

531 COBBITTY ROAD, COBBITTY

Road Traffic Noise Assessment

13 March 2023

Mirvac Homes (NSW)

TM504-02F02 Road Traffic Noise Assessment (r2)

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1 Introduction

Renzo Tonin & Associates was engaged by Mirvac Homes to conduct an acoustic assessment of the road traffic noise impact onto the proposed Tranche 4 residential subdivision at 531 Cobbitty Road, Cobbitty. This report provides an update to the previous traffic noise modelling and now includes further detail for the Tranche 4 subdivision which consist of 128 residential lots, eight residue lots (future integrated housing via separate Development Application), a neighbourhood centre lot and proposed school lot. It is understood that this road traffic noise assessment is to support the Development Application (DA) for Tranche 4.

A revised masterplan and lot layout plans for the Tranche 4 allotments was provided in preparation for this report. It is understood that the remaining future 'superlots' will be further subdivided and subject to additional Development Applications. A provisional assessment for these superlots have been provided in this report but are expected to be assessed in greater detail in future DA's.

The main sources of noise affecting the proposed residential development is road traffic along the future extension of Charles McIntosh Parkway.

APPENDIX A contains a glossary of acoustic terms used in this report.

2 Site description

Land zoning for the State Environmental Planning Policy South West Growth Centre (2006) (SEPP) indicates that the land within the proposed site is zoned as R1 General Residential and C4 Environmental Living. This is presented in Figure 1.

It is anticipated that a total of 135 residential lots will be created within Tranche 4 located on the north-eastern portion of the site bound by the future planned extension of Charles McIntosh Parkway. Tranche 4 also consists of eight residue lots, a neighbourhood centre lot and a proposed school lot.

Nearby existing roads to the site include Cobbitty Road to the south and the Northern Road arterial road to the far east.

A layout of the Tranche 4 subdivision masterplan is presented in Figure 2 below.

Figure 1: South West Growth Centre SEPP (2006) land zoning

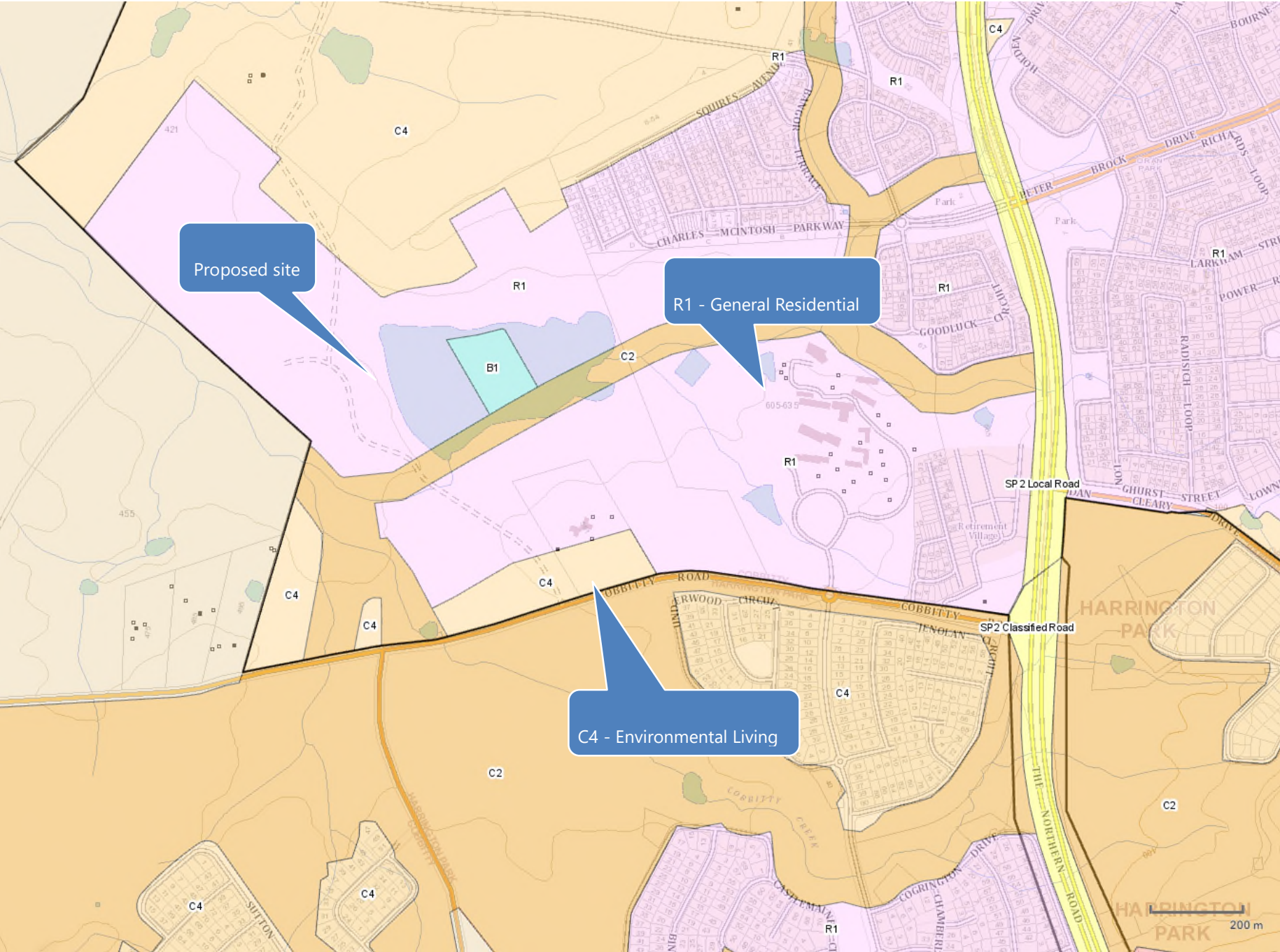


Figure 2: Proposed subdivision layout



3 Noise Criteria

This assessment is concerned with impacts on proposed and future residential allotments. Given that most of the planned future lots are at an early design stage, non-residential land uses will be designed based on the predicted noise levels once further detailed design of the future lots are known.

3.1 Oran Park Precinct Development Control Plan 2007

The proposed residential subdivision is within the Oran Park South West Growth Area. The SEPP refers to the Oran Park Precinct Development Control Plan 2007.

The Oran Park Precinct Development Control Plan 2007 (DCP 2007) aims to reduce potential noise and vibration impacts by identifying the conditions where an acoustic assessment may be required. It also details which policies and guidelines should be used to inform the assessment.

Controls 1 and 2 in Section 6.9 of DCP 2007 addresses road traffic noise and states:

1. *Residential development shall be designed to comply with Council's Environmental Noise Policy that incorporates DECC's Environmental Criteria for Road Traffic Noise. However, for residential development adjoining sub-arterial and collector roads, where external traffic noise level limits will be exceeded at the façade of the residential premises nearest to the noise source, the development will be deemed to comply with Council's Environmental Noise Policy if:*
 - *the principal private open space area of the residential premises complies with the relevant noise limit, and*
 - *the internal noise levels identified in sub-clause (2) are achieved.*
2. *The internal noise level limits for residential development are:*

For residential premises impacted by traffic noise from arterial, or sub-arterial roads;

- *In a naturally ventilated - windows open condition (i.e. windows open up to 5% of the floor area, or attenuated natural ventilation open to 5% of the floor area), or mechanically ventilated windows closed condition:*

Sleeping areas	LAeq 15 hour, Day	40dB
	LAeq, 9 hour, Night	35dB
Living areas	LAeq 15 hour, Day	45 dB
	LAeq, 9 hour, Night	40dB

- *where a naturally ventilated - windows open condition cannot be achieved, it is necessary to incorporate mechanical ventilation compliant with AS1668 and the Building Code of Australia. The noise levels above shall be met with mechanical ventilation or air-conditioning systems not operating. The following LAeq noise levels shall not be*

exceeded when doors and windows are shut and mechanical ventilation or air conditioning is operating:

Sleeping areas	LAeq 15 hour, Day	43dB
	LAeq, 9 hour, Night	38dB
Living areas	LAeq 15 hour, Day	48 dB
	LAeq, 9 hour, Night	43dB

Note: These levels correspond to the combined measured level of external sources and the ventilation system operating normally.

