



TRAFFIC NOISE IMPACT ASSESSMENT

PROPOSED PRECINCT 4F DEVELOPMENT

YARRABILBA

**PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL**

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Prepared for:
Lendlease

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30 September 2022

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1.0 INTRODUCTION

1.1 STUDY BRIEF

MWA Environmental has been engaged to prepare a Traffic Noise Impact Assessment for the proposed 'Precinct 4F' development at Yarrabilba.

The report has assessed the potential road traffic noise impact and mitigation measures associated with the Major Collector Road corridor within the Yarrabilba development area based on the updated lot reconfiguration plan and civil earthworks design.

Using standard traffic noise assessment methodology and 10 Year Planning Horizon traffic forecasts, this assessment has been conducted using computer noise modelling of the road traffic volumes on the Major Collector Road as part of Yarrabilba development, and considering the following:

- Preliminary design level contours for Precinct 4F by KN Group;
- Proposed ROL for Precinct 4F by KN Group;
- Preliminary civil works levels for the ultimate Major Collector Road corridors provided by KN Group; and
- Updated planning horizon traffic design data for the road corridor as advised by SLR.

1.2 SITE DESCRIPTION

The proposed Precinct 4F development is located in the southwestern portion of the overall Yarrabilba development. The site location is shown on **Figure 1**.

The Major Collector Road, North-South Road is located along the eastern side of Precinct 4F.

1.3 PROPOSED DEVELOPMENT

The proposed overall Precinct 4F development comprises approximately 331 residential allotments and associated internal road network.

The development plan is shown on **Figure 2**.

2.0 RELEVANT NOISE CRITERIA

2.1 EXTERNAL NOISE CRITERIA

The Logan Planning Scheme 2015 requirements for the assessment and mitigation of road traffic noise from Council-controlled roadways are limited to regulation of the acoustic treatment of houses within designated 'transport noise corridors' through the Queensland Development Code. There are no external traffic noise criteria in the current Logan Planning Scheme 2015 and there does not appear to be a specific requirement for assessment of road traffic noise for a reconfiguration of lot adjacent to a road that is not a designated 'transport noise corridor'.

Logan City Council has gazetted transport noise corridors under the Building Act 1975 which provides for the regulation of the acoustic treatment of dwellings affected by road traffic noise in accordance with Queensland Development Code Mandatory Part 4.4 '*Buildings in a transport noise corridor*' ("**MP4.4**"). This process is managed by private certifiers based upon overlay mapping managed by the Queensland Department of Housing and Public Works.

The Arterial and Major Collector road corridors are not currently gazetted as a transport noise corridor but is likely to be at some stage in the future if and when traffic volumes exceed 5,000 vehicles per day. Until such time as the road corridors is gazetted as a 'transport noise corridor' there is unlikely to be a requirement for acoustic treatment of houses in proximity to the road. There is the potential that houses may already be constructed on allotments adjacent to the road prior to a 'transport noise corridor' being gazetted and thus no acoustic treatment requirements would be applied.

This notwithstanding, this assessment has addressed the methodology and criteria of the TMR *Road Traffic Noise Management: Code of Practice* and Queensland Development Code (QDC) MP4.4 – *Buildings in a Transport Noise Corridor* and State Code 1: *Development in a state-controlled road environment (SDAP)*. The assessment has considered what noise levels would be experienced at the backyard of the proposed allotments to comply with a 60 dB(A) L₁₀ 18 hour noise limit typically applied by the more recent SDAP and the MP4.4 'noise categories' (which define standard of acoustic treatment required) that would be expected within a transport noise corridor if gazetted after completion.

The relevant criteria for the assessment of noise impacts are outlined in *State Code 1: Development in a state-controlled road environment - Table 1.5 Environmental emissions*, as follows:

Involving the creation of 6 or more new residential lots adjacent to a state-controlled road or type 1 multi-modal corridor	
PO38 Reconfiguring a lot minimises free field noise intrusion from a state-controlled road .	AO38.1 Development provides noise barrier or earth mound which is designed, sited and constructed: - to achieve the maximum free field acoustic levels in reference table 2 (item 2.1); - in accordance with: - Chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013; - Technical Specification-MRTS15 Noise Fences, Transport and Main Roads, 2019; - Technical Specification-MRTS04 General Earthworks, Transport and Main Roads, 2020. OR AO38.2 Development achieves the maximum free field acoustic levels in reference table 2 (item 2.1) by alternative noise attenuation measures where it is not practical to provide a noise barrier or earth mound.

