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Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

Proposed Design

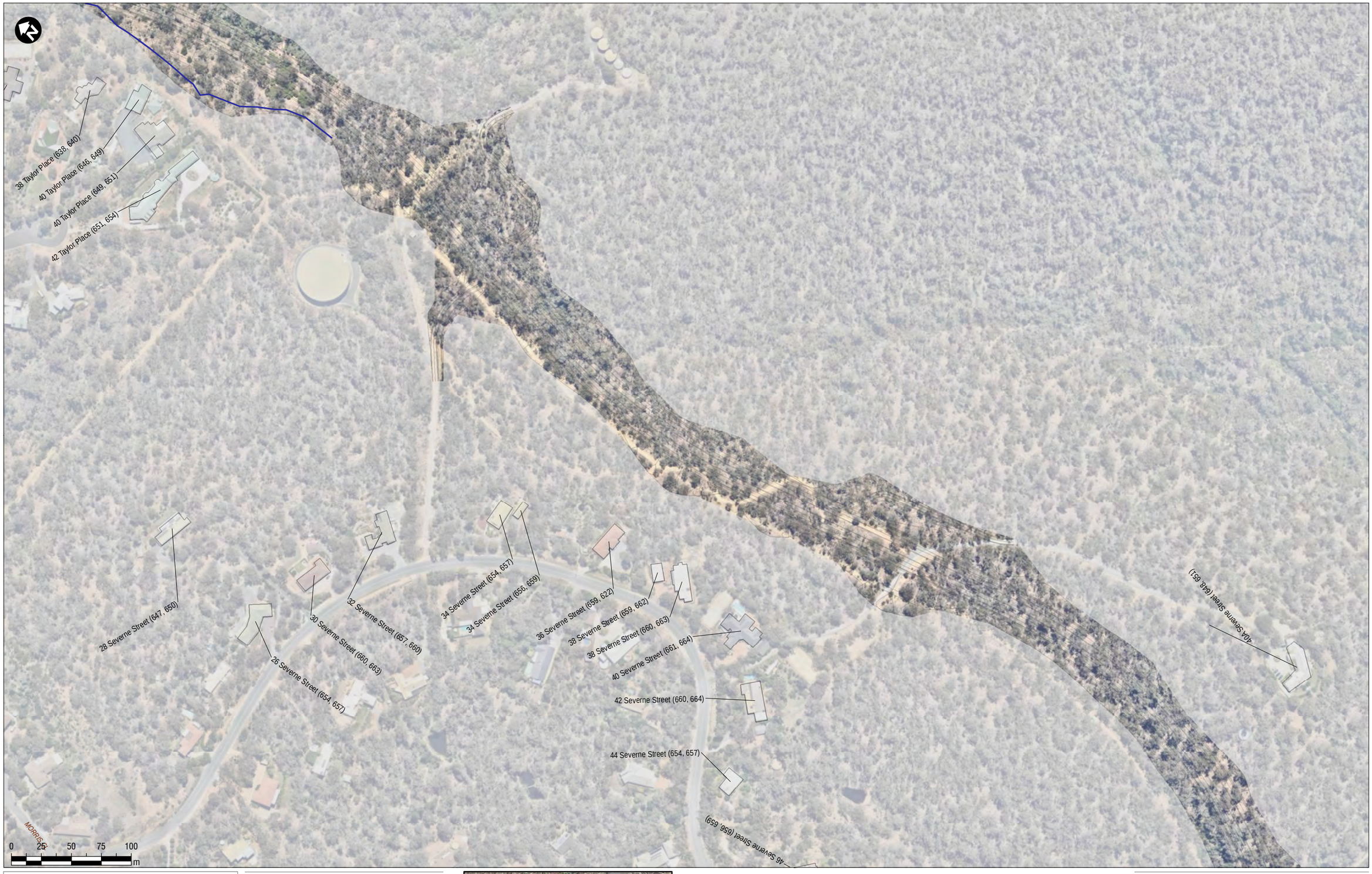
Assessed Buildings (Building Base Height, Building Roof Height)

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Assessed Buildings

FIGURE P - 2



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Projection:	GDA 1994 MGA Zone 55

Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

Proposed Design

Assessed Buildings (Building Base Height, Building Roof Height)

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Assessed Buildings

FIGURE P - 3

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Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

Proposed Design

Assessed Buildings (Building Base Height, Building Roof Height)

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Assessed Buildings

FIGURE P - 4

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Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

Proposed Design

Assessed Buildings (Building Base Height, Building Roof Height)

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Assessed Buildings

FIGURE P - 5

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Scale:	1:2,000
Sheet Size:	A3
Projection:	GDA 1994 MGA Zone 55

Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

Proposed Design

Assessed Buildings (Building Base Height, Building Roof Height)

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Assessed Buildings

FIGURE P - 6

$L_{Aeq(15hour)}$ noise contours with the implementation of noise barrier

OLD SYDNEY RD
PATRICK BRICK CCT
THOMAS ROYAL GDNS
ELLERTON DR
TENNYSON DR
NORTHCIFFE PL
BUTTLE ST
STONEHAVEN CCT
GEEBUNG PL
TANKEE PL
BULLOAK ST
ONEILL ST
BOOTH ST

0 25 50 75 100 m

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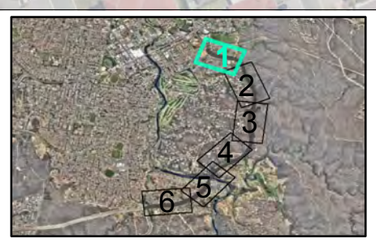
Projection:	GDA 1994 MGA Zone 55



Noise Protection Wall Height
- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

- Mitigated Day 45 dBA
- Mitigated Day 50 dBA
- Mitigated Day 55 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Daytime LAeq (15hr)

FIGURE Q - 1

ELLERTON DR

GEEBUNG PL

TANKEE PL

0 25 50 75 100 m

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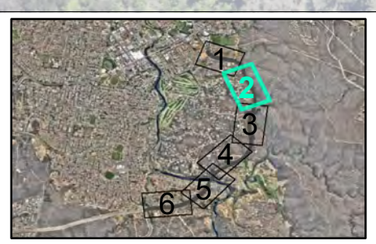


Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

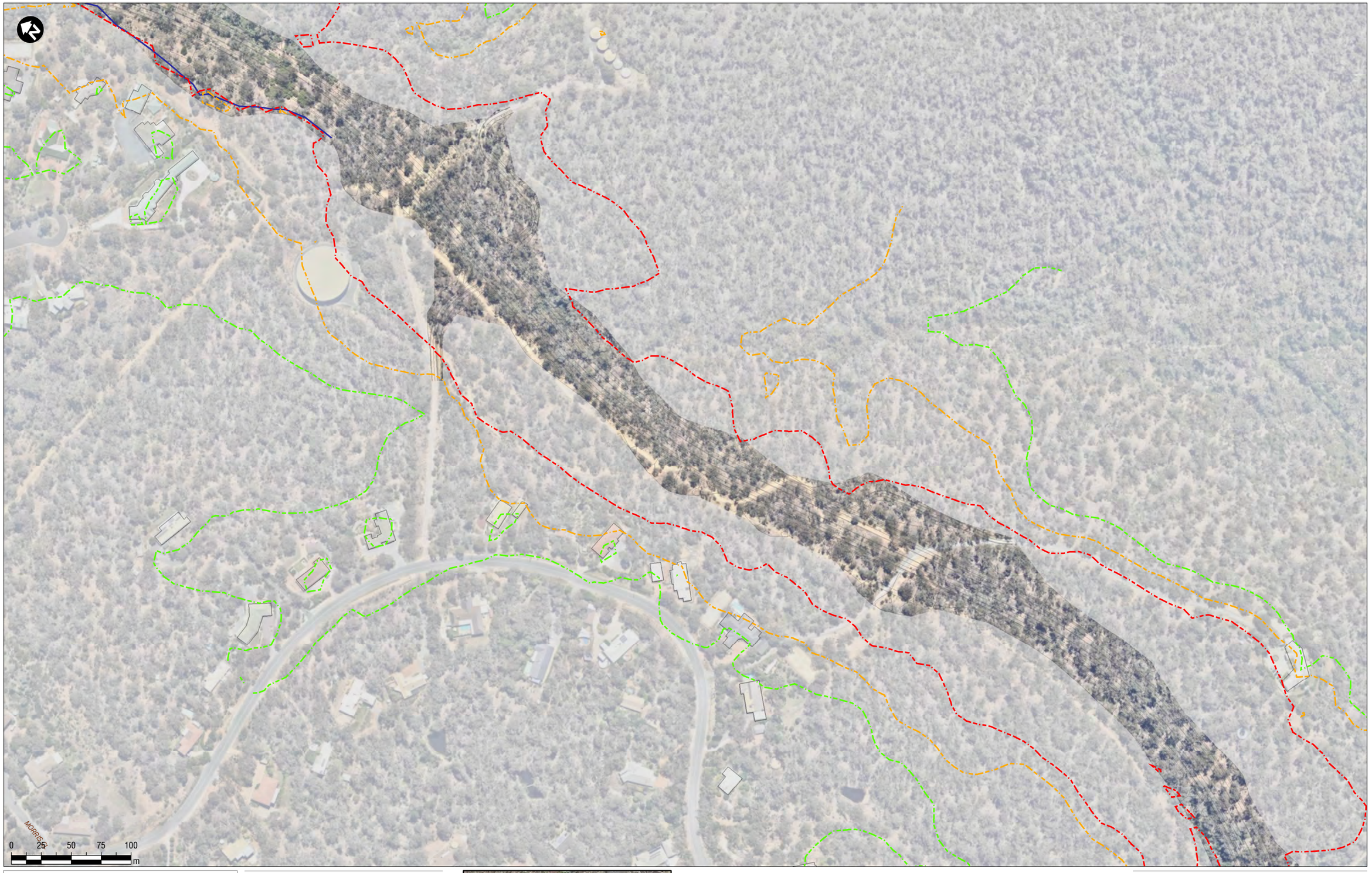
- Mitigated Day 45 dBA
- Mitigated Day 50 dBA
- Mitigated Day 55 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Daytime LAeq (15hr)

