# Construction Phase Noise Management Plan

## Iron Ore and Downstream Processing, Cape Preston, Western Australia

**Mineralogy Pty Ltd**

September 2006

MAUNSELL | AECOM

**MINERALOGY PTY LTD**

A.B.N. 65 010 582 680

# Construction Phase Noise Management Plan

Prepared for

## Mineralogy Pty Ltd

Prepared by

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# 1.0 Introduction

## 1.1 Background

Mineralogy Pty Ltd (the proponent), proposes the development of an iron ore mine and downstream processing facilities at Cape Preston, 80km south west of Karratha.

In response to project environmental impact assessment requirements as determined by the Environmental Protection Authority (EPA), a Public Environmental Review (PER) was submitted to the Authority in December 2000 (HGM, 2000). The PER was supplemented with a Supplementary Environmental Review (SER) in February 2002 to address changes to the project design being sought by the proponent (HGM, 2002). Under the proposal assessed by the EPA pursuant to the PER and SER, and a subsequent successful application for a non-substantial change to the assessed project pursuant to Section 45(c) of the *Environmental Protection Act 1986,* the project would entail an annual mining rate of approximately 67.4 Mt and annual production of the following:

- Concentrate – approximately 19.6 Mt;
- Pellets – approximately 13.8 Mt; and
- Direct reduced/hot briquetted iron – approximately 4.7 Mt.

Through the Section 45 (C) process seeking Ministerial approval for a non-substantial change to the assessed project, it was made clear that the stockpiling and export of concentrate was intended and in this regard, it should be noted that the Minister's approval of the proposed change was unconditional.

The Ministerial Statement for the project was issued in October 2003, subject to a number of Conditions and the Proponent's Commitments. One of the Ministerial Conditions requires preparation of a Noise Management Plan for both the construction and operational phases of the project.

## 1.2 Relevant Legislation and Guidelines

| **State Government Legislation** | **Application** |
|---|---|
| *Environmental Protection Act, 1986* | PER assessment and Ministerial approval process, and Section 45 (C) non substantial change |
| *Iron Ore Processing (Mineralogy Pty Ltd) Agreement Act, 2002* | Act under which the project is developed |
| *Occupational Health, Safety and Welfare Act, 1984* | Sets workplace limits for air quality |
| *Environmental Protection (Noise) Regulations 1997* | Control of construction and operational noise |
| *Mine Safety And Inspection Regulations 1995* | Protection of mine personnel |

## 1.3 Purpose of this Document

The purpose of this document is to respond to the noise management requirements established pursuant to Condition 12-1 of the Ministerial Statement No. 000635 (Minister for the Environment, 2003). Ministerial Condition 12-1 requires that:

*Prior to commencement of construction of ground disturbing activities, the proponent shall prepare a Noise Management Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.*

*This Plan shall include:*

1. *modelling of cumulative noise levels associated with components of the expanded project at personnel accommodation sites, the project boundary and at the public campsite near the mouth of the Fortescue River; and*
2. *a strategy to protect popular "visitor locations" from undue noise levels associated with the project.*

## 1.4 Objectives of this Document

The objective of this document is to present the outcomes from noise modelling undertaken in response to Ministerial Condition 12-1, and the consequent proposals for managing noise emissions generated within the project area during construction so as to meet appropriate criteria. As such, this document constitutes the Construction Phase Noise Management Plan for the Cape Preston project, and it needs to be read in conjunction with the project Environmental Management System and Construction Environmental Management Plan.

An Operational Phase Noise Management Plan will also be required pursuant to Ministerial Condition 12-1. This plan will be prepared prior to the commencement of productive operations in order to incorporate the results from noise monitoring during the construction phase of the project so that more accurate noise impact predictions can be made and more adequate management strategies developed.

## 1.5 Responsibilities and Reporting

Overall responsibility for ensuring that site environmental management requirements are met during the construction phase of the project will rest with the proponent's Construction Manager. In respect of this Noise Management Plan, this responsibility will include:

- ensuring that all construction personnel, both the proponent's workforce and contract personnel, conform with requirements pursuant to the Management Plan;
- ensuring that contractor staff are fully inducted and aware of their environmental responsibilities and obligations;
- ensuring that monitoring requirements are being met.

Contracting companies undertaking construction will be required to appoint an environmental representative. The key responsibilities of this representative will be to:

- maintain routine contact with the proponent's Construction Manager to ensure that environmental objectives of this plan are being met;
- provide monthly reports to the proponent's Construction Manager on environmental issues and conduct regular audits; and
- ensure that all management aims and monitoring requirements of this Noise Management Plan are being met.

## 1.6 Consultation

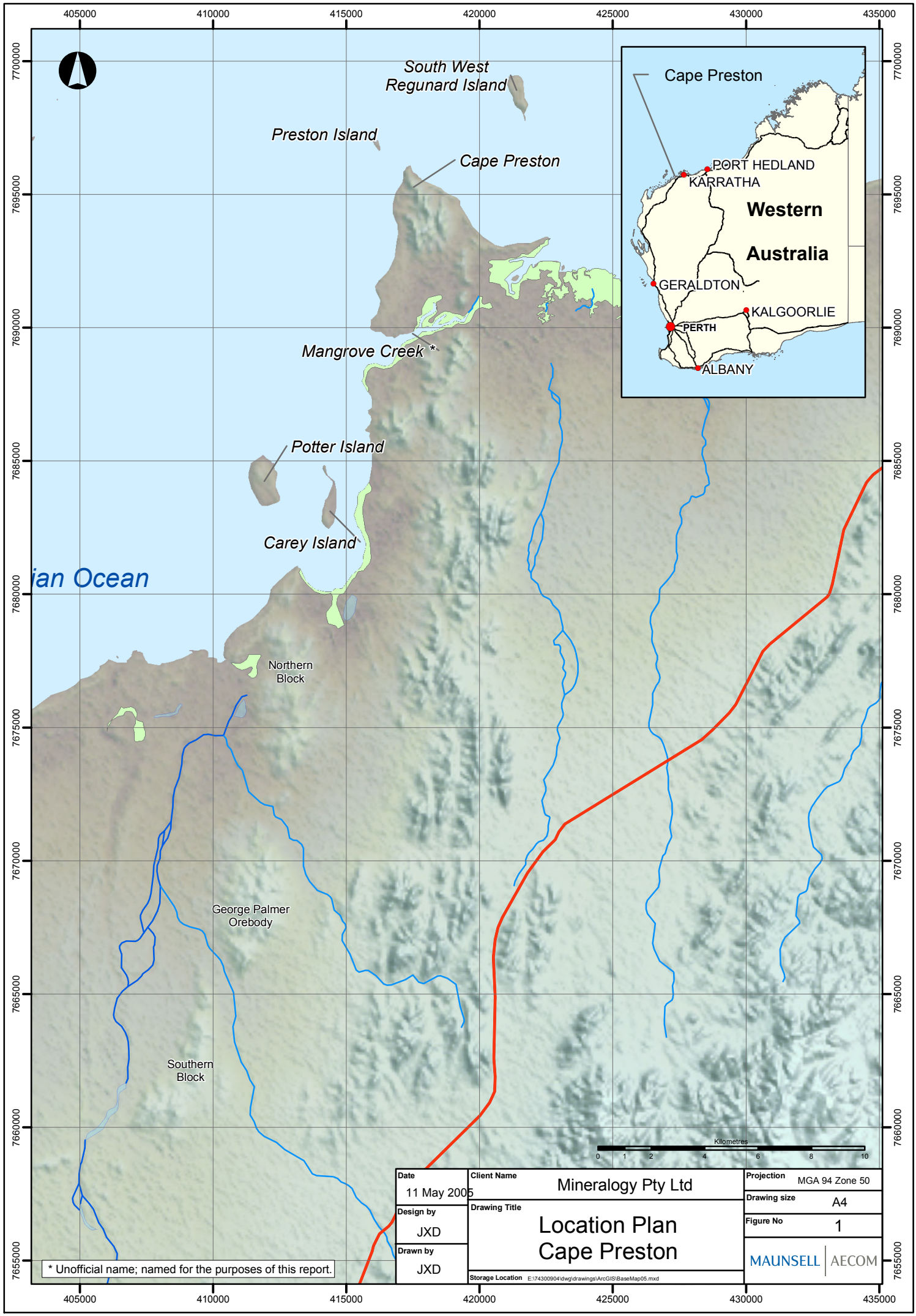
Pursuant to Environmental Impact Assessment requirements under the *Environmental Protection Act (1986)*, Comprehensive consultation with stakeholders and members of the community has been undertaken. The outcomes of these negotiations were used to develop the commitments provided by Mineralogy and presented in the Public and Supplementary Environmental Review documents (HGM 2000, 2002) and, ultimately, in the development of this environmental management plan.

# 2.0 Project Description

The proponent plans to mine the George Palmer Orebody, which is located approximately 80km south west of Karratha and 25 km south of Cape Preston in the Pilbara region of Western Australia. A stockyard and laydown area will be constructed at Cape Preston. Preston Island is the intended location for the port facilities. Figure 1 depicts the location of the site in a regional context. The major components of the project are:

- open pit mine;
- desalination plant;
- HBI (Hot Briquetted Iron) plant;
- DRI (Direct Reduced Iron) plant;
- pellet plant;
- concentrator plant;
- tailings dam;
- system of conveyors and a service road to Cape Preston;
- product stockpile (HBI, DRI, pellets, concentrate) and adjacent general laydown areas at Cape Preston
- causeway to Preston Island;
- jetty to the load out / port facilities;
- port facilities; and
- accommodation for employees and construction staff.

**Figure 1 - Regional setting of project area**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# 3.0 Noise Impacts and Management

## 3.1 Predicted Impacts and Management Criteria

During the project construction phase, various activities will produce noise emissions which will extend into the surrounding environment. As indicated in Section 1.3, Condition 12-1 of the Ministerial Statement focuses on managing the potential effects of project related noise emissions on humans. In this regard, environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations) which prescribe noise levels that must be complied with during specified times of the day.

The Mining Leases encompassing the Cape Preston project area are within the boundaries of the Mardie pastoral station and accordingly, the project area is isolated from any substantial human development and is a low noise environment.

There are two established camp sites adjacent to the mouth of the Fortescue River that could potentially be affected by noise emissions associated with the Cape Preston project, one a public site, the other servicing an offshore pearling lease. These are some 6 to 7 km from the closest component of the proposed Cape Preston operation, the waste rock dump, although the minimum separation between the western boundary of the Mining Leases and these sites is approximately 3.5 km.

### 3.1.1 Construction Noise Criteria

Noise associated with construction activities is not, however, specifically required to comply with the levels prescribed in the Regulations. Rather, the following management requirements established pursuant to Regulation 13 apply:

*a) the construction work was carried out in accordance with control of environmental noise practices set out in section 6 of AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites;*

*b) the equipment used on the premises was the quietest reasonably available; and*

*c) if the occupier was required to prepare a noise management plan under sub-regulation (4) in respect of the construction site –*

(i) the noise management plan was prepared and given in accordance with the requirement, and approved by the Chief Executive Officer; and

(ii) the construction work was carried out in accordance with the management plan.

### 3.1.2 Blasting Noise Criteria

Any blasting required during the construction phase would also represent a source of noise. The following table (extracted from Appendix A) shows the allowable maximum unconfined charge mass per delay based on the assumption that pit development would be the most probable source of blasting, and the separation between the pit site and the accommodation camp and Fortescue River mouth.

Blasting levels associated with Mineralogy's construction activities must comply with Regulation 11 of the *Environmental Protection (Noise) Regulations 1997* (Sub-regulations 3 and 4), which identify the following criteria that are to be complied with:

*3. No airblast level resulting from blasting on any premises or public place, when received at any other premises , may exceed:*

*a. 125dB L $_{Linear\ Peak}$ between 0700 hours and 1800 hours on Monday to Saturday inclusive; or*

*b 120dB L $_{Linear\ Peak}$ between 0700 hours and 1800 hours on a Sunday or public holiday.*

*4. Notwithstanding sub-regulation (3), airblast levels for 9 in any 10 consecutive blasts (regardless of the interval between each blast), when received at any other premises, must not exceed:*

*a. 120dB L $_{Linear\ Peak}$ between 0700 hours and 1800 hours on Monday to Saturday inclusive; or*

*b. 115dB L $_{Linear\ Peak}$ between 0700 hours and 1800 hours on a Sunday or Public holiday.*

## 3.2 Noise Modelling Outcomes

### 3.2.1 Construction Noise

In accordance with Condition 12-1 of the project Ministerial Statement, modelling of noise levels associated with both construction and operation of the Cape Preston project has been undertaken and the report documenting outcomes from this modelling (Lloyd Acoustics, 2004) forms Appendix A to this plan.

Results from the modelling of general construction-related noise are shown in the following table.

| LOCATION | PREDICTED NOISE LEVEL (dB) | |
|---|---|---|
| | DAY | NIGHT |
| Accommodation Camp | 40 | 40 |
| Fortescue River Mouth | 26 | 24 |

**Table 3.1 - Predicted $L_{A10}$ Noise Levels – Construction Scenario**

Based on the investigations undertaken, the following conclusions are drawn in respect of construction noise (refer to Section 6 of Appendix A):

- although construction noise is not required to comply with the levels assigned under the Regulations, the predicted noise level at the public camp site is 24 dB $L_{A10}$ during the critical night period, which would comply with the assigned noise level of 35 dB $L_{A10}$ even with tonality adjustments;
- predicted noise levels at the project accommodation site are up to 40 dB $L_{A10}$ , due to equipment located in the tailings area, which also complies with the regulatory criterion of 65 dB $L_{A10}$.
- noise associated with construction activities is, therefore, considered to be acceptable.

### 3.2.2 Blasting Noise

Blasting noise levels were calculated using equations developed by Orica Explosives Australia (Lloyd Acoustics, 2004). The level permissible pursuant to Regulation 11 of the *Environmental Protection (Noise) Regulations 1997* is 120 dB L $_{Linear\ peak}$ for 9 out of 10 consecutive blasts. Calculations presented in Appendix A indicate that this level can be achieved at the river mouth, by limiting the charge mass to 60 kg. The calculated noise level at the Mine Camp will be around 123 dB L $_{Linear\ peak}$ for this same scenario. Since the accommodation camp is part of the mine site, a higher level is likely to be acceptable. Nevertheless, the following conclusions were drawn from the blasting-related noise investigations conducted, refer to Section 6 of Appendix A (Lloyd Acoustics, 2004):

- noise levels from blasting can vary significantly depending on the 'charge mass' and whether the blast is confined or unconfined (for a confined charge, the allowable mass is significantly higher); and

- initial blasting should be limited to a mass of 60kg and measurements undertaken near both the river mouth camps and the accommodation camp site determine the actual allowable mass to comply with Regulation 11 in the *Environmental Protection (Noise) Regulations 1997*.

## 3.3 Management Commitments and Strategies

In response to the conclusions drawn on the basis of the general construction and blasting-related noise investigations undertaken, Mineralogy provides the following noise management commitments:

- all construction work will be carried out in accordance with control of environmental noise practices set out in section 6 of AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites;

- all equipment, machines and vehicles to be used on site during construction will be the quietest reasonably available consistent with operational requirements, and will be routinely maintained to ensure the effectiveness of noise suppression systems and equipment;

- implementation of a monitoring programme to quantify noise levels during the project construction phase and compare these with modelling predictions, as a basis for –
    - adaptation of construction practices as and if appropriate, and
    - preparation of the Operational Phase Noise Management Plan;

- in the event that any blasting is required to facilitate construction, initial blasts will be limited to a mass of 60kg and measurements will be undertaken near both the river mouth camps and the accommodation camp site as a basis for determining the actual allowable charge mass to ensure compliance with Regulation 11 of the *Environmental Protection (Noise) Regulations 1997*;

- through site induction programmes, all construction personnel (including contractors) will be informed of their responsibilities and the importance of managing noise levels during the construction phase of the project; and

- any noise-related complaints received during the construction phase will be registered and will trigger a review of the relevant operational / management procedure/s by the site Environmental Officer as a basis for development and implementation of appropriate modified practice/s.

