Appendix 10:
SPP5.4 Noise Management Plan

HERRING STORER ACOUSTICS

SILVER THOMAS HANLEY ARCHITECTURE

MENTAL HEALTH UNIT
ST JOHN OF GOD MURDOCH HOSPITAL
MURDOCH

SPP 5.4 NOISE MANAGEMENT PLAN

MARCH 2022

OUR REFERENCE: 29299-6-20178

Rochdale Holdings Pty Ltd A.B.N. 85 009 049 067 trading as:
HERRING STORER ACOUSTICS
P.O. Box 219, Como, W.A. 6952
(08) 9367 6200
hsa@hsacoustics.com.au

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SPP 5.4 NOISE MANAGEMENT PLAN
MENTAL HEALTH UNIT
ST JOHN OF GOD MURDOCH HOSPITAL
MURDOCH

Job No: 20178

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FOR

SILVER THOMAS HANLEY ARCHITECTS

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1	Comments from client	31/03/2022	GH	TR
2	Updates re: Outdoor Living Area	08/08/2022	GH	TR
3	Updates to contours for clarity	10/08/2022	GH	TR
4	Updates to DPLH comments	10/02/2023	GH	TR
5	Updated noise contours	22/02/2023	GH	TR

DOCUMENT DISTRIBUTION

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1	4	Silver Thomas Hanley Architects Attn: Adele Teh Email: adele@silverthomashanley.com		✓
1	5	Silver Thomas Hanley Architects Attn: Adele Teh Email: adele@silverthomashanley.com		✓

CONTENTS

APPENDICES

1. INTRODUCTION

Herring Storer Acoustics were commissioned through Silver Thomas Hanley Architects to carry out an acoustic study with regards to traffic related noise for the proposed Mental Health Unit for the St John of God Murdoch Campus in Murdoch.

The purpose of the study was to:

- Assess the noise that would be received within the development area from vehicles travelling on Murdoch Drive and South Street for future traffic volumes.
- Compare the results with accepted criteria and if exceedances exist, develop the framework for the management of noise.

A plan is attached in Appendix A.

It is noted that the information utilised to undertake this study is preliminary and the intent is to inform of general acoustic requirements as well as garner development approval. A further report will be required with precise specifications once the detailed design stage of the project is commenced, in response to an anticipated development approval condition requesting a full assessment in accordance with *State Planning Policy 5.4*.

2. ACOUSTIC CRITERIA

2.1 NOISE

The Western Australian Planning Commission (WAPC) released on 6th September 2019 State Planning Policy 5.4 *"Road and Rail Noise".* The requirements of State Planning Policy 5.4 are outlined identifies for non-residential facilities the following:

> *"Indoor noise target – for noise-sensitive land-use and/or development proposals (Reference AS/NZS 2107:2016 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors for non-residential developments)."*

As of such the development would consider the following room types and associated criteria from *AS/NZS 2107:2016*.

Health Buildings

Corridors and Lobby Spaces	< 50 dB(A)
Consulting Rooms	40 to 45 dB(A)
Dining Area	40 to 45 dB(A)
Intensive Care Wards	40 to 45 dB(A)
Kitchens, Sterilising and Service Areas	< 55 dB(A)
Nurseries	35 to 45 dB(A)
Office Areas	35 to 45 dB(A)
Operating Theatres	40 to 50 dB(A)
Patient Lounge	40 to 45 dB(A)
Surgeries, Treatment and Procedure Rooms	40 to 45 dB(A)
Ward Bedrooms	35 to 40 dB(A)
Waiting Rooms and Reception Areas	40 to 50 dB(A)

3. ACOUSTIC ENVIRONMENT

The noise measurements were conducted for a seven day period starting on 16 March 2022.

Measurements were conducted with a pair of NSRT MK3 Noise Data Loggers. One was placed near South Street, approximately 1m behind the fence, and the other near Murdoch Drive, approximately 1m behind the fence. The noise loggers were calibrated prior to and after use with a Bruel and Kjaer 4230 Calibrator. All equipment used is currently NATA laboratory calibrated. Calibration certificates are available on request.

TABLE 3.1: SUMMARY OF MEASURED NOISE LEVELS

Measurement Location	Measured/Calculated Noise Level, dB(A)		
	L_{A10}	$L_{Aeq,\ day\ (6am\ to\ 10pm)}$	$L_{Aeq,\ night\ (10pm\ to\ 6am)}$
South Street	70.5	67.6	60.8
Murdoch Drive	71.5	68.0	59.5

4. MODELLING

To determine the noise levels from traffic on South Street and Murdoch Drive, acoustic modelling was carried out using Sound Plan, using the Calculation of Road Traffic Noise (CoRTN)[1] algorithms.

The input data for the model included:

- Topographical and cadastral data supplied by client (Shown in Appendix A);
- Traffic data as per Table 4.1 (Obtained from MRWA Traffic Map, Attached in Appendix C);
- Adjustments as listed in Table 4.2.