FIGURE Q - 2



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Noise Protection Wall Height

- 2.4m
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- 4.8m

- Mitigated Day 45 dBA
- Mitigated Day 50 dBA
- Mitigated Day 55 dBA
- Proposed Design
- Assessed Buildings

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ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Daytime LAeq (15hr)

FIGURE Q - 3

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Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

- Mitigated Day 45 dBA
- Mitigated Day 50 dBA
- Mitigated Day 55 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Daytime LAeq (15hr)

FIGURE Q - 4

LING PL

LONERGAN DR

BARRACKS FLAT DR

DOEBERL PL

ANNAND PL

0 25 50 75 100 m

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Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

- Mitigated Day 45 dBA
- Mitigated Day 50 dBA
- Mitigated Day 55 dBA
- Proposed Design
- Assessed Buildings

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ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Daytime LAeq (15hr)

FIGURE Q - 5

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Noise Protection Wall Height
- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

- Mitigated Day 45 dBA
- Mitigated Day 50 dBA
- Mitigated Day 55 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Daytime LAeq (15hr)

FIGURE Q - 6

$L_{Aeq(9hour)}$ noise contours with the implementation of noise barrier

OLD SYDNEY RD
PATRICK BRICK CCT
THOMAS ROYAL GDNS
ELLERTON DR
TENNYSON DR
NORTHCIFFE PL
BUTTLE ST
STONEHAVEN CCT
GEEBUNG PL
TANKEE PL
BULLOAK ST
ONEILL ST
BOOTH ST

0 25 50 75 100 m

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Date:	12/02/2015
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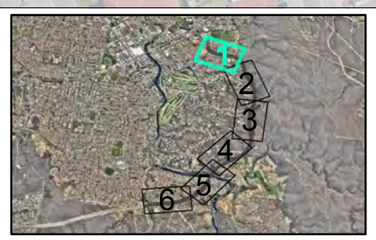
Projection:	GDA 1994 MGA Zone 55



Noise Protection Wall Height
- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

- Mitigated Night 40 dBA
- Mitigated Night 45 dBA
- Mitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

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ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Night-time LAeq (9hr)

FIGURE R - 1

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Scale:	1:2,500
Sheet Size:	A3
Projection:	GDA 1994 MGA Zone 55

Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

- Mitigated Night 40 dBA
- Mitigated Night 45 dBA
- Mitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

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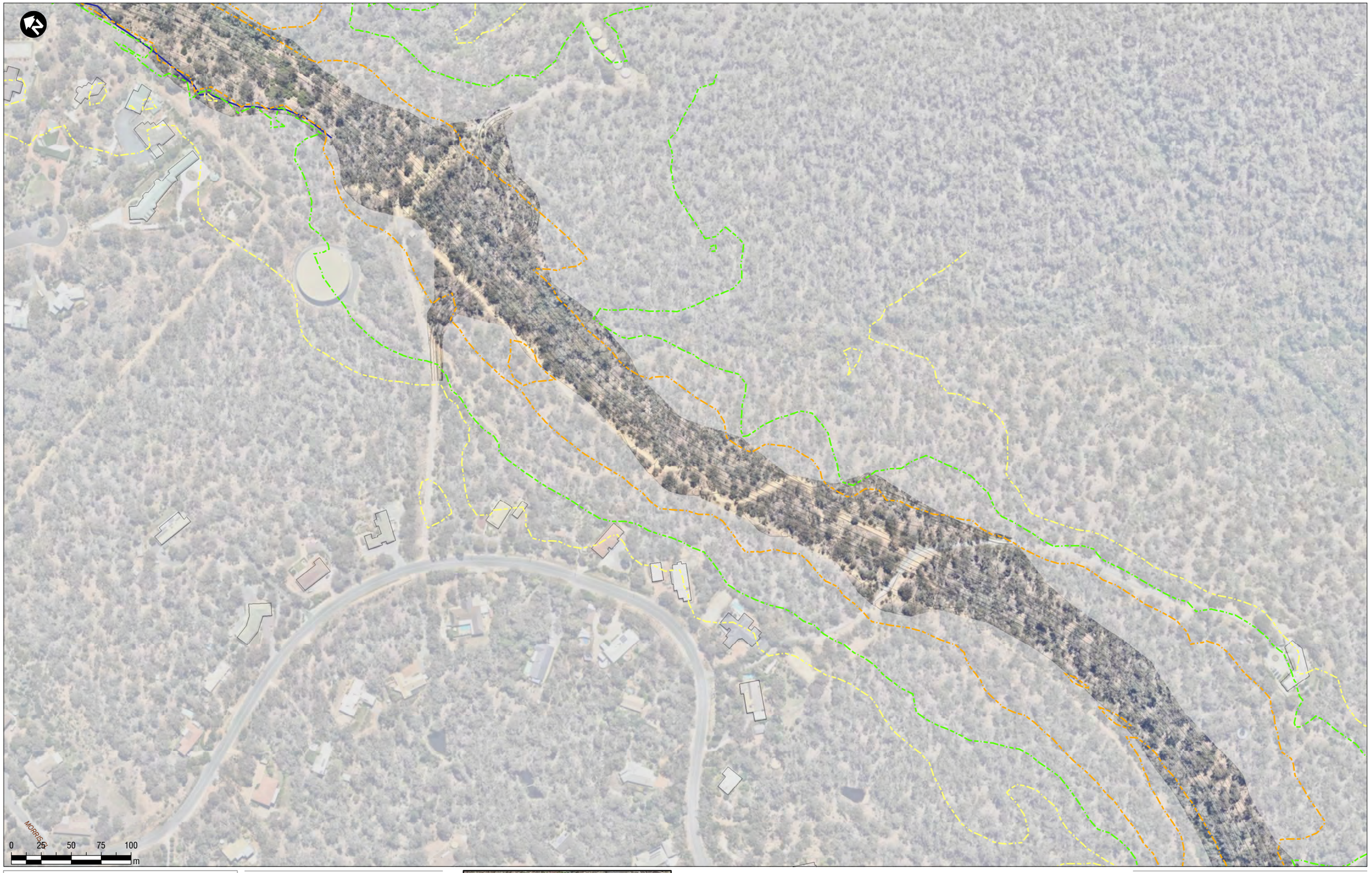
ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Night-time LAeq (9hr)

FIGURE R - 2



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Noise Protection Wall Height
- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

- Mitigated Night 40 dBA
- Mitigated Night 45 dBA
- Mitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

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ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Night-time LAeq (9hr)

FIGURE R - 3

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Noise Protection Wall Height

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- Mitigated Night 40 dBA
- Mitigated Night 45 dBA
- Mitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

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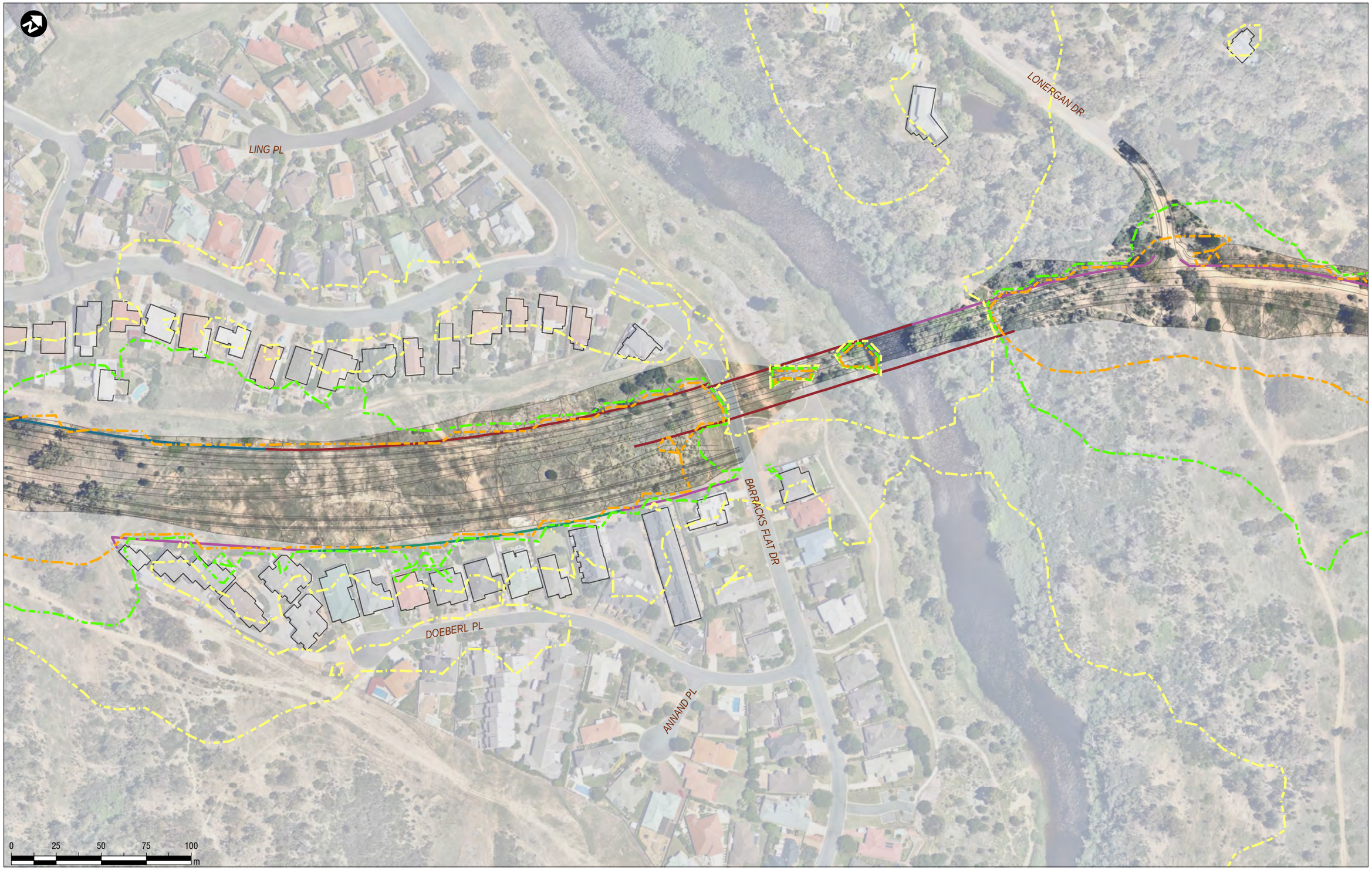
ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Night-time LAeq (9hr)