## 3.4 Summary of Management Commitments

| Item | Task/Requirement | Timing | Responsibility | Related Plans/Procedures |
|---|---|---|---|---|
| 3.4.1 | All construction work will be carried out in accordance with control of environmental noise practices set out in section 6 of AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites | Construction phase | Construction Manager<br><br>Environmental Officer | Staff Inductions<br><br>AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites |
| 3.4.2 | All equipment, machines and vehicles to be used on site during construction will be the quietest reasonably available consistent with operational requirements, and will be routinely maintained to ensure the effectiveness of noise suppression systems and equipment | Construction phase | Construction Manager | Vehicle Maintenance register<br><br>Pre-start inspection checklist |
| 3.4.3 | Implementation of a monitoring programme to quantify noise levels during the project construction phase and compare these with modelling predictions, as a basis for –<br>➢ adaptation of construction practices as and if appropriate, and<br>➢ preparation of the Operational Phase Noise Management Plan | Construction phase | Environmental Manager | Noise Monitoring Programme<br><br>Operation Phase Noise Management Plan |
| 3.4.4 | In the event that any blasting is required to facilitate construction, initial blasts will be limited to a mass of 60kg and measurements will be undertaken near both the river mouth camps and the accommodation camp site as a basis for determining the actual allowable charge mass to ensure compliance with Regulation 11 of the *Environmental Protection (Noise) Regulations 1997* | Project duration | Construction Manager<br><br>Environmental Officer | Staff inductions<br><br>Regulation 11 of the Noise Regulations, 1997 |
| 3.4.5 | Through site induction programmes, all construction personnel (including contractors) will be informed of their responsibilities and the importance of managing noise levels during the construction phase of the project | Construction phase | Environmental Officer | Staff Induction Programme<br><br>Environmental Management System (DIN 13 & 14)<br><br>Construction Environmental Management Plan – Section 3.2 |
| 3.4.6 | Any noise-related complaints received during the construction phase will be registered and will trigger a review of the relevant operational / management procedure/s by the site Environmental Officer as a basis for development and implementation of appropriate modified practice/s. | Construction phase | Environmental Officer | Environmental Management System (DIN 15 & 16)<br><br>Construction Environmental Management Plan – Section 3.4<br>Complaints Register |

**Table 3.2 -** Summary of Noise Management Commitments

## 3.5 Performance Indicators

Mineralogy will ensure that all realistic, best practice noise management measures will be implemented for the duration of construction activities, and the effectiveness of the Construction Phase Noise Management Programme will be reviewed against the following indicators:

- compliance with the Regulation 13 *Environmental Protection (Noise) Regulations 1997* (general construction noise);
- compliance with the Regulation 11 *Environmental Protection (Noise) Regulations 1997* (blasting noise); and
- the level of complaints received and registered.

Using these performance indicators, Mineralogy will continuously review the Construction Phase Noise Management Plan during project construction and will adapt the plan as improved resources, capability or technical understanding is achieved.

## 3.6 Monitoring

In addition to the inspection and monitoring initiatives included in Appendix B, Mineralogy will monitor noise levels at noise sensitive sites during the project construction phase in order to test the outcomes from noise modelling. These sites will include the Fortescue River mouth camping area and Mardie Homestead. The objective will be to measure representative noise levels under typical and “worst case” (ie noisiest) conditions. Necessarily, monitoring will occur in the event that blasting is required during the construction phase.

Clearly, the scope of the monitoring programme implemented will need to respond to construction activities and Mineralogy will, therefore, liaise with the Department of Environment (DoE, now part of Department of Environment and Conservation) prior to the commencement of construction to finalise programme details. Data from the monitoring programme will be reported to the Department as agreed through this liaison and in accordance with Section 3.8.

## 3.7 Training

All employees and subcontractors will be required to undergo a site specific induction, outlining environmental controls to be implemented during construction. The induction will provide necessary awareness of noise management and the procedures and work practices to minimise and report noise generation.

Regular toolbox meetings will also be held to reinforce a positive attitude towards dust management and to highlight any issues that arise during the course of construction. A record of all training will be maintained.

## 3.8 Reporting

Noise monitoring as outlined in Section 3.6 will occur for the duration of project construction, with the results published in monthly internal reports. All data collected through the noise monitoring programme will be collated and summarised in the Annual Environmental Review, which will be submitted to the Environmental Protection Authority. Records will be maintained in accordance with the Project Environmental Management System. The regulatory bodies will be immediately notified of any exceedance of the performance indicators indicated in Section 3.5, and of the response to such exceedance.

# 4.0 References

Halpern Glick Maunsell (HGM), (2000), *Iron Ore Mine and Down Stream Processing, Cape Preston, WA, Public Environmental Review, December 2000.* Unpublished report prepared for Mineralogy Pty Ltd.

Halpern Glick Maunsell (HGM) (2002), *Iron Ore Mine and Downstream Processing, Cape Preston, WA. Supplementary Environmental Review, February 2002.* Unpublished report prepared for Mineralogy Pty Ltd.

Lloyd Acoustics (2004), *Noise Impact Assessment Mineralogy Pty Ltd Project Iron Ore Mine and Processing Plant Cape Preston, Western Australia.* Unpublished report prepared for Mineralogy Pty Ltd.

Minister for the Environment (2003). *Statement that a proposal may be implemented (Pursuant to the provisions of the Environmental Protection Act 1986).* Statement No 00635. October 2003.

# Appendix A – Noise Impact Assessment

**Mineralogy Pty Ltd Project**
**Iron Ore Mine and Processing Plant.  Cape Preston, Western Australia**

# Noise Impact Assessment

## Mineralogy Pty Ltd Project

## Iron Ore Mine and Processing Plant

## *Cape Preston, Western Australia*

**Prepared For**

Maunsell Australia Pty Ltd

**January 2005**

Reference: 405208-01a


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# Report: 405208-01a



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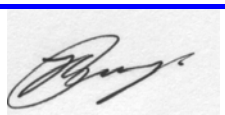
| **Approved for Issue:** |  Terry George |
| **Position:** | Project Director |
| **Date:** | 11 January 2005 |
| **Verified** |  Daniel Lloyd |

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# APPENDICES

# 1 INTRODUCTION

The Mineralogy Project consists of construction and operation of a 67.4 million tonnes per annum iron ore mine, power station, desalination plant, processing plant, port facilities and accommodation facilities in the Cape Preston area, 80 km southwest of Karratha in Western Australia.

A Public Environmental Review (PER) was produced for the proposed project, which included a noise impact assessment undertaken by ERM (*Austeel Mine and HBI Facility – Cape Preston, Noise Assessment*). In February 2002, Halpern Glick Maunsell Pty Ltd (now Maunsell Australia Pty Ltd and hereafter referred to as Maunsell's) produced a Supplementary Environmental Review (SER) addressing a series of proposed changes to the project from the original PER document. Following this document, further 'non-substantial' changes are proposed. The changes are summarised as follows:

- Increase in mining rate and reduction to project life;
- Net increase (~10ha) in total area disturbed (incorporates increases to the plant site and power station area and clearing for a gas pipeline lateral whilst allowing for a reduction in area for the removal of the southern tailings dam);
- Increased power (and natural gas) demand (extra two 160MW operating gas turbines plus two back-up turbines);
- Increased ore concentration (to 19.6 Mtpa);
- Increase in pellet production (additional 6.9Mtpa for export);
- Removal of the southern tailings dam (eastern tailings dam only);
- Minimisation of waste dump encroachment into the Fortescue River Floodplain;
- Identification of two options for the gas pipeline lateral;
- Consideration of the option to haul product to the port site rather than use conveyor;
- Modified jetty design; and
- Increase in project workforce and changes to on-site accommodation.

Of most significance in terms of noise emissions, are the increase in power station load and the option of hauling the product to the port rather than via conveyor.

In October 2003, the Minister for the Environment issued Statement 635, which under Section 12, requested the following:

*12-1 Prior to the commencement of ground-disturbing activities, the proponent shall prepare a Noise Management Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.*

*This Plan shall include:*

1. *modelling of the cumulative noise levels associated with components of the expanded project at personnel accommodation sites, the project boundary and at the public campsite near the mouth of the Fortescue River; and*
2. *a strategy to protect popular "visitor locations" from undue noise levels associated with project.*

*12-2 The proponent shall implement the Noise Management Plan required by condition 12-1.*

*12-3 The proponent shall make the Noise Management Plan required by condition 12-1 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.*

This report forms the Noise Management Plan required in Condition 12-1. It utilises both the information contained in the ERM noise impact assessment as well as additional information resulting from the proposed project changes.

# 2 EXECUTIVE SUMMARY

Noise levels were predicted to the areas surrounding the proposed mine and export facility and specifically, the Mine Camp and Public Camp near the mouth of the Fortescue River. Predictions included construction activities (overburden removal), operational activities and blasting noise, with results assessed against the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

The requirements for construction noise are documented in Regulation 13, which specify management practices to be followed, rather than meeting specific noise levels. Operational noise is required to meet the assigned noise levels of Regulation 8 and noise from blasting is required to satisfy Regulation 11.

Noise levels from construction and operational noise were predicted under worst-case meteorological conditions using the computer programme *SoundPlan 6.1*. The predicted night-time noise levels, which are the most critical time period, are summarised below in *Table 2.1*. Note that for the operational noise, six (6) scenarios were modelled, which were for the progressive stages of mining in the pit and for the two options of either conveying or hauling the ore from the plant to the port.

Source rankings for the two assessment locations and noise contour plots for the surrounding areas are shown in Appendices B & C.

***Table 2.1 – Predicted $L_{A10}$ Night-time Noise Levels***

| SCENARIO | PREDICTED NOISE LEVEL, dB | |
|---|---|---|
| | **LOCATION 1 MINE CAMP** | **LOCATION 2 PUBLIC CAMP (FORTESCUE RIVER)** |
| Construction | 40 | 24 |
| ***Operational*** | | |
| 1. Mining (Initial) (Conveyor) | 36 | 26 |
| 2. Mining (Initial) (Haul) | 34 | 24 |
| 3. Mining (Future) (Conveyor) | 36 | 25 |
| 4. Mining (Future) (Haul) | 33 | 23 |
| 5. Mining (Final) (Conveyor) | 36 | 25 |
| 6. Mining (Final) (Haul) | 33 | 23 |

The assigned noise level during the night-time at the Public Camp is 35 dB $L_{A10}$. Even if the noise contained tonal characteristics (such that a + 5 dB penalty was applied), compliance would still be achieved, irrespective of the method of transferring the ore to the port.

As the Mine Camp is associated with the proposed mine itself, it is considered to be an industrial premises under the Regulations and the assigned noise level is therefore 65 dB $L_{A10}$. However, it is considered that such a noise level would result in an unacceptable amenity and a lower noise level should be achieved. The predicted noise levels are well below the 65 dB $L_{A10}$ criterion being no more than 36 dB $L_{A10}$ for the operational scenarios. Thus, compliance is obtained and it is considered that an acceptable amenity is also achieved.

Blasting noise levels were calculated using equations developed by Orica Explosives Australia. The allowable level in accordance with Regulation 11 is 120 dB $L_{Linear\ peak}$ for 9 out of 10 consecutive blasts. It is calculated that this can be achieved at the Public Camp, by limiting the 'charge mass' to 60kg. Note that this is based on an 'unconfined' blast and is likely to be conservative. The calculated noise level at the Mine Camp will be around 123 dB $L_{Linear\ peak}$ for this same scenario. Again, since the Mine Camp is part of the mine itself, a higher level is likely to be acceptable. It is recommended that measurements be undertaken during blasting to accurately determine the allowable 'charge mass' in order to comply with the Regulations.

# 3 CRITERIA

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations). The relevant sections of these Regulations are discussed below.

## 3.1 Operational Noise Criteria

Regulation 7 defines the prescribed standard for noise emissions as follows:

"7. (1) Noise emitted from any premises or public place when received at other premises –

(a) Must 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

(b) Must be free of –

i. Tonality;

ii. Impulsiveness; and

iii. Modulation".

A "…noise emission is taken to *significantly contribute to* a level of noise if the noise emission exceeds a value which is 5 dB below the assigned level…"

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

(a) The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and

(b) The noise emission complies with the standard after the adjustments of *Table 3.1* are made to the noise emission as measured at the point of reception.

***Table 3.1 – Adjustments For Intrusive Characteristics***

| TONALITY | MODULATION | IMPULSIVENESS |
|---|---|---|
| + 5 dB | + 5 dB | + 10 dB |

Note: The above are cumulative to a maximum of 15 dB.

The assigned levels (prescribed standards) are specified in Regulation 8 and are shown below in *Table 3.2*.

***Table 3.2 – Assigned Noise Levels For Noise Sensitive Premises***

| PREMISES RECEIVING NOISE | TIME OF DAY | ASSIGNED LEVEL (dB) | | |
|---|---|---|---|---|
| | | $L_{A10}$ | $L_{A1}$ | $L_{Amax}$ |
| Noise Sensitive[1] | 0700 to 1900 hours Monday to Saturday | 45 + influencing factor | 55 + influencing factor | 65 + influencing factor |
| | 0900 to 1900 hours Sunday and public holidays | 40 + influencing factor | 50 + influencing factor | 65 + influencing factor |
| | 1900 to 2200 hours all days | 40 + influencing factor | 50 + influencing factor | 55 + influencing factor |
| | 2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays | 35 + influencing factor | 45 + influencing factor | 55 + influencing factor |
| Noise Sensitive[2] | All hours | 60 | 75 | 80 |
| Industrial and utility premises[3] | All hours | 65 | 80 | 90 |

1. Applies within 15 metres of a building associated with a noise sensitive use, as defined in Schedule 1, Part C.
2. Applies at locations further than 15 metres from a building associated with a noise sensitive use, as defined in Schedule 1, Part C.
3. Applies to premises as defined in Schedule 1, Part A, including *Caretaker's and like residences attached to or forming part of premises referred to in [Part A]*.

In the above, the influencing factor, $L_{A10}$, $L_{A1}$ and $L_{Amax}$ are defined as follows:

Influencing factor in relation to noise received at noise sensitive premises, means –

$$= \frac{1}{10}\left(\%\ \text{Type A}_{100} + \%\ \text{Type A}_{450}\right) + \frac{1}{20}\left(\%\ \text{Type B}_{100} + \%\ \text{Type B}_{450}\right)$$

*where*:

$\%\ \text{Type A}_{100}$ = the percentage of industrial land within a 100m radius of the premises receiving the noise

$\%\ \text{Type A}_{450}$ = the percentage of industrial land within a 450m radius of the premises receiving the noise

$\%\ \text{Type B}_{100}$ = the percentage of commercial land within a 100m radius of the premises receiving the noise

$\%\ \text{Type B}_{450}$ = the percentage of commercial land within a 450m radius of the premises receiving the noise

+ Traffic Factor (maximum of 6 dB)

= 2 for each secondary road within 100m

= 2 for each major road within 450m

= 6 for each major road within 100m

| | |
|---|---|
| $L_{A10}$ assigned level | means an assigned level which, measured as a $L_{A\ slow}$ value, is not to be exceeded for more than 10% of the *representative assessment period*. |
| $L_{A1}$ assigned level | means an assigned level which, measured as a $L_{A\ slow}$ value, is not to be exceeded for more than 1% of the *representative assessment period*. |
| $L_{Amax}$ assigned level | means an assigned level which, measured as a $L_{A\ slow}$ value, is not to be exceeded at any time. |

Where *representative assessment period* means a period of time not less than 15 minutes, and not exceeding 4 hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

Noise levels have been considered over the general surrounding area as well as the following specific areas:

1. Personnel Accommodation Site (Mine Camp); and
2. Public campsite at the mouth of the Fortescue River (Public Camp).

Location 1 is the Camp associated with the proposed mine and therefore, it is the "Industrial and Utility" assigned noise levels that are applicable, since it is considered to be a caretaker's premises or the like, attached to, or forming part of the mine. For location 2 there is no influencing factor, therefore, the base levels shown in *Table 3.2* are applicable.

