PLANS AND DOCUMENTS
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DEVELOPMENT APPROVAL

Approval no: DEV2018/955

Date: 15 October 2018

Queensland Government

TRAFFIC NOISE IMPACT ASSESSMENT

PROPOSED PRECINCT 3A SUPERBLOCK DEVELOPMENT

YARRABILBA

Prepared for:
Lendlease

Prepared by:
MWA Environmental

7 August 2018

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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 3A - Superblock” development at Yarrabilba.

The report has assessed the potential road traffic noise impact and mitigation measures associated with the Arterial Road (Yarrabilba Drive) corridor within the Yarrabilba Precinct 3A development area.

Using standard traffic noise assessment methodology and ultimate planning horizon traffic data for the likely timeframe for development (Year 2031), this assessment has been conducted using computer noise modelling of the road traffic on Yarrabilba Drive, considering the following:

- Preliminary design levels for Precinct 3A provided by Lendlease;
- Estimated road levels for the ultimate Yarrabilba Drive; and
- Preliminary planning horizon traffic volume of 11,830 vehicle per day for Yarrabilba Drive as advised by SLR.

1.2 SITE DESCRIPTION

The proposed Precinct 3A - Superblock development is located in the north-eastern portion of the overall Yarrabilba development. Precinct 3A is bound by Basalt Drive, McKinnon Drive, Yarrabilba Drive and Woodward Avenue.

The site location is shown on **Figure 1.**

1.3 PROPOSED DEVELOPMENT

The proposed Precinct 3A - Superblock development comprises of 37 allotments as part of Stage 1 development with associated internal road network. The remaining Balance Lot 7000 will form part of Stage 2 development which will be lodged in a separate application.

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 road corridor is 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 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 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.

Woodward Avenue, Basalt Drive and McKinnon Drive that adjoin the development site will likely carry less than 3,000 per day as advised by SLR consulting and thus are inconsequential in terms of road transport noise assessment.

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) L_{10} 18 hour noise free-field limit typically applied by the more recent SDAP and what MP4.4 'noise categories' (which define standard of acoustic treatment required) which would be expected within a transport noise corridor if gazetted after completion.

Recent advice from Logan City Council indicates that, in general, acoustic barriers are not a preferred outcome due to the visual impact that solid fencing can create in certain circumstances.

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

Performance outcomes	Acceptable outcomes
Noise	
Accommodation activities	
PO23 Development involving an **accommodation activity** or land for a future **accommodation activity** minimises noise intrusion from a **state-controlled road** or **type 1 multi-modal corridor** in **habitable rooms**.	**AO23.1** A noise barrier or earth mound is provided which is designed, sited and constructed: 1. to meet the following external noise criteria at all facades of the building envelope: a. ≤60 dB(A) L_{10} (18 hour) façade corrected (measured L_{90} (8 hour) free field between 10pm and 6am ≤40 dB(A)) b. ≤63 dB(A) L_{10} (18 hour) façade corrected (measured L_{90} (8 hour) free field between 10pm and 6am >40 dB(A)) 2. 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.
PO24 Development involving an **accommodation activity** or land for a **future accommodation activity** minimises noise intrusion from a **state-controlled road** or **type 1 multi-modal corridor** in **outdoor spaces for passive recreation**.	**AO24.1** A noise barrier or earth mound is provided which is designed, sited and constructed: 1. to meet the following external noise criteria in **outdoor spaces for passive recreation**: 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)) 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. 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. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the State Development Assessment Provisions Supporting Information – Community Amenity (Noise), Department of Transport and Main Roads, 2013.

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	L_{10} 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 levels have been predicted across the site. The noise model has represented the design horizon traffic flow on Yarrabilba Drive based upon the design ground levels of the road and of Precinct 3A allotments.

The SoundPLAN 8.0 model was setup to predict the external $L_{10\ (18\ hour)}$ traffic noise levels under design traffic flow conditions for the Year 2031.

3.1.1 Traffic Volume Data

The design horizon traffic volumes (daily two way total) and speed limits provided by SLR are as indicated 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	Daily Vehicles Volume (AADT)	Daily Vehicles Volume (18hour)	Speed (km/hr)
10 Year Design Year 2031	11,830	11,120	60

3.1.2 Predicted Future Traffic Noise Levels – Residential Outdoor Areas

A SoundPLAN 8.0 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) receptors ***without acoustic barriers.***

The results of the traffic noise modelling for ground level receptors within Precinct 3A indicates that the adopted SDAP noise criterion of 60 dB(A) L_{10} (18 hour) free-field for outdoor recreation space (backyards) will be exceeded for the proposed allotments with boundaries adjoining the Yarrabilba Drive. The intrusion of the 60 dB(A) noise level occurs on the first two rows of allotments in Precinct 3A that adjoins the road corridor, albeit the majority of all lot areas comply with the road traffic noise planning limit without the need for acoustic barriers.