Acoustic amenity to residential principal private open space (PPOS) areas in sub-clause (1) is addressed in Camden Council's Environmental Noise Policy 2018. This is elaborated in Section 3.2 below.

It is noted that the internal levels in Control 1, sub-clause (2) of the DCP 2007 for the windows closed condition are generally consistent with the noise limits contained within the Department of Planning's "Development near Rail Corridors and Busy Roads – Interim Guideline", although they allow an additional 3dB for contribution from mechanical ventilation system.

3.2 Camden Council Environmental Noise Policy 2018

3.2.1 External noise

'Road and Rail Noise' Control 3 in Camden Council's Environmental Noise Policy 2018 addresses acoustic amenity for PPOS areas. Control 3 states:

The principle private open space or an equivalent area of useable open space of a dwelling within a new release area is not to exceed 57dBA LAeq (15hr) from 7am to 10pm.

Note: For clarification purposes, a new release area, includes land mapped as Urban Release Area within the CLEP 2010 and includes Growth Area Precincts that have been rezoned.

For dwellings in areas outside of the new release areas, the principle private open space area is to be attenuated to 55dBA LAeq (15hr) from 7am to 10pm.

Council may consider an increased decibel level where it can be demonstrated that the objectives of this policy are met and the above criteria is not able to be reasonably or feasibly achieved.

Note: The residential noise level criterion includes + 2.5 dBA allowance for noise reflected from the façade ('facade correction').

As the proposed residential subdivision is located within the Oran Park South West Growth Area, the daytime 57dB(A) criteria applies. It is noted that no criteria are stated for other time periods.

3.2.2 Internal noise

'Road and Rail Noise' Control 2 in Camden Council's Environmental Noise Policy 2018 addresses internal noise criteria for residential dwellings adjacent to an existing or proposed railway line, arterial, sub-arterial or collector road. Control 2 states:

Both 'residential dwellings' and 'non-residential buildings must comply with the internal noise criteria in 'Table 3.1' from the 'Department of Planning: Interim Guideline – Development Near Rail Corridors and Busy Roads'

Henceforth in this report, the *Development near Rail Corridors and Busy Roads – Interim Guideline* has been utilised to establish applicable internal road traffic noise criteria, as detailed in Section 3.4.

3.3 Department of Planning 'Development near rail corridors and busy roads – interim guideline'

The NSW State Environmental Planning Policy (Transport and Infrastructure) 2021 commenced on 1 March 2022 and consolidated a number of former state environmental planning policies. The former State Environmental Planning Policy (Infrastructure) 2007 (known as 'ISEPP') has been integrated into "Chapter 2 Infrastructure" of the Transport and Infrastructure SEPP.

Chapter 2 of the Transport and Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across NSW. The aim of the Chapter includes identifying the environmental assessment category into which different types of infrastructure and services development fall and identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure.

Pertinent to road noise assessment, the Transport and Infrastructure SEPP includes the following sections:

2.120 Impact of road noise or vibration on non-road development

- (1) *This section applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume data published on the website of TfNSW) and that the consent authority considers is likely to be adversely affected by road noise or vibration:*
- (a) *Residential accommodation,*
 - (b) *a place of public worship,*
 - (c) *a hospital,*
 - (d) *an educational establishment or centre-based child care facility.*

- (2) *Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this clause and published in the Gazette.*
- (3) *If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*
 - (a) *in any bedroom in the residential accommodation - 35 dB(A) at any time between 10 pm and 7am,*
 - (e) *anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway) - 40 dB(A) at any time.*
- (3A) *Subsection (3) does not apply to a building to which State Environmental Planning Policy (Housing) 2021, Chapter 3, Part 7 applies.*
- (4) *In this section, "freeway", "tollway" and "transitway" have the same meanings as they have in the Roads Act 1993.*

The Transport and Infrastructure SEPP (ISEPP) has been used to set appropriate road traffic noise criteria for the proposed subdivision.

The NSW Department of Planning has additionally released the *Development near Rail Corridors and Busy Roads – Interim Guideline* (December 2008). The Guideline assists in the planning, design and assessment of developments in, or adjacent to, major transport corridors in terms of noise, vibration and air quality. While the Transport and Infrastructure SEPP applies only to roads with an AADT greater than 20,000 vehicles, the Guideline is also recommended for other road traffic noise affected sites.

3.4 Clarification of Transport and Infrastructure SEPP noise limits

The Guideline clarifies the time period of measurement and assessment. Section 3.4 '*What Noise and Vibration Concepts are Relevant*' and Table 3.1 of Section 3.6.1 confirms that noise assessment is based over the following time periods:

- Daytime 7:00am - 10:00pm LAeq(15hr)
- Night-time 10:00pm - 7:00am LAeq(9hr)

The noise criteria nominated in the Transport and Infrastructure SEPP apply to internal noise levels with windows and doors closed. However, as the preliminary noise assessment is based on predictions at external locations, equivalent external noise criteria has been established. The equivalent external noise criterion is used to determine which areas of the development may require acoustic treatment to meet the internal noise requirements of the Transport and Infrastructure SEPP. The equivalent external goals have been determined on the following basis:

- The Guideline states: *"If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that occupants*

can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia." The internal criteria with windows open is therefore 10dB(A) above the criteria explicitly outlined in the Transport and Infrastructure SEPP.

- The generally accepted noise reduction through an open window from a free-field external position is 10dB(A). Windows/doors are assumed to be open no more than 5% of room floor area, in accordance with the Building Code of Australia (BCA) ventilation requirements.

presents the Transport and Infrastructure SEPP internal noise criteria along with the equivalent external noise criteria for residential premises.

Table 1: Transport and Infrastructure SEPP noise criteria for new residential development

Room	Location	L _{Aeq, 15hr} Day 7am – 10pm	L _{Aeq 9hr} Night 10pm – 7am
Living rooms*	Internal, windows closed	40	40
	Internal, windows open	50	50
	External free-field (allowing windows to remain open)^	60	60
Bedrooms*	Internal, windows closed	40	35
	Internal, windows open	50	45
	External free-field (allowing windows to remain open)^	60	55

Notes: * Requisite for 20,000AADT Roads only under Transport and Infrastructure SEPP 2021.

^ Guideline states that where internal noise criteria are exceeded by more than 10dB(A) with windows open mechanical ventilation is required. External goals have been calculated on the basis of nominal 10dB(A) reduction through an open window to a free-field position. Windows open to 5% of floor area in accordance with the BCA 2019 requirements.

4 Road traffic noise assessment

4.1 Traffic flow and composition

To conduct an acoustic assessment for the site, traffic flows along Cobbitty Road and the future extension of Charles McIntosh Parkway are required.

Peak hour traffic flows along Cobbitty Road were obtained from the response to Council's RFI by SCT Consulting (SCT). SCT based on a future 2036 forecast that Cobbitty Road could carry up to 600 vehicles per hour in each direction during the peak hours.

Worst case peak hour traffic volumes along Charles McIntosh Parkway were obtained from the traffic and transport assessment provided by email on 31 January 2022 (document reference: northern-road-ref-appendix-j-3). The traffic assessment predicted that Charles McIntosh parkway could carry 853 vehicles travelling southbound towards Cobbitty Road and 594 Vehicles travelling northbound from Cobbitty Road to The Northern Road.

A memo from SCT Consulting dated 15 September 2022 addressed the Tranche 4 lots and confirmed that:

- Charles McIntosh Parkway is a sub-arterial road, and
- The previous traffic modelling conducted for the masterplan are still relevant and forecasted traffic and volumes along Charles McIntosh Parkway have not changed.