Table 2: Maximum free field acoustic levels

Applicable use	Acoustic levels
2.1: Private open space for residential lots	a. ≤ 57 dB(A) L_{10} (18 hour) free field (measured L_{90} (18 hour) free field between 6am and 12 midnight ≤ 45 dB(A))
2.2: Private open space for an accommodation activity (including lots created for a future accommodation activity)	OR b. ≤ 60 dB(A) L_{10} (18 hour) free field (measured L_{90} (18 hour) free field between 6am and 12 midnight > 45 dB(A))
2.3: Outdoor education areas and outdoor play areas in a childcare centre or educational establishment	≤ 63 dB(A) L_{10} (12 hour) free field (between 6am and 6pm)

2.2 QDC MP4.4 NOISE CATEGORIES

Since implementation in August 2010, assessment of internal road traffic noise amenity (i.e. within habitable rooms) for dwellings adjacent to state-controlled roads is regulated by the Queensland Development Code (QDC) MP4.4 *Buildings in a Transport Noise Corridor* (“**QDC MP4.4**”).

An objective of this noise assessment is to determine which QDC MP4.4 noise categories are appropriate for proposed allotments. Under MP4.4 the specific acoustic treatment requirements for proposed dwellings are dependent upon the noise exposure category of the building site, as follows:

Table 1: Summary of QDC MP4.4 Traffic Noise Categories

QDC MP4.4 Noise Category	L₁₀ 18 hour* for state-controlled roads
Category 4	≥ 73 dB(A)
Category 3	68 – 72 dB(A)
Category 2	63 – 67 dB(A)
Category 1	58 - 62 dB(A)
Category 0 (no acoustic treatment required)	≤ 57 dB(A)

** measured at 1 m from the façade of the proposed or existing building.*

3.0 TRAFFIC NOISE IMPACT ASSESSMENT

3.1 TRAFFIC NOISE ASSESSMENT

In order to assess compliance with the SDAP external noise criteria, 10-year design horizon traffic noise predictions have been predicted across the site. The noise model has represented the design horizon of the development traffic on the Major Collector road based upon the design topographical contours of the road and of Precinct 4F allotments.

The SoundPLAN 8.2 model was setup to predict the external L_{10} (18 hour) traffic noise levels under design traffic flow conditions for the Year 2034.

3.1.1 Traffic Volume Data

The design horizon traffic volumes (daily two way total) and speed limits provided by SLR are as provided in the **Table 2** below.

The 18 hour (6am to Midnight) traffic volume has been approximated as 94% of the daily volume. Heavy vehicle percentage is considered to be a conservative 5% for modelling purposes as advised by SLR.

Table 2: Design Traffic Volume Data

Planning Horizon	Road Section	Daily Vehicles Volume (AADT)	Speed (km/hr)
10 Year Planning	North-South Road	18,700	60

3.1.2 Predicted Future Traffic Noise Levels – Residential Outdoor Areas

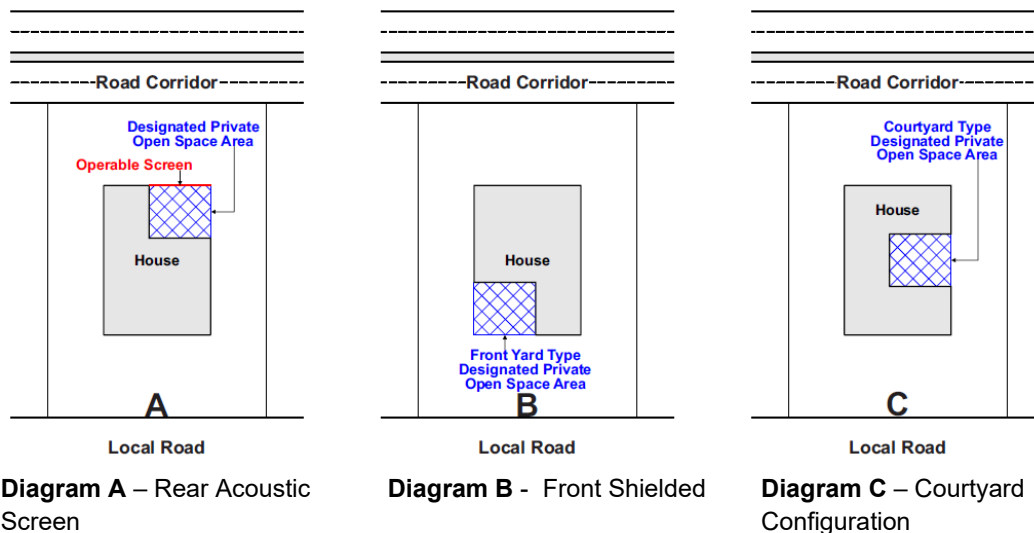
A SoundPLAN 8.2 model was setup to predict the external L_{10} (18 hour) traffic noise levels under 10 year design traffic flow conditions for Ground Level (+1.8m) and Upper Level (+4.6m) receptors **with acoustic barriers**. The recommended acoustic barriers were represented at height of **1.8 metres above the proposed allotment pad level or on top of the retaining wall** whichever is the higher point as shown on **Figure 3**.

