NEWMONT

BODDINGTON GOLD MINE

RESIDUE DISPOSAL AREA 2

ENVIRONMENTAL NOISE ASSESSMENT

OCTOBER 2024

OUR REFERENCE: 32980-4-24083

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ENVIRONMENTAL NOISE ASSESSMENT

BODDINGTON GOLD MINE – RESIDUE DISPOSAL AREA 2

Job No: 24083

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FOR

NEWMONT

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3	Updated for Additional receivers (Bibbumun Track)	28/05/2025	PLD	

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EXECUTIVE SUMMARY

This executive summary provides an overview of the acoustic study conducted for the proposed Residue Disposal Area 2 (RDA 2) at the Boddington Gold Mine, commissioned by Newmont and undertaken by Herring Storer Acoustics on behalf of CDM Smith.

This environmental noise assessment has been undertaken for the Boddington Gold Life of Mine Extension Amendment Proposal. The LOM Extension Amendment Proposal includes Supporting infrastructure required for the new TSF facility (previously approved) including roads, pipelines, power lines and construction areas, Bauxite stockpiles and associated haul road access, and Waste rock dump expansion.

The acoustic study aims to assess potential noise impacts associated with the development and operation of RDA 2. It considers existing noise emissions from Boddington Gold Mine, including RDA F1/F3, to accurately predict and model cumulative noise levels.

The study adheres to the Western Australian Environmental Protection (Noise) Regulations 1997, specifying permissible noise levels and criteria for tonality, modulation, and impulsiveness in noise emissions.

Baseline ambient noise levels were monitored at strategic locations surrounding the proposed RDA 2 site, capturing day, evening, and night periods as per regulatory requirements.

Short-term noise level measurements were conducted to calibrate the predictive noise model, capturing actual noise levels during operational periods for the mine and processing operations.

Predictive noise modelling was performed using SoundPlan software, incorporating sound power levels from equipment data. The study assumes worst-case operational scenarios to ensure conservative noise assessments.

Predicted noise levels were calculated for various scenarios, demonstrating compliance with regulatory noise limits during night-time operations, the most critical period.

The acoustic assessment concludes that noise emissions from RDA 2 will comply with the Environmental Protection (Noise) Regulations 1997, ensuring that noise levels at nearby sensitive receptors remain below assigned levels.

Based on the findings of the acoustic study, it is recommended that RDA 2 can proceed without significant adverse acoustic impacts, provided mitigation measures outlined in the report are implemented as necessary.

This summary outlines the key findings and recommendations from the acoustic study, crucial for informing the Section 38 application process under the *Environmental Protection Act 1986* for the establishment of Residue Disposal Area 2 at Boddington Gold Mine.

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APPENDICES

1. INTRODUCTION

CDM Smith, on behalf of Newmont commissioned Herring Storer Acoustics to carry out an acoustic study of noise emissions for the proposed Boddington Gold Life of Mine Extension Amendment Proposal to be located at the Boddington Gold Mine, Boddington.

This acoustic report has been prepared in support of the Section 38 application for the establishment of Residue Disposal Area (RDA) 2. The proposed RDA 2 is intended to serve as a crucial facility for the disposal of residues generated from the processing at the Boddington Gold Mine. The primary objective of this report is to assess and evaluate the potential acoustic impacts associated with the development and operation of RDA 2.

Importantly, the cumulative effect of noise from the existing mining operations at the Boddington Gold Mine (including RDA F1/F3) has been measured and used to calibrate the predictive noise model for RDA 2. This ensures that the assessment accurately reflects the combined noise contributions from both current and proposed activities for the most stringent regulatory time period for night operations.

Furthermore, this report presents the results of the acoustic assessment, detailing predicted noise levels at key receptor locations and comparing them against applicable noise criteria and standards. Where necessary, mitigation measures are proposed to address any identified exceedances and ensure that noise emissions from RDA 2 are controlled within acceptable limits.

The findings contained herein are intended to inform decision-makers involved in the Section 38 application process under the *Environmental Protection Act 1986* application for RDA 2, ensuring that all relevant acoustic considerations are adequately addressed and managed in accordance with best practices and regulatory requirements.

Figure 1.1 shows the overall location plan for the Project.