The following assumptions have been used which are consistent with previous assessments conducted by Renzo Tonin & Associates for the Oran Park Precinct:

- Peak hour traffic volumes are 10% of the 24hr volume;
- The 15hr daytime volume is 85% of the 24hr volume;
- Percentage of heavy vehicles in traffic mix is assumed to be 5%.

The traffic volumes used for the acoustic assessment are presented in Table 2. It is noted that variations in the actual traffic volumes, in particular heavy vehicle percentages, will affect the traffic noise exposure. A sensitivity assessment could be undertaken during the detail design phase of the development to further refine the predicted traffic noise exposure.

Table 2: Traffic volumes and compositions

Road	Direction	Day (7am to 10pm)		Night (10pm to 7am)		Speed, km/h
		15hr Volume	% Heavy vehicles ²	9hr Volume	% Heavy vehicles ²	
Cobbitty Road	Eastbound	5100	5	900	5	80 ¹
	Westbound	5100	5	900	5	80 ¹
	Northbound	5049	5	891	5	60 ³

Road	Direction	Day (7am to 10pm)		Night (10pm to 7am)		Speed, km/h
		15hr Volume	% Heavy vehicles ²	9hr Volume	% Heavy vehicles ²	
Charles McIntosh Parkway	Southbound	7251	5	1280	5	60 ³

- Notes:
1. Posted speed
 2. Assumed heavy vehicle percentage
 3. Assumed vehicle speed

While both 'day' and 'night' traffic noise goals are to be satisfied, the daytime traffic goals are more likely to be exceeded in a developed residential area. This corresponds with the assumed traffic distribution. Night-time road traffic noise levels are likely to create greater impact only where the night-time percentage of heavy vehicles is significantly higher than the daytime period.

4.2 Road noise prediction model

Noise predictions are based on a method developed by the United Kingdom Department of Environment titled "Calculation of Road Traffic Noise (1988)" known as the CoRTN (1988) method. This method has been adapted to Australian conditions and extensively tested by the Australian Road Research Board and as a result it is recognised and accepted by the Environment Protection Authority. The model predicts noise levels for steady flowing traffic and noise from high truck exhausts is also considered.

The CoRTN algorithms are contained within the CadnaA noise modelling software which has been used to calculate traffic noise levels at receivers. The noise prediction model accounts for the following:

Table 3: Summary of modelling inputs

Input parameters	Data acquired from
Traffic volumes and mix	Day and night volumes as detailed in Table 2
Vehicle speed	Posted speed limit as detailed in Table 2
Gradient of roadways	Based upon 3D topographic data obtained from NSW Land and Property Information
Source height	0.5 metre as per standard CoRTN algorithms
Ground topography	3D topographic data obtained from Land and Property Information
Ground absorption	0.5 (to represent part hardstand road/footpath and part landscaped area)
Receiver heights	1.5 m above ground level for ground floor, 4.5 m above ground level for first floor
Facade correction	N/A
Acoustic properties of road surfaces	Dense graded asphalt, +0 dB correction

4.3 Noise modelling assumptions

The following assumptions were adopted for noise modelling:

- Indicative building envelopes on each lot as per the subdivision layout in Figure 2 and APPENDIX C. Front and rear property setbacks for each building envelope are generally in accordance with Section 7.6.1 of the Oran Park Precinct Development Control Plan (2007).
- Each building is assumed a two-storey dwelling with a total height of 6m above ground level.
- Residential floor areas and window sizes are assumed to not exceed those outlined in Appendix B of the Department of Planning "Development near Rail Corridors and Busy Roads - Interim Guideline".
- Proposed community centre was assumed to be a building with a height of three metres as indicated in Figure 2. The proposed school lot is subject to its respective DA and has not been included in this assessment. More detailed modelling of these sites can occur once detailed plans are available.

4.4 Noise modelling results

Noise modelling was conducted for both ground and first floor receivers for the daytime period which is the worst case. The generated road traffic noise contours from Cobbitty Road and Charles McIntosh Parkway are presented in Figure 3 and Figure 4.

Building treatment recommendations for the site are derived from the noise model results and are presented in Figure 5 - Figure 8. The highest required building treatment for each allotment is detailed in Table 4. Each category and its required facade sound reduction performance and construction details are summarised in APPENDIX B.

The noise model results indicate that for Tranche 4 allotments, 32 future dwellings will require facade treatment of at least Category 1. Of those, 12 dwelling facades facing Charles McIntosh Parkway will require at least Category 2 treatment as presented in Figure 7 and Figure 8.

For future allotments, seven future superlots will require facade treatment of at least Category 1. Of those, five superlots may require treatment of at least Category 2. These predictions can be confirmed at their respective DA stages.

Table 4: Worst case building treatment required

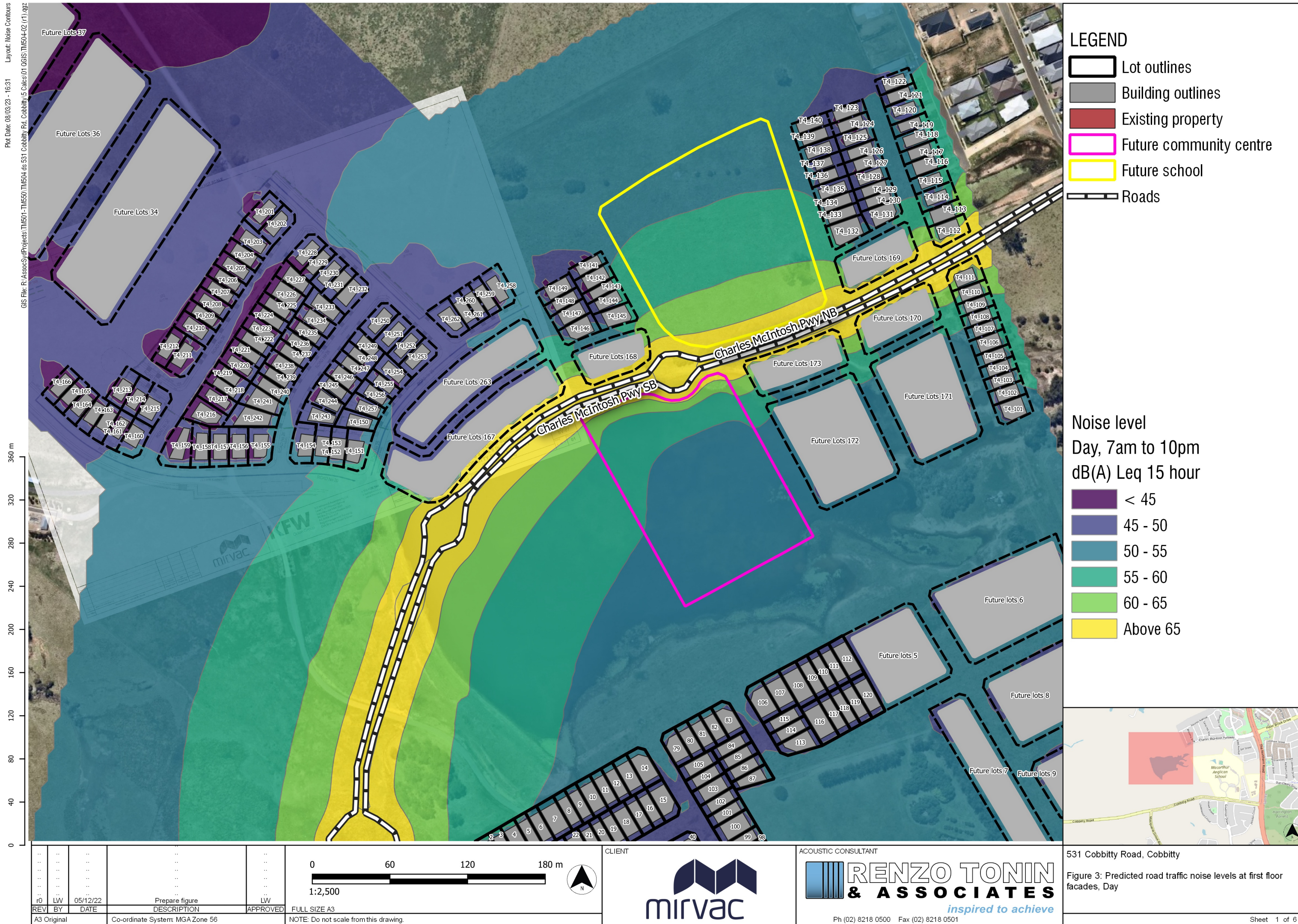
Lot Number	Highest building treatment category required	Facade direction of highest building treatment required
102	Category 1	East
103	Category 1	East
104	Category 1	East
105	Category 1	East
106	Category 1	East

