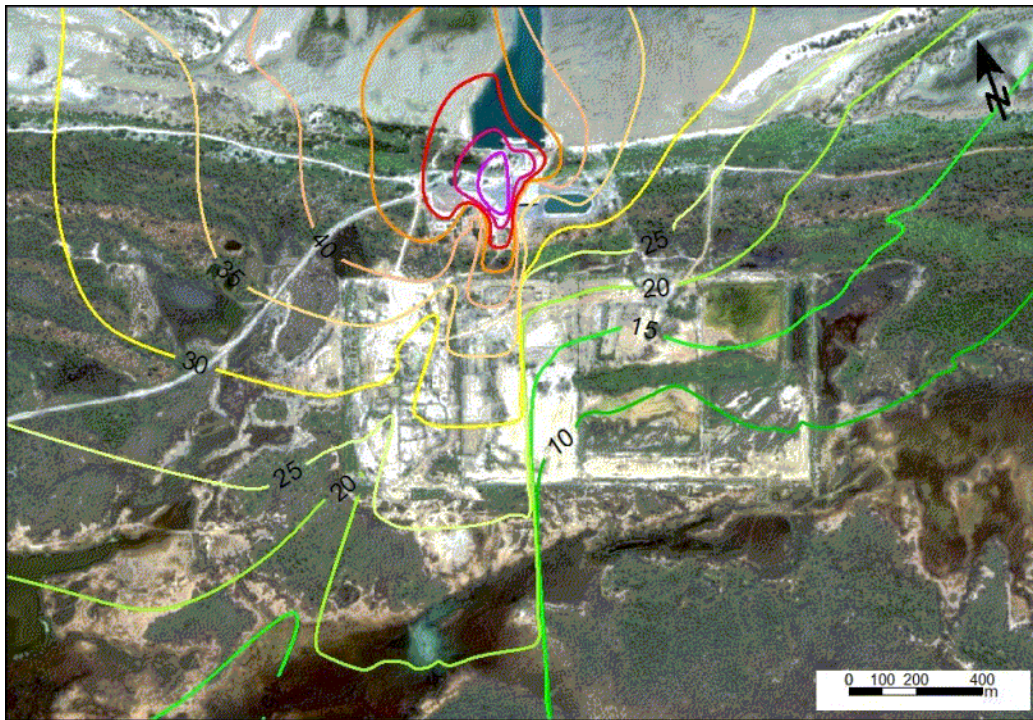


Figure 4-4 : Bing Bong Port noise contours under worst case wind conditions [dB(A)]

4.3 Haul Route between MRM and BB

Road side drive by measurements were taken of haul trucks servicing the mine on the 17th and 19th May 2011. Measurements were taken on the Carpenteria Hwy at a distance of 10m from the road edge. The Hamptons trucks hauling concentrate from the MRM site to Bing Bong port were the main interest however a measurement was also taken of another truck for comparison. The results are shown in Table 4-1.

Table 4-1 : Drive by noise measurements of trucks

Vehicle description	LAeq,30s	LASmax
Semi-trailer, transport	76.8	86.9
Hamptons truck, four trailers (full)	75.8	84.4
Hamptons truck, four trailers (empty)	76.8	86.4

The proposed development will see trucks increasing from 4 per day to 8 per day.

Worst case calculations indicate that noise levels from the trucks will drop to below 35 dB(A) beyond 1.25 km. SVT has unable to identify any sensitive premises within this distance of the highway (the closest resident in Booraloola is 1.6km from the highway).

4.4 Construction Noise

Typically, the noisiest activity in construction is mobile equipment during the earthworks stage of the project. As the amount of mobile equipment utilised in the construction of the MRM Phase 3 expansion will be far less than the equipment used in mining, it is unlikely that the noise impact from construction will exceed the predicted noise levels of mining activities.

5. BLASTING NOISE AND VIBRATION

5.1 Current and Proposed Blasting

The current and proposed blasting schedules are shown in Table 5-1. Blasting under the proposed expansion will be more frequent and the size of the typical shot will increase. This will not necessarily increase the noise or vibration levels of the blast as each blast is staged in 8ms bursts.

