HERRING STORER ACOUSTICS

URBAN RESOURCES

EXTRACTIVE INDUSTRY
59 GODEL ROAD, NOWERGUP

ACOUSTIC ASSESSMENT

AUGUST 2024

OUR REFERENCE: 33139-2-24196

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ACOUSTIC ASSESSMENT

GODEL ROAD, NOWERGUP

Job No: 24196

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FOR

UBAN RESOURCES

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CONTENTS

APPENDICIES

1. INTRODUCTION

Herring Storer Acoustics have been commissioned by Element on behalf of Urban Resources Pty Ltd to undertake an acoustic assessment of noise emissions from the proposed sand extraction operations located at 59 Godel Road, Nowergup.

The proposed extraction operations will operate from 07:00 – 19:00 Monday to Friday and 07:00 – 16:00 on Saturdays. No operations would occur on Sundays or Public Holidays.

The nearest residential premises are located to the south of the proposed operations. The most critical in terms of distance from the proposed operations, are approximately 245m from the boundary of the nearest operations.

The main access road is via the south as shown in Figure 1.1, along with the proposed operations.

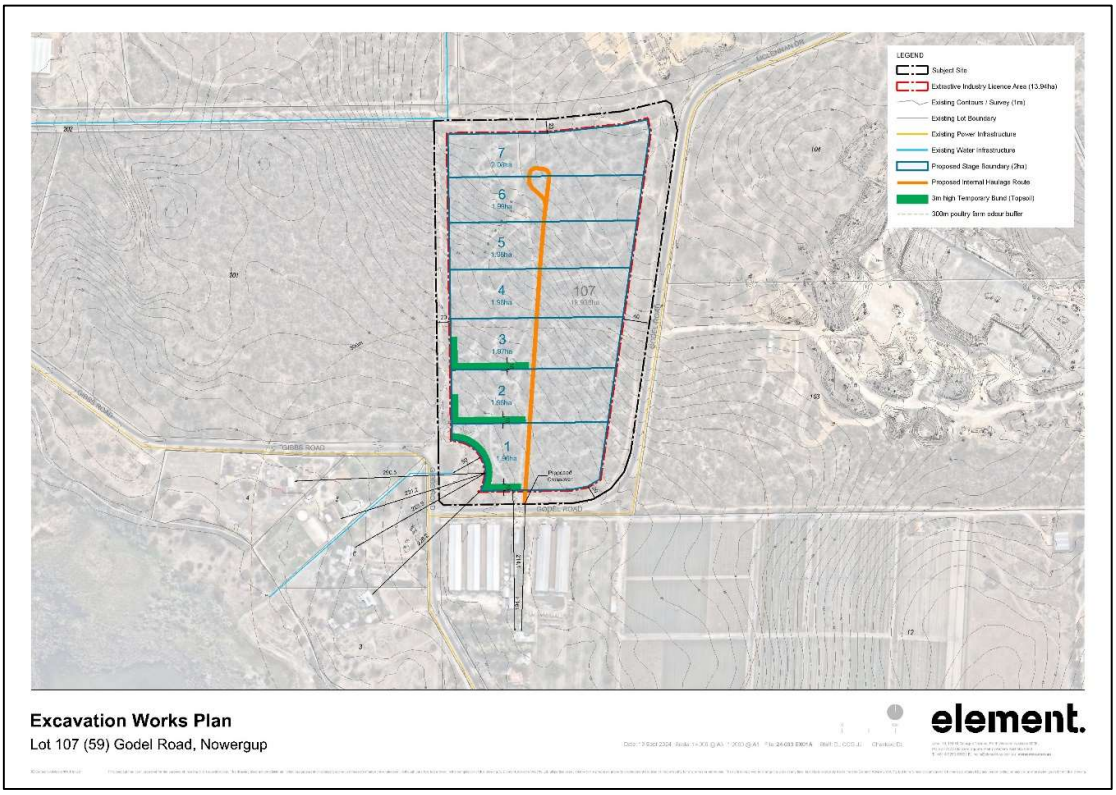


FIGURE 1.1 – EXTRACTION OPERATIONS

This assessment is provided to support the regulatory approvals processes and show that compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997* can be achieved.

As part of the study, the following was carried out:

- Identification of individual operations and the associated noise levels.
- Measurement of the existing background noise levels.
- Assess the predicted noise levels at the nearest surrounding highly noise sensitive premises for compliance with the appropriate criteria.
- If exceedances are predicted, comment on possible noise amelioration options for compliance with the appropriate criteria.

For information, a locality plan is shown in Appendix A.

2. SUMMARY

Assessment has been conducted on the proposed limestone and sand extraction operations for 59 Godel Road, Nowergup.

The facility would only operate during the day period (being Monday to Friday 07:00 to 19:00 hours and 07:00 to 16:00 on Saturdays). Therefore, at the neighbouring residences, the applicable acoustic criteria for this assessment is the assigned L_{A10} day period noise level of 45 dB(A).

Noise received at the nearest residential premises has been determined, to be 45 dB(A) for the sand extraction operations for the highest noise level at any stage of the operations. This can be compared to the applicable assigned noise level criteria of 45 dB(A).

Noise monitoring conducted shows that the ambient noise (background) is generally around 44 dB(A) during the day. Given this, annoying characteristics such as tonality may be present, hence a +5 dB(A) penalty has been included in the assessable noise level stated above.

To ensure the above noise levels are maintained, bund for stages 1 to 3 is required for the screen and loader operations. Details are contained further in this report.

Given these operating parameters, noise levels received at the nearest premises has been calculated to comply with the *Environmental Protection (Noise) Regulations 1997* for the operating times as outlined in this assessment.

3. CRITERIA

The allowable noise level for noise sensitive premises in the vicinity of the proposed site is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 and 8 stipulate maximum allowable external noise levels or assigned noise levels that can be received at a premise from another premises. For residential premises, this noise level is 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. The base noise levels for residential premises are listed in Table 3.1.

TABLE 3.1 - 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	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

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.

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 3 dB 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.

The nearest potential noise sensitive premises to the proposed development have been identified using the area map in Figure 3.1.

The usage of the surrounding land use varies from intensive horticulture (with residential premises) and other extractive industries. Therefore, the assigned noise levels for operational times are as noted in Table 3.2.

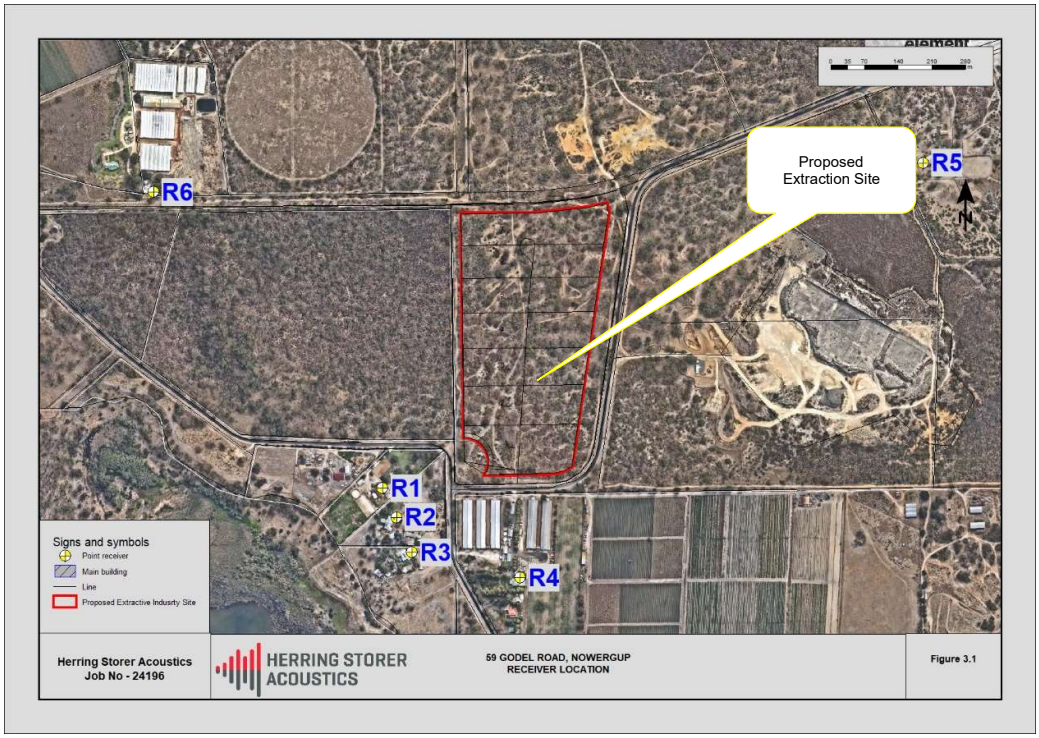


FIGURE 3.1 – RECEIVER LOCATION MAP

TABLE 3.2 – ASSIGNED NOISE LEVELS

Premises Receiving Noise	IF dB	Time of Day	Assigned Level (dB)		
			$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Receivers R1 to R6	0	0700 - 1900 hours Monday to Saturday (Day)	45	55	65

4. CALCULATED NOISE LEVELS

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

The modelling of noise levels has been based on noise sources and sound power levels shown in Table 4.1.