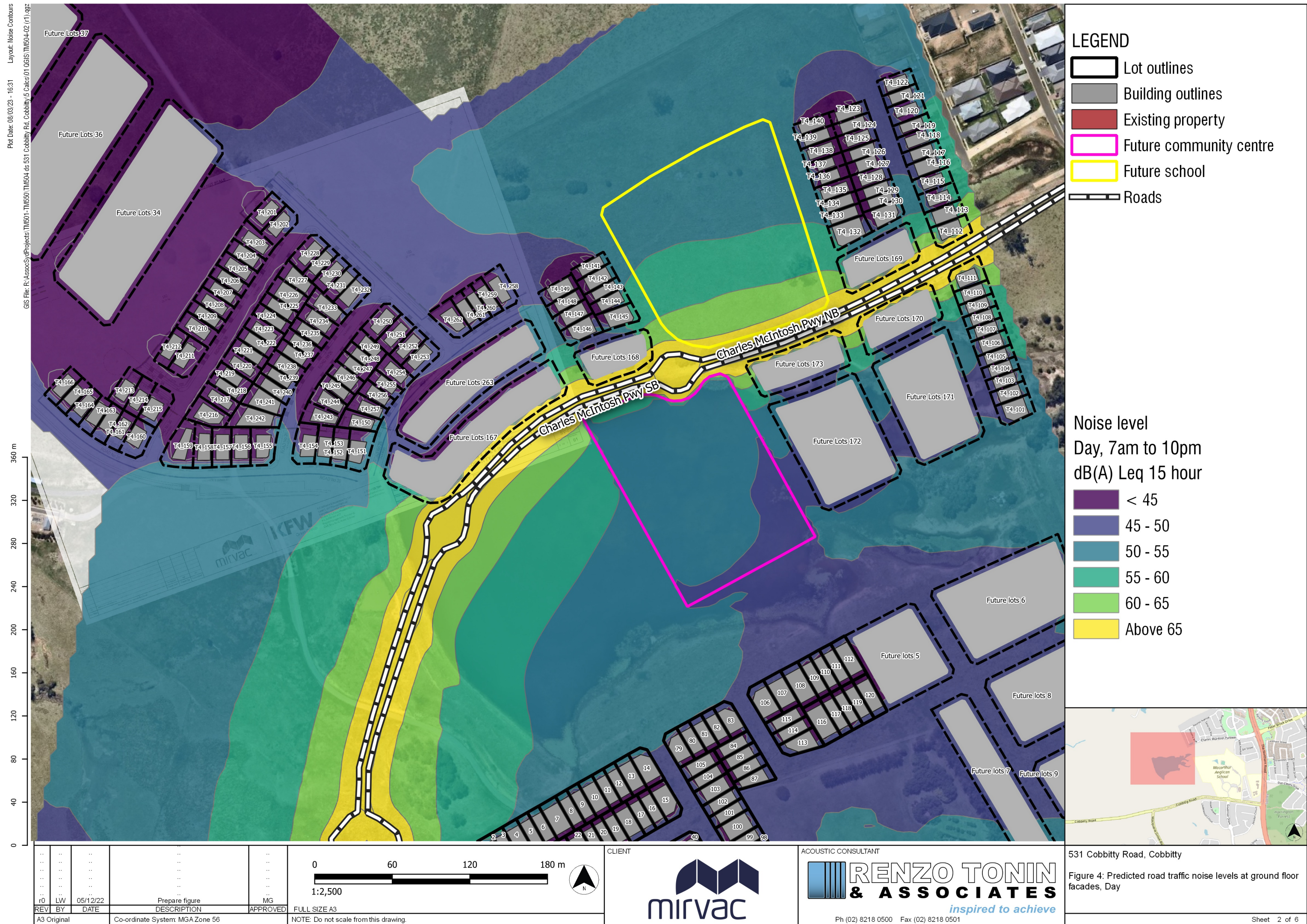
Lot Number	Highest building treatment category required	Facade direction of highest building treatment required
107	Category 1	East
108	Category 2	East
109	Category 2	East
110	Category 2	East, West
111	Category 4	North
112	Category 4	Southeast
113	Category 2	East, West
114	Category 2	East
115	Category 2	East
116	Category 2	East
117	Category 2	East
118	Category 1	East
119	Category 1	East
120	Category 1	East
121	Category 1	East
122	Category 1	East
131	Category 1	South, East
132	Category 2	Southwest
133	Category 1	West
134	Category 1	West
143	Category 1	Northeast
144	Category 1	Northeast
145	Category 2	East
146	Category 1	Southwest
151	Category 1	South, East
152	Category 1	South
153	Category 1	South

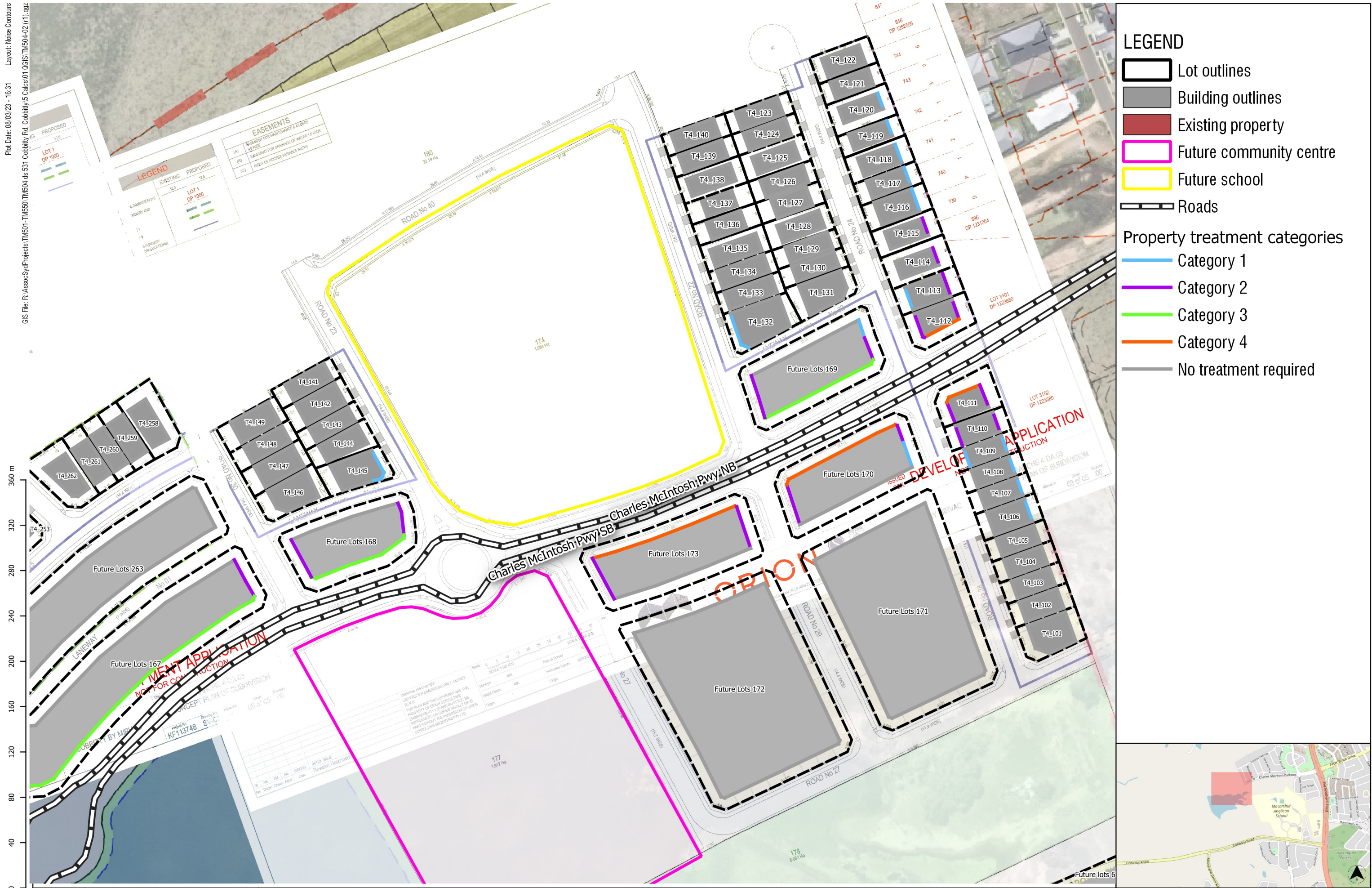
Note: Worst case results demonstrated at first floor level