TABLE 4.1 - NOISE MODELLING INPUT DATA

Parameter	South Street (Current) 2016	South Street (Future) 2041	Murdoch Drive (Current) 2016	Murdoch Drive (Future) 2041
Traffic Volumes	52,200 vpd	66,100 vpd	19,000 vpd	40,100vpd
Percentage traffic 0600 – 2400 hours (Assumed)	94%	94%	94%	94%
Heavy Vehicles (%) (Assumed*)	6.9%	6.9%	6.1%	6.1%
Speed (km/hr)	70km/hr	70km/hr	70km/hr	70km/hr
Road Surface	Dense Graded Asphalt	Dense Graded Asphalt	Chip Seal	Dense Graded Asphalt

*MRWA did not provide heavy vehicle movements and as of such data was sought from MRWA Online Traffic Map

TABLE 4.2 – ADJUSTMENTS FOR NOISE MODELLING

Description	Value
Façade Reflection Adjustment	+2.5 dB
Conversion from $L_{A10\ (18\ hour)}$ to $L_{Aeq\ (16\ hour)}$ (Day)	-2.9 dB/ -3.5 dB

1 *Calculation of Road Traffic Noise* UK Department of Transport 1987

5. TRAFFIC NOISE ASSESSMENT

Using the data contained in Tables 3.1, 4.1 and 4.2, modelling was carried out under existing conditions for calibration. The Sound Plan model for the site has been set up for the 2041 scenario as defined in Table 4.1. The following assumptions have been made:

- 18 hour traffic count will be 94% of daily figures.
- Noise model calibrated to measured noise level as per Table 3.1
- The same diurnal relationship will exist in the future between the $L_{A10\ (18\ hour)}$ and the L_{Aeq} parameters; and
- 2.5 dB(A) has been added to the results for façade reflection.

The noise requirements based on the above have been showed in Appendix A and listed in Appendix B as well as noise contours in Appendix D

It is noted that these requirements pertain to acoustic requirements only, with regard to *State Planning Policy 5.4,* and may be superseded by other requirements (BAL, Thermal, etc).

6. CONCLUSION

In accordance with the WAPC Planning Policy 5.4, an assessment of the noise that would be received within the development of the Mental Health Unit at St John of God Murdoch, Murdoch, from vehicles travelling on South Street and Murdoch Drive has been undertaken.

In accordance with the Policy, the following would be the acoustic criteria applicable to this project:

Health Buildings

Corridors and Lobby Spaces	< 50 dB(A)
Consulting Rooms	40 to 45 dB(A)
Dining Area	40 to 45 dB(A)
Intensive Care Wards	40 to 45 dB(A)
Kitchens, Sterilising and Service Areas	< 55 dB(A)
Nurseries	35 to 45 dB(A)
Office Areas	35 to 45 dB(A)
Operating Theatres	40 to 50 dB(A)
Patient Lounge	40 to 45 dB(A)
Surgeries, Treatment and Procedure Rooms	40 to 45 dB(A)
Ward Bedrooms	35 to 40 dB(A)
Waiting Rooms and Reception Areas	40 to 50 dB(A)

The results of the acoustic assessment indicate that noise received at the development from future traffic, exceed external noise level criteria. Therefore, noise amelioration in the form of quiet house design shown in Appendix A and listed in Appendix B, as well as notifications on the title is required.

It is noted that walls of the development would be required to meet and R_w+C_{tr} of 50 dB. Currently a 9mm CFC cladding with 50mm cavity, in front of external 150mm studwall with 75mm batt insulation within, 13mm impact resistant lining within is proposed. This construction has a R_w+C_{tr} of 51 dB and hence meets the requirements.

Similarly, a 13.52mm laminate glazing is currently proposed. This has an R_w+C_{tr} of 38 dB and would meet the highest required R_w+C_{tr} of 34 dB.

Finally, *State Planning Policy 5.4* recommends to "*provide for at least one protected outdoor living area… as far as practicable*." The development has a shielded dining balcony that would meet the outdoor living criteria. In addition there is a larger outdoor therapy garden bordered by the building, the "Quenda Wetlands" and South Street. Current the plans denote an acoustic fence separating this therapy garden from South Street and the Quenda Wetlands.

Without a fence the outdoor therapy garden would have a future noise level of up to 63 dB(A) $L_{Aeq(day).}$ Implementation of a solid boundary fence of 2.4m would reduce the noise level to below 55 dB(A) $L_{Aeq(day)}$ in some areas whilst a 2.7m fence would reduce the noise level below 55 dB(A) $L_{Aeq(day)}$ in most areas, as shown in Appendix D. Similarly, a set of noise contours with a "Stepped Fence" is shown.