Given the relatively minor land area predicted to exceed a 60 dB(A) L_{10} (18 hour) external traffic noise level during the 10 year design horizon there is no warrant for construction of an acoustic barrier if a solid fence is not the preferred outcome of the development plan.

However, the results of the modelling demonstrate that, for outdoor recreation areas that do exceed the relevant criterion, specific design features (e.g. more shielded locations, operable walls/louvres to shield road traffic noise) are required on the flowing Lots in order to comply with the 60 dB(A) L_{10} (18 hour) external noise amenity criteria.

- Lot 1 and 2;
- Lot 7 and 8; and
- Lot 36 and 37.

Lots 21 to 25 indicate exceedance of the noise criteria on the front portion of the allotments, however the backyards remain complaint, therefore with construction of future dwellings on these allotments the backyards will readily achieve compliance.

As such, it is recommended that outdoor recreational spaces for future dwellings on the Lots described above and as presented in **Figure 3**, 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).

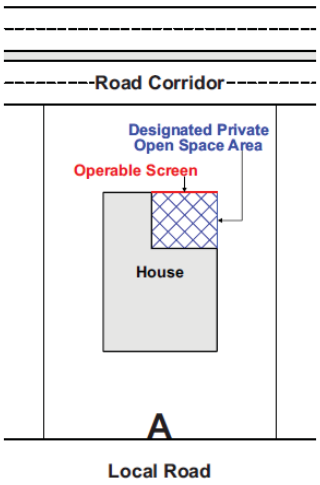

Diagram A – Rear Acoustic Screen

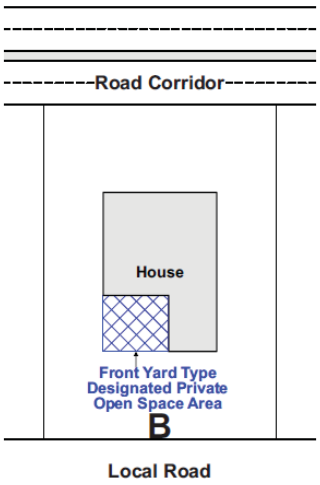

Diagram B - Front Shielded

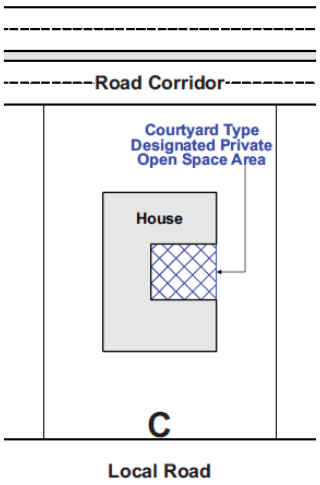

Diagram C – Courtyard Configuration

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 – Residential External Façade

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 not occur in the future under an ultimate design horizon for Yarrabilba Drive thus it is expected that up to and after Year 2031 the land within 100 metres of the Yarrabilba Drive would at some time be designated as being within a transport noise corridor.

In the event that Yarrabilba Drive were to be gazetted as a 100 metre transport noise corridor then, based upon our 2031 modelling for Precinct 3A, single-storey dwellings adjoining the road corridor boundaries would be subject to QDC MP4.4 'Noise Category 1 and 2' acoustic treatment requirements.

For the upper level of any two-storey houses within Precinct 3A a maximum 'Noise Category 3' acoustic treatment requirement may 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 3A.

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 'Superblock' Allotments**

QDC MP4.4 Noise Categories		
Lot #	**Single storey / ground floor**	**Upper floor**
1	Category 2	Category 3
2	Category 2	Category 2
3	Category 1	Category 2
4	Category 1	Category 1
5	Category 1	Category 1
6	Category 1	Category 2
7	Category 2	Category 2
8	Category 2	Category 3
9	Category 0	Category 1
10	Category 0	Category 1
11	Category 0	Category 1
12	Category 0	Category 1
13	Category 0	Category 1
14	Category 0	Category 1
15	Category 0	Category 1
16	Category 0	Category 1
17	Category 0	Category 0
18	Category 0	Category 1
19	Category 0	Category 1
20	Category 1	Category 1
21	Category 2	Category 2
22	Category 2	Category 2
23	Category 2	Category 2
24	Category 2	Category 2
25	Category 2	Category 2
26	Category 1	Category 1
27	Category 0	Category 1
28	Category 0	Category 0
29	Category 0	Category 1
30	Category 0	Category 1
31	Category 0	Category 1
32	Category 0	Category 1
33	Category 0	Category 1
34	Category 1	Category 1
35	Category 1	Category 1
36	Category 1	Category 2
37	Category 2	Category 3
Balance Lot	Category 3	Category 3

*no acoustic treatment is required for allotments with Category 0

The SoundPLAN model predictions are presented as plots of predicted Year 2031 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 2031 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 3A - Superblock” residential development within the Yarrabilba estate development.