The results of the traffic noise modelling for ground level receptors within Precinct 4F indicates that the adopted SDAP noise criterion of 60 dB(A) L_{10} (18 hour) for outdoor recreation space (backyards) will comply at majority of the allotments along the road frontage.

Lots 270, 271, 370, 407, 462, 463, 498 to 510 and 601 to 604 exceed the outdoor recreational space criteria with the 1.8 metre high acoustic barriers and thus alternatively, specific design features (e.g. more shielded locations, operable walls/louvres to shield road traffic noise) may be incorporated in order to comply with the 60 dB(A) L_{10} (18 hour) noise amenity criteria for outdoor recreational areas. The outdoor recreational spaces this solution can be considered for are shown on **Figure 4**.

As such, Lots 270, 271, 370, 407, 462, 463, 498 to 510 and 601 to 604 outdoor recreational spaces for future dwellings on the Lots described above may be designed to incorporate either:

1. A covered outdoor recreation space (e.g. patio / deck) set into a rear corner of the dwelling with an operable wall/louvre (or similar) along the trafficable lane façade which can be closed by residents during higher traffic noise periods if desired (see **Diagram A** below); or
2. An outdoor recreation area on the front façade of the dwelling (located at front façade facing access road) (see **Diagram B** below); or
3. A more centrally located outdoor recreational area in the form of courtyard to maximise building façade shielding (see **Diagram C** below).



With the above design feature(s) residents will have access to outdoor recreation space that is compliant with the relevant external noise amenity criteria.

The predicted road traffic noise contour maps which demonstrate areas in compliance of the 60 dB(A) L_{10} (18 hour) for outdoor spaces are provided in **Attachment 1**.

3.1.3 Predicted Future Traffic Noise Levels – QDC MP4.4 Noise Categories

Under the *Building Act 1975*, the transport Chief Executive may designate land as being within a transport noise corridor and compliance with QDC MP4.4 is required if the land is within:

- 100 metres of a state-controlled road; or
- Up to 250 metres of a state-controlled road if the noise of traffic on the road is at least 58 dB(A).

Effectively, for the purposes of land use planning assessment and the design of future dwellings in accordance with the QDC, acoustic treatment may be required for dwellings located within 250 metres of the roadway if external L_{10} (18 hour) noise levels exceed 58 dB(A). This notwithstanding, it is noted that this may occur some stage in the future under an ultimate design horizon or when the Southern Infrastructure Corridor is commissioned, however it is expected that up to and after Year 2034 the land within 100 metres of the Major Collector Road would at some time be designated as being within a transport noise corridor.

In the event that major roads were to be gazetted as a 100 metre transport noise corridor then, based upon our 2034 modelling for Precinct 4F, single-storey dwellings adjoining the road corridor boundaries would be subject to QDC MP4.4 'Noise Category 0 to 2' acoustic treatment requirements.

For the upper level of any two-storey houses within Precinct 4F a maximum 'Noise Category 3' acoustic treatment requirement would apply.

Table 3 below presents the affected allotments within a 100 metre transport corridor and the applicable QDC MP4.4 noise categories for any future single or two storey dwellings on the allotments within Precinct 4F.

A copy of the Queensland Development Code (QDC) *MP4.4 – Buildings in a Transport Noise Corridor* is included in **Attachment 2** including indicative acceptable forms of construction.

Table 3: Recommended QDC MP4.4 'Noise Categories' for 'Precinct 4F' Allotments

QDC MP4.4 Noise Categories PRECINCT 4F		
Lot #	Single storey house / ground floor	Upper floor of two storey house
265	Category 0	Category 1
266	Category 1	Category 1
267	Category 1	Category 1
268	Category 1	Category 2
269	Category 1	Category 2
270	Category 2	Category 2
271	Category 2	Category 3
370	Category 3	Category 3
371	Category 2	Category 2
372	Category 1	Category 2
373	Category 1	Category 2
374	Category 1	Category 1
375	Category 1	Category 1
376	Category 1	Category 1
392	Category 0	Category 1
393	Category 1	Category 1
394	Category 1	Category 1
395	Category 1	Category 1
396	Category 1	Category 1
397	Category 1	Category 1
402	Category 1	Category 1
403	Category 1	Category 1
404	Category 1	Category 1
405	Category 1	Category 2
406	Category 2	Category 2
407	Category 2	Category 3
460	Category 1	Category 2
461	Category 2	Category 2
462	Category 2	Category 3
463	Category 2	Category 3
464	Category 1	Category 2
465	Category 2	Category 3
466	Category 2	Category 3
467	Category 2	Category 3
468	Category 2	Category 3
469	Category 1	Category 2
470	Category 1	Category 1
471	Category 1	Category 1
472	Category 2	Category 1
494	Category 0	Category 1
495	Category 0	Category 1
496	Category 1	Category 1
497	Category 1	Category 1

