LEICHHARDT
ERAMURRA SALT PROJECT

ENVIRONMENTAL NOISE ASSESSMENT

SEPTEMBER 2022

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FOR

LEICHHARDT

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EXECUTIVE SUMMARY

Leichhardt Industrials Pty Ltd (Leichhardt) commissioned Herring Storer Acoustics to carry out an acoustic study of noise emissions for the proposed Eramurra Solar Salt Project (ESSP) located 55km Southwest of Karratha in the Pilbara region of Western Australia.

The proposed operations are designed to supply 4.2 million tonnes per annum (Mtpa) of industrial grade salt and will run 24 hours a day.

The nearest noise sensitive premises are situated approximately 12 to 16km from the processing plant, and 2.5 to 3.5km from the nearest noise source (being pumps).

For the most stringent time period (night) the assigned noise level is 35 dB(A). The highest predicted noise emissions for the nearest noise sensitive premise is 22 dB(A) for the same time period. This includes all noise sources associated with the ESSP plant and mobile equipment.

The operating scenarios consider all noise sources from the proposed facilities operating at the same time. This includes both options for the power supply to the transfer pumps, being either centralised or individual generators at each pump site. The calculated noise levels have been assessed under the highest night-time propagation weather conditions. Given this, the noise modelling would be considered conservative, as it is unlikely that all noise sources are operating at the same time under the worst-case propagation conditions.

The acoustic assessment shows that in the worst case, that noise received at a premise is below the assigned noise level. Thus, noise emissions from the proposed ESSP would be deemed to comply with the requirements of the Regulations.

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1. INTRODUCTION

Leichhardt Industrials Pty Ltd (Leichhardt) commissioned Herring Storer Acoustics to carry out an acoustic study of noise emissions for the proposed Eramurra Solar Salt Project (ESSP) located 55km Southwest of Karratha in the Pilbara region of Western Australia.

Leichhardt is developing the ESSP and will export product through the proposed port of Cape Preston East (CPE) for which Leichhardt has approval and will develop the port in conjunction with the ESSP. Figure 1.1 shows the ESSP area map.

