Appendix K

International Minerals (Balmoral South) Iron Ore Mine Environmental Noise Assessment

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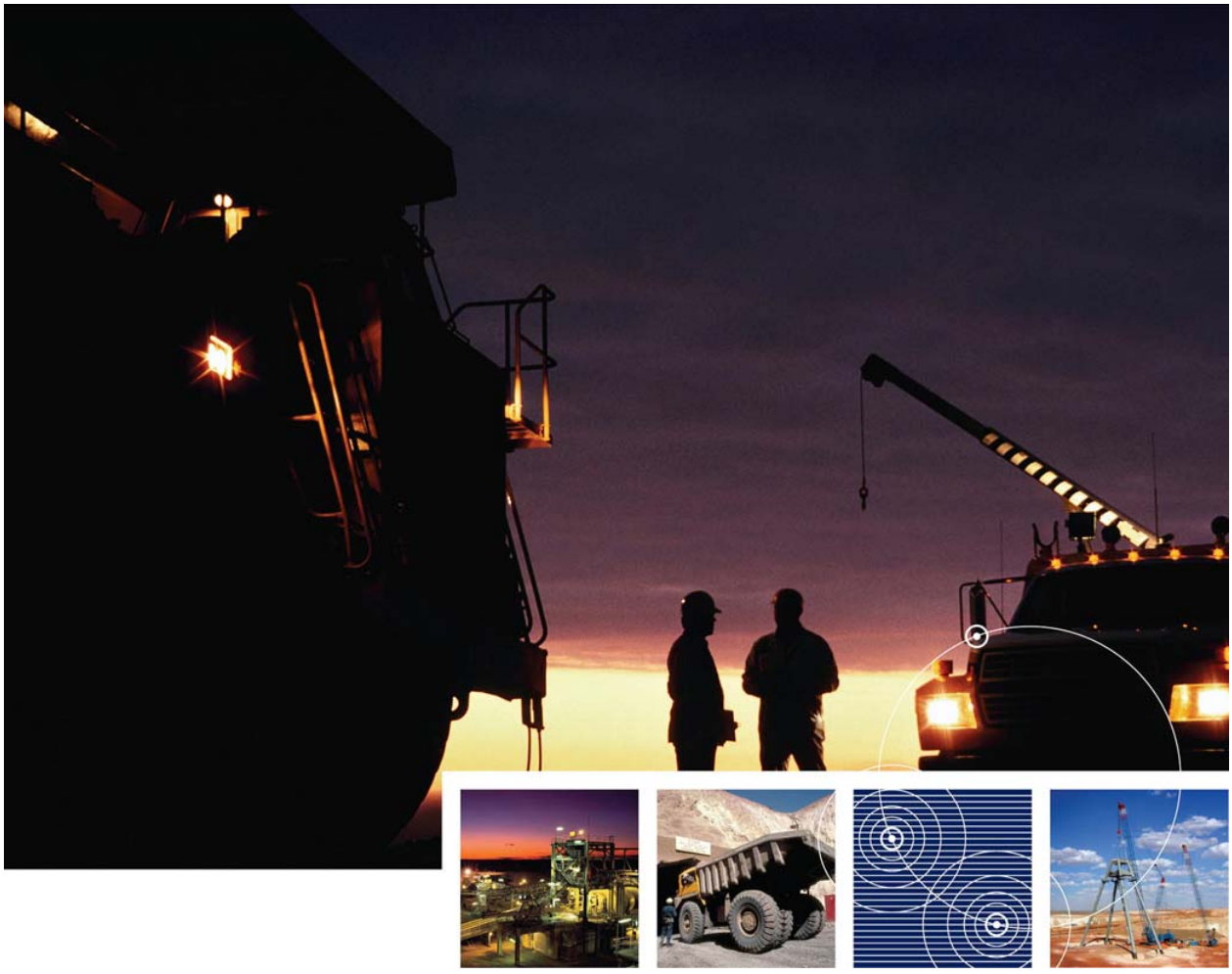

International Minerals (Balmoral South) Iron Ore Mine Environmental Noise Assessment

Iron Ore Mine and Processing Plant

Maunsell Pty Ltd

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Environmental Noise Assessment

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Executive Summary

International Minerals propose to undertake the Balmoral South Project, an iron ore mining operation in the Cape Preston area approximately 80km southwest of Karratha, WA. The proposed mine site is approximately 2km south of another proposed iron ore mine, the Mineralogy Central Block Project.