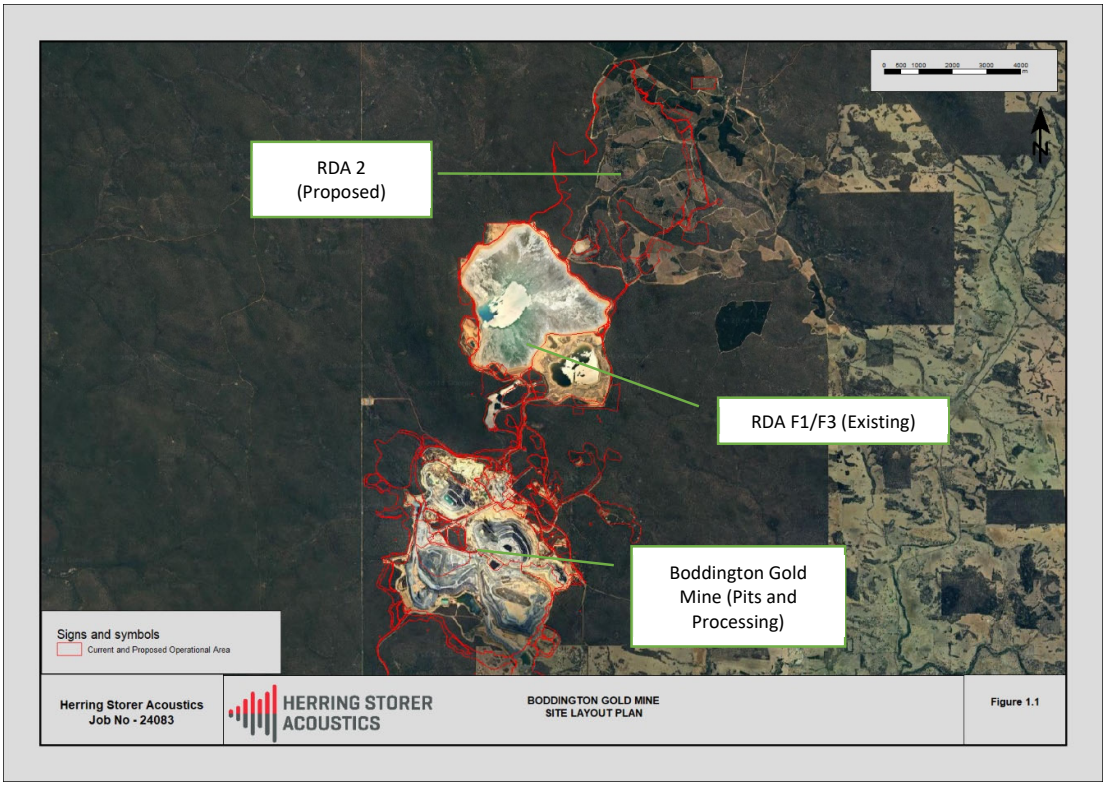


FIGURE 1.1 – LOCATION PLAN

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

2. ACOUSTIC CRITERIA

2.1 ALLOWABLE NOISE LEVEL

The allowable noise level at the surrounding locales is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 & 8 stipulate maximum allowable external noise levels determined by the calculation of an influencing factor, which is then added to the base levels shown below. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern.

TABLE 2.1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise sensitive premises within 15 metres of a dwelling	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day Period)	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	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 Premises	All Hours	65	80	90

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

2.2 ANNOYING CHARACTERISTICS

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

"impulsiveness" means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax\ Slow}$ is more than 15 dB when determined for a single representative event;

"modulation" means a variation in the emission of noise that –

(a) is more than 3dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;
(b) is present for more at least 10% of the representative assessment period; and
(c) is regular, cyclic and audible;

"tonality" means the presence in the noise emission of tonal characteristics where the difference between –

(a) the A-weighted sound pressure level in any one-third octave band; and
(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 2.2 below.

TABLE 2.2 - ADJUSTMENTS TO MEASURED LEVELS

Where **tonality** is present	Where **modulation** is present	Where **impulsiveness** is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

2.3 INFLUENCING FACTOR

The nearest potential highly noise sensitive premises to the proposed Project have been identified using the area map in Figure 2.1.

The influencing factor at the closest identified highly Noise sensitive premises (R1 to R7), has been assessed as 0 therefore the assigned noise levels would be as per those contained in Table 2.1.

Additionally, consideration has been made for the campsites associated with the Bibbulmun track. Under the Regulations, these locations would be considered as Noise Sensitive: any area other than highly noise sensitive area.

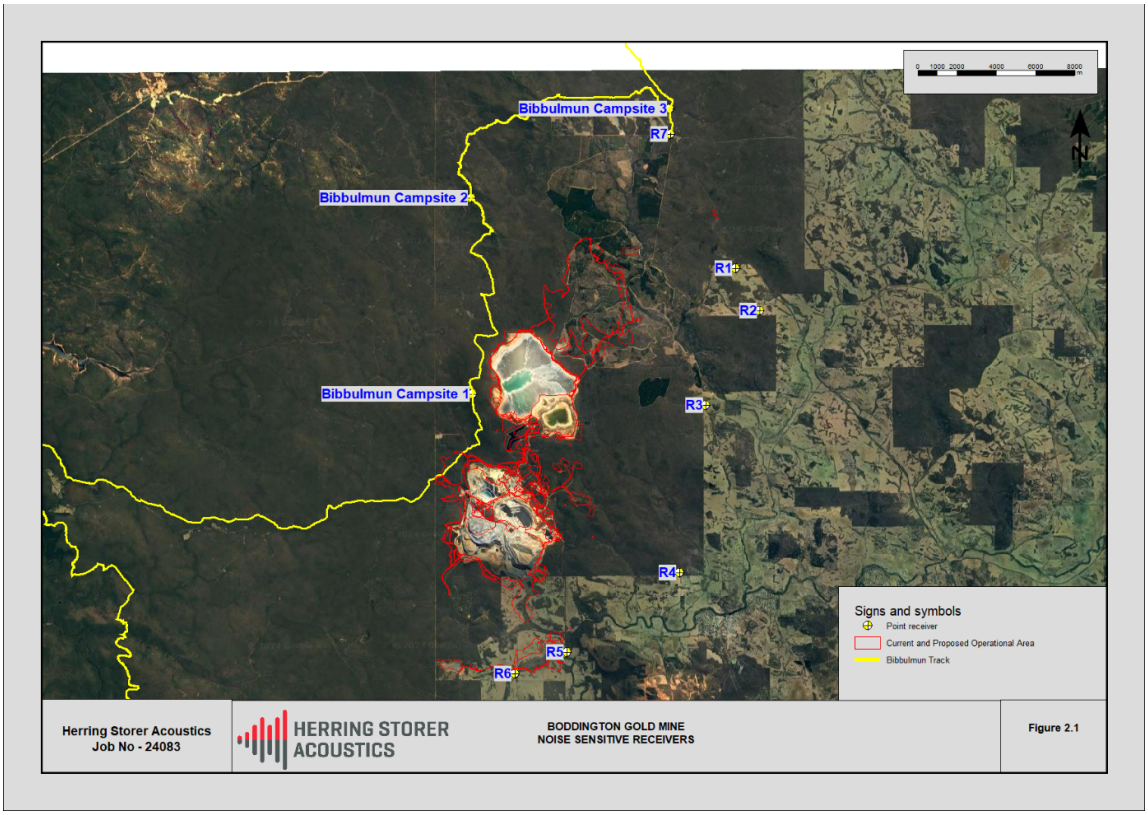


FIGURE 2.1 – SURROUNDING NOISE SENSITIVE PREMISES

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, hence noise characteristics will be increasingly weak. At noise emission levels around 35 dB(A) it will generally be the case that the noise emission level is low enough that the influence of background noise will result in the noise emission not being "technically tonal".

2.4 SIGNIFICANTLY CONTRIBUTING

"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 Noise Regulations, noise received at a premise is deemed to be NOT "significantly contributing" to the noise received at a premise 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 Noise Regulations.

Although we note that all noise sources in the area are produced by the same emitter (i.e. Newmont) we have assessed the proposed noise impact from RDA 2 on the basis that it is a separate premise, and therefore, "significantly contributing" would need to be considered in the assessment.

It is note that this ensures a conservative assessment of the noise impact of the proposed RDA 2 noise emissions.

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
Noise Sensitive Premises: any area other than highly sensitive area	All Hours	55	70	75
Commercial	All Hours	55	70	75
Industrial	All Hours	60	75	85

3. MONITORED AMBIENT NOISE

As per the "Draft Guidelines on Environmental Noise for Prescribed Premises" (released in May 2021), continuous noise monitoring has been conducted to establish the ambient noise levels.