A map showing the mine and above locations is contained in *Appendix A*.

## 3.2 Construction Noise Criteria

Noise associated with construction activities is not required to satisfy the above prescribed standards but rather management practices as defined in Regulation 13 as follows:

*a) the construction work was carried out in accordance with control of environmental noise practices set out in section 6 of AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites;*

*b) the equipment used on the premises was the quietest reasonably available; and*

*c) if the occupier was required to prepare a noise management plan under subregulation (4) in respect of the construction site –*

*i. the noise management plan was prepared and given in accordance with the requirement, and approved by the Chief Executive Officer; and*

*ii. the construction work was carried out in accordance with the management plan."*

## 3.3 Blasting Noise Criteria

Blasting levels are covered by Regulation 11, which provides the following criteria:

*(3) No airblast level resulting from blasting on any premises or public place, when received at any other premises, may exceed –*

*(a) 125dB $L_{Linear\ peak}$ between 0700 hours and 1800 hours on Monday to Saturday inclusive; or*

*(b) 120dB $L_{Linear\ peak}$ between 0700 hours and 1800 hours on a Sunday or public holiday.*

*(4) Notwithstanding subregulation (3), airblast levels for 9 in any 10 consecutive blasts (regardless of the interval between each blast), when received at any other premises, must not exceed –*

*(c) 120dB $L_{Linear\ peak}$ between 0700 hours and 1800 hours on Monday to Saturday inclusive; or*

*(a) 115dB $L_{Linear\ peak}$ between 0700 hours and 1800 hours on a Sunday or public holiday.*

# 4 METHODOLOGY

The computer modelling programme *SoundPlan 6.1* has been utilised to predict the noise propagation from the mine to the surrounding areas. This programme was developed by Braunstein + Berndt, GmbH, a European company and is endorsed by the Department of Environment (DoE). The programme was selected to use the *CONCAWE* algorithms, which requires the following input data:

- Meteorological Information;
- Topographical data;
- Ground Absorption;
- Source sound power levels.

## 4.1 Meteorological Information

Meteorological information utilised was in accordance with the default conditions nominated in the draft EPA Guidance for the Assessment of Environmental Factors No. 8 as shown below in *Table 4.1*.

***Table 4.1 – Modelling Meteorological Conditions***

| PARAMETER | VALUE | |
|---|---|---|
| | DAY | NIGHT |
| Temperature ($^{o}$C) | 20 | 15 |
| Humidity (%) | 50 | 50 |
| Wind Speed (m/s) | 4 | 3 |
| Temperature Gradient ($^{o}$C/100m) | 0 | 2 |

1. *SoundPlan* does not allow the incorporation of a temperature gradient, but rather a Pasquil Stability Factor (PSF). For Day conditions, a PSF of Type B was chosen and for Night conditions, a PSF of Type E was chosen.

## 4.2 Topographical Data

Topographical data was 3-dimensional and supplied electronically by Maunsell's.

## 4.3 Ground Absorption

Ground absorption varies from a value of 0 to 1, with 0 being for an acoustically reflective ground (e.g. water or bitumen) and 1 for acoustically absorbent ground (e.g. grass). In this instance, water bodies have been set to 0 and all other ground to a value of 0.65.

## 4.4 Sound Power Data

Source sound power level data have been obtained from the PER and also existing file data of similar plant. These are listed below in *Tables 4.2 & 4.3*.

***Table 4.2 – Source Sound Power Levels – Construction Scenario, dB***

| SOURCE | OCTAVE BAND CENTRE FREQUENCY (Hz) | | | | | | | | OVERALL, dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | |
| Excavator | 121 | 118 | 117 | 114 | 112 | 110 | 106 | 102 | **115** |
| Haul Truck | 110 | 112 | 121 | 118 | 115 | 109 | 106 | 101 | **116** |
| Drill | 90 | 109 | 111 | 118 | 116 | 112 | 108 | 103 | **117** |
| Wheeled Dozer | 107 | 106 | 112 | 109 | 110 | 107 | 106 | 98 | **112** |
| Tracked Dozer | 107 | 111 | 120 | 122 | 110 | 110 | 104 | 102 | **116** |
| Watercart | 110 | 111 | 116 | 106 | 102 | 104 | 105 | 99 | **110** |
| Grader | 106 | 104 | 105 | 103 | 106 | 106 | 104 | 98 | **110** |

### *Table 4.3 – Source Sound Power Levels – Operational Scenarios, dB*

| SOURCE | OCTAVE BAND CENTRE FREQUENCY (Hz) | | | | | | | | OVERALL, dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | |
| ***Mine Area*** | | | | | | | | | |
| Excavator (3 off) | 121 | 118 | 117 | 114 | 112 | 110 | 106 | 102 | **115** |
| Haul Truck (15 off) | 110 | 112 | 121 | 118 | 115 | 109 | 106 | 101 | **116** |
| Drill (3 off) | 90 | 109 | 111 | 118 | 116 | 112 | 108 | 103 | **117** |
| Wheeled Dozer (1 off) | 107 | 106 | 112 | 109 | 110 | 107 | 106 | 98 | **112** |
| Tracked Dozer (3 off) | 107 | 111 | 120 | 122 | 110 | 110 | 104 | 102 | **116** |
| Watercart (1 off) | 110 | 111 | 116 | 106 | 102 | 104 | 105 | 99 | **110** |
| Grader (1 off) | 106 | 104 | 105 | 103 | 106 | 106 | 104 | 98 | **110** |
| Semi-Mobile Crusher | 100 | 120 | 117 | 113 | 114 | 113 | 111 | 107 | **118** |
| Conveyor (per metre) from Mine to Concentrator | - | 84 | 89 | 82 | 86 | 83 | 79 | 74 | **88** |
| ***Concentrator Plant*** | | | | | | | | | |
| Grinding Mills | 118 | 122 | 123 | 119 | 121 | 113 | 111 | 103 | **121** |
| Fans/Pumps/Blowers | 84 | 90 | 93 | 102 | 109 | 99 | 92 | 98 | **108** |
| ***Pellet Plant*** | | | | | | | | | |
| Fans/Pumps/Blowers | 81 | 87 | 90 | 99 | 106 | 96 | 89 | 95 | **105** |
| ***DRI Plant*** | | | | | | | | | |
| Compressors | 88 | 97 | 100 | 109 | 116 | 106 | 99 | 115 | **121** |
| Fans/Pumps/Blowers | 81 | 87 | 90 | 99 | 106 | 96 | 89 | 95 | **105** |
| ***Power Station*** | | | | | | | | | |
| Power Station | 83 | 95 | 100 | 103 | 105 | 108 | 102 | 99 | **111** |
| ***Port*** | | | | | | | | | |
| Shiploader | 114 | 111 | 108 | 108 | 109 | 110 | 104 | 100 | **113** |
| Front End Loader | 106 | 111 | 117 | 110 | 111 | 107 | 105 | 98 | **113** |
| Conveyor (per metre) | - | 84 | 89 | 82 | 86 | 83 | 79 | 74 | **88** |
| Desalination Plant | 81 | 87 | 90 | 99 | 106 | 96 | 89 | 95 | **105** |

| SOURCE | OCTAVE BAND CENTRE FREQUENCY (Hz) | | | | | | | | OVERALL, dB(A) |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | |
| ***Conveyor Scenario*** | | | | | | | | | |
| Conveyor (per metre) | - | 84 | 89 | 82 | 86 | 83 | 79 | 74 | **88** |
| ***Haul Truck Scenario*** | | | | | | | | | |
| Primemover & 8 Trailers | 107 | 110 | 112 | 120 | 112 | 109 | 108 | 104 | **116** |

## 4.5 Scenarios

Various scenarios were considered in the noise modelling to represent various stages of the mine as follows:

### *4.5.1 Construction Noise Scenario*

1. Overburden Removal – This is considered to be construction noise as the overburden is required to be removed, before exporting can commence. The overburden will be used to construct the tailings, roads and hardstand areas in the plant. As such, equipment has been distributed accordingly, including some in the mine area (at natural ground level) and some at the waste area (5 metres above natural ground level). Construction noise is not required to satisfy the prescribed standards, but rather management practices (refer Section 3.2). No other plant is operating.

### *4.5.2 Operational Noise Scenario*

1. Mining (Initial) (Conveyor) – Mobile equipment and crushing plant is located in the pit, at a level of 40 metres below existing ground level. Four haul trucks and dozer are operating in the waste area (10 metres above natural ground level). All other plant is operating. Note that the majority of ore above the 40 metre depth is waste and the ore is transferred from the pit via conveyor to the concentrator plant and then to the port via conveyor.
2. Mining (Initial) (Haul) – As above, with ore hauled from the DRI plant to the port by road trains having up to 8 trailers and travelling up to 80km/hr.
3. Mining (Future) (Conveyor) – As for Operational Noise Scenario 1, with mining equipment located in the pit, at a level of 100 metres below existing ground level and crushing plant located in the pit, at a level of 40 metres below existing ground level. Two haul trucks and dozer are operating in the waste area (20 metres above natural ground level).
4. Mining (Future) (Haul) – As for Operational Noise Scenario 3, except using haul trucks between the DRI plant and port.
5. Mining (Final) (Conveyor) – As for Operational Noise Scenario 1, with mining equipment and crushing plant located in the pit, at a level of 200 metres below existing ground level. One truck and one dozer are located in the waste area (30 metres above natural ground level).

6. Mining (Final) (Haul) – As for Operational Noise Scenario 5, except using haul trucks between the DRI plant and port.

In reality, equipment within the pit will be distributed at various heights working at the one time rather than all at the same level as above, however the scenarios allows the change in noise level to be examined, as the pit depth increases.

### *4.5.3 Blasting Noise Scenario*

Noise from blasting is calculated using equations developed by Orica Explosives Australia (Orica). As the charge size is unknown, it is this that has been calculated based on distance to the noise sensitive premises and the criteria of Regulation 11 (refer Section 3.3).

The Orica equations are shown below:

Unconfined Charge

$$Airblast\ Level\ dB\ L_{Linear\ peak} = 20\log\left(\frac{P_A}{P_0}\right)$$

*where*:

$$P_A = 185\left(\frac{R}{W^{\frac{1}{3}}}\right)^{-1.2} \qquad \textit{eqn: 4.1}$$

$P_0 = 2x10^{-8}$

$R =$ *distance from blast*

$W =$ *maximum charge mass per delay*

Confined Charge

$$Airblast\ Level\ dB\ L_{Linear\ peak} = 20\log\left(\frac{P_B}{P_0}\right)$$

*where*:

$$P_B = 3.3\left(\frac{R}{W^{\frac{1}{3}}}\right)^{-1.2} \qquad \textit{eqn: 4.2}$$

$P_0 = 2x10^{-8}$

$R =$ *distance from blast*

$W =$ *maximum charge mass per delay*

Note that, particularly during the first number of blasts, the airblast levels should be recorded at various distances, so that the constants (185 & 3.3) can be determined for site specific conditions.

# 5 RESULTS

The results of the construction and operational noise modelling and blasting calculations are discussed in Sections 5.1 to 5.3 below.

## 5.1 Construction Noise Modelling

*Table 5.1* summarises the results of the construction noise modelling for worst-case, light, downwind conditions. Source rankings are available in *Appendix B*.

***Table 5.1 – Predicted $L_{A10}$ Noise Levels – Construction Scenario***

| LOCATION | PREDICTED NOISE LEVEL, dB | |
|---|---|---|
| | DAY | NIGHT |
| 1. Mine Camp | 40 | 40 |
| 2. Public Camp (Fortescue River) | 26 | 24 |

*Figure 5.1* below shows a noise level contour plot for the above night scenario, under 'all winds' (3m/s winds occurring simultaneously in all directions). A full size (A4) plot is contained in *Appendix B*.

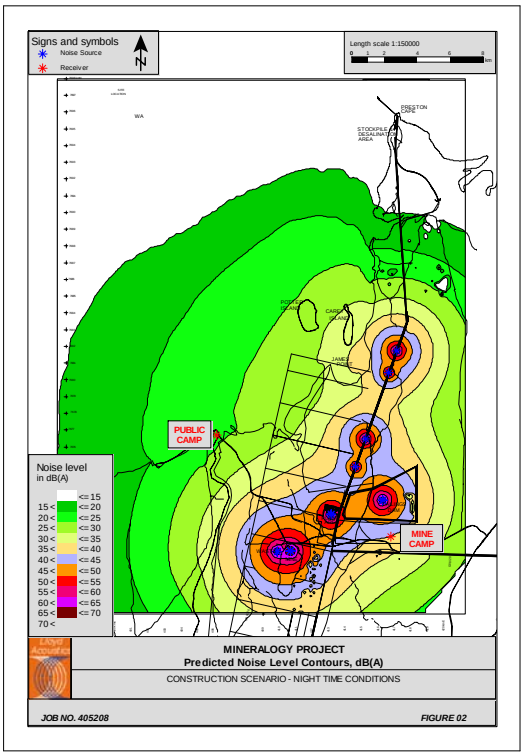



***Figure 5.1 – Predicted $L_{A10}$ Night Noise Levels Construction Scenario***

## 5.2 Operational Noise Modelling

The results of the operational noise modelling scenarios, for light, downwind conditions, are summarised below in *Table 5.2*, with source rankings contained in *Appendix C*.

***Table 5.2 – Predicted $L_{A10}$ Night-time Noise Levels – Operational Scenarios***

| SCENARIO | PREDICTED NOISE LEVEL, dB | |
|---|---|---|
| | LOCATION 1<br>MINE CAMP | LOCATION 2<br>PUBLIC CAMP (FORTESCUE RIVER) |
| 1. Mining (Initial) (Conveyor) | 36 | 26 |
| 2. Mining (Initial) (Haul) | 34 | 24 |
| 3. Mining (Future) (Conveyor) | 36 | 25 |
| 4. Mining (Future) (Haul) | 33 | 23 |
| 5. Mining (Final) (Conveyor) | 36 | 25 |
| 6. Mining (Final) (Haul) | 33 | 23 |

Note: Only the night-time scenario was modelled, as this is the most critical.

*Figures 5.2 & 5.3* show noise level contour plots for scenarios 1 & 2 above.