TABLE 4.1 – SOUND POWER LEVEL - NOISE SOURCES dB(A)

Source Name	Quantity	SWL dB(A)
Loaders (Cat 966 or similar)	1	105
Screening Plant (McCloskey S190 Screener or Similar)	1	101
Semi- Tipper Truck	1	98

Note: The above equipment models have been used to provide an indication of the size. Other models may be used although these have been assumed to have a similar sound power level.

Based on noise emissions from the above equipment, an overall operating scenario has been developed. Figure 4.1 details the source locations assumed in the predictive modelling along with the proposed development of the pit.

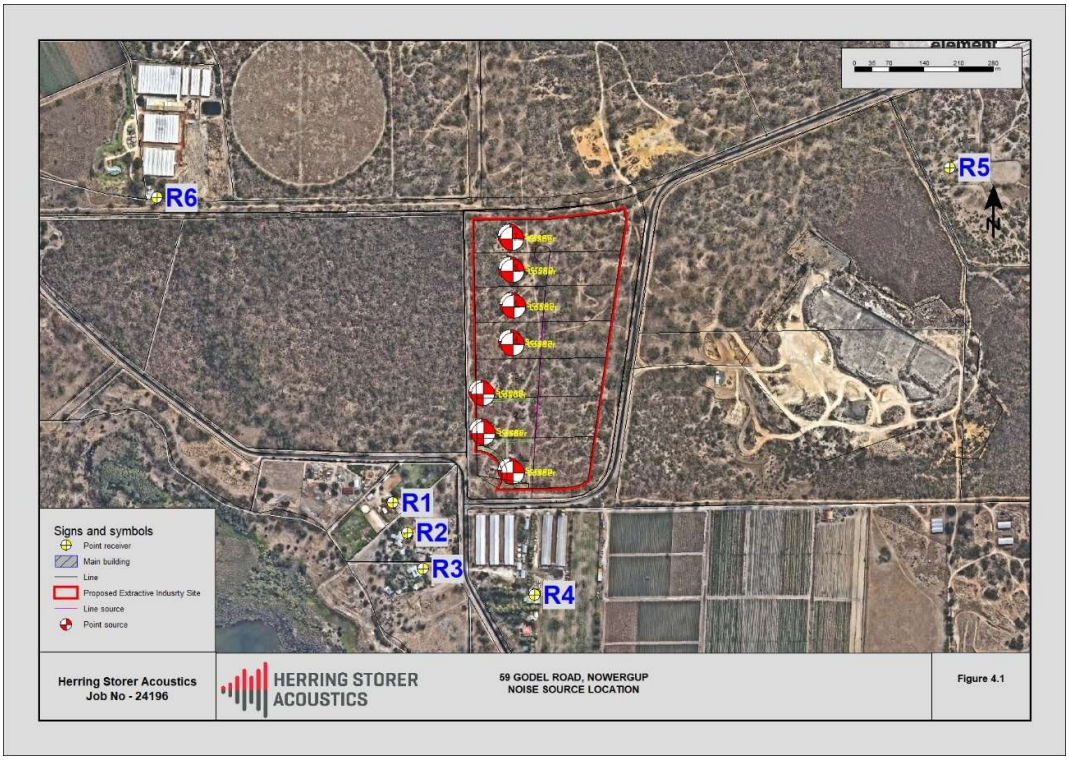


FIGURE 4.1 – SOURCE LOCATION AND PIT PROGRESSION

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

Based on the above, various operating scenarios have been developed for each stage of the proposal. As the fixed plant, being the loader and screen will generally remain in a static location, this has been modelled for each stage. The truck transporting of material can be within any stage, hence this has been modelled in a separate scenario and included in the overall assessable noise level (added to the fixed plant noise levels). It is noted that each stage is assessed individually, with the noise contour plot for the overall noise level being a maximum of each stage (not the cumulative of all stages) for information purposes only.

Additional to the above, the material is understood to be located around 1 to 5m deep (from ground level). Therefore, as the pits progress, the bottom of the pit will be such that there is a pit wall (operating face) being maintained between equipment and receivers. Our noise modelling does not include this, with noise sources placed on natural ground level to provide a worst case scenario for the commencement of operations.

Therefore, the operating scenarios considered are:

- Scenario 1 Stage 1 Fixed Plant and truck movements
- Scenario 2 Stage 2 Fixed Plant and truck movements
- Scenario 3 Stage 3 Fixed Plant and truck movements
- Scenario 4 Stage 3 Fixed Plant and truck movements
- Scenario 5 Stage 3 Fixed Plant and truck movements
- Scenario 6 Stage 3 Fixed Plant and truck movements
- Scenario 7 Stage 3 Fixed Plant and truck movements
- Scenario 8 – Noise Contour Plot only – Maximum of all stages.

Based on the above scenarios, operations in Stages 1 to 3 had the potential to exceed the assigned noise levels at the receivers to the south. Therefore, barriers, in the form of earthen bunds were included in the modelling to allow for the attenuation of noise levels. The locations of the bunding are shown in figure 4.2.

It is noted that only one bund is required for each stage, i.e. construction of the bund in stage two is only required while operations are occurring in stage 2 etc. Once operations reach stage 4, the distance from the receivers is such that bunding would no longer be required to attenuate noise levels. Figure 4.2 shows the locations of the bunding at each stage. The height of the bund has been assumed at 3.0m high.

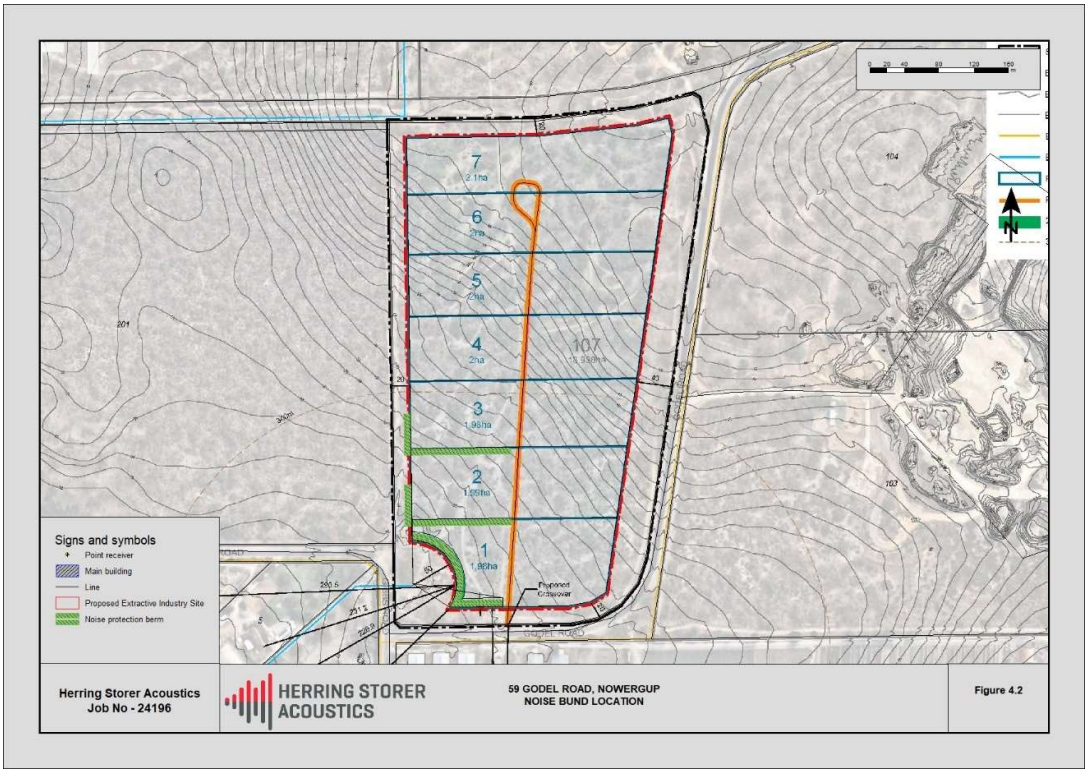


FIGURE 4.2 – NOISE BUND LOCATION

The following input data was used in the calculations:

a) Provided area plots.
b) Sound Power Levels listed in Table 4.1.
c) Ground contours and receiver point provided by client (Appendix A).

Weather conditions for modelling were as stipulated in the Environmental Protection Authority's "*Draft Guidelines on Environmental Noise for Prescribed Premises"* and for the day period are as listed in Table 4.2.

TABLE 4.2 – WEATHER CONDITIONS

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

* From sources, towards receivers.

5. MONITORED AMBIENT NOISE

As per the "Draft Guidelines on Environmental Noise for Prescribed Premises" (released in May 2016), continuous noise monitoring has been conducted to establish the ambient noise levels.

The monitoring location was on the southern boundary of the development, nearest to the neighboring residence. Monitoring commenced on the 30th May 2024 and continued through till the 17th June 2024. Figure 5.1 contains a map of the monitoring location, with Figure 5.2 showing pictures of the monitor in situ.

