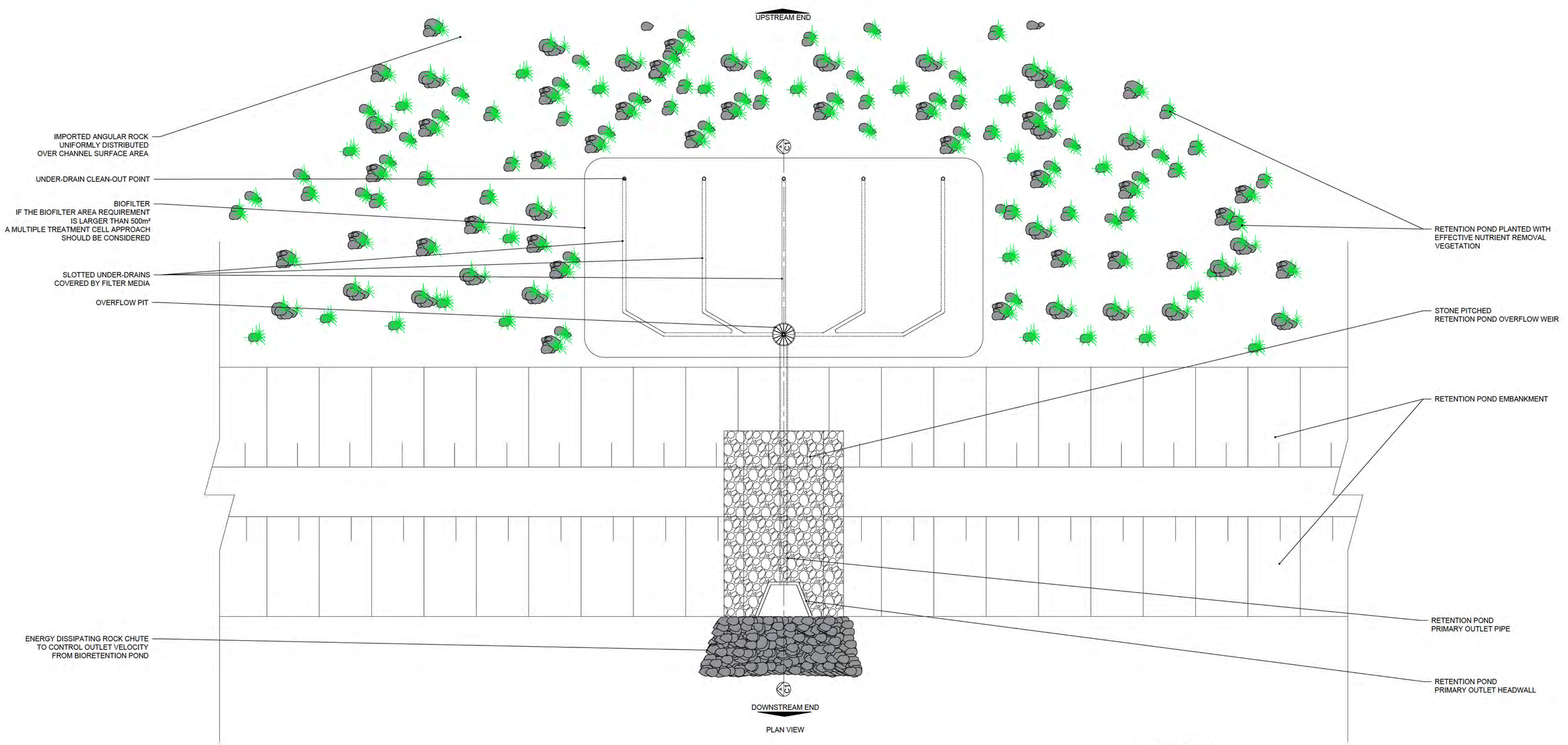

PLAN VIEW

DETAIL D1 : TYPICAL BIORETENTION POND

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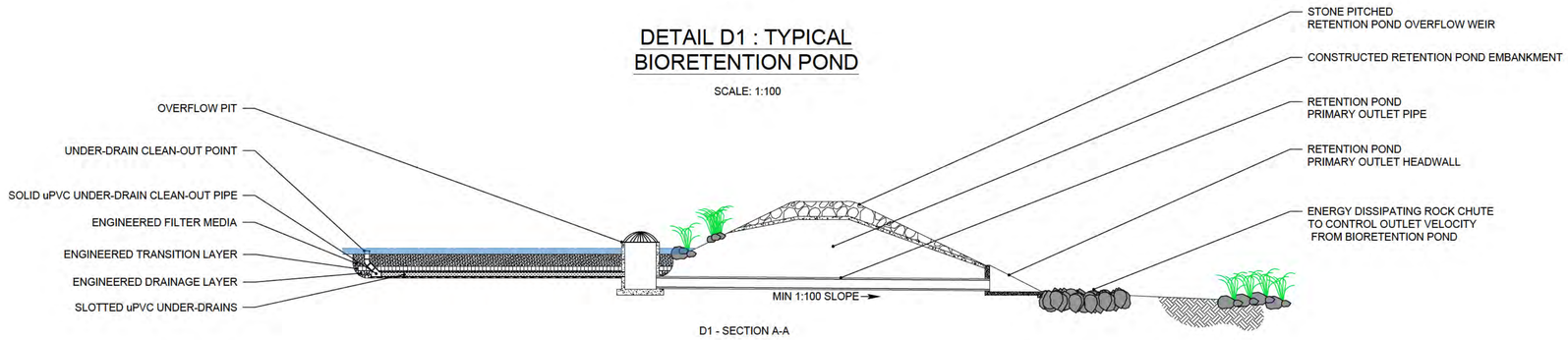

D1 - SECTION A-A

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Project Drafter Check			
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Verification/Approval			
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SHEET 24 OF 25

REV.	DATE	BY	DESCRIPTION	CHK	APPD
0	27/01/2021		FINAL SUBMISSION TO CLIENT		

REFERENCE COORDINATION DRAWINGS

DESCRIPTION	DRAWING NO.	REV	CHK
N/A	N/A		

SURVEY DATUM

HORIZONTAL DATUM: VERTICAL DATUM:

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A1 ORIGINAL
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SIGNED:

DATE: 27/01/2021

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CLIENT: ACT Government

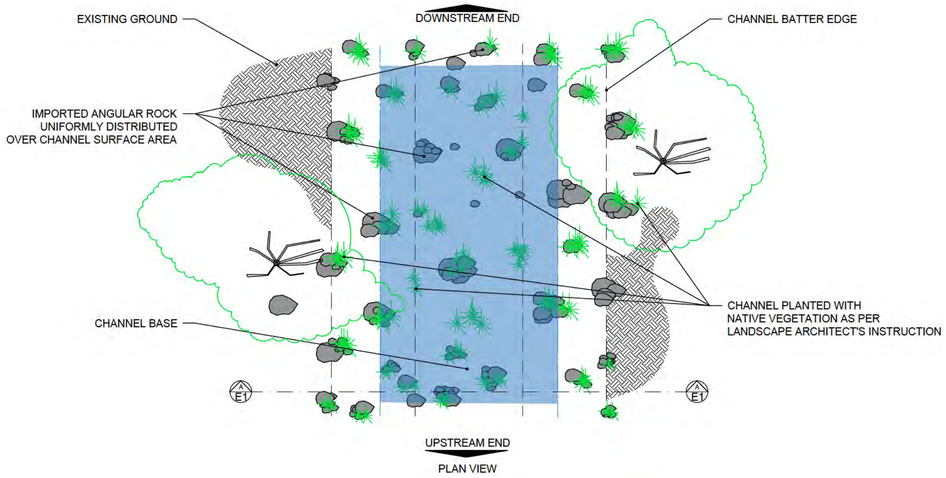
PROJECT: MOLONGLO VALLEY PLANNING AND INFRASTRUCTURE STUDY

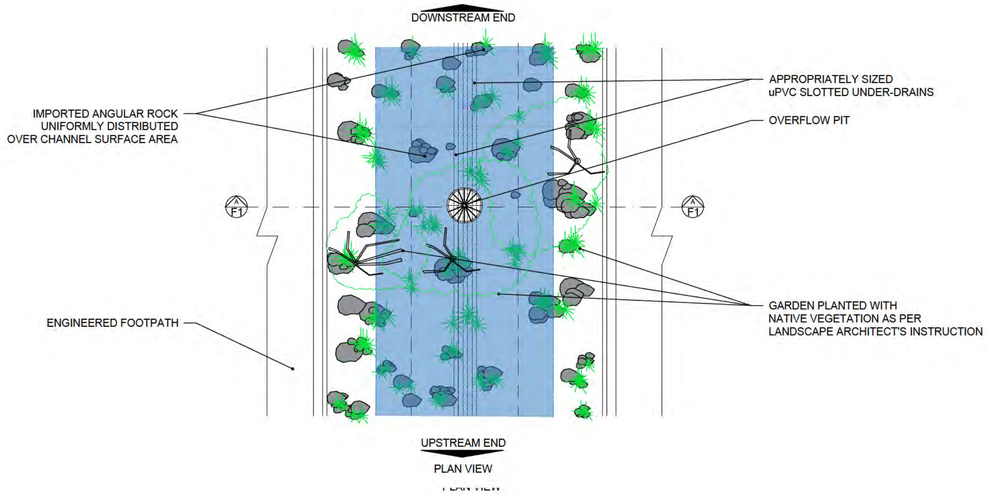
TITLE: TYPICAL DETAILS - BIORETENTION POND

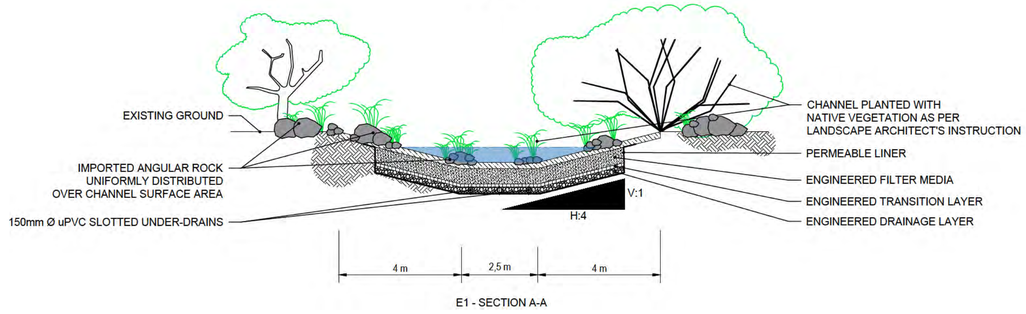
DRAWING STATUS: FOR INFORMATION ONLY

DESIGNED:	CHECKED:	APPROVED:
PROJECT No: PS120325	DRAWN:	DATE: 25/01/2021

DRAWING No: PS119657_CIV_TD_002 REV: 00







E1 - SECTION A-A

PLEASE NOTE:
THE CHANNEL SIZE IS INDICATIVE ONLY, BASED ON TYPICAL RUNOFF FLOWS FROM THE LARGER CATCHMENTS WITHIN THE STUDY AREA. A CONTROLLED FLOW VELOCITY OF 1.5 m/s WAS ASSUMED.

DETAIL E1 : TYPICAL BIOSWALE

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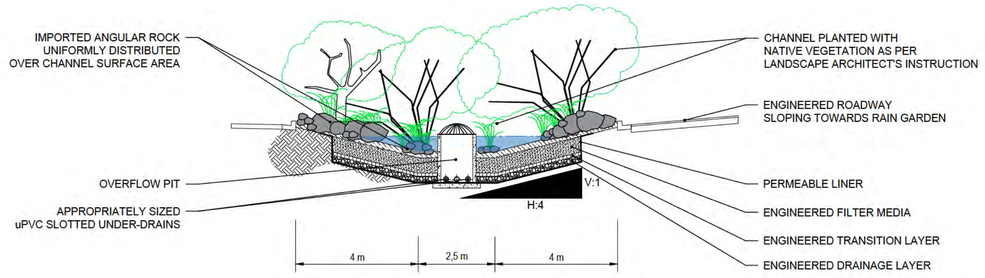

E1 - SECTION A-A

PLEASE NOTE:
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DETAIL F1 : TYPICAL RAIN GARDEN

SCALE: 1:100

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SHEET 25 OF 25

REV	DATE	BY	DESCRIPTION	CHK	APPD
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REFERENCE COORDINATION DRAWINGS

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HORIZONTAL DATUM: | VERTICAL DATUM:

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PROJECT: MOLONGLO VALLEY PLANNING AND INFRASTRUCTURE STUDY

TITLE: TYPICAL DETAILS - BIOSWALE

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DESIGNED:	CHECKED:	APPROVED:
PROJECT No: PS120325	DRAWN:	DATE: 25/01/2021

DRAWING No: PS119657_CIV_TD_003 | REV: 00

APPENDIX E

TRANSPORT MODELLING REPORT

ENVIRONMENT, PLANNING AND SUSTAINABLE DEVELOPMENT DIRECTORATE

MARCH 2021

CONFIDENTIAL

MOLONGLO 3 EAST PLANNING AND INFRASTRUCTURE STUDY

TRANSPORT MODELLING REPORT

Question today
Imagine tomorrow
Create for the future

Molonglo 3 East Planning and Infrastructure Study
Transport Modelling Report

Environment, Planning and Sustainable Development Directorate

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REV	DATE	DETAILS
A	20 January 2021	Draft for client and stakeholder comment
B	05 March 2021	Final

	NAME	DATE	SIGNATURE
Prepared by:	Various contributors	05 March 2021	
Reviewed by:		05 March 2021	
Approved by:		05 March 2021	

TABLE OF CONTENTS

EXECUTIVE SUMMARY

WSP was engaged by the ACT Government - Environment, Planning and Sustainable Development Directorate (EPSDD) to undertake the Molonglo 3 East Planning and Infrastructure Study. As part of the study, an Intertown Public Transit service (IPT) which has been modelled as a light rail service, has been proposed within the study area. Two project options involving different road network configurations and light rail alignments have been considered. A brief description of each project option is given below:

- In Project Option 1, the IPT/light rail runs along Bindubi Street Extension and two collectors connect northern neighbourhoods to John Gorton Drive and the Southern Collector runs north-south through the precinct.
- In Project Option 2, the IPT/light rail follows Coppins Creek and runs parallel to Bindubi Street Extension. The Northern Collector and a local road connect northern neighbourhoods to John Gorton Drive and the Southern Collector runs north-south through the precinct.

The objective of the transport modelling component of the project is to help assess overall road capacity requirements under each project option and to provide inputs required for determining a suitable general arrangement of major intersections within the study area.

The strategic modelling was undertaken using the latest version of Canberra Strategic Transport Model (CSTM) supplied by Transport Canberra and City Services (TCCS) for this study. To ensure the fitness of the supplied model at the study area level, a detailed review of the 2041 CSTM model was carried out. The outcomes of model review process verified the suitability of the supplied 2041 CSTM model's use for this project and recommended necessary changes to the highway and public transport networks.

The modelling was carried out for two project options for the year 2041 and the modelling outputs indicate that both the project options provide identical traffic operating conditions during the AM and PM peaks. More specifically:

- The public transport ridership indicates that at an overall level, the public transport patronage under both the options are similar. However, the total inbound/ outbound riders to/ from the Molonglo Valley Stage 3 development, is slightly higher under Project Option 1 during both peaks when compared to Project Option 2, which could be due to the proximity of the light rail alignment to a major road supporting both active and motorised transport modes in Project Option 1.
- The volume over capacity ratios indicate that both the project options provide similar internal roads operating conditions during the AM and PM peaks with most of the outbound sections of the internal roads during AM Peak and inbound sections during PM peak operating at or near capacity.
- The volume difference plots indicate that the total traffic entering and exiting the study area during both AM and PM peaks are similar between the two project options with some differences in traffic volumes observed at some internal roads and a small section of John Gorton Drive, which can be attributed to the redistribution of traffic due to slight differences in the internal road and centroid connector arrangement between the two project options.
- The select link analysis results show expected traffic flow pattern using key road sections within the study area except at John Gorton Drive in Project Option 1, where the Collector/ Local road connecting John Gorton Drive to Southern Collector in Project Option 1, acts as an alternate route for the north – south traffic resulting in diversion of some of the external traffic onto internal roads. This can be mitigated by introducing traffic calming measures on internal roads.

Lastly, SIDRA analysis was carried out at selected intersections to ascertain the performance on the adjoining arterial roads and the potential geometry at key locations within the development. This assessment was based on using the strategic model 2041 AM and PM peak traffic demand for Project Option 1. The results of the Project Option 1 SIDRA analysis results indicate that the intersections surrounding the development were near to or over capacity which may limit

access to the development via the collector roads. The internal intersections operate below capacity based on providing single through lanes with turning lanes on each approach.