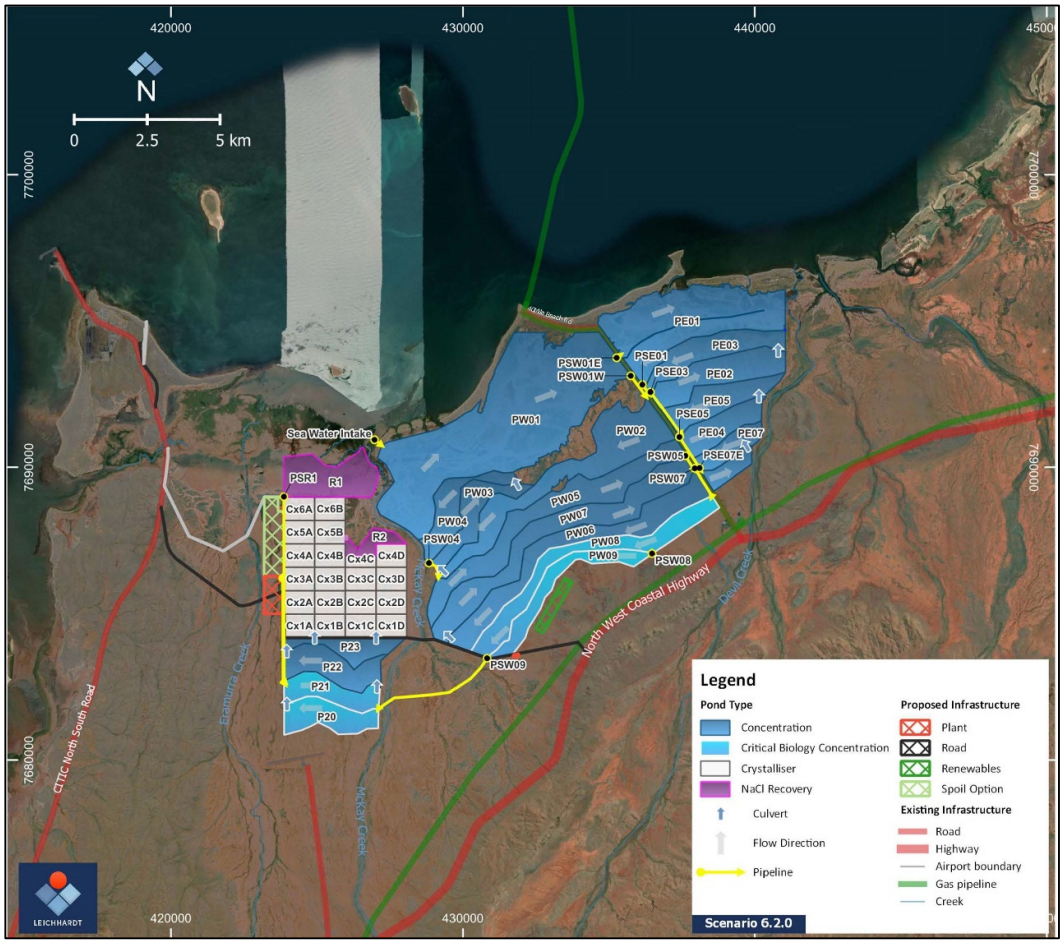


FIGURE 1.1 – AREA MAP

The proposed operations are designed to supply 4.2 million tonnes per annum (Mtpa) of industrial grade salt and will run 24 hours a day.

The nearest noise sensitive premises are situated approximately 12 to 16km from the processing plant, and 2.5 to 3.5km from the nearest noise source (being pumps).

This report assesses night-time (worst case) noise emissions under maximum propagation conditions for the entire project for compliance with the requirements of the Western *Australian Environmental Protection (Noise) Regulations 1997* (WA) *(the Noise Regulations)*.

2. ACOUSTIC CRITERIA

The nearest noise sensitive premises are as follows:

a. **40 Mile Beach Campground** – This campground is operated by the City of Karratha with camping permitted all year round. The main camping season is between 1 May and 30 September.

b. **Santos' Devil Creek Village**. This is a privately operated accommodation facility to support the operation and maintenance of the Devil Creek Gas Plant.

c. **Eramurra Village** – Citic Pacific's workforce accommodation village located approximately 5km south of the Cape Preston Airport, across North West Coastal Highway.

The proposed site boundary and receiver locations are shown in Figure 2.1, and Appendix A.