FIGURE 5.1 – MONITORING LOCATION

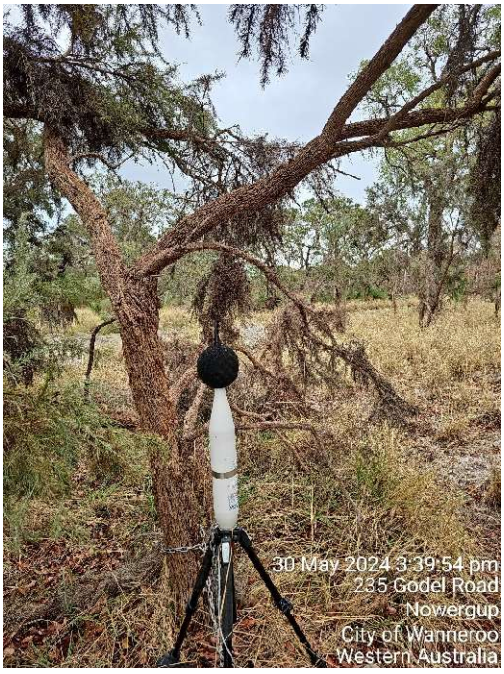


FIGURE 5.2 – MONITORING PICTURE – IN SITU

Noise monitoring results are summarised graphically below in Figure 5.3, with the full results contained in Appendix C.

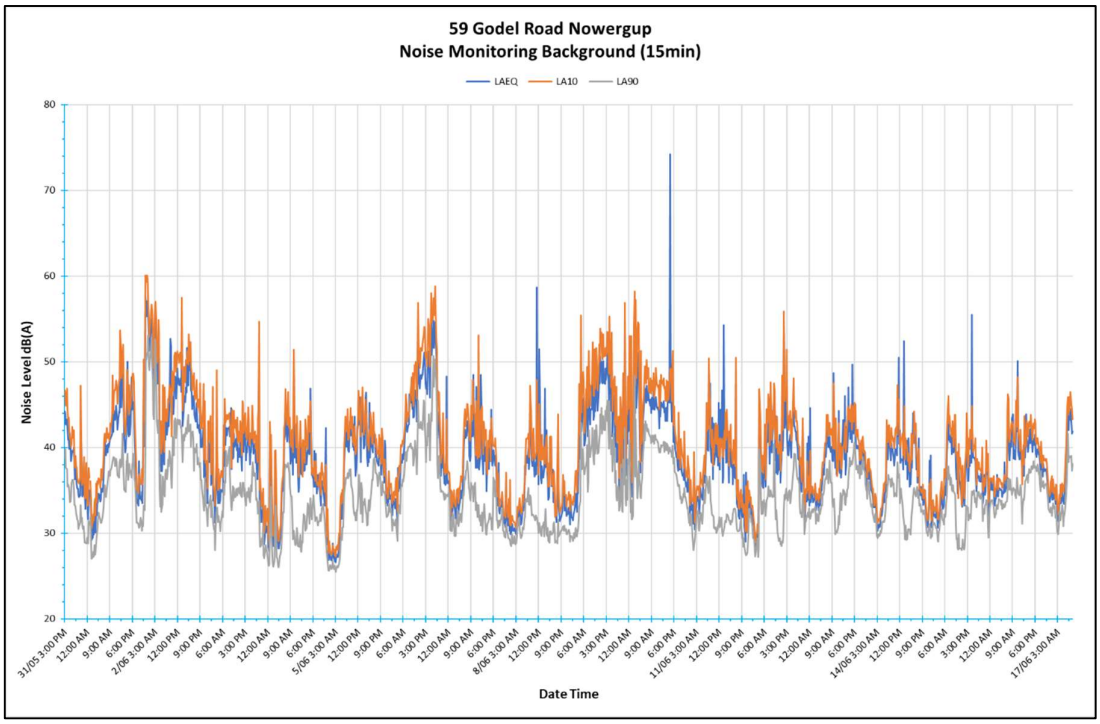


FIGURE 5.3 – MONITORED NOISE LEVELS – TOTAL MONITORING PERIOD

During the monitoring period intermittent rainfall occurred. The days (periods) where rainfall impacted noise levels have been discounted from the assessment of ambient noise. An example of two days where the weather was clear has been included in Figure 5.4 for information purposes.

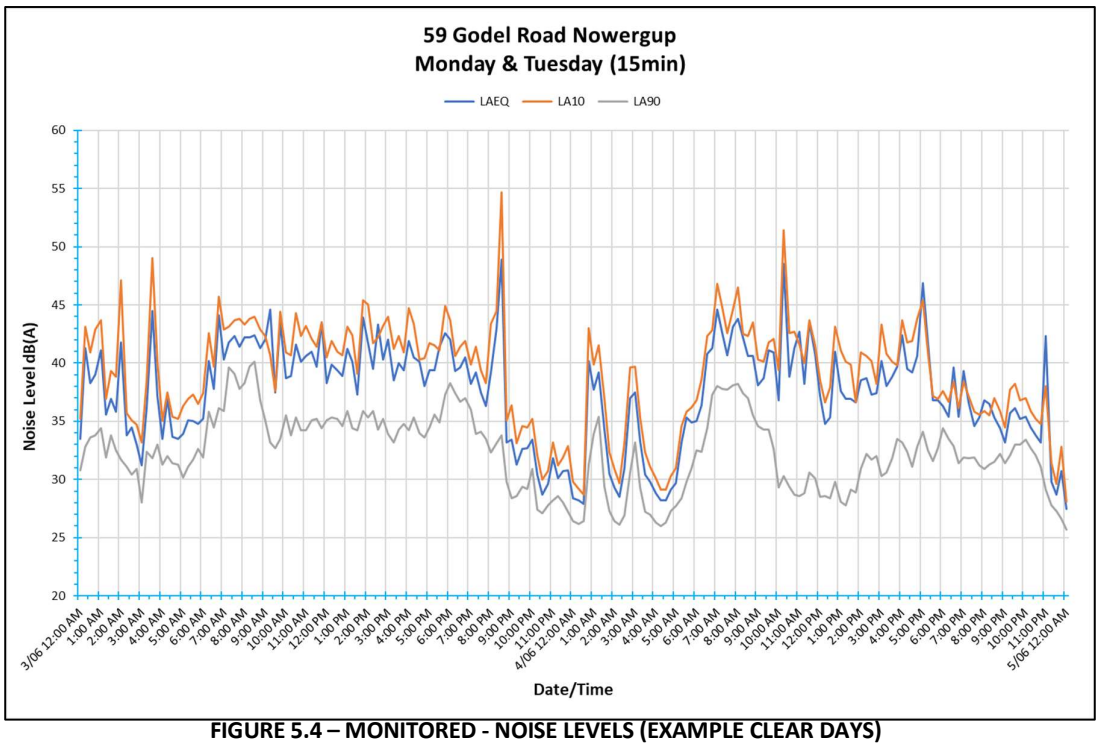


FIGURE 5.4 – MONITORED - NOISE LEVELS (EXAMPLE CLEAR DAYS)

For informational purposes, a summary of the average noise level for each daily regulatory time period is shown in Table 5.1.

Weather data for the monitoring period was sourced via the Bureau of Meteorology web site for the area.

TABLE 5.1 – SUMMARY NOISE LEVELS

Day / Date	Noise Level	Comments
	Day Period	
Friday, 31 May 2024	42.1	
Saturday, 1 June 2024	44.4	
Sunday, 2 June 2024	47.5	Rainfall
Monday, 3 June 2024	41.0	Rainfall
Tuesday, 4 June 2024	40.8	
Wednesday, 5 June 2024	41.9	
Thursday, 6 June 2024	49.3	
Friday, 7 June 2024	41.9	Rainfall
Saturday, 8 June 2024	44.2	
Sunday, 9 June 2024	47.3	Rainfall
Monday, 10 June 2024	57.6	Rainfall
Tuesday, 11 June 2024	43.0	
Wednesday, 12 June 2024	43.3	Rainfall
Thursday, 13 June 2024	42.1	Rainfall
Friday, 14 June 2024	41.9	
Saturday, 15 June 2024	41.6	
Sunday, 16 June 2024	41.4	
Average (Good Days)	**44.0**	

6. RESULTS

Calculated noise levels associated with the noise emissions from the proposed operations for the assumed scenarios, including bunding to Stages 1 - 3 are summarised below in Table 6.1. Appendix B contains the overall noise contour plots.

TABLE 6.1 – CALCULATED NOISE LEVEL

Receiver	Calculated Noise Level (L_{A10} dB(A))						
	Scenario 1 Stage 1 Fixed Plant and Truck Movement	Scenario 2 Stage 2 Fixed Plant and Truck Movement	Scenario 3 Stage 3 Fixed Plant and Truck Movement	Scenario 4 Stage 4 Fixed Plant and Truck Movement	Scenario 5 Stage 5 Fixed Plant and Truck Movement	Scenario 6 Stage 6 Fixed Plant and Truck Movement	Scenario 7 Stage 7 Fixed Plant and Truck Movement
R1	38	39	38	41	40	39	38
R2	39	38	37	40	39	39	38
R3	39	38	37	40	39	38	38
R4	39	38	37	40	39	39	38
R5	30	28	28	28	28	31	31
R6	30	29	29	33	33	33	34

7. ASSESSMENT

For the day time operations, based on calculated noise levels at the nearest premises, noise levels could be considered as potentially containing tonal characteristics.