1 INTRODUCTION

1.1 BACKGROUND

WSP was engaged by the ACT Government - Environment, Planning and Sustainable Development Directorate (EPSDD) to undertake the Molonglo 3 East Planning and Infrastructure Study. As part of the study, an Intertown Public Transit service (IPT) which has been modelled as a light rail service, has been proposed within the study area. Two project options involving different road network configurations and light rail alignments have been considered. The objective of the transport modelling component of the project is to help assess overall road capacity requirements under each project option and to provide inputs required for determining a suitable general arrangement of major intersections.

1.2 MODELLING SCOPE

The scope of the project includes undertaking strategic modelling with the Canberra Strategic Transport Model (CSTM) supplied by Transport Canberra and City Services (TCCS) to forecast travel demand and present traffic conditions under each project option. SIDRA analysis was then carried out at selected intersections to ascertain the potential geometry on key roads at key locations.

1.3 PURPOSE OF THIS REPORT

The purpose of this report is to provide an overview of the adopted transport modelling approach and assumptions, and to present the project options modelled, the key model inputs changes, and the demand forecasting results.

1.4 REPORT STRUCTURE

Following this introductory section, the report is structured as follows:

- Section 2 gives an overview of the modelling approach, model description, and the modelled project options
- Section 3 discusses key modelling inputs
- Section 4 presents demand forecasting results
- Section 5 discusses the SIDRA analysis results
- Section 6 summarises the conclusion
- Section 7 outlines the limitations.

2 STRATEGIC MODELLING OVERVIEW

2.1 SUITABILITY OF CSTM

The strategic transport modelling for this project was carried out using the latest CSTM model supplied by TCCS. This model is a multimodal four-step strategic transport model that uses future population and employment projections to forecast the future impacts of changes to the Canberra's road and public transport networks. The CSTM is a standard strategic planning tool used by the ACT Government for comparing the likely impacts of scenarios under different land use and/or transport network assumptions. It is therefore a suitable tool for Molonglo 3 Planning and Infrastructure Study, which requires transport demand forecasting at the strategic level to inform assessment of different project options.

It should be noted however, that any demand forecast is subject to uncertainties. Inevitably, some assumptions (e.g. land use, transport network) used to develop the forecasts will not be realised, and unanticipated events/circumstances may occur. The actual outcomes could vary from those reported forecasts.

2.2 MODELLING SOFTWARE

The supplied CSTM model was developed using TransCAD software platform, which is one of the industry-standard software packages for strategic modelling.

2.3 MODELLING APPROACH

An overview of the modelling approach undertaken for this project is outlined in Figure 2.1. The modelling for Molonglo 3 Planning and Infrastructure Study was initiated with a review of the latest CSTM model supplied by TCCS, which identified highway and public transport network changes required for the project options modelling. The project options modelling was carried out for the year 2041 and demand modelling outputs were used to understand the traffic conditions under each project option.

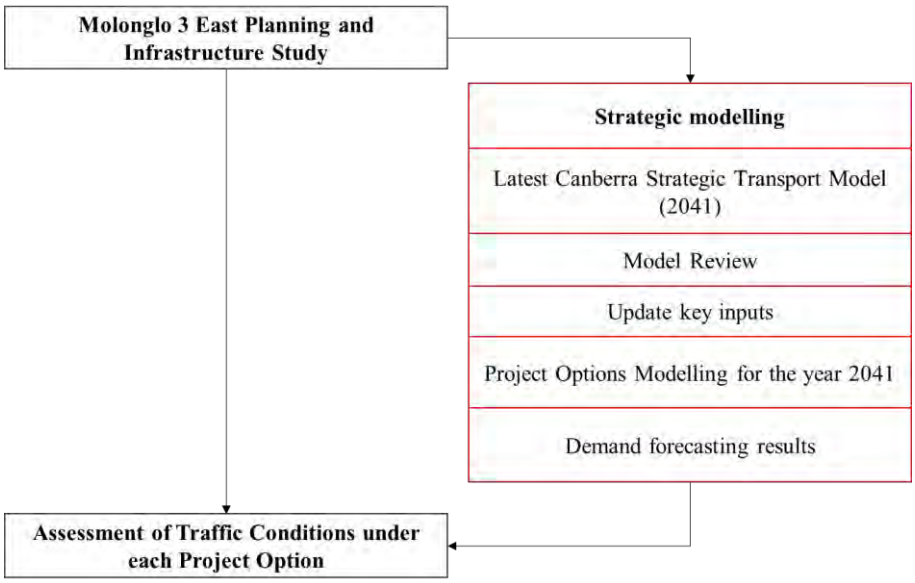


Figure 2.1 Modelling Overview

2.4 STUDY AREA

Molonglo Valley Stage 3 is located north of the Molonglo River, and is approximately 6.5 kilometres from the Canberra City centre. The development covers approximately 480 hectares and is expected to be a major future urban development area in Molonglo Valley District. The study area is highlighted in Figure 2.2.

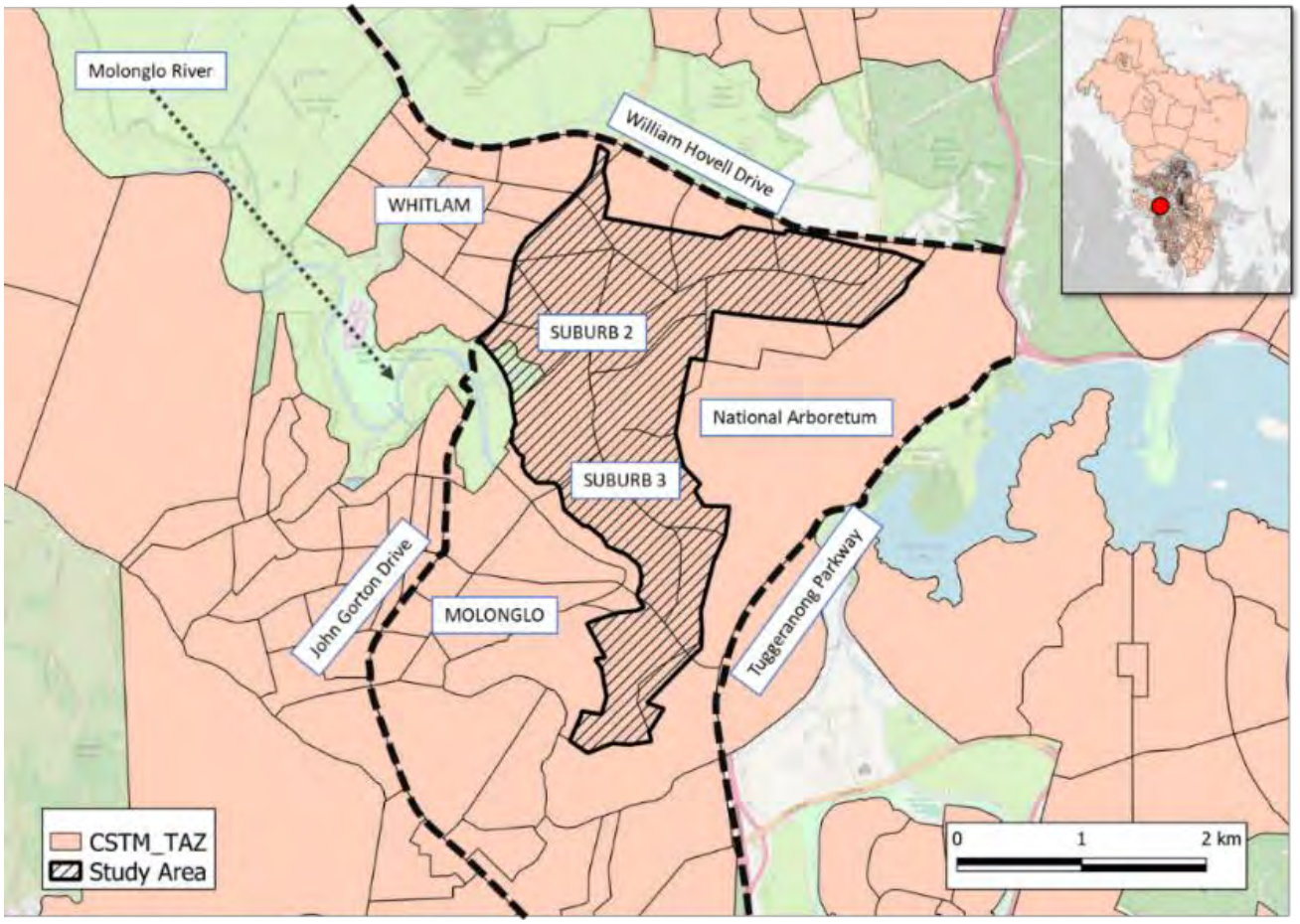


Figure 2.2 Study area

2.5 MODEL DESCRIPTION

2.5.1 MODEL VERSION AND SCENARIO YEAR

TCCS provided the latest version 2041 CSTM model for use in this project.

The latest CSTM includes 2016 as its base year and years 2021, 2026, 2031 and 2041 as its future years. 2041 forecast year was selected for this study as it provides sufficient insights into travel demand impacts by the Molonglo 3 development.

2.5.2 MODEL REVIEW

To ensure the fitness of the supplied model for this study, a detailed review of the 2041 CSTM model was carried out in terms of private and public transport network representation, demand and overall model performance. The key observations are summarised below (more details on CSTM review are included in the CSTM Review memo, ref: PS119657-P&M-LTR-003-RevD, issued on 3rd June 2020):

— The Molonglo 3 development is represented by 19 Traffic Analysis Zones (TAZ) within the CSTM as illustrated in Figure 2.3.

— The model includes all the relevant arterials, major and minor collectors however, it may need updates related to road hierarchy and posted speed for project options modelling.

— The base model only includes bus line coded within the study, which will need to be updated to light rail as part of the project options modelling.

— The number of zones representing the Molonglo 3 development are suitable for a strategic assessment, but the location and number of connectors needs to be revised based on the network connectivity proposed under each project option.

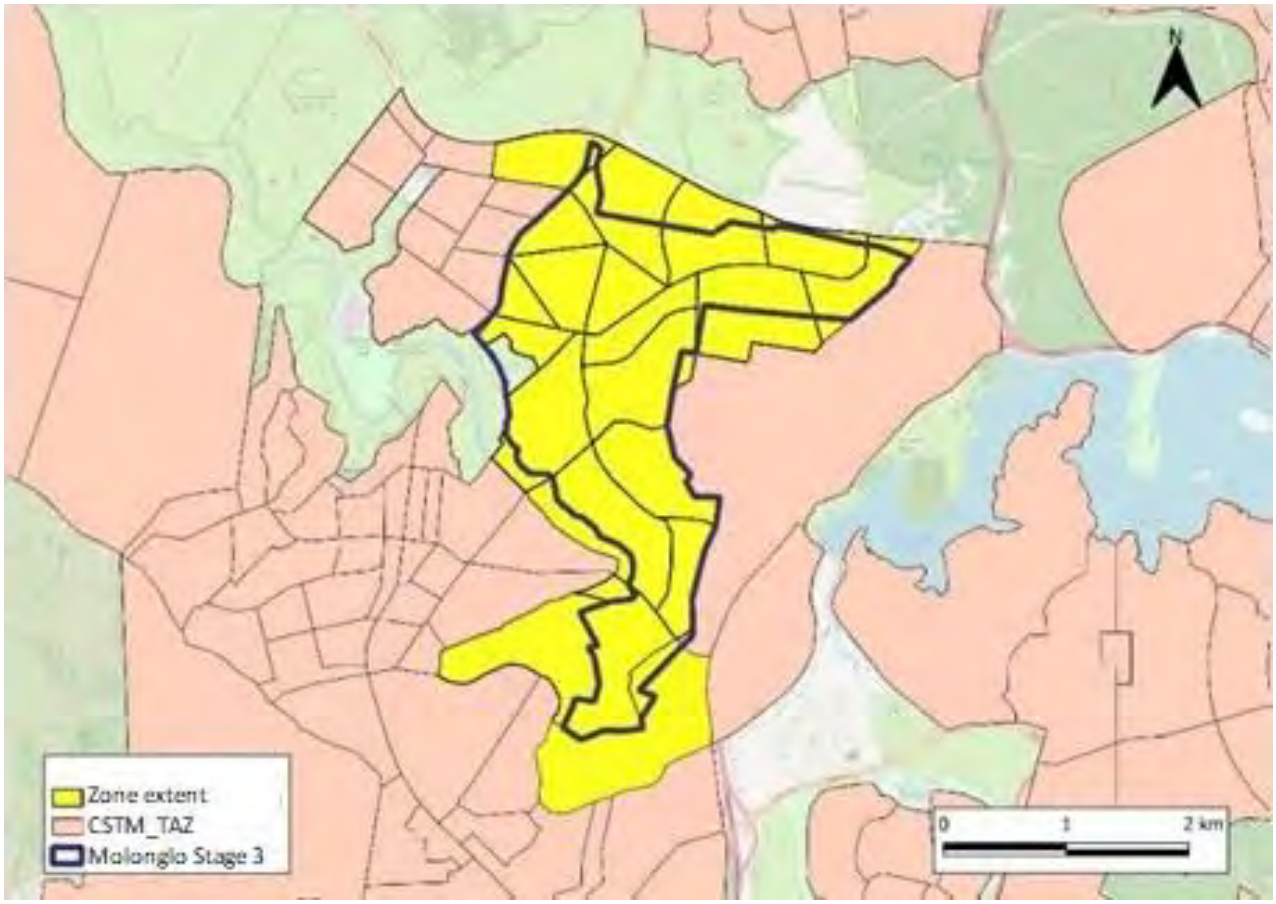


Figure 2.3 Zoning Structure

2.6 PROJECT OPTIONS

Molonglo 3 East Planning and Infrastructure Study Options Report submitted by WSP to EPSDD on 22 July 2020 identified three transport network options (Option 1, Option 2 and Option 3) emphasising active travel and public transport along the major corridor within the study area. On review of the Options Report, EPSDD selected Option 1 and Option 2 for further strategic modelling work. A brief description of the modelled options is provided below:

— Project Option 1: an IPT route/light rail runs along Bindubi Street Extension (a major transport and active transport spine) except within group centre. Two collectors connect northern neighbourhoods to John Gorton Drive and the Southern Collector runs north-south through the precinct (Figure 2.4).

— Project Option 2: an IPT route/light rail and an active travel boulevard follow Coppins Creek and run parallel to Bindubi Street Extension. The Northern Collector and a local road connect northern neighbourhoods to John Gorton Drive and the Southern Collector runs north-south through the precinct (Figure 2.5).