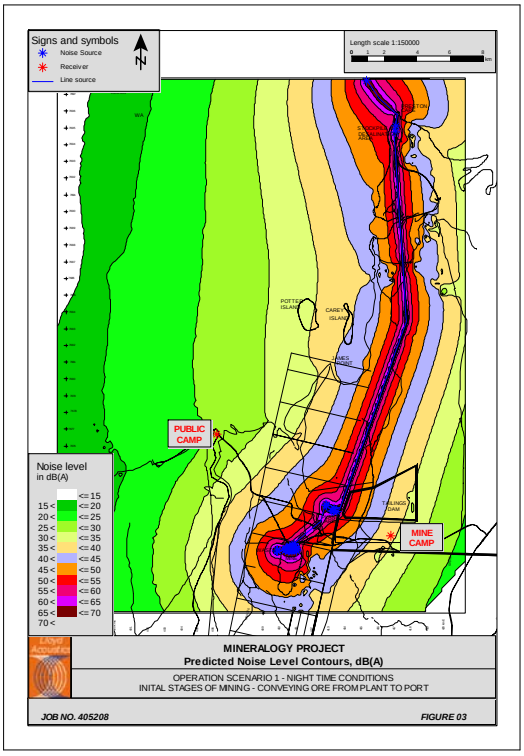



***Figure 5.2 – Predicted $L_{A10}$ Night Noise Levels***
***Operational Scenario 1***

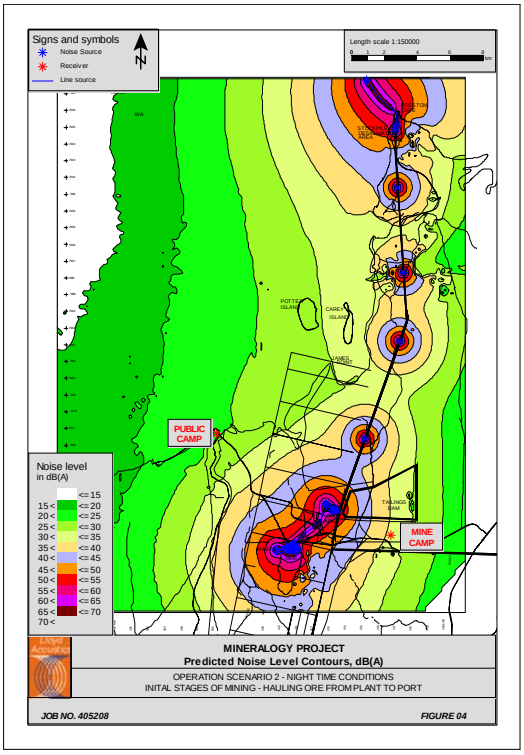



***Figure 5.3 – Predicted $L_{A10}$ Night Noise Levels***
***Operational Scenario 2***

Full size (A4) plots for all operational scenarios are contained in *Appendix C*.

## 5.3 Blasting Noise Calculations

The distances between the Mine Camp and the Public Camp (Fortescue River) to the closest position of the ore body are 5.5 and 7.9 kilometres respectively. Based on these distances, *Table 5.3* shows the allowable maximum charge mass per delay based on equation 4.1 (unconfined blast).

***Table 5.3 – Allowable Maximum Charge Mass Per Delay***

***Unconfined Blast***

| **ALLOWABLE NOISE LEVEL, dB $L_{Linear\ peak}$** | **MAXIMUM CHARGE MASS PER DELAY** | |
|---|---|---|
| | **LOCATION 1 MINE CAMP** | **LOCATION 2 PUBLIC CAMP (FORTESCUE RIVER)** |
| 125 | 85 | 250 |
| 120 | 20 | 60 |
| 115 | 5 | 15 |

Note that for a confined charge, the allowable mass is significantly higher.

# 6 CONCLUSION

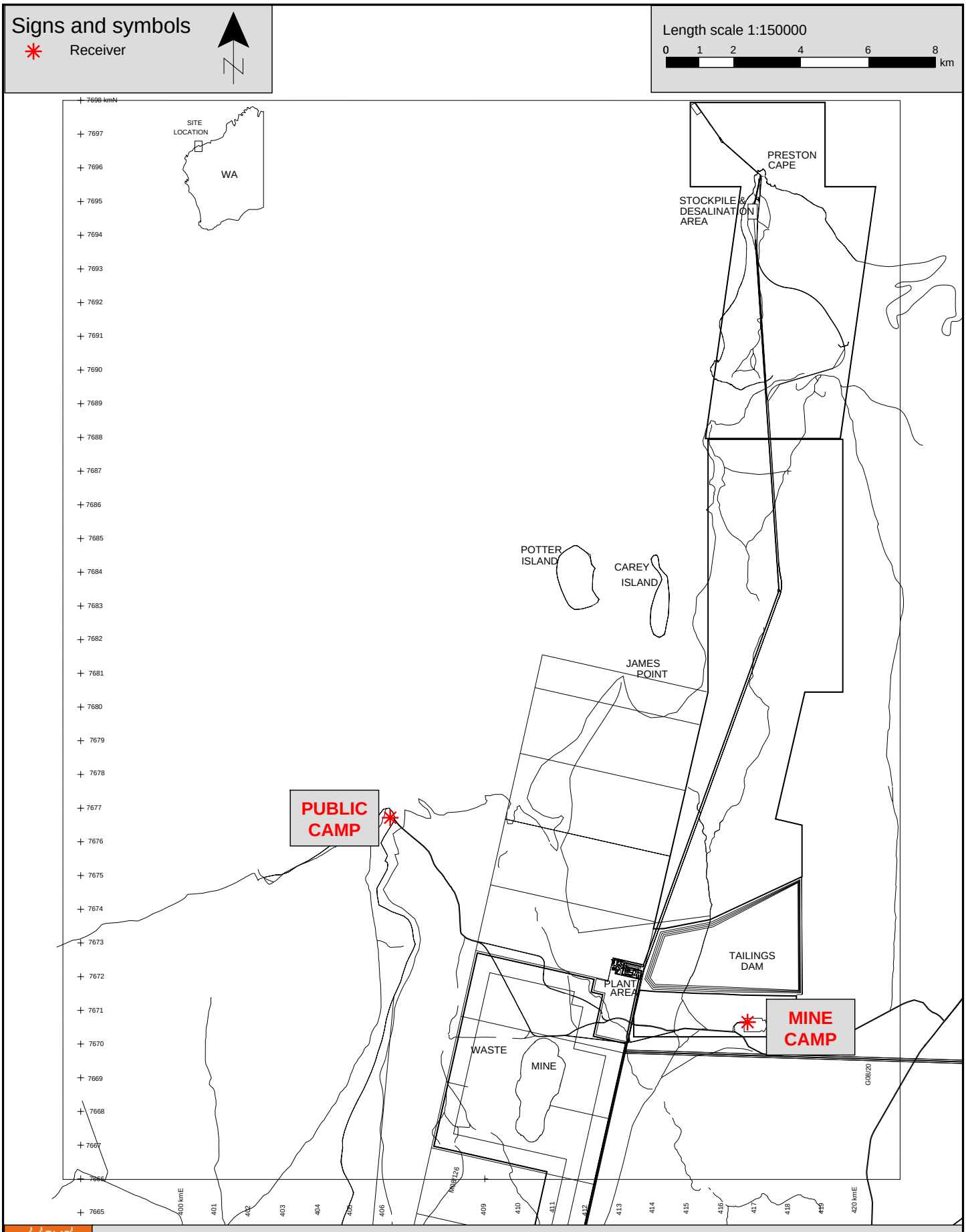
Construction noise is not required to comply with the assigned noise levels, but rather the management practices of Regulation 13. Nevertheless, the predicted noise level at the Public Camp is 24 dB $L_{A10}$ during the critical night period, which would comply with the assigned noise level of 35 dB $L_{A10}$ even with tonality adjustments. Predicted noise levels, at the Mine Camp are up to 40 dB $L_{A10}$ due to equipment located in the tailings area. This also complies with the Regulatory criteria of 65 dB $L_{A10}$. Therefore, noise associated with construction activities is considered acceptable.

Operational noise levels are calculated to be up to 26 dB $L_{A10}$ at the Public Camp and even with an adjustment for tonality still complies with the assigned noise levels and is therefore acceptable. At the Mine Camp, noise levels are predicted to be up to 36 dB $L_{A10}$, with the dominant noise source being the conveyor to the port and grinding mills in the concentrator plant. The relevant assigned noise level is for an industrial premises, being 65 dB $L_{A10}$ and hence compliance is achieved.

Noise levels from blasting can vary significantly depending on the ‘charge mass’ and whether the blast is confined or unconfined. Based on the calculations, it is recommended that initial blasting be limited to a mass of 60kg and measurements be undertaken near both the Public Camp and Mine Camp to determine the actual allowable mass to comply with Regulation 11.

# APPENDIX A

## Locality Map

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# MINERALOGY PROJECT

LOCALITY MAP

***JOB NO. 405208***

***FIGURE A1***

# APPENDIX B

## Noise Source Rankings and Contour Plots

## Construction Noise Scenario

### *Table B1 – Construction Scenario: Day Time Conditions*

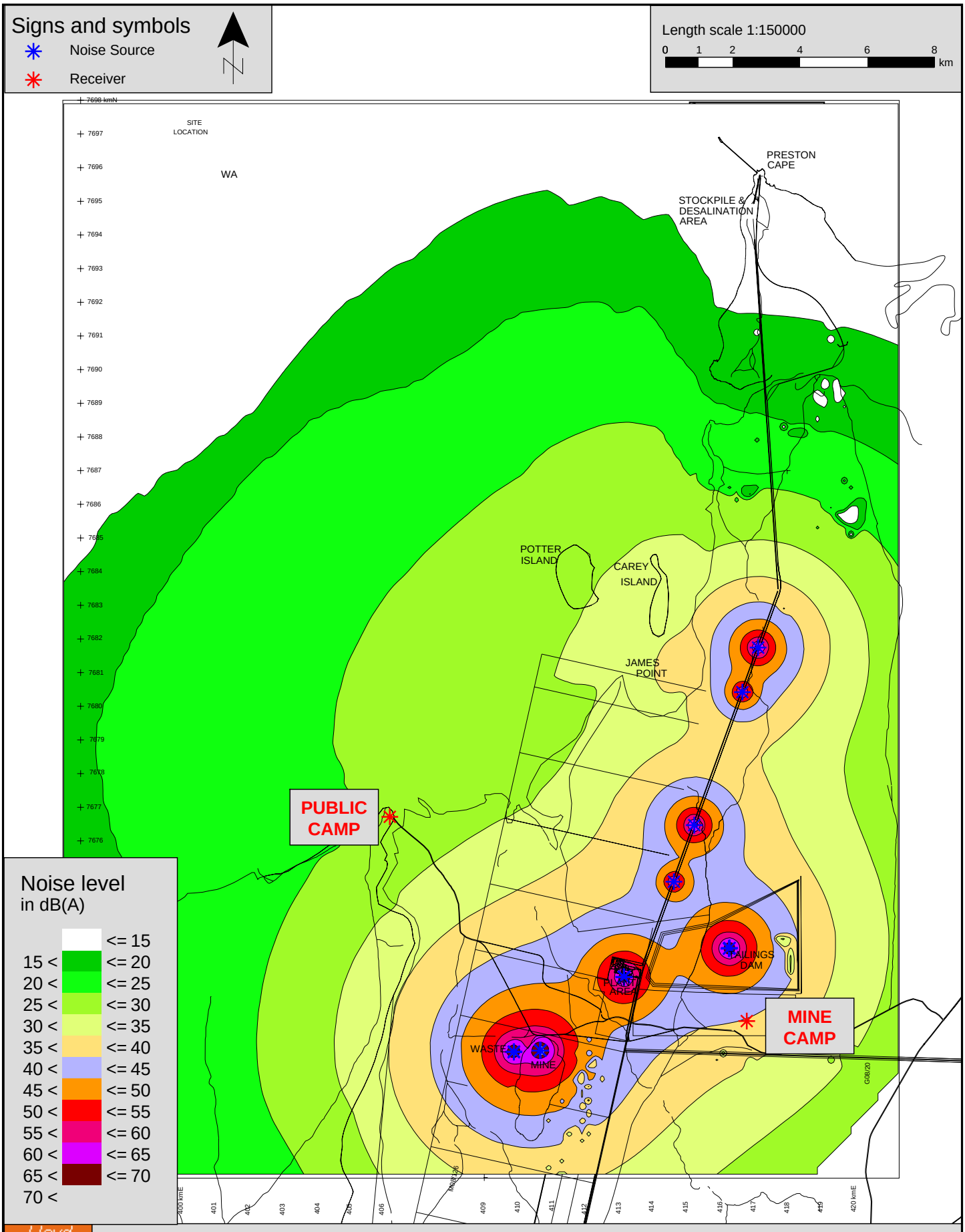
| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| ***Location 1 - Mine Camp*** | | |
| 8 | 190t Haul Truck (6) - Tailings Constr | 34.1 |
| 9 | 190t Haul Truck (7) - Tailings Constr | 34.0 |
| 17 | Tracked Dozer (2) - Tailings Constru | 33.6 |
| 6 | 190t Haul Truck (4) - Plant Hardstand | 26.8 |
| 7 | 190t Haul Truck (5) - Plant Hardstand | 26.8 |
| 15 | Wheeled Dozer (1) - Plant Hardstand | 20.7 |
| 5 | 190t Haul Truck (3) - Road Constructi | 20.2 |
| 3 | 190t Haul Truck (1) - Mine | 19.8 |
| 4 | 190t Haul Truck (2) - Mine | 19.8 |
| 13 | Drill Rig (1) - Mine | 18.9 |
| 14 | Drill Rig (2) - Mine | 18.9 |
| 16 | Tracked Dozer (1) - Waste | 18.6 |
| 11 | 190t Haul Truck (9) - Waste | 18.0 |
| 12 | 190t Haul Truck (10) - Waste | 18.0 |
| 1 | 475t Excavator (1) - Mine | 16.4 |
| 2 | 475t Excavator (2) - Mine | 16.4 |
| 18 | Watercart (1) - Road Construction | 14.9 |
| 10 | 190t Haul Truck (2) - Road Construct | 11.0 |
| 19 | Grader (1) - Road Construction | -1.0 |
| **Total** | | **40** |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| ***Location 2 - Public Camp (Fortescue River)*** | | |
| 16 | Tracked Dozer (1) - Waste | 16.6 |
| 11 | 190t Haul Truck (9) - Waste | 15.8 |
| 12 | 190t Haul Truck (10) - Waste | 15.8 |
| 3 | 190t Haul Truck (1) - Mine | 15.1 |
| 4 | 190t Haul Truck (2) - Mine | 15.1 |
| 7 | 190t Haul Truck (5) - Plant Hardstand | 14.8 |
| 6 | 190t Haul Truck (4) - Plant Hardstand | 14.8 |
| 10 | 190t Haul Truck (2) - Road Construct | 14.3 |
| 5 | 190t Haul Truck (3) - Road Constructi | 13.3 |
| 13 | Drill Rig (1) - Mine | 13.1 |
| 14 | Drill Rig (2) - Mine | 13.1 |
| 17 | Tracked Dozer (2) - Tailings Constru | 11.8 |
| 1 | 475t Excavator (1) - Mine | 11.5 |
| 2 | 475t Excavator (2) - Mine | 11.5 |
| 8 | 190t Haul Truck (6) - Tailings Constr | 11.2 |
| 9 | 190t Haul Truck (7) - Tailings Constr | 11.2 |
| 18 | Watercart (1) - Road Construction | 7.3 |
| 15 | Wheeled Dozer (1) - Plant Hardstand | 7.1 |
| 19 | Grader (1) - Road Construction | -1.2 |
| **Total** | | **26** |