Based on the assessable noise levels above, comparison against the relevant assigned noise level is contained in Table 7.1. For the purpose of assessment, the highest noise level received for any stage of the operation has been assessed.

TABLE 7.1 – ASSESSMENT OF NOISE LEVELS

Receiver	Premises Receiving Noise Assessable Noise Level dB(A)	Time of Day	Assigned Level (dB)	Compliance
R1	40[45]	0700 - 1900 hours Monday to Saturday (Day)	45	Complies
R2	40[45]			Complies
R3	40[45]			Complies
R4	40[45]			Complies
R5	31[36]			Complies
R6	34[39]			Complies

[ ] Denotes penalty for tonality

8. CONCLUSION

Assessment has been conducted on the proposed limestone and sand extraction operations for 59 Godel Road, Nowergup.

The facility would only operate during the day period (being Monday to Friday 07:00 to 19:00 hours and 07:00 to 16:00 on Saturdays). Therefore, at the neighbouring residences, the applicable acoustic criteria for this assessment is the assigned L_{A10} day period noise level of 45 dB(A).

Noise received at the nearest residential premises has been determined, to be 45 dB(A) for the sand extraction operations for the highest noise level at any stage of the operations. This can be compared to the applicable assigned noise level criteria of 45 dB(A).

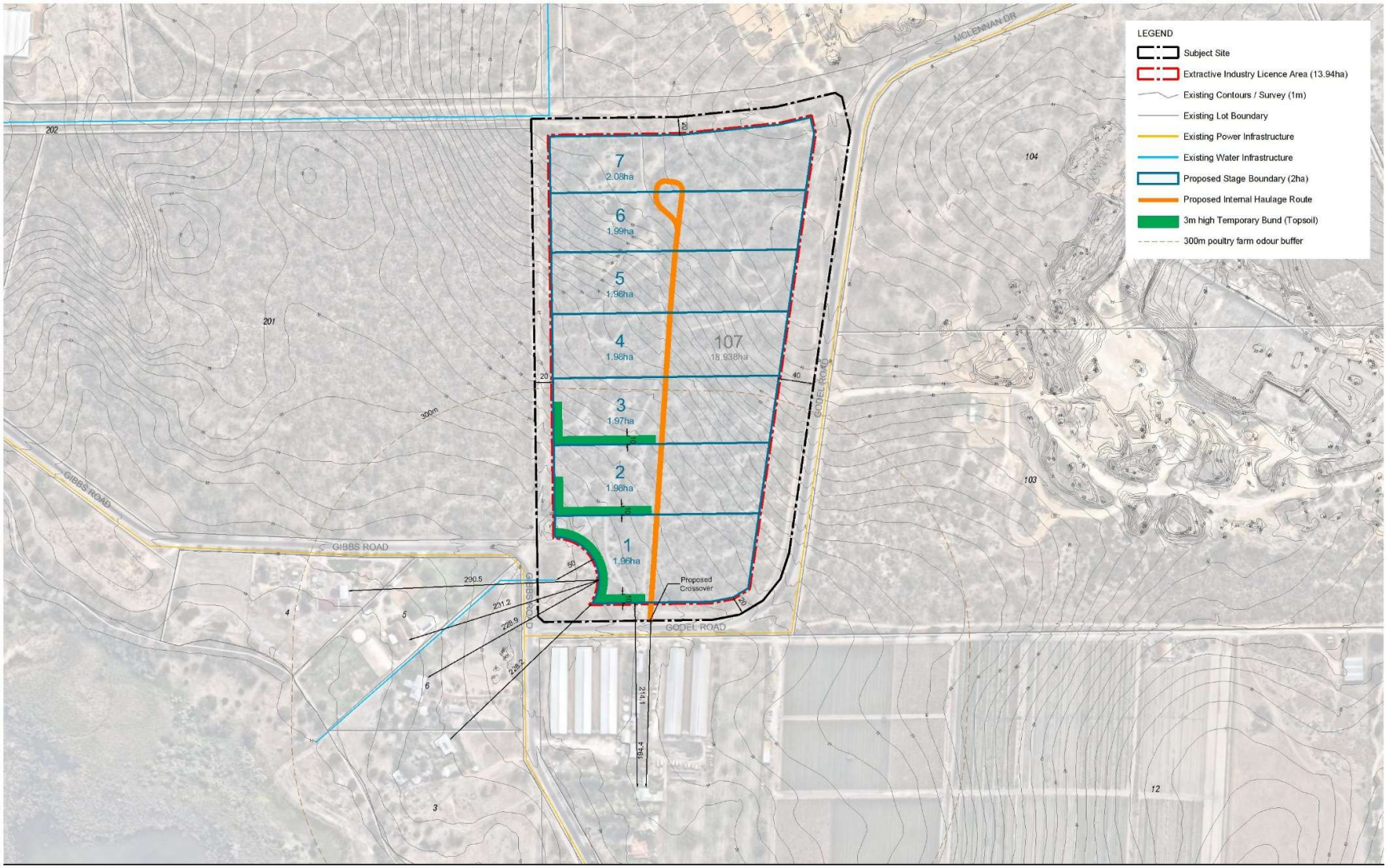
Noise monitoring conducted shows that the ambient noise (background) is generally around 44 dB(A) during the day. Given this, annoying characteristics such as tonality may be present, hence a +5 dB(A) penalty has been included in the assessable noise level stated above.

To ensure the above noise levels are maintained, bund for stages 1 to 3 is required for the screen and loader operations. Details are contained further in this report.

Given these operating parameters, noise levels received at the nearest premises has been calculated to comply with the *Environmental Protection (Noise) Regulations 1997* for the operating times as outlined in this assessment.