Table 5-1 : Current and Proposed blasting schedule⁵

	Material	Bench height (m)	Hole depth (m)	Hole diameter (mm)	Holes drilled per day	Area of typical shot (m ²)	Shots per year
Current	Ore zone	8	9	115-165	49	1,200	133
	Overburden	16	17.5	140-250	26	6,000	75
Proposed	Ore zone	8	9	115-165	82	2,300	133
	Overburden	16	17.5	140-250	67	8,800	133

5.2 Recommended Maximum levels

The recommended maximum peak particle velocity and sound pressure noise levels from blasting are given by Australian Standard AS 2187.2-2006 (Appendix J) and are summarised in Table 5-2 below.

Table 5-2 : Ground vibration and peak noise limits for human comfort

Type of building or structure	Peak component particle velocity [mm/s]	Peak sound pressure level [dB(L)]
Sensitive site (residential buildings, theatres, schools, and other similar buildings occupied by people)	5 mm/s for 95% blasts per year 10 mm/s maximum	115 dB(L) for 95% blasts per year 120 dB(L) maximum
Occupied non-sensitive sites, such as factories and commercial premises	25 mm/s maximum	125 dB(L) maximum

It is recognised that it is difficult to provide a detailed assessment of the likely impacts of blasting in terms of airblast overpressure and ground vibration levels prior to the actual blasting, as some of the factors involved in the predictions are site-specific. However, SVT has estimated the levels using available empirical formulae.

⁵ Blasting schedule as provided by MET Serve.

5.3 Predicted Maximum Vibration Level

When blasting is carried out to a free face in average field conditions, the peak particle velocity (V in mm/s) due to blasting has been estimated by Australian Standard AS 2187.2-2006 (J7.3(1)) shown below:

$$V = 1140 (R / Q^{0.5})^{-1.6}$$

Where R is the distance from the charge to the point of interest in meters and Q is the maximum instantaneous charge mass in kilograms.

Distances have been calculated to determine a radius from the blast site that has peak vibration levels that exceed the recommended limits set by AS 2187.2-2006. These are shown in Table 5-3.

Table 5-3 : Distances from blast that exceed vibration limits

Blast Type	Maximum instantaneous charge [kg/0.008s] ⁶	Distance from blast that exceeds vibration limit [m]	
		5 mm/s	25 mm/s
Regular Blast	500	666	243
Void Blast	1050	965	353

Predicted results indicate that peak vibration levels will not exceed the recommended limits beyond 1 km from the blasting location.

5.4 Predicted Maximum Peak Sound Pressure Level

The unweighted peak noise level at the receiver due to blasting can be predicted using the following empirical formula reported by Fidell et al⁷

$$SPL = 20 \text{ Log}_{10} [0.162 (W^{1/3} / R)^{0.794}] + 171$$

Where SPL is the unweighted peak instantaneous sound pressure level in dB, R is the distance in feet, W is the maximum charge per delay (weight of explosive detonated at any one instant) in pounds.

Distances have been calculated to determine a radius from the blast site that has peak noise levels that exceed the recommended limits set by AS 2187.2-2006. These are shown in Table 5-4.

⁶ The quantity of explosive set off within an 8ms time slot is assumed as the maximum instantaneous charge, and is based on information provided by mining engineers at MRM.

⁷ Fidell S, Horonjeff R, Schultx T and Teffeteller S Journal of the Acoustical Society of America 74(3): 888-893. *Community response to blasting*.

Table 5-4 : Distances from blast that exceed peak noise limits

Blast Type	Maximum instantaneous charge [kg/0.008s]	Distance from blast that exceeds peak noise limit [m]	
		115 dB(L)	125 dB(L)
Regular Blast	500	1072	251
Void Blast	1050	1373	322

Predicted results indicate that peak sound pressure levels will not exceed the recommended limits beyond 1.4 km from the blasting location.