FIGURE R - 4



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Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

- Mitigated Night 40 dBA
- Mitigated Night 45 dBA
- Mitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

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ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Night-time LAeq (9hr)

FIGURE R - 5

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Scale:	1:2,000
Sheet Size:	A3
Projection:	GDA 1994 MGA Zone 55

Noise Protection Wall Height
- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

- Mitigated Night 40 dBA
- Mitigated Night 45 dBA
- Mitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Mitigated Noise Contour Night-time LAeq (9hr)

FIGURE R - 6

$L_{Aeq(15hour)}$ noise contours with no mitigation

OLD SYDNEY RD
PATRICK BRICK CCT
THOMAS ROYAL GDNS
ELLERTON DR
TENNYSON DR
NORTHCIFFE PL
BUTTLE ST
STONEHAVEN CCT
GEEBUNG PL
TANKEE PL
BULLOAK ST
ONEILL ST
BOOTH ST
0 25 50 75 100 m

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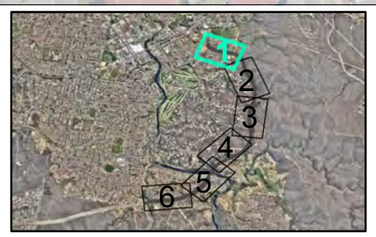

Unmitigated Day 45 dBA
Unmitigated Day 50 dBA
Unmitigated Day 55 dBA
Proposed Design
Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Daytime LAeq (15hr)

FIGURE S - 1

ELLERTON DR

GEEBUNG PL

TANKEE PL

0 25 50 75 100 m

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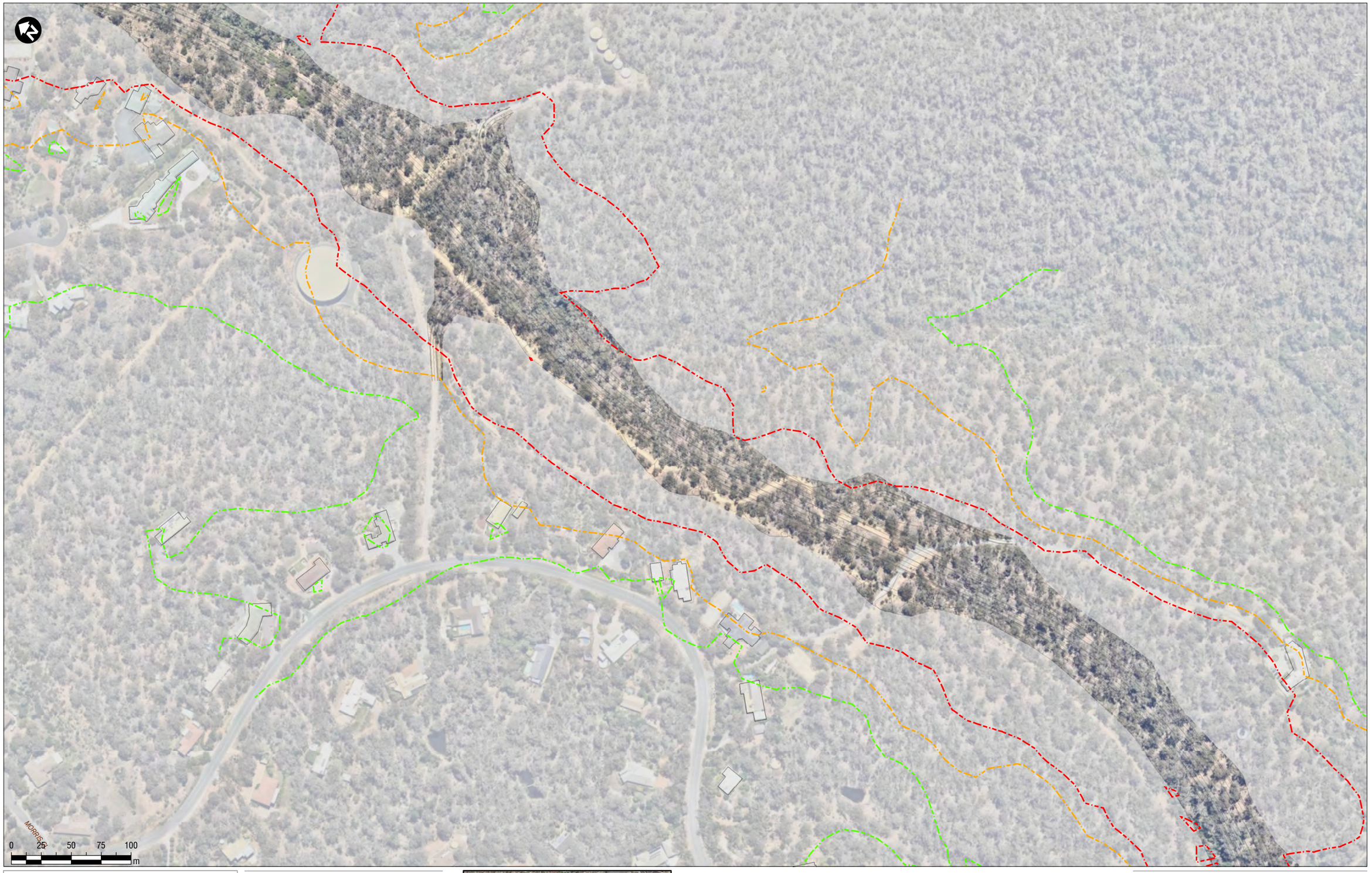
Unmitigated Day 45 dBA
Unmitigated Day 50 dBA
Unmitigated Day 55 dBA
Proposed Design
Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Daytime LAeq (15hr)

FIGURE S - 2



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- Unmitigated Day 45 dBA
- Unmitigated Day 50 dBA
- Unmitigated Day 55 dBA
- Proposed Design
- Assessed Buildings

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ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Daytime LAeq (15hr)

FIGURE S - 3

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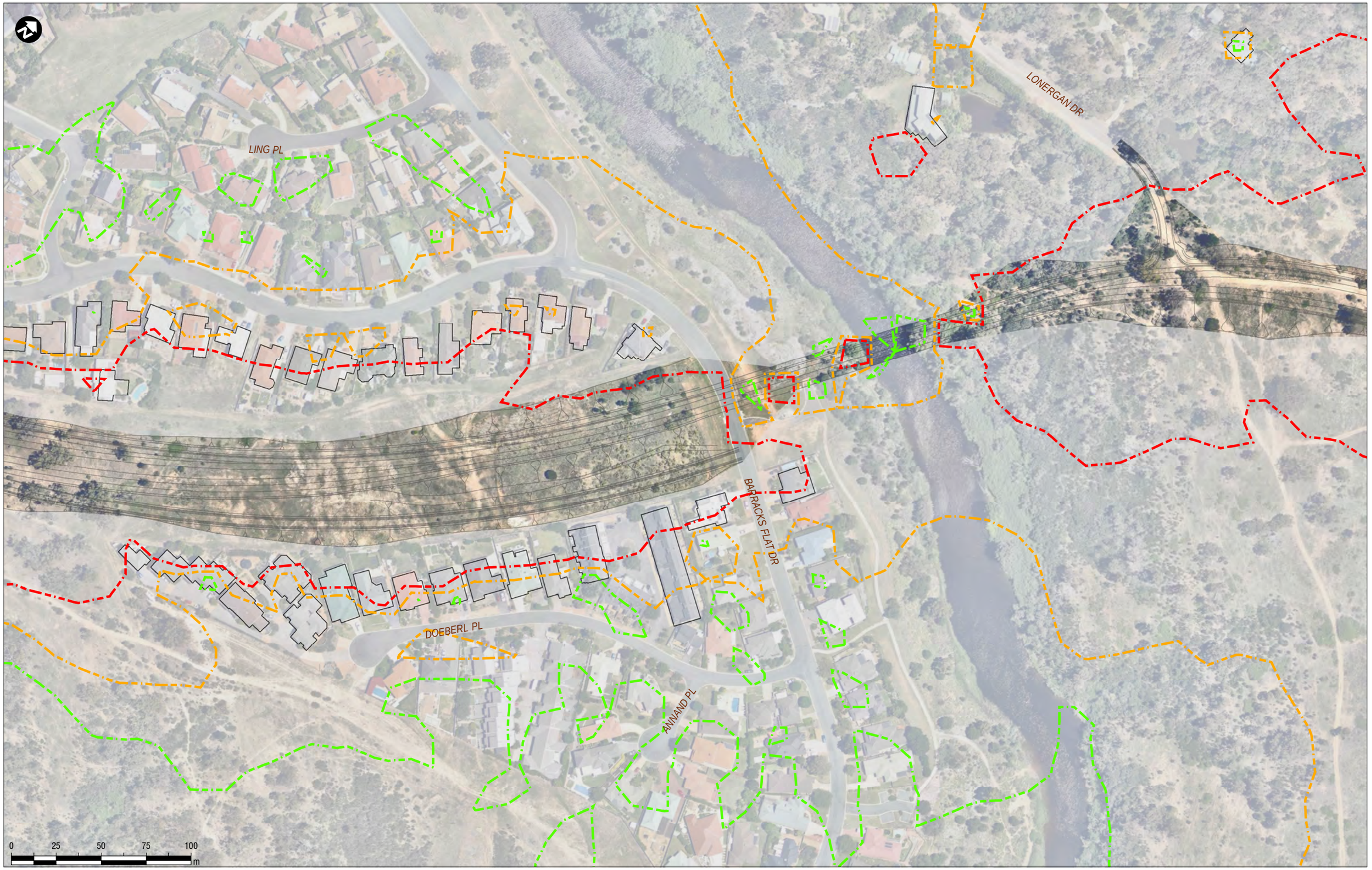
- Unmitigated Day 45 dBA
- Unmitigated Day 50 dBA
- Unmitigated Day 55 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Daytime LAeq (15hr)