The report has assessed the potential road traffic noise impact and mitigation measures associated with the Arterial Road (Yarrabilba Drive) corridor within the Yarrabilba Precinct 3A development area.

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 volume 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 results of the traffic noise modelling for outdoor areas within Precinct 3A indicates that the adopted noise criterion of 60 dB(A) L_{10} (18 hour) for outdoor recreation space (backyards) will be exceeded for the proposed residential allotment boundaries adjoining the Yarrabilba Drive. Though the intrusion of the 60 dB(A) noise limits does occur on some of the first two rows of allotments in Precinct 3A, the majority of all lot areas comply with the road traffic noise planning limit without barriers.

Given the relatively minor land area predicted to exceed a 60 dB(A) L_{10} (18 hour) external traffic noise level during the 10 year design horizon there may not be a warrant for construction of an acoustic barrier if a solid fence is not the preferred outcome of the development plan.

The results of the modelling demonstrate that, outdoor recreation areas on the following Lots will require specific design features (e.g. more shielded locations, operable walls/louvres to shield road traffic noise) in order to comply with the 60 dB(A) L_{10} (18 hour) external noise amenity criteria.

- Lot 1 and 2;
- Lot 7 and 8; and
- Lot 36 and 37.

As such, it is recommended that future dwellings on the Lots described above, 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** of report); or

2. An outdoor recreation area on the front façade of the dwelling (located at front façade facing access road) (see **Diagram B** of report); or

3. A more centrally located outdoor recreational area in the form of courtyard to maximise building façade shielding (see **Diagram C** of report).

Lots 21 to 25 indicate exceedance of the noise criteria on the front portion of the allotments, however the backyards remain complaint, therefore with construction of future dwellings on these allotments the backyards will readily achieve compliance.

In the event that major roads were to be gazetted as a 100 metre transport noise corridor then, based upon our 2031 modelling for Precinct 3A, single-storey dwellings adjoining the road corridor boundaries would be subject to QDC MP4.4 'Noise Category 1 and 2' acoustic treatment requirements. For the upper level of any two-storey houses within Precinct 3A a maximum 'Noise Category 3' acoustic treatment requirements 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 3A.

In summary, the development can be designed and conditioned to comply with regulatory road traffic noise requirements.

MWA Environmental
7 August 2018

FIGURES

LEGEND

PROPERTY BOUNDARY

PRECINCT 3A SITE LOCATION

DRAWING REFERENCES

- © THE STATE OF QUEENSLAND 2018 QLDGLOBE
- GOOGLE EARTH PRO 2017.