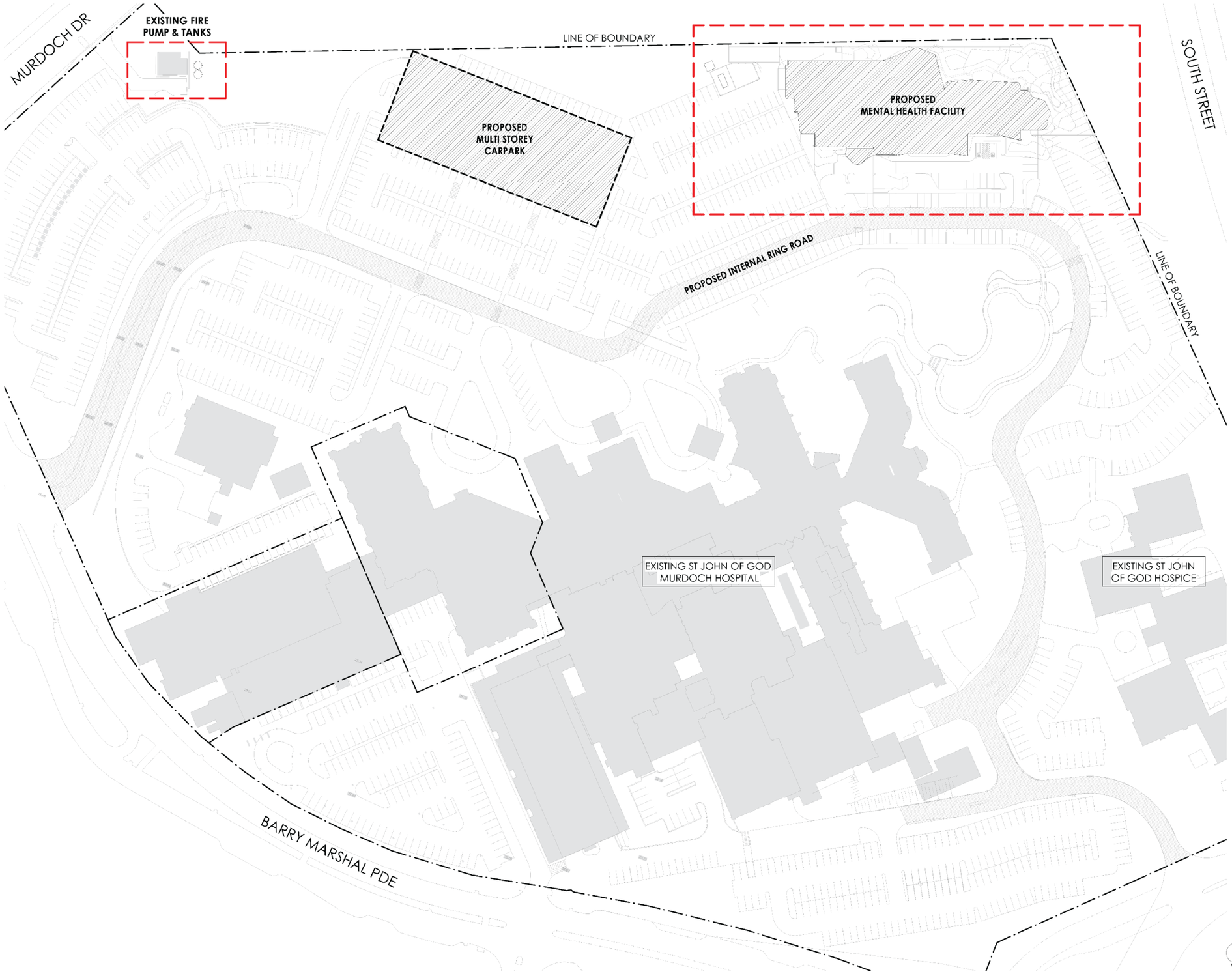
As noise is not the only criteria to be met, it is recommended that the potential height and use of the fence be considered to reduce the noise as far as practicable whilst allowing for other criteria such as interfacing with the Quenda Wetlands, and inpatient impact.

When future detailed designed is implemented after development approval is granted, ground heights may change and affect the requirements of the height of the fence, as a result it is recommended that a further acoustic report be required once detail design is completed, and the development potentially be conditioned as such.

If implemented, the acoustic fence is recommended to have a minimum surface density of 15kg/m^2 (or equivalent) in accordance with *SPP5.4 Guidelines*.

APPENDIX A

PLANS



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ARCHITECT

silver thomas hanley
ARCHITECTURE

PROJECT

SJOGM MHU

SJOG MURDOCH

ARCHITECTURAL

DRAWING
SERVICES SITE PLAN

DRAWN	APPROVED	REDUCTION
RA	SH	0 25
SCALE	DATE	
1:2000@A1	01/02/22	
PROJECT No.	DRAWING No.	REV.
3242	3242_A01.0.004	A

NORTH

REV	DATE	DESCRIPTION	BY
D	10/03/22	FOR INFORMATION	AT
C		FOR INFORMATION	VC
B	21/02/22	FOR INFORMATION	VC
A		FOR COORDINATION	VC

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ARCHITECT
silver thomas hanley ARCHITECTURE