This report considers the predicted noise levels of both sites operating during the more critical night time to the nearest noise sensitive receivers and compares them with the appropriate environmental noise criteria. In particular, noise sensitive receivers are the two miners' camps located to the east and south of the proposed mine, and the public camping area at the mouth of the Fortescue River. It is noted that an additional mine construction camp / permanent village was shown on the map approximately collocated with the CPMM (Central Block) Project pit and was as such, excluded from this study.

The worst case operational scenario was considered for the assessment of the mining noise, being the "future" scenario (Year 3 to Year 24), assuming that the processing plant is at 100% operational capacity. Based on the operational noise sources listed in Section 3.1 and their characteristics detailed in Appendix B, noise emission levels for the worst case operating scenario have been predicted at the receivers and are displayed below.

Predicted Environmental Noise Levels

Receiver Location	Night Time Noise Emission – L_{A10} dB(A)			
	Predicted Worst Case (Future)	WAEPNR Assigned Noise Criteria	EPA Guidance Statement No 8	Allowed from additional sources
Miners camp (east)	37	60	50	60
Miners camp (south)	23	60	50	60
Public camping area (Fortescue River)	23	30	N/A	29

The table above indicates that the noise emission criteria are achieved at all sensitive receivers for the proposed Balmoral South mine. Noise contour plots for the modelled operational scenario are included in Appendix C. The alternative proposed scenario described in Section 3.2 has also been determined to comply with the most stringent criteria at the Fortescue River camping area.

In both cases, the results also show there is further scope for expansion of undeveloped lots in the area. The total cumulative level of 29 dB(A) is allowed from noise sources associated with potential future projects at the Fortescue River public camping site.

Construction noise emission was assessed to be significantly less than the worst-case operational scenario. Compliance with the worst case operational scenario is therefore considered to ensure compliance with the assigned levels during the construction phase.

Blasting noise at the receiver locations will vary depending on the stage of the mining operations, blast configuration and site specific conditions. The noise from blasting is likely to be higher during construction and the initial stages of mining, and as such, blast levels should be monitored for the initial blasts to determine the typical maximum permissible charge size.

1.0 Introduction

International Minerals propose to undertake the Balmoral South Project, an iron ore mining operation in the Cape Preston area, approximately 80km southwest of Karratha, Western Australia. The proposed mine site is approximately 2km south of another proposed iron ore mine, Mineralogy Central Block Project.

As a part of the mining operations, it is proposed to establish a power station, processing plant and transport infrastructure (conveyers) immediately east of each of the mines, as well as shared port facilities further north. Also there are to be accommodation facilities to the south of the mine, as shown in Figure 1. Under the proposal, the operations will operate for 24 hours per day, 7 days per week.

Specifically, the report considers the cumulative operational noise levels at the critical (worst case) night time scenario at the nearest noise sensitive receivers and compares them with the appropriate environmental noise criteria. In particular, noise sensitive receivers are the two miners' camps located to the east and south of the proposed mine, and the public camping area at the mouth of the Fortescue River. It should be noted that an additional mine construction camp / permanent village was shown on the map approximately collocated with the CPMM (Central Block) Project pit and was as such, excluded from this study.

The proposed mining operations for the Balmoral South mine will consist of:

- open cut mine, eventually 300 m deep, 4 km long and 1.5 km wide;
- extraction of 80 million tonnes per annum (Mtpa) of ore on a 24 hour basis, 7 days per week;
- fleet of approximately 50, 218 tonne haul trucks;
- 24 drilling rigs;
- 50 Mt of waste in the first year and 90 Mtpa thereafter;
- 56 Mtpa of tailings, co-disposed with the mine waste;
- 14 Mtpa pellets and 11 Mtpa of concentrate;
- 4 high pressure grinding rolls with a force of 2,000 tonnes;
- permanent accommodation for up to 1500 people; and
- conveyors to run from the plant to the stockpile then to the jetty offshore from Cape Preston.

In addition, the Central Block operation was modelled on the corresponding [Mining (Future) (Conveyor)] operation detailed in the Lloyd Acoustics Pty Ltd reports for the CPMM Central Block Project. These reports are "Noise Impact Assessment, Mineralogy Project, Iron Ore Mine and Processing Plant, Cape Preston, Western Australia" dated January 2005 and April 2005. Source sound power data from the above report were also used as a reference for the preparation of this report, unless otherwise specified by the client.