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PROJECT

TRAFFIC NOISE IMPACT ASSESSMENT PROPOSED RESIDENTIAL DEVELOPMENT PRECINCT 3A YARRABILBA QLD

TITLE

SITE LOCATION

JOB	YARRABILBA	**FIGURE 1**
JOB NO.	18-011	
DATE	07/08/18	DRAWING NUMBER
SCALE	1:70,000 (A4)	**18-011-1**
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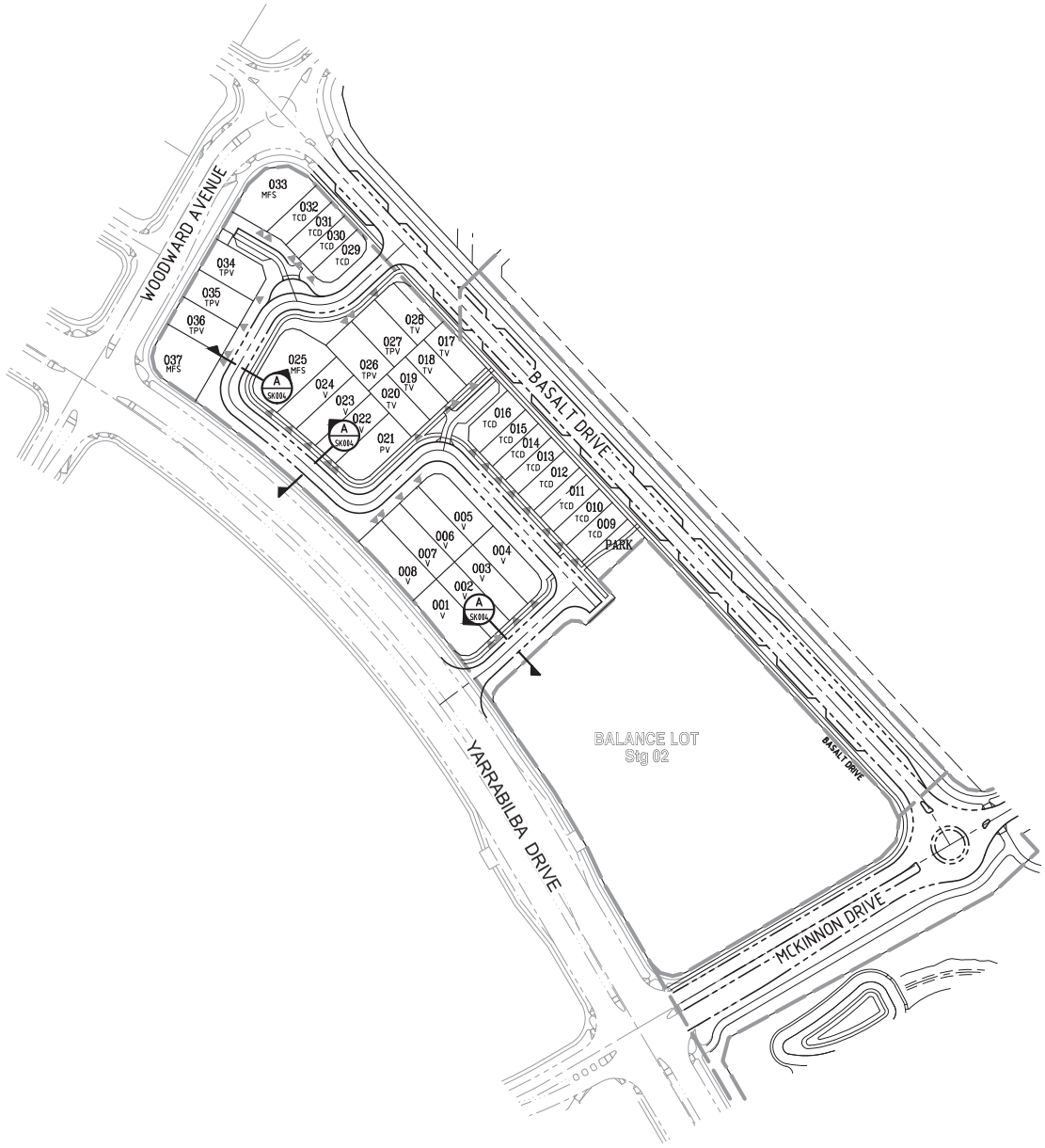

LEGEND

- STAGE BOUNDARY
- PROPOSED KERB FACE
- PROPOSED ROAD CENTRELINE
- PROPOSED 'GREENWAY CORRIDOR'
- PROPOSED FOOTPATH
- NOMINATED DRIVEWAY LOCATION

SCALE 10 5 0 10 20 30 40 50 60 70 80 90 100m

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PROJECT

TRAFFIC NOISE IMPACT ASSESSMENT PROPOSED RESIDENTIAL DEVELOPMENT PRECINCT 3A YARRABILBA QLD

TITLE

PRECINCT 3A SITE PLAN

JOB	YARRABILBA	FIGURE 2
JOB NO.	18-011	
DATE	07/08/18	DRAWING NUMBER
SCALE	1:2000 (A3)	18-011-2
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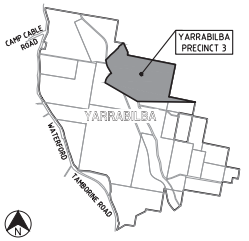
NORTH

LOCALITY PLAN



REVISIONS

No	Description	Date	By
A	FOR APPROVAL	JUN/16	JAS
B	BUS STOPS AMENDED	17/11/16	JAS
C	LOT LAYOUT & NUMBERS AMENDED	09/02/16	JAS
D	STAGING & LAYOUT AMENDED	17/03/17	JAS
E	LOT LAYOUT & NUMBERS AMENDED	30/06/17	JAS
F	REVISED LOT TYPE	11/07/17	DES
G	REVISED LOT LAYOUT	13/06/18	SLK
H	FOR INFORMATION	13/07/18	GPC
I	FOR APPROVAL	1/08/18	GPC
J	FOR APPROVAL	2/08/18	GPC