To quantify the existing noise environment at the development site and surrounding area, two automatic noise data loggers were positioned to the east of the proposed RDA 2 site, and to the south east of the existing mining operations. The monitoring location shown in Figure 3.1, with pictures of the monitor in situ shown in Figure 3.2.

For ease of reporting the summarised noise levels for each regulatory period are shown in Table 3.1, with the graphical noise plot contained in Appendix C.

TABLE 3.1 - BASELINE MONITORED NOISE LEVEL, dB(A)

Date	Monitor 1 (East)			Monitor 2 (South East)		
	Day (07:00 to 19:00)	Evening (19:00 to 22:00)	Night (22:00 to 07:00)	Day (07:00 to 19:00)	Evening (19:00 to 22:00)	Night (22:00 to 07:00)
Tuesday, 7 May 2024	45	38	39	39	29	33
Wednesday, 8 May 2024	42	35	36	39	31	35
Thursday, 9 May 2024	44	42	40	41	30	26
Friday, 10 May 2024	47	41	39	39	45	36
Saturday, 11 May 2024	41	47	39	35	22	26
Sunday, 12 May 2024	48	37	38	34	26	29
Monday, 13 May 2024	42	38	43	36	32	31
Tuesday, 14 May 2024	41	41	42	34	27	27
Wednesday, 15 May 2024	41	38	41	34	25	30
Thursday, 16 May 2024	41	47	37	37	27	33
Friday, 17 May 2024	40	38	37	36	31	33
Saturday, 18 May 2024	46	43	39	36	26	27
Sunday, 19 May 2024	42	41	39	37	28	30
Monday, 20 May 2024	43	43	43	35	22	26
Tuesday, 21 May 2024	49	-	-	56	-	-
Average	**44**	**41**	**39**	**39**	**29**	**33**

(-) completion of noise monitoring

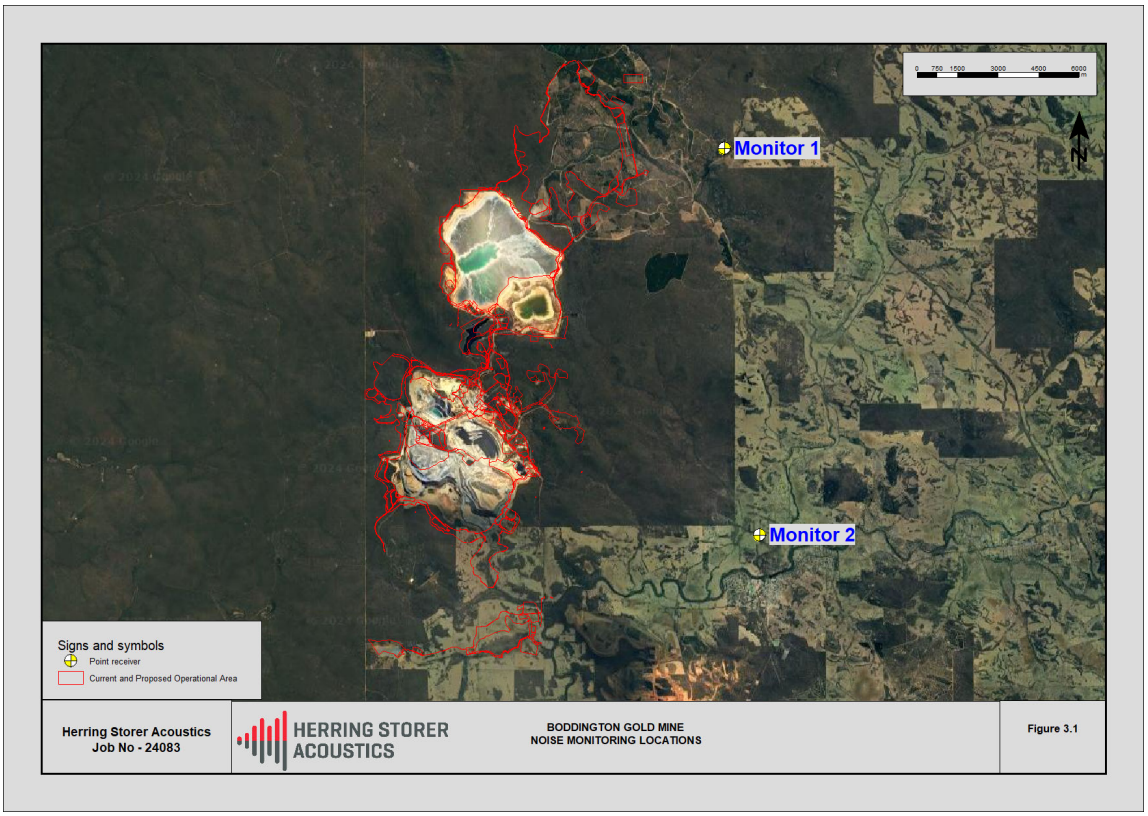


FIGURE 3.1 – MONITORING LOCATION

FIGURE 3.2 – MONITORING IN SITU

Based on the measured noise levels, the daytime noise levels were around 39 to 44 dB(A), with the night periods being an average of 33 to 39 dB(A).

4. OBSERVED NOISE LEVEL MEASUREMENTS

During the site visit on the 7th May 2024, short term, observed noise level measurements were conducted.

Measurements were conducted from 10pm onwards. The locations were chosen to represent the near field noise levels and were used to calibrate the predictive noise model. Information as to the equipment operating at the time of the measurements, and its location was sourced from Newmont mine control.

Measurement locations are shown in Figure 4.1, with the equipment location plan shown in Figures 4.2 and 4.3 with the resultant noise levels summarised in Table 4.1 and shown graphically in Figure 4.4.