*Noise Category 0 – No acoustic treatment is required

Table 3 – Continued

QDC MP4.4 Noise Categories PRECINCT 4F		
Lot #	Single storey house / ground floor	Upper floor of two storey house
498	Category 2	Category 3
499	Category 2	Category 3
500	Category 2	Category 3
501	Category 2	Category 3
502	Category 2	Category 3
503	Category 2	Category 3
504	Category 2	Category 3
505	Category 2	Category 3
506	Category 2	Category 3
507	Category 2	Category 3
508	Category 2	Category 3
509	Category 2	Category 3
510	Category 2	Category 3
511	Category 1	Category 2
512	Category 1	Category 1
513	Category 1	Category 1
514	Category 1	Category 1
515	Category 0	Category 1
516	Category 0	Category 1
527	Category 0	Category 1
528	Category 0	Category 1
529	Category 1	Category 1
530	Category 1	Category 1
531	Category 1	Category 1
532	Category 1	Category 1
533	Category 1	Category 1
534	Category 0	Category 1
535	Category 0	Category 1
537	Category 0	Category 1
538	Category 0	Category 1
539	Category 1	Category 1
540	Category 1	Category 1
595	Category 0	Category 1
596	Category 0	Category 1
597	Category 0	Category 1
598	Category 1	Category 1
599	Category 1	Category 2
600	Category 1	Category 2
601	Category 2	Category 3
602	Category 2	Category 3
603	Category 2	Category 3
604	Category 2	Category 3
605	Category 1	Category 1
606	Category 0	Category 1
607	Category 0	Category 0
620	Category 0	Category 1
621	Category 0	Category 1
622	Category 0	Category 0

*Noise Category 0 – No acoustic treatment is required

The SoundPLAN model predictions are presented as plots of predicted Year 2034 L_{10} (18 hour) traffic noise levels (including +2.5dB façade reflection) over the proposed residential subdivision for ground level (+1.8m) receptors (refer **Attachment 3**).

The SoundPLAN model predictions are also presented as plots of predicted Year 2034 L_{10} (18 hour) traffic noise levels (including +2.5dB façade reflection) over the proposed residential subdivision for upper level (+4.6m) receptors (refer **Attachment 4**).

4.0 CONCLUSIONS

MWA Environmental has been engaged by Lend Lease to prepare a Traffic Noise Impact Assessment for the proposed 'Precinct 4F' development at Yarrabilba.

The report has assessed the potential road traffic noise impact and mitigation measures associated with the Major Collector Road corridor within the Yarrabilba development area based on updated lot reconfiguration plan and civil earthworks design.

The road corridor is not currently gazetted as a transport noise corridor but it is likely to be at some stage in the future if and when traffic volumes exceed 5,000 vehicles per day. Until such time as the road corridor is gazetted as a 'transport noise corridor' there is unlikely to be a requirement for acoustic treatment of houses in proximity to the road. There is the potential that houses may be constructed on allotments adjacent to the road prior to a 'transport noise corridor' being gazetted and thus no acoustic treatment requirements would be applied at the time of construction.

This notwithstanding, this assessment has addressed the methodology and criteria of the TMR *Road Traffic Noise Management: Code of Practice, State Code 1: Development in a state-controlled road environment (SDAP)* and Queensland Development Code (QDC) *MP4.4 – Buildings in a Transport Noise Corridor*.

The assessment has considered what noise levels would be experienced at the backyard of the proposed allotments to comply with a 60 dB(A) L_{10} 18 hour noise limit typically applied and the MP4.4 'noise categories' (which define standard of acoustic treatment required) would be expected within a transport noise corridor if gazetted after completion.

The results of the traffic noise modelling for outdoor areas within Precinct 4F indicates that the adopted noise criterion of 60 dB(A) L_{10} (18 hour) for outdoor recreation space (backyards) will achieve compliance at most of the proposed allotment within Precinct 4F with the inclusion of acoustic barriers at height of **1.8 metres above the allotment pad level or on top of the retaining wall**, whichever is the higher point as shown on **Figure 3, with the exception of Lots 270, 271, 370, 407, 462, 463, 498 to 510 and 601 to 604.**

Alternatively, specific design features (e.g. more shielded locations, operable walls/louvres to shield road traffic noise) may be incorporated for Lots 270, 271, 370, 407, 462, 463, 498 to 510 and 601 to 604 in order to comply with the 60 dB(A) L_{10} (18 hour) noise amenity criteria for outdoor recreational areas. The outdoor recreational spaces this solution can be considered for are shown on **Figure 4.**