To achieve the ventilation requirements as specified in the “Development near rail corridors and busy roads – interim guideline”, any room on a facade with treatment Category 2 or higher would require ventilation that allows windows and doors to remain closed.

In general, acoustic amenity to PPOS areas are dependent on the orientation of future dwellings. Future dwellings fronting Charles McIntosh Parkway are likely to provide adequate acoustic shielding to PPOS areas. Acoustic mitigation measures such as acoustically rated boundary fences may be required if dwellings are orientated such that PPOS areas are exposed to Charles McIntosh Parkway and Cobbitty Road. At this stage of the development, it has been assumed that PPOS areas are shielded from the main roads and hence do not require any acoustic mitigation measures. Acoustic amenity to private open spaces can be assessed further at a later design stage once proposed dwelling orientations are known.









LEGEND

- Lot outlines
- Building outlines
- Existing property
- Future community centre
- Future school
- Roads

Property treatment categories

- Category 1
- Category 2
- Category 3
- Category 4
- No treatment required



REV	BY	DATE	DESCRIPTION	APPROVED
r1	LW	08/03/2023	Updated T4 subdivision plan	MG
r0	LW	01/12/22	Prepare figure	MG
A3 Original			Co-ordinate System: MGA Zone 56	



NOTE: Do not scale from this drawing.

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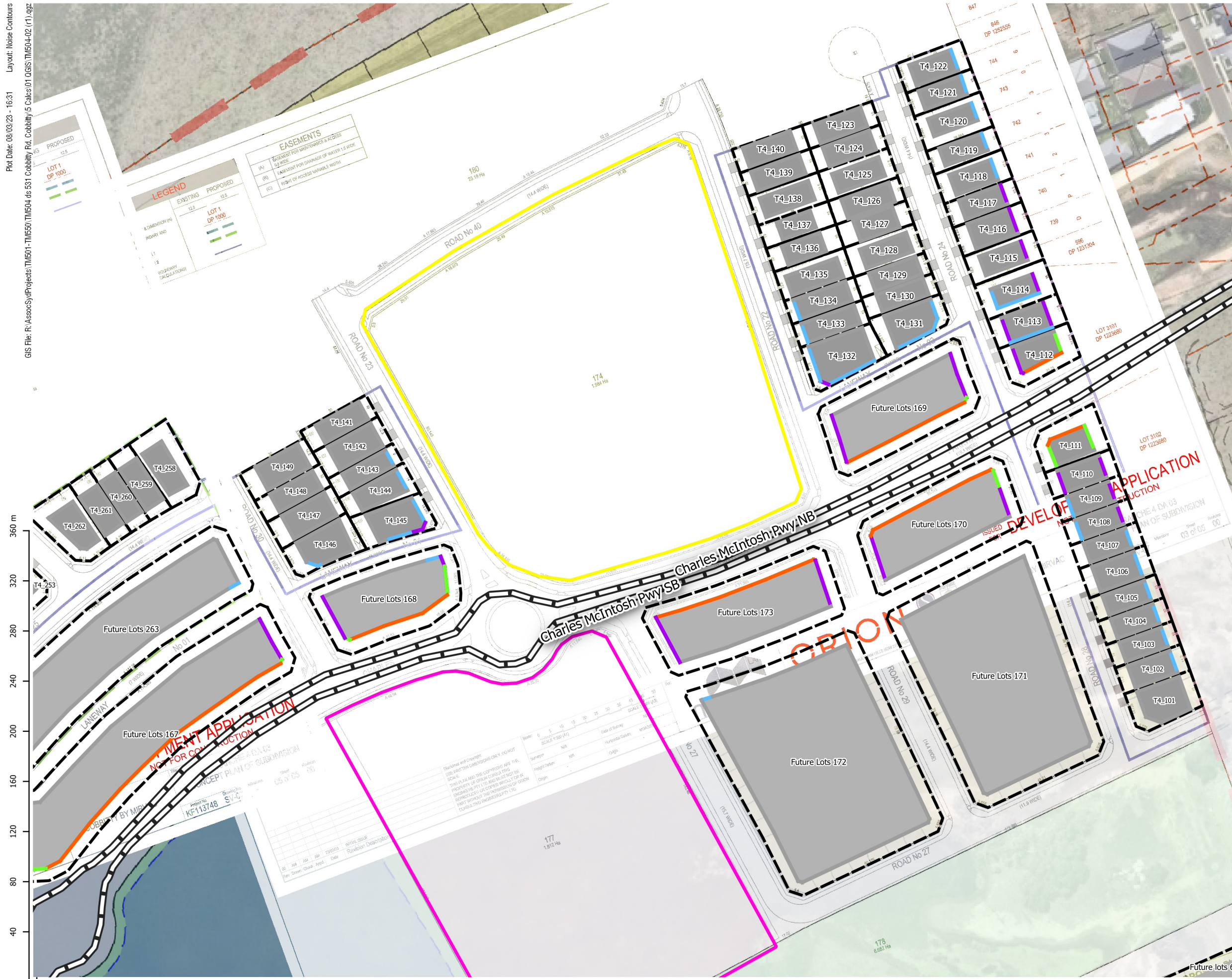
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Figure 6: Treatment categories at ground floor facades (western side), Day

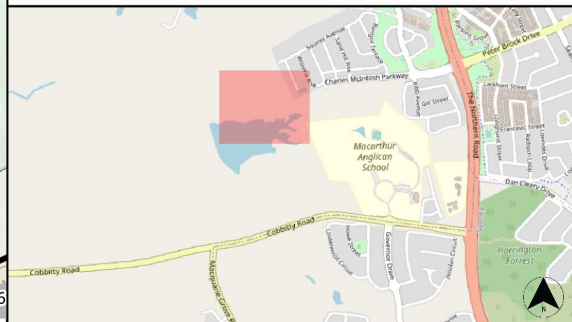


LEGEND

- Lot outlines
- Building outlines
- Existing property
- Future community centre
- Future school
- Roads

Property treatment categories

- Category 1
- Category 2
- Category 3
- Category 4
- No treatment required



REV	BY	DATE	DESCRIPTION	APPROVED
r1	LW	08/03/23	Updated T4 subdivision plan	MG
r0	LW	01/12/22	Prepare figure	MG
A3 Original			Co-ordinate System MGA Zone 56	