Our assessment is based on 3 dimensional topographical data and plant and mine layout data provided to us in electronic form by Maunsell Australia. Sound power data utilised for the mining equipment was the same as that used for the Central Block mine assessment. There has been no information provided for the bore field, and as such this study excludes noise emission from the bore field. This however is expected to be minimal, as it uses submersible pumps.

Nomenclature relevant to this report has been included in Appendix A.

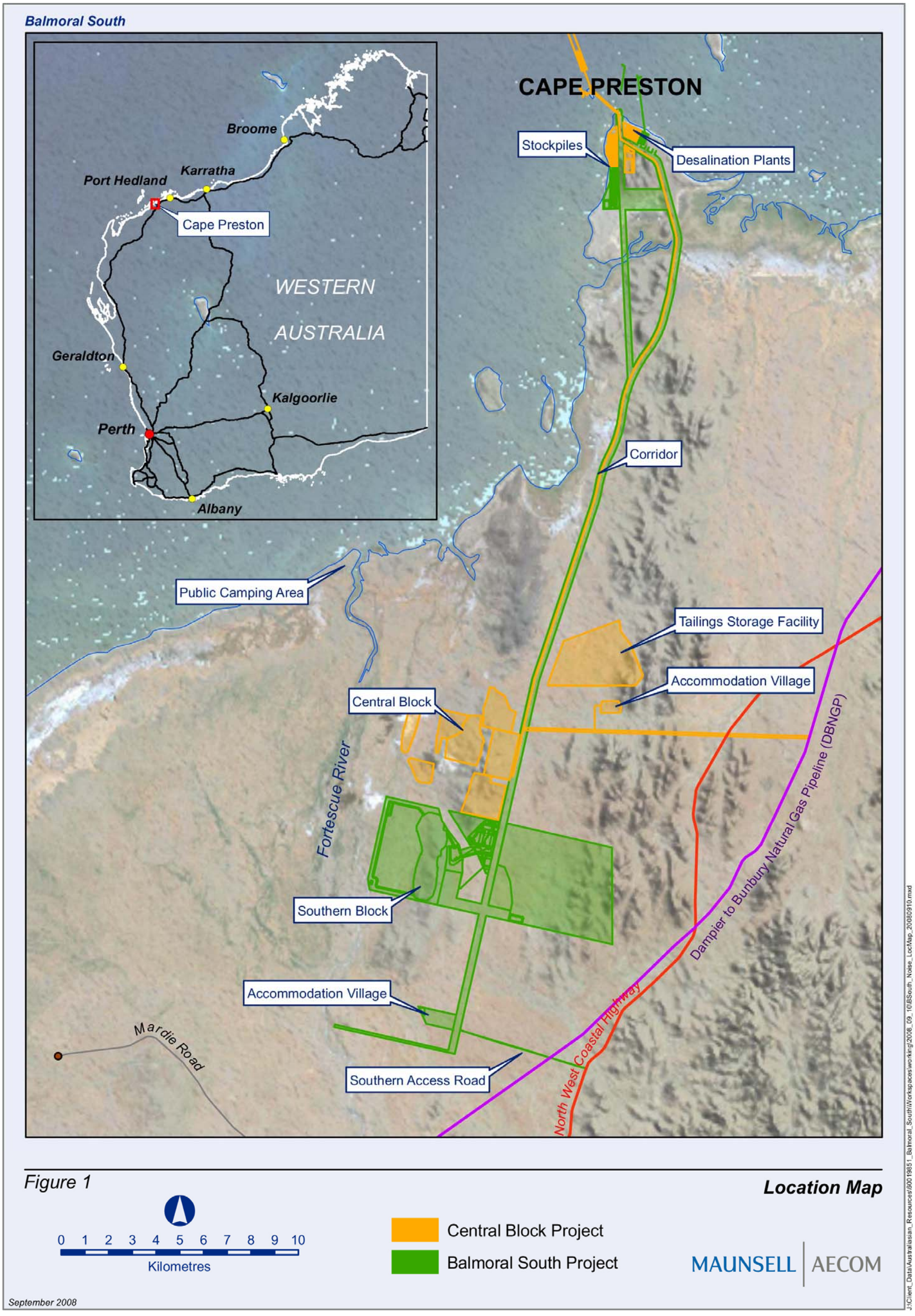


Figure 1 Balmoral South and Central Block Projects Locality Map

2.0 Criteria

2.1 Environmental Noise Criteria

The Western Australian *Environmental Protection (Noise) Regulations* (1997), WAEPNR, made pursuant to the *Environmental Protection Act 1986,* specify allowable noise emissions as shown in Table 1.