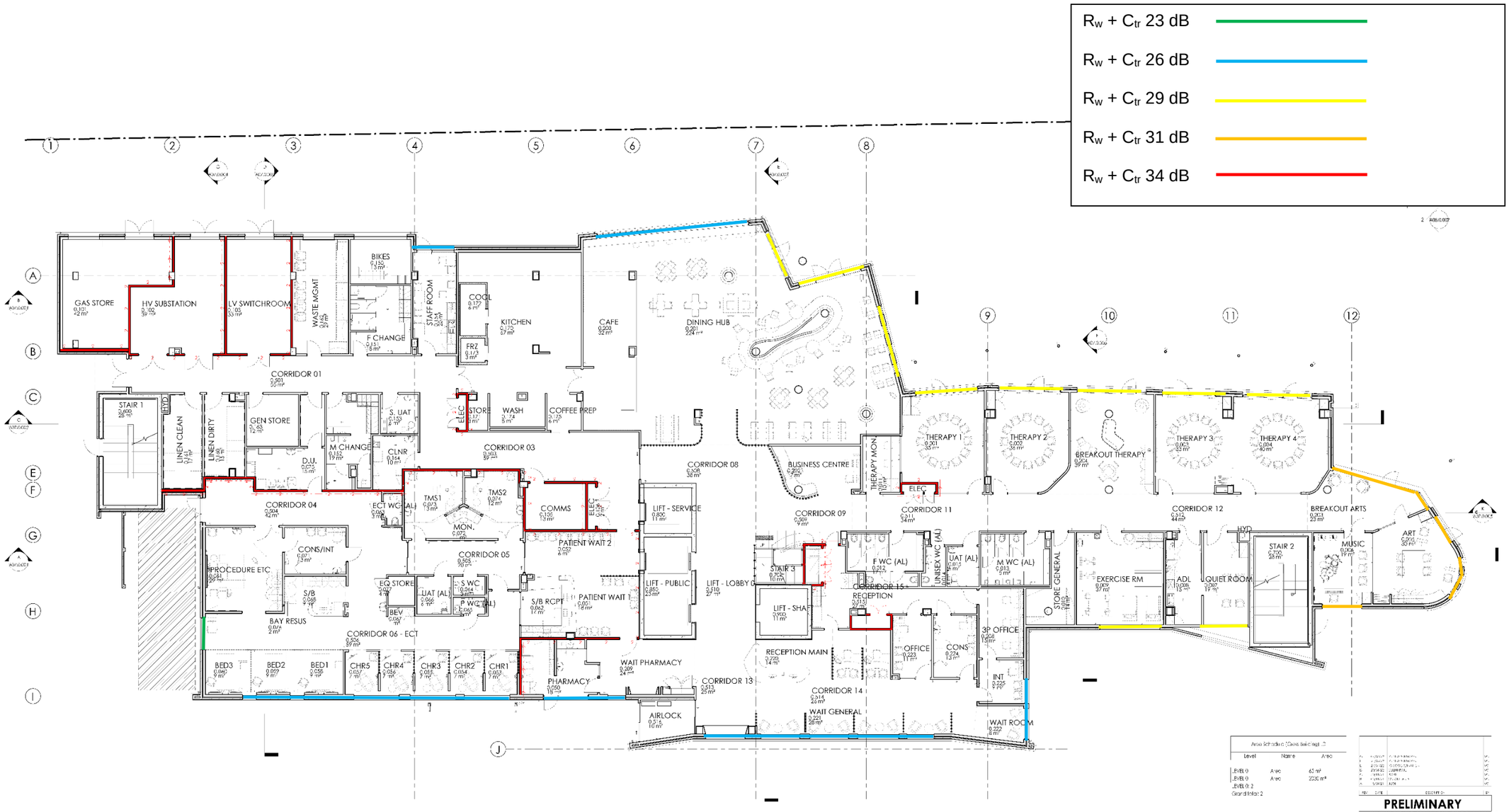
PROJECT
SJOGM MHU
SJOG MURDOCH

ARCHITECTURAL

DRAWING
PROPOSED SITE PLAN

DRAWN AT | APPROVED STH | REDUCTION 0 25
SCALE | DATE 04/03/22

PROJECT No. 3242 | DRAWING No. 3242_A01.0.003 | REV. D



LEVEL 0 GA
SCALE 1 : 100

All non marked glazing elements would comply given standard construction

Level	Name	Area
LEVEL 0	Area	65 m²
LEVEL 0	Area	2235 m²
LEVEL 0: 2		
Grand total: 2		

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ARCHITECT

SJOGM MHU

SJOG MURDOCH

ARCHITECTURAL

DRAWING
LEVEL 0 - GENERAL ARRANGEMENT PLANS

DRAWN	APPROVED	REVISION
AT	ST-H	0

SCALE 1:100 @ A1

PROJECT No.	DRAWING No.	TRV
3242	3242_A03.0.100	G

$R_w + C_{tr}$ 23 dB (green)

$R_w + C_{tr}$ 26 dB (blue)

$R_w + C_{tr}$ 29 dB (yellow)

$R_w + C_{tr}$ 31 dB (orange)

$R_w + C_{tr}$ 34 dB (red)