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Project

YARRABILBA

PRECINCT 3
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FUNCTIONAL DRAWINGS

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Approved - RPEQ 12805

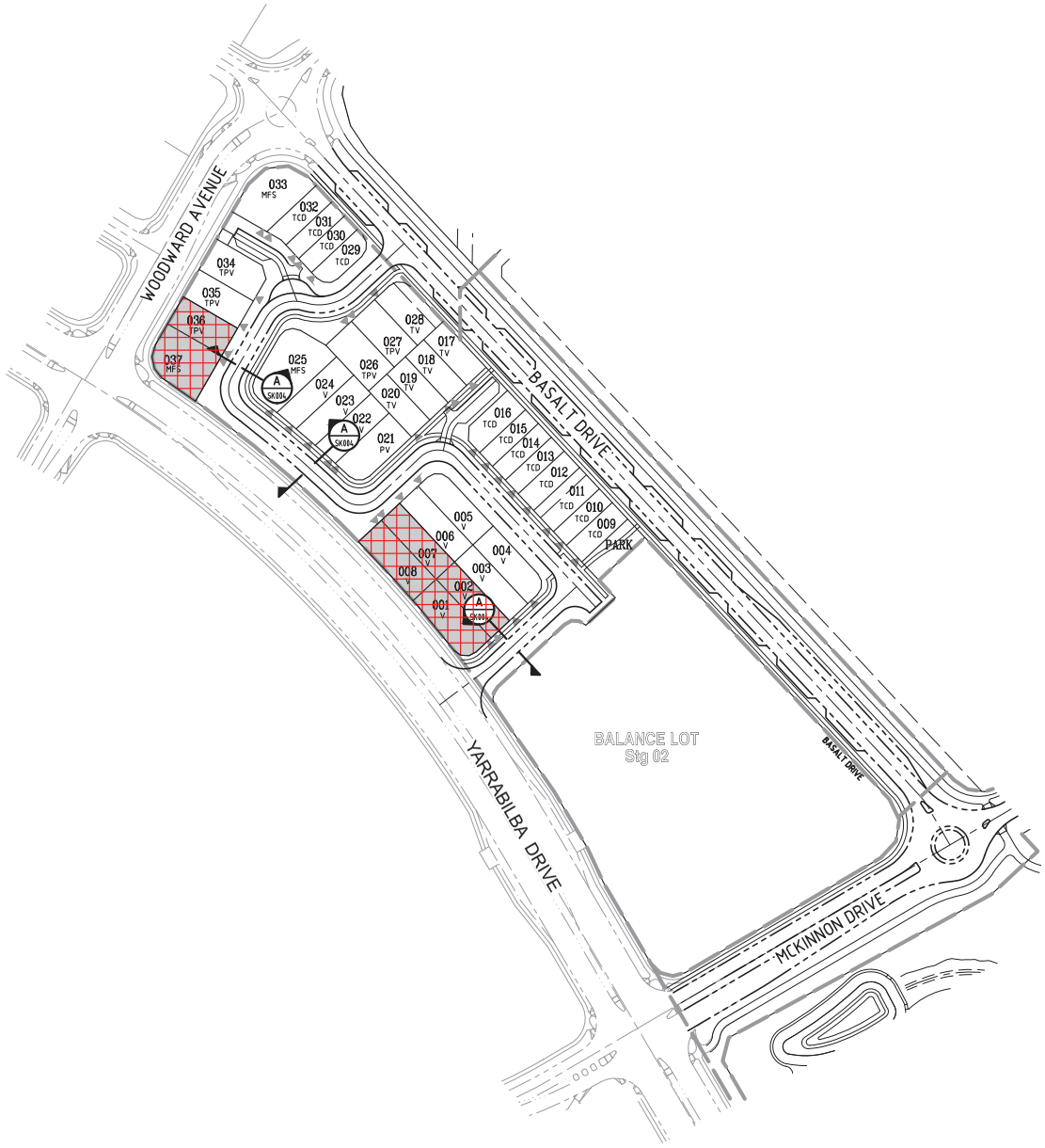
Drawing Title

P03A FUNCTIONAL LAYOUT
ROADWORKS PLAN
SHEET 2

Drawn	Designed	Checked	Date
JAS	JAS	GBG	MAY 16

Scale	Sheet
AS SHOWN	02 of 17

	Drawing No	Revision
A1	15-111-SK002	J



LEGEND

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- PROPOSED KERB FACE
- PROPOSED ROAD CENTRELINE
- PROPOSED 'GREENWAY CORRIDOR'
- PROPOSED FOOTPATH
- NOMINATED DRIVEWAY LOCATION