FIGURE S - 4



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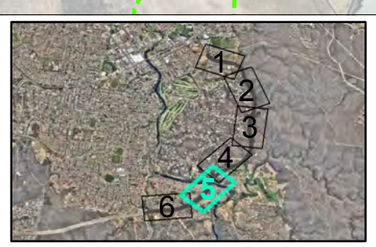

- Unmitigated Day 45 dBA
- Unmitigated Day 50 dBA
- Unmitigated Day 55 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Daytime LAeq (15hr)

FIGURE S - 5

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SLR
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CANBERRA ACT 2600
AUSTRALIA
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F: 61 2 6287 0801
www.slrconsulting.com

Project No.:	670.10568
Date:	12/02/2015
Drawn by:	NT
Scale:	1:2,000
Sheet Size:	A3
Projection:	GDA 1994 MGA Zone 55

- Unmitigated Day 45 dBA
- Unmitigated Day 50 dBA
- Unmitigated Day 55 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Daytime LAeq (15hr)

FIGURE S - 6

H:\Projects-SLR\630-Srv\NT\L670-CAN\670.10568 Ellerton Drive Extension\SLR670.10568_T_UnmitigatedNoiseContoursNight_01.mxd

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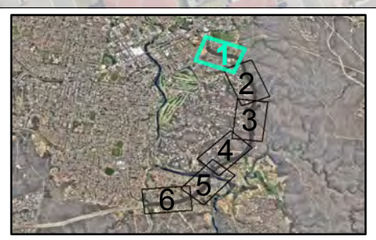
Scale:	1:2,000
Sheet Size:	A3
Projection:	GDA 1994 MGA Zone 55



- Unmitigated Night 40 dBA
- Unmitigated Night 45 dBA
- Unmitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Night-time LAeq (9hr)

FIGURE T - 1

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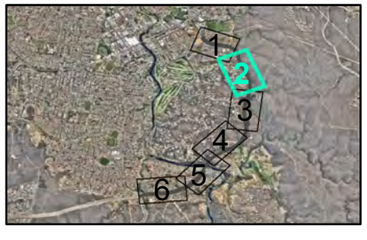


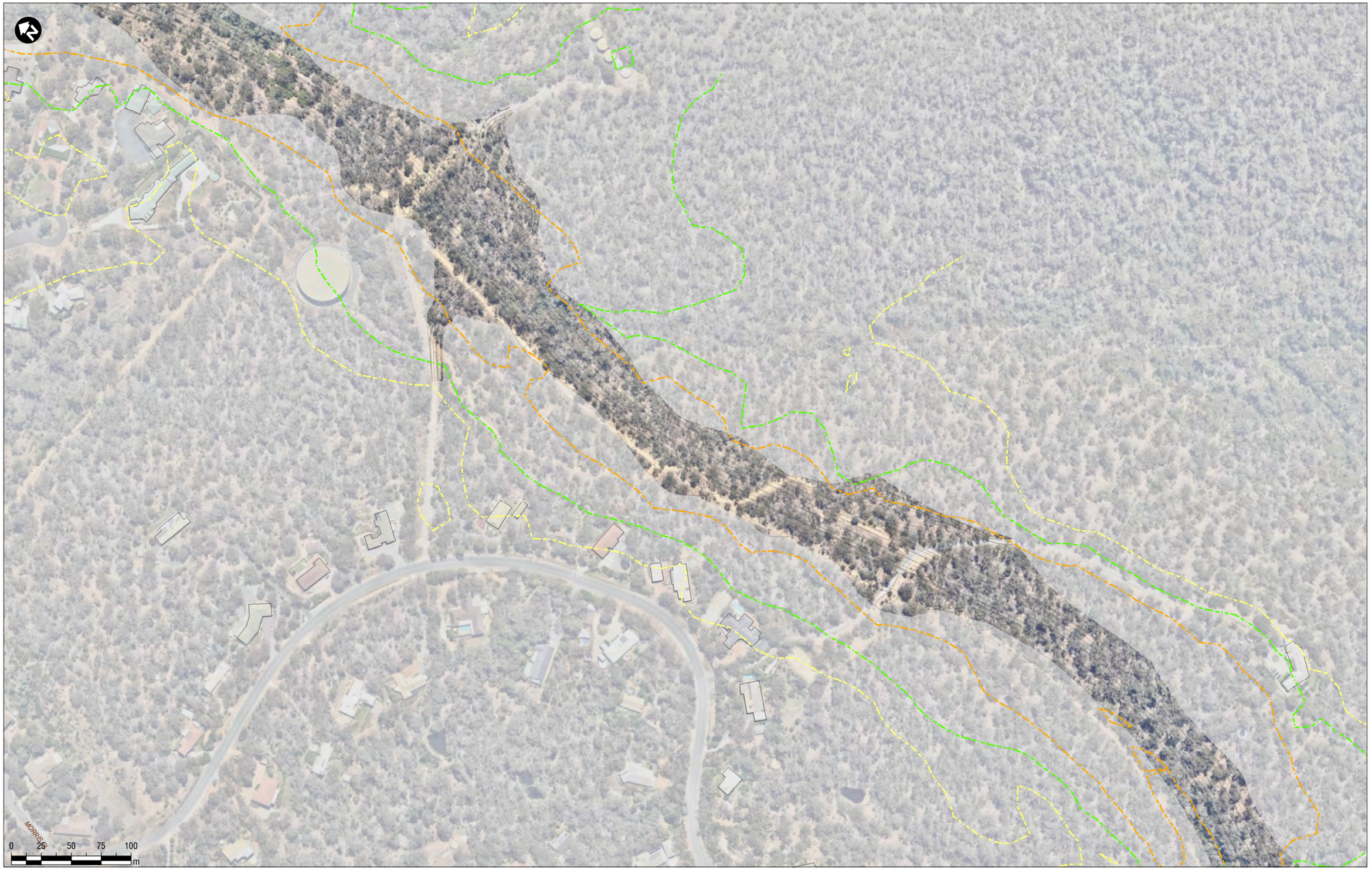
- Unmitigated Night 40 dBA
- Unmitigated Night 45 dBA
- Unmitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Night-time LAeq (9hr)

FIGURE T - 2



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- Unmitigated Night 40 dBA
- Unmitigated Night 45 dBA
- Unmitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Night-time LAeq (9hr)

FIGURE T - 3

H:\Projects-SLR\630-Srv\NTL670-CAN\670.10568 Ellerton Drive Extension\SLR670.10568_T_UnmitigatedNoiseContoursNight_01.mxd

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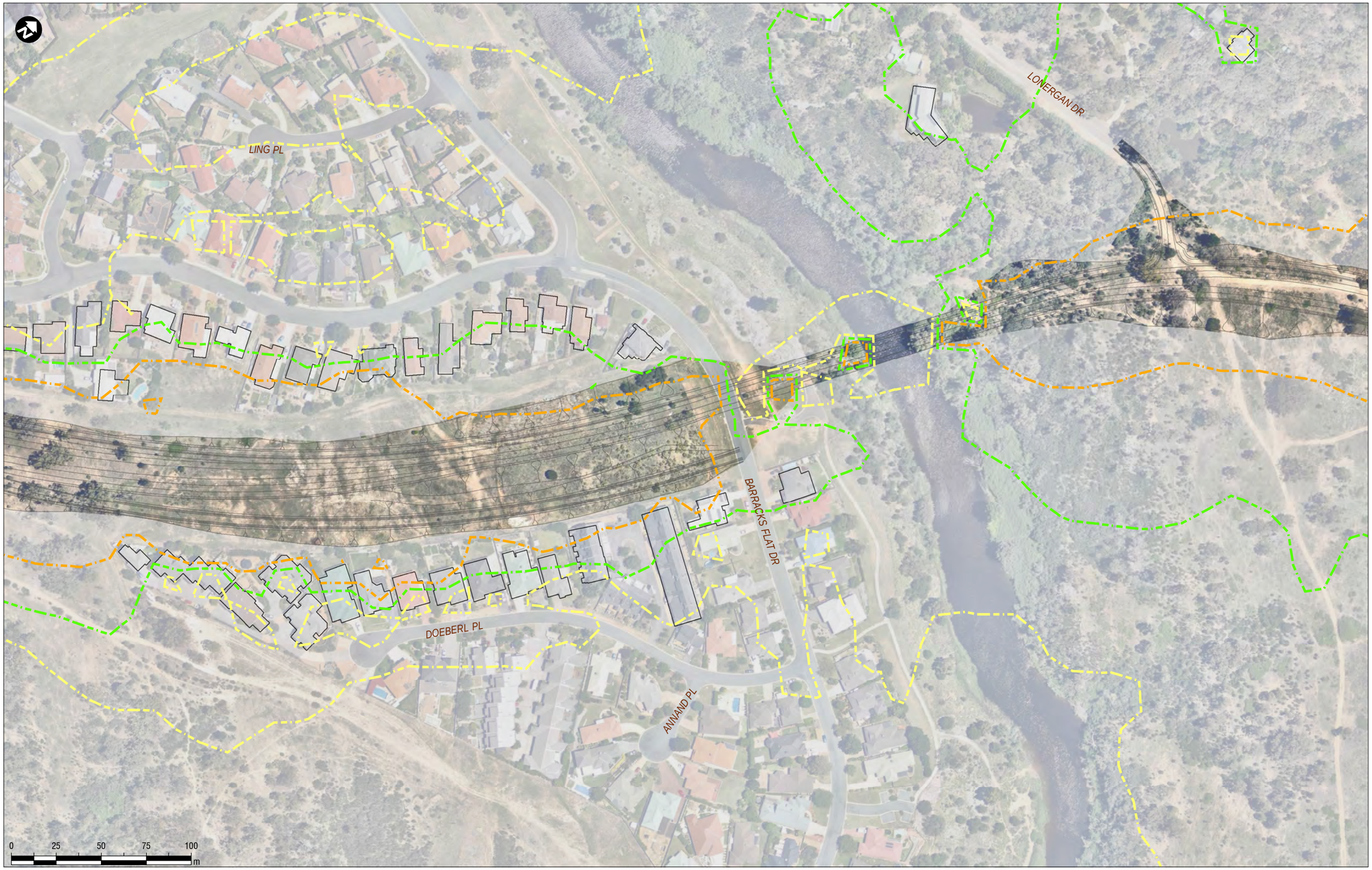
- Unmitigated Night 40 dBA
- Unmitigated Night 45 dBA
- Unmitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Night-time LAeq (9hr)