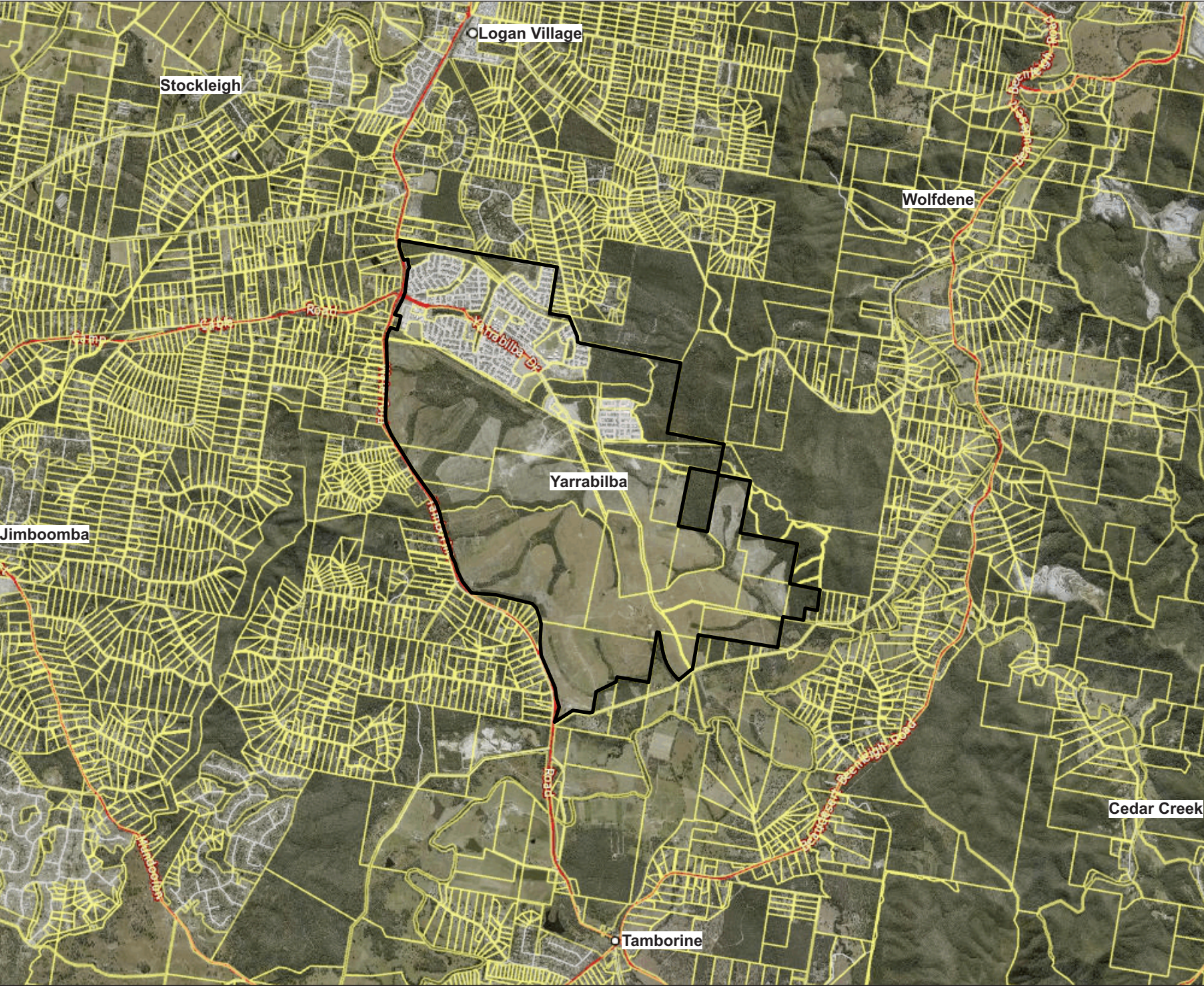
As such, Lots 270, 271, 370, 407, 462, 463, 498 to 510 and 601 to 604 outdoor recreational spaces for future dwellings on the Lots described above may be designed to incorporate either:

1. A covered outdoor recreation space (e.g. patio / deck) set into a rear corner of the dwelling with an operable wall/louvre (or similar) along the trafficable lane façade which can be closed by residents during higher traffic noise periods if desired (see **Diagram A** below); or
2. An outdoor recreation area on the front façade of the dwelling (located at front façade facing access road) (see **Diagram B** below); or
3. A more centrally located outdoor recreational area in the form of courtyard to maximise building façade shielding (see **Diagram C** below).

In the event that major roads were to be gazetted as a 100 metre transport noise corridor then, based upon our 2034 modelling for Precinct 4F, single-storey dwellings adjoining the road corridor boundaries would be subject to QDC MP4.4 'Noise Category 0 to 2' acoustic treatment requirements. For the upper level of any two-storey houses within Precinct 4F a maximum 'Noise Category 3' acoustic treatment requirement would apply. **Table 3** of this report presents the affected allotments and the applicable QDC MP4.4 noise categories for any future single or double storey dwellings on the allotment within Precinct 4F.