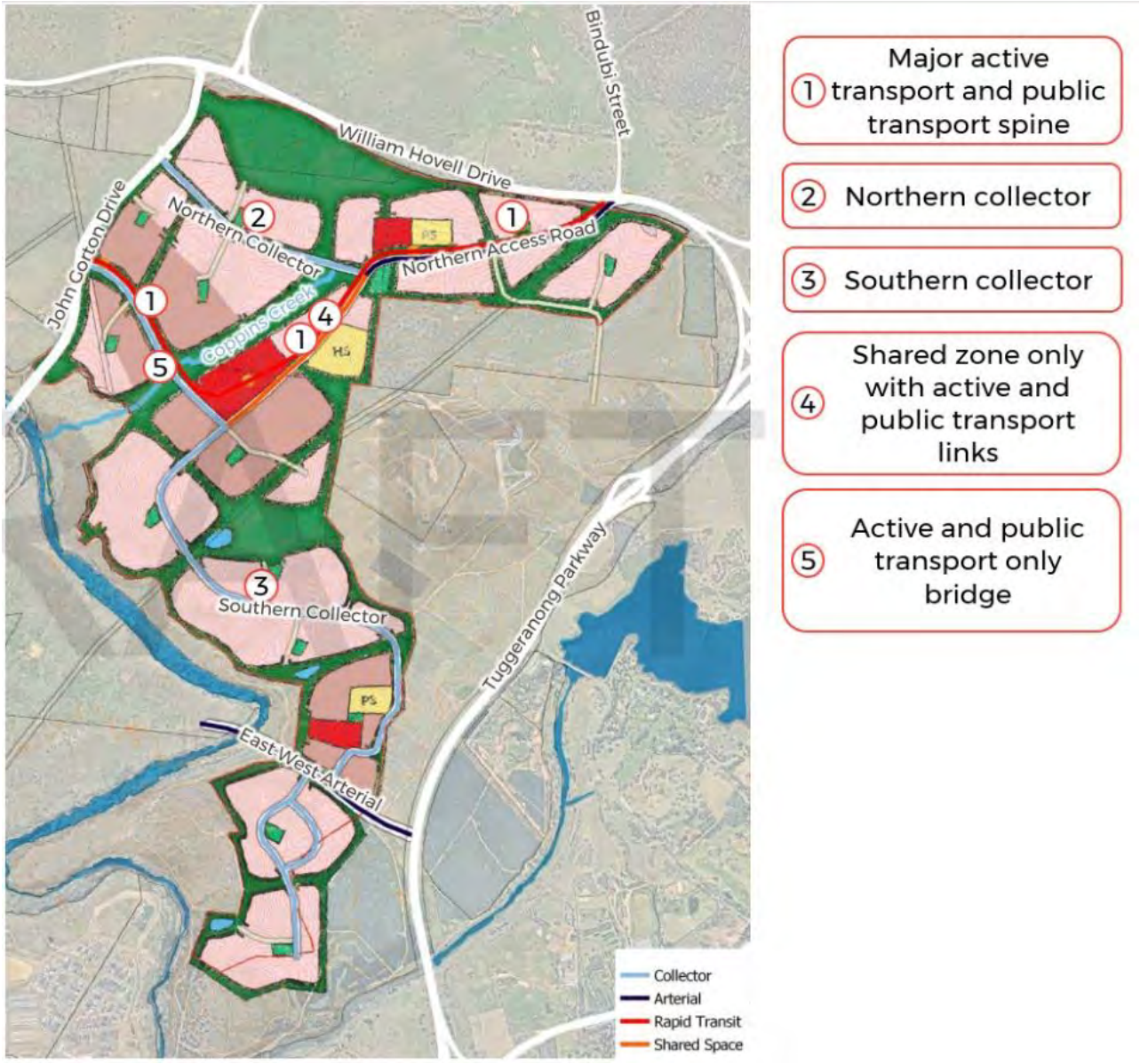


Figure 2.4 Project Option 1

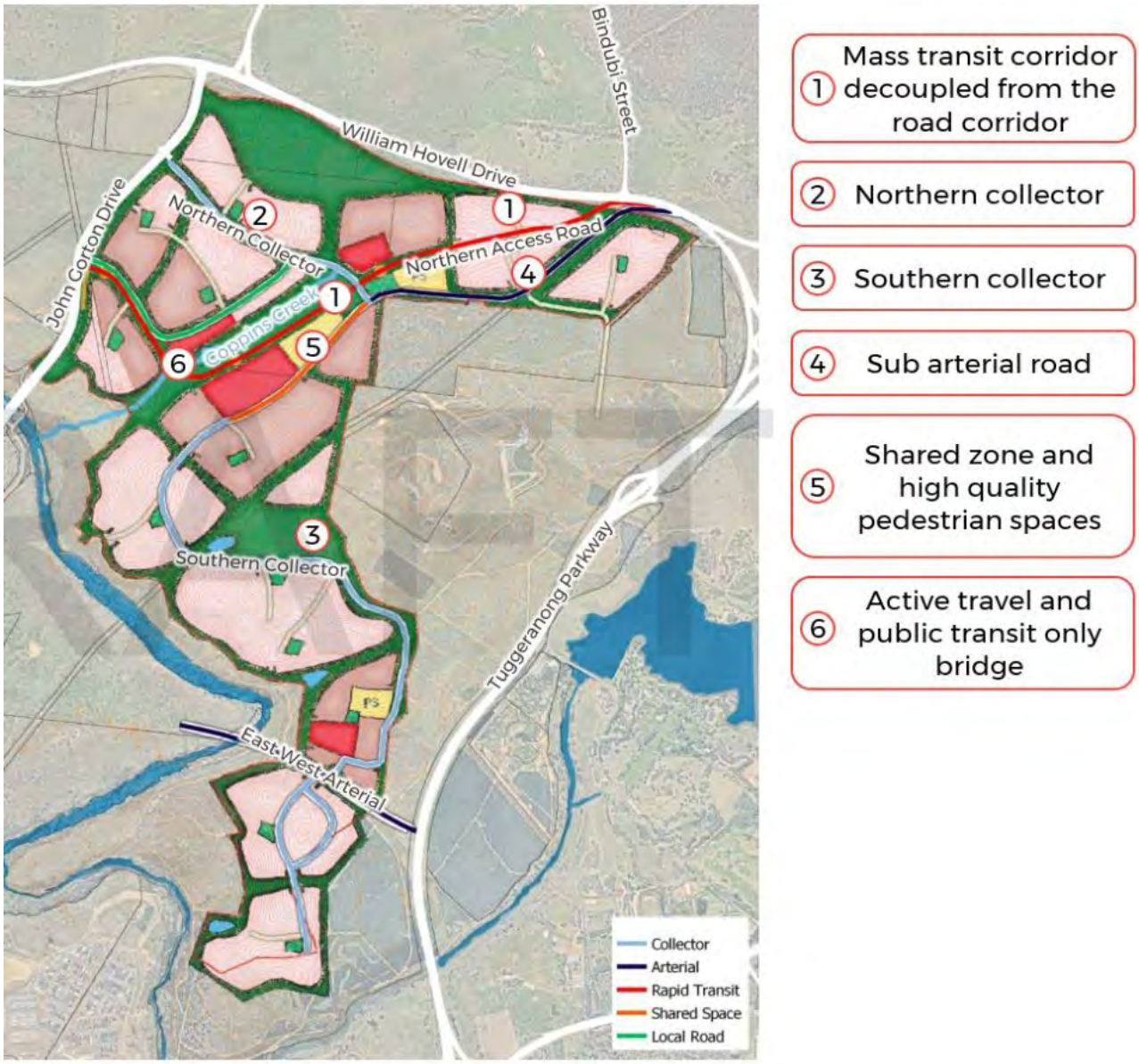


Figure 2.5 Project Option 2

3 KEY INPUTS

3.1 LAND USE

The land use is the key model input for the trip generation stage of the travel demand modelling process. The land use inputs used for this project are consistent with the 2041 CSTM model supplied by TCCS (i.e., no changes were made to the demographic details).

A summary of 2041 demographic details coded for Molonglo Valley within the CSTM is presented in Table 3.1.

Table 3.1 Demographic details - Molonglo Valley in year 2041

ATTRIBUTE	VALUE
Residents	58,648
Employment	7,955
Retail Space	43,000 [m2 GFA]
Education (Enrolments)	5,300
Tertiary Enrolments	0

Traffic outcomes would likely change should the Molonglo 3 development mix change from the assumptions shown above.

3.2 HIGHWAY NETWORK UPDATE

The highway network update includes changes in road hierarchy resulting in reduced capacity and posted speed reduction on Bindubi Street Extension and on collector roads. The following summarises the changes carried out on the highway network:

Project Option 1:

- Bindubi Street Extension is coded as 60 km/hr stretch (was 70 km/hr in the base model),
- A small section of Bindubi Street Extension parallel to Coppins Creek, which is a part of the shared zone is coded as 40 km/hr, and
- A local road connecting northern neighbourhoods to John Gorton Drive is deactivated, and an additional access is provided to Forest Drive (Arboretum) from Bindubi Street Extension.

Project Option 2:

- Similar to the Project Option 1 except that a local road connecting northern neighbourhoods to John Gorton Drive is activated, and
- Creek crossing is deactivated for highway traffic (transit only link).

The network plots showing the link types, number of lanes and free flow speed coded for the highway links with the study area for the Project Option 1 and Project Option 2 are included in Appendix A.

It was noted during the modelling that the traffic outcomes were sensitive to network assumptions, which was most likely caused by the congested nature of the surrounding network. Nevertheless, should further investigations be necessary regarding posted speeds (as an example), more detailed models generally offer greater insights into the outcomes from localised treatments.

3.3 PUBLIC TRANSPORT NETWORK UPDATE

The public transport network update is related to the IPT/light rail within the Molonglo Valley Stage 3 development. The following summarises the changes to the public transport network:

Project Option 1:

- The light rail corridor follows Bindubi Street Extension (as in Base Case), and
- Public transport parameter updates were carried out to replicate the existing Gunghalin to City light rail.

Project Option 2:

- Similar to the Project Option 1 except light rail is coded along an exclusive corridor on Coppins Creek, parallel to Bindubi Street Extension.

The light rail alignments in the Project Option 1 and Project Option 2 are shown in Appendix A. During project meetings it was noted that public transport schemes are subject to change. As this was not the focus of the study they have not been considered as part of the assessment.

4 DEMAND FORECAST RESULTS

4.1 OVERVIEW

This section presents demand information for the Base and assesses the performance of the project options in terms of the following metrics:

- Public transport ridership,
- Volume over capacity (V/C) ratios and volume difference plots on road network,
- Select link analysis, and
- Performance of key road corridors.

Except where otherwise noted, the information quoted in this report are for peak one-hour (AM and PM Peak).

Other model outputs such as road usage statistics, which identifies spare capacity of road network and detailed model-wide network performance under Base and project options are provided in Appendix B.

4.2 MOLONGLO 3 DEVELOPMENT– 2041

This section provides an overall trip information related to Molonglo 3 Development using Base model outputs. As the land use inputs used for the project options are consistent with the base model, it is expected that the overall demand to remain similar between the Base and the project options.

4.2.1 PRIVATE AND PUBLIC TRANSPORT TRIPS BY ORIGIN & DESTINATION

Table 4.1 presents private and public transport trips by origin and destination for the Molonglo 3 development for the 2041 AM and PM peaks. It shows that approximately 4,900 private vehicle and 270 public transport trips leave development during the AM peak and approximately 4,770 private vehicle and 840 public transport trips return during the PM peak.

Table 4.1 Private and public transport trips by origin and destination – Molonglo 3 Development

PERIOD	BY ORIGIN		BY DESTINATION	
	PV	PT	PV	PT
AM Peak Hour	4,900	270	1,480	130
PM Peak Hour	2,100	60	4,770	840

4.2.2 TRIPS DISTRIBUTION

Table 3.1 presents Internal – Internal (II), Internal – External (IE) and External – Internal (EI) trips information related to Molonglo 3 Development for the year 2041 AM and PM peaks. It shows that for private vehicle, there are approximately 270 II; 4,630 IE and 1,210 EI trips during the AM peak (for PM peak it is 360 II, 1,740 IE and 4,410 EI trips).

Table 4.2 II, IE and EI trips – Molonglo 3 Development

PERIOD	PRIVATE VEHICLE			PUBLIC TRANSPORT		
	II	IE	EI	II	IE	EI
AM Peak Hour	270	4,630	1,210	20	260	120
PM Peak Hour	360	1,740	4,410	20	40	810

4.3 PUBLIC TRANSPORT RIDERSHIP

Figure 4.1 to Figure 4.4 present public transport riders at the network link level for each project option for the year 2041 AM and PM peaks.

The figures indicate that at an overall level, the public transport ridership under both the options are similar.

However, the total inbound/ outbound riders to/ from the Molonglo Valley Stage 3 development, is slightly higher under Project Option 1 during both peaks when compared to Project Option 2, which could be due to:

- the proximity of the light rail alignment to a major road supporting both active and motorised transport modes under Project Option 1.
- one connector (walking) lengths within the CSTM.

In reality, development composition would be expected to ‘follow’ and be aligned around the public transport corridor and therefore supports the similarities between options.

Figure 4.1 Public transport ridership – AM Peak – Project Option 1

Figure 4.2 Public transport ridership – AM Peak – Project Option 2

Figure 4.3 Public transport ridership – PM Peak – Project Option 1

Figure 4.4 Public transport ridership – PM Peak – Project Option 2

4.4 VOLUME OVER CAPACITY RATIO

The volume to capacity (V/C) ratio is a measure that reflects the level of congestion on a road link given the modelled traffic and modelled road capacity. When the V/C ratio reaches 1, this indicates that the road is at capacity.

Figure 4.5 to Figure 4.8 show AM and PM V/C ratios and traffic volumes for the roads within the study area. The findings derived from these plots can be summarised as follows:

- In general, both the project options provide similar internal roads operating conditions during the AM and PM peaks in the year 2041.
- Most of the outbound sections of all the internal roads are operating at or near capacity during the AM peak under both the project options. Similar traffic operating conditions are observed in the inbound directions under both the project options during the PM peak. This suggests constraints largely exist at the external road network.
- The surrounding roads are operating under similar traffic levels under both the project options and are generally at or above capacity.

The implications of the network performance are further assessed through the SIDRA assessment included in Section 5.