FIGURE T - 4



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- Unmitigated Night 40 dBA
- Unmitigated Night 45 dBA
- Unmitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Night-time LAeq (9hr)

FIGURE T - 5

H:\Projects-SLR\630-Srv\NT\L670-CAN\670.10568 Ellerton Drive Extension\SLR670.10568_T_UnmitigatedNoiseContoursNight_01.mxd

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- Unmitigated Night 40 dBA
- Unmitigated Night 45 dBA
- Unmitigated Night 50 dBA
- Proposed Design
- Assessed Buildings

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Unmitigated Noise Contour Night-time LAeq (9hr)

FIGURE T - 6

global environmental solutions

Ellerton Drive Extension Project

Property Inspections

Report Number 670.10568-R3

27 March 2015

Opus International Consultants
Unit 2, Level 1,
99 Northbourne Avenue,
Turner ACT 2612

Version: Draft 1

Ellerton Drive Extension Project

Property Inspections

PREPARED BY:

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
670.10568-R3	Draft 1	27 March 2015	Matthew Bryce	Zhang Lai	

Table of Contents

TABLES

1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) was commissioned by the Queanbeyan City Council (QCC) to undertake inspections of external facades of numerous properties located in close proximity to the proposed Ellerton Drive Extension (EDE).

The purpose of the inspections was to estimate the level of facade reduction from outside to inside, ie how much noise would reduce across the facade, based on the building construction.

This report provides a summary of the inspection results in terms of a single estimated decibel value for each facade of each property that was inspected.

2 METHODOLOGY

The QCC arranged for SLR to access numerous properties between 16 March 2015 and 19 March 2015. A total of 35 properties were inspected.

The properties were visually inspected, noting where habitable rooms (eg living, dining/kitchen, study, rumpus/family and bedrooms) and non-habitable rooms (eg bathroom, toilet, garage) were located. Window type (eg sliding, hinged or awning style) was noted and glazing thickness was measured where possible.

For all properties, the glazed area of the facade will be the controlling element with regard to noise reduction. The facade reduction was estimated based on the size of the total glazed area to the internal occupancy, and the thickness of glazing.

3 PROPERTY INSPECTION RESULTS

The properties were all of brick or blockwork construction, except 26 Lonergan Drive and the upper level of 100 Barracks Flat Drive. The constructions of the non-glazed elements of those properties were such that the glazed elements would be the controlling element.

All windows were aluminium framed with brush/weather seals, unless noted.

The relevant property details and estimated total facade noise reduction have been shown in **Table 1**.

Table 1 Property Inspection Details and Estimated Façade Noise Reduction

Address	Room	Direction	Window Type	Estimated Minimum Total Facade Reduction
12 Alfred Place	Bedroom	North	Sliding, double glazed (5mm inside, 70mm air gap, 3mm outside)	30
	Bedroom	North	Sliding, double glazed (5mm inside, 70mm air gap, 3mm outside)	30
	Lounge	North	Sliding, double glazed (5mm inside, 70mm air gap, 3mm outside)	30
	Kitchen/Dining	East	Sliding, double glazed (5mm inside, 70mm air gap, 3mm outside)	30
		South	Sliding, single glazing	15-20
	Bedroom	South	Sliding, double glazed (5mm inside, 70mm air gap, 3mm outside)	30
16 Alfred Place	Bedroom	North	Awning, single glazing	20
	Bedroom	North	Awning, single glazing	20
	Living/TV	North	Awning, single glazing	20
	Dining/Kitchen	South	Sliding door and windows, single glazing	20
	Bedroom	South	Sliding, single glazing	20
74 Barracks Flat Drive	Lower Floor:			
	Bedroom	Northeast	Sliding, single glazing	20
	Kitchen/Living	Northeast	Sliding, single glazing	20
	Living	Northwest	Sliding, single glazing	20
	Upper Floor:	Northeast	Sliding, single glazing	20
	Bedroom	Northeast	Sliding, single glazing	20
	Dining/Kitchen	Northeast	Sliding door and window, single glazing	20
	Dining/Living	Southeast	Sliding, single glazing	20
		South	Sliding door, single glazing	20
	Lounge	Southwest	Sliding, single glazing	20
	Lounge/Living	Northwest	Sliding, single glazing	20
	Bedroom	Northwest	Sliding, single glazing	20
	Study	Northwest	Sliding, single glazing	20
	Bedroom	Northwest	Sliding, single glazing	20
78 Barracks Flat Drive	Bedroom	Northwest	Sliding, single glazing	20
	Bedroom	Northeast	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Dining/Kitchen	Southeast	Sliding door and window, single glazing	20
	Dining/Living	Southwest	Sliding, single glazing	20
	Lounge/Living	Northwest	Sliding, single glazing	20
82 Barracks Flat Drive	Bedroom	Northwest	Sliding, single glazing	20
	Bedroom	Northwest	Sliding, single glazing	20
	Lounge/Dining	Northwest	Sliding door, single glazing	20
		Northeast	Sliding, single glazing	20
	Lounge/Kitchen	Southeast	Sliding, single glazing	20
	Bedroom	Southeast	Sliding, single glazing	20
	Bedroom	Southeast	Sliding, single glazing	20
90 Barracks Flat Drive	Living/Kitchen	Northeast	Sliding door and window, single glazing	20

Address	Room	Direction	Window Type	Estimated Minimum Total Facade Reduction
	Bedroom	Northeast	Sliding door and window, single glazing	20
		Southeast	Fixed window	20
	Lounge/Dining	Southwest	Sliding door and window, single glazing	20
98 Barracks Flat Drive	Sunroom	Northwest	Sliding, single glazing	15-20
		Northeast	Sliding, single glazing	15-20
		Southeast	Sliding, single glazing	15-20
	Living/Dining	Northeast	Internal to sunroom	15-20
	Living	Northeast	Sliding, single glazing	15-20
		Southeast	Sliding door and window, single glazing	15-20
	Bedroom	Southeast	Sliding, single glazing	20
	Bedroom	Southeast	Sliding, single glazing	20
		Southwest	Sliding, single glazing	20
100 Barracks Flat Drive	Lower Floor:			
	Bedroom	East	Sliding, single glazing	20
		South	Sliding door and window, single glazing	20
	Bedroom	South	Sliding door and window, single glazing	20
	Upper Floor:			
	Lounge	North	Sliding, single glazing	20
		East	Sliding, single glazing	20
	Living/Kitchen	East	Sliding, single glazing	15-20
	Living/TV	South	Sliding door and window, single glazing	15-20
	Bedroom	North	Sliding, single glazing	20
	Bedroom	North	Sliding, single glazing	20
104 Barracks Flat Drive	Family/Kitchen	North - East - South	Sliding, single glazing	15-20
	Lounge	South	Sliding, single glazing	20
	Bedroom	South	Sliding, single glazing	20
	Bedroom	West	Sliding, single glazing	20
	Bedroom	North	Sliding, single glazing	20
	Bedroom	East	Sliding, single glazing	20
	Living/TV	East	Sliding, single glazing	15-20
114 Barracks Flat Drive	Bedroom	Northeast	Sliding, single glazing	20
	Lounge/Dining	Northwest	Sliding, single glazing	20
		Northeast	Sliding, single glazing	20
	Living/TV	Northeast	Sliding door and window, single glazing	20
	Bedroom	Southeast	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
116 Barracks Flat Drive	Bedroom	Southeast	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Living	Southeast	Sliding, single glazing	20
		Northeast	Sliding door, single glazing	20
	Dining/kitchen	Southeast	Sliding windows, single glazing	20

Address	Room	Direction	Window Type	Estimated Minimum Total Facade Reduction
123 Barracks Flat Drive	Bedroom	North	Sliding, single glazing	20
		West	Sliding, single glazing	20
	Living/Dining	North	Sliding, single glazing	15-20
	Bedroom	North	Sliding, single glazing	20
		East	Awning, single glazing	20
	Bedroom	South	Sliding, single glazing	20
	Bedroom	South	Sliding, single glazing	20
		West	Sliding, single glazing	20
126B Barracks Flat Drive	Lower Floor:			
	Entry/Living	North	Sliding, single glazing	20
	Dining/Kitchen	East	Sliding, single glazing	20
		South	Sliding, single glazing	20
	Upper Floor:			
	Bedroom	North	Sliding, single glazing	20
	Bedroom	North	Sliding, single glazing	20
		East	Sliding, single glazing	20
	Bedroom	East	Sliding, single glazing	20
130 Barracks Flat Drive	Lower Floor:			
	Guest room	Northeast	Sliding door, single glazing	20
	Upper Floor:			
	Lounge/TV	Northeast	Sliding door, single glazing	20
		Northwest	Sliding, single glazing	20
	Entry/Lounge	Northeast	Double leaf timber doors, single glazing	20
	Study	Northeast	Sliding, single glazing	20
	Bedroom	Northeast	Sliding, single glazing	20
	Bedroom	Southeast	Sliding, single glazing	20
	Bedroom	Southeast	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Dining/Kitchen	Southwest	Sliding/fixed, atrium	15-20
		Northwest	Sliding	15-20
	Living	Southwest	Sliding, single glazing	20
		Northwest	Sliding, single glazing	20
131 Barracks Flat Drive	Living	Northeast	Sliding, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25
		Northwest	Sliding, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25
	Dining/Kitchen	Northeast	Sliding, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25
	Lounge/TV	Northeast	Sliding, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25
	Kitchen/Dining	Southeast	Sliding, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25
		Northwest	Sliding, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25