0 30 60 90 m

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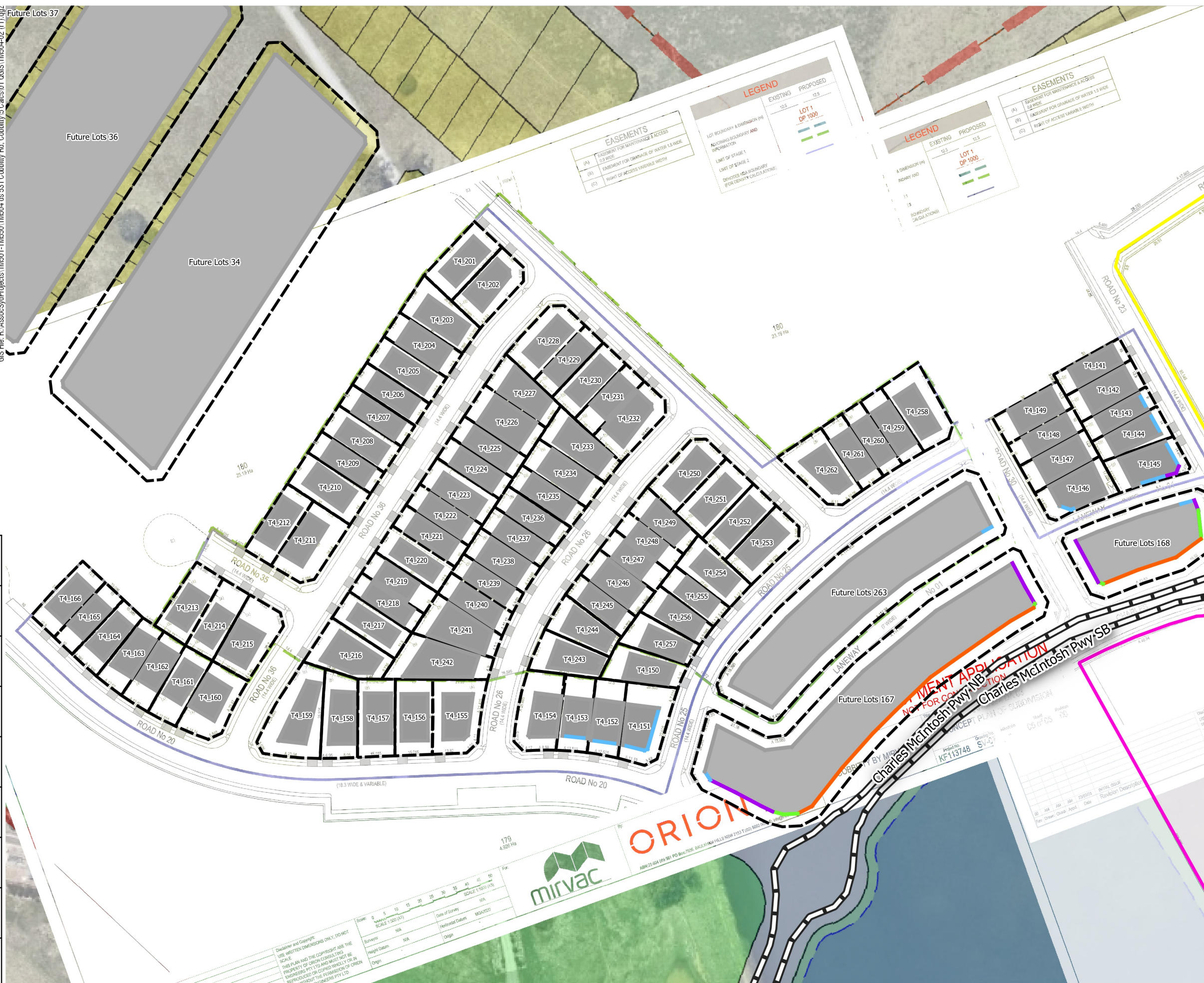
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Figure 8: Treatment categories at ground floor facades (western side), Day

Sheet 6 of 6

LEGEND

-  Lot outlines
-  Building outlines
-  Existing property
-  Future community centre
-  Future school
-  Roads

Property treatment categories

-  Category 1
-  Category 2
-  Category 3
-  Category 4
-  No treatment required

5 Conclusion

Potential noise impacts have been identified and assessed for the proposed Tranche 4 residential subdivision at 531 Cobbitty Road, Cobbitty. Road traffic noise from Cobbitty Road and Charles McIntosh Parkway has been considered.

Based on the noise modelling and indicative building envelopes, future dwellings will require facade treatment to control road traffic noise ingress in accordance with the Transport and Infrastructure SEPP and the Department of Planning *"Development in Rail Corridors and Busy Roads – Interim Guideline"*. Facade treatments have been considered for both future planned lots and present proposed residential subdivisions.

The recommended treatments can be achieved using standard building materials and techniques.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).																																								
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.																																								
Assessment period	The period in a day over which assessments are made.																																								
Assessment Point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.																																								
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).																																								
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of common sounds in our daytime environment: <table><tr><td rowspan="2">threshold of hearing</td><td>0 dB</td><td>The faintest sound we can hear</td></tr><tr><td>10 dB</td><td>Human breathing</td></tr><tr><td rowspan="2">almost silent</td><td>20 dB</td><td></td></tr><tr><td>30 dB</td><td>Quiet bedroom or in a quiet national park location</td></tr><tr><td rowspan="2">generally quiet</td><td>40 dB</td><td>Library</td></tr><tr><td>50 dB</td><td>Typical office space or ambience in the city at night</td></tr><tr><td rowspan="2">moderately loud</td><td>60 dB</td><td>CBD mall at lunch time</td></tr><tr><td>70 dB</td><td>The sound of a car passing on the street</td></tr><tr><td rowspan="2">loud</td><td>80 dB</td><td>Loud music played at home</td></tr><tr><td>90 dB</td><td>The sound of a truck passing on the street</td></tr><tr><td rowspan="2">very loud</td><td>100 dB</td><td>Indoor rock band concert</td></tr><tr><td>110 dB</td><td>Operating a chainsaw or jackhammer</td></tr><tr><td rowspan="2">extremely loud</td><td>120 dB</td><td>Jet plane take-off at 100m away</td></tr><tr><td>130 dB</td><td></td></tr><tr><td>threshold of pain</td><td>140 dB</td><td>Military jet take-off at 25m away</td></tr></table>			threshold of hearing	0 dB	The faintest sound we can hear	10 dB	Human breathing	almost silent	20 dB		30 dB	Quiet bedroom or in a quiet national park location	generally quiet	40 dB	Library	50 dB	Typical office space or ambience in the city at night	moderately loud	60 dB	CBD mall at lunch time	70 dB	The sound of a car passing on the street	loud	80 dB	Loud music played at home	90 dB	The sound of a truck passing on the street	very loud	100 dB	Indoor rock band concert	110 dB	Operating a chainsaw or jackhammer	extremely loud	120 dB	Jet plane take-off at 100m away	130 dB		threshold of pain	140 dB	Military jet take-off at 25m away
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dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.																																								
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.																																								

Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L _{Max}	The maximum sound pressure level measured over a given period.
L _{Min}	The minimum sound pressure level measured over a given period.
L ₁	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L ₁₀	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L ₉₀	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L _{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain L _{eq} sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Building Treatment Categories

The dwellings in the proposed development will require facade treatment to achieve suitable internal noise levels. The facade treatment recommendations are shown in Figure 5 and Figure 6. The recommendations are for both ground and first floor and are applicable to bedrooms and living rooms.

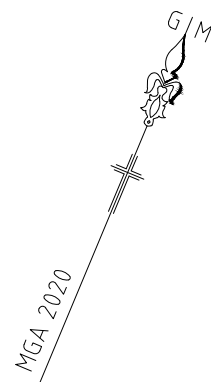
Table 5 details the facade treatment categories and recommended constructions. The facade recommendations assume room volumes and areas as per Table B1 of the ISEPP Guideline.