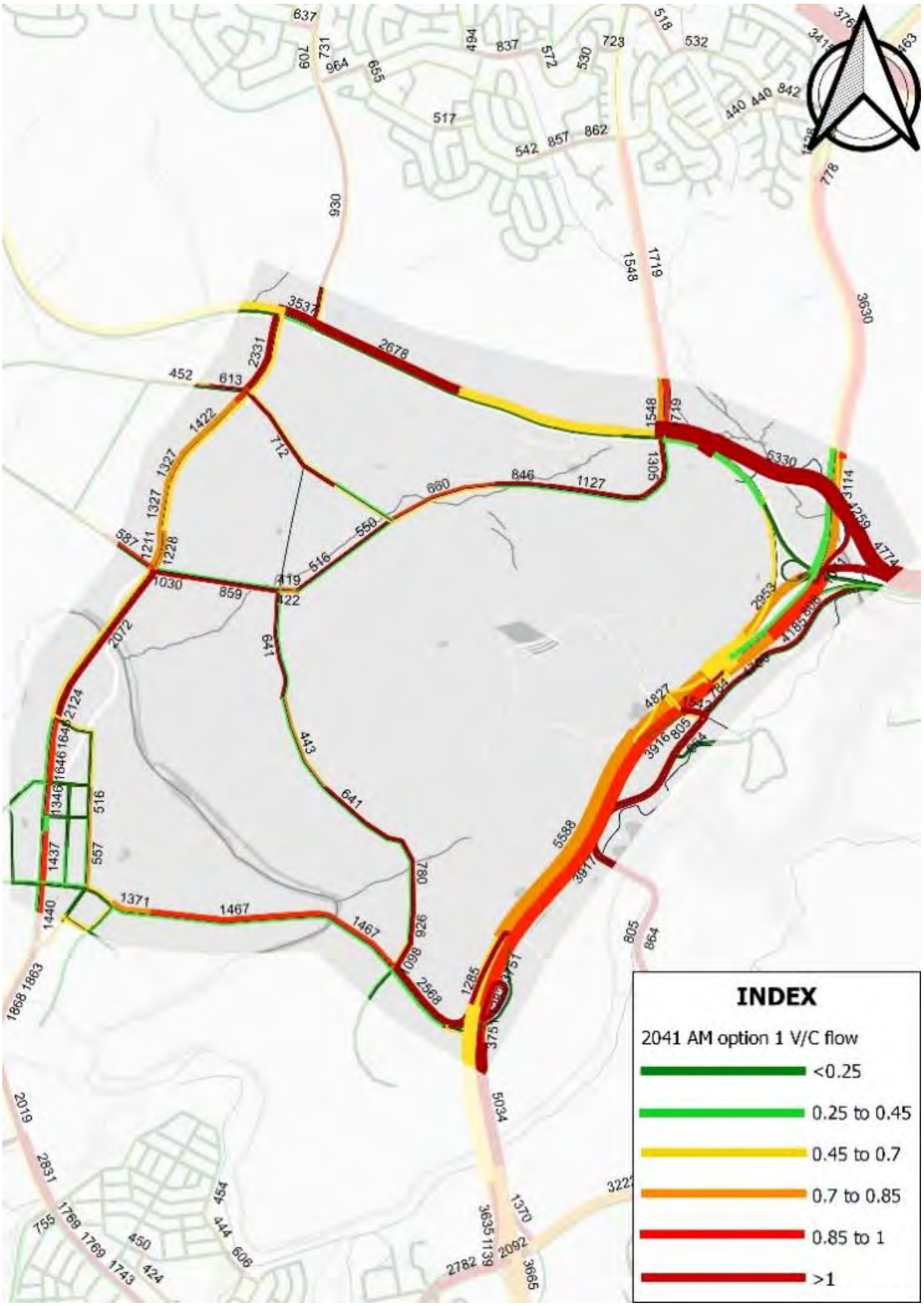


Figure 4.5 Volume of capacity ratios – AM Peak – Project Option 1

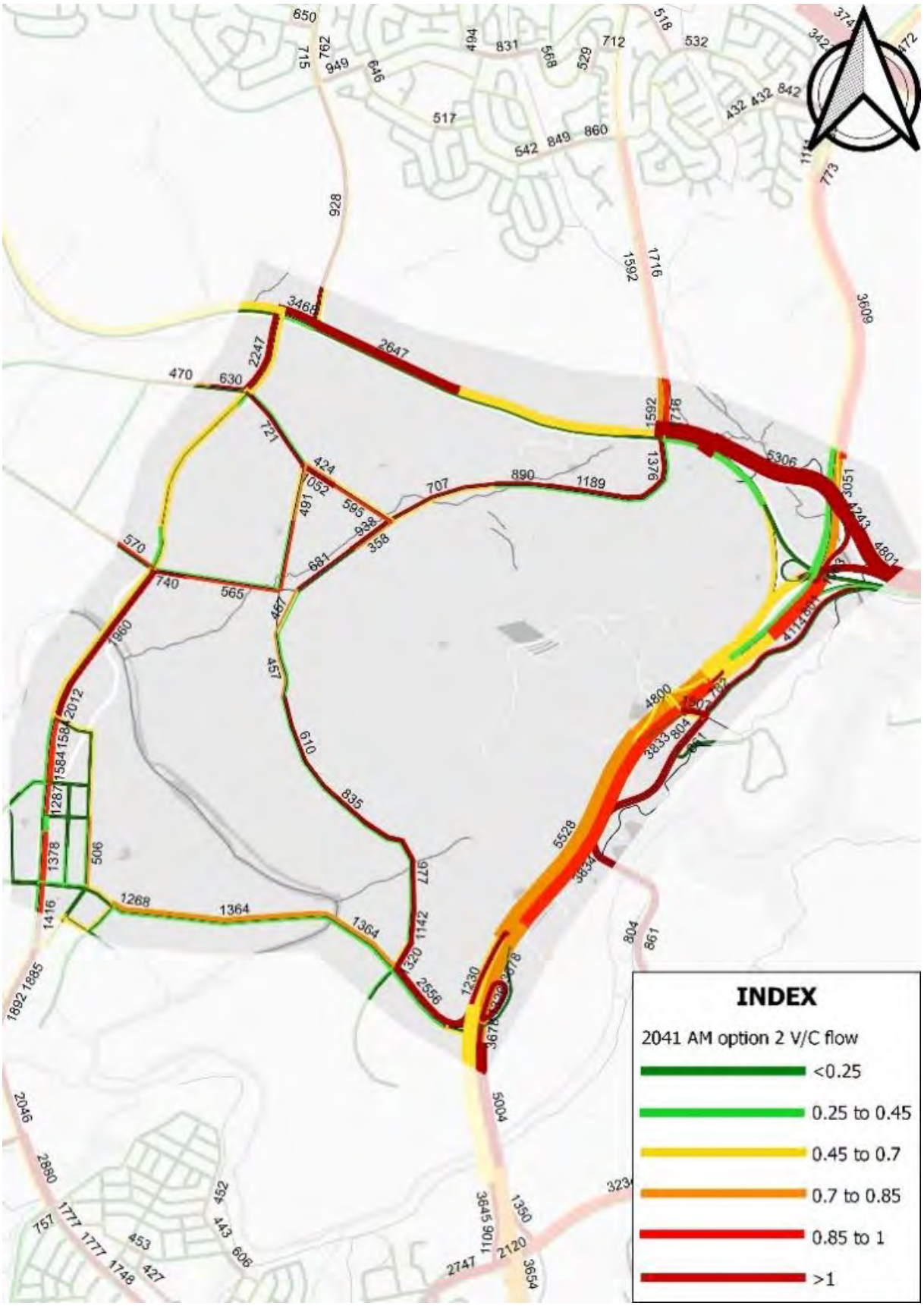


Figure 4.6 Volume of capacity ratios – AM Peak – Project Option 2

Figure 4.7 Volume of capacity ratios – PM Peak – Project Option 1

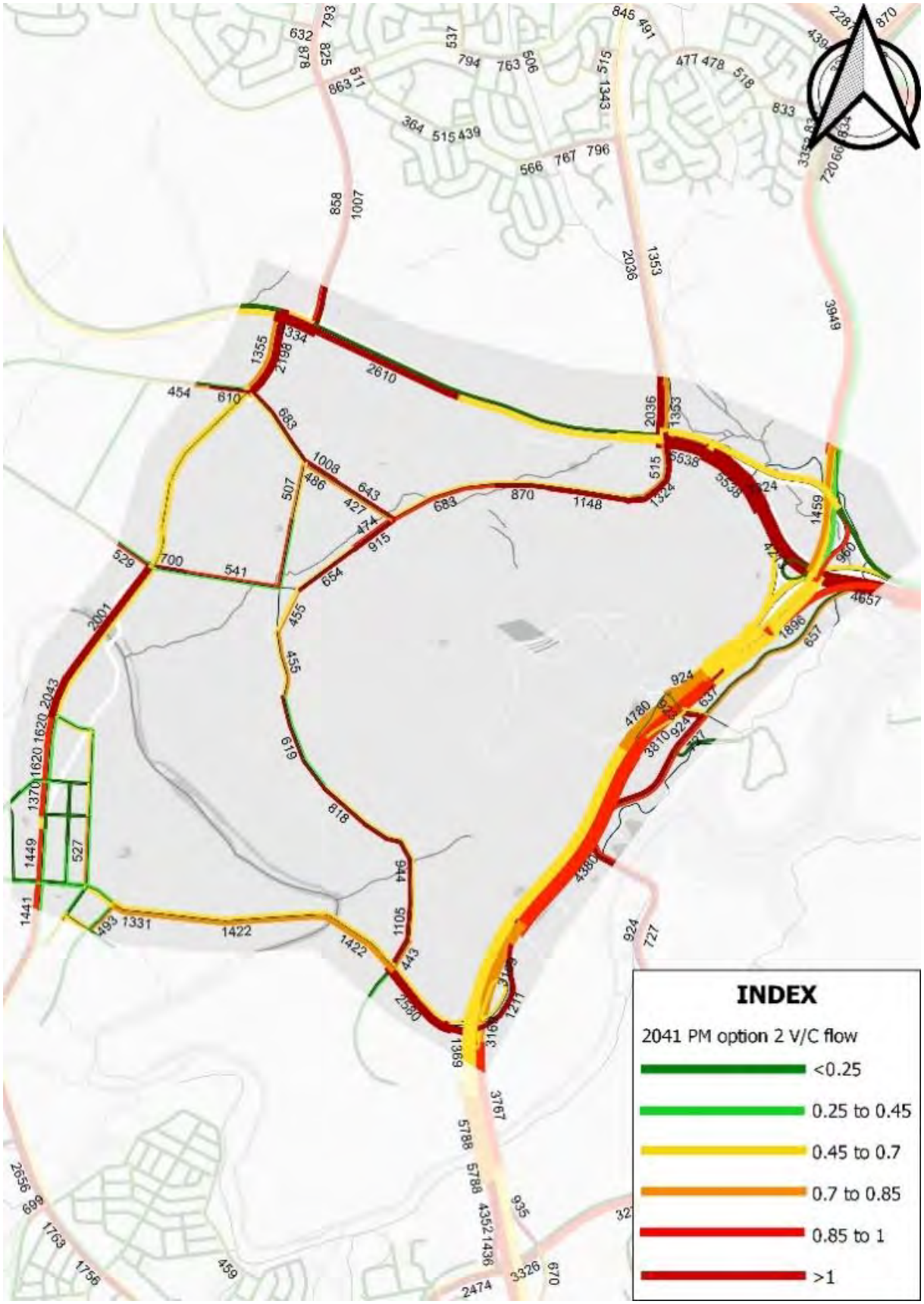


Figure 4.8 Volume of capacity ratios – PM Peak – Project Option 2

4.5 SELECT LINK ANALYSIS

A select link analysis provides information on traffic assignment within the model and, more specifically, provides insights as to link functionality and risks/opportunities should the network structure change.

The following roads were analysed with the figures for the Northern Collector shown in Figure 4.9 to Figure 4.12 (all plots are included in Appendix B):

- John Gorton Drive – Northbound and Southbound,
- Bindubi Street Extension – Northbound and Southbound,
- Northern Collector – Eastbound and Westbound, and
- Southern Collector – Northbound and Southbound

The select link analysis results show expected traffic flow patterns of those using above links during both AM and PM peaks under both project options except at John Gorton Drive in Project Option 1. The Collector/ Local road connecting John Gorton Drive to Bindubi Street Extension/ Southern Collector in Project Option 1, provides an alternate route (shorter route) for the external traffic travelling north/ south of the development. This has resulted in diversion of some of the external traffic (pass-by trips between Belconnen and Weston Creek areas) onto internal roads. This is also highlighted in the figures below with additional traffic on the Northern Collector in Option 2 caused by the reduction in alternatives routes.

It is recommended that arrangements be made to discourage external traffic using internal roads to minimise its impact on internal road traffic operation. This will discourage external traffic from using the internal roads on normal days however, it can still be used during emergencies (e.g. accidents or road closures).