Address	Room	Direction	Window Type	Estimated Minimum Total Facade Reduction
	Bedroom	Northeast	Awning, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25
		Southeast	Awning, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25
	Entry	Southwest	Hinged glass door, fixed windows	25
	Bedroom	Northwest	Awning, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25
		Northeast	Awning, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25
	Bedroom	Northeast	Awning, double glazed (4mm inside, 12mm air gap, 4mm outside, estimated)	25
142 Barracks Flat Drive	Bedroom	Northeast	Single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Family/Kitchen	South - Southwest	Sliding window, single glazing	15
		Northwest	Sliding door and window, single glazing	15
	Living	Northwest	Sliding door, single glazing	20
146 Barracks Flat Drive	Lounge	Northwest	Sliding, single glazing	20
		Northeast	Sliding, single glazing	20
	Bedroom	Southeast	Sliding, single glazing	20
	Bedroom	Southeast	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Bedroom	Northwest	Sliding, single glazing	20
	Living/TV	Northwest	Sliding, single glazing	20
	Dining Kitchen	Northwest	Sliding door and windows - Atrium style, single glazing	15-20
15 Caroline Place	Living	West	Sliding, single glazing	20
		North	Sliding, single glazing	20
	Dining/Kitchen	East	Sliding door and window, single glazing	20
	Bedroom	East	Sliding, single glazing	20
	Bedroom	West	Sliding, single glazing	20
19 Caroline Place	Lower Floor:			
	Bed/Living	South	Timber door, Sliding window, single glazing	20
	Upper Floor:			
	Family	North	Sliding, single glazing	20
	Bedroom	North	Sliding, single glazing	20
	Bedroom	North	Sliding, single glazing	20
	Bedroom	South	Sliding, single glazing	20
	Dining/Kitchen	South	Sliding, single glazing	20
	Lounge	South	Sliding, single glazing	20
		West	Sliding, single glazing	20
	Living	North	Sliding, single glazing	20
3/6 Doeberl Place	Lower Floor:			
	Living	Northeast	Sliding door, single glazing	20

Address	Room	Direction	Window Type	Estimated Minimum Total Facade Reduction
	Bedroom	Northeast	Sliding, single glazing	20
	Upper Floor:			
	Bedroom	Southwest	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
7/32 Doeberl Place	Lower Floor:			
	Dining/Living/Kitchen	North	Sliding door, single glazing	20
	Upper Floor:			
	Bedroom	North	Sliding door and window, single glazing	20
	Bedroom	South	Sliding, single glazing	20
	Bedroom	South	Sliding, single glazing	20
12/32 Doeberl Place	Lower Floor:			
	Dining/Living/Kitchen	North	Sliding door and window, single glazing	20
	Middle Floor:			
	Bedroom	North	Sliding door and window, single glazing	20
	Bedroom	South	Sliding, single glazing	20
	Bedroom	South	Sliding, single glazing	20
	Upper Floor:			
	Study/Bedroom	North	Awning, single glazing	20
13/32 Doeberl Place	Lower Floor:			
	Living	North	Sliding, single glazing	20
		West	Sliding, single glazing (to sun room)	20
	Dining/Kitchen	South	Sliding, single glazing	20
		North	Sliding door (to sun room) and window, single glazing	20
	Upper Floor:			
	Gallery	West	Sliding door, single glazing	20
		North	Sliding, single glazing	20
	Bedroom	East	Sliding, single glazing	20
	Bedroom	South	Sliding, single glazing	20
	Bedroom	North	Sliding door and window, single glazing	20
20 Doeberl Place	Living	Northwest	Sliding door, single glazing	20
		Southeast	Sliding, single glazing	20
	Sitting room	Southeast	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Dining/Kitchen	Northeast	Sliding door and window, single glazing	20
26 Doeberl Place	Living	West-Northeast	Sliding door and windows - Atrium style, single glazing	15-20
	Living/Kitchen	Northeast	Sliding door and window, single glazing	15-20
	Lounge	Southeast	Sliding, single glazing	20
	Bedroom	Southeast	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20

Address	Room	Direction	Window Type	Estimated Minimum Total Facade Reduction
	Bedroom	Northwest	Sliding, single glazing	20
	Bedroom	Northwest	Sliding, single glazing	20
28 Doeberl Place	Lower Floor:			
	Family	North	Sliding door, single glazing	20
	Bedroom	Northwest	Sliding, single glazing	20
		Northeast	Sliding, single glazing	20
	Upper Floor:			
	Rumpus	Northwest	Sliding door, single glazing	20
		Northeast	Sliding, single glazing	20
		Southeast	Sliding, single glazing	20
	Living	Southeast	Sliding, single glazing	20
	Bedroom	Southeast	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Bedroom	Southwest	Sliding, single glazing	20
	Bedroom	Northwest	Sliding, single glazing	20
	Dining/Kitchen	North	Sliding door, single glazing	20
		Northwest	Sliding, single glazing	20
		Northeast	Sliding, single glazing	20
26 Lonergan Drive	Lower Floor:			
	Main bedroom	North	Sliding, single glazing	20
		South	Sliding door, single glazing	20
		East	Sliding, single glazing	20
	Main living area (incl kitchen)	East	Sliding door, fixed upper level windows, single glazing	20
		South	Sliding, single glazing	20
		North	Sliding, single glazing	20
	Upper Floor:			
	Study	South	Sliding door, single glazing	20
	Bedroom	North	Sliding, single glazing	20
	Bedroom	East	Sliding, single glazing	20
		South	Sliding, single glazing	20
33 Lonergan Drive	All rooms	All	Timber framed, sliding doors	15-20
			Timber framed, sliding/awning windows	20
35 Lonergan Drive	Lower Floor:			
	Lounge	East	Two sets of sliding door	15
	Dining	East and South	Two sets of sliding window	20
	Family	South	Two sets of sliding window	20
	Kitchen	North	Two sets of sliding door and full height fixed glazed panel	15-20
	Rumpus	Northeast	Two sets of sliding window	20
	Upper Floor:			

Address	Room	Direction	Window Type	Estimated Minimum Total Facade Reduction
	Bed1 (main)	East	Single set of sliding door	20
		South	Two sets of sliding window	20
	Bed2	East	Sliding window, single glazing	20
		South	Sliding window, single glazing	20
	Bed3	East	Single set of sliding door	20
	Bed4	East	Single set of sliding door	20
		North	Sliding window, single glazing	20
	Pool room	Northeast	Sliding door and 2 sets of sliding window	15
73 River Drive	Lower Floor:			
	Rumpus	North	Sliding, single glazing	20
		East	Sliding door, single glazing	20
	Family/Guest room	North	Sliding, single glazing	20
	Upper Floor:			
	Bedroom	North	Sliding door, single glazing	20
	Entry	North	Timber doors, single glazing	20
	Living	North	Sliding, single glazing	20
		East	Sliding door, single glazing	20
	Living/Family	North	Sliding door, single glazing	20
		East	Sliding, single glazing	20
	Dining/Kitchen	East - South	10mm fixed atrium style	25
		South	Sliding door, single glazing	20
	Bedroom	South	Sliding, single glazing	20
	Bedroom	West	Sliding door, single glazing	20
34 Severne Street	Bedroom	North	Timber frame, awning, single glazing (full height)	20
	Dining	North	Timber frame, awning, single glazing (full height)	20
	Living	North	Timber frame, awning, single glazing (full height)	20
	Bedroom	North	Timber frame, awning, single glazing (full height)	20
	Bedroom	East	Timber frame, awning, single glazing	20
	Bedroom	South	Timber frame, awning, single glazing	20
	Lounge/Kitchen	South	Timber frame, awning and hinged door, single glazing	20
38 Severne Street	Main House:			
	Bedroom	Northeast-Northwest	Sliding, single glazing	20
	Bedroom	Northeast	Sliding, single glazing	20
	Bedroom	Northeast	Sliding, single glazing	20
	Lounge	Southeast	Sliding door, single glazing	20
	Dining/Kitchen	Southeast	Sliding door and window, single glazing	20
	Office	Southwest-Southeast	Sliding, single glazing	20
		Northeast	Sliding, single glazing	20

Address	Room	Direction	Window Type	Estimated Minimum Total Facade Reduction
	Bedroom	Northwest-Southwest	Sliding, single glazing	20
		Northwest	Glass blocks	20
	Living	Southwest-Southeast	Sliding, single glazing	20
		Northwest-Southwest	Sliding, single glazing	20
	Lounge/TV	Northwest	Sliding door, single glazing	20
	Rumpus	Northwest	Sliding door and windows, single glazing	20
	Flat:			
	Living/Kitchen	Northeast	Sliding, single glazing	20
		Southeast	Sliding door, single glazing	20
	Bedroom	Northwest	Glass blocks	20
40 Severne Street	Lounge/Office	East	Sliding, single glazing	20
	Bed1	North	Awning windows	20
	Lounge	East	Awning windows	20
	Bed2	North	Awning window	20
		East	Awning window	20
	Bed3	North	Awning window	20
	Bed4	North	Awning window	20
	Living	North	Large 4-panel sliding door	15-20
		East	Large 4 panel sliding door	15-20
20 Taylor Place	Lounge/Entry	North	Timber frame, awning window	15-20
		Northeast	Timber frame, hinged door, awning window	15-20
	Lounge/Kitchen	North	Timber frame, awning window	15-20
	Dining	North	Timber frame, hinged door, awning window	15-20
	Bedroom	East	Timber frame, awning window	15-20
	Bedroom	South	Timber frame, awning window	20
	Bedroom	South	Timber frame, awning window	20
	Bedroom	South	Timber frame, awning window	15-20
24 Taylor Place	Lower Floor:			
	Bedroom/Kitchen/Living	North	Sliding, single glazing	20
		East	Sliding door, single glazing	20
	Upper Floor:			
	Lounge	West	Sliding, single glazing	15-20
		North	Sliding, single glazing	15-20
		East	Sliding, single glazing	15-20
	Kitchen/Open Plan	North	Sliding door, single glazing	15-20
	Dining	West	Sliding, single glazing	15-20
		North	Sliding, single glazing	15-20
		East	Sliding, single glazing	15-20
	Lounge/TV	North	Sliding door, single glazing	15-20
	Bedroom	North	Sliding door, single glazing	20