Table 1 Assigned levels by the Western Australian Environmental Protection (Noise) Regulations 1997

Type of premise receiving noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises at locations within 15m from a building directly associated with a noise sensitive use	7:00 to 19:00 Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + influencing factor
	9:00 to 19:00 Sundays and public holidays	40 + influencing factor	50 + influencing factor	65 + influencing factor
	19:00 to 22:00 any day	40 + influencing factor	50 + influencing factor	55 + influencing factor
	22:00 on any day to 7:00 Monday to Saturday and 9:00 Sunday and public holidays	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises at locations further than 15m from a building directly associated with a noise sensitive use	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and Utility premises	All hours	65	80	90

The influencing factor is applied to account for higher noise areas as a result of nearby industrial and commercial areas and major roads. The influencing factor is determined by considering the land use within two circles having a radius of 100m and 450m from the noise sensitive premises of concern.

According to the policy the noise emissions must not significantly contribute to a level of noise which exceeds the assigned level (as shown in Table 1). The Environmental Protection (Noise) Regulations 1997 suggest that a noise emission is taken to “significantly contribute to” a level of noise if the noise emission is greater than a level which is 5 dB below the assigned level at the point of reception. Therefore, the design target shall be 5 dB less than the assigned noise level as set out by the Environmental Protection (Noise) Regulations 1997 in order to not significantly contribute to the overall noise environment.

Penalties for the character of the noise may be applicable according to the policy. A 5 dB(A) penalty is to be applied for each of the characteristics of tone and modulation, and a 10 dB(A) penalty is applied impulsiveness. The noise emission is expected to be broadband in nature and hence no penalty is warranted. However, “track slap” can be produced by the tracked dozers which would attract a penalty for modulation. This can be minimised with operational management, for example, by restricting the dozers to 2nd gear in reverse, and therefore no penalty has been applied. Another management alternative is not to operate tracked dozers at night in exposed locations such as for example the top of stockpiles or waste mounds.

The noise criteria will be applicable at the following locations:

- miners camp located to the east of the proposed mine;
- miners camp located to the south of the proposed mine; and
- public camping area located at the mouth of the Fortescue River.

Since the miners camps are associated with the mines, they are considered to be a caretakers premises or the like, attached to or forming part of the mine. Therefore the applicable assigned levels fall under the "Industrial and Utility" category. The design target for the miners camps is therefore L_{A10} 60 dB(A), which is 5 dB(A) below the assigned noise level so as not to significantly contribute to the overall noise environment.

The public camping area on the other hand falls under the "noise sensitive" category. The design target for the public camping area is most stringent at night, and as the mine will operate for 24 hours per day the applicable criteria is 30 dB(A), since no influencing factor is applied.

2.2 Construction Noise Criteria

The WAEPNR provides guidance for construction noise, however there are no specific criteria. The guidelines for construction work carried out between 7am and 7pm on any day which is not a Sunday or public holiday are:

- the construction work must be carried out in accordance with control of noise practices set out in section six of Australian Standard 2436-1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites";
- the equipment used for the construction work must be the quietest reasonably available; and
- the chief executive officer (CEO) of the EPA or their authorized representative may request that a noise management plan be submitted for the construction work at any time.

For construction work done outside the hours shown above:

- the work must be carried out in accordance with section six of AS 2436-1981;
- the equipment used must be the quietest reasonably available;
- the proponent must advise any nearby occupants of the work to be done at least 24 hours before it commences;
- the proponent must show that it was reasonably necessary for the work to be done out of hours; and
- the proponent must submit to the CEO of the EPA (or their representative) a noise management plan at least seven days before the work starts, and the plan must be approved by the CEO.

Given that there are no occupants in the surrounding area, the applicable construction noise criteria would be the same as the operational (environmental) noise criteria, unless exceedances are predicted, in which case an application for an exemption must be submitted to the EPA.