LEVEL 1 GA

SCALE 1 : 100

Area Schedule (Gross Building)		
Level	Name	Area
LEVEL 1	Area	1311 m²
LEVEL 1: 1		
Grand total: 1		

PRELIMINARY

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ARCHITECT

ARCHITECTURE

PROJECT

SJOGM MHU

SJOG MURDOCH

ARCHITECTURAL

DRAWING

LEVEL 1 - GENERAL ARRANGEMENT PLANS

DRAWN	APPROVED	REDUCTION
AT	STH	0 — 25
SCALE	DATE	
1 : 100 @ B1	04/03/22	
PROJECT No.	DRAWING No.	REV.
3242	3242_A03.1.100	G

NORTH

PLOT DATE: 4/03/2022 4:01:51 PM

- $R_w + C_{tr}$ 23 dB — green
- $R_w + C_{tr}$ 26 dB — blue
- $R_w + C_{tr}$ 29 dB — yellow
- $R_w + C_{tr}$ 31 dB — orange
- $R_w + C_{tr}$ 34 dB — red

LEVEL 2 GA
SCALE 1 : 100

Area Schedule (Gross Building) L2&3		
Level	Name	Area
LEVEL 2	Area	1427 m²
LEVEL 2: 1		
Grand total: 1		

PRELIMINARY

CONTRACTORS MUST VERIFY ALL DIMENSIONS ON THE SITE BEFORE COMMENCING ANY WORK. THIS IS A 3D GENERATED DRAWING. DO NOT AMEND MANUALLY. DO NOT SCALE FROM THIS DRAWING.

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ARCHITECTURE

PROJECT
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ARCHITECTURAL

DRAWING
LEVEL 2 - GENERAL ARRANGEMENT PLANS

PROJECT No. 3242
DRAWING No. 3242_A03.2.100
REV. G

APPENDIX B

ADDITIONAL REQUIREMENTS

Calculated Noise Levels and Required R_w and C_{tr} Ratings			
Location	**Floor**	**Level**	**Required $R_w + C_{tr}$**
East Facing	All Floors	63-65	As per Appendix A
North Facing	All Floors	59-62	As per Appendix A
South Facing	All Floors	55-61	As per Appendix A
West Facing	All Floors	50-57	As per Appendix A
Walls	All Floors	Minimum R_w+C_{tr} of 50 dB.	
Roof & Ceilings	N/A	No Additional Requirement	
Balcony	Level 2/3	A 1.8m high solid glass barrier is required to meet the Outdoor Living Area level of 55 dB L_{Aeqday}	

Notes: The required R_W rating can be reduced by reducing the area of glazing.
Requirements pertain to only acoustic advice in regards to *State Planning Policy 5.4* and may be superceded by other requirements (BAL, Thermal, etc).