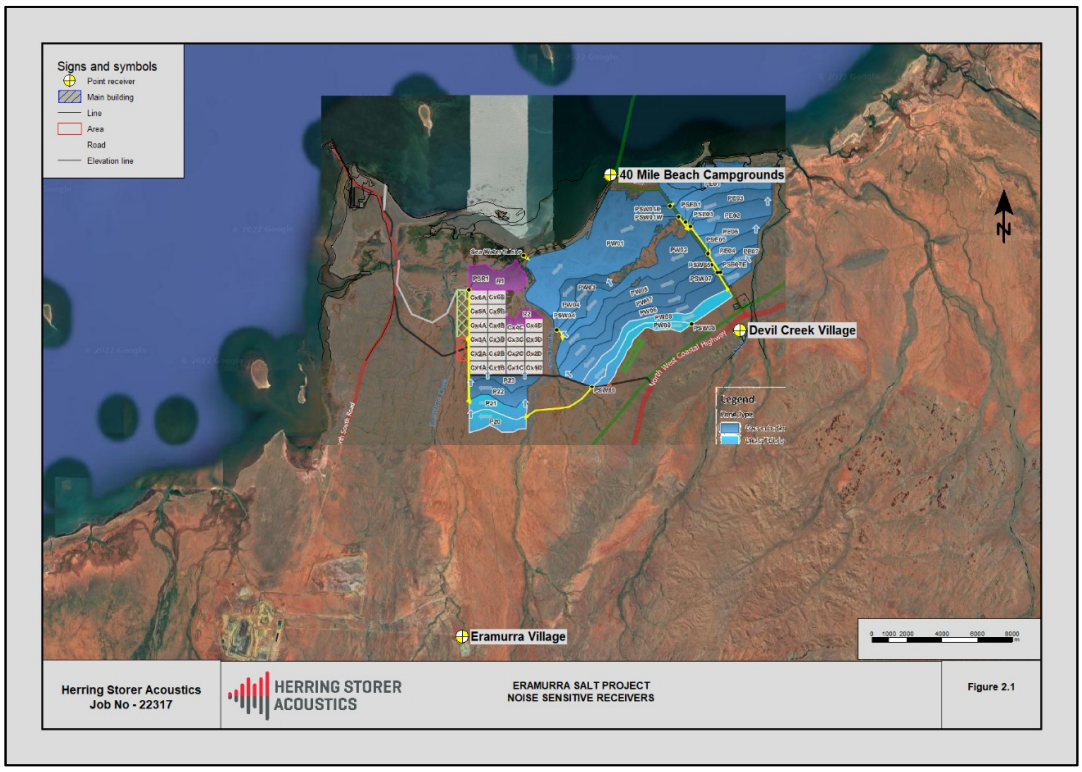


FIGURE 2.1 – NOISE SENSITIVE RECEIVER LOCATION MAP

2.1 *ENVIRONMENTAL PROTECTION (NOISE) REGULATIONS 1997* (WA)

These regulations stipulate maximum allowable external noise levels that can be received at premises. For noise sensitive premise, the assigned noise levels are determined by the calculation of an influencing factor, which is then added to base noise levels. The influencing factor is calculated for the usage of land within the two circles, having radii of 100m and 450m from the premises of concern. For commercial and industrial premises, the assigned noise levels are fixed. The base assigned noise levels for noise sensitive premises and the fixed assigned noise levels for commercial and industrial premises are listed in Table 2.1.

TABLE 2.1 –ASSIGNED OUTDOOR NOISE LEVELS

Type of premises receiving noise	Time of day	Assigned level (dB)		
		$L_{A\,10}$	$L_{A\,1}$	$L_{A\,max}$
Noise sensitive premises: highly sensitive area (i.e within 15m of a dwelling)	0700 to 1900 hours Monday to Saturday	45 + IF	55 + IF	65 + IF
	0900 to 1900 hours Sunday and public holidays	40 + IF	50 + IF	65 + IF
	1900 to 2200 hours all days	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + IF	45 + IF	55 + IF
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises	All hours	65	80	90

Note: The L_{A10} noise level is the noise that is exceeded for 10% of the time.
The L_{A1} noise level is the noise that is exceeded for 1% of the time.
The L_{Amax} noise level is the maximum noise level recorded.
IF = Influencing Factor

At the neighbouring residences, the influencing factor would be 0dB(A) as there are no significant noise sources within the area of influence i.e. 100 and 450m. Hence, the assigned noise levels are as listed in Table 2.1.

Where the above characteristics are present and cannot be practicably removed, the following adjustments are made to the measured or predicted level at other premises.

TABLE 2.2 – ADJUSTMENTS FOR ANNOYING CHARACTERISTICS WHEN MUSIC IS NOT PRESENT

Where tonality is present	Where modulation is present	Where impulsiveness is present
+ 5 dB	+ 5 dB	+ 10 dB

Note: Where annoying characteristics are present, the adjustment is +10 dB, and is +15dB if impulsiveness is present. The adjustments are cumulative to a maximum of 15 dB.

It is assumed that the operational noise will not have a 'tonal' characteristic applicable, due to the distance and the noise approaching the existing background noise level.

Where there is more than one industry that emits noise to a residence and the combined noise levels of all industries results in an exceedance to the assigned noise levels, each industry is required to be at least 5 dB less than these levels as documented below (Regulation 7(2)).

"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…"

"…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 at the point of reception."*

Under the Regulations, noise received at a residence is deemed to be NOT "significantly contributing" to the noise received at a premises if it is at least 5 dB(A) below the assigned noise level. Table 2.3 presents the required outdoor noise levels at each residence to comply with the Regulations.

TABLE 2.3 – NOT "SIGNIFICANTLY CONTRIBUTING" OUTDOOR NOISE LEVELS AT RESIDENCES

Type of premises receiving noise	Time of day	Assigned level (dB)		
		$L_{A\,10}$	$L_{A\,1}$	$L_{A\,max}$
Noise sensitive premises: highly sensitive area (i.e. within 15m of a dwelling)	0700 to 1900 hours Monday to Saturday	40	50	60
	0900 to 1900 hours Sunday and public holidays	35	45	60
	1900 to 2200 hours all days	35	45	50
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	30	40	50

3. METHODOLOGY

Noise immissions[1] at the nearest neighbouring residential premises, due to noise associated with the proposed operations, were modelled using the computer programme SoundPlan. Sound power levels used for the noise modelling were based on both manufacturer data and measured sound pressure levels of similar equipment proposed for use on site.