2.3 Blasting Noise Criteria

The WAEPNR specifies allowable airblast levels resulting from blasting when received at any other noise sensitive premises.

For blasting carried out between 7am and 6pm on any day, which is not a Sunday or a public holiday, the airblast level received on any other premises must not exceed:

- 125 dB(LIN) L_{peak} for any one blast; and
- 120 dB(LIN) L_{peak} for nine in any 10 consecutive blasts (irrespective of interval between blasts).

For blasting carried out between 7am and 6pm on a Sunday or public holiday, the airblast level received on any other premises must not exceed:

- 120 dB(LIN) L_{peak} for any one blast; and
- 115 dB(LIN) L_{peak} for nine in any 10 consecutive blasts (irrespective of interval between blasts).

The airblast level is limited to 90 dB(LIN) for any period outside these specified times.

2.4 EPA Guidance Statement No 8 Criteria

The aspirational goal recommended in EPA Guidance Statement No.8 for a construction camp located on the same premises as the proposal should be used as the design target for the miners' camps. According to the Guidance Statement, the aspirational goal based on indoor levels inside the accommodation sleeping areas of L_{A10} 40dB(A) and L_{Amax} 50dB(A) should be considered. For the general building structure of a operation camp, this goal normally equals to L_{A10} 50dB(A) and L_{Amax} 60dB(A) outside. IM should revise the assessment criteria and design objectives for the operation camps, in accordance with EPA Guidance Statement No.8.

The applicable external noise criteria in accordance to the EPA Guidance Statement No 8 are therefore as shown in Table 2 below.

Table 2: EPA Guidance Statement – External Noise Criteria

Receiver Location	EPA Guidance Statement No 8 Noise Criteria (dBA)	
	L_{A10}	L_{Amax}
Miners camp (east)	50	60
Miners camp (south)	50	60
Public camping area (Fortescue River)	N/A	N/A

3.0 Assessment

3.1 Environmental Noise

The environmental noise emission was predicted using CONCAWE[1] algorithms in the SoundPLAN[2] noise propagation software. Noise levels were predicted for "worst case" night time meteorological conditions as required by the Western Australian Environmental Protection (Noise) Regulations. The modelled weather conditions are: 3m/s wind speed blowing from source to receiver, 15°C temperature, 50% relative humidity, 1013mbar atmospheric pressure, Pasquill Stability Category 'F'.

Four separate scenarios were considered for the assessment of the mining noise, the worst of which was selected for detailed modelling. The scenarios considered include a construction scenario and three operational scenarios including initial, future and final. The potentially worst case, 24 Mtpa options were considered for all operational scenarios.

The worst case scenario was determined to be the "future" scenario, from Year 3 to Year 24, due to the largest number of equipment both in the pit and in the waste / processing areas. Compliance of the noise emissions associated with the worst case scenario ensures compliance associated with all other scenarios.

The worst case "future" scenario is described in detail below, assuming that the processing plant is at 100% operational capacity:

Mine Site (approx 278 m below natural surface level)
26 off Off-Highway Trucks (218t)
24 off Production Drills
8 off Tracked Dozers
8 off Face Shovels
6 off Water carts
6 off Graders
2 off Large Front End Loaders
1 off Wheel dozer

Waste Area (approx 40 m above natural surface level)
8 off Off-Highway Trucks (218t)
2 off Tracked Dozers

Processing Plant
1 off gas fired power station
1 off Primary Crusher
2 off Secondary Crushers
4 off Magnetic Concentrator Plants
2 off Pelletising Plants
4 km (approx) of Conveyors linking the crushers, concentrator and palletising plants to conveyors

Primary Crusher
8 off Off-Highway Trucks (218t)
1 off Wheeled Dozer
1 off Large Front End Loader

Conveyors
2 off, from Balmoral south processing plant to off-shore jetty ship-loading facility
1 off, from Central block processing plant to off-shore jetty ship-loading facility

[1] CONCAWE – The oil companies' international study group for conservation of clean air and water – Europe (established in 1963) Report 4/81 "The propagation of noise from petroleum and petrochemical complexes to neighbouring communities".

[2] SoundPLAN 6.4 is a suite of noise propagation programs.