APPENDIX A

LOCATION MAP



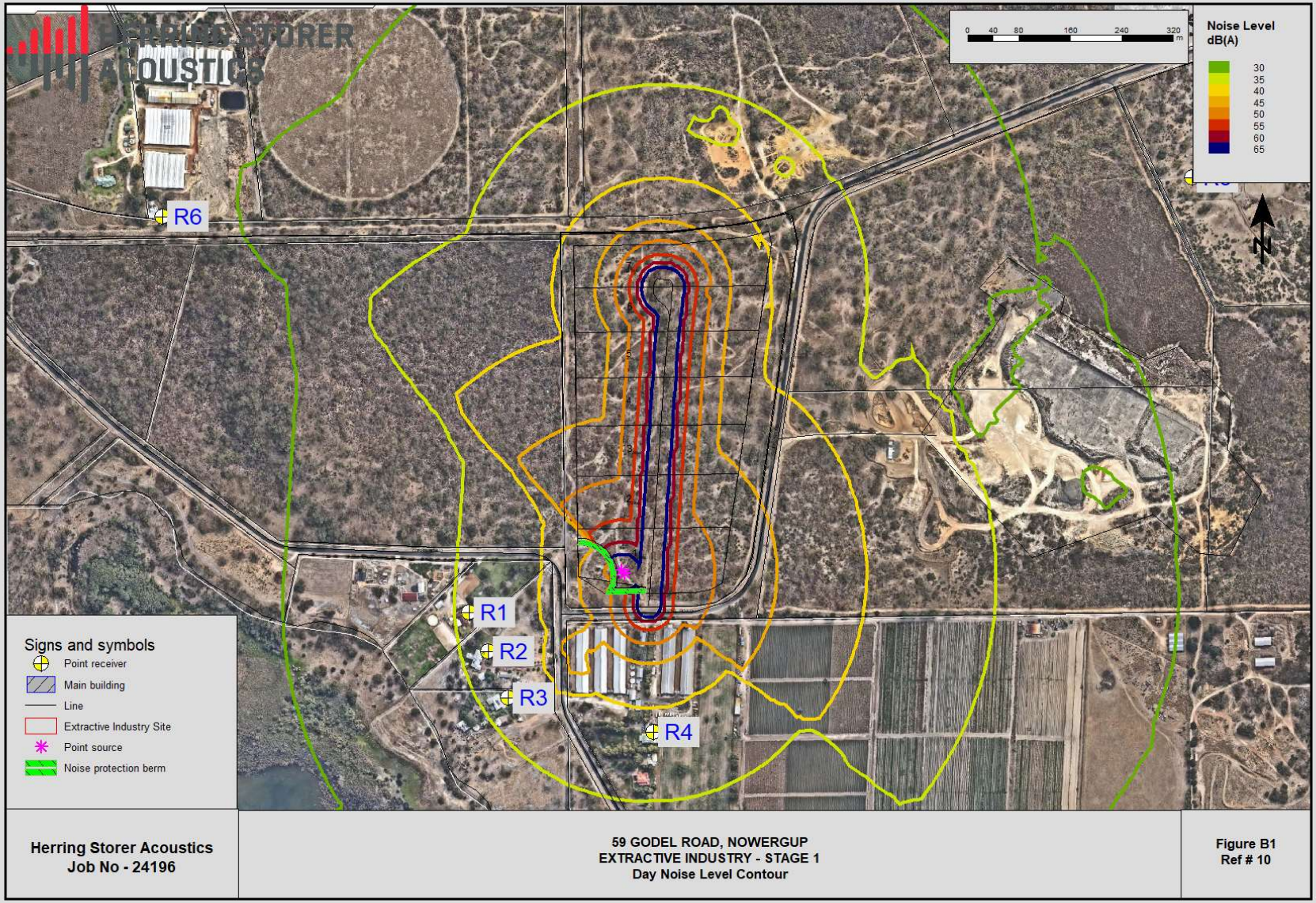
Excavation Works Plan

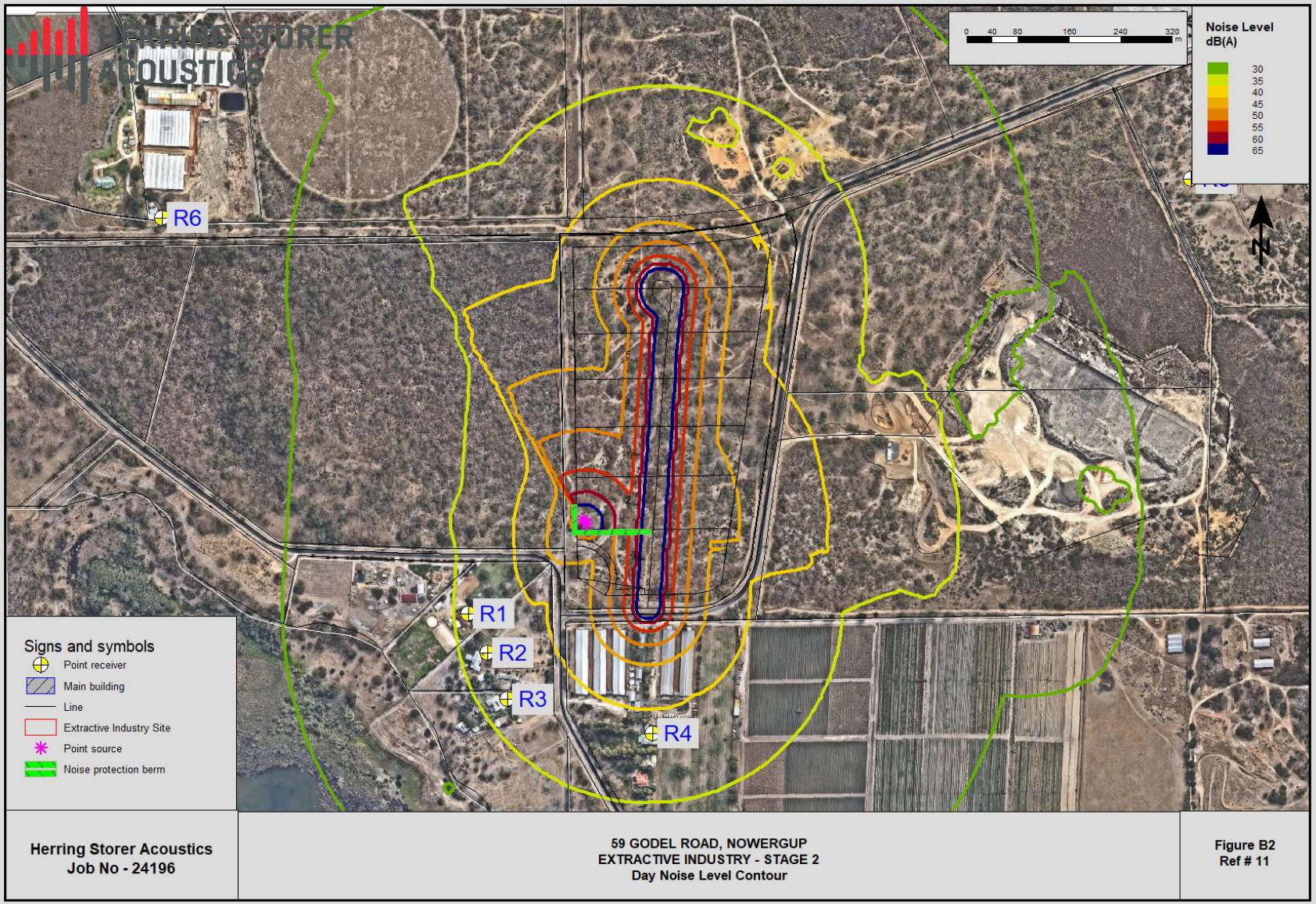
Lot 107 (59) Godel Road, Nowergup

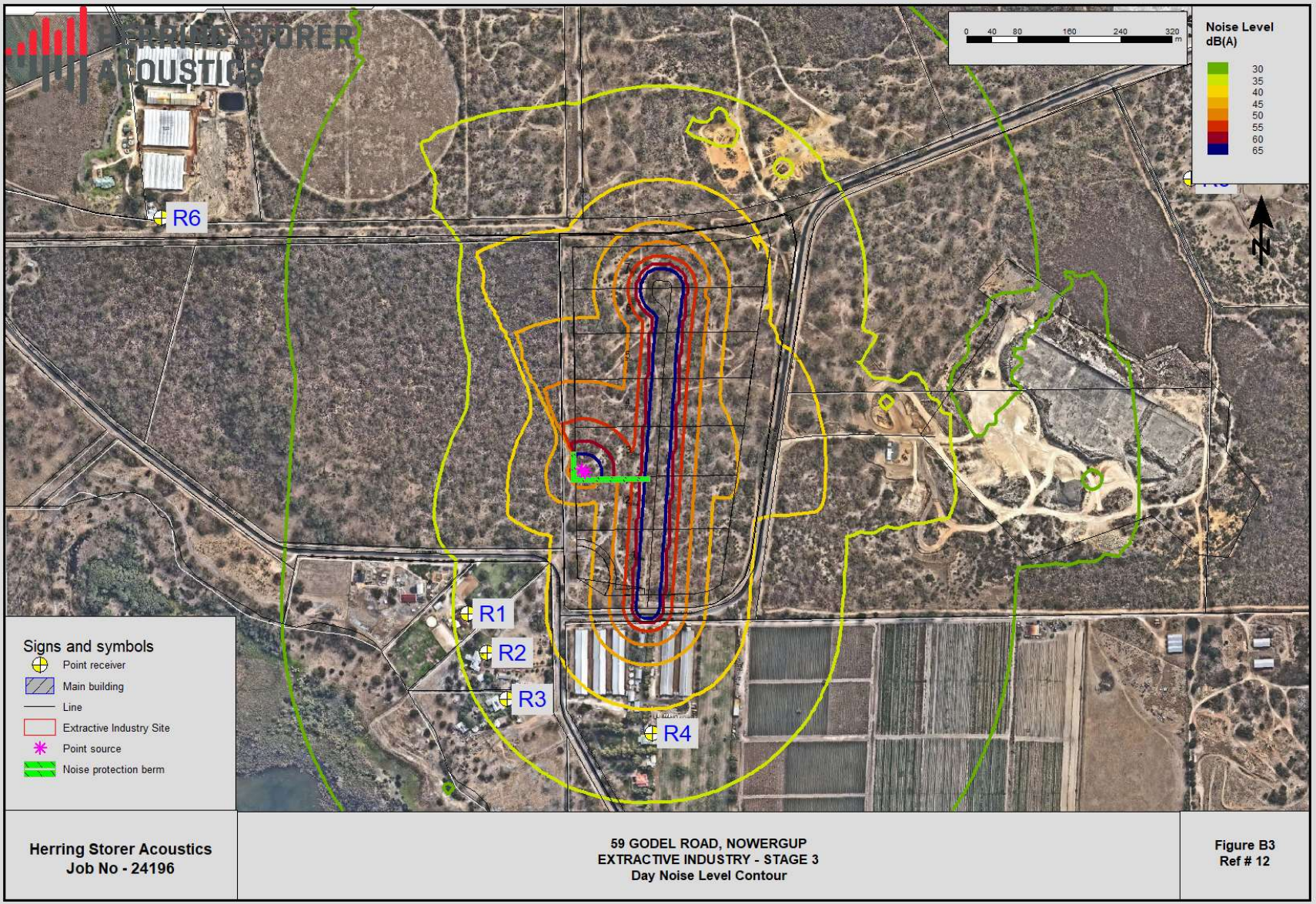
element.