## *Table B2 – Construction Scenario: Night Time Conditions*

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| ***Location 1 - Mine Camp*** | | |
| 8 | 190t Haul Truck (6) - Tailings Constr | 34.7 |
| 9 | 190t Haul Truck (7) - Tailings Constr | 34.6 |
| 17 | Tracked Dozer (2) - Tailings Constru | 33.9 |
| 6 | 190t Haul Truck (4) - Plant Hardstand | 26.4 |
| 7 | 190t Haul Truck (5) - Plant Hardstand | 26.4 |
| 15 | Wheeled Dozer (1) - Plant Hardstand | 20.7 |
| 5 | 190t Haul Truck (3) - Road Constructi | 18.8 |
| 3 | 190t Haul Truck (1) - Mine | 18.3 |
| 4 | 190t Haul Truck (2) - Mine | 18.3 |
| 13 | Drill Rig (1) - Mine | 17.5 |
| 14 | Drill Rig (2) - Mine | 17.5 |
| 16 | Tracked Dozer (1) - Waste | 16.6 |
| 11 | 190t Haul Truck (9) - Waste | 16.1 |
| 12 | 190t Haul Truck (10) - Waste | 16.1 |
| 1 | 475t Excavator (1) - Mine | 15.0 |
| 2 | 475t Excavator (2) - Mine | 15.0 |
| 18 | Watercart (1) - Road Construction | 14.1 |
| 10 | 190t Haul Truck (2) - Road Construct | 8.2 |
| 19 | Grader (1) - Road Construction | -3.4 |
| **Total** | | **40** |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| ***Location 2 - Public Camp (Fortescue River)*** | | |
| 16 | Tracked Dozer (1) - Waste | 14.3 |
| 11 | 190t Haul Truck (9) - Waste | 13.7 |
| 12 | 190t Haul Truck (10) - Waste | 13.7 |
| 3 | 190t Haul Truck (1) - Mine | 12.9 |
| 4 | 190t Haul Truck (2) - Mine | 12.9 |
| 7 | 190t Haul Truck (5) - Plant Hardstand | 12.5 |
| 6 | 190t Haul Truck (4) - Plant Hardstand | 12.5 |
| 10 | 190t Haul Truck (2) - Road Construct | 11.3 |
| 13 | Drill Rig (1) - Mine | 10.8 |
| 14 | Drill Rig (2) - Mine | 10.8 |
| 5 | 190t Haul Truck (3) - Road Constructi | 10.8 |
| 1 | 475t Excavator (1) - Mine | 9.4 |
| 2 | 475t Excavator (2) - Mine | 9.4 |
| 17 | Tracked Dozer (2) - Tailings Constru | 8.9 |
| 8 | 190t Haul Truck (6) - Tailings Constr | 8.4 |
| 9 | 190t Haul Truck (7) - Tailings Constr | 8.4 |
| 18 | Watercart (1) - Road Construction | 5.0 |
| 15 | Wheeled Dozer (1) - Plant Hardstand | 4.9 |
| 19 | Grader (1) - Road Construction | -3.9 |
| **Total** | | **24** |

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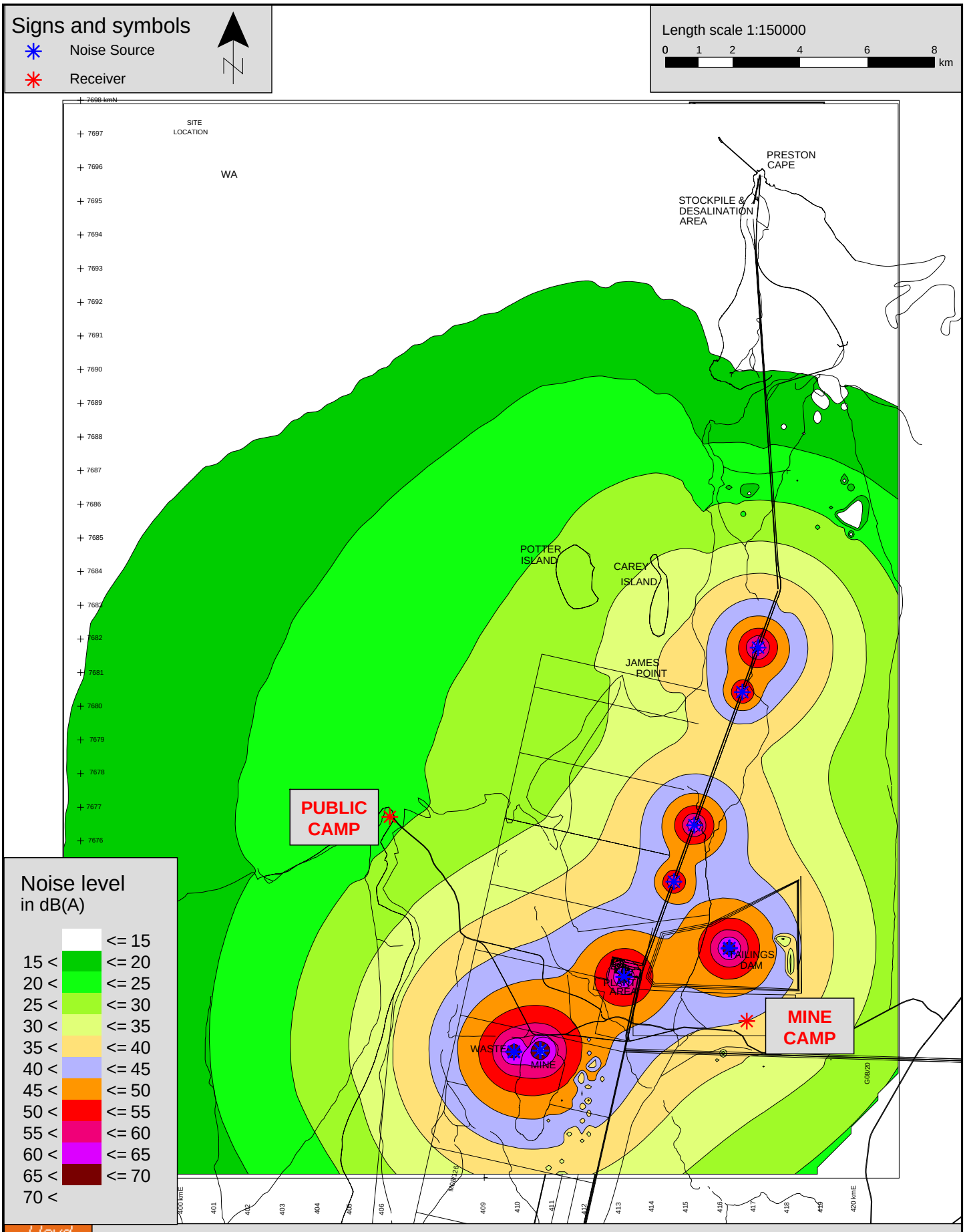
# MINERALOGY PROJECT
## Predicted Noise Level Contours, dB(A)

CONSTRUCTION SCENARIO - DAY TIME CONDITIONS

***JOB NO. 405208***

***FIGURE 01***

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# MINERALOGY PROJECT
## Predicted Noise Level Contours, dB(A)

CONSTRUCTION SCENARIO - NIGHT TIME CONDITIONS

***JOB NO. 405208***

***FIGURE 02***

# APPENDIX C

## Noise Source Rankings and Contour Plots

## Operational Noise Scenarios

## *Table C1 - Operational Scenario 1 - Night Time Conditions*

## *Mining Initial Stages - Conveyor from Plant to Port*

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| ***Location 1 - Mine Camp*** | | |
| 9 | Conveyor - DRI to Port | 32.4 |
| 4 | Concentrator - Grinding Mills | 29.0 |
| 1 | Conveyor - Mine to Concentrator | 27.8 |
| 8 | DRI Plant - Compressors | 25.3 |
| 9 | Power Station | 18.7 |
| 23 | 190t Haul Truck (1) - Pit | 17.4 |
| 15 | Tracked Dozer (1) - Waste | 16.6 |
| 25 | Drill Rig (2) - Pit | 16.5 |
| 5 | Concentrator - Pumps/Blowers etc | 16.4 |
| 13 | 190t Haul Truck (7) - Waste | 16.1 |
| 16 | 190t Haul Truck (8) - Waste | 16.1 |
| 17 | 190t Haul Truck (9) - Waste | 16.1 |
| 14 | 190t Haul Truck (10) - Waste | 16.1 |
| 7 | DRI Plant - Pumps/Blowers etc | 15.6 |
| 6 | Pellet Plant - Pumps/Blowers etc | 15.5 |
| 35 | Excavator (2) | 13.7 |
| 22 | 190t Haul Truck (2) - Pit | 13.1 |
| 30 | Haul Truck (11) | 12.7 |
| 31 | Haul Truck (12) | 8.5 |
| 21 | 190t Haul Truck (3) - Pit | 6.5 |
| 26 | Wheeled Dozer - Pit | 6.4 |
| 32 | Haul Truck (13) | 5.1 |
| 18 | 190t Haul Truck (6) - Pit | 4.9 |
| 27 | Tracked Dozer (2) - Pit | 4.0 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 24 | Drill Rig - Pit | 3.8 |
| 20 | 190t Haul Truck (4) - Pit | 3.4 |
| 19 | 190t Haul Truck (5) - Pit | 3.1 |
| 33 | Haul Truck (14) | 3.1 |
| 34 | Haul Truck (15) | 1.6 |
| 3 | Semi-mobile Crusher - Pit (-40) | 0.8 |
| 37 | Tracked Dozer (2) | -0.6 |
| 36 | Drill Rig (3) | -0.9 |
| 35 | Excavator (1) | -1.9 |
| 28 | Water Truck - Pit | -2.1 |
| 38 | Excavator (3) | -3.1 |
| 29 | Grader - Pit | -7.9 |
| **Total** | | **36** |

***Location 2 - Public Camp (Fortescue River)***

| | | |
|---|---|---|
| 9 | Conveyor - DRI to Port | 21.4 |
| 4 | Concentrator - Grinding Mills | 17.1 |
| 1 | Conveyor - Mine to Concentrator | 16.8 |
| 15 | Tracked Dozer (1) - Waste | 14.3 |
| 13 | 190t Haul Truck (7) - Waste | 13.7 |
| 16 | 190t Haul Truck (8) - Waste | 13.7 |
| 17 | 190t Haul Truck (9) - Waste | 13.7 |
| 14 | 190t Haul Truck (10) - Waste | 13.7 |
| 37 | Tracked Dozer (2) | 10.1 |
| 8 | DRI Plant - Compressors | 7.8 |
| 33 | Haul Truck (14) | 2.9 |
| 5 | Concentrator - Pumps/Blowers etc | 2.2 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 32 | Haul Truck (13) | 1.4 |
| 27 | Tracked Dozer (2) - Pit | -0.5 |
| 20 | 190t Haul Truck (4) - Pit | -0.9 |
| 34 | Haul Truck (15) | -1.1 |
| 21 | 190t Haul Truck (3) - Pit | -1.3 |
| 30 | Haul Truck (11) | -1.8 |
| 9 | Power Station | -2.1 |
| 6 | Pellet Plant - Pumps/Blowers etc | -2.3 |
| 7 | DRI Plant - Pumps/Blowers etc | -2.4 |
| 19 | 190t Haul Truck (5) - Pit | -2.6 |
| 31 | Haul Truck (12) | -2.8 |
| 35 | Excavator (1) | -2.9 |
| 18 | 190t Haul Truck (6) - Pit | -3.1 |
| 23 | 190t Haul Truck (1) - Pit | -4.5 |
| 22 | 190t Haul Truck (2) - Pit | -4.9 |
| 24 | Drill Rig - Pit | -5.6 |
| 36 | Drill Rig (3) | -7.4 |
| 3 | Semi-mobile Crusher - Pit (-40) | -7.7 |
| 25 | Drill Rig (2) - Pit | -8.1 |
| 35 | Excavator (2) | -9.1 |
| 28 | Water Truck - Pit | -9.2 |
| 38 | Excavator (3) | -9.3 |
| 26 | Wheeled Dozer - Pit | -12.8 |
| 29 | Grader - Pit | -17.0 |
| **Total** | | **26** |

## *Table C2 - Operational Scenario 2 - Night Time Conditions*

## *Mining Initial Stages – Haul Trucks from Plant to Port*

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| ***Location 1 - Mine Camp*** | | |
| 4 | Concentrator - Grinding Mills | 29.0 |
| 1 | Conveyor - Mine to Concentrator | 27.8 |
| 8 | DRI Plant - Compressors | 25.3 |
| 9 | Power Station | 18.7 |
| 23 | 190t Haul Truck (1) - Pit | 17.4 |
| 14 | Primemover (4) | 17.4 |
| 15 | Tracked Dozer (1) - Waste | 16.6 |
| 25 | Drill Rig (2) - Pit | 16.5 |
| 5 | Concentrator - Pumps/Blowers etc | 16.4 |
| 13 | 190t Haul Truck (7) - Waste | 16.1 |
| 16 | 190t Haul Truck (8) - Waste | 16.1 |
| 17 | 190t Haul Truck (9) - Waste | 16.1 |
| 14 | 190t Haul Truck (10) - Waste | 16.1 |
| 7 | DRI Plant - Pumps/Blowers etc | 15.6 |
| 6 | Pellet Plant - Pumps/Blowers etc | 15.5 |
| 35 | Excavator (2) | 13.7 |
| 22 | 190t Haul Truck (2) - Pit | 13.1 |
| 30 | Haul Truck (11) | 12.7 |
| 31 | Haul Truck (12) | 8.5 |
| 21 | 190t Haul Truck (3) - Pit | 6.5 |
| 26 | Wheeled Dozer - Pit | 6.4 |
| 32 | Haul Truck (13) | 5.1 |
| 18 | 190t Haul Truck (6) - Pit | 4.9 |
| 27 | Tracked Dozer (2) - Pit | 4.0 |
| 14 | Primemover (3) | 4.0 |
| 24 | Drill Rig - Pit | 3.8 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 20 | 190t Haul Truck (4) - Pit | 3.4 |
| 19 | 190t Haul Truck (5) - Pit | 3.1 |
| 33 | Haul Truck (14) | 3.1 |
| 34 | Haul Truck (15) | 1.6 |
| 3 | Semi-mobile Crusher - Pit (-40) | 0.8 |
| 37 | Tracked Dozer (2) | -0.6 |
| 36 | Drill Rig (3) | -0.9 |
| 35 | Excavator (1) | -1.9 |
| 28 | Water Truck - Pit | -2.1 |
| 14 | Primemover (2) | -2.4 |
| 38 | Excavator (3) | -3.1 |
| 29 | Grader - Pit | -7.9 |
| **Total** | | **34** |