LEGEND

ALLOTMENTS REQUIRING DESIGNATED PRIVATE OPEN SPACE

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PROJECT

TRAFFIC NOISE IMPACT ASSESSMENT PROPOSED RESIDENTIAL DEVELOPMENT PRECINCT 3A YARRABILBA QLD

TITLE

ALLOTMENTS REQUIRING DESIGNATED PRIVATE OPEN SPACE

JOB	YARRABILBA	**FIGURE 3**
JOB NO.	18-011	
DATE	07/08/18	DRAWING NUMBER
SCALE	1:2000 (A3)	**18-011-3**
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SCALE 10 5 0 10 20 30 40 50 60 70 80 90 100m

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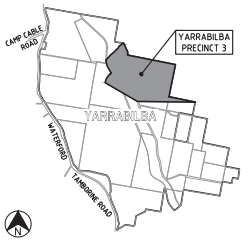
NORTH

LOCALITY PLAN



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Drawing Title

P03A FUNCTIONAL LAYOUT
ROADWORKS PLAN
SHEET 2

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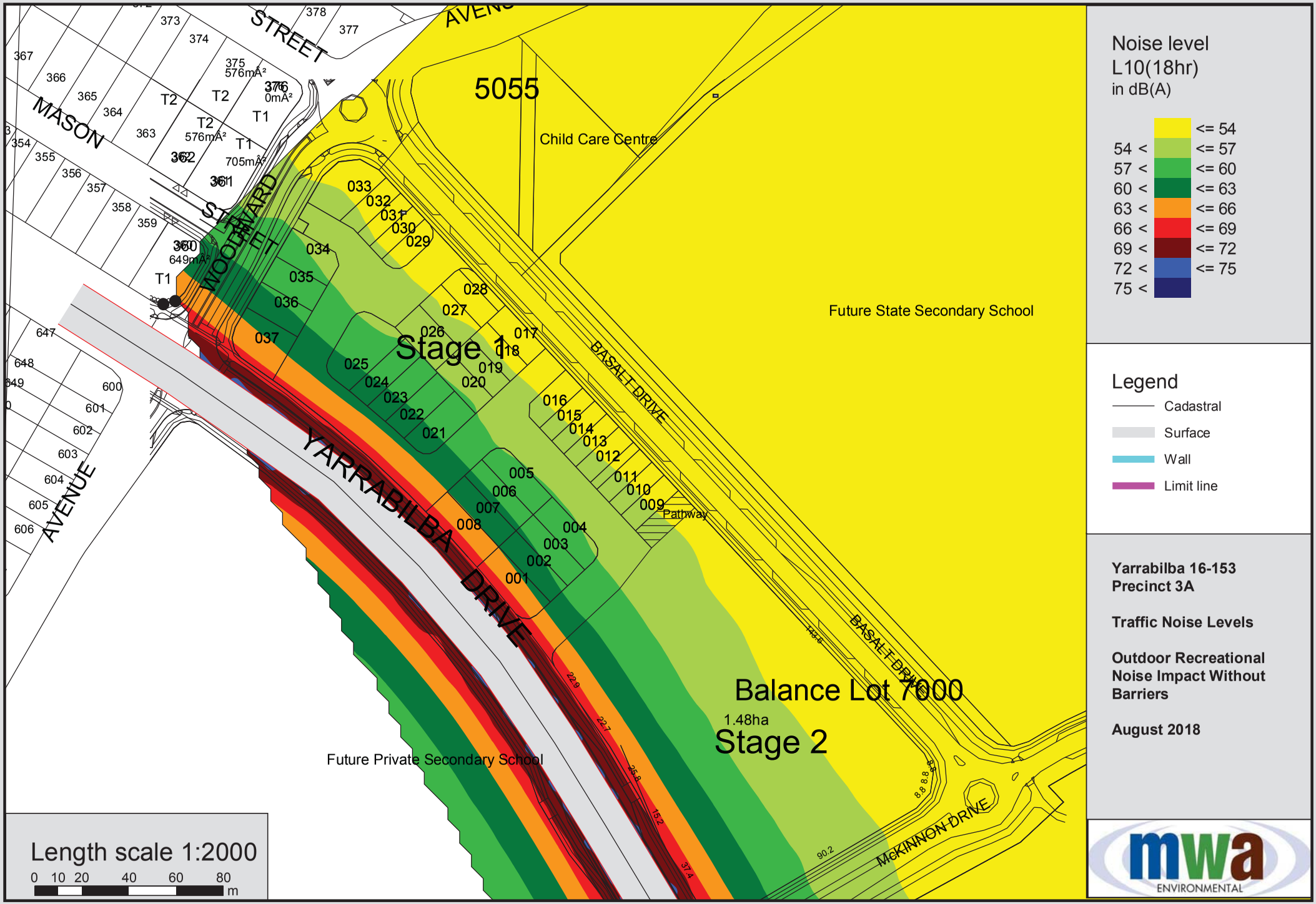
Scale	Sheet
AS SHOWN	02 of 17