This acoustic assessment is required for the approval process and is being undertaken prior to the final design of the plant being known. Whilst the plant design is undergoing final consideration, for the purpose of the predictive noise modelling, the current design has been used as a basis for the assessment.

Within the current design, there are two options being explored for the power supply to the transfer pumps and the pump station at the sea water intake. Generally, the options are to either supply power to electric pumps via a centralised powerhouse, or individual diesel power units at each pump site. To allow for the "worst case" acoustic operating condition, both these options have been combined in the overall noise modelling scenario. This allows for both a centralised powerhouse, and individual diesel power units at each pump site. The final design may contain either of these options, or a part option, however, acoustically both have been allowed for.

The modelling of noise levels has been based on noise sources and sound power levels shown in Table 3.1.

1 Immissions – noise received at a source
2 Emissions – noise emanating from a source and / or location

TABLE 3.1 – SOUND POWER LEVEL - NOISE SOURCES dB(A)

Noise Sources	Quantity	Sound Power Level dB(A)	Comments
Transfer Pumps	13	94	Concentrator Ponds
Grader 16H	2	109	Crystallizer Ponds
Harvester	2	112	Crystallizer Ponds
Prime Mover and Trailer	4	98	Crystallizer Ponds
Transfer Pumps	3	94	Wash Plant
Washery: Top - 1 level, screens	1	96	Wash Plant
Washery: Top - 1 level, screens front	1	101	Wash Plant
Washery: Top - 2 level, chutes	1	102	Wash Plant
Washery: Top - 2 level	1	98	Wash Plant
Washery: Ground - pump	1	96	Wash Plant
Washery: Ground mid	1	99	Wash Plant
Washery: pump	1	95	Wash Plant
Drive Station after Washery: Top level chute	1	99	Wash Plant
2nd Transfer Station: Top chute	1	87	Wash Plant
2nd Transfer Station: Top-1 chute	1	98	Wash Plant
2nd Transfer Station: Ground chute	1	97	Wash Plant
Dozer D10	1	112	Wash Plant - Stockpile
Loader CAT992	1	105	Wash Plant - Stockpile
Powerhouse: Engines Internal	2	117	Gas-fuelled centralised power station
Powerhouse: Next to external exhaust casing	1	105	Gas-fuelled centralised power station
Powerhouse: East side exhaust fan (external)	1	87	Gas-fuelled centralised power station
Truck - Kenworth C500 Inc + 9	4	124	Transport to Cape Preson
Pump Station	8	112	Sea water Intake

Based on noise emissions from the above equipment, the following operating scenario was developed:

SCENARIO 1
Night Operations (Most critical 10pm to 7am)

It is noted, that for the scenarios considered, all equipment has been assumed to be operating at the same time with Figure 3.1 detailing the source location map.