6. COMPLIANCE ASSESSMENT AND CONCLUSIONS

MRM Site Noise

The noise levels in the environment surrounding the MRM site, due to the proposed expansion, are likely to increase by 3 to 10 dB depending on the receiver location. However, with the lack of sensitive receivers in the area, this increase does not have any foreseeable impact to local communities.

Results show that predicted noise from the power station located at site 4 may have a negative impact on the mining camp, bringing ambient noise levels in the camp over 55 dB(A). Consideration for this should be made when deciding on the proposed location. The power station proposed site 2 is a better option in consideration of noise.

Bing Bong Port Noise

Noise levels at Bing Bong port will remain the same, however loading frequency will increase with the proposed expansion. The noise surrounding the Bing Bong loading facility is dominated by the diesel generators. Noise levels drop to a low 30 dB(A) within 1.3 km from the loading facility. As there are no known sensitive receivers within this distance from the facility, there is no foreseeable noise impact on the local communities.

Concentrate Haulage Noise

Noise levels from the concentrate haulage between MRM site and Bing Bong will remain the same; however truck frequency will increase with the proposed expansion. Extrapolation from road side measurements predict that truck noise levels will dissipate to below 35 dB(A) at 1.25 km from the haulage route. As there are no known sensitive receivers within this distance there is no foreseeable noise impact on the local communities.

Construction Noise

Construction noise has not been assessed as it is unlikely to raise noise levels above those already predicted for mining activities. Therefore, there will be no noise impact on local communities.

Blasting Vibration and Noise

Peak noise and vibration levels from blasting will remain the same, however the frequency and duration of the blasts will increase. Given the large distance between the mine and the nearest sensitive receiver there is no foreseen impact on the local community.

Noise Control

As no noise impact to the local community was identified there is no need to implement any specific noise controls.