Other Sources
1 off, Ship Loading Facility
1 off, Large Front End Loader at Stockpile

In addition, the corresponding Mining (Future) (Conveyor) Central Block pit operational sources reported in Lloyd Acoustics reports were reproduced in this assessment and added to the Balmoral South operations.

Based on the operational noise sources listed in Appendix B, noise emission levels have been predicted at the receivers and are displayed in Table 2.

Table 3 Predicted Environmental Noise Levels

Receiver Location	Night Time Noise Emission – L_{A10} dB(A)			
	Predicted Worst Case (Future)	WAEPNR Assigned Noise Criteria	EPA Guidance Statement No 8	Allowed from additional sources
Miners camp (east)	37	60	50	60
Miners camp (south)	23	60	50	60
Public camping area (Fortescue River)	23	30	N/A	29

Table 3 indicates that the noise emission criteria are achieved at all sensitive receivers for the proposed Balmoral South mine and corresponding Central Block operation. Relative contributions of the top 20 sources at the Fortescue River public camping area are presented in Table 4, and noise contour plots for the worst case (night time) operational scenario in Appendix C.

Table 4 Source strength ranking at the Fortescue River public camping area (overall noise level of 23 dB(A))

Ranking	Source	Noise Contribution dB(A)
1	Balmoral South conveyor 1	15.6
2	Balmoral South conveyor 2	15.6
3	Central Block conveyor 1	14.7
4	Grinding Mill 1 (Central Block Concentrator)	10.6
5	Grinding Mill 2 (Central Block Concentrator)	10.6
6	Grinding Mill 3 (Central Block Concentrator)	10.6
7	Grinding Mill 4 (Central Block Concentrator)	10.5
8	Dump truck 1 (Central Block tailings)	8.1
9	Dump truck 2 (Central Block tailings)	7.9
10	Tracked dozer (Central Block tailings) 2	7.5
11	Grinding Mill 1 (Balmoral South Concentrator)	4.2
12	Grinding Mill 2 (Balmoral South Concentrator)	4.2
13	Grinding Mill 3 (Balmoral South Concentrator)	4.2
14	Grinding Mill 4 (Balmoral South Concentrator)	4.1
15	Dump truck 1 (Balmoral South tailings)	3.8
16	DRI Plant Compressors (Central Block)	3.4
17	Dump truck 2 (Balmoral South tailings)	3.3
18	Dump truck 3 (Balmoral South tailings)	3.3
19	Dump truck 4 (Balmoral South tailings)	3
20	Dump truck 5 (Balmoral South tailings)	2.9

The results also indicate noise contribution of 23 dB(A) from the considered operations at the noise sensitive public camping area at Fortescue River. A further 29 dB(A) would therefore be allowable at the camping area from future sources associated with potential new operations in the area.

3.2 Alternative Scenario configuration

It is understood that the source configuration detailed in Section 3.1 has not been finalised and an alternative configuration (presented below) is also being considered:

Amended Processing Plant
1 off gas fired power station
4 off Primary Crusher
12 off Secondary Crushers
8 off High Pressure Grinding Rolls
2 off Magnetic Concentrator Plants
2 off Pelletising Plants
4 km (approx) of Conveyors linking the crushers, concentrator and palletising plants to conveyors

Amended Conveyors

Slurry pipelines will be used instead of conveyor belts to transport the refined product to off-shore jetty ship-loading facility.

All other plant would remain unchanged.

Source strength ranking has been used to incorporate the proposed changes and calculate the associated noise level of at the Fortescue River camp. The proposed changes result in 21 dB(A) at the camp, a 2 dB(A) reduction of overall levels due to the removal of the dominant conveyor belts. The alternative configuration therefore also results in compliance with the criteria. The allowable noise contribution from future sources associated with potential new operations in the area would remain the same at 29 dB(A).

3.3 Construction Noise

Construction noise emission is expected to be significantly less than the modelled worst-case operational scenario. Compliance with the worst case scenario therefore ensures that construction noise levels are below the assigned noise levels set out in the WAEPNR.

3.4 Blasting Noise

Blasting noise at the receiver locations will vary depending on the stage of the mining operations, blast configuration and site specific conditions. The noise from blasting is likely to be higher during construction and the initial stages of mining, and as such, blast levels should be monitored for the initial blasts to determine the typical maximum permissible charge size. Blast overpressure is manageable in operation within the Regulation limits.