	Drawing No	Revision
A1	15-111-SK002	J

Attachment 1

SoundPLAN 7.3 Modelling
Design Horizon Traffic Noise Predictions – Outdoor Recreation Space


Noise level
L10(18hr)
in dB(A)
<= 54
54 < <= 57
57 < <= 60
60 < <= 63
63 < <= 66
66 < <= 69
69 < <= 72
72 < <= 75
75 <
Legend
Cadastral
Surface
Wall
Limit line
Yarrabilba 16-153
Precinct 3A
Traffic Noise Levels
Outdoor Recreational
Noise Impact Without
Barriers
August 2018
Length scale 1:2000
0 10 20 40 60 80 m
5055
Child Care Centre
Future State Secondary School
Stage 1
Balance Lot 7000
1.48ha
Stage 2
Future Private Secondary School
Pathway
YARRABILBA DRIVE
BASALT DRIVE
McKINNON DRIVE
MASON STREET
WOODWARD AVENUE
AVENUE
mwa
ENVIRONMENTAL

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 *habitable room* is greater than 1.8m^2)
			35 (where total area of glazing for a *habitable room* 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 *habitable room* is greater than 1.8m^2)
			32 (where total area of glazing for a *habitable room* 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 *habitable room* is greater than 1.8m^2)
			24 (where total area of glazing for a *habitable room* 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 *acoustically rated seals*.
	38	Minimum 14.38mm thick laminated glass, with full perimeter *acoustically rated seals*; 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 *acoustically rated seals*
	35	Minimum 10.38mm thick laminated glass, with full perimeter *acoustically rated seals*.
	32	Minimum 6.38mm thick laminated glass with full perimeter *acoustically rated seals*.
	27	Minimum 4mm thick glass with full perimeter *acoustically rated seals*
	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/m^3 or 50mm thick polyester insulation with a density of 20kg/m^3 in the cavity. OR Two leaves of clay brick masonry at last 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/m^3 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 last 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/m^3 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.