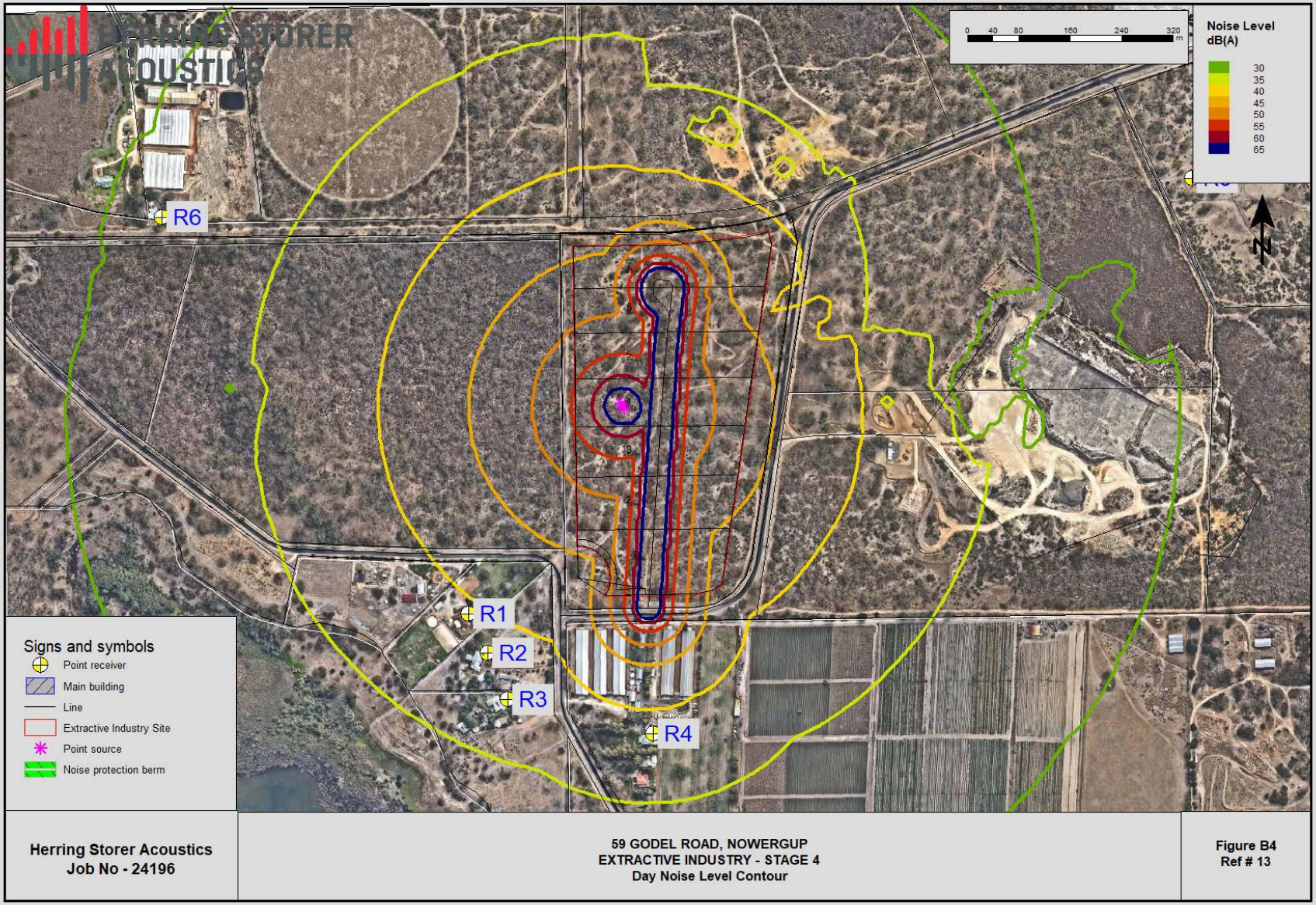
APPENDIX B

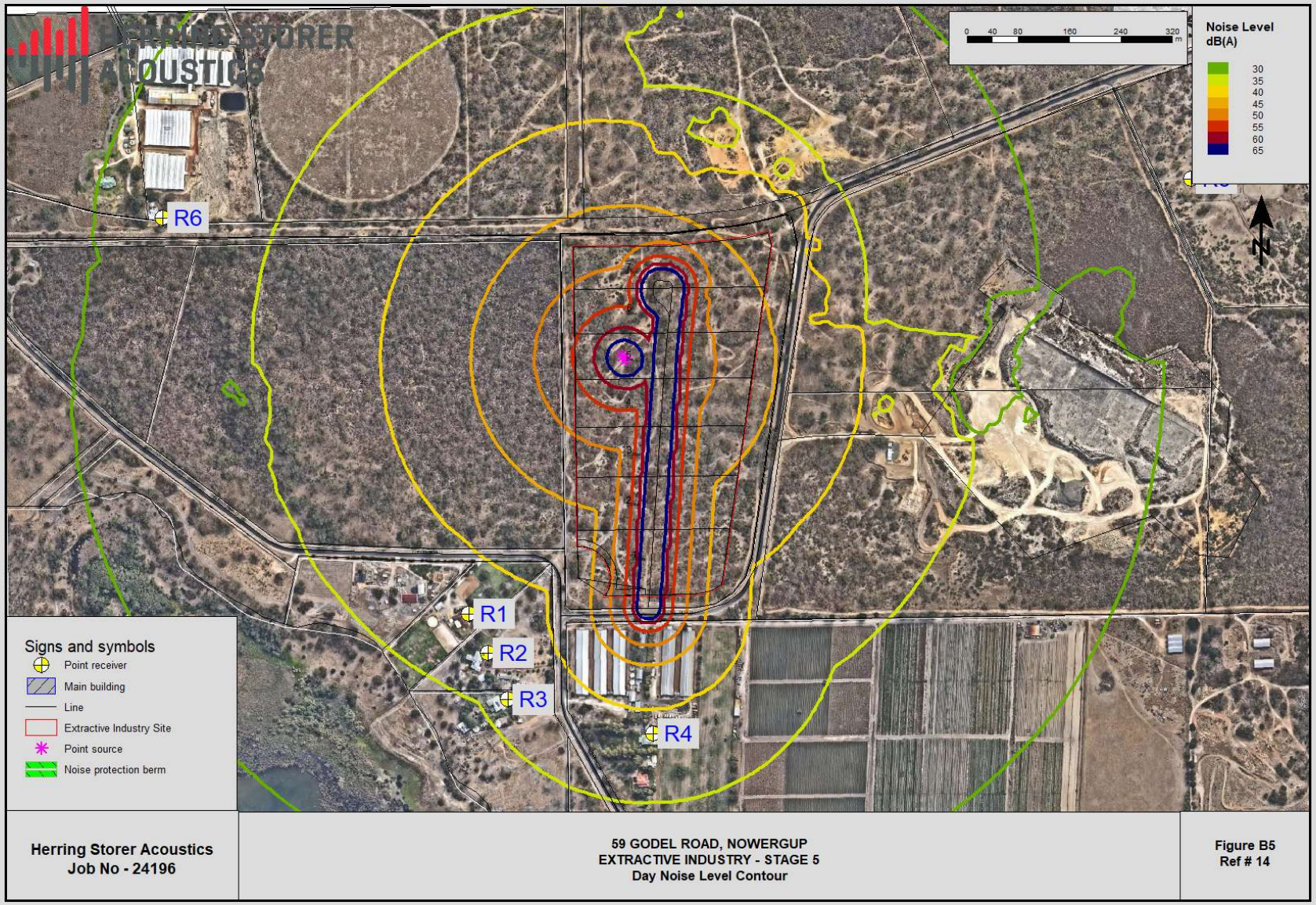
Noise Contours

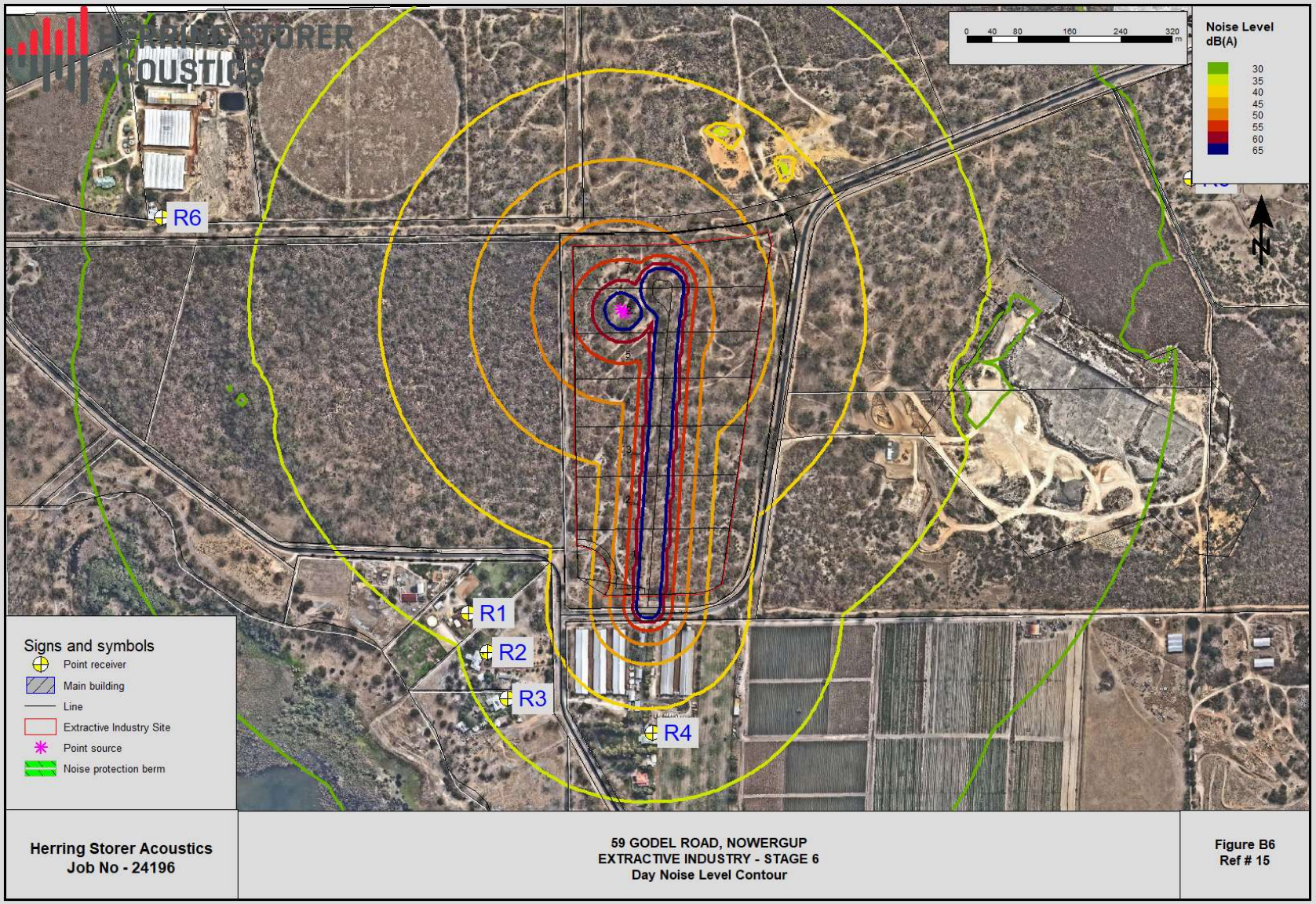

HERRING STORER ACOUSTICS
0 40 80 160 240 320 m
Noise Level dB(A)
30
35
40
45
50
55
60
65
N
R6
R1
R2
R3
R4
Signs and symbols
Point receiver
Main building
Line
Extractive Industry Site
Point source
Noise protection berm
Herring Storer Acoustics
Job No - 24196
59 GODEL ROAD, NOWERGUP