4.0 Conclusion

An environmental noise assessment for the proposed development of the Balmoral South Project has been undertaken. This assessment has considered the applicable criteria based on the Western Australian Environmental Protection (Noise) Regulations (1997) (WAEPNR) as well as the EPA Guidance Statement No.8 noise goals for construction camps.

Based on the number of sources and sound power data listed in Section 3.1 and Appendix B, the combined operational noise of both the Central Block and the Balmoral South projects will comply with the relevant criteria at the miners' camps and the public camping area at the Fortescue River. The alternative scenario described in Section 3.2 has also been determined to comply with the most stringent criteria at the Fortescue River camping area.

If penalties are applied (particularly for modulation from the tracked dozer "track slap"), then the 30 dB(A) design criterion at the Fortescue River may be exceeded, however the noise level will still be within the 35 dB(A) overall environmental noise criterion. This is not desirable since there may be additional noise emission from the (as yet) undeveloped mine parcels contributing to the overall noise level at the Fortescue River location. Noise from tracked dozer operations on the waste mound can be managed in operation. Alternatively, wheeled dozers could be considered for the waste mound.

The construction noise does not need to comply with the assigned noise levels, rather, best practices should be used to minimise noise emission during the period. However, given the expected construction noise levels, it is anticipated that these are likely to be acceptable as they comply with the operational assigned noise level criteria.

Blasting noise will vary and as such should be monitored during the construction and initial operational stages to determine the typical maximum charges sizes for compliance.

6.0 References

Lloyd Acoustics Pty Ltd report “Noise Impact Assessment, Mineralogy Project, Iron Ore Mine and Processing Plant, Cape Preston, Western Australia” dated January 2005.

Lloyd Acoustics Pty Ltd report “Noise Impact Assessment, Mineralogy Project, Iron Ore Mine and Processing Plant, Cape Preston, Western Australia” dated April 2005.

Appendix A: Nomenclature

A-Weighting	The “A” weighting scale is designed to adjust the absolute sound pressure levels to correspond to the subjective response of the human ear.
dB(A)	A-Weighted sound pressure level measured in decibels.
dB(LIN)	Unweighted sound pressure level measured in decibels.
L_{A1}	The A-weighted sound level exceeded for 1% of a time period.
L_{A10}	The A-weighted sound level exceeded for 10% of a time period.
L_{Amax}	The maximum A-weighted sound level in dB(A).
L_{peak}	Peak sound pressure level measured in decibels. When followed by dB(LIN) it represents the linear (un-weighted) peak sound pressure level.
Influencing factor	The influencing factor is calculated for each noise-sensitive premises receiving noise. It takes into account the amount of industrial and commercial land and the presence of major roads within a 450m radius around the noise receiver.