Address	Room	Direction	Window Type	Estimated Minimum Total Facade Reduction
		East	Glass blocks	20
	Sitting Room	South	Sliding, single glazing	20
	Bedroom	South	Sliding, single glazing	20
	Study	West	Sliding, single glazing	20
32 Taylor Place	Lower Floor:			
	Lounge	East	Sliding door, single glazing	20
		North	Sliding, single glazing	20
	Upper Floor:			
	Bed1	North	Sliding	20
	Bed2	East	Sliding	20
	Living room	North/East	4 sets of sliding window, with roller shutters	15-20
5 Webber Place	Bed	Northeast	Sliding, single glazing	20
	Bed	Southwest	Sliding, single glazing	20
	Living	Southwest	Sliding, single glazing	20
	Dining	Northeast	Sliding, single glazing	20
		Southeast	Sliding door, single glazing	20
	Other habitable		Sliding, single glazing	20
			Sliding door, single glazing	20
11 Webber Place	Bedroom	South	Sliding, single glazing	20
	Bedroom	East	Sliding, single glazing	20
	Habitable	West	Sliding, single glazing	20
	Lounge	East	Sliding, single glazing	20
	Dining/Kitchen	South	Sliding, single glazing	20
12 Webber Place	Lower Floor:			
	Lounge/Dining	North	Sliding, single glazing	20
		South	Sliding, single glazing	20
	Entry	North	Timber doors	20
	Living/TV	North	Sliding, single glazing	20
		East	Sliding, single glazing	20
	Family	South	Sliding, single glazing	20
	Office	South	Sliding, single glazing	20
	Kitchen/Open Plan	South	Sliding, single glazing	20
	Upper Floor:			
	Bedroom	West	Sliding, single glazing	20
	Bedroom	North	Sliding, single glazing	20
	Bedroom	North	Sliding, single glazing	20
	Bedroom	South	Sliding, single glazing	20
	Bedroom	South	Sliding, single glazing	20
13 Webber Place	Bedroom	West	Sliding, single glazing	20
	Hallway	East	Sliding door, single glazing	20
	Kitchen/Dining	South	Sliding door and sliding window, single glazing	20

4 OTHER PROPERTIES NOT INSPECTED

SLR viewed several properties without accessing the land.

Consistent with the inspected properties, the most common type of window in the survey area would be aluminium framed, single glazing (up to 6 mm thick).

It would be reasonable to apply a minimum facade noise reduction of 20 dBA for most facades, however a value of 15 dBA may be appropriate where the facade contains a significant proportion of glazing. As a guide, a significant proportion may be a surface area of above 5.5m^2.

5 INTERNAL NOISE LEVEL DESIGN GOALS

In accordance to the NSW Department of Planning *Development Near Rail Corridors and Busy Roads – Interim Guideline*, the following internal noise level design goals are recommended:

- $L_{Aeq(15hour)}$ 40 dBA for living area (day time L_{Aeq})
- $L_{Aeq(9hour)}$ 35 dBA for sleeping area (night time L_{Aeq})

This guideline is primarily intended for use when designing new residential establishment near existing transport corridor. However, this will provide a suitable guidance in determining whether existing façade construction is sufficient in providing the appropriate level of noise reduction. These recommended levels are also consistent with the upper limit of the recommended design goal for 'residential buildings near minor roads' in accordance to AS2107:2000:

- L_{Aeq} 25 to 35 dBA for sleeping area
- L_{Aeq} 30 to 40 dBA for living area

With a noise reduction through a façade of 15 dB, the internal noise level design goals based on the above can generally be met provided that the external noise levels at façade meet the day and night time L_{Aeq} of 55 dBA and 50 dBA respectively in accordance to the NSW Road Noise Policy.

MEMORANDUM

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Michael.Hill@opus.com.au	Michael Hill	DATE:	30 March 2015
	Opus International Consultants	NO OF PAGES:	17
		TO BE MAILED:	No

Dear Michael

Ellerton Drive Extension
Noise Assessment

1 Introduction

SLR Consulting Australia Pty Ltd (SLR) is pleased to present the results and findings of further noise assessment conducted for the Ellerton Drive Extension project. The objective of this further assessment is to:

- Determine and confirm the number of properties that require consideration of property treatment for the following:
    - NCA3 without noise barrier
    - NCA5 without noise barrier
    - NCA5 with noise barrier
    - NCA7 with noise barrier
    - NCA8 with noise barrier
- Determine the potential benefit of the use of stone mastic asphalt (i.e. SMA, a type of low noise pavement)

2 Noise Mitigation Scenarios – Summary of Assessment Findings

Based on recent modelling work conducted by SLR on various noise mitigation scenarios and the potential use of SMA, a summary is provided in **Table 1** to **Table 5** that details the findings associated with each mitigation scenario. It is noted that, subject to further assessment, the Road Noise Policy recommends the following order in the consideration of noise mitigation strategies:

- Noise control at source i.e. low noise pavement
- Noise control along the transfer path i.e. noise barrier
- Noise control at the receiver i.e. property treatment

2.1 NCA1 and NCA2

Based on previous assessments, the noise mitigation provided for NCA1 and NCA2 is recommended to be a combination of noise barrier (positioned along property boundary to replace existing fence) and property treatment. **Table 1** provides a summary of the number of residual properties requiring consideration of individual treatment based on various mitigation scenarios.

Table 1 Summary of Assessment Findings – NCA1 and NCA2

Road Surface	Noise Barrier	Number of Properties				List of Properties Requiring Property Treatment
		Total Assessed	Exceed 55/50 Criteria	Exceed Relative Increase Criteria	Recommended for Property Treatment	
NCA1						
DGA	Existing property boundary fence only (i.e. no further noise mitigation)	26 (7 are double- storey)	26 (by up to 8 dB)	22 (by up to 8 dB)	Noise barrier option recommended	-
DGA	530 m noise barrier at 3 to 3.6 m to replace existing fence	26	11 (5 by up to 1 dB, which is considered minor) (6 by up to 2 to 7 dB)	3 (by up to 2 dB)	6	Upper level of 6, 8, 23, 25, 29 and 31 Patrick Brick Court
SMA	Existing property boundary fence only	26	26 (by up to 6 dB)	20 (by up to 6 dB)	Noise barrier option recommended	-

Road Surface	Noise Barrier	Number of Properties				List of Properties Requiring Property Treatment
		Total Assessed	Exceed 55/50 Criteria	Exceed Relative Increase Criteria	Recommended for Property Treatment	
SMA	530 m noise barrier at 2.4 to 3 m to replace existing fence	26	12 (4 by up to 1 dB, which is considered minor) (8 by up to 2 to 6 dB)	5 (by up to 2 dB)	8	Upper level of 8, 23, 25, 29, 31 and 33 Patrick Brick Court Ground level of 45 and 49 Thomas Royal Garden
NCA2						
DGA	Existing property boundary fence only	21	12 (by up to 7 dB)	5 (by up to 6 dB)	Noise barrier option recommended	
DGA	320 m noise barrier at 2.4 m high to replace existing fence	21	2 (1 by 1 dB, minor) (1 by 4 dB)	1 (by up to 2 dB)	1	12 Northcliffe Place
SMA	Existing property boundary fence only	21	8 (by up to 5 dB)	3 (by up to 4 dB)	Noise barrier option recommended	

2.2 NCA3, NCA4, NCA5 and NCA6

The assessment findings for NCA3 to NCA6 and the list of addresses requiring further consideration of property treatment based on various mitigation scenarios are presented in **Table 2**.