MWA Environmental
30 September 2022

FIGURES



LEGEND

PROPERTY BOUNDARY

DRAWING REFERENCE

© THE STATE OF QUEENSLAND QLDGLOBE

N

01.02.0km

CLIENT

LENDELEASE

PROJECT

TRAFFIC NOISE
IMPACT ASSESSMENT
PROPOSED PRECINCT 4F
YARRABILBA QLD

TITLE

SITE LOCATION

JOB

YARRABILBA

FIGURE 1

JOB NO.

22-084

DRAWING NUMBER

DATE

04/04/22

22-084-1

SCALE

1:70,000 (A4)

REV.

mwa

ENVIRONMENTAL

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- PRECINCT FOUR - APPLICATION FIVE BOUNDARY
- STAGE BOUNDARY
- OPEN SPACE
- LOCAL STAGE ROAD
- PATHWAY CONNECTION
- VILLAGE ROAD
- MAJOR ROAD

LAND USE	AREA (ha)
Residential	14.84 ha
Open Space	0.92 ha
Road - Major Road	1.60 ha
Road - Collector Road	2.69 ha
Road - Local Street	4.29 ha
TOTAL	24.33 ha

MINIMUM RESIDENTIAL DENSITY - 22.73 ha
331 dw

MAXIMUM RESIDENTIAL DENSITY - 14.6 dw/ha
22.73 ha
331 dw
14.6 dw/ha

LOT YIELD BY LOT TYPE

LOT TYPE	No.	No. %	AREA	AREA %	MINIMUM	MAXIMUM	AVERAGE
T1	15	4.53%	10631.73m ²	7.16%	640.00m ²	891.28m ²	708.78m ²
T2	13	3.93%	7907.44m ²	5.33%	576.00m ²	751.23m ²	608.26m ²
T3	5	1.51%	3145.53m ²	2.12%	576.00m ²	699.00m ²	629.11m ²
C2	56	16.92%	26009.53m ²	17.52%	448.00m ²	611.31m ²	464.46m ²
C3	51	15.41%	27736.59m ²	18.69%	508.16m ²	778.59m ²	543.85m ²
PV	58	17.52%	24340.38m ²	16.40%	396.97m ²	592.34m ²	419.66m ²
V	32	9.67%	11417.86m ²	7.69%	336.00m ²	519.49m ²	356.81m ²
TT3	4	1.21%	2971.66m ²	2.00%	691.64m ²	782.67m ²	742.91m ²
TCY2	23	6.95%	8860.50m ²	5.97%	350.00m ²	502.41m ²	385.24m ²
TCY3	22	6.65%	10144.87m ²	6.84%	400.00m ²	596.94m ²	461.13m ²
TPV	19	5.74%	6128.98m ²	4.13%	312.50m ²	413.04m ²	322.58m ²
TV	21	6.34%	6011.13m ²	4.05%	262.50m ²	386.25m ²	286.24m ²
TCD	12	3.63%	3113.11m ²	2.10%	202.50m ²	373.28m ²	259.43m ²
TOTALS	331	100%	148419.31m²	100%	202.50m²	891.28m²	448.40m²

NOTE:
MINIMUM DWELLINGS is based on the development of one dwelling on each single family and multi-family strata (MFS) lot.
MAXIMUM DWELLINGS is based on the development of one dwelling on each single family lot, and three dwellings on each multi family strata (MFS).

DENSITY calculations include the area of residential lots, local roads and credited park. The boundaries, roads and pathways shown hereon are subject to detailed engineering design, final survey and approval of subsequent development applications by the relevant authorities.

PRECINCT FOUR - APPLICATION FIVE RECONFIGURATION OF A LOT

NOTE: This plan is indicative only, and specific uses, road alignment, boundaries, setbacks, and building layout shown may vary due to detailed design consideration. ©2022 Lendlease Communities (Australia). All rights reserved. Except as permitted by Lendlease, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the permission of Lendlease.

0 25 50 75 100 125m

Scale 1:2,500 at A3



Lendlease

Date 07 SEPT 2022





Legend

-  Cadastral
-  Surface
-  1.8m Acoustic Barrier
-  Road

FIGURE 4

**Yarrabilba 22-021
Precinct 4F**

**Year 2034 Road Traffic
Noise**

**Acoustic Barrier Location
and Height**

September 2022



Attachment 1

*SoundPLAN 8.2 Modelling
Design Horizon Traffic Noise Predictions – Outdoor Recreation Space*

Attachment 2

QDC MP4.4 – Acceptable Solutions

Schedule 1

Noise category	Minimum transport noise reduction (dB (A)) required for habitable rooms	Component of building's external envelope	Minimum R_w required for each component
Category 4	40	Glazing	43
		External walls	52
		Roof	45
		Floors	51
		Entry doors	35
Category 3	35	Glazing	38 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m ²)
			35 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m ²)
		External walls	47
		Roof	41
		Floors	45
		Entry doors	33

Noise category	Minimum transport noise reduction (dB (A)) required for habitable rooms	Component of building's external envelope	Minimum R_w required for each component
Category 2	30	Glazing	35 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m ²)
			32 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m ²)
		External walls	41
		Roof	38
		Floors	45
		Entry doors	33
Category 1	25	Glazing	27 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m ²)
			24 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m ²)
		External walls	35
		Roof	35
		Entry Doors	28
Category 0	No additional acoustic treatment required – standard building assessment provisions apply.		