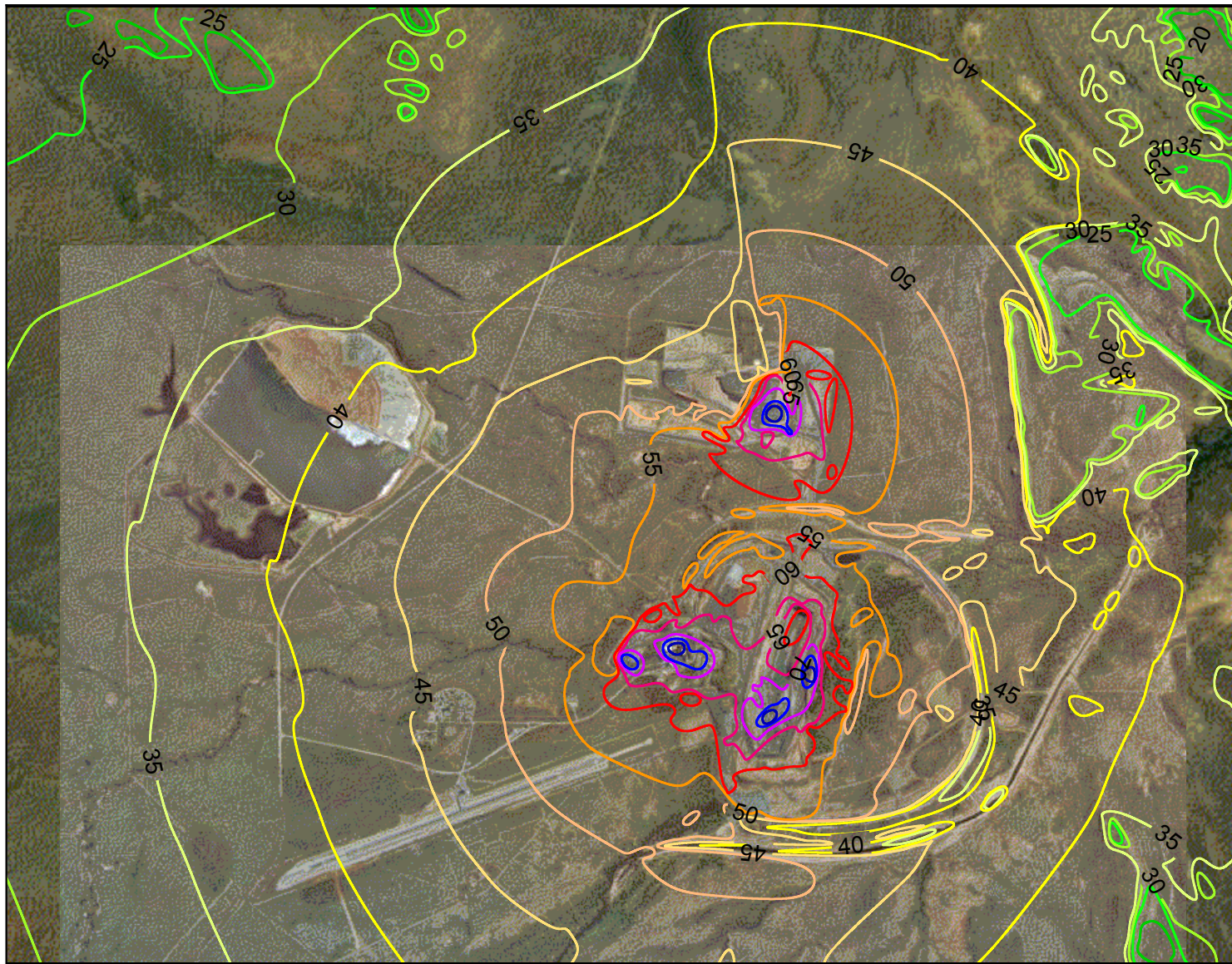
APPENDIX A : NOISE CONTOUR RESULTS

Mc Arthur River Mine Phase 3 Expansion Environmental Noise Assessment

Current Situation

Noise Contours for Worst Case Wind Conditions

Figure 1



Noise levels dB(A)

< 20
20 <= < 25
25 <= < 30
30 <= < 35
35 <= < 40
40 <= < 45
45 <= < 50
50 <= < 55
55 <= < 60
60 <= < 65
65 <= < 70
70 <= < 75
75 <= < 80
80 <=