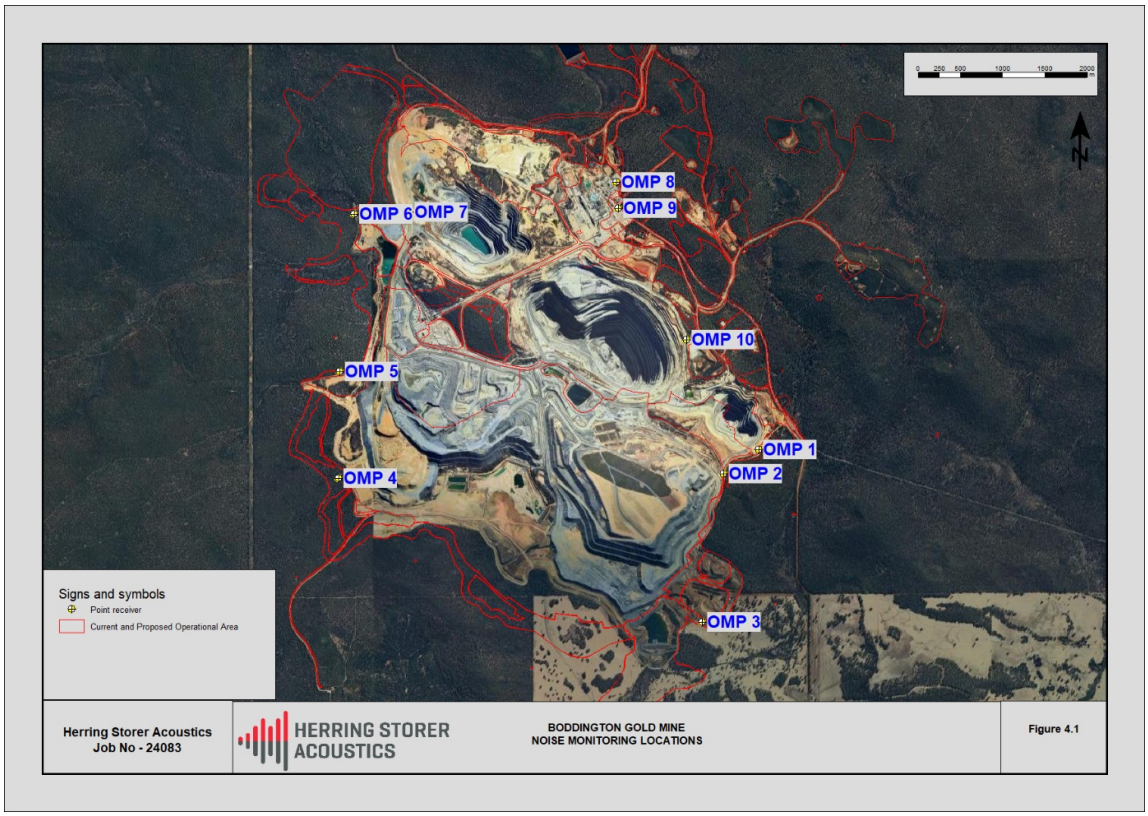


FIGURE 4.1 – MINESITE – NOISE MEASUREMENT LOCATIONS

FIGURE 4.2 – HAUL TRUCK MOVEMENTS 7TH MAY 2024

FIGURE 4.3 – DIG UNITS AND SUPPORTING EQUIPMENT MOVEMENTS 7TH MAY 2024

TABLE 4.1 – OBSERVED MEASURED NOISE LEVELS 7TH MAY 2024

Location	Noise Level dB(A)
OMP 1	49
OMP 2	63
OMP 3	50
OMP 4	48
OMP 5	49
OMP 6	54
OMP 7	74
OMP 8	53
OMP 9	58
OMP 10	74

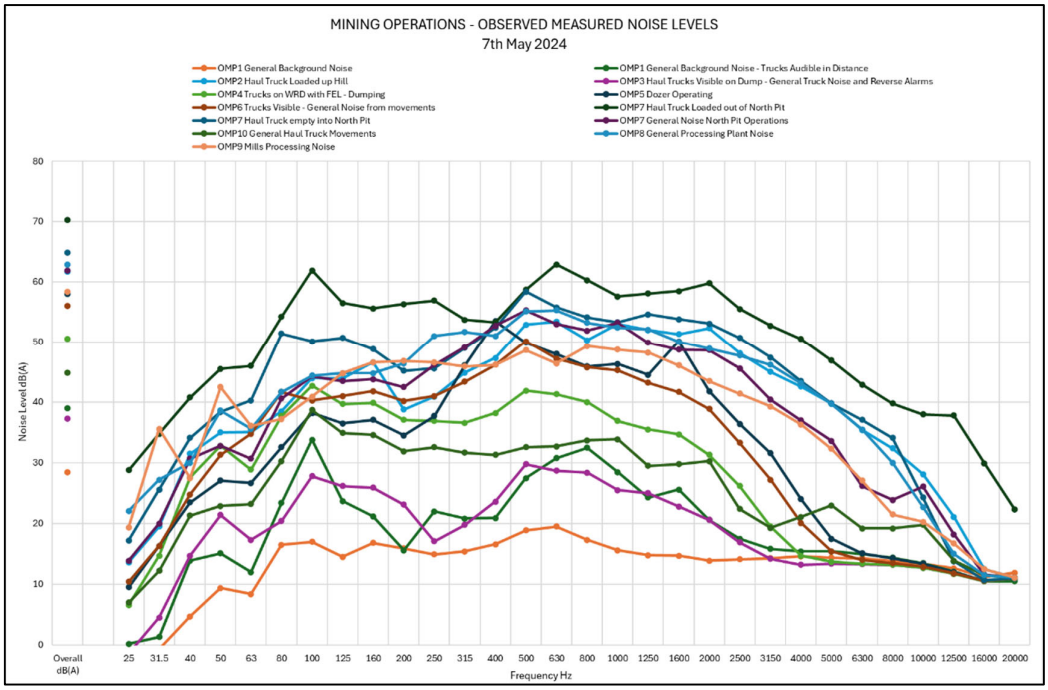


FIGURE 4.4– THIRD OCTAVE BAND NOISE LEVELS 7TH MAY 2024

5. METHODOLOGY

5.1 NOISE MODELLING OVERVIEW

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 manufacturer data levels of 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 RD2 area being known. Whilst the 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.

The modelling of noise levels has been based on noise sources and sound power levels shown in Figure 5.1 and Table 5.1. It is noted that the equipment includes the current Boddington Gold operations as well as the proposed RDA 2 noise emissions.