Table 2 Summary of Assessment Findings – NCA3, NCA4, NCA5 and NCA6

Road Surface	Noise Barrier	Number of Properties				List of Properties Requiring Property Treatment
		Total Assessed	Exceed 55/50 Criteria	Exceed Relative Increase Criteria	Recommended for Property Treatment	
NCA3						
DGA	No barrier	16	3 (by up to 4 dB)	7 (by up to 6 dB, including 3 that exceeds 55/50 criteria)	7	20, 22, 24, 26, 30, 32 and 38 Taylor Place
DGA	480 m at 2.4 m high	16	0	1 (by up to 1 dB, considered to be minor exceedance)	0	-
SMA	No barrier	16	1 (by up to 2 dB)	3 (by up to 4 dB, including 1 that exceeds 55/50 criteria)	3	30, 32 and 38 Taylor Place
NCA4						
DGA	No barrier	13	0	4 (by up to 2.3 dB)	4	34, 36, 38 and 40 Severne Street
SMA	No barrier	13	0	1 (by less than 0.5 dB)	0	-
NCA5						
DGA	No barrier	14	2 (by up to 2 dB)	6 (by up to 6 dB)	6, if noise barrier deemed not feasible and reasonable	13 Woodman Place 24, 26, 31, 33 and 35 Lonergan Drive
DGA	370 m at 3.6 m high	14	0	4 (by up to 3 dB)	4	26, 31, 33 and 35 Lonergan Drive

Road Surface	Noise Barrier	Number of Properties				List of Properties Requiring Property Treatment
		Total Assessed	Exceed 55/50 Criteria	Exceed Relative Increase Criteria	Recommended for Property Treatment	
DGA	* 370 m at 3.6 m high * 100 m extension along bridge (outside NB lane) at 2.4 m high	14	0	2 (by up to 2 dB)	2	26, 35 Lonergan Drive
SMA	No barrier	14	0	3 (by up to 4 dB)	3	26, 33 and 35 Lonergan Drive
SMA	370 m at 3.6 m high	14	0	1, (by up to 1 dB, considered to be minor exceedance)	Comments: Noise barrier in addition to SMA not likely to be feasible and reasonable as only 3 properties exceed the criteria with SMA.	
NCA6						
DGA	No barrier	1	1 (by up to 2 dB)	1 (by up to 7 dB)	1	40A Severne Street
SMA	No barrier	1	-	1 (by up to 5 dB)	1	40A Severne Street

2.3 NCA7

The assessment findings for NCA7 and the list of addresses requiring further consideration of property treatment based on various mitigation scenarios are presented in **Table 3**. Based on the noise barrier optimization procedure suggested in the RMS Noise Mitigation Guideline, with the implementation of SMA, a combination of a 140 m barrier on the bridge of 2.4 m high and a 380 m barrier outside the southbound carriageway of up to 4.2 m high was predicted and considered to be acoustically most appropriate. This is however subject to further feasible and reasonable considerations and taking into account meeting the Relative Increase Criteria. This option results in 9 properties requiring further consideration of individual treatment. With implementation of DGA, the optimized noise barrier height in accordance to the RMS guidelines is more than 5.4 m.

Table 3 Summary of Assessment Findings – NCA7

Road Surface	Noise Barrier	Number of Properties				List of Properties Requiring Property Treatment
		Total Assessed	Exceed 55/50 Criteria	Exceed Relative Increase Criteria	Recommended for Property Treatment	
NCA7						
DGA	No barrier	33 (16 are double-storey)	15 (by up to 8 dB)	25 (by up to 13 dB)	Noise barrier in combination with property treatment recommended	
SMA	* 380 m at up to 4.2 m high * 140 m extension along bridge (outside SB lane) at 2.4 m high	33	0	9 (by up to 3 dB)	9	130 Barracks Flat Drive
						2 townhouses in 6 Doeberl Place closest to EDE
						28 and 30 Doeberl Place
						Units 3, 9, 10, and 13/32 Doeberl Place
SMA	* 380 m at up to 3.6 m high * 140 m extension along bridge (outside SB lane) at 2.4 m high	33	1	14 (by up to 3 dB)	14	130 Barracks Flat Drive
						2 townhouses in 6 Doeberl Place closest to EDE
						26, 28 and 30 Doeberl Place
						Units 3, 4, 8, 9, 10, 11, 12 and 13/32 Doeberl Place

Road Surface	Noise Barrier	Number of Properties				List of Properties Requiring Property Treatment
		Total Assessed	Exceed 55/50 Criteria	Exceed Relative Increase Criteria	Recommended for Property Treatment	
DGA	* 380 m at 3.6 m high * 140 m extension along bridge (outside SB lane) at 2.4 m high	33	2 (by up to 1 dB)	18	18	130 and 132 Barracks Flat Drive
						2 townhouses in 6 Doeberl Place closest to EDE
						20, 22, 24, 26, 28 and 30 Doeberl Place
						Unit 3 and 4/32 Doeberl Place
						Unit 8 to 12/32 Doeberl Place
						Unit 13/32 Doeberl Place

2.4 NCA8 – East of Northbound On/Off Ramp

The assessment findings for NCA8 and the list of addresses requiring further consideration of property treatment based on various mitigation scenarios are presented in **Table 4**. Based on the noise barrier optimization procedure suggested in the RMS Noise Mitigation Guideline, with the implementation of SMA, a 500 m barrier outside the northbound carriageway of up to 3 m high was predicted and considered to be acoustically most appropriate. This is however subject to further feasible and reasonable considerations and taking into account meeting the Relative Increase Criteria. This option results in 10 properties requiring further consideration of individual treatment. With implementation of DGA, the optimized noise barrier height in accordance to the RMS guidelines is about 4.2 m with 13 properties requiring further consideration of individual treatment.

Table 4 Summary of Assessment Findings – NCA8 (East of Northbound On/Off Ramp)

Road Surface	Noise Barrier	Number of Properties				List of Properties Requiring Property Treatment
		Total Assessed	Exceed 55/50 Criteria	Exceed Relative Increase Criteria	Recommended for Property Treatment	
NCA8 (Barracks Flat Drive properties, east of NB on/off ramp)						
DGA	No barrier	24	19 (by up to 6 dB)	27 (by up to 11 dB)	Noise barrier in combination with property treatment recommended	
SMA	500 m of 3 m high	24	0	10 (by 1 to 2 dB)	10	78, 80, 90, 98, 100, 108, 110, 114, 116, 118 Barracks Flat Drive
DGA	500 m of up to 4.2 m high	24	0	11 (by up to 4 dB)	11	78, 90, 98, 100, 108, 110, 112, 114, 116, 118 and 126A Barracks Flat Drive
DGA	500 m of up to 2.4 to 3 m high	24	7 (by up to 3 dB)	19 (by up to 6 dB)	19	78-84, 90, 94-120, 126 Barracks Flat Drive

2.5 NCA8 – (West of Northbound On/Off Ramp)

The assessment findings for NCA8 and the list of addresses requiring further consideration of property treatment based on various mitigation scenarios are presented in **Table 5**. A number of properties within this area are affected by noise from the existing Old Cooma Road, which were predicted to cause an exceedance of the day/night L_{Aeq} criteria at these locations. With a 560 m barrier outside the northbound lane of 2.4 m high, the properties requiring further consideration of individual treatment are 18 Alfred Place, 9 and 12 Weber Place.

Table 5 Summary of Assessment Findings – NCA8 (East of Northbound On/Off Ramp)

Road Surface	Noise Barrier	Number of Properties				List of Properties Requiring Property Treatment
		Total Assessed	Exceed 55/50 Criteria	Exceed Relative Increase Criteria	Recommended for Property Treatment	
NCA8 (Alfred Place, Caroline Place, Fitzgibbon Place and Webber Place properties, west of NB on/off ramp)						
DGA	No Barrier	19	14 (by up to 6 dB)	4 (by up to 3 dB)	Noise barrier recommended	
DGA	560 m of 2.4 m	19	9 (due to contribution from existing Old Cooma Road)	0	3 (to reduce contribution from Ellerton Drive only)	18 Alfred Place 9 and 12 Weber Place
SMA	No Barrier	19	11	1 (by 1 dB)	11, Noise barrier option recommended	

3 Noise Barrier Material

It is recommended that the material selected for the noise barrier has a minimum surface mass of 13 kg/m^2. This is typically equivalent to an Rw rating of approximately 28 dB. Suitable materials include 20 mm timber (based on density of 700 kg/m^3), 12 mm Perspex and any aerated concrete or masonry construction.

4 Conclusion

Based on the results presented in **Table 1**, the following findings can be made in relation to the use of low noise pavement (e.g. stone mastic asphalt):

- NCA1 and NCA2
    - The benefit of SMA is not significant and therefore not recommended for this section. The combination of property boundary noise barrier and DGA is recommended.
- NCA3:
    - With the use of SMA, the RNP criteria (including the relative increase criteria) were exceeded at 3 out of 16 properties. No further noise barrier is likely to be required with these 3 residual properties being considered for property treatment.
    - With the use of DGA, the RNP criteria were exceeded at 7 out of 16 properties.
- NCA4:
    - With the implementation of SMA, the predicted noise levels without noise barrier comply with all RNP criteria. The only exception was at one property where the relative increase criteria were exceeded by less than 1 dB. This is considered to be a minor exceedance and no further mitigation is likely to be required.
- NCA5:
    - With the implementation of SMA, the RNP criteria (including the relative increase criteria) were exceeded at 3 out of 14 properties. No further noise barrier is likely to be required with these 3 residual properties being considered for property treatment.
- NCA6 (40A Severne Street):
    - Due to the isolated nature of this property, property treatment is recommended. The use of SMA has the potential of reducing the external noise impact at this property.
- NCA7:
    - With the implementation of SMA, 380 m of noise barrier at up to 4.2 m height outside the southbound main carriageway and 140 m of barrier at 2.4 m height along the bridge, all RNP criteria were met at all 33 assessed receivers apart from at 9 properties.
    - The scenario above was predicted and considered to acoustically appropriate based on optimization procedure as recommended by RMS guidelines.

- NCA8 (east of NB on/off ramp)
    - With the implementation of SMA and 500 m of noise barrier at 3 m height outside the northbound main carriageway, all RNP criteria were met at all 24 assessed receivers apart from at 10 properties.
    - The scenario above was predicted and considered to acoustically appropriate based on optimization procedure as recommended by RMS guidelines.
- NCA8 (west of NB on/off ramp)
    - With the use of DGA and a 560 m noise barrier outside the northbound lane of 2.4 m high, the properties requiring further consideration of individual treatment are 18 Alfred Place, 9 and 12 Weber Place.
- SMA is recommended for the section covering NCA3, NCA4, NCA5, NCA6, NCA7 and NCA8 just west of the northbound on/off ramp.

We trust this information meets your current requirements. Please do not hesitate to contact me at 0417 903 521 if you wish to discuss anything.

Yours sincerely

ZHANG LAI
Senior Consultant

5 Appendix – Extent and Locations of Modelled Noise Barrier

Figure 1 NCA1 and NCA2 Noise Barrier

Figure 2 NCA3 Noise Barrier

Figure 3 NCA5 Noise Barrier

Figure 4 NCA7 and NCA8 Noise Barrier (east of NB on/off ramp)

Figure 5 NCA8 Noise Barrier (west of NB on/off ramp)