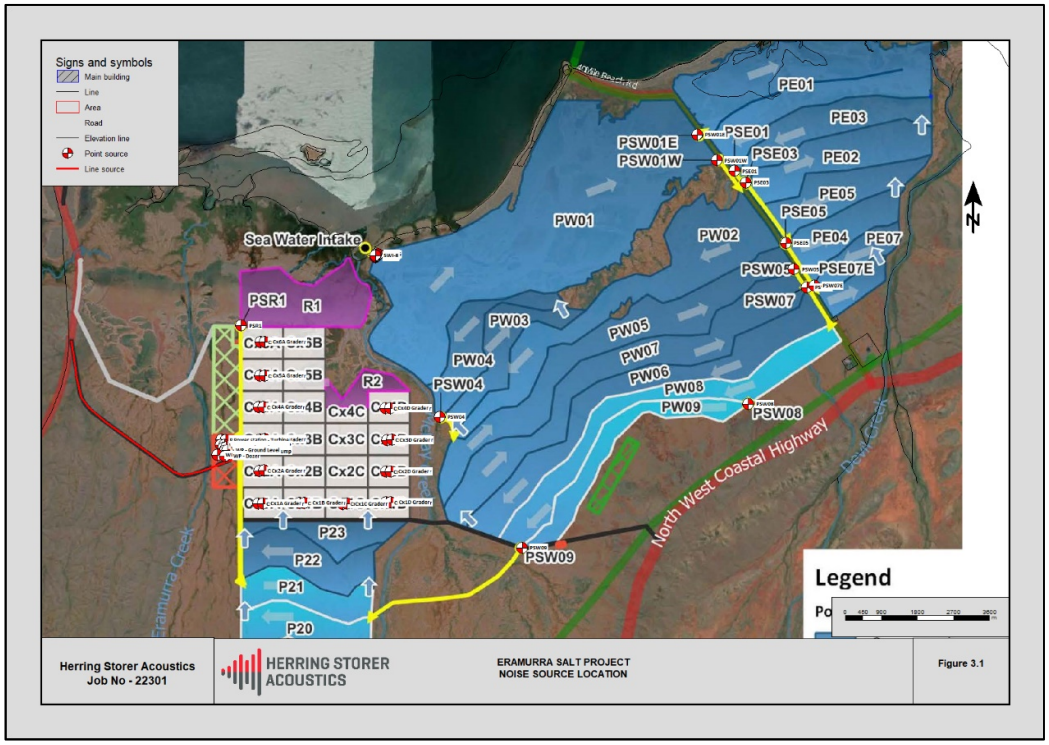


FIGURE 3.1 – NOISE SOURCE LOCATION MAP

The following input data was used in the calculations:

a) Provided site layouts.
b) Sound Power Levels as listed.
c) Ground contours and receiver points provided by client.

Weather conditions for modelling were as stipulated in the Environmental Protection Authority's "*Draft Guidance for Assessment of Environmental Factors No. 8 - Environmental Noise"* as listed in Table 3.3.

TABLE 3.3 – WEATHER CONDITIONS

Condition	Night	Day
Temperature	15°C	20°C
Relative humidity	50%	50%
Pasquill Stability Class	F	E
Wind speed	3 m/s*	4 m/s*

* From sources, towards receivers.

It is noted that 'worst case' wind conditions refer to conditions where there is a temperature inversion in conjunction with light winds in the direction from noise source to receiver, resulting in the highest sound propagation towards receiver locations.

4. RESULTS

A summary of the calculated noise levels for scenarios are shown in Table 4.1.

TABLE 4.1 – CALCULATED NOISE LEVELS, L_{A10} dB(A)

Receiver Name	Scenario 1 – Night Operations (All Operations)
R1 - 40 Mile Beach Campgrounds	22
R2 - Devil Creek Village	19
R3 - Eramurra Village	16

Noise contour plots for the above scenario is included in Appendix B.

5. ASSESSMENT

It is assumed that during the night period, the operational noise when received at the neighbouring premises will not have a 'tonality' characteristic, due to the distance, and the noise levels approaching the existing background noise level. Hence noise characteristics such as tonality, would not be applicable.

Based on this, Table 5.1 and 5.2 contain the applicable adjustments, with Table 5.3 showing the assessable noise levels.

TABLE 5.1 – SCENARIO 1 - APPLICABLE ADJUSTMENTS AND ASSESSABLE LEVEL OF NOISE EMISSIONS, L_{A10} dB(A) NIGHT OPERATIONS

Noise Measurement Location	Calculated Noise Level Scenario 1 Day Time L_{A10}	Applicable Adjustments to Measured Noise Levels, Characteristics			Assessable Noise Level
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
R1 - 40 Mile Beach Campgrounds	22	-	-	-	22
R2 - Devil Creek Village	19	-	-	-	19
R3 - Eramurra Village	16	-	-	-	16

TABLE 5.3 – ASSESSMENT OF NOISE LEVELS

Receiver	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable L_{A01} Assigned Noise Level (dB)	Exceedance to Assigned Noise Level L_{A01} (dB)
R1 - 40 Mile Beach Campgrounds	22	Night (22:00 to 07:00)	35	Complies
R2 - Devil Creek Village	19			Complies
R3 - Eramurra Village	16			Complies