1 Immissions – noise received at a source

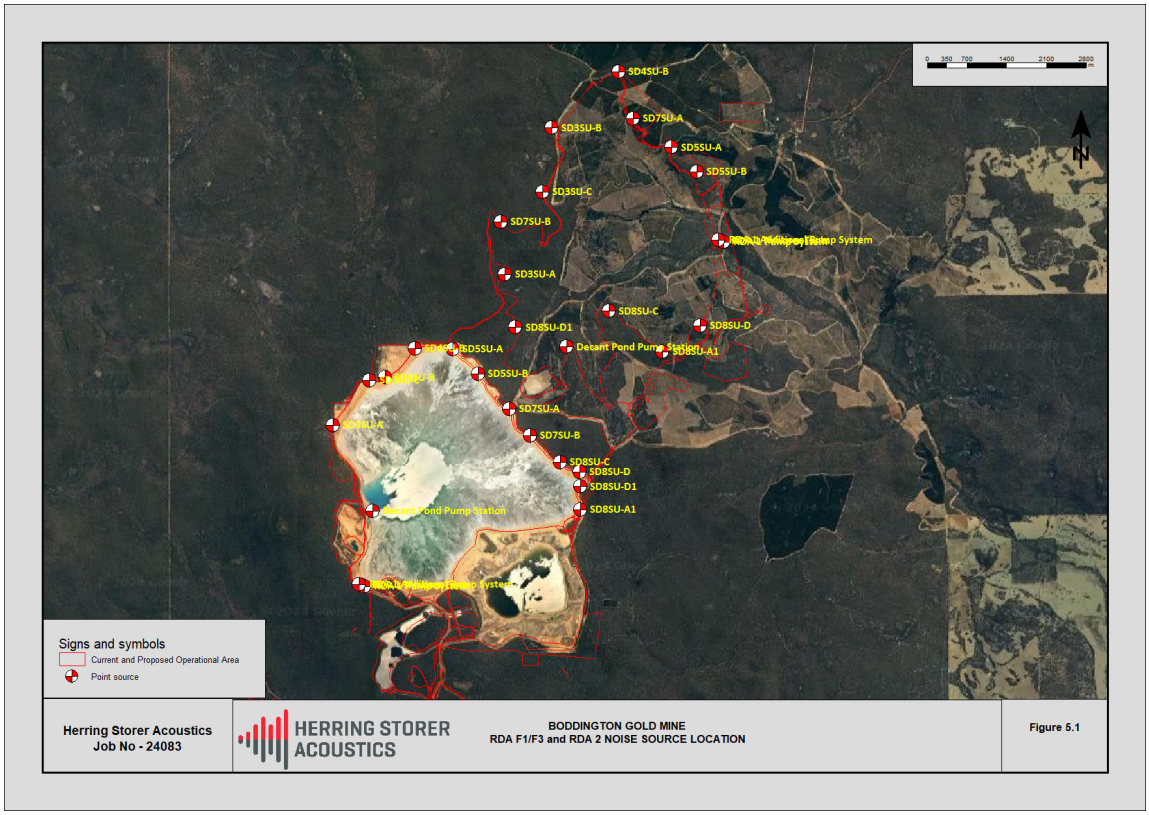


FIGURE 5.1 – RDA 2 LAYOUT

5.2 MODELLING INPUTS

TABLE 5.1 – SOUND POWER LEVEL - NOISE SOURCES dB(A)

Area	Noise Sources	Sound Power Level dB(A)
Mining and Processing	2 x CAT 495 Electric Rope Shovel	126
	1 x Terex RH340 Electric Hydraulic Shove;	126
	1 x CAT6090 Electric Hydraulic Shovel	126
	41 x CAT 793F Autonomous Haulage Systems Trucks	124
	1 x EX3600 Excavator	116
	1 x EX2600 Excavator	110
	1 x CAT6040 Excavator	116
	2 x CAT 6060 Excavator	110
	2 x CAT994 Loader	117
	4 x CAT D11 Track Dozer	118
	4 x CAT854G/K Wheel Dozer	117
	2 x CAT 24H Grader	105
	2 x CAT 24M Grader	105
	1 x CAT 16H Grader	103
	Processing Plant	125
	Conveyors	85/m,m^2
RDA F1/F3	14 x Pumps	95
	1 x Decant Pond Pump Station	105
	1 x Thickener System	109
RDA 2	14 x Pumps	95
	1 x Decant Pond Pump Station	105
	1 x Thickener System	109

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

SCENARIO 1
Night Operations (Most critical 10pm to 7am)
Mining and Processing
RDA F1/F3
RDA 2

It is noted, that for the scenario considered, all equipment has been assumed to be operating at the same time under normal state operations.

Based on noise emissions from the above equipment, a night time operating scenario has been developed. This scenario represents periods of worst case noise emissions for the operations.

It is noted that the plant would have some diversity in operations, therefore it is unlikely that all the equipment considered in the predictive noise model would be operating at the same time. However, to provide a conservative assessment, the calculated operating scenario includes all items operating at the same time.

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.
d) Concawe Algorithms
e) Ground absorption coefficient 0.6

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 5.2.

TABLE 5.2 – 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*
Temperature Inversion Lapse Rate	2°C/100m	0°C/100m

* 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.

6. RESULTS

A summary of the calculated noise levels for scenarios are shown in Table 6.1.

TABLE 6.1 – CALCULATED NOISE LEVELS, L_{A10} dB(A)

Receiver Name	All operations Including RDA2
R1	14
R2	7
R3	18
R4	22
R5	27
R6	25
R7	11
Bibbulmun Campsite 1	34
Bibbulmun Campsite 2	16
Bibbulmun Campsite 3	11

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

7. ASSESSMENT

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, hence noise characteristics will be increasingly weak. At noise emission levels around 35 dB(A) it will generally be the case that the noise emission level is low enough that the influence of background noise will result in the noise emission not being 'technically tonal', although that does not mean that some characteristics would not be audible.

Based on this, Table 7.1 shows the assessable noise levels.

TABLE 7.1 – ASSESSMENT OF NOISE LEVELS

Scenario	Receiver	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable L_{A10} Assigned Noise Level (dB)	Exceedance to Assigned Noise Level L_{A01} (dB)
Night Time Full Plant Operations	R1	14	Night (22:00 to 07:00)	35	Complies
	R2	7			Complies
	R3	18			Complies
	R4	22			Complies
	R5	27			Complies
	R6	25			Complies
	R7	11			Complies
	Bibbulmun Campsite 1	34	All Hours	60	Complies
	Bibbulmun Campsite 2	16			Complies
	Bibbulmun Campsite 2	11			Complies

For the most stringent time period (night) the assigned noise level is 35 dB(A) at the nearest highly noise sensitive receiver. The highest predicted noise emissions for the nearest noise sensitive premise is 27 dB(A) for the same time period. This includes all noise sources associated with the Boddington Gold Mine.