EXTRACTIVE INDUSTRY - STAGE 1
Day Noise Level Contour
Figure B1
Ref # 10

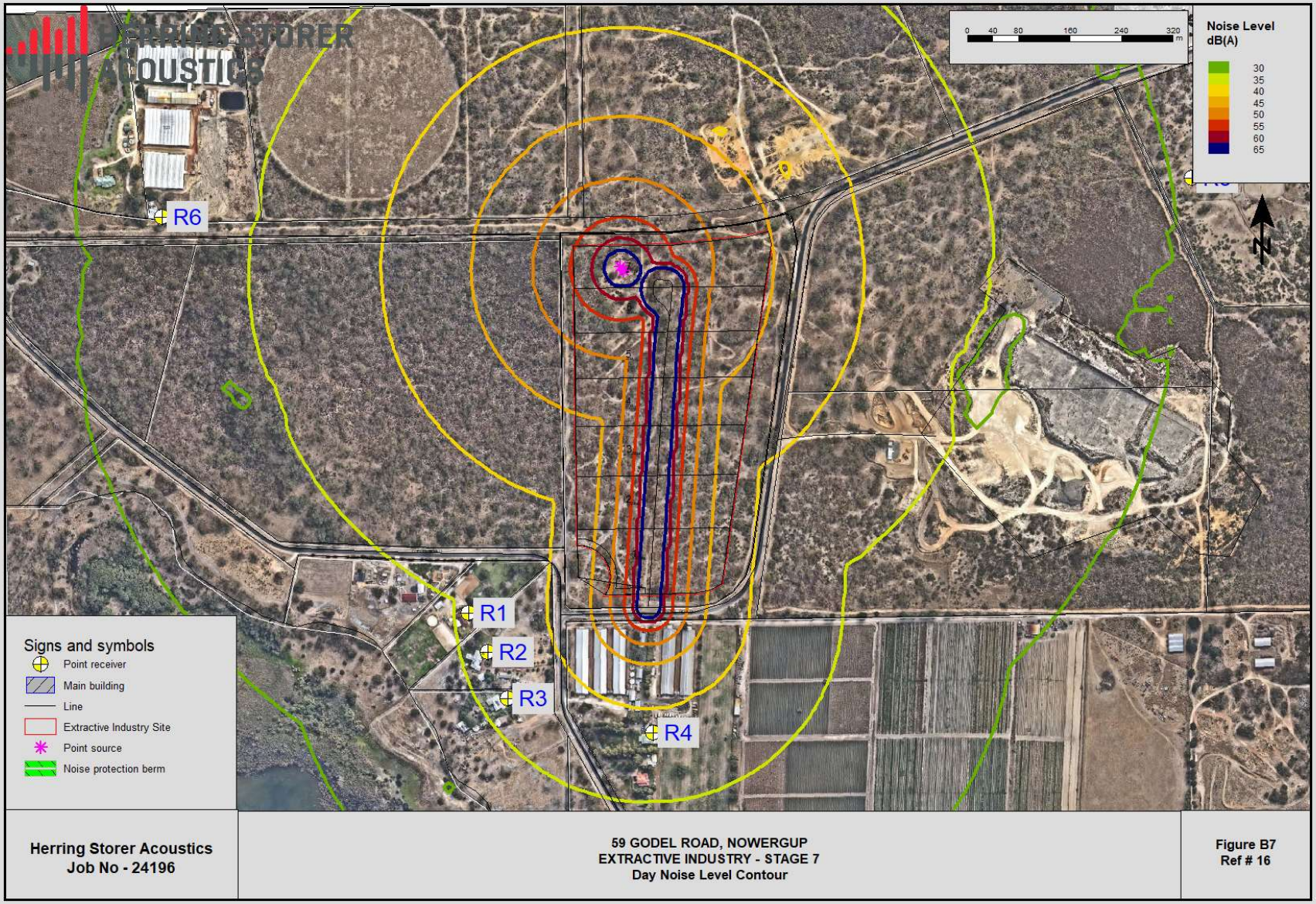

Noise Level dB(A)
30
35
40
45
50
55
60
65
0 40 80 160 240 320 m
N
R6
R1
R2
R3
R4
Signs and symbols
Point receiver
Main building
Line
Extractive Industry Site
Point source
Noise protection berm
Herring Storer Acoustics
Job No - 24196
59 GODEL ROAD, NOWERGUP
EXTRACTIVE INDUSTRY - STAGE 2
Day Noise Level Contour
Figure B2
Ref # 11