APPENDIX C

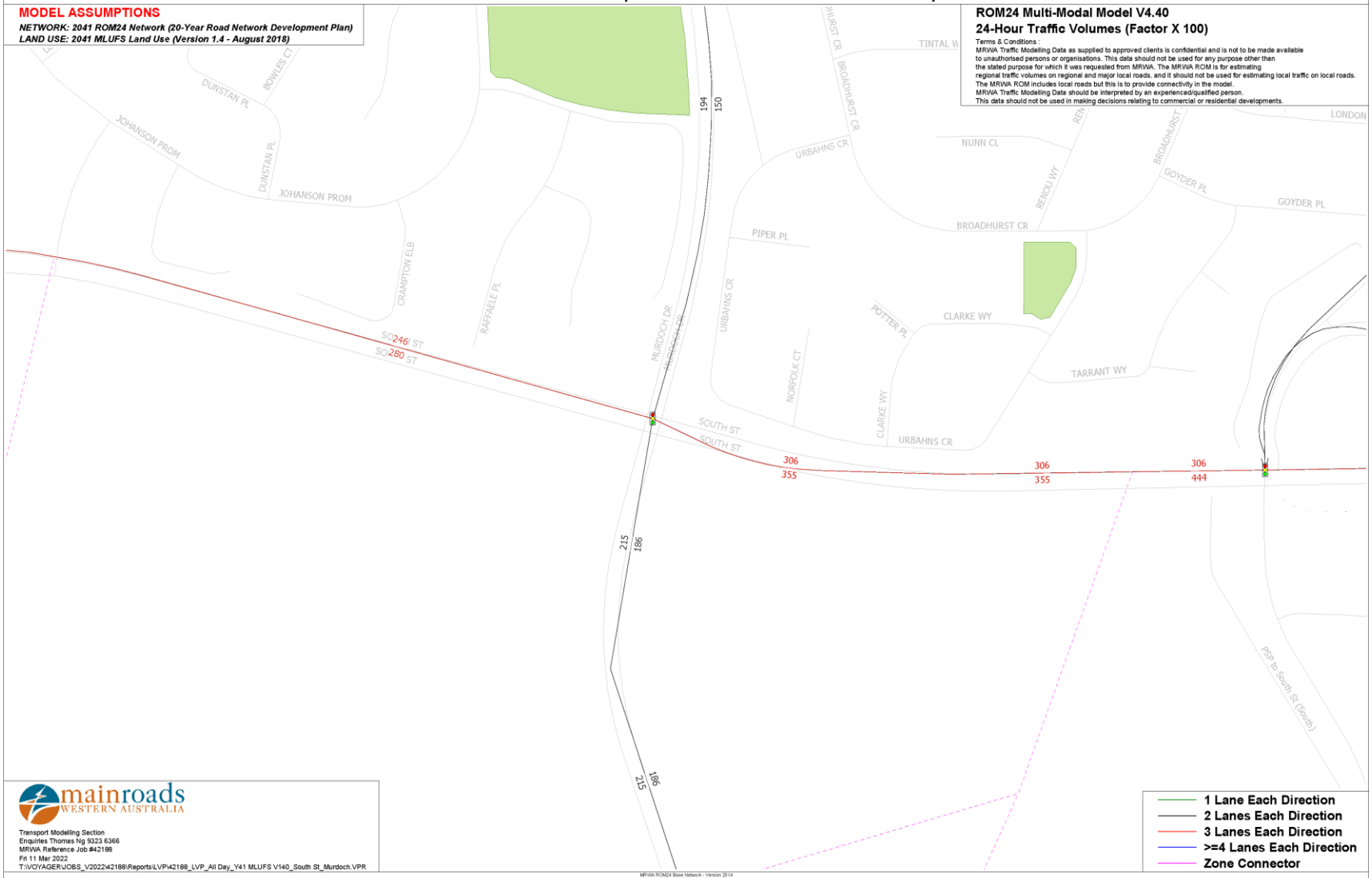
MRWA TRAFFIC FLOW DATA

2041 ROM24 Scenario - Link Volume Plot for South St and Murdoch Dr, Murdoch Noise Assessment
All Day
MLUFS Version 1.4 land use assumption with 20-Year Road Network Development Plan

MODEL ASSUMPTIONS

NETWORK: 2041 ROM24 Network (20-Year Road Network Development Plan)