It is also noted that the calculated noise impacts are below the allowable noise levels if "significantly contributing" was needed to be considered, which would entail utilising an Assigned Noise Level 5 dB(A) lower than the applicable level.

The operating scenarios consider all noise sources from the existing and proposed operations 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 RDA 2 Project would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997*.

8. CONSTRUCTION ACTIVITIES

Noise and impact assessment in Western Australia is governed by the Environmental Protection (Noise) Regulations 1997. Within these, Regulation 13 addresses noise from construction sites. This Regulation does not provide specific noise levels which must be met but rather, provides management procedures to be followed

Construction works for the project will be conducted between 06:00 – 18:00 Monday to Sunday. The duration of the works is yet unknown. There is a possibility of a night shift, however this is dependent on environmental influences which may affect to progress of the construction.

Under the Construction Management Plan for the site, a specific Noise Management Plan is required for any activity to be performed outside the “normal” construction hours which are 07:00 to 19:00 Monday to Saturday.

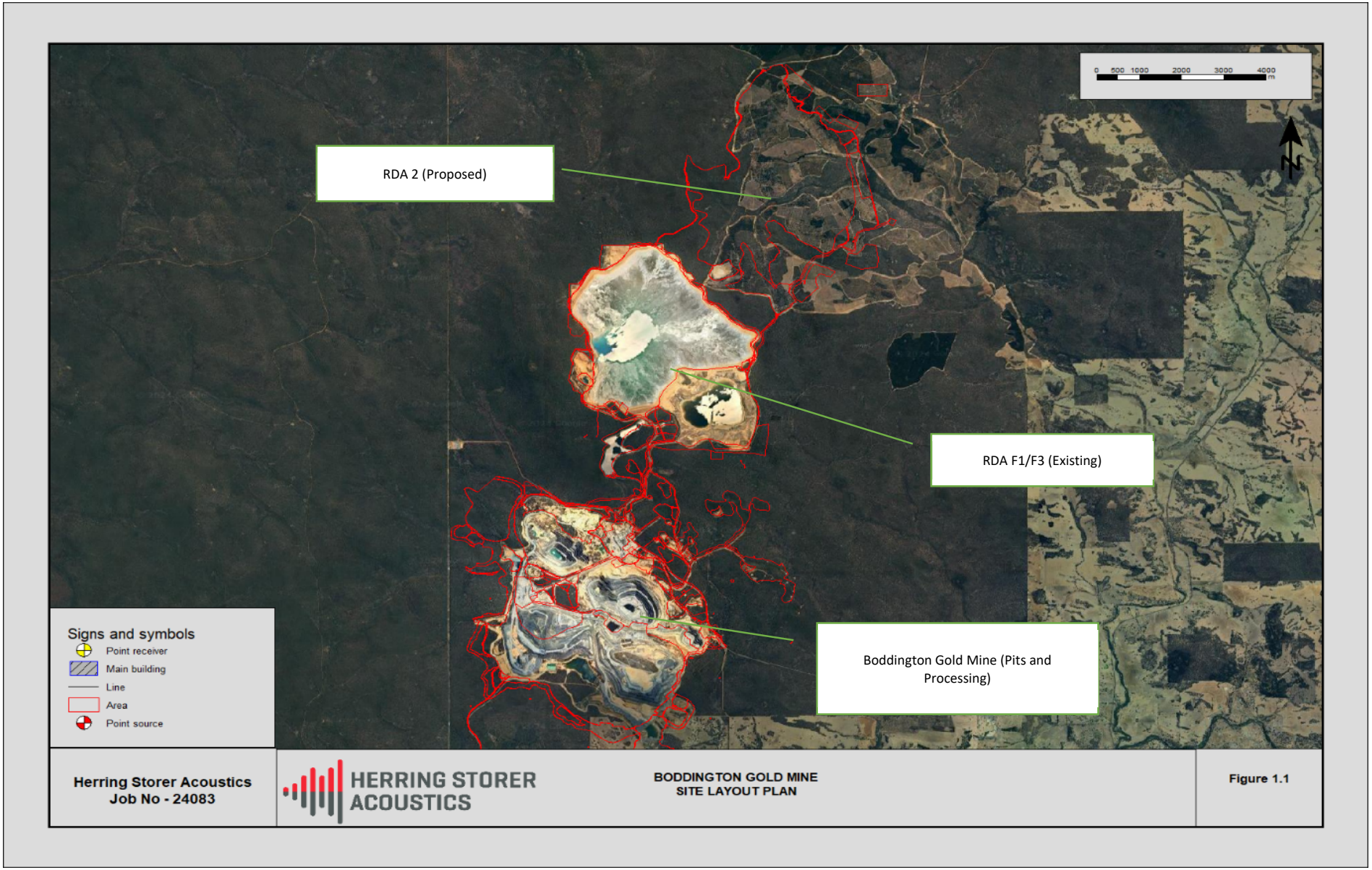
Under Regulation 13 of the Environmental Protection (Noise) Regulations 1997, construction work carried out between 07:00 to 19:00 Monday to Saturday does not need to comply with the assigned noise levels as determined under Regulation 7.

Additionally, noise emissions from construction work outside the above times can also be exempt for Regulation 7 if the occupier of the construction site complies with the requirements of Regulation 13(3).

The development of the construction noise management plan will be carried out once details are available for the construction schedule, with the CNMP forming a separate assessment to this Development Application assessment.