Table 5: Treatment categories

Category No.	Building Element	Required Acoustic Rating of Building Element, Rw	Construction Recommendation		
1	Windows / Sliding Doors	24+	Openable with minimum 4mm monolithic glass and standard weather seals		
	Facade	38+	Cladding Construction: 9mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm timber stud, R2 insulation batts in wall cavity, 10mm standard plasterboard internally.	Brick Veneer Construction: 110mm brick, 90mm timber stud, minimum 40mm clearance between masonry and stud frame, R2 insulation batts in wall cavity, 10mm standard plasterboard internally.	Cavity Brick Construction: 2 leaves of 110mm brickwork separated by 50mm gap.
	Roof	40+	Pitched concrete or terracotta tile or metal sheet roof, 10mm plasterboard ceiling fixed to ceiling joists, bulk insulation in roof cavity.		
	Door	28+	35mm solid core timber door fitted with full perimeter acoustic seals		
2	Windows / Sliding Doors	27+	Openable with minimum 6mm monolithic glass and full perimeter acoustic seals		
	Facade	45+	Cladding Construction: 9mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm timber stud, R2 insulation batts in wall cavity, 10mm standard plasterboard internally.	Brick Veneer Construction: 110mm brick, 90mm timber stud, minimum 40mm clearance between masonry and stud frame, R2 insulation batts in wall cavity, 10mm standard plasterboard internally.	Cavity Brick Construction: 2 leaves of 110mm brickwork separated by 50mm gap.
	Roof	43+	Pitched concrete or terracotta tile or metal sheet roof, 10mm plasterboard ceiling fixed to ceiling joists, bulk insulation in roof cavity.		
	Door	30+	40mm solid core timber door fitted with full perimeter acoustic seals		
3	Windows / Sliding Doors	32+	Openable with minimum 6.38mm laminated glass and full perimeter acoustic seals		
	Facade	52+	Brick Veneer Construction: 110mm brick, 90mm timber stud, minimum 40mm clearance between masonry and stud frame, R2 insulation batts in wall cavity, 10mm standard plasterboard internally.	Cavity Brick Construction: 2 leaves of 110mm brickwork separated by 50mm gap.	

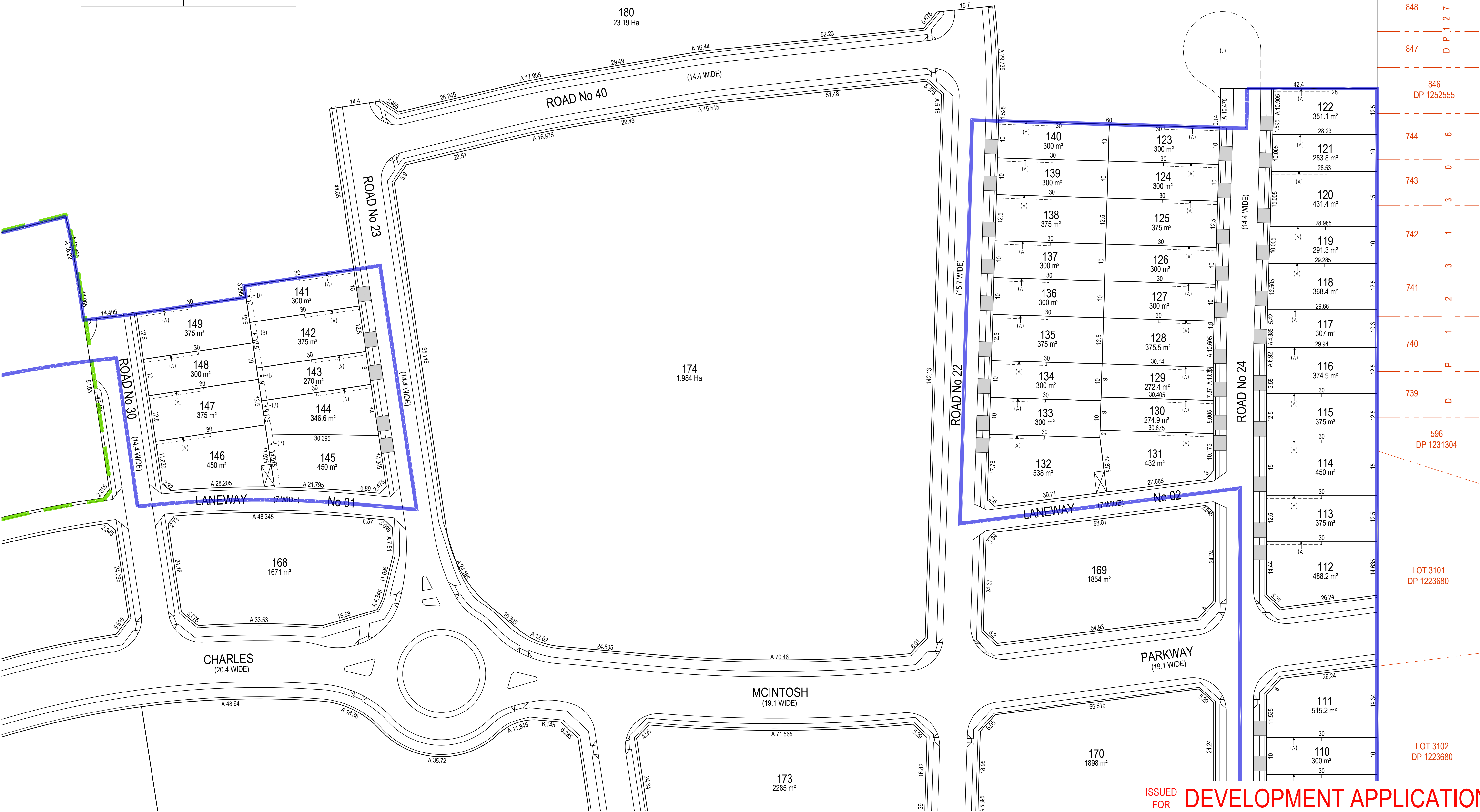
Category No.	Building Element	Required Acoustic Rating of Building Element, Rw	Construction Recommendation
4	Roof	48+	Pitched concrete or terracotta tile or sheet metal roof, 1 layer of 13mm sound-rated plasterboard fixed to ceiling joists, bulk insulation in roof cavity.
	Door	33+	45mm solid core timber door fitted with full perimeter acoustic seals
	Windows / Sliding Doors	35+	Openable with minimum 10.38mm laminated glass and full perimeter acoustic seals
	Facade	55+	Brick Veneer Construction: 110mm brick, 90mm timber stud, minimum 40mm clearance between masonry and stud frame, R2 insulation batts in wall cavity, 10mm standard plasterboard internally. Cavity Brick Construction: 2 leaves of 110mm brickwork separated by 50mm gap.
4	Roof	52+	Pitched concrete or terracotta tile or sheet metal, 2 layers of 13mm sound-rated plasterboard fixed to ceiling joists, bulk insulation in roof cavity.
	Door	33+	45mm solid core timber door fitted with full perimeter acoustic seals
Notes: - Where a room has different category recommendations on two or more facades, the roof recommendation for the highest category applies. - Any wall, roof or ceiling penetrations shall be acoustically sealed so as not to reduce the acoustic performance of the element. - The acoustic performance of glazed doors should be in accordance with the window glazing requirement of the applicable category. - Development Near Rail Corridors and Busy Roads – Interim Guideline recommends solid core timber doors of 45mm thickness for treatment categories 3 and 4. To align with current industry construction methods, solid core door recommendations have been limited to no more than 40mm thickness.			
The required acoustic rating is for the entire system. For example, for windows this includes the glass, frame and seals including the perimeter seal at the wall junction. By way of explanation, the Sound Insulation Rating Rw is a measure of the noise reduction property of the glazing assembly, a higher rating implying a higher sound reduction performance. Note that the Rw rating of systems measured as built on site (R'w Field Test) may be up to 5 points lower than the laboratory result.			
The client is advised not to commence detailing or otherwise commit to systems which have not been tested in an approved laboratory or for which an opinion only is available. Testing of systems and assemblies is a component of the quality control of the design process and should be viewed as a priority because there is no guarantee the forecast results will be achieved. No responsibility is taken for use of or reliance upon untested systems, estimates or opinions. The advice provided here is in respect of acoustics only.			
The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.			
NOTES FOR GLAZING CONSTRUCTIONS: All openable glass windows and doors shall incorporate full perimeter acoustic seals equivalent to Q-Lon, which enable the Rw rating performance of the glazing to not be reduced. The above glazing thicknesses should be considered the minimum thicknesses to achieve acoustical ratings. Greater glazing thicknesses may be required for structural loading, wind loading etc.			
GENERAL The sealing of all gaps in acoustic rated glazing assemblies and facades is critical in a sound rated construction. Use only sealer approved by the acoustic consultant. Check design of all junction details with acoustic consultant prior to construction. Check the necessity for HOLD POINTS with the acoustic consultant to ensure that all building details have been correctly interpreted and constructed. The information provided in this table is subject to modification and review without notice. The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.			