LAND USE: 2041 MLUFS Land Use (Version 1.4 - August 2018)

ROM24 Multi-Modal Model V4.40
24-Hour Traffic Volumes (Factor X 100)



mainroads WESTERN AUSTRALIA

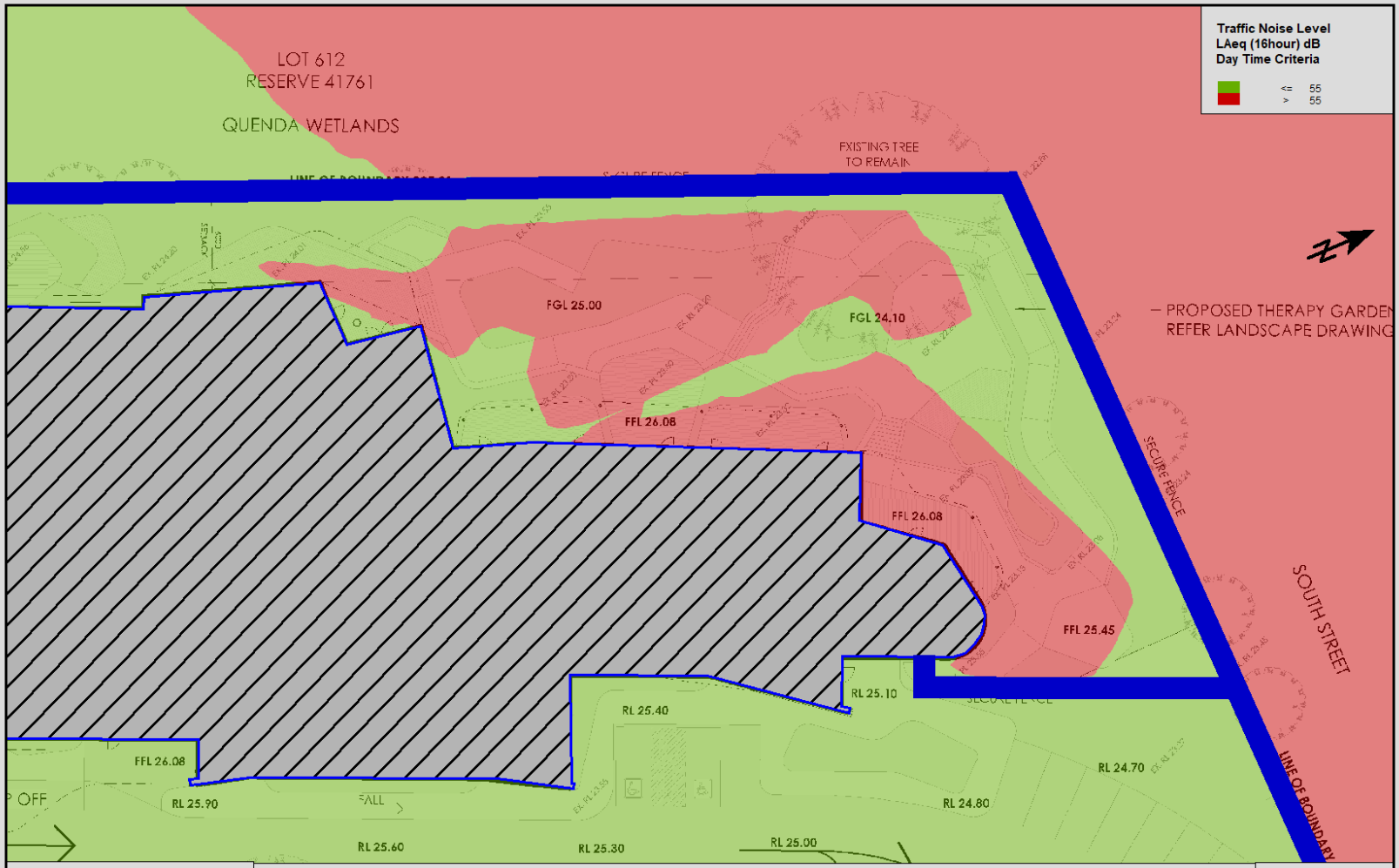
Transport Modelling Section
Enquiries Thomas Ng 9323 6366
MRWA Reference Job #42188
Fri 11 Mar 2022
T:\VOYAGER\JOBS_V2022\42188\Reports\LVP\42188_LVP_All Day_Y41 MLUFS V140_South St_Murdoch.VPR