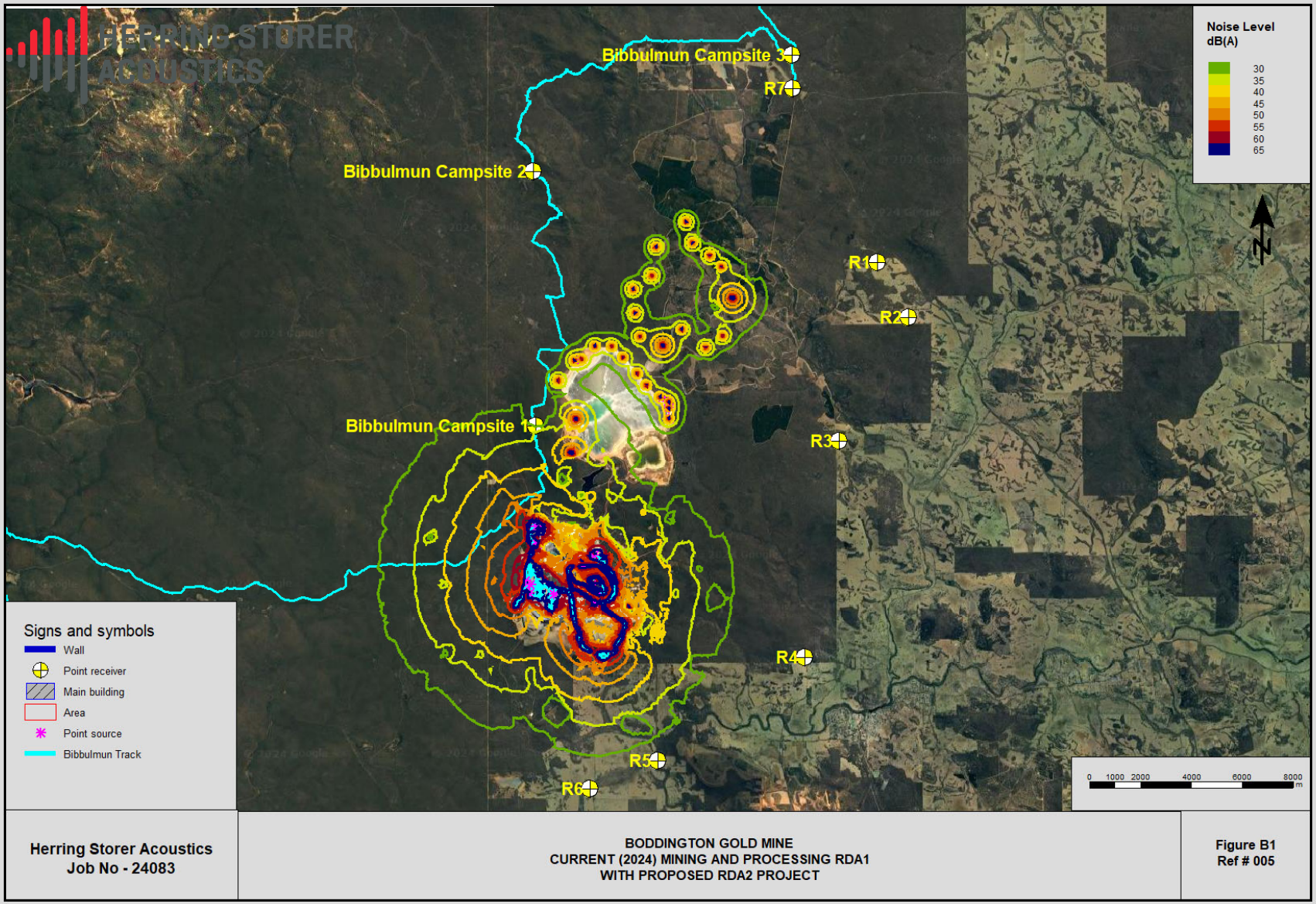
APPENDIX A

LOCATION PLANS


RDA 2 (Proposed)
RDA F1/F3 (Existing)
Boddington Gold Mine (Pits and Processing)
0 500 1000 2000 3000 4000 m
N
Signs and symbols
Point receiver
Main building
Line
Area
Point source
Herring Storer Acoustics
Job No - 24083
HERRING STORER ACOUSTICS
BODDINGTON GOLD MINE
SITE LAYOUT PLAN
Figure 1.1