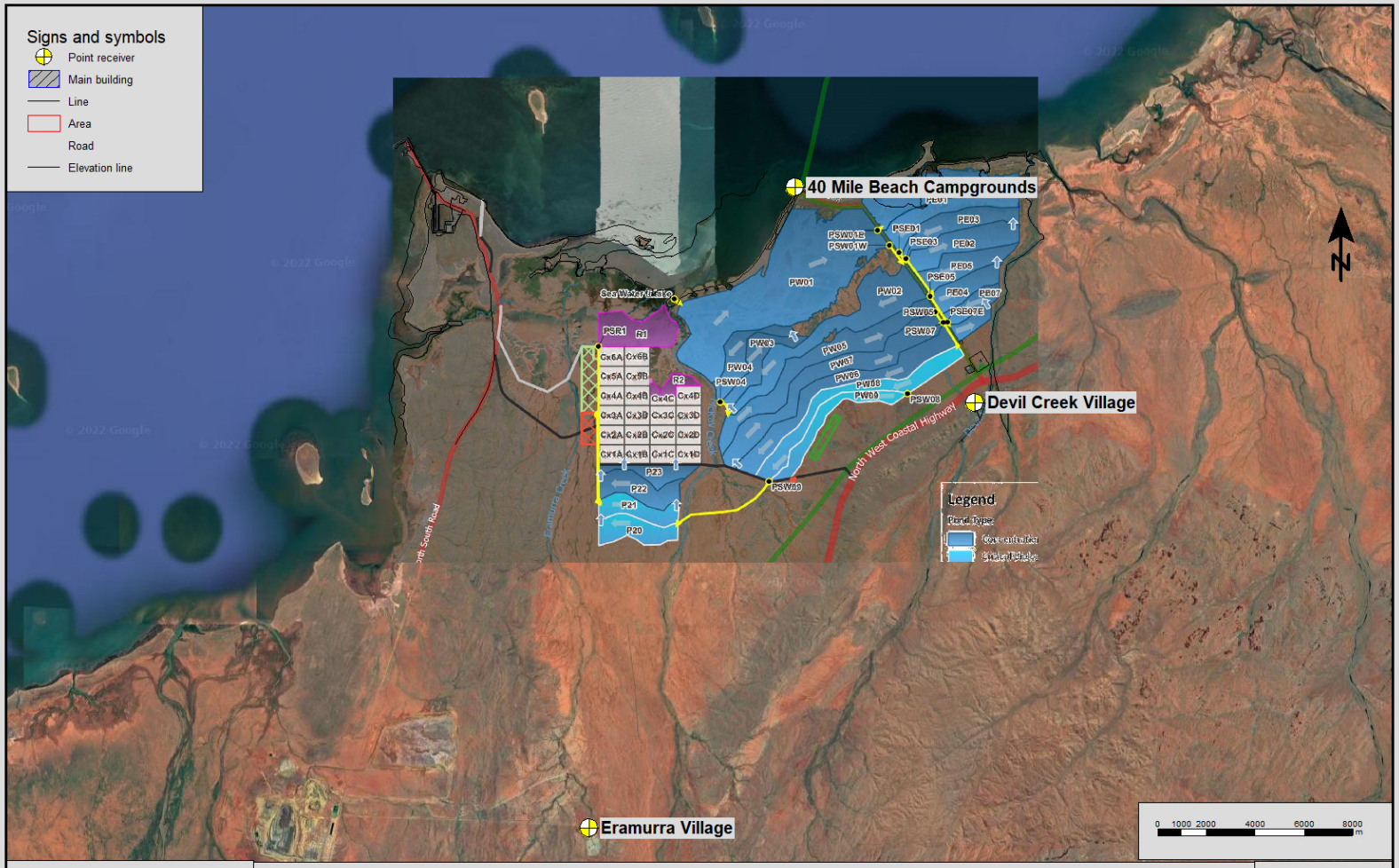
For the most stringent time period (night) the assigned noise level is 35 dB(A). The highest predicted noise emissions for the nearest noise sensitive premise is 22 dB(A) for the same time period. This includes all noise sources associated with the ESSP plant and mobile equipment.

The operating scenarios consider all noise sources from the proposed facilities operating at the same time. The calculated noise levels have been assessed under the highest night-time propagation weather conditions. Given this, the noise modelling would be considered conservative, as it is unlikely that all noise sources are operating at the same time under the worst-case propagation conditions.

The acoustic assessment shows that in the worst case, that noise received at a premise is below the assigned noise level. Thus, noise emissions from the proposed ESSP would be deemed to comply with the requirements of the Regulations.