Schedule 2

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
Glazing	43	Double glazing consisting of two panes of minimum 5mm thick glass with at least 100mm air gap and full perimeter <i>acoustically rated seals</i> .
	38	Minimum 14.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> ; OR Double glazing consisting of one pane of minimum 5mm thick glass and one pane of minimum 6mm thick glass with at least 44mm air gap, and full perimeter <i>acoustically rated seals</i>
	35	Minimum 10.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> .
	32	Minimum 6.38mm thick laminated glass with full perimeter <i>acoustically rated seals</i> .
	27	Minimum 4mm thick glass with full perimeter <i>acoustically rated seals</i>
	24	Minimum 4mm thick glass with standard weather seals

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
External walls	52	Two leaves of clay brick masonry, at least 270mm in total, with subfloor vents fitted with noise attenuators.
	47	Two leaves of clay brick masonry at least 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) 50mm thick mineral insulation or 50mm thick glass wool insulation with a density of 11kg/m³ or 50mm thick polyester insulation with a density of 20kg/m³ in the cavity. OR Two leaves of clay brick masonry at least 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) at least 13mm thick cement render on each face OR Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) Mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³ positioned between studs; and (iii) One layer of plasterboard at least 13mm thick fixed to outside face of studs. OR Single leaf of minimum 150mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	41	Two leaves of clay brick masonry at least 110mm thick with cavity not less than 50mm between leaves OR Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³ positioned between studs; and (iii) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR Single leaf of brick masonry at least 110mm thick with at least 13mm thick render on each face OR Concrete brickwork at least 110mm thick OR In-situ concrete at least 100mm thick OR Precast concrete at least 100mm thick and without joints.

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	35	Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR Minimum 6mm thick fibre cement sheeting or weatherboards or plank cladding externally, minimum 90mm deep timber stud or 92mm metal stud, standard plasterboard at least 13mm thick internally.
Roof	45	Concrete or terracotta tile or sheet metal roof with sarking, <i>acoustically rated plasterboard</i> ceiling at least 13mm thick fixed to ceiling joists, cellulose fibre insulation at least 100mm thick with a density of at least 45kg/m³ in the cavity. OR Concrete or terracotta tile or sheet metal roof with sarking, 2 layers of <i>acoustically rated plasterboard</i> at least 16mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity.
	41	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity. OR Concrete suspended slab at least 100mm thick.
	38	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity, mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³.

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	35	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity.
Floors	51	Concrete slab at least 150mm thick.
	45	Concrete slab at least 100mm thick OR Tongued and grooved boards at least 19mm thick with: (i) timber joists not less than 175mm x 50mm; and (ii) mineral insulation or glass wool insulation at least 75mm thick with a density of at least 11kg/m ³ positioned between joists and laid on plasterboard at least 10mm thick fixed to underside of joists; and (iii) mineral insulation or glass wool insulation at least 25mm thick with a density of at least 11kg/m ³ laid over entire floor, including tops of joists before flooring is laid; and (iv) secured to battens at least 75mm x 50mm; and (v) the assembled flooring laid over the joists, but not fixed to them, with battens lying between the joists.
Entry Doors	35	Solid core timber not less than 45mm thick, fixed so as to overlap the frame or rebate of the frame by not less than 10mm, with full perimeter <i>acoustically rated seals</i> .
	33	Fixed so as to overlap the frame or rebate of the frame by not less than 10mm, fitted with full perimeter <i>acoustically rated seals</i> and constructed of - (i) solid core, wood, particleboard or blockboard not less than 45mm thick; and/or (ii) acoustically laminated glass not less than 10.38mm thick.

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	28	Fixed so as to overlap the frame or rebate of the frame, constructed of - (i) Wood, particleboard or blockboard not less than 33mm thick; or (ii) Compressed fibre reinforced sheeting not less than 9mm thick; or (iii) Other suitable material with a mass per unit area not less than 24.4kg/m²; or (iv) Solid core timber door not less than 35mm thick fitted with full perimeter <i>acoustically rated seals</i>.