***Location 2 - Public Camp (Fortescue River)***

| | | |
|---|---|---|
| 4 | Concentrator - Grinding Mills | 17.1 |
| 1 | Conveyor - Mine to Concentrator | 16.8 |
| 15 | Tracked Dozer (1) - Waste | 14.3 |
| 13 | 190t Haul Truck (7) - Waste | 13.7 |
| 16 | 190t Haul Truck (8) - Waste | 13.7 |
| 17 | 190t Haul Truck (9) - Waste | 13.7 |
| 14 | 190t Haul Truck (10) - Waste | 13.7 |
| 37 | Tracked Dozer (2) | 10.1 |
| 14 | Primemover (3) | 8.7 |
| 14 | Primemover (4) | 8.4 |
| 8 | DRI Plant - Compressors | 7.8 |
| 14 | Primemover (1) | 3.6 |
| 33 | Haul Truck (14) | 2.9 |
| 5 | Concentrator - Pumps/Blowers etc | 2.2 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 32 | Haul Truck (13) | 1.4 |
| 27 | Tracked Dozer (2) - Pit | -0.5 |
| 20 | 190t Haul Truck (4) - Pit | -0.9 |
| 34 | Haul Truck (15) | -1.1 |
| 21 | 190t Haul Truck (3) - Pit | -1.3 |
| 30 | Haul Truck (11) | -1.8 |
| 9 | Power Station | -2.1 |
| 6 | Pellet Plant - Pumps/Blowers etc | -2.3 |
| 7 | DRI Plant - Pumps/Blowers etc | -2.4 |
| 19 | 190t Haul Truck (5) - Pit | -2.6 |
| 31 | Haul Truck (12) | -2.8 |
| 35 | Excavator (1) | -2.9 |
| 18 | 190t Haul Truck (6) - Pit | -3.1 |
| 23 | 190t Haul Truck (1) - Pit | -4.5 |
| 14 | Primemover (2) | -4.8 |
| 22 | 190t Haul Truck (2) - Pit | -4.9 |
| 24 | Drill Rig - Pit | -5.6 |
| 36 | Drill Rig (3) | -7.4 |
| 3 | Semi-mobile Crusher - Pit (-40) | -7.7 |
| 25 | Drill Rig (2) - Pit | -8.1 |
| 35 | Excavator (2) | -9.1 |
| 28 | Water Truck - Pit | -9.2 |
| 38 | Excavator (3) | -9.3 |
| 26 | Wheeled Dozer - Pit | -12.8 |
| 29 | Grader - Pit | -17.0 |
| **Total** | | **24** |

## *Table C3 - Operational Scenario 3 - Night Time Conditions*

## *Mining Future Stages - Conveyor from Plant to Port*

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| | ***Location 1 - Mine Camp*** | |
| 9 | Conveyor - DRI to Port | 32.4 |
| 4 | Concentrator - Grinding Mills | 29.0 |
| 1 | Conveyor - Mine to Concentrator | 27.8 |
| 8 | DRI Plant - Compressors | 25.3 |
| 9 | Power Station | 18.7 |
| 15 | Tracked Dozer (1) - Waste | 16.6 |
| 5 | Concentrator - Pumps/Blowers etc | 16.4 |
| 17 | 190t Haul Truck (9) - Waste | 16.1 |
| 14 | 190t Haul Truck (10) - Waste | 16.1 |
| 7 | DRI Plant - Pumps/Blowers etc | 15.6 |
| 6 | Pellet Plant - Pumps/Blowers etc | 15.5 |
| 3 | Semi-mobile Crusher - Pit (-40) | 0.8 |
| 38 | Haul Truck (15) - Pit | -0.4 |
| 27 | Tracked Dozer (2) - Pit | -0.4 |
| 20 | 190t Haul Truck (4) - Pit | -0.6 |
| 23 | 190t Haul Truck (1) - Pit | -0.7 |
| 36 | Haul Truck (13) - Pit | -0.8 |
| 32 | Drill Rig (3) - Pit | -0.8 |
| 34 | Haul Truck (11) - Pit | -1.0 |
| 37 | Haul Truck (14) - Pit | -1.2 |
| 19 | 190t Haul Truck (5) - Pit | -1.3 |
| 21 | 190t Haul Truck (3) - Pit | -1.3 |
| 33 | Tracked Dozer (2) - Pit | -1.4 |
| 16 | 190t Haul Truck (8) - Waste | -1.4 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 22 | 190t Haul Truck (2) - Pit | -1.5 |
| 35 | Haul Truck (12) - Pit | -1.5 |
| 13 | 190t Haul Truck (7) - Pit | -1.6 |
| 18 | 190t Haul Truck (6) - Pit | -1.7 |
| 24 | Drill Rig - Pit | -2.7 |
| 25 | Drill Rig (2) - Pit | -3.2 |
| 31 | Excavator (2) - Pit | -3.5 |
| 32 | Excavator (3) - Pit | -4.1 |
| 30 | Excavator (1) - Pit | -4.2 |
| 26 | Wheeled Dozer - Pit | -8.5 |
| 28 | Water Truck - Pit | -10.1 |
| 29 | Grader - Pit | -12.6 |
| **Total** | | **36** |

***Location 2 - Public Camp (Fortescue River)***

| | | |
|---|---|---|
| 9 | Conveyor - DRI to Port | 21.4 |
| 4 | Concentrator - Grinding Mills | 17.1 |
| 1 | Conveyor - Mine to Concentrator | 16.8 |
| 15 | Tracked Dozer (1) - Waste | 14.3 |
| 17 | 190t Haul Truck (9) - Waste | 13.7 |
| 14 | 190t Haul Truck (10) - Waste | 13.7 |
| 8 | DRI Plant - Compressors | 7.8 |
| 5 | Concentrator - Pumps/Blowers etc | 2.2 |
| 9 | Power Station | -2.1 |
| 6 | Pellet Plant - Pumps/Blowers etc | -2.3 |
| 7 | DRI Plant - Pumps/Blowers etc | -2.4 |
| 27 | Tracked Dozer (2) - Pit | -5.0 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 20 | 190t Haul Truck (4) - Pit | -5.2 |
| 16 | 190t Haul Truck (8) - Waste | -5.6 |
| 37 | Haul Truck (14) - Pit | -6.2 |
| 33 | Tracked Dozer (2) - Pit | -6.6 |
| 21 | 190t Haul Truck (3) - Pit | -6.7 |
| 35 | Haul Truck (12) - Pit | -6.7 |
| 18 | 190t Haul Truck (6) - Pit | -6.8 |
| 19 | 190t Haul Truck (5) - Pit | -6.9 |
| 13 | 190t Haul Truck (7) - Pit | -7.0 |
| 22 | 190t Haul Truck (2) - Pit | -7.2 |
| 34 | Haul Truck (11) - Pit | -7.3 |
| 23 | 190t Haul Truck (1) - Pit | -7.5 |
| 38 | Haul Truck (15) - Pit | -7.5 |
| 3 | Semi-mobile Crusher - Pit (-40) | -7.7 |
| 36 | Haul Truck (13) - Pit | -7.7 |
| 31 | Excavator (2) - Pit | -9.0 |
| 24 | Drill Rig - Pit | -9.2 |
| 25 | Drill Rig (2) - Pit | -9.6 |
| 32 | Drill Rig (3) - Pit | -9.8 |
| 32 | Excavator (3) - Pit | -10.3 |
| 30 | Excavator (1) - Pit | -10.6 |
| 28 | Water Truck - Pit | -14.2 |
| 26 | Wheeled Dozer - Pit | -14.6 |
| 29 | Grader - Pit | -19.3 |
| **Total** | | **25** |

## *Table C4 - Operational Scenario 4 - Night Time Conditions*

## *Mining Future Stages – Haul Trucks from Plant to Port*

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| ***Location 1 - Mine Camp*** | | |
| 4 | Concentrator - Grinding Mills | 29.0 |
| 1 | Conveyor - Mine to Concentrator | 27.8 |
| 8 | DRI Plant - Compressors | 25.3 |
| 9 | Power Station | 18.7 |
| 14 | Primemover (4) | 17.4 |
| 15 | Tracked Dozer (1) - Waste | 16.6 |
| 5 | Concentrator - Pumps/Blowers etc | 16.4 |
| 17 | 190t Haul Truck (9) - Waste | 16.1 |
| 14 | 190t Haul Truck (10) - Waste | 16.1 |
| 7 | DRI Plant - Pumps/Blowers etc | 15.6 |
| 6 | Pellet Plant - Pumps/Blowers etc | 15.5 |
| 14 | Primemover (3) | 4.0 |
| 3 | Semi-mobile Crusher - Pit (-40) | 0.8 |
| 38 | Haul Truck (15) - Pit | -0.4 |
| 27 | Tracked Dozer (2) - Pit | -0.4 |
| 20 | 190t Haul Truck (4) - Pit | -0.6 |
| 23 | 190t Haul Truck (1) - Pit | -0.7 |
| 36 | Haul Truck (13) - Pit | -0.8 |
| 32 | Drill Rig (3) - Pit | -0.8 |
| 34 | Haul Truck (11) - Pit | -1.0 |
| 37 | Haul Truck (14) - Pit | -1.2 |
| 19 | 190t Haul Truck (5) - Pit | -1.3 |
| 21 | 190t Haul Truck (3) - Pit | -1.3 |
| 33 | Tracked Dozer (2) - Pit | -1.4 |
| 16 | 190t Haul Truck (8) - Waste | -1.4 |
| 22 | 190t Haul Truck (2) - Pit | -1.5 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 35 | Haul Truck (12) - Pit | -1.5 |
| 13 | 190t Haul Truck (7) - Pit | -1.6 |
| 18 | 190t Haul Truck (6) - Pit | -1.7 |
| 14 | Primemover (2) | -2.4 |
| 24 | Drill Rig - Pit | -2.7 |
| 25 | Drill Rig (2) - Pit | -3.2 |
| 31 | Excavator (2) - Pit | -3.5 |
| 32 | Excavator (3) - Pit | -4.1 |
| 30 | Excavator (1) - Pit | -4.2 |
| 26 | Wheeled Dozer - Pit | -8.5 |
| 28 | Water Truck - Pit | -10.1 |
| 29 | Grader - Pit | -12.6 |
| **Total** | | **33** |

***Location 2 - Public Camp (Fortescue River)***

| | | |
|---|---|---|
| 4 | Concentrator - Grinding Mills | 17.1 |
| 1 | Conveyor - Mine to Concentrator | 16.8 |
| 15 | Tracked Dozer (1) - Waste | 14.3 |
| 17 | 190t Haul Truck (9) - Waste | 13.7 |
| 14 | 190t Haul Truck (10) - Waste | 13.7 |
| 14 | Primemover (3) | 8.7 |
| 14 | Primemover (4) | 8.4 |
| 8 | DRI Plant - Compressors | 7.8 |
| 14 | Primemover (1) | 3.6 |
| 5 | Concentrator - Pumps/Blowers etc | 2.2 |
| 9 | Power Station | -2.1 |
| 6 | Pellet Plant - Pumps/Blowers etc | -2.3 |
| 7 | DRI Plant - Pumps/Blowers etc | -2.4 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 14 | Primemover (2) | -4.8 |
| 27 | Tracked Dozer (2) - Pit | -5.0 |
| 20 | 190t Haul Truck (4) - Pit | -5.2 |
| 16 | 190t Haul Truck (8) - Waste | -5.6 |
| 37 | Haul Truck (14) - Pit | -6.2 |
| 33 | Tracked Dozer (2) - Pit | -6.6 |
| 21 | 190t Haul Truck (3) - Pit | -6.7 |
| 35 | Haul Truck (12) - Pit | -6.7 |
| 18 | 190t Haul Truck (6) - Pit | -6.8 |
| 19 | 190t Haul Truck (5) - Pit | -6.9 |
| 13 | 190t Haul Truck (7) - Pit | -7.0 |
| 22 | 190t Haul Truck (2) - Pit | -7.2 |
| 34 | Haul Truck (11) - Pit | -7.3 |
| 23 | 190t Haul Truck (1) - Pit | -7.5 |
| 38 | Haul Truck (15) - Pit | -7.5 |
| 3 | Semi-mobile Crusher - Pit (-40) | -7.7 |
| 36 | Haul Truck (13) - Pit | -7.7 |
| 31 | Excavator (2) - Pit | -9.0 |
| 24 | Drill Rig - Pit | -9.2 |
| 25 | Drill Rig (2) - Pit | -9.6 |
| 32 | Drill Rig (3) - Pit | -9.8 |
| 32 | Excavator (3) - Pit | -10.3 |
| 30 | Excavator (1) - Pit | -10.6 |
| 28 | Water Truck - Pit | -14.2 |
| 26 | Wheeled Dozer - Pit | -14.6 |
| 29 | Grader - Pit | -19.3 |
| **Total** | | **23** |

## *Table C5 - Operational Scenario 5 - Night Time Conditions*

## *Mining Final Stages - Conveyor from Plant to Port*

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| ***Location 1 - Mine Camp*** | | |
| 9 | Conveyor - DRI to Port | 32.4 |
| 4 | Concentrator - Grinding Mills | 29.0 |
| 1 | Conveyor - Mine to Concentrator | 27.8 |
| 8 | DRI Plant - Compressors | 25.3 |
| 9 | Power Station | 18.7 |
| 15 | Tracked Dozer (1) - Waste | 16.6 |
| 5 | Concentrator - Pumps/Blowers etc | 16.4 |
| 14 | 190t Haul Truck (10) - Waste | 16.1 |
| 7 | DRI Plant - Pumps/Blowers etc | 15.6 |
| 6 | Pellet Plant - Pumps/Blowers etc | 15.5 |
| 27 | Tracked Dozer (2) - Pit | -0.7 |
| 20 | 190t Haul Truck (4) - Pit | -0.9 |
| 37 | Haul Truck (13) - Pit | -1.1 |
| 18 | 190t Haul Truck (6) - Pit | -1.7 |
| 35 | Haul Truck (11) - Pit | -1.9 |
| 39 | Haul Truck (15) - Pit | -2.0 |
| 19 | 190t Haul Truck (5) - Pit | -2.1 |
| 38 | Haul Truck (14) - Pit | -2.2 |
| 33 | Tracked Dozer (3) - Pit | -2.5 |
| 16 | 190t Haul Truck (8) - Pit | -2.5 |
| 22 | 190t Haul Truck (2) - Pit | -3.0 |
| 31 | Excavator (2) - Pit | -3.3 |
| 13 | 190t Haul Truck (7) - Pit | -3.5 |
| 23 | 190t Haul Truck (1) - Pit | -3.5 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 21 | 190t Haul Truck (3) - Pit | -3.7 |
| 3 | Semi-mobile Crusher - Pit (-200) | -3.9 |
| 36 | Haul Truck (12) - Pit | -4.1 |
| 25 | Drill Rig (2) - Pit | -4.6 |
| 24 | Drill Rig - Pit | -4.7 |
| 17 | 190t Haul Truck (9) - Pit | -5.0 |
| 32 | Excavator (3) - Pit | -5.3 |
| 34 | Drill Rig (3) - Pit | -5.8 |
| 30 | Excavator (1) - Pit | -6.7 |
| 26 | Wheeled Dozer - Pit | -9.9 |
| 28 | Water Truck - Pit | -10.2 |
| 29 | Grader - Pit | -12.7 |
| **Total** | | **36** |