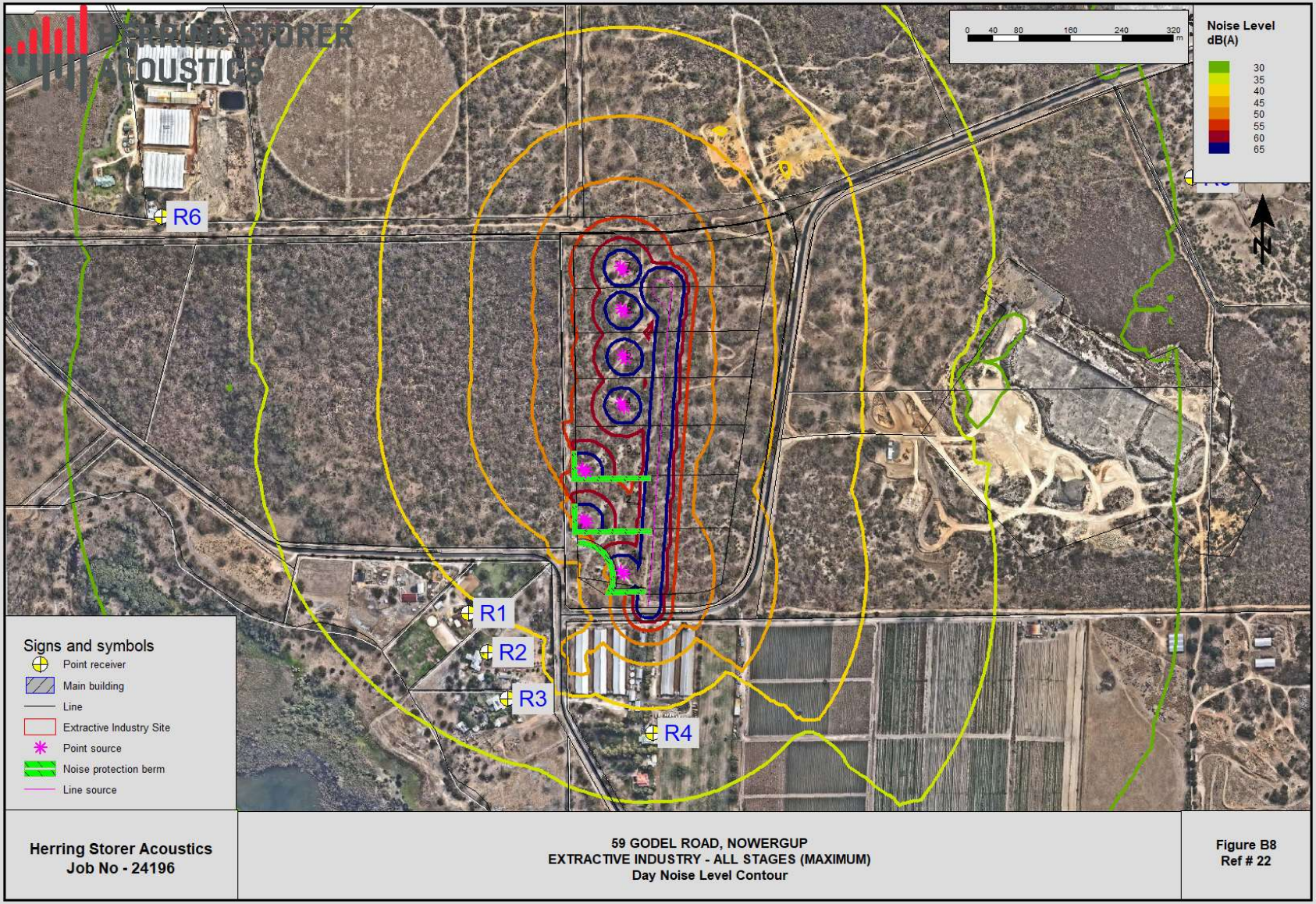

HERRING STORER ACOUSTICS
0 40 80 160 240 320 m
Noise Level dB(A)
30
35
40
45
50
55
60
65
N
R6
R1
R2
R3
R4
Signs and symbols
Point receiver
Main building
Line
Extractive Industry Site
Point source
Noise protection berm
Herring Storer Acoustics
Job No - 24196
59 GODEL ROAD, NOWERGUP
EXTRACTIVE INDUSTRY - STAGE 3
Day Noise Level Contour
Figure B3
Ref # 12


HERRING STORER ACOUSTICS
0 40 80 160 240 320 m
Noise Level dB(A)
30
35
40
45
50
55
60
65
N
R6
R1
R2
R3
R4
Signs and symbols
Point receiver
Main building
Line
Extractive Industry Site
Point source
Noise protection berm
Herring Storer Acoustics
Job No - 24196
59 GODEL ROAD, NOWERGUP
EXTRACTIVE INDUSTRY - STAGE 4
Day Noise Level Contour
Figure B4
Ref # 13


HERRING STORER ACOUSTICS
0 40 80 160 240 320 m
Noise Level dB(A)
30
35
40
45
50
55
60
65
N
R6
R1
R2
R3
R4
Signs and symbols
Point receiver
Main building
Line
Extractive Industry Site
Point source
Noise protection berm
Herring Storer Acoustics
Job No - 24196
59 GODEL ROAD, NOWERGUP
EXTRACTIVE INDUSTRY - STAGE 5
Day Noise Level Contour
Figure B5
Ref # 14

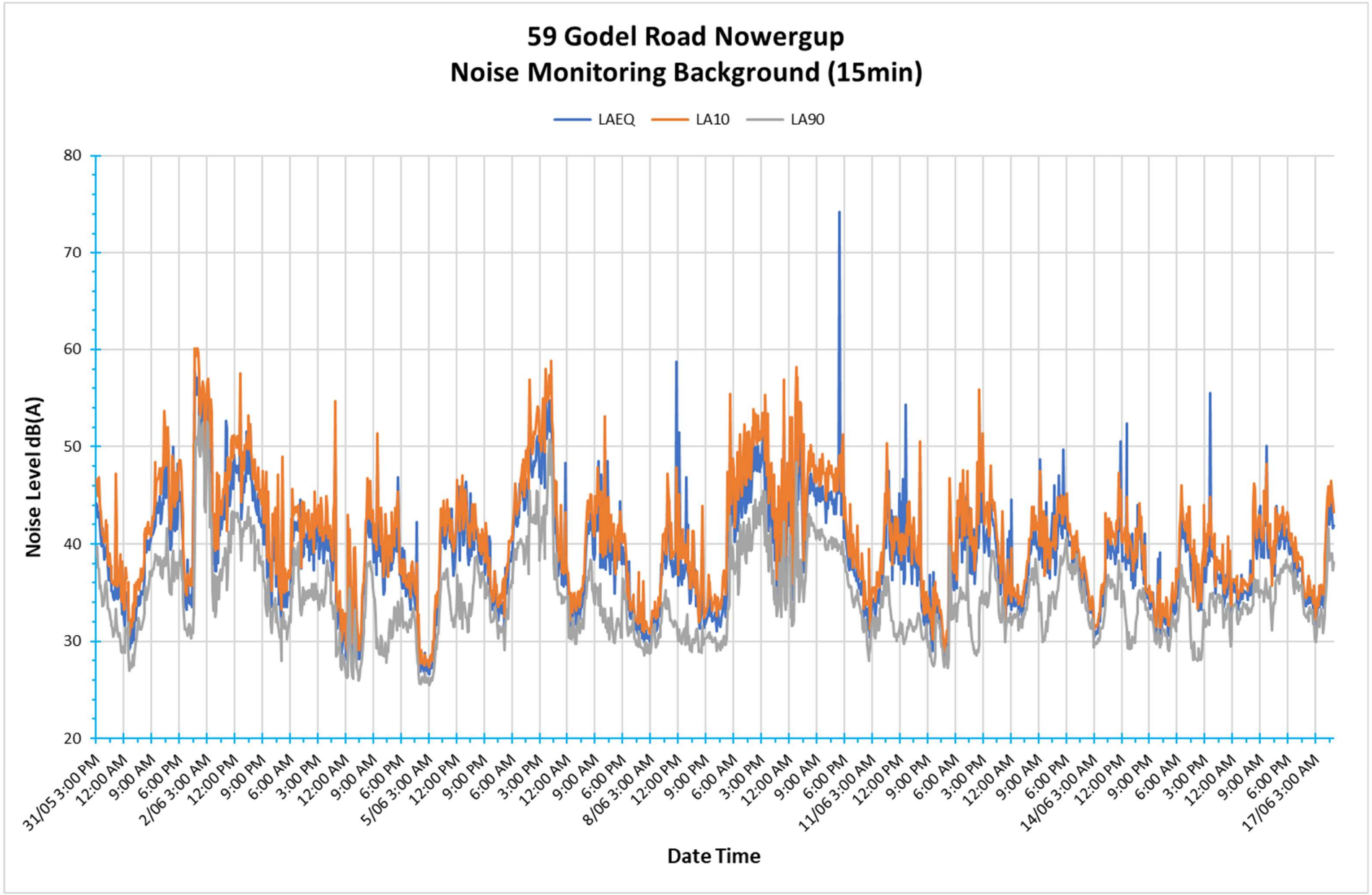

HERRING STORER ACOUSTICS
0 40 80 160 240 320 m
Noise Level dB(A)
30
35
40
45
50
55
60
65
N
R6
R1
R2
R3
R4
Signs and symbols
Point receiver
Main building
Line
Extractive Industry Site
Point source
Noise protection berm
Herring Storer Acoustics
Job No - 24196
59 GODEL ROAD, NOWERGUP
EXTRACTIVE INDUSTRY - STAGE 6
Day Noise Level Contour
Figure B6
Ref # 15


Noise Level
dB(A)
30
35
40
45
50
55
60
65
0 40 80 160 240 320 m
N
R1
R2
R3
R4
R6
Signs and symbols
Point receiver
Main building
Line
Extractive Industry Site
Point source
Noise protection berm
Herring Storer Acoustics
Job No - 24196
59 GODEL ROAD, NOWERGUP
EXTRACTIVE INDUSTRY - STAGE 7
Day Noise Level Contour
Figure B7
Ref # 16


Noise Level dB(A)
30
35
40
45
50
55
60
65
0 40 80 160 240 320 m
N
R6
R1
R2
R3
R4
Signs and symbols
Point receiver
Main building
Line
Extractive Industry Site
Point source
Noise protection berm
Line source
Herring Storer Acoustics
Job No - 24196
59 GODEL ROAD, NOWERGUP
EXTRACTIVE INDUSTRY - ALL STAGES (MAXIMUM)
Day Noise Level Contour
Figure B8
Ref # 22

APPENDIX C

Ambient Noise Monitoring


59 Godel Road Nowergup
Noise Monitoring Background (15min)
LAEQ
LA10
LA90
Noise Level dB(A)
80
70
60
50
40
30
20
31/05 3:00 PM
12:00 AM
9:00 AM
6:00 PM
2/06 3:00 AM
12:00 PM
9:00 PM
6:00 AM
3:00 PM
12:00 AM
9:00 AM
6:00 PM
5/06 3:00 AM
12:00 PM
9:00 PM
6:00 AM
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