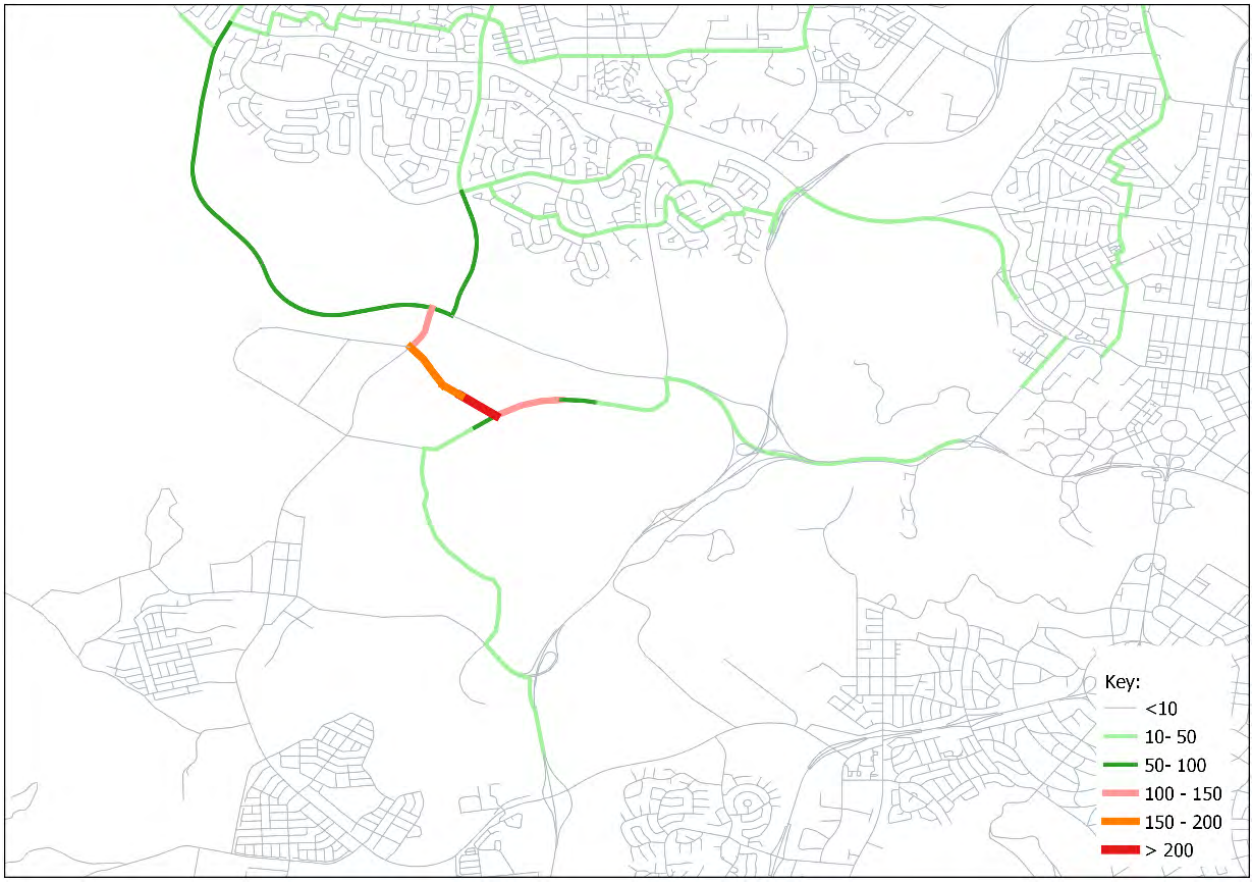


Figure 4.9 Northern Collector – Westbound – Project Option 1

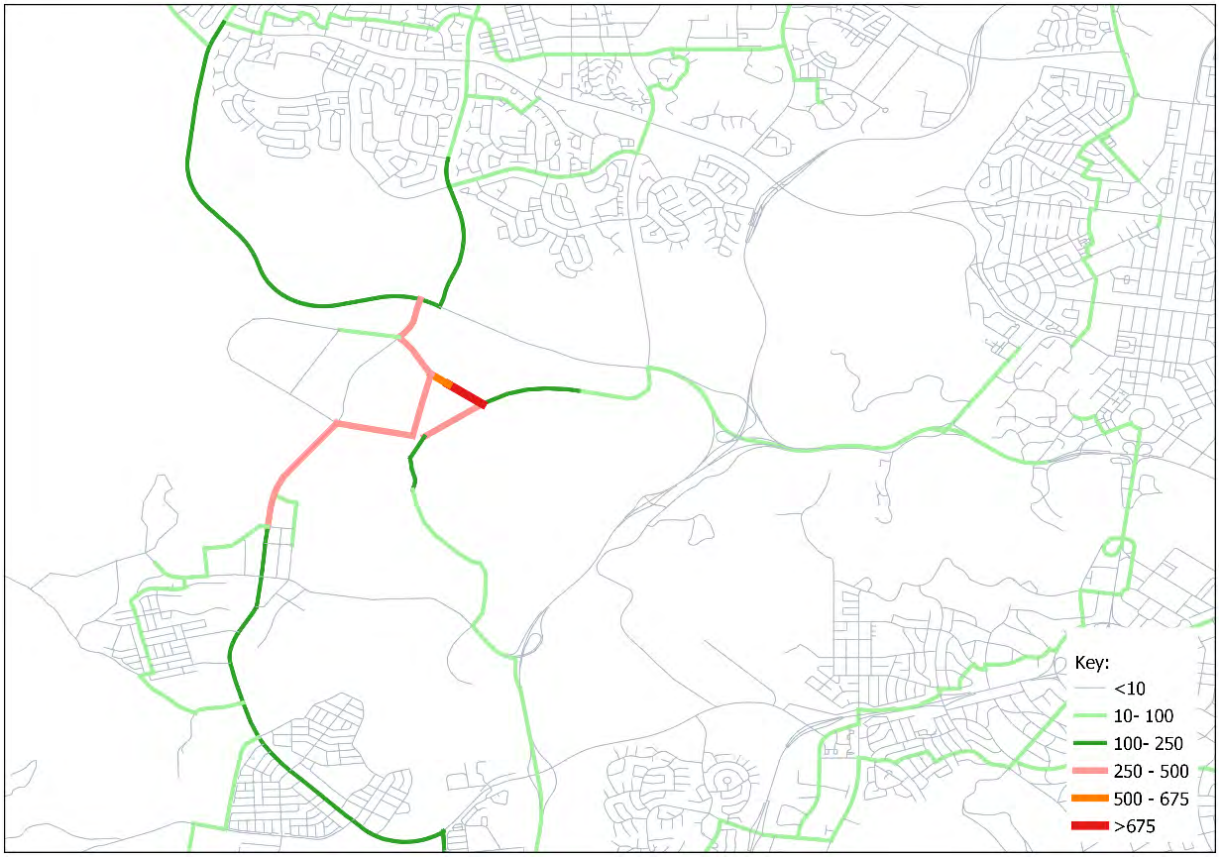


Figure 4.10 Northern Collector – Westbound – Project Option 2

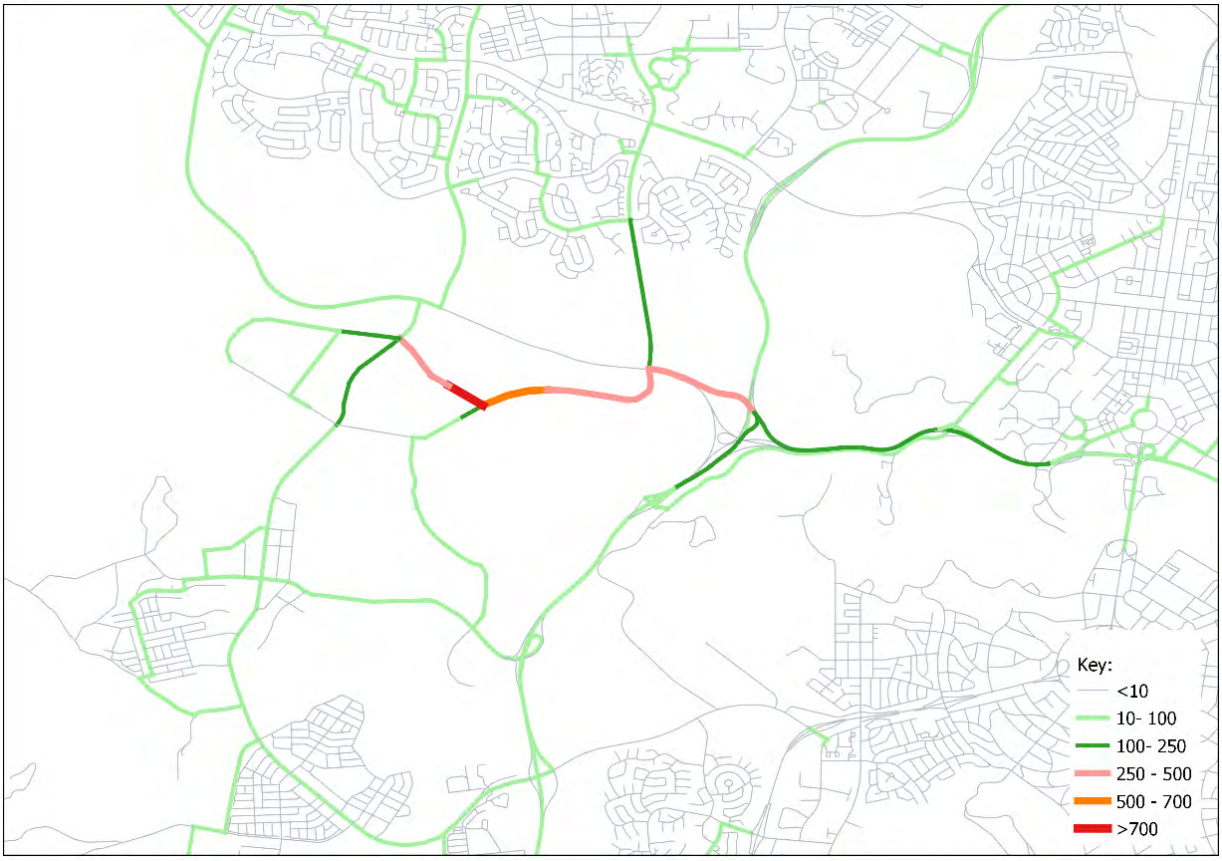


Figure 4.11 Northern Collector – Eastbound – Project Option 1

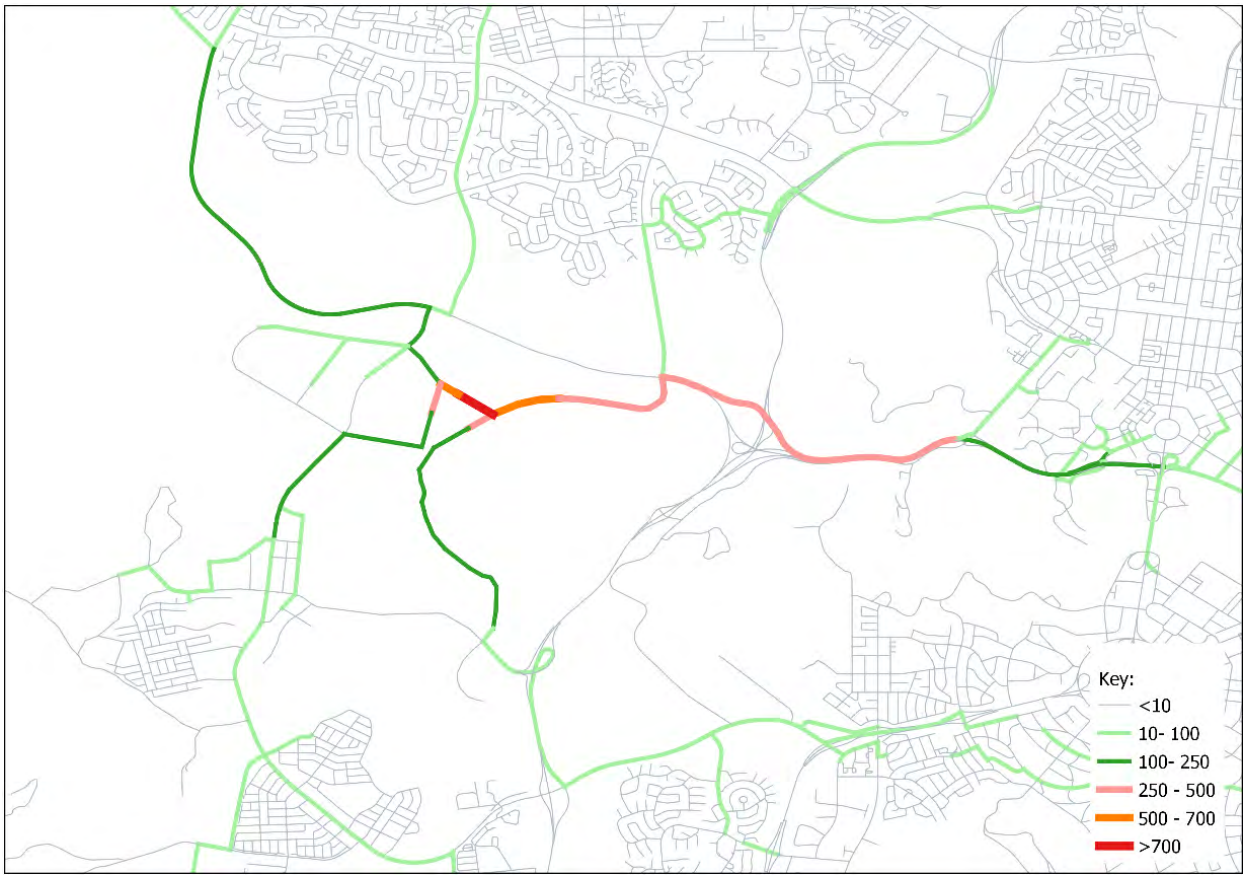


Figure 4.12 Northern Collector – Eastbound – Project Option 2

4.6 VOLUME DIFFERENCE PLOTS

Figure 4.13 and Figure 4.14 show volume difference plots for the study are between the Project Option 1 and Project Option 2 for the AM and PM peaks. *Note: This figure only includes roads which are consistent across both options.*

It shows that between the project options, the total traffic entering and exiting the study area during both AM and PM peaks are similar with some differences in traffic volumes observed at some internal roads and a small section of John Gorton Drive, which can be attributed to the redistribution of traffic due to changes in the internal road and centroid connector arrangement between the two project options. Noted differences include:

- Volume differences on John Gorton Drive
- Volumes along the Southern Collector

The volume difference plots comparing project options against the Base Case are included in Appendix B.

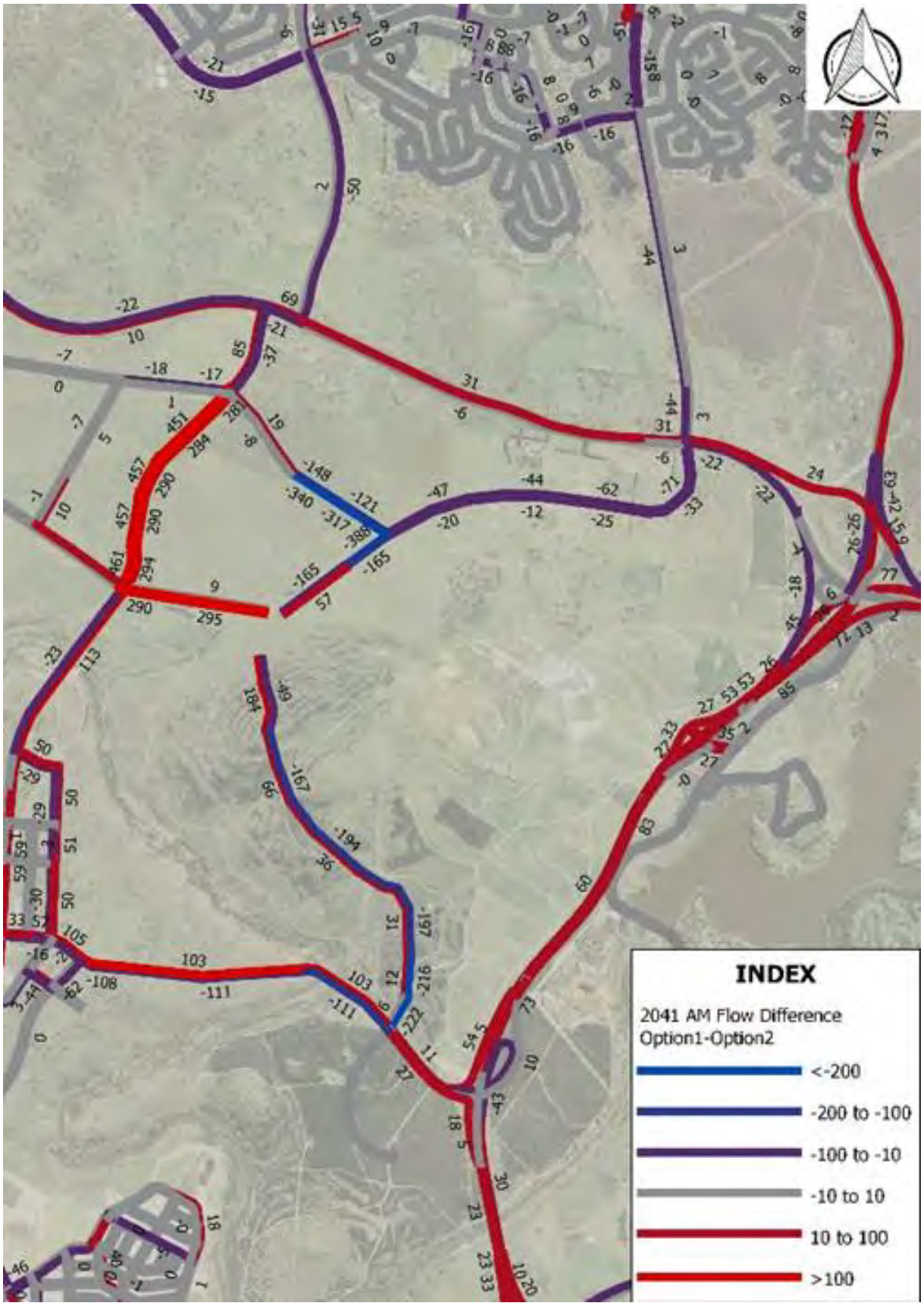


Figure 4.13 Traffic Volume difference – (Project Option 1 - Project Option 2) – AM Peak

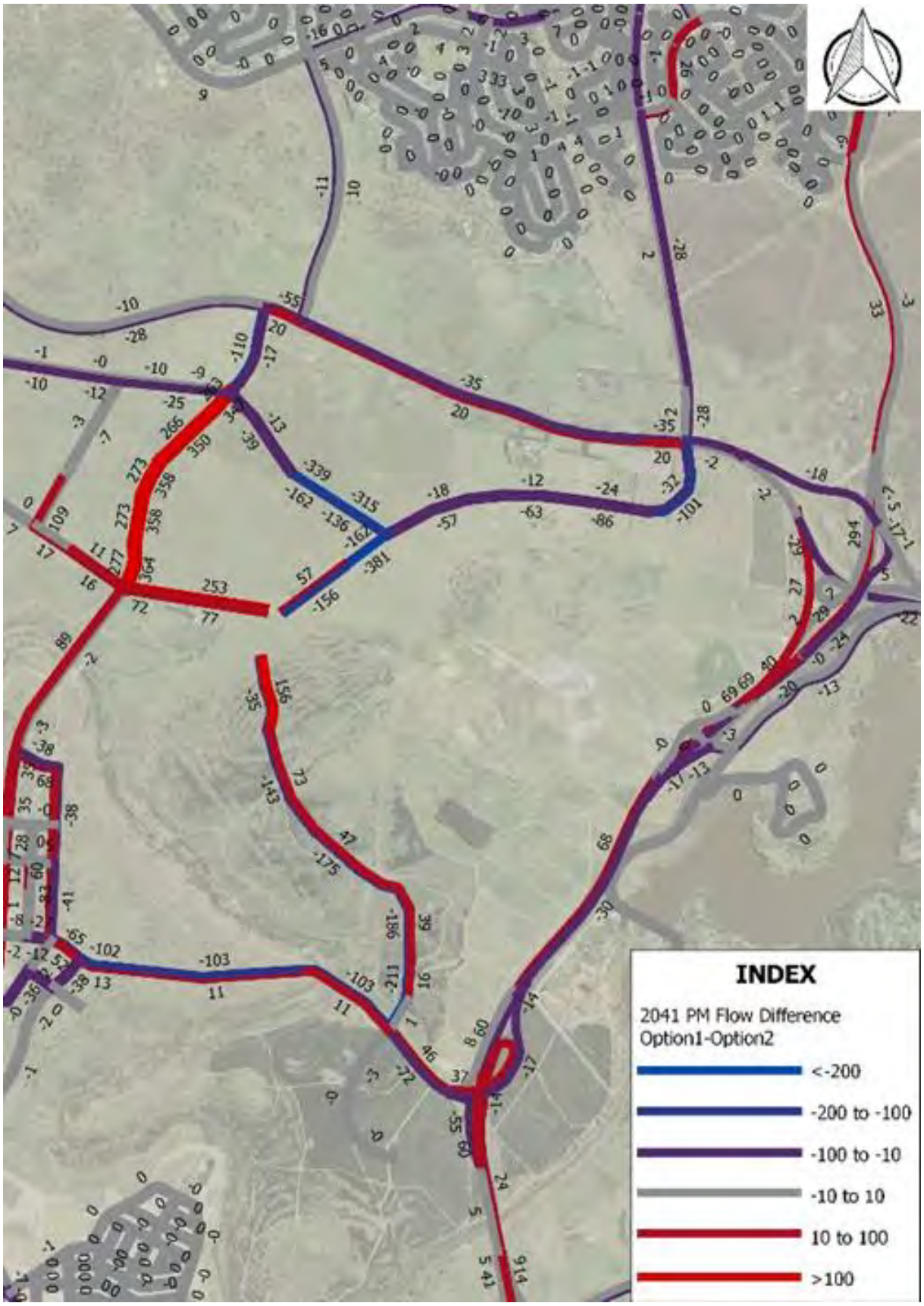


Figure 4.14 Traffic Volume difference – (Project Option 1 - Project Option 2) – PM Peak

4.7 PERFORMANCE OF KEY ROAD CORRIDORS

The congested speed and V/C ratio under project options on selected major road sections (highlighted in Figure 4.15) within the Molonglo Valley Stage 3 development for the AM and PM peaks are presented in Table 4.3 to Table 4.6. The tables indicate that the Project Option 1 provides slightly better operating conditions on all key road corridors except John Gorton Drive and Collector/ Local road when compared to Project Option 2 during both AM and PM peaks.

The results suggest that the number of lanes on the selected roads where the V/C are >1 might be insufficient to cater for the forecast demands and should be reviewed through more detailed modelling which consider localised capacities and more certainty with respect to the proposed development/s.

The comparison of congested speed and V/C ratio along key corridors between the project options and the Base Case are included in Appendix B.

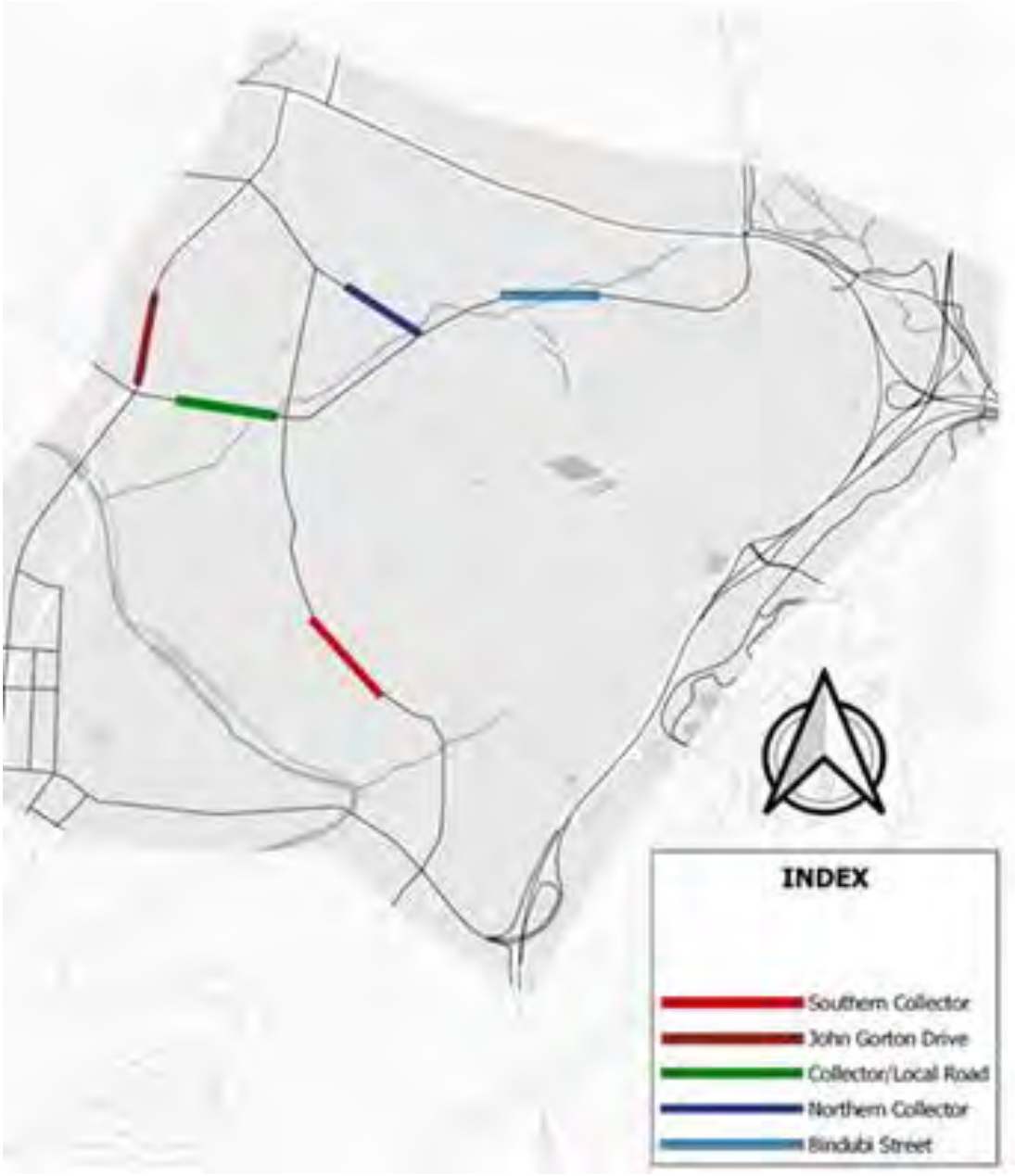


Figure 4.15 Key road corridors within the study area

Table 4.3 Performance metrics along key corridors – AM Peak – Outbound

CORRIDOR FEATURES			CONGESTED SPEED(KPH)		V/C	
Name	Lanes	Speed	Project Opt 1	Project Opt 2	Project Opt 1	Project Opt 2
Bindubi Street Extension	2	60	7	6	1.21	1.27
Northern Collector	2	50	49	47	0.45	0.65
Southern Collector	2	50	49	49	0.4	0.29
Collector/Local Road	2	various	7	34	1.23	0.97
John Gorton Dr	4	70	63	68	0.78	0.51