0 0.5 1 2 km

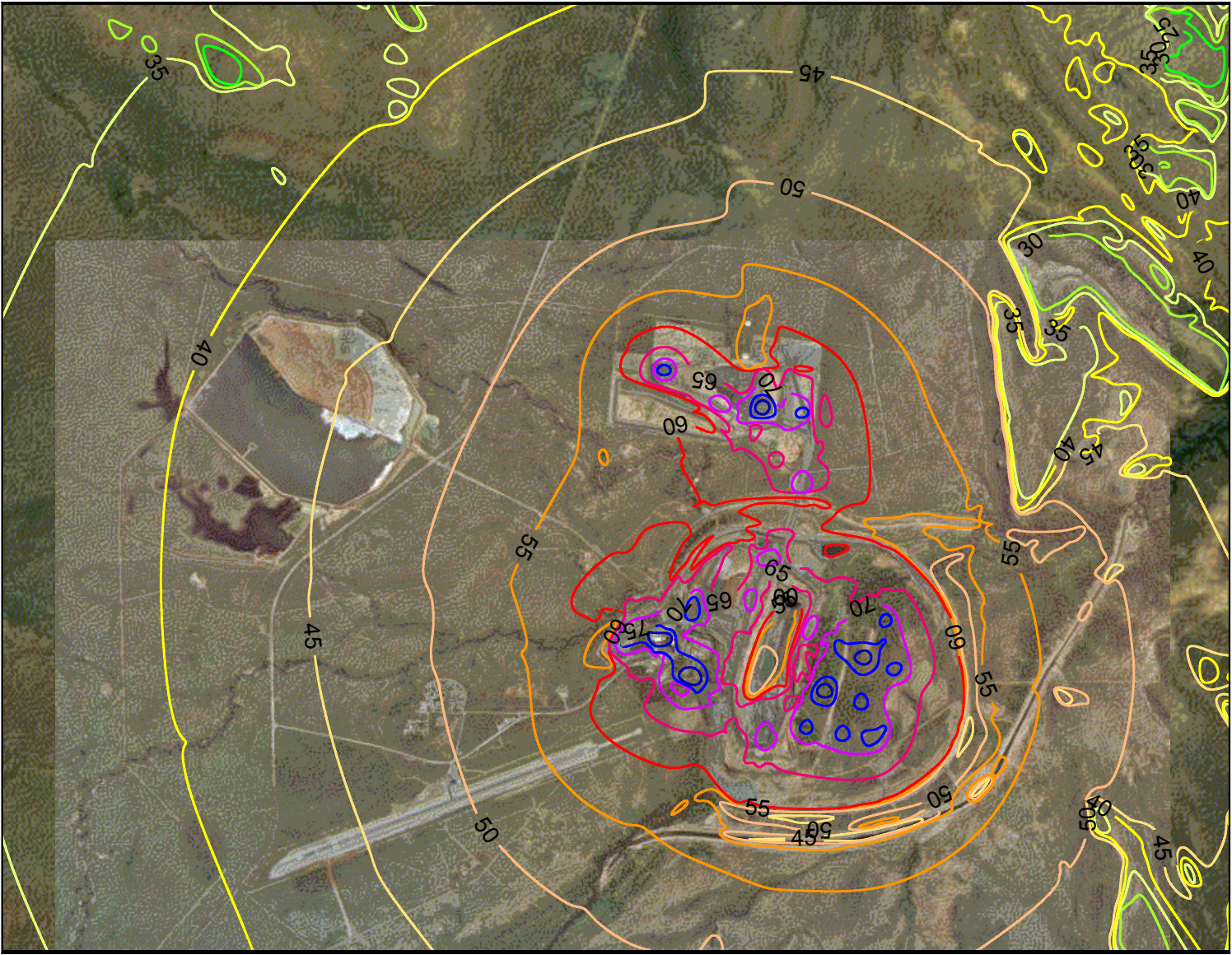
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Mc Arthur River Mine Phase 3 Expansion Environmental Noise Assessment
Proposed Expansion with Power Station on Site 2
Noise Contours for Worst Case Wind Conditions

Figure 2



Noise levels dB(A)

< 20
20 <= < 25
25 <= < 30
30 <= < 35
35 <= < 40
40 <= < 45
45 <= < 50
50 <= < 55
55 <= < 60
60 <= < 65
65 <= < 70
70 <= < 75
75 <= < 80
80 <=