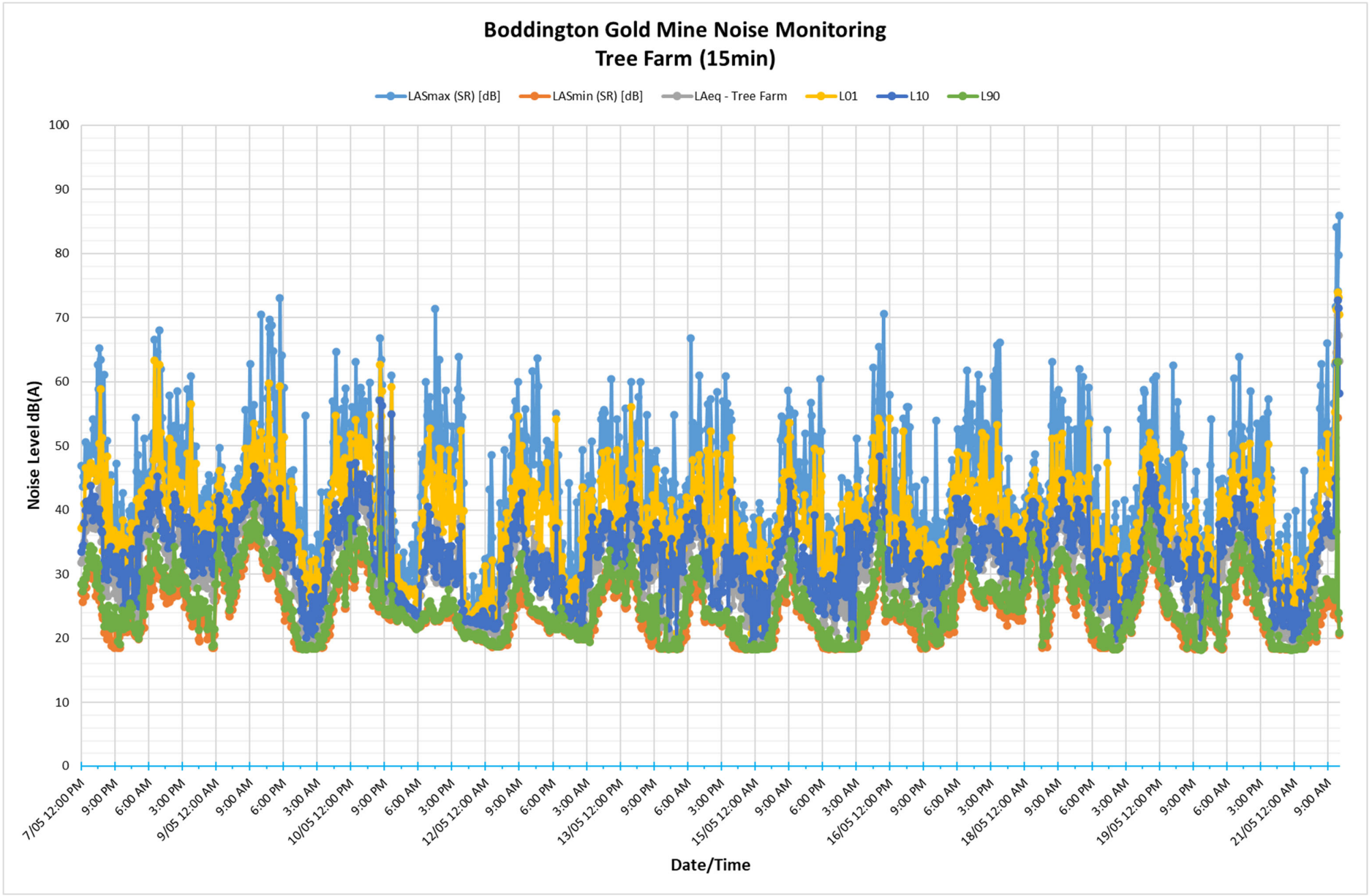
APPENDIX B

NOISE CONTOUR PLOTS


HERRING STORER ACOUSTICS
Noise Level dB(A)
30
35
40
45
50
55
60
65
Bibbulmun Campsite 3
R7
Bibbulmun Campsite 2
R1
R2
Bibbulmun Campsite 1
R3
R4
R5
R6
N
Signs and symbols
Wall
Point receiver
Main building
Area
Point source
Bibbulmun Track
0 1000 2000 4000 6000 8000 m
Herring Storer Acoustics
Job No - 24083
BODDINGTON GOLD MINE
CURRENT (2024) MINING AND PROCESSING RDA1
WITH PROPOSED RDA2 PROJECT
Figure B1
Ref # 005

APPENDIX C

MONITORED DATA


Boddington Gold Mine Noise Monitoring
Tree Farm (15min)
LASmax (SR) [dB]
LASmin (SR) [dB]
LAeq - Tree Farm
L01
L10
L90
Noise Level dB(A)
100
90
80
70
60
50
40
30
20
10
0
7/05 12:00 PM
9:00 PM
6:00 AM
3:00 PM
9/05 12:00 AM
9:00 AM
6:00 PM
3:00 AM
10/05 12:00 PM
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6:00 AM
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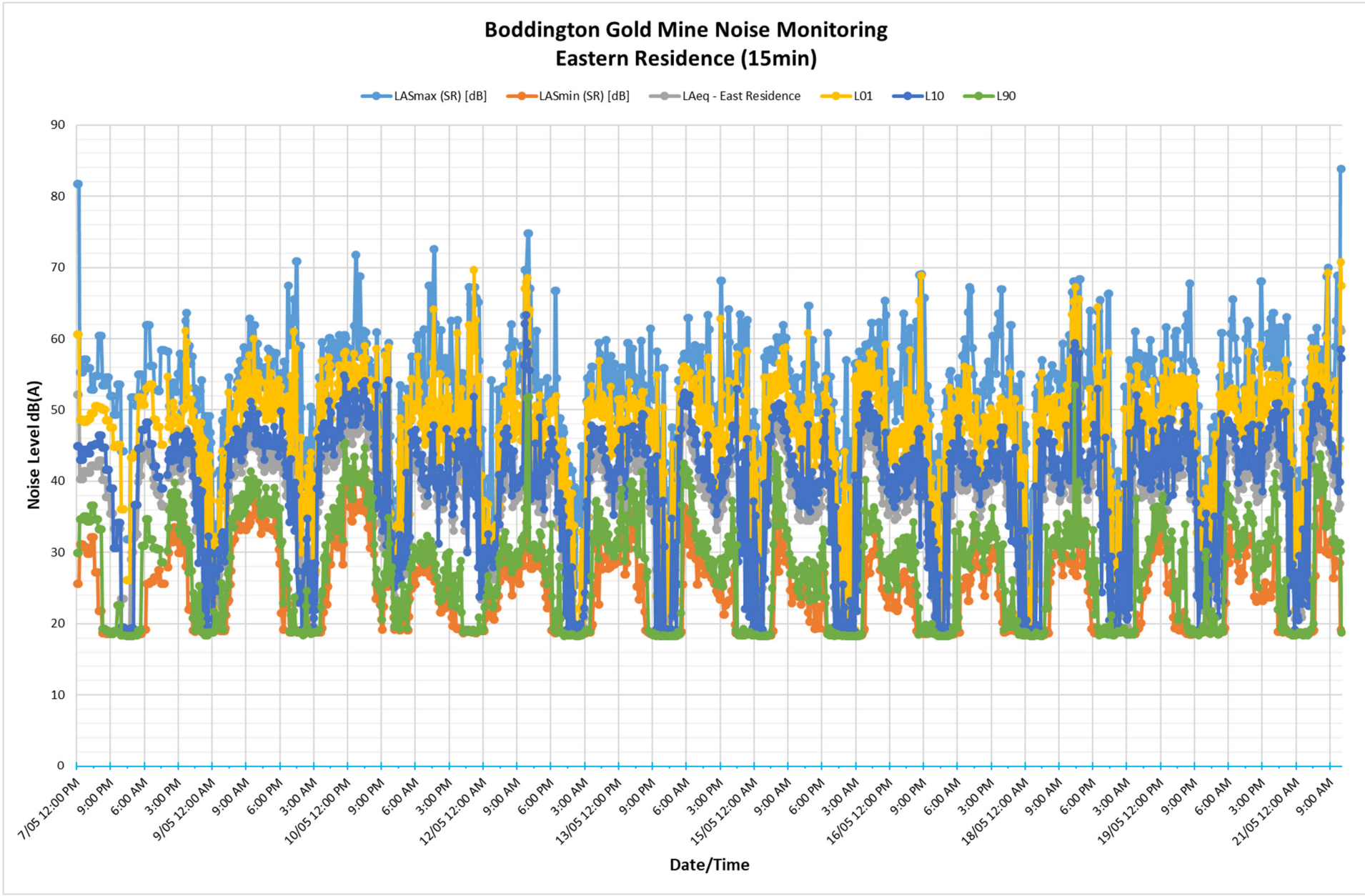
Date/Time


Boddington Gold Mine Noise Monitoring
Eastern Residence (15min)
LASmax (SR) [dB]
LASmin (SR) [dB]
LAeq - East Residence
L01
L10
L90
Noise Level dB(A)
90
80
70
60
50
40
30
20
10
0
7/05 12:00 PM
9:00 PM
6:00 AM
3:00 PM
9/05 12:00 AM
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