Table 4.4 Performance metrics along key corridors – AM Peak - Inbound

CORRIDOR FEATURES			CONGESTED SPEED(KPH)		V/C	
Name	Lanes	Speed	Project Opt 1	Project Opt 2	Project Opt 1	Project Opt 2
Bindubi Street Extension	2	60	59	59	0.4	0.41
Northern Collector	2	50	49	24	0.46	0.99
Southern Collector	2	50	46	19	0.74	1.02
Collector/Local Road	2	various	59	49	0.31	0.34
John Gorton Dr	4	70	66	68	0.66	0.49

Table 4.5 Performance metrics along key corridors – PM Peak – Outbound

CORRIDOR FEATURES			CONGESTED SPEED(KPH)		V/C	
Name	Lanes	Speed	Project Opt 1	Project Opt 2	Project Opt 1	Project Opt 2
Bindubi Street Extension	2	60	57	57	0.59	0.61
Northern Collector	2	50	48	13	0.55	1.07
Southern Collector	2	50	44	18	0.79	1.03
Collector/Local Road	2	various	59	49	0.39	0.33
John Gorton Dr	4	70	63	67	0.76	0.6

Table 4.6 Performance metrics along key corridors – PM Peak – Inbound

CORRIDOR FEATURES			CONGESTED SPEED(KPH)		V/C	
Name	Lanes	Speed	Project Opt 1	Project Opt 2	Project Opt 1	Project Opt 2
Bindubi Street Extension	2	60	9	6	1.15	1.24
Northern Collector	2	50	48	46	0.48	0.71
Southern Collector	2	50	48	49	0.55	0.43
Collector/Local Road	2	various	10	38	1.13	0.9
John Gorton Dr	4	70	63	67	0.77	0.56

5 SIDRA ASSESSMENT

5.1 BACKGROUND

SIDRA analysis was carried out at selected intersections to ascertain the potential geometry on key roads at key locations. These locations are listed in Table 5.1 and illustrated in Figure 5.1. The intersection layout used for SIDRA analysis are shown in Figure 5.2 to Figure 5.5.

Table 5.1 Assessed intersections

NO.	EXTERNAL/INTERNAL (TO DEVELOPMENT)	INTERSECTION
1	External	John Gorton Dr / Bindubi St Extension
2	External	John Gorton Dr / Northern Collector Rd
3	External	Bindubi St / William Hovell Dr / Bindubi St Extension
4	Internal	Northern Collector Rd/Bindubi St Extension
5	Internal	Southern Collector Rd/Bindubi St Extension

The SIDRA analysis is intended to:

- Confirm proposed intersection configurations along the Bindubi Street Extension for allocation of road reserve, and
- Identify risks and opportunities for the intersections along the surrounding arterial network which provide access in/out of the development.

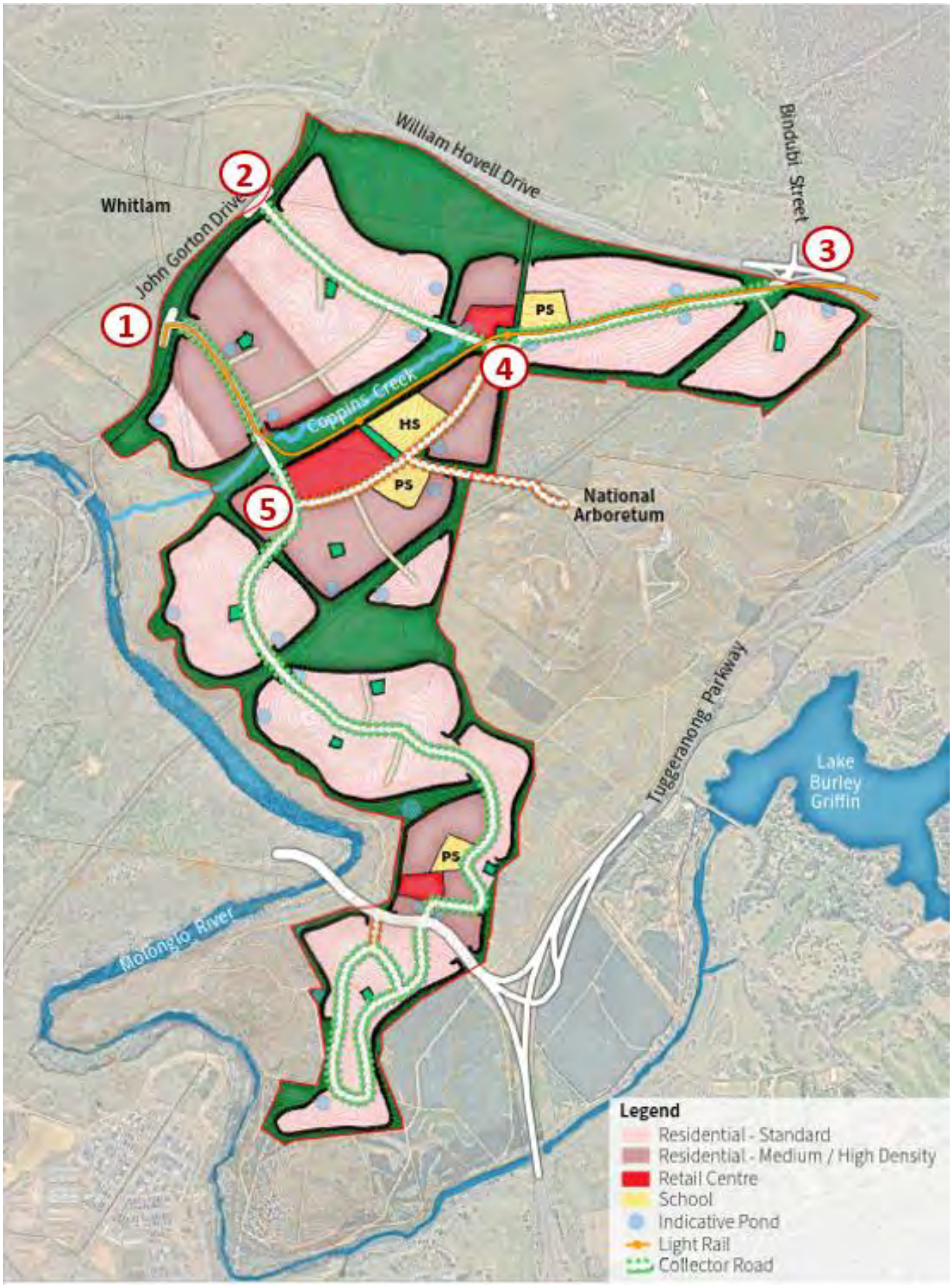


Figure 5.1 Intersection assessment locations

Figure 5.2 Intersection 2 layout: John Gorton Drive and Northern Collector

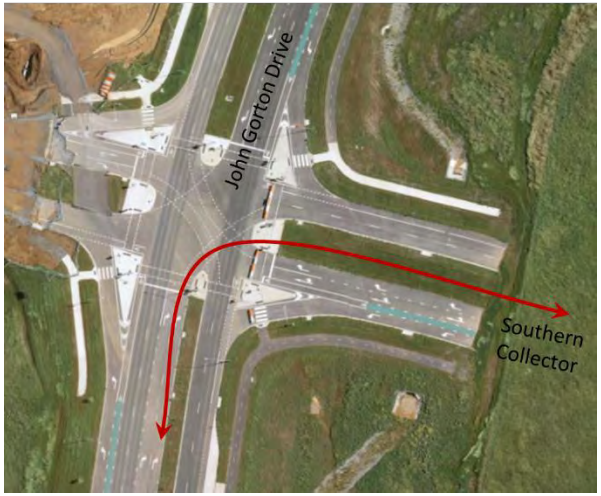
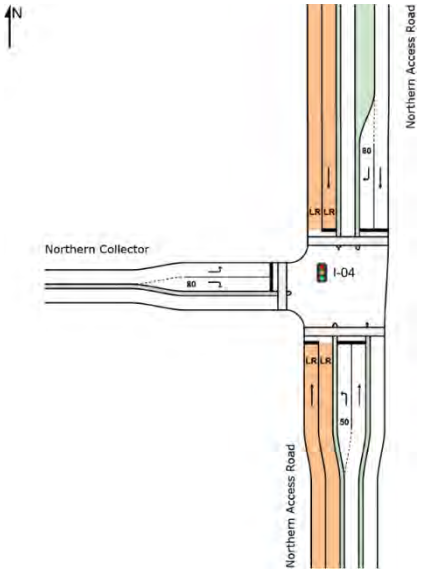
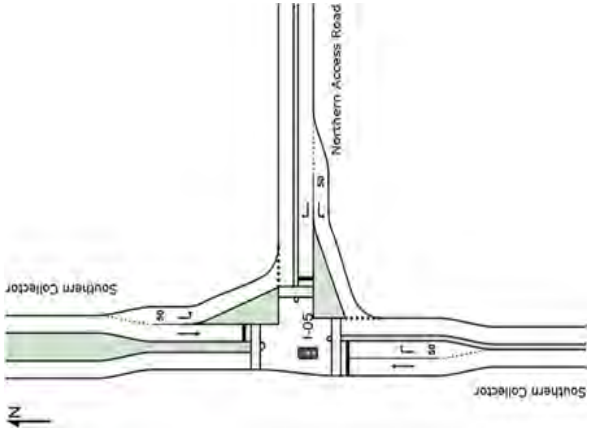


Figure 5.3 Intersection 1 layout: John Gorton Drive and Southern Collector

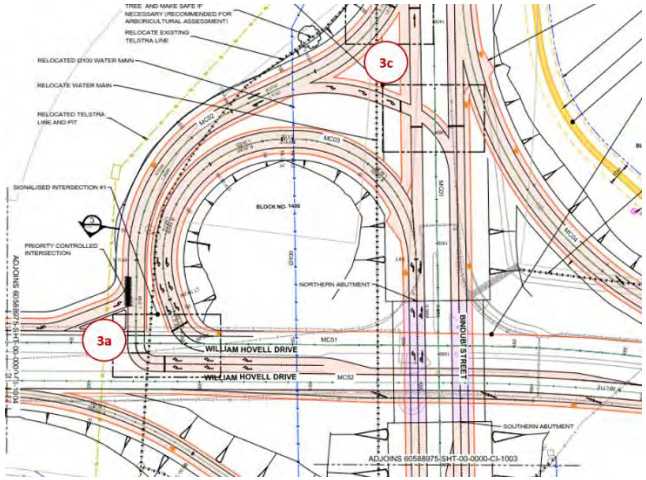


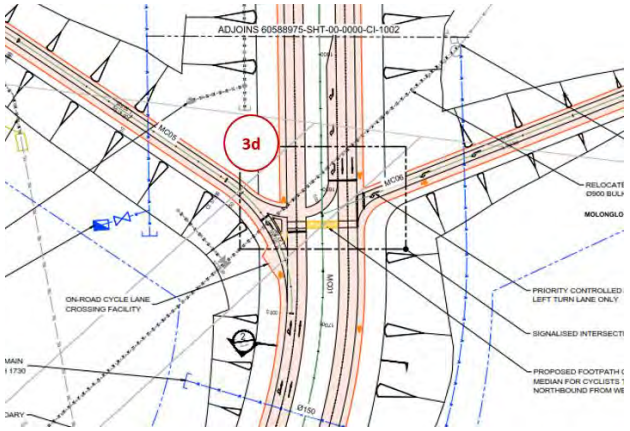
INTERSECTION 4



INTERSECTION 5

Figure 5.4 Internal intersection layout (intersection 4 and intersection 5)





Source: Bindubi Street - William Hovell Drive Grade Separated Interchange feasibility Study Report (AECOM, 2019)

Figure 5.5 Intersection 3 layout: Bindubi Street and William Hovell Drive

5.2 ASSUMPTIONS

The following assumptions have been made for the SIDRA assessment:

- 2041 Project Option 1 strategic traffic volumes have been used for the assessment. A 3% heavy vehicle proportion has been applied to all movements. A peak flow period of 30 minutes has been applied with no additional peak flow factors (default is 95%, which increases demand by 5%, i.e. raw strategic model turning volumes have been used). It is noted that the volumes used for this assessment may not reflect forecasts in previous studies.
- The assessment has been based on intersections working in isolation with the exception of the William Hovell Drive / Bindubi Street grade separated intersection which has been set up as a network of 3 intersections which are closely spaced to each other.
- The layout for the intersections along John Gorton Drive is based on what is on site, with the exception of turn lane length on the eastern and western approach which has been set where possible to contain the 95th percentile queue. The William Hovell Drive / Bindubi Street grade separated intersection layout is based on sketch plans obtained from AECOM. The development internal intersections assume single lane approach with separate turn lanes.
- The IPT (Light Rail) has been included into the assessment of the John Gorton Drive / Southern Collector intersection and the Northern Collector / Bindubi Street Extension.
- Pedestrian volumes have been set to default and assumed to operate every signal cycle, this will provide conservative results.
- The signal cycle times have been calculated by SIDRA based on minimising delays with a maximum of 150 seconds, no set cycle time has been specified given the assessment is based on a 2041 design year. The development internal intersections cycle times have been kept to a minimum to reduce delays to pedestrians within the town centre.
- Modelling does not assess the inclusion of dedicated (or priority calls) cycling phases associated with cycling infrastructure.

5.3 SIDRA RESULTS

A degree of saturation over 0.9 and/or a level of service above a ‘D’ indicate the approach/intersection is operating over capacity. SIDRA version 8 has been used for the assessment.

5.3.1 AM PEAK

Table 5.2 provides AM peak SIDRA analysis results. The AM peak results using 2041 demand indicate the following:

- The intersection of John Gorton Drive / Southern Collector is operating near to capacity.
- The intersection of John Gorton Drive / Northern Collector is operating over capacity on the northern and western approaches. The left turn from the western approach has a 254m 95th percentile queue and well exceeds the storage of the existing layout (30m).
- The intersection of Bindubi Street connections / William Hovell Drive is operating well over capacity with the westbound right turn from William Hovell Drive into Bindubi Street and the eastbound William Hovell Drive through movements experiencing long delays and queues.
- The Bindubi Street / William Hovell Drive connections intersection and William Hovell Drive ramps / Bindubi Street Extension intersection operate below capacity.

— The Northern Collector / Bindubi Street Extension intersection and Southern Collector / Bindubi Street Extension intersection within the development operate below capacity assuming single lane approaches with turning lanes as shown in Figure 5.4.

Table 5.2 AM Peak results

NO	INTERSECTION	FLOW	DEGREE OF SATURATION	AVE DELAY (S)	CYCLE TIME (S)	95TH PERCENTILE QUEUE (M)				LEVEL OF SERVICE
						STH	EAST	NTH	WEST	
1	John Gorton Drive / Southern Collector	3,654	0.90	49	120	87	142	268	113	D
2	John Gorton Drive / Northern Collector	3,722	1.03	54	100	242	88	211	254	D
3a	Bindubi Street connections / William Hovell Drive	4,998	1.29	258	150		571	182	1067	F
3c	Bindubi Street / William Hovell Drive connections	4,391	0.81	21	150	151		10	184	B
3d	William Hovell Drive ramps / Bindubi Street Extension	1,669	0.45	6	150	52	3	15		A
4	Northern Collector / Bindubi Street Extension	1,151	0.86	27	70	133		41	25	B
5	Southern Collector / Bindubi Street Extension	1,220	0.71	16	50	46	56	13		B

5.3.2 PM PEAK

Table 5.3 provides PM peak SIDRA analysis results. The PM peak results using 2041 demand indicate the following:

- The intersection of John Gorton Drive / Southern Collector is operating near to capacity.
- The intersection of John Gorton Drive / Northern Collector is operating near to capacity. The right turn from the northern approach has a 259m 95th percentile queue and well exceeds the storage of the existing layout (100m).
- The Bindubi Street connections / William Hovell Drive intersection is operating well over capacity with the westbound right turn from William Hovell Drive into Bindubi Street experiencing long delays and queues.
- The Bindubi Street / William Hovell Drive connections intersection and William Hovell Drive ramps / Bindubi Street Extension intersection operate below capacity.
- The Northern Collector / Bindubi Street Extension intersection and Southern Collector / Bindubi Street Extension intersection within the development operate below capacity assuming single lane approaches with turning lanes as shown in Figure 5.4.