APPENDIX C Tranche 4 lot layouts



LEGEND		
LOT BOUNDARY & DIMENSION (m)	EXISTING	PROPOSED
	12.5	12.5
ADJOINING BOUNDARY AND INFORMATION	LOT 1 DP 1000	
LIMIT OF STAGE 1		
LIMIT OF STAGE 2		
DENOTES NDA BOUNDARY (FOR DENSITY CALCULATIONS)		

EASEMENTS	
(A)	EASEMENT FOR MAINTENANCE & ACCESS 0.9 WIDE
(B)	EASEMENT FOR DRAINAGE OF WATER 1.5 WIDE
(C)	RIGHT OF ACCESS VARIABLE WIDTH



ISSUED FOR **DEVELOPMENT APPLICATION**
NOT FOR CONSTRUCTION

Rev	Drawn	Check	Appd.	Date	Revision Description
00	AM	AM	AM	23/02/23	INITIAL ISSUE

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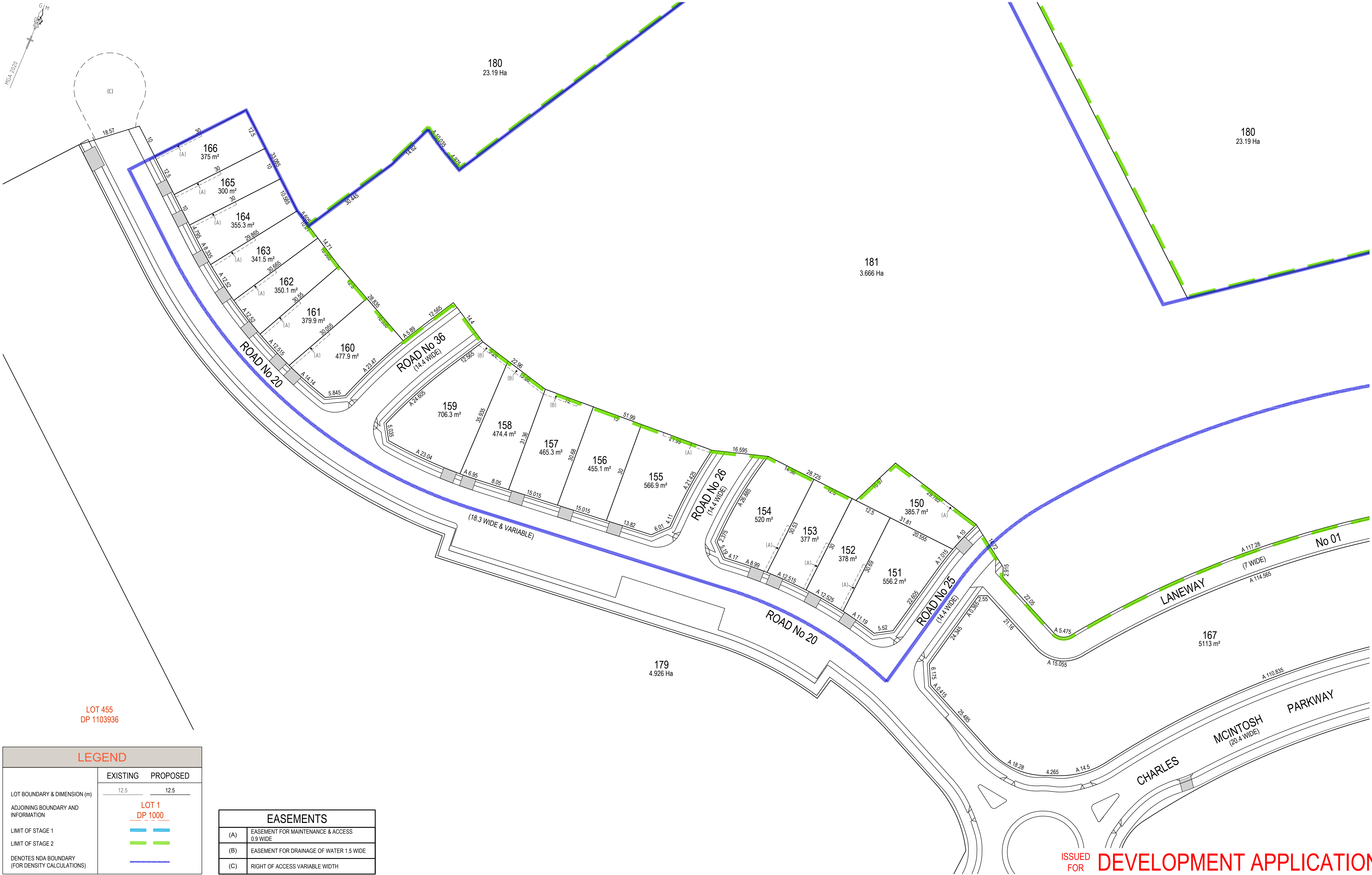
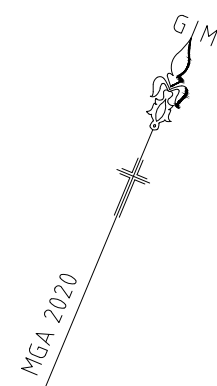
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Surveyor	N/A
Date of Survey	N/A
Height Datum	N/A
Horizontal Datum	MGA2020
Origin	-

For: 

By: 
ABN:25 604 069 981 PO Box:7936, BAULKHAM HILLS NSW 2153 T:(02) 8660 0035 E: info@theoriongroup.au

Project: COBBITTY BY MIRVAC

Title: TRANCHE 4 DA 03
CONCEPT PLAN OF SUBDIVISION
Project No. KF113748 Drawing No. SV-07 Milestone - Sheet 03 of 05 Revision 00



LOT 455
DP 1103936

LEGEND	
LOT BOUNDARY & DIMENSION (m)	EXISTING PROPOSED
ADJOINING BOUNDARY AND INFORMATION	12.5 12.5
LIMIT OF STAGE 1	LOT 1 DP 1000
LIMIT OF STAGE 2	
DENOTES NDA BOUNDARY (FOR DENSITY CALCULATIONS)	

EASEMENTS	
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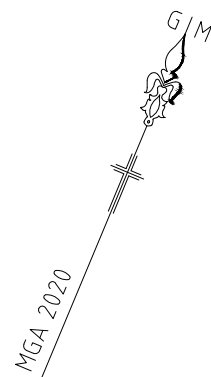
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Rev	Drawn	Check	Appd.	Date	Revision Description											KF113748 SV-07 - 04 of 05 00	



COBBITTY BY MIRVAC

TRANCHE 4 DA 03
CONCEPT PLAN OF SUBDIVISION



EASEMENTS	
(A)	EASEMENT FOR MAINTENANCE & ACCESS 0.9 WIDE
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LEGEND	
LOT BOUNDARY & DIMENSION (m)	EXISTING
	PROPOSED
ADJOINING BOUNDARY AND INFORMATION	12.5 12.5
LIMIT OF STAGE 1	LOT 1 DP 1000
LIMIT OF STAGE 2	
DENOTES NDA BOUNDARY (FOR DENSITY CALCULATIONS)	



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00	AM	AM	AM	23/02/23	INITIAL ISSUE

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Date of Survey	N/A
Height Datum	N/A
Horizontal Datum	MGA2020
Origin	Origin



Project:
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Tranche 4 DA 03 CONCEPT PLAN OF SUBDIVISION				
Project No.	Drawing No.	Milestone	Sheet	Revision
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