0 0.5 1 2 km



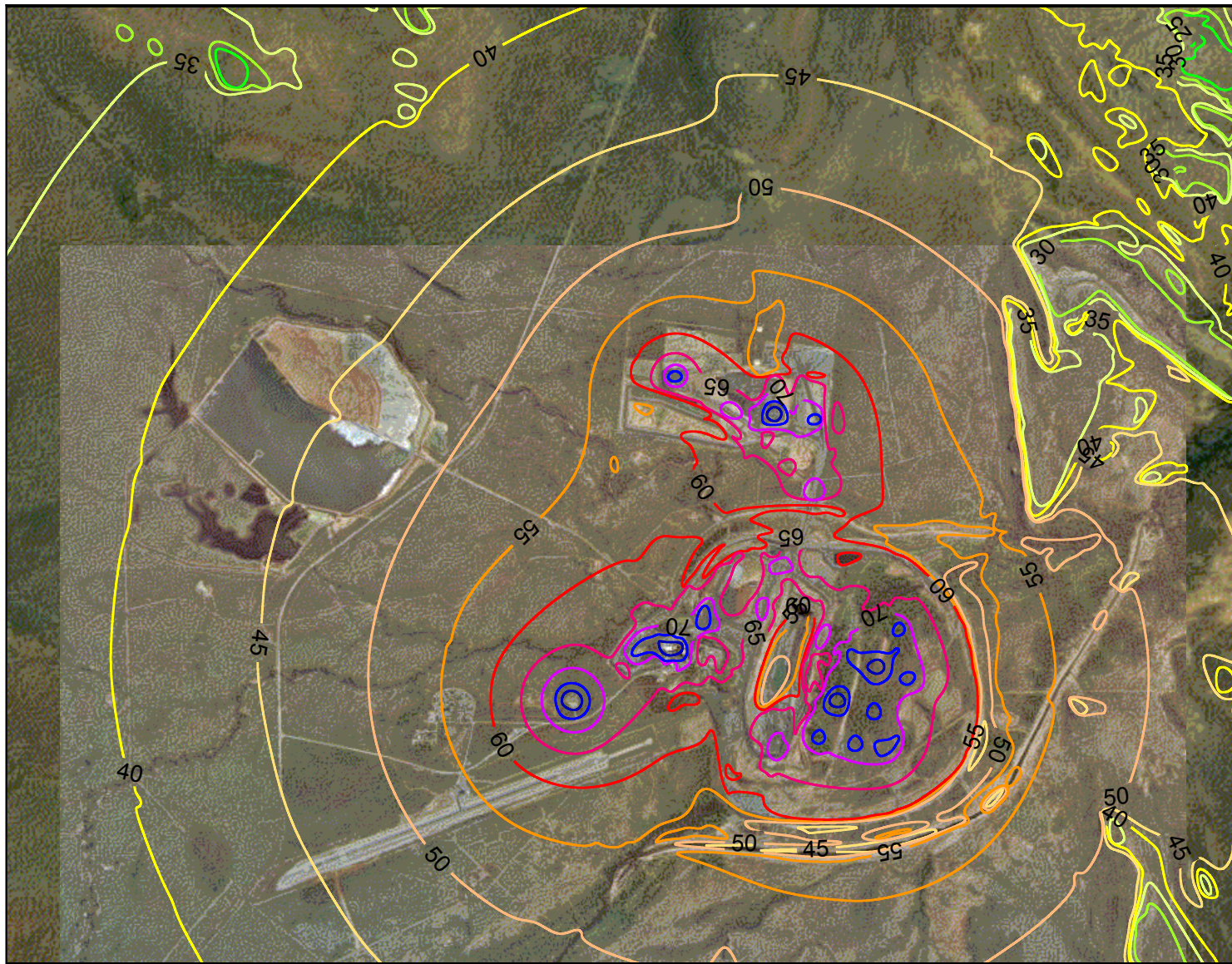
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Mc Arthur River Mine Phase 3 Expansion Environmental Noise Assessment

Proposed Expansion with Power Station on Site 4

Noise Contours for Worst Case Wind Conditions

Figure 3



Noise levels dB(A)

< 20
20 <= < 25
25 <= < 30
30 <= < 35
35 <= < 40
40 <= < 45
45 <= < 50
50 <= < 55
55 <= < 60
60 <= < 65
65 <= < 70
70 <= < 75
75 <= < 80
80 <=