***Location 2 - Public Camp (Fortescue River)***

| | | |
|---|---|---|
| 9 | Conveyor - DRI to Port | 21.4 |
| 4 | Concentrator - Grinding Mills | 17.1 |
| 1 | Conveyor - Mine to Concentrator | 16.8 |
| 15 | Tracked Dozer (1) - Waste | 14.3 |
| 14 | 190t Haul Truck (10) - Waste | 13.7 |
| 8 | DRI Plant - Compressors | 7.8 |
| 5 | Concentrator - Pumps/Blowers etc | 2.2 |
| 9 | Power Station | -2.1 |
| 6 | Pellet Plant - Pumps/Blowers etc | -2.3 |
| 7 | DRI Plant - Pumps/Blowers etc | -2.4 |
| 18 | 190t Haul Truck (6) - Pit | -6.9 |
| 16 | 190t Haul Truck (8) - Pit | -7.2 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 27 | Tracked Dozer (2) - Pit | -7.9 |
| 22 | 190t Haul Truck (2) - Pit | -7.9 |
| 35 | Haul Truck (11) - Pit | -7.9 |
| 39 | Haul Truck (15) - Pit | -8.2 |
| 33 | Tracked Dozer (3) - Pit | -8.3 |
| 20 | 190t Haul Truck (4) - Pit | -8.4 |
| 19 | 190t Haul Truck (5) - Pit | -8.6 |
| 23 | 190t Haul Truck (1) - Pit | -8.7 |
| 37 | Haul Truck (13) - Pit | -8.8 |
| 38 | Haul Truck (14) - Pit | -9.1 |
| 3 | Semi-mobile Crusher - Pit (-200) | -9.5 |
| 13 | 190t Haul Truck (7) - Pit | -9.5 |
| 36 | Haul Truck (12) - Pit | -9.9 |
| 21 | 190t Haul Truck (3) - Pit | -10.0 |
| 17 | 190t Haul Truck (9) - Pit | -10.2 |
| 30 | Excavator (1) - Pit | -10.7 |
| 25 | Drill Rig (2) - Pit | -11.3 |
| 31 | Excavator (2) - Pit | -11.7 |
| 32 | Excavator (3) - Pit | -12.2 |
| 34 | Drill Rig (3) - Pit | -12.6 |
| 24 | Drill Rig - Pit | -13.2 |
| 28 | Water Truck - Pit | -14.2 |
| 26 | Wheeled Dozer - Pit | -15.6 |
| 29 | Grader - Pit | -19.3 |
| **Total** | | **25** |

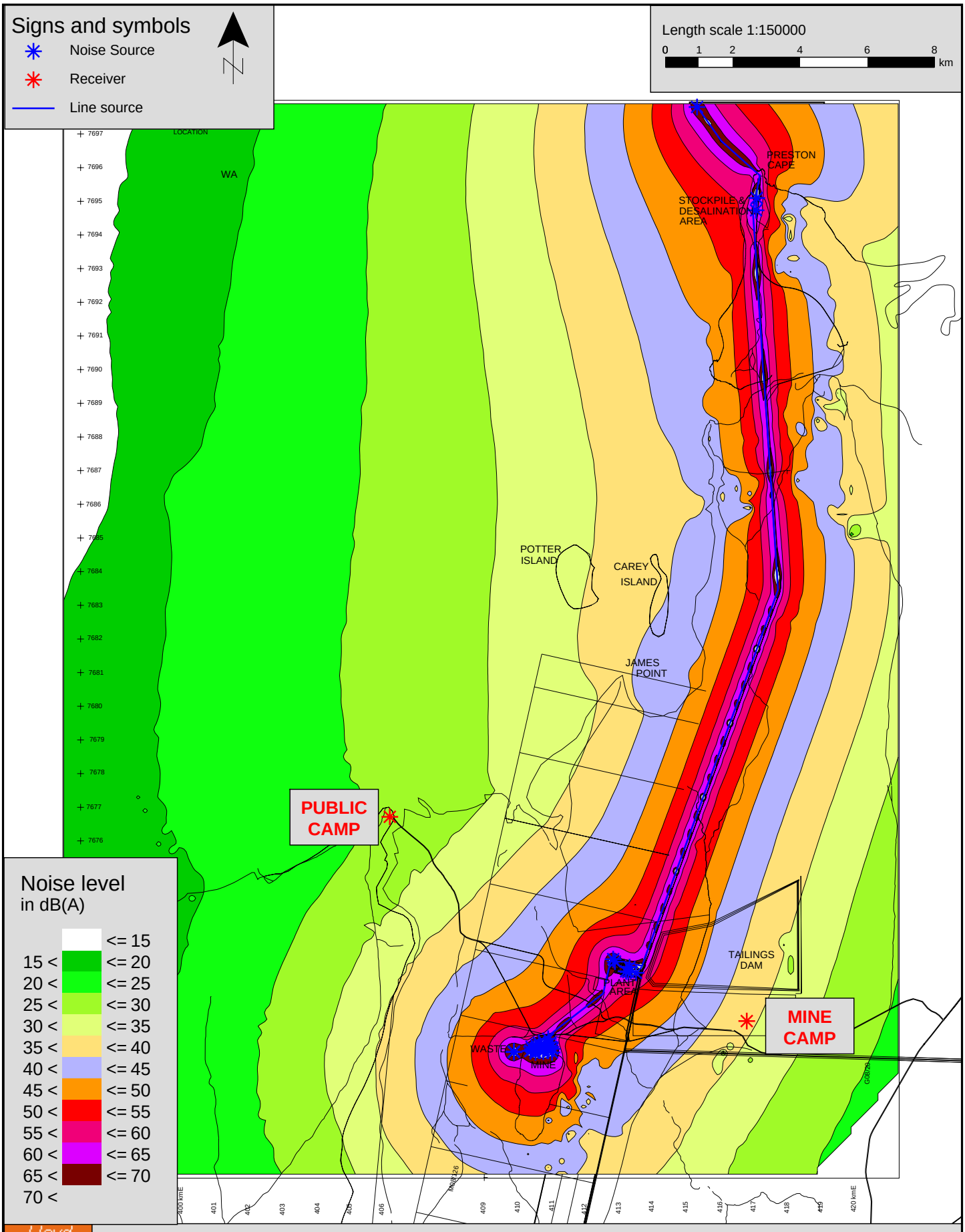
## *Table C6 - Operational Scenario 6 - Night Time Conditions*

## *Mining Final Stages – Haul Trucks from Plant to Port*

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| ***Location 1 - Mine Camp*** | | |
| 4 | Concentrator - Grinding Mills | 29.0 |
| 1 | Conveyor - Mine to Concentrator | 27.8 |
| 8 | DRI Plant - Compressors | 25.3 |
| 9 | Power Station | 18.7 |
| 14 | Primemover (4) | 17.4 |
| 15 | Tracked Dozer (1) - Waste | 16.6 |
| 5 | Concentrator - Pumps/Blowers etc | 16.4 |
| 14 | 190t Haul Truck (10) - Waste | 16.1 |
| 7 | DRI Plant - Pumps/Blowers etc | 15.6 |
| 6 | Pellet Plant - Pumps/Blowers etc | 15.5 |
| 14 | Primemover (3) | 4.0 |
| 27 | Tracked Dozer (2) - Pit | -0.7 |
| 20 | 190t Haul Truck (4) - Pit | -0.9 |
| 37 | Haul Truck (13) - Pit | -1.1 |
| 18 | 190t Haul Truck (6) - Pit | -1.7 |
| 35 | Haul Truck (11) - Pit | -1.9 |
| 39 | Haul Truck (15) - Pit | -2.0 |
| 19 | 190t Haul Truck (5) - Pit | -2.1 |
| 38 | Haul Truck (14) - Pit | -2.2 |
| 14 | Primemover (2) | -2.4 |
| 33 | Tracked Dozer (3) - Pit | -2.5 |
| 16 | 190t Haul Truck (8) - Pit | -2.5 |
| 22 | 190t Haul Truck (2) - Pit | -3.0 |
| 31 | Excavator (2) - Pit | -3.3 |
| 13 | 190t Haul Truck (7) - Pit | -3.5 |
| 23 | 190t Haul Truck (1) - Pit | -3.5 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 21 | 190t Haul Truck (3) - Pit | -3.7 |
| 3 | Semi-mobile Crusher - Pit (-200) | -3.9 |
| 36 | Haul Truck (12) - Pit | -4.1 |
| 25 | Drill Rig (2) - Pit | -4.6 |
| 24 | Drill Rig - Pit | -4.7 |
| 17 | 190t Haul Truck (9) - Pit | -5.0 |
| 32 | Excavator (3) - Pit | -5.3 |
| 34 | Drill Rig (3) - Pit | -5.8 |
| 30 | Excavator (1) - Pit | -6.7 |
| 26 | Wheeled Dozer - Pit | -9.9 |
| 28 | Water Truck - Pit | -10.2 |
| 29 | Grader - Pit | -12.7 |
| **Total** | | **33** |
| ***Location 2 - Public Camp (Fortescue River)*** | | |
| 4 | Concentrator - Grinding Mills | 17.1 |
| 1 | Conveyor - Mine to Concentrator | 16.8 |
| 15 | Tracked Dozer (1) - Waste | 14.3 |
| 14 | 190t Haul Truck (10) - Waste | 13.7 |
| 14 | Primemover (3) | 8.7 |
| 14 | Primemover (4) | 8.4 |
| 8 | DRI Plant - Compressors | 7.8 |
| 14 | Primemover (1) | 3.6 |
| 5 | Concentrator - Pumps/Blowers etc | 2.2 |
| 9 | Power Station | -2.1 |
| 6 | Pellet Plant - Pumps/Blowers etc | -2.3 |
| 7 | DRI Plant - Pumps/Blowers etc | -2.4 |
| 14 | Primemover (2) | -4.8 |
| 18 | 190t Haul Truck (6) - Pit | -6.9 |

| SOURCE NO. | SOURCE DESCRIPTION | SOUND PRESSURE LEVEL dB(A) |
|---|---|---|
| 16 | 190t Haul Truck (8) - Pit | -7.2 |
| 27 | Tracked Dozer (2) - Pit | -7.9 |
| 22 | 190t Haul Truck (2) - Pit | -7.9 |
| 35 | Haul Truck (11) - Pit | -7.9 |
| 39 | Haul Truck (15) - Pit | -8.2 |
| 33 | Tracked Dozer (3) - Pit | -8.3 |
| 20 | 190t Haul Truck (4) - Pit | -8.4 |
| 19 | 190t Haul Truck (5) - Pit | -8.6 |
| 23 | 190t Haul Truck (1) - Pit | -8.7 |
| 37 | Haul Truck (13) - Pit | -8.8 |
| 38 | Haul Truck (14) - Pit | -9.1 |
| 3 | Semi-mobile Crusher - Pit (-200) | -9.5 |
| 13 | 190t Haul Truck (7) - Pit | -9.5 |
| 36 | Haul Truck (12) - Pit | -9.9 |
| 21 | 190t Haul Truck (3) - Pit | -10.0 |
| 17 | 190t Haul Truck (9) - Pit | -10.2 |
| 30 | Excavator (1) - Pit | -10.7 |
| 25 | Drill Rig (2) - Pit | -11.3 |
| 31 | Excavator (2) - Pit | -11.7 |
| 32 | Excavator (3) - Pit | -12.2 |
| 34 | Drill Rig (3) - Pit | -12.6 |
| 24 | Drill Rig - Pit | -13.2 |
| 28 | Water Truck - Pit | -14.2 |
| 26 | Wheeled Dozer - Pit | -15.6 |
| 29 | Grader - Pit | -19.3 |
| **Total** | | **23** |

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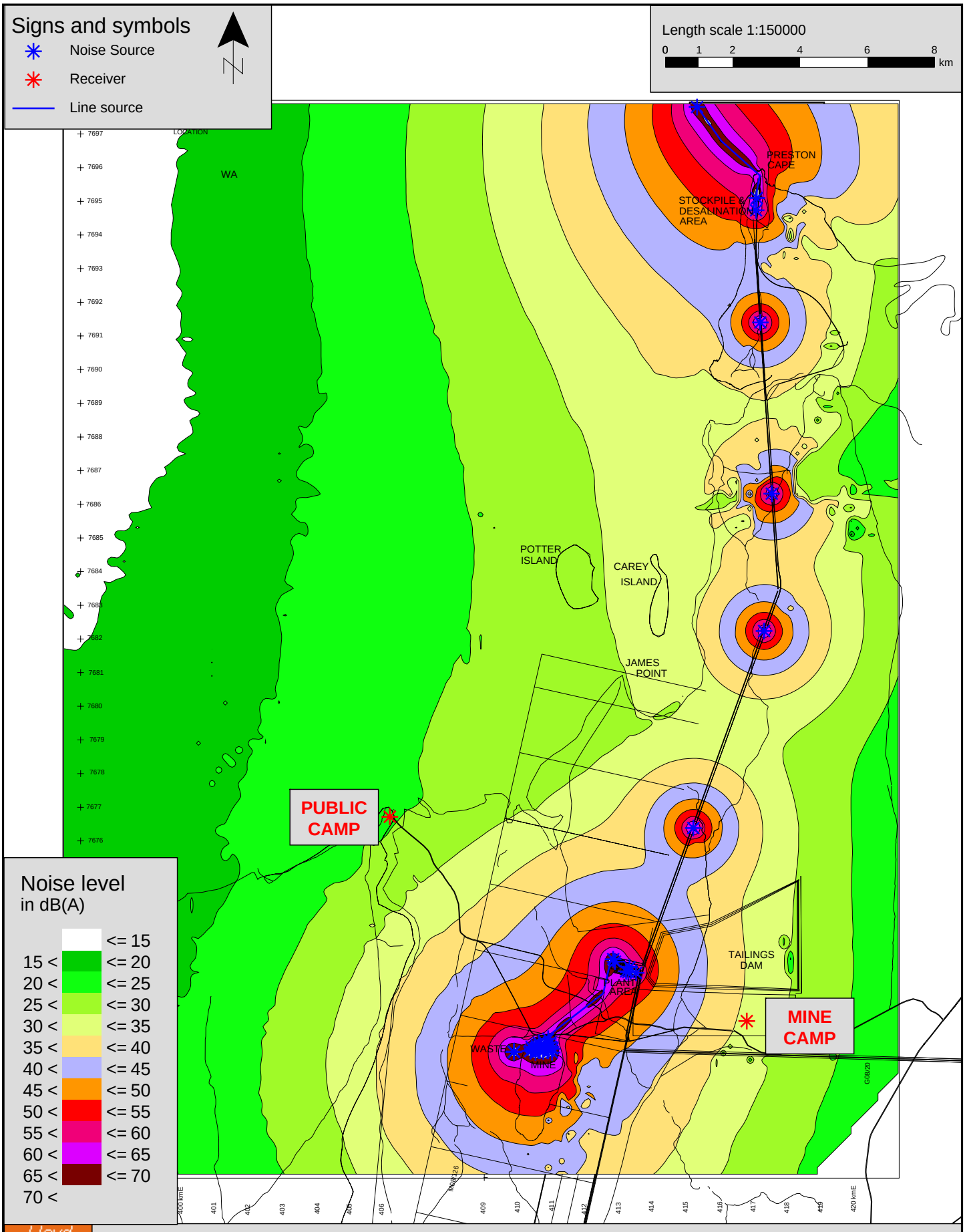
# MINERALOGY PROJECT
## Predicted Noise Level Contours, dB(A)