Table 5.3 PM Peak results

NO	INTERSECTION	FLOW	DEGREE OF SATURATION	AVE DELAY (S)	CYCLE TIME (S)	95TH PERCENTILE QUEUE (M)				LEVEL OF SERVICE
						STH	EAST	NTH	WEST	
1	John Gorton Drive / Southern Collector	4,146	0.90	39	110	261	36	182	31	C
2	John Gorton Drive / Northern Collector	3,928	0.93	50	130	254	59	300	27	D
3a	Bindubi Street connections / William Hovell Drive	2,895	1.0	78	100		486	1	71	F
3c	Bindubi Street / William Hovell Drive connections	3,920	0.89	12	100	13		19	195	A
3d	William Hovell Drive ramps / Bindubi Street Extension	1,801	0.84	13	100	36	84	7		A
4	Northern Collector / Bindubi Street Extension	1,183	0.68	18	60	27		49	38	B
5	Southern Collector / Bindubi Street Extension	1,269	0.57	11	50	11	18		50	A

5.4 RISKS AND OPPORTUNITIES

The following risks and opportunities are highlighted based on the SIDRA assessment:

- The performance of the Southern and Northern connectors intersections along John Gorton Drive are largely based on the modelled traffic generation demand on the side roads which access this project and the development to the west. The risk is that the existing layouts may operate over capacity with delays to traffic entering/exiting the developments based on the current strategic model demand. As shown in Figure 4.13 and Figure 4.14 (volume difference plot) John Gorton Drive is sensitive to volume changes and this should be noted when considering future development and network detail development.
- The performance of the Bindubi Street connections / William Hovell Drive intersection (right into and left out of Bindubi Street onto William Hovell Drive) show that this intersection is well over capacity. The risk is that based on the current design that access to Bindubi Street Extension will be significantly impacted. Given the designs of these intersections are still in early development there is the opportunity for these to be further refined to cater for the expected demand.
- The internal intersections within the development assume single lane approach with turning lanes and left turn slip lanes where possible. There are a number of other factors which may impact the size and layout of these intersections such as:
    - Light Rail alignment and stop location
    - Pedestrian requirements
    - Cycle lanes and/or shared user paths
    - Proximity to other structures (bridges etc)

6 CONCLUSION

WSP has carried out strategic modelling as part of Molonglo 3 East Planning and Infrastructure Study using the 2041 Canberra Strategic Transport Model (CSTM) supplied by Transport Canberra and City Services (TCCS).

The strategic modelling was carried out for two project options (Option 1 and Option 2) for the year 2041 and the modelling outputs indicate that both the project options provide identical traffic operating conditions during the AM and PM peaks. The following summarises key findings of demand forecast results for the two project options:

- The public transport ridership indicates that at an overall level, the public transport patronage under both the options are similar. However, the total inbound/ outbound riders to/ from the Molonglo Valley Stage 3 development, is slightly higher under Project Option 1 during both peaks when compared to Project Option 2, which could be due to the proximity of the IPT alignment to a major road supporting both active and motorised transport modes in Project Option 1.
- The volume over capacity ratios indicate that both the project options provide similar internal roads operating conditions during the AM and PM peaks with most of the outbound sections of the internal roads during AM Peak and inbound sections during PM peak operating at or near capacity.
- The volume difference plots indicate that the total traffic entering and exiting the study area are similar between the two project options with some differences in traffic volumes observed at some internal roads and a small section of John Gorton Drive, which can be attributed to the redistribution of traffic due to slight differences in the internal road and centroid connector arrangement between the two project options.
- The select link analysis results show expected traffic flow pattern using key road sections within the study area except at John Gorton Drive in Project Option 1, where the Collector/ Local road connecting John Gorton Drive to Southern Collector in Project Option 1, acts as an alternate route for the north – south traffic resulting in diversion of some of the external traffic onto internal roads. This can be mitigated by introducing traffic calming measures on internal roads.

SIDRA analysis was carried out at selected intersections to ascertain the performance on the adjoining arterial roads and the potential geometry at key locations within the development. This assessment was based on using the strategic model 2041 AM and PM peak traffic demand for Project Option 1. It is noted that the volumes used for this assessment may not reflect forecasts in previous studies.

- The results of the Project Option 1 SIDRA analysis results indicate that the intersections surrounding the development were near to or over capacity which may limit access to the development via the collector roads.
- The internal intersections operate below capacity based on providing single through lanes with turning lanes on each approach.

Once the development plan is further refined the following tasks are recommended to undertake a detailed assessment of the overall road capacity requirements:

- Review and update the CSTM land use, road network and public transport inputs with latest development option to determine strategic volumes.
- Undertake mesoscopic modelling of study area and surrounding arterial road network to determine forecast intersection turning volumes and identify any network capacity constraints.
- Undertake intersection assessment using SIDRA to inform internal intersection design and possible intersection upgrades to surrounding arterial network to mitigate increased demand.

7 LIMITATIONS

7.1 SCOPE OF SERVICES

This report has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or data constraints. Due to such limitations, the direction of the project focused on primary areas to support the assessment of objectives of this study.

7.2 RELIANCE ON DATA

In preparing the report, WSP has relied upon data and other information provided by the client. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

7.3 REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the client (and no other party) but may be relied upon by EPSDD acting in its capacity as the administering authority. WSP assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report. Parties other than the client should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

The EPSDD in its capacity as the administering authority may consider and rely upon the report for the purposes of deciding and for the administration of matters.