APPENDIX A

LOCATION PLANS


Signs and symbols
Point receiver
Main building
Line
Area
Road
Elevation line
40 Mile Beach Campgrounds
Devil Creek Village
Eramurra Village
Sea Water Reticulation
North West Coastal Highway
Eramurra Creek
Legend
Pond Type
Evaporation
Crystallising
N
0 1000 2000 4000 6000 8000
m
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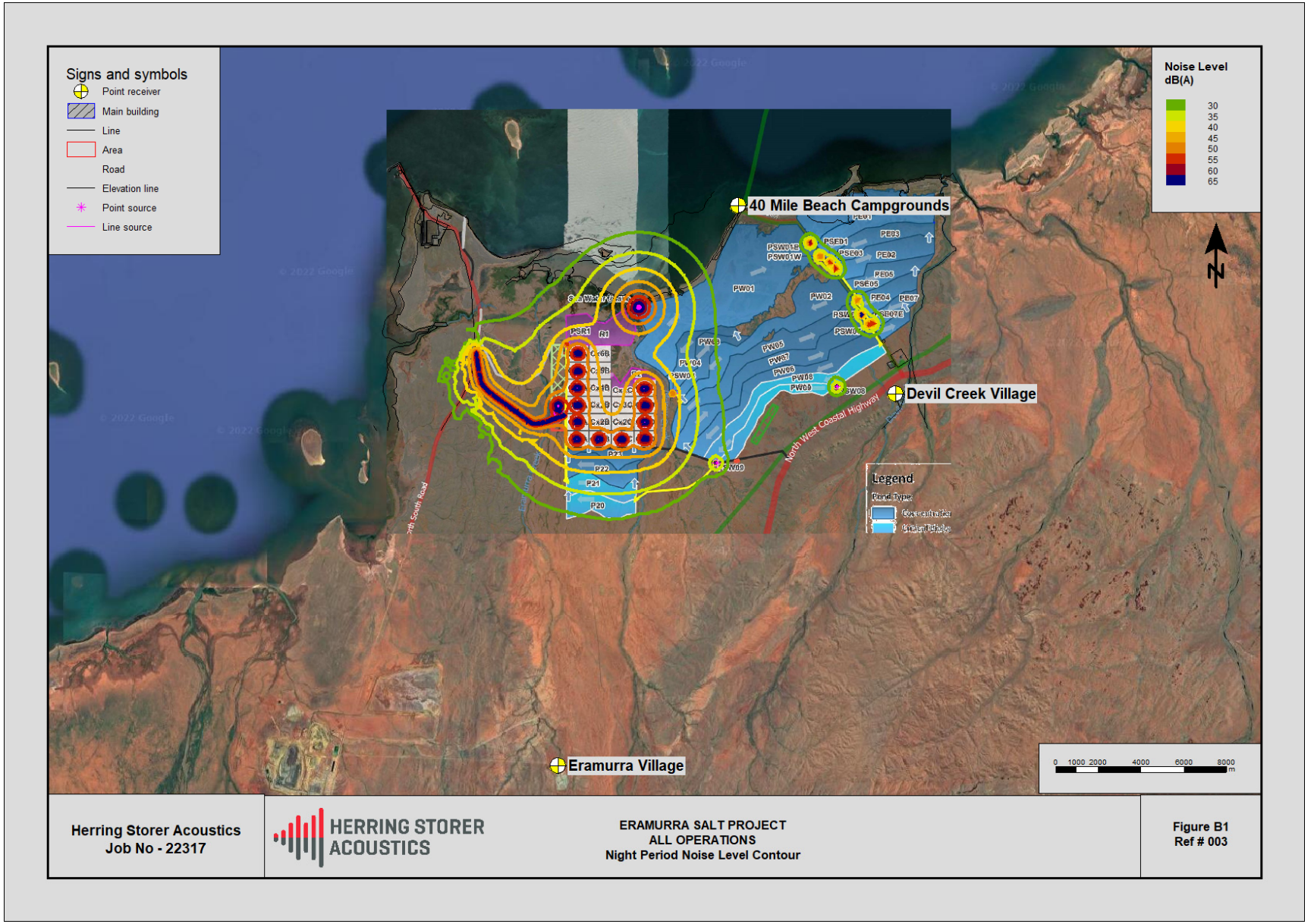
NOISE SENSITIVE RECEIVERS
Appendix A

APPENDIX B

NOISE CONTOUR PLOT


Signs and symbols
Point receiver
Main building
Line
Area
Road
Elevation line
Point source
Line source
Noise Level dB(A)
30
35
40
45
50
55
60
65
40 Mile Beach Campgrounds
Devil Creek Village
Eramurra Village
North West Coastal Highway
Legend
Pond Type
0 1000 2000 4000 6000 8000 m
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Job No - 22317
HERRING STORER ACOUSTICS
ERAMURRA SALT PROJECT
ALL OPERATIONS
Night Period Noise Level Contour
Figure B1
Ref # 003