- 1 Lane Each Direction
- 2 Lanes Each Direction
- 3 Lanes Each Direction
- >=4 Lanes Each Direction
- Zone Connector

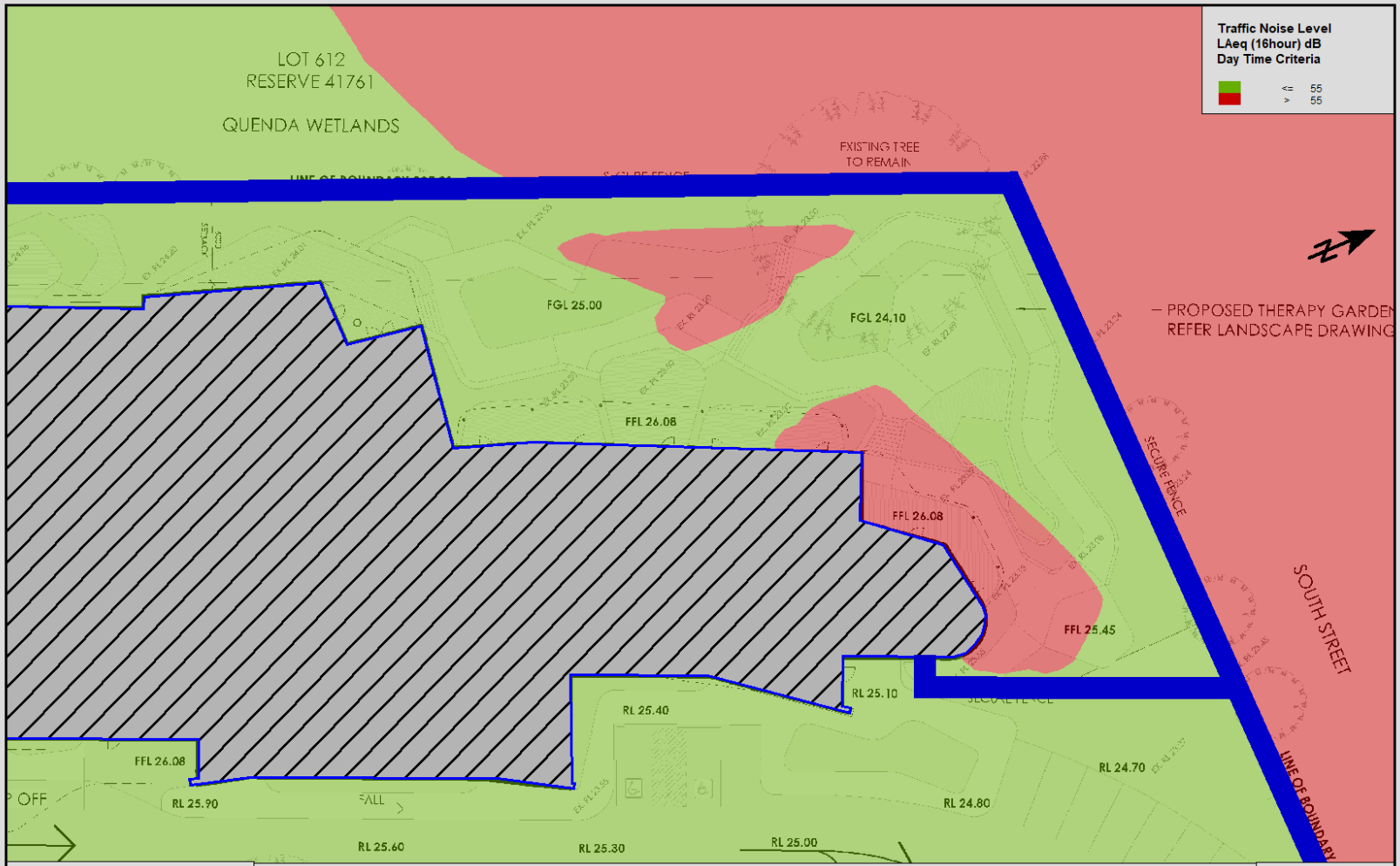
cube

APPENDIX D

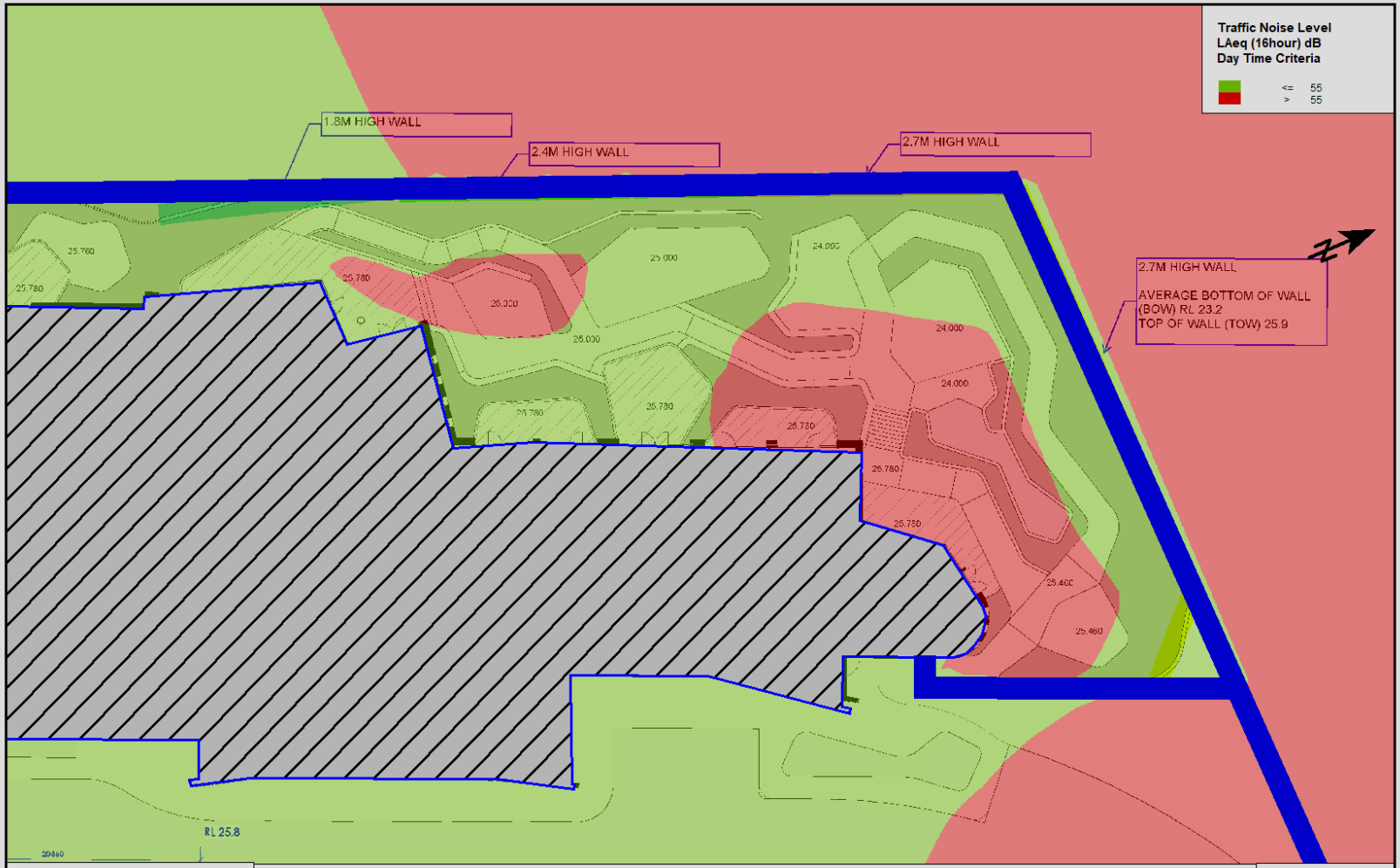
NOISE CONTOURS



Herring Storer Acoustics **Job No - 20178**	**SJOG Murdoch, Mental Health Hospital** **Future Traffic Volumes - 2.4m Boundary Fence** **LAeq (16hour) Day Noise Level Contour**	**Figure 01**



Herring Storer Acoustics **Job No - 20178**	**SJOG Murdoch, Mental Health Hospital** **Future Traffic Volumes - 2.7m Boundary Fence** **LAeq (16hour) Day Noise Level Contour**	**Figure 02**



Herring Storer Acoustics Job No - 20178	SJOG Murdoch, Mental Health Hospital Future Traffic Volumes - Fences Indicated LAeq (16hour) Day Noise Level Contour	Figure 03