Attachment 3

*SoundPLAN 8.2 Modelling
Design Horizon Traffic Noise Predictions –
Ground Level QDC MP4.4 Noise Categories*



Noise level
L10(18hr)
incl. facade reflection
in dB(A)

Noise Category 0
≤ 58.0
Noise Category 1
58.0 < ≤ 63.0
Noise Category 2
63.0 < ≤ 68.0
Noise Category 3
68.0 < ≤ 73.0
Noise Category 4
73.0 <

Legend

— Cadastral
— Road Surface

**Yarrabilba 22-084
Precinct 4F**

Year 2034 Traffic Noise

MP4.4 Noise Categories

**Ground Level Facades
With Barriers**

September 2022

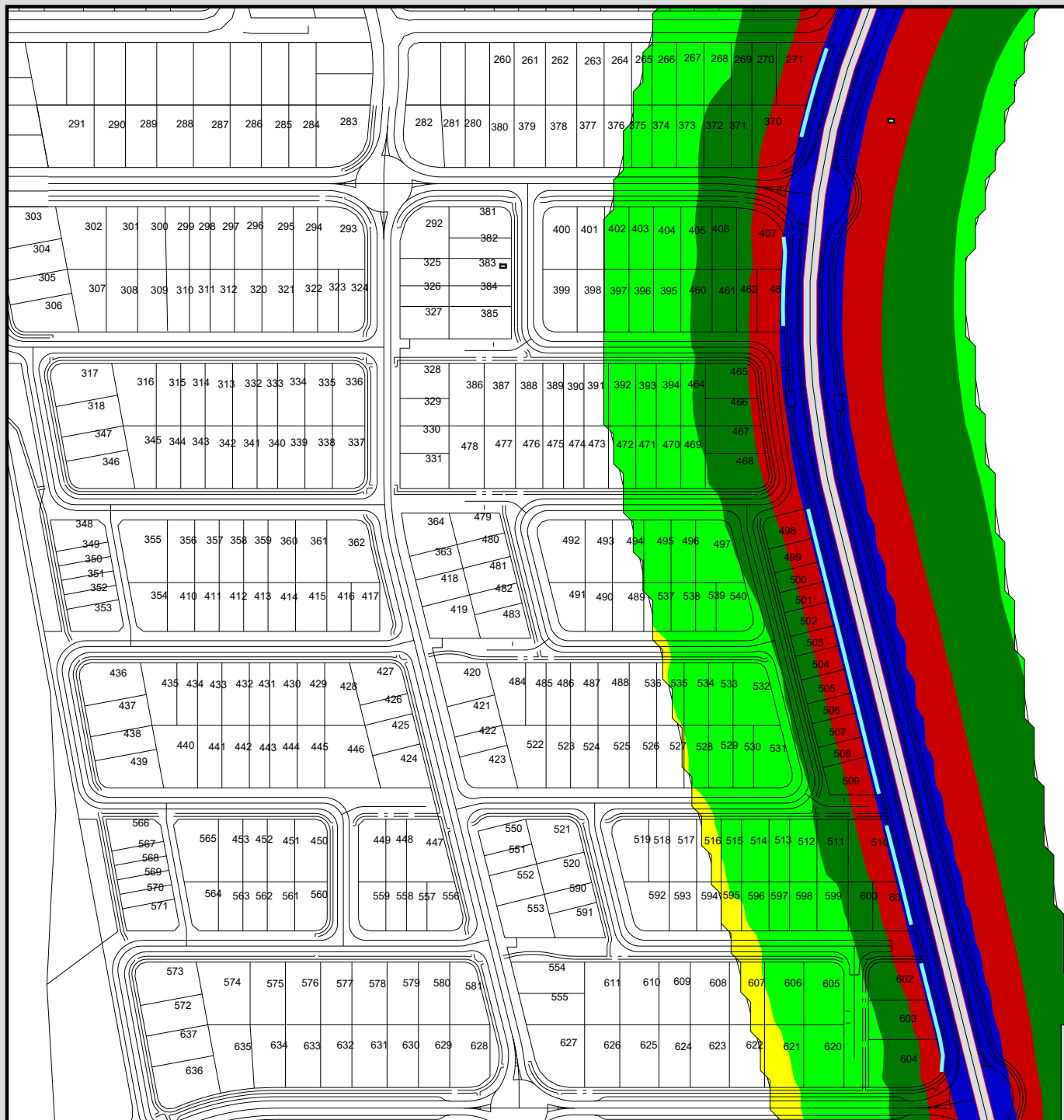
Length scale 1:3000

0 15 30 60 90 120
m



ATTACHMENT 4

*SoundPLAN 8.2 Modelling
Design Horizon Traffic Noise Predictions –
Upper Level QDC MP4.4 Noise Categories*



Noise level
L10(18hr)
incl. facade reflection
in dB(A)

Noise Category 0
≤ 58.0
Noise Category 1
58.0 < ≤ 63.0
Noise Category 2
63.0 < ≤ 68.0
Noise Category 3
68.0 < ≤ 73.0
Noise Category 4
73.0 < ≤ 78.0

Legend

— Cadastral
— Road Surface

**Yarrabilba 22-084
Precinct 4F**

Year 2034 Traffic Noise

MP4.4 Noise Categories

**Upper Level Facades
With Barriers**

September 2022

Length scale 1:3000

0 15 30 60 90 120 m