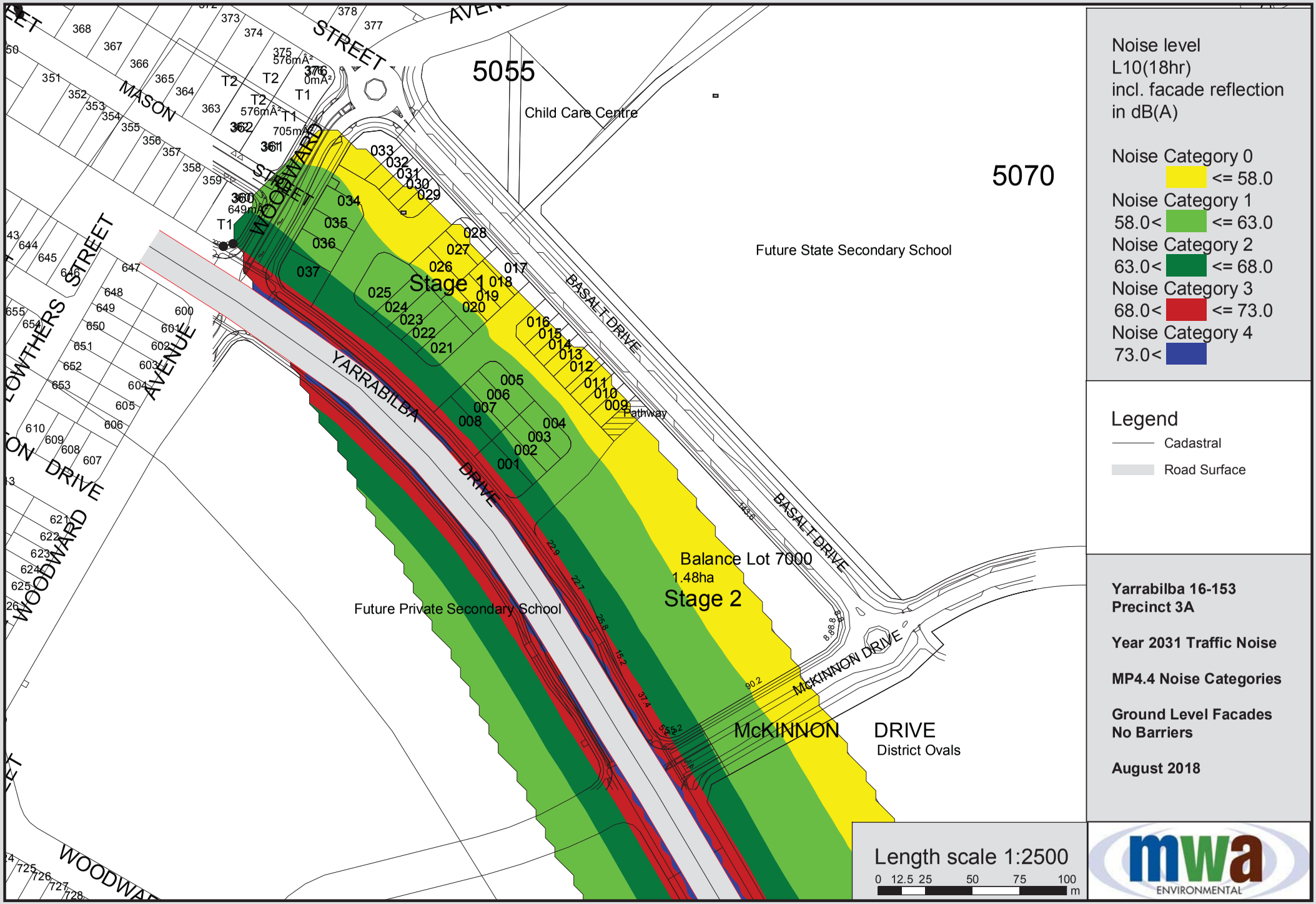
Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	35	Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) One layer 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, *acoustically rated plasterboard* ceiling at least 13mm thick fixed to ceiling joists, cellulose fibre insulation at least 100mm thick with a density of at least 45kg/m^3 in the cavity. OR Concrete or terracotta tile or sheet metal roof with sarking, 2 layers of *acoustically rated plasterboard* at least 16mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m^3 or polyester insulation at least 50mm thick with a density of at least 20kg/m^3 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/m^3 or polyester insulation at least 50mm thick with a density of at least 20kg/m^3 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/m^3.

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 *acoustically rated seals*.
	33	Fixed so as to overlap the frame or rebate of the frame by not less than 10mm, fitted with full perimeter *acoustically rated seals* 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/m^2; or (iv) Solid core timber door not less than 35mm thick fitted with full perimeter *acoustically rated seals*.

Attachment 3

SoundPLAN 7.3 Modelling
Design Horizon Traffic Noise Predictions –
Ground Level QDC MP4.4 Noise Categories


5055
Child Care Centre
5070
Future State Secondary School
Stage 1
Balance Lot 7000
1.48ha
Stage 2
Future Private Secondary School
Pathway
McKINNON DRIVE
District Ovals
YARRABILBA DRIVE
BASALT DRIVE
MASON STREET
WOODWARD STREET
LOWTHERS AVENUE
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 16-153
Precinct 3A
Year 2031 Traffic Noise
MP4.4 Noise Categories
Ground Level Facades
No Barriers
August 2018
Length scale 1:2500
0 12.5 25 50 75 100
m
mwa
ENVIRONMENTAL

ATTACHMENT 4

SoundPLAN 7.3 Modelling
Design Horizon Traffic Noise Predictions –
Upper Level QDC MP4.4 Noise Categories


5055
Child Care Centre
5070
Future State Secondary School
Stage 1
Balance Lot 7000
1.48ha
Stage 2
Future Private Secondary School
Pathway
MASON STREET
WOODWARD STREET
LOWTHERS AVENUE
GTON DRIVE
WOODWARD STREET
WOODWARD STREET
YARRABILBA DRIVE
BASALT DRIVE
BASALT DRIVE
McKINNON DRIVE
McKINNON DRIVE
District Ovals
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 16-153
Precinct 3A
Year 2031 Traffic Noise
MP4.4 Noise Categories
Upper Level Facades
No Barriers
August 2018
Length scale 1:2500
0 12.5 25 50 75 100 m
mwa
ENVIRONMENTAL