OPERATION SCENARIO 1 - NIGHT TIME CONDITIONS
INITAL STAGES OF MINING - CONVEYING ORE FROM PLANT TO PORT

***JOB NO. 405208*** ***FIGURE 03***

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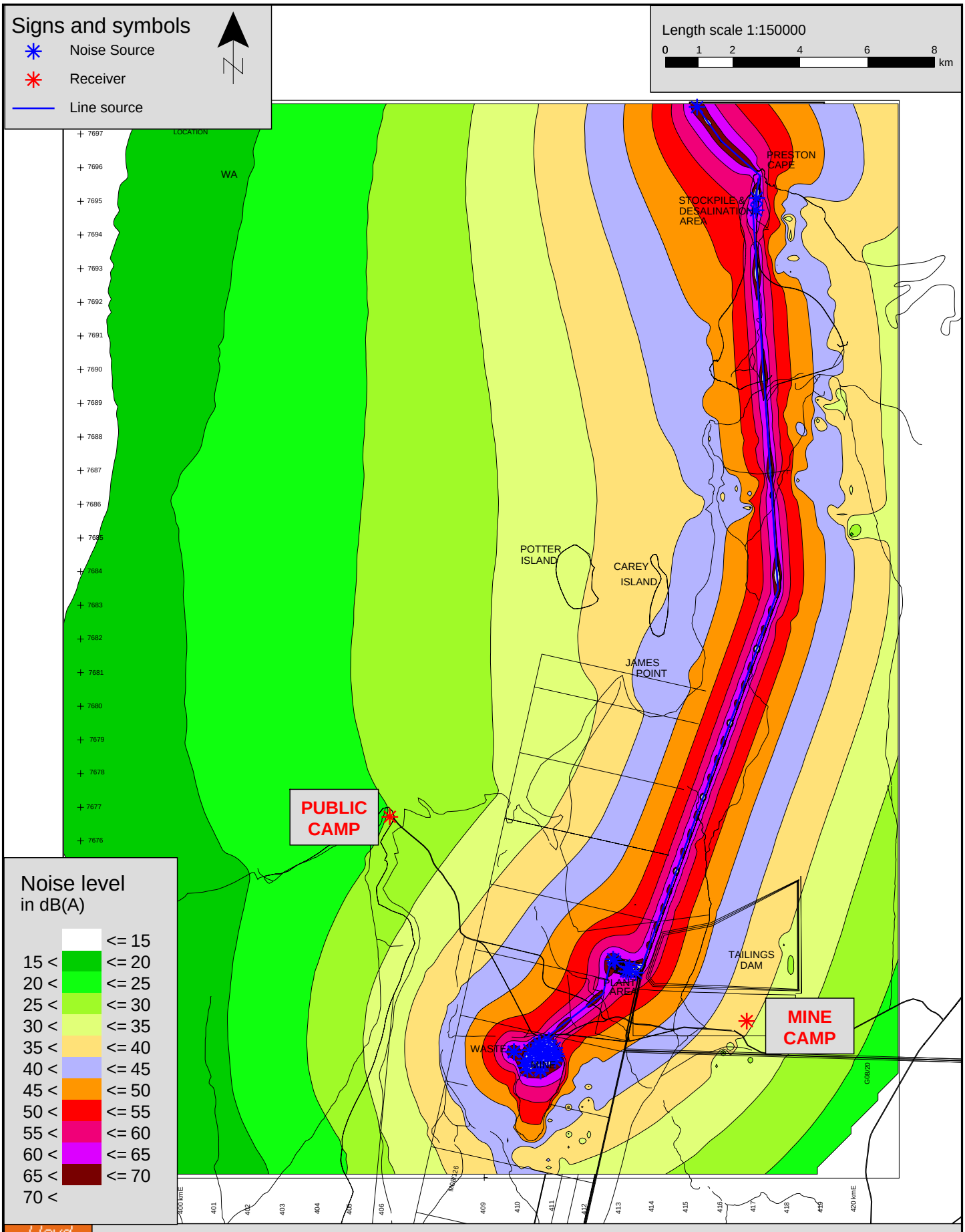
# MINERALOGY PROJECT
## Predicted Noise Level Contours, dB(A)

OPERATION SCENARIO 2 - NIGHT TIME CONDITIONS
INITAL STAGES OF MINING - HAULING ORE FROM PLANT TO PORT

***JOB NO. 405208*** ***FIGURE 04***

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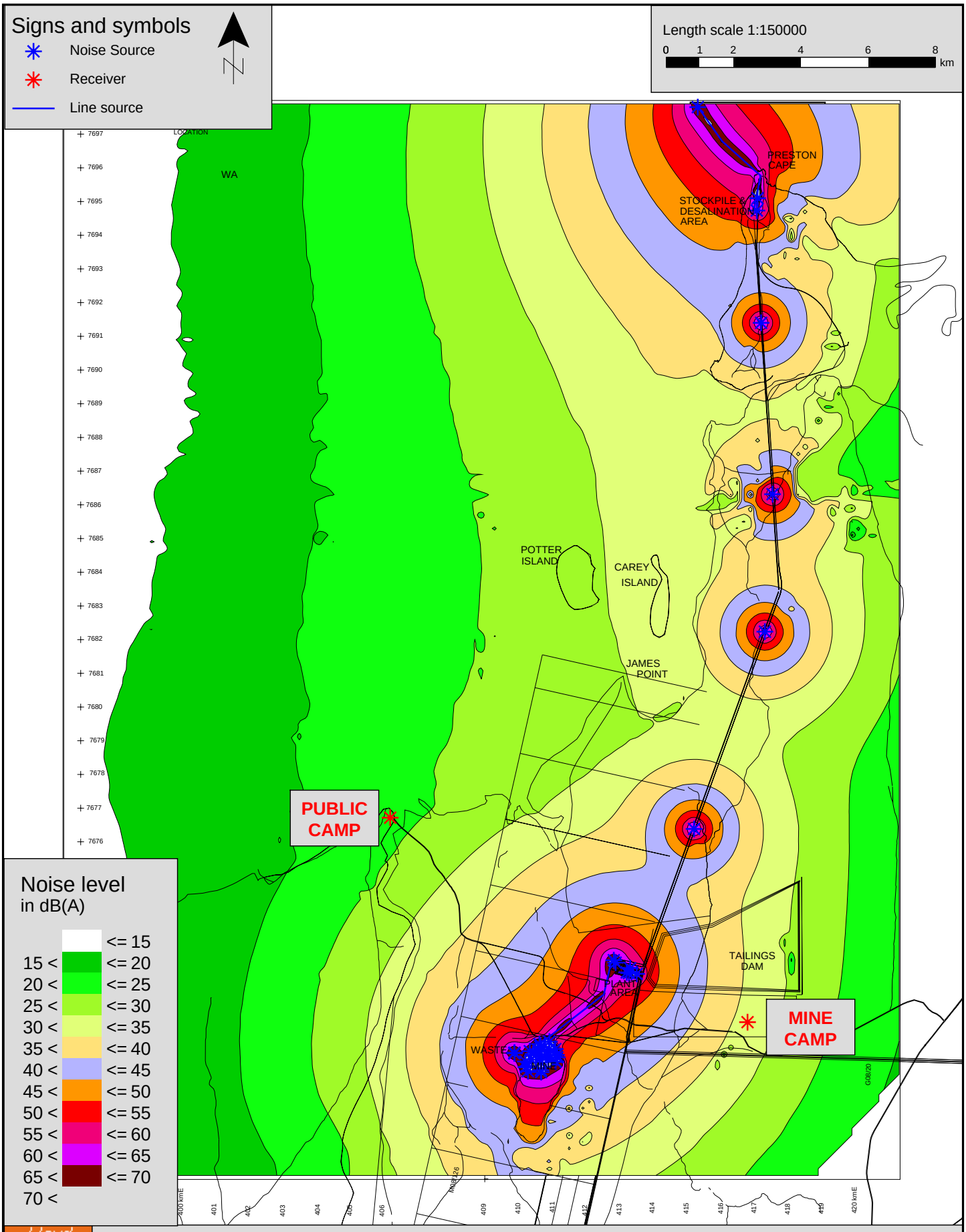
## MINERALOGY PROJECT
## Predicted Noise Level Contours, dB(A)

OPERATION SCENARIO 3 - NIGHT TIME CONDITIONS
FUTURE STAGES OF MINING - CONVEYING ORE FROM PLANT TO PORT

***JOB NO. 405208*** ***FIGURE 05***

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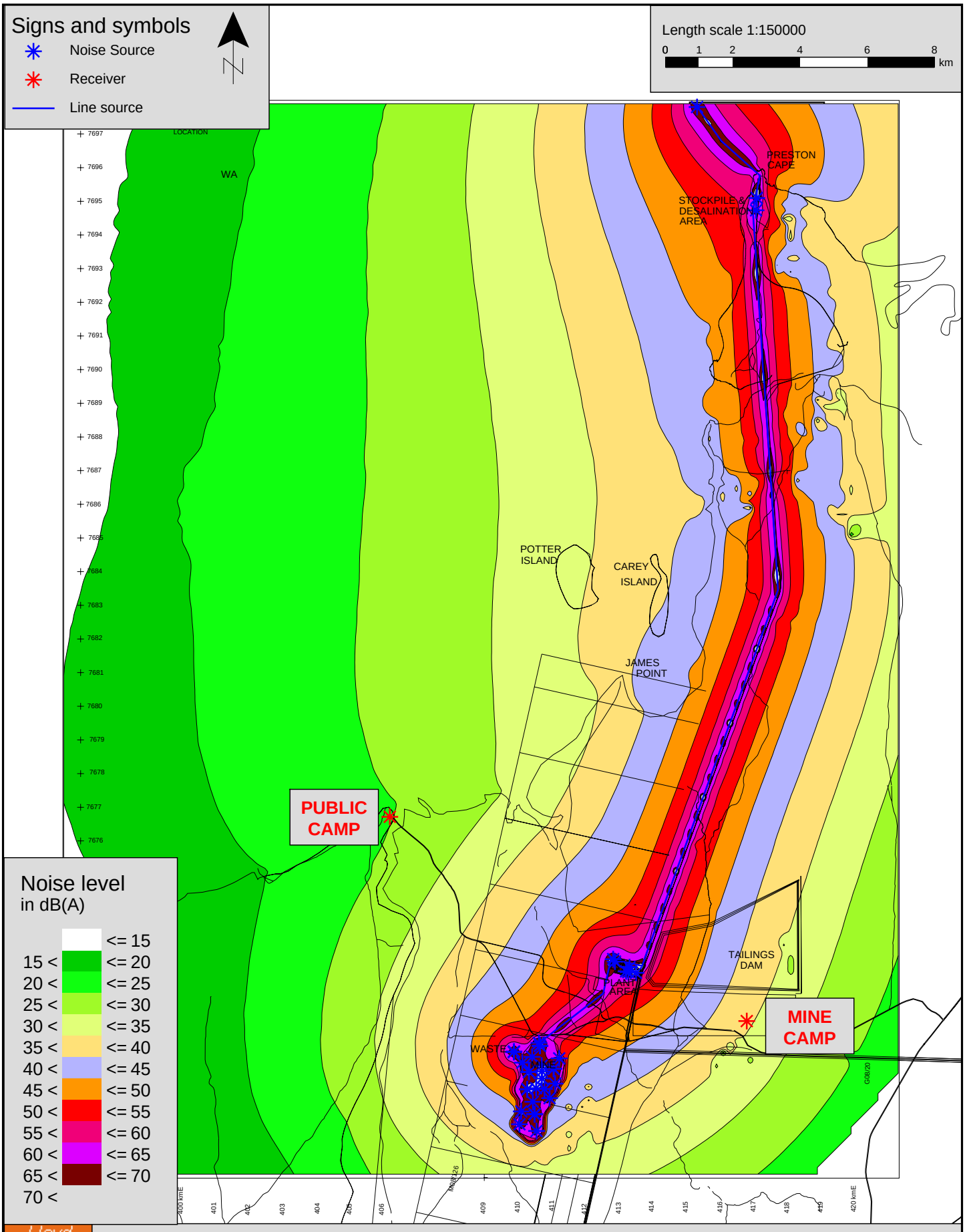
# MINERALOGY PROJECT
## Predicted Noise Level Contours, dB(A)

OPERATION SCENARIO 4 - NIGHT TIME CONDITIONS
FUTURE STAGES OF MINING - HAULING ORE FROM PLANT TO PORT

***JOB NO. 405208*** ***FIGURE 06***

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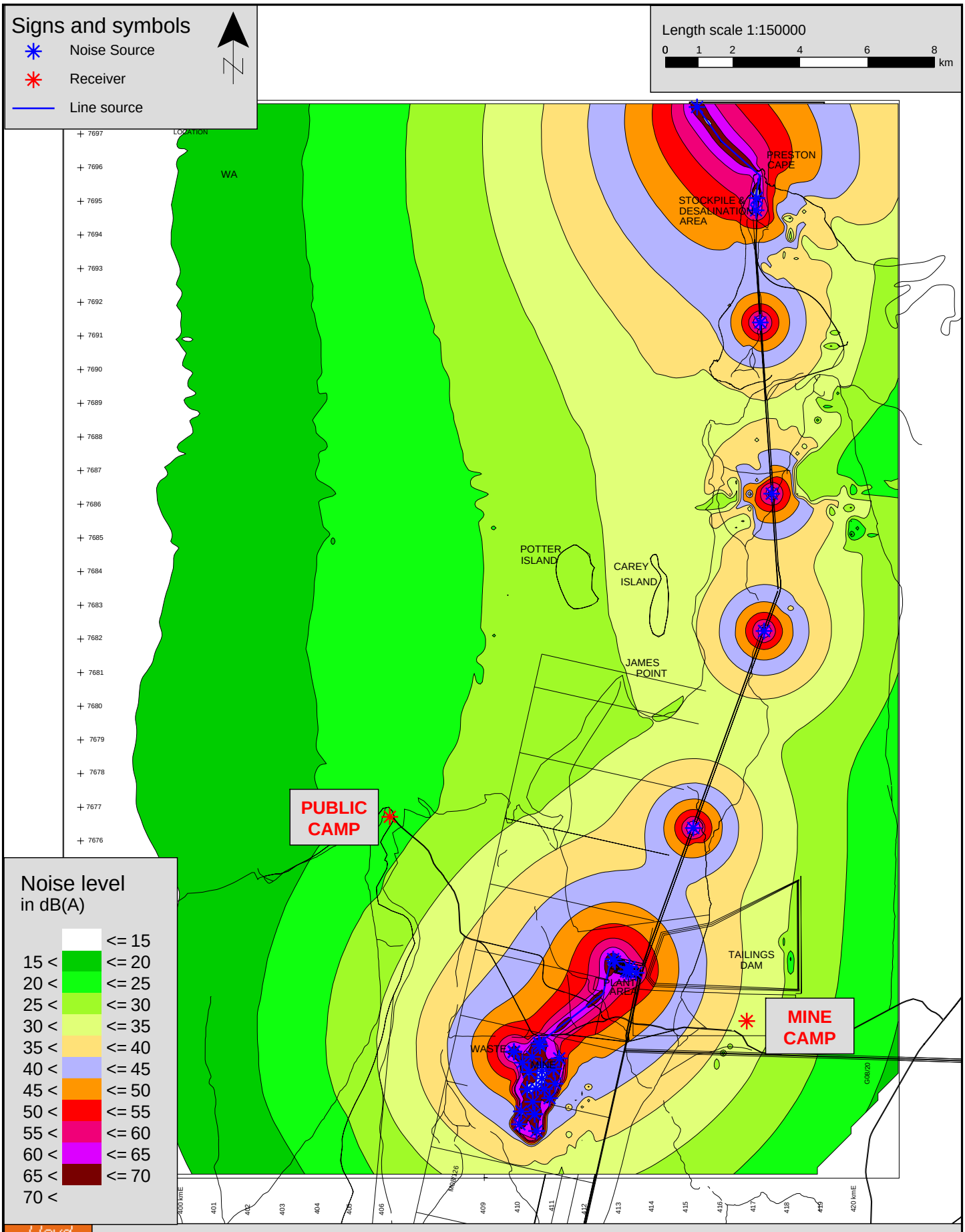
# MINERALOGY PROJECT
## Predicted Noise Level Contours, dB(A)

OPERATION SCENARIO 5 - NIGHT TIME CONDITIONS
FINAL STAGES OF MINING - CONVEYING ORE FROM PLANT TO PORT

***JOB NO. 405208*** ***FIGURE 07***

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**MINERALOGY PROJECT**
**Predicted Noise Level Contours, dB(A)**

OPERATION SCENARIO 6 - NIGHT TIME CONDITIONS
FINAL STAGES OF MINING - HAULING ORE FROM PLANT TO PORT

***JOB NO. 405208*** ***FIGURE 08***