Appendix B: Noise Sources

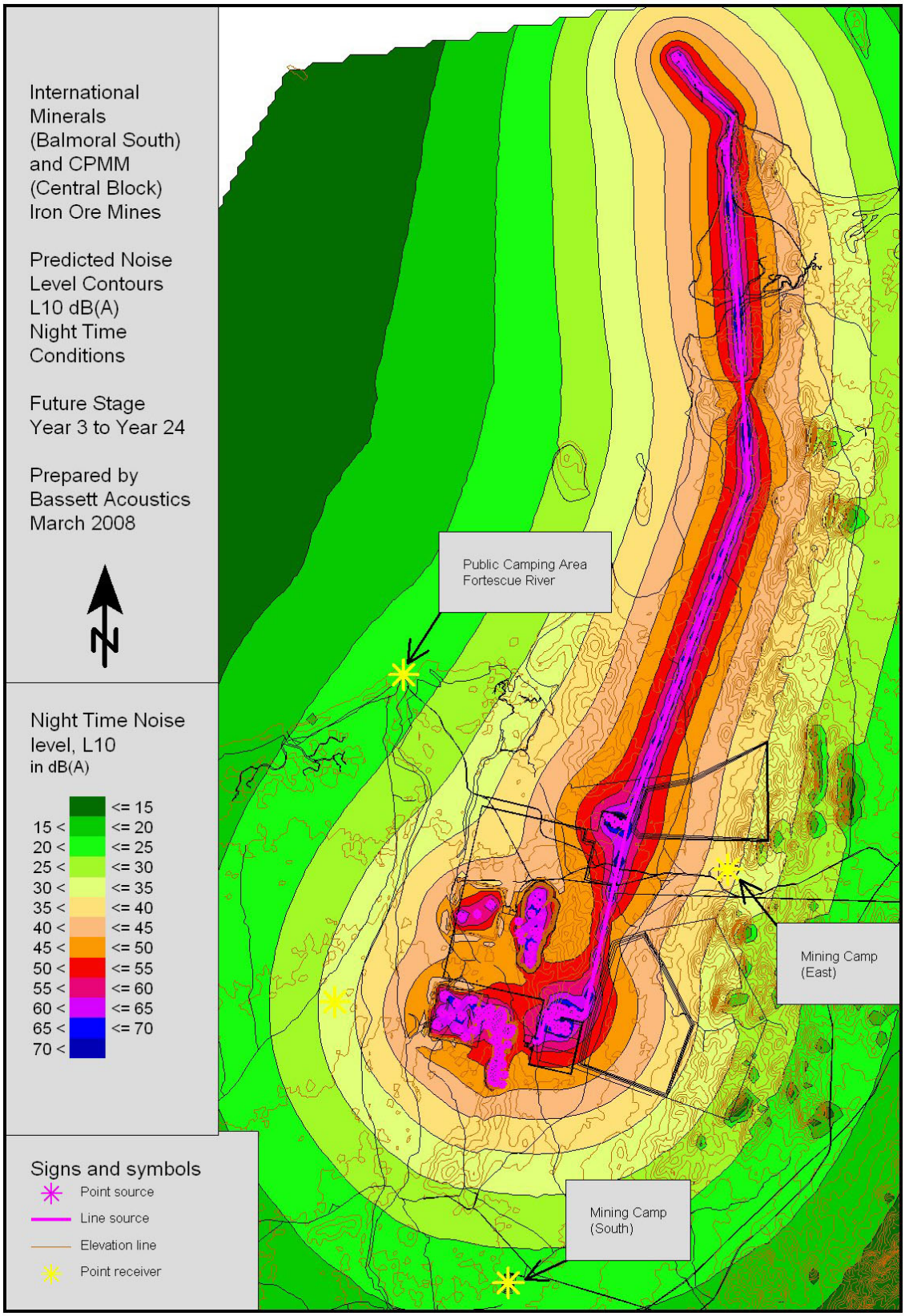
Operational Noise Sources

The sound power characteristics of individual operational noise sources that were used in the model are listed in the table below. The numbers of items of plant included in the model are listed in Section 3.0.

Source	Source Height (m)	Sound Power Level (dB re 10^{-12}W) at Octave Band Centre Frequency (Hz)								Overall Noise Level dB(A)
		31.5	63	125	250	500	1k	2k	4k	
Mine Area										
Excavator	4	121	118	117	114	112	110	106	102	115
Off Highway Truck	4	110	112	121	118	115	109	106	101	116
Production Drill	4	90	109	111	118	116	112	108	103	117
Wheeled FEL	3	107	106	112	109	110	107	106	98	112
Large FEL	4	106	111	117	110	110	107	105	98	113
Watercart	3	110	111	116	106	102	104	105	99	110
Grader	3	106	104	105	103	106	106	104	98	110
Wheeled Dozer	3	107	106	112	109	110	107	106	98	112
Tracked Dozer	3	107	111	120	122	110	110	104	102	116
Face Shovel	4	125	122	122	119	117	115	111	107	120
Crusher	5	100	120	117	113	114	113	111	107	118
Conveyors (/m)	1	-	84	89	82	86	83	79	74	88
Processing / Concentrator Plant										
Grinding Mills	5	118	122	123	119	121	113	111	103	121
Fans/Pumps	5	84	90	93	102	109	99	92	98	108
Crushers	5	100	120	117	113	114	113	111	107	118
Pellet Plant										
Fans/Pumps	5	81	87	90	99	106	96	89	95	105
Power Station										
Power Station	10	86	98	103	106	108	111	105	102	114
Port										
Shiploader	15*	114	111	108	108	109	110	104	100	113
Wheeled FEL	3	107	106	112	109	110	107	106	98	112
Conveyors (/m)	1		84	89	82	86	83	79	74	88
Desal Plant	5	81	87	90	99	106	96	89	95	105

* Height above sea level

Appendix C: Noise Contour Plot



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