0 0.5 1 2 km

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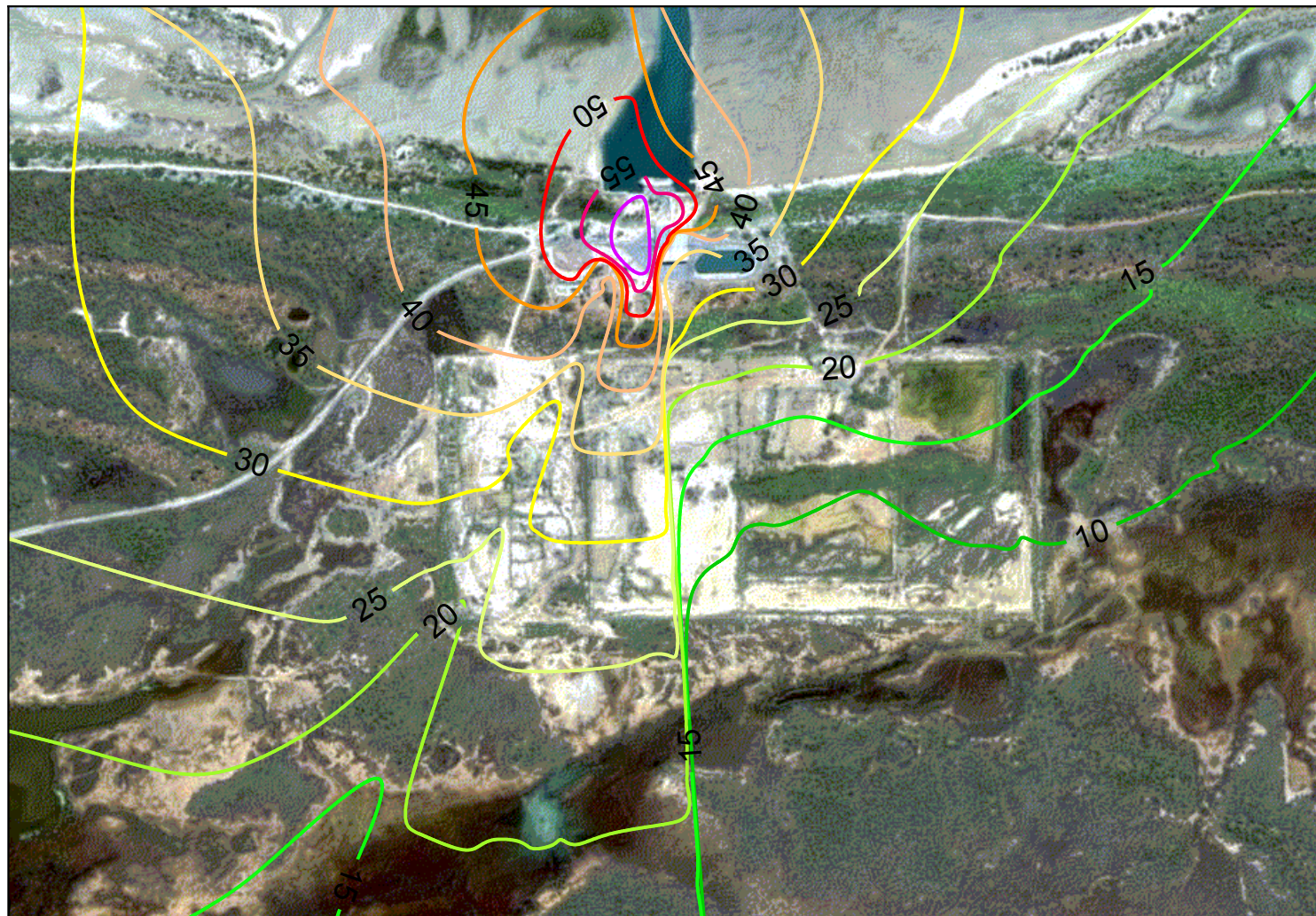
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Mc Arthur River Mine Phase 3 Expansion Environmental Noise Assessment

Bing Bong Port, Current Situation

Noise Contours for Worst Case Wind Conditions

Figure 4



Noise levels dB(A)

< 10
10 <= < 15
15 <= < 20
20 <= < 25
25 <= < 30
30 <= < 35
35 <= < 40
40 <= < 45
45 <= < 50
50 <= < 55
55 <= < 60
60 <= < 65
65 <= < 70
70 <=



0 100 200 400
m

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APPENDIX B : SOURCE SOUND POWER LEVELS