APPENDIX A

NETWORK UPDATES

A1 HIGHWAY NETWORK UPDATE

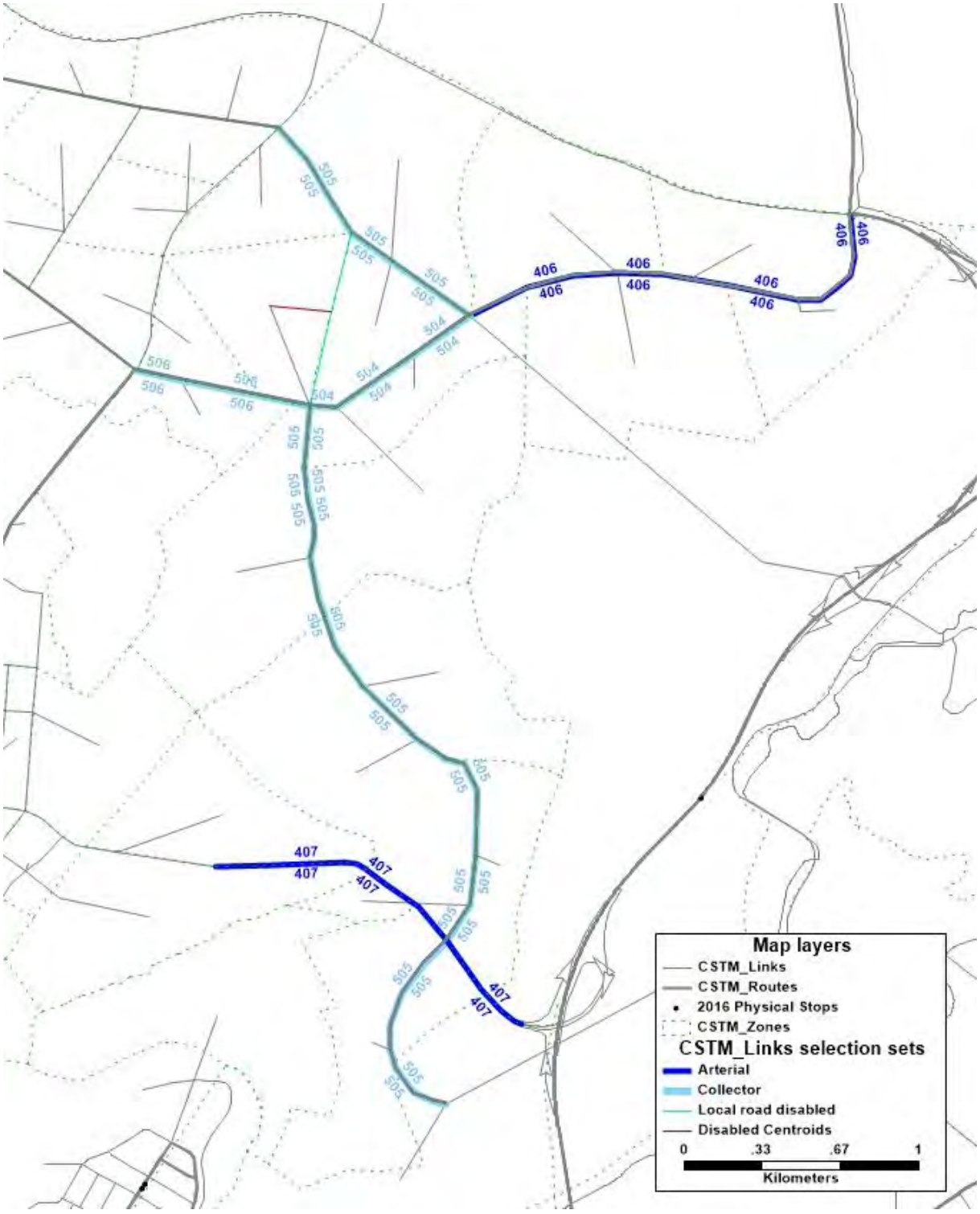


Figure A.1 Linktypes – Project Option 1

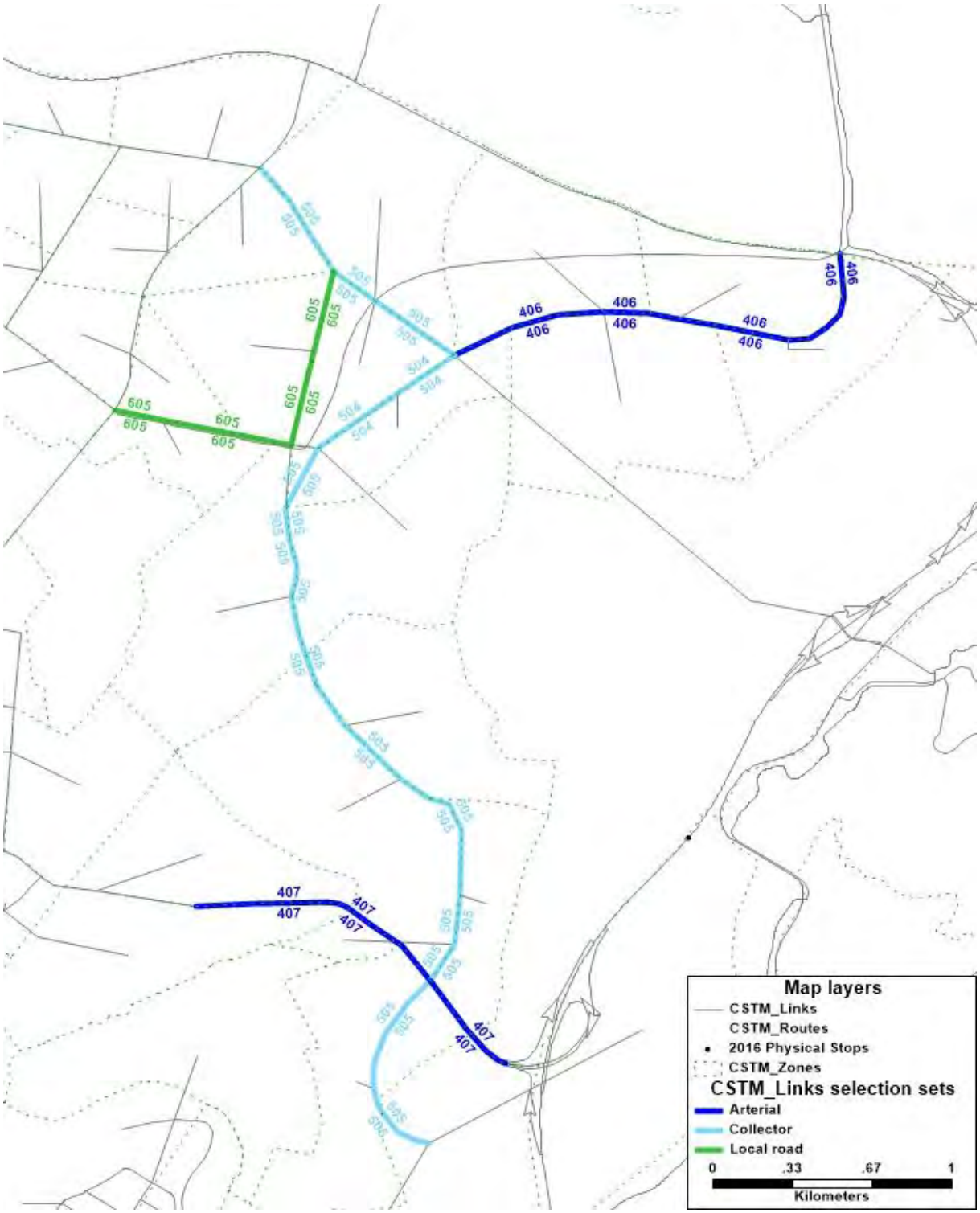


Figure A.2 Linktypes – Project Option 2

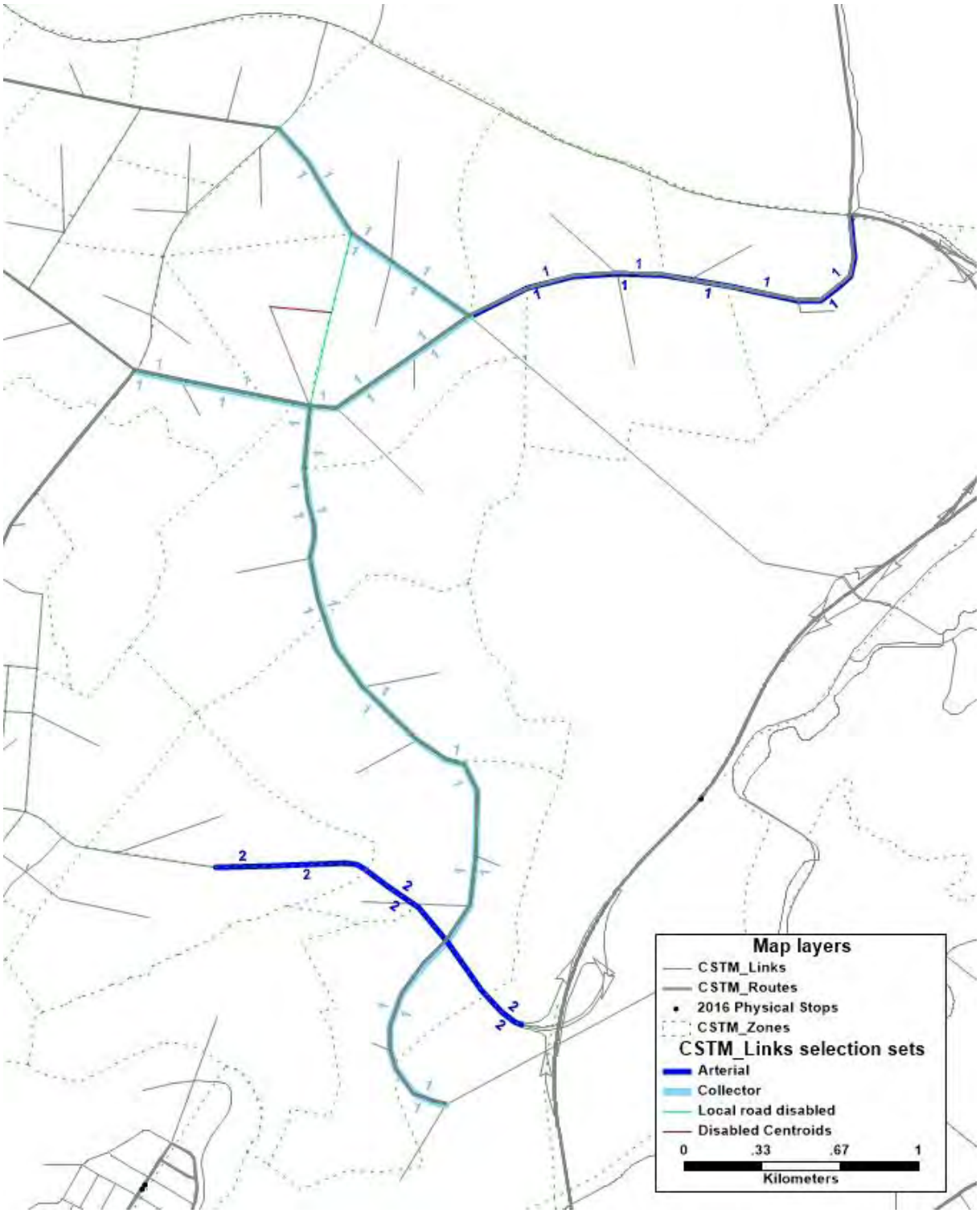


Figure A.3 Number of lanes – Project Option 1

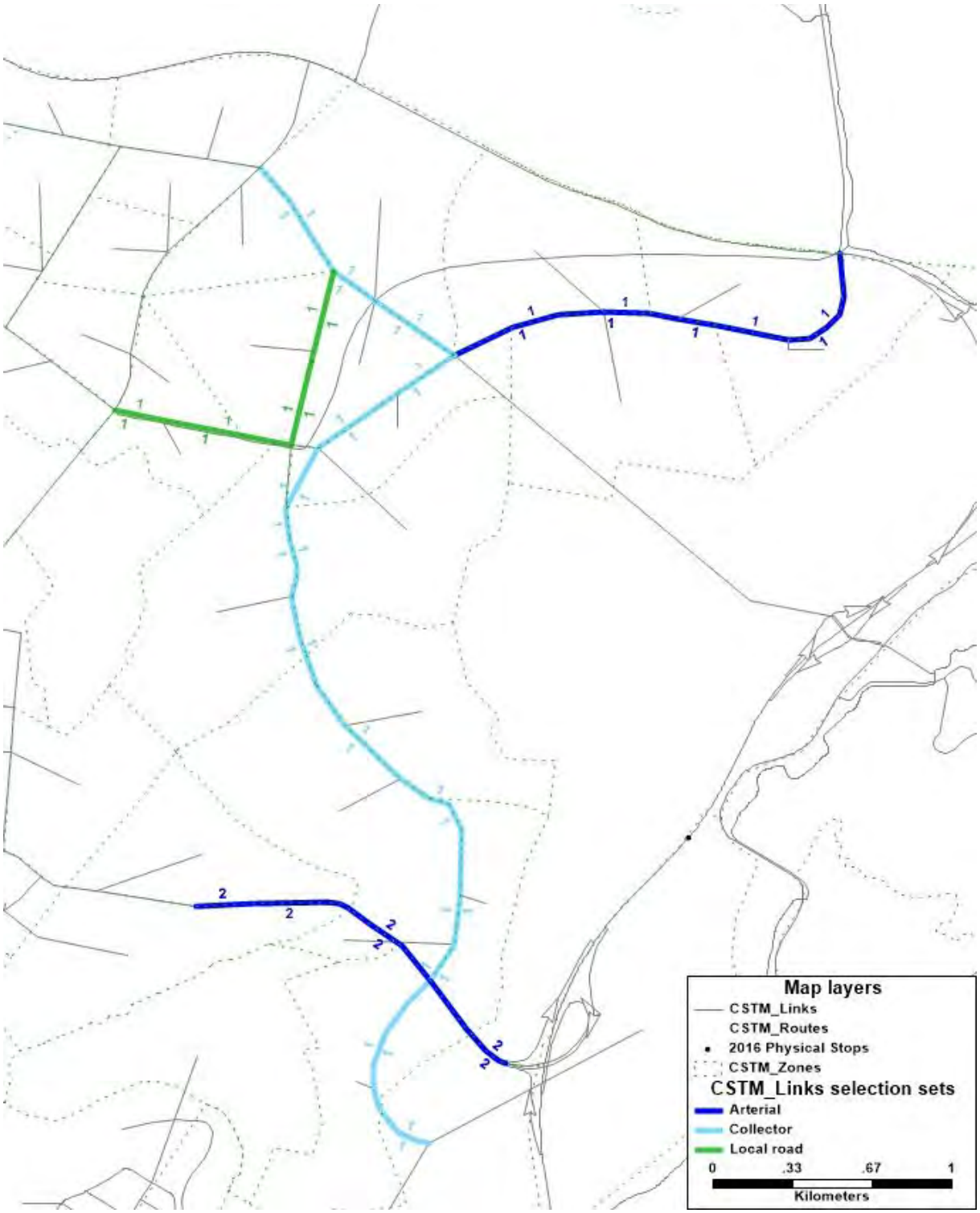


Figure A.4 Number of lanes – Project Option 2

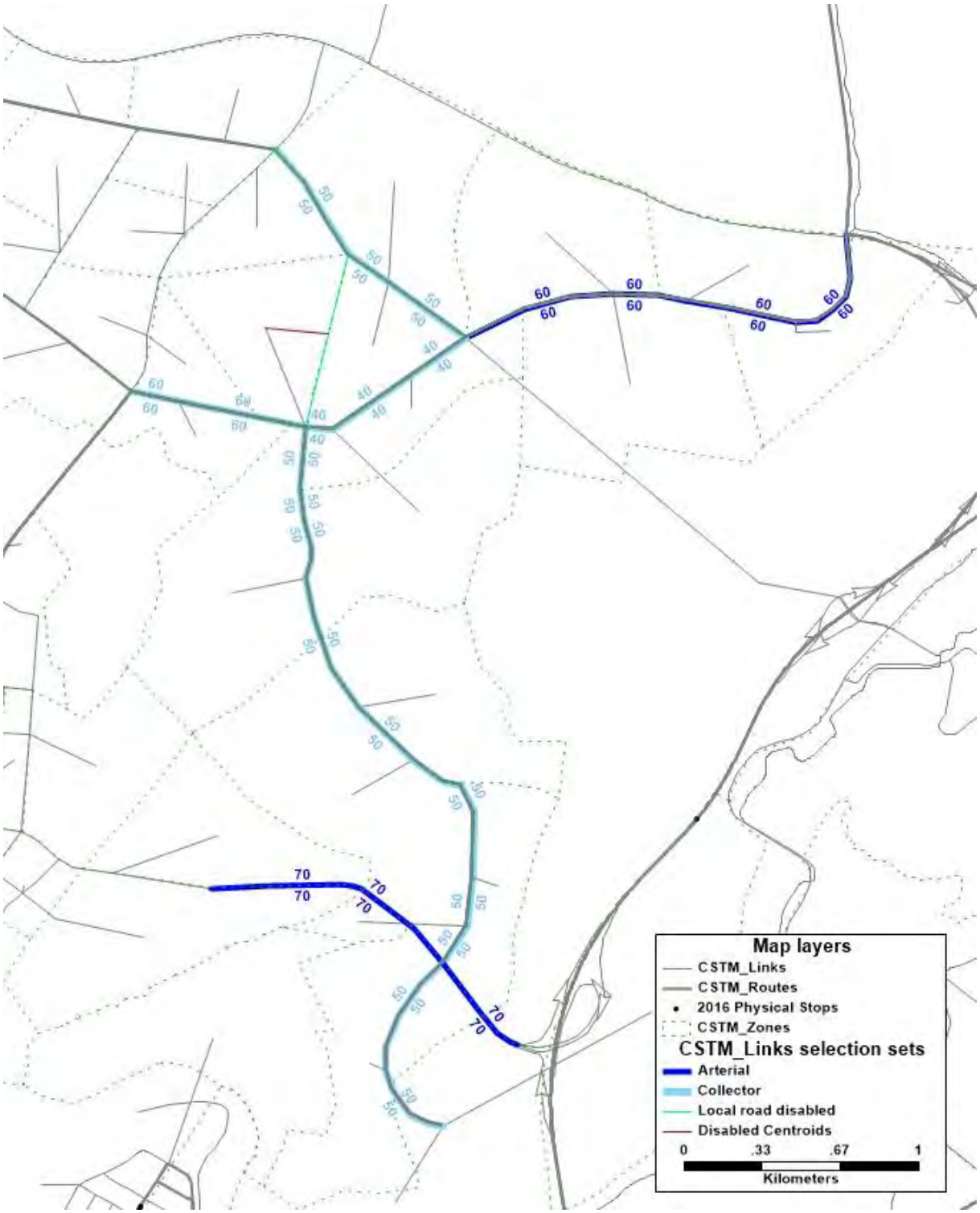


Figure A.5 Speed – Project Option1

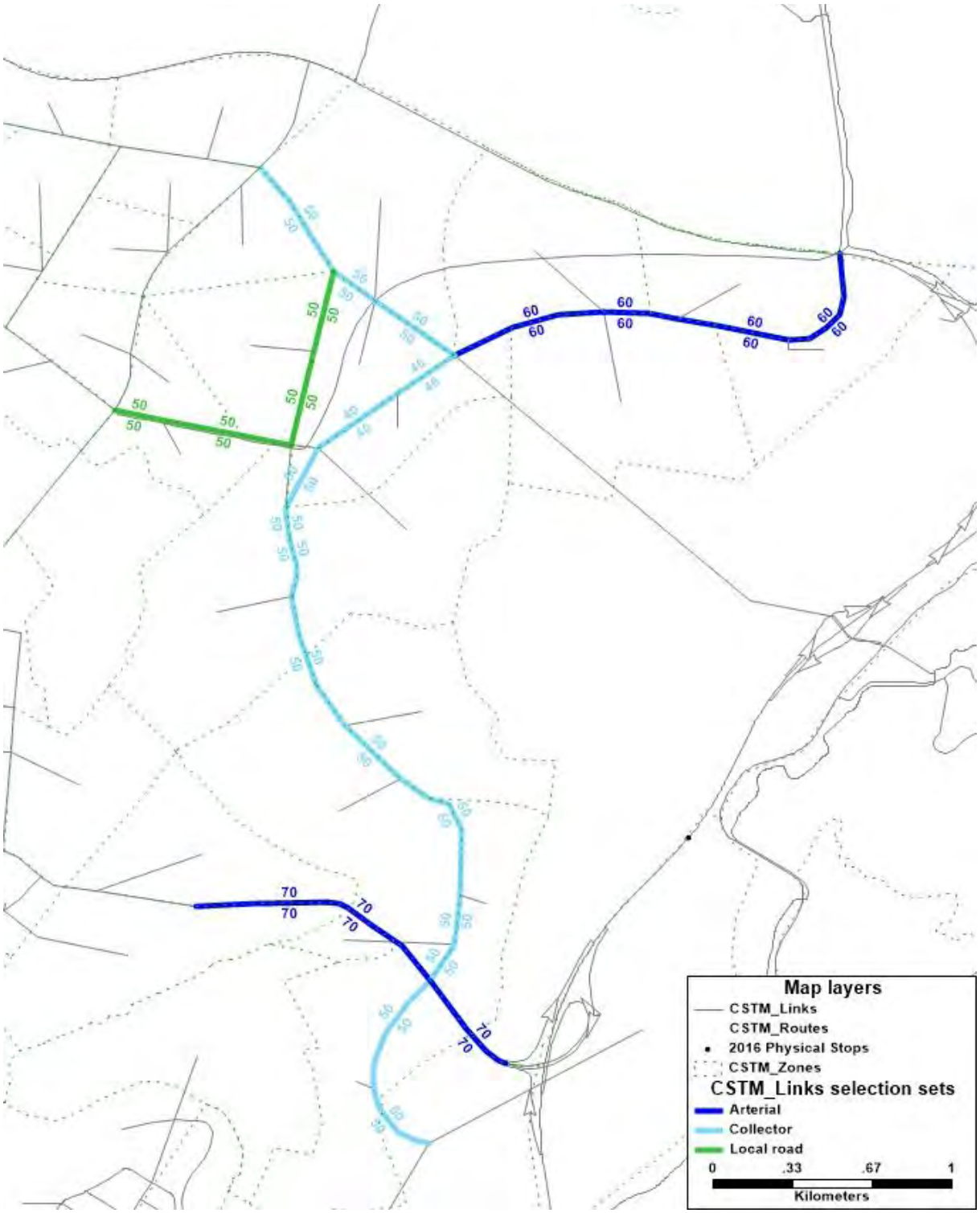


Figure A.6 Speed – Project Option 2

Table A.1 Comparison of Base Case, Project Option1 and Project Option 2 network attributes for key roads

ATTRIBUTE	NORTHERN ARTERIAL			BINDUBI EXTENSION			WESTERN COLLECTOR/LOCAL ROAD		
	BASE CASE	PROJECT OPT 1	PROJECT OPT 2	BASE CASE	PROJECT OPT 1	PROJECT OPT 2	BASE CASE	PROJECT OPT 1	PROJECT OPT 2
Link Type	507	406	406	505	504	504	507	506	605
Description	Urban Distributor	Urban Arterial	Urban Arterial	Urban Distributor	Urban Distributor	Urban Distributor	Urban Distributor	Urban Distributor	Local Street
Speed(km/hr)	70	60	60	50	40	40	70	60	50
Capacity per lane	800	700	700	600	500	500	800	700	600
No. of lanes per direction	1	1	1	1	1	1	1	1	1

A2 PUBLIC TRANSPORT UPDATE

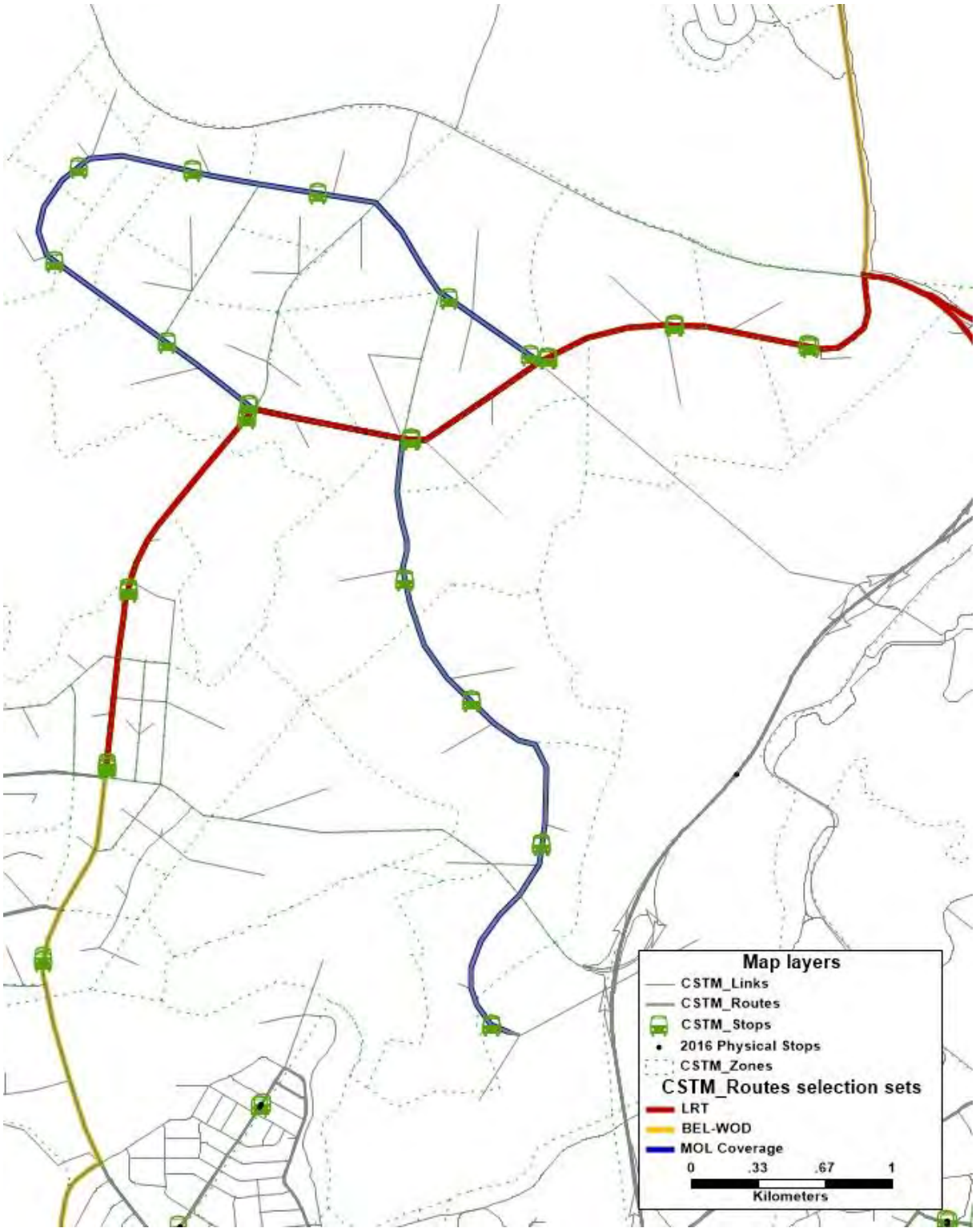


Figure A.7 Light rail alignment – Project Option 1