Source	Lw(A)	Lw(L)	Octave Sound Power Level [dB(L)]										
			31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	
			Current Minesite										
Milling	Mill (4 MW)	117.8	123.2	114.0	114.2	117.0	116.0	114.9	113.3	110.2	106.1	96.1	82.4
	Float floor	120.8	124.8	120.0	114.1	112.1	115.8	116.8	115.4	114.3	110.9	104.9	94.5
	Roughers	117.1	122.7	116.4	117.9	111.2	112.7	111.3	112.6	110.4	107.9	96.8	84.2
	Regrinders	112.6	116.9	102.4	102.9	112.5	106.8	110.6	109.1	104.0	93.5	84.9	73.6
	M10,000 Regrinders	108.5	115.5	100.7	103.2	112.7	108.5	104.2	102.5	102.8	91.2	79.2	68.2
Crushing	Primary crusher	114.5	120.7	108.2	114.8	113.9	113.5	113.0	110.0	105.1	98.6	91.2	81.7
	Secondary crusher	111.4	114.1	106.5	99.0	102.2	105.9	107.1	107.5	104.8	99.4	93.6	86.7
	Tertiary crusher	104.6	108.3	97.9	99.4	98.5	97.6	103.7	100.5	94.7	90.6	86.1	80.0
	Screen 1	112.6	114.8	101.6	102.3	107.2	104.8	107.7	107.9	107.0	101.4	94.2	82.6
	Screen 2	106.2	115.6	97.5	101.4	114.3	105.4	101.6	100.1	98.3	94.9	91.5	81.8
Power plant, gas turbine (inc. stack)	114.2	126.7	118.5	124.2	119.4	110.5	110.6	109.2	101.7	108.0	100.5	81.3	
Proposed Expansion (where different from the current minesite)													
Crushing	Mill (11MW)	122.2	127.6	118.4	118.6	121.4	120.4	119.3	117.7	114.6	110.5	100.5	86.8
	Primary crusher	117.9	124.2	111.6	118.2	117.4	116.9	116.5	113.5	108.6	102.1	94.6	85.1
	Secondary crusher	114.8	117.5	109.9	102.5	105.6	109.3	110.5	110.9	108.2	102.8	97.0	90.1
	Tertiary crusher	108.0	111.7	101.4	102.8	102.0	101.1	107.1	103.9	98.1	94.0	89.6	83.4
	Screen 1	116.0	118.2	105.0	105.7	110.6	108.2	111.1	111.3	110.4	104.9	97.6	86.0
Power plant, gas turbine (inc. stack)	Screen 2	109.7	119.0	100.9	104.8	117.7	108.8	105.0	103.6	101.8	98.3	94.9	85.2
	Heavy Media Plant (4 screens)	115.7	125.0	106.9	110.9	123.8	114.9	111.0	109.6	107.8	104.3	101.0	91.3
	Power plant, gas turbine (inc. stack)	113.8	118.9	111.2	115.2	109.2	100.2	104.2	109.2	109.2	104.2	90.2	
Bing Bong													
Diesel genset	105.8	108.1	98.0	95.5	96.7	98.5	102.8	100.8	100.0	93.9	84.5	73.1	
Conveyor	94.3	113.7	112.8	102.5	103.6	95.8	92.9	87.0	78.8	68.3	61.4	55.2	

Source	Lw(A)	Lw(L)	Octave Sound Power Level [dB(L)]									
			31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
			Mobile Equipment									
Water Cart	105.1	111.9	100.3	104.8	106.4	105.9	102.0	99.5	97.9	89.6	81.7	0.0
Haul Truck CAT 777B (100T)	105.1	111.9	100.3	104.8	106.4	105.9	102.0	99.5	97.9	89.6	81.7	0.0
Haul Truck CAT 799C (150-175T)	106.7	117.6	105.9	113.8	112.7	108.3	103.3	100.1	98.9	91.5	83.8	0.0
Haul Truck CAT 793D (220T)	118.7	127.2	108.5	119.5	125.0	115.8	115.0	113.2	111.9	105.5	100.2	90.8
Excavator Komatsu PC1800	109.9	116.1	97.2	102.2	112.2	110.2	108.2	106.2	95.2	91.2	84.2	0.0
Dozer CAT D11R	125.5	127.6	112.2	115.1	117.3	118.7	122.7	120.4	119.7	111.7	98.8	93.8
Wheel Loader CAT 992G	110.6	117.5	100.0	104.2	115.5	106.1	108.3	105.6	102.6	97.8	91.6	0.0
Grader CAT 16H	105.3	112.0	99.9	101.4	109.1	103.1	101.7	100.4	98.0	92.4	87.0	74.8
Cha 1100 Drill Rig	115.3	120.3	100.5	105.9	115.0	115.5	111.6	111.7	106.2	98.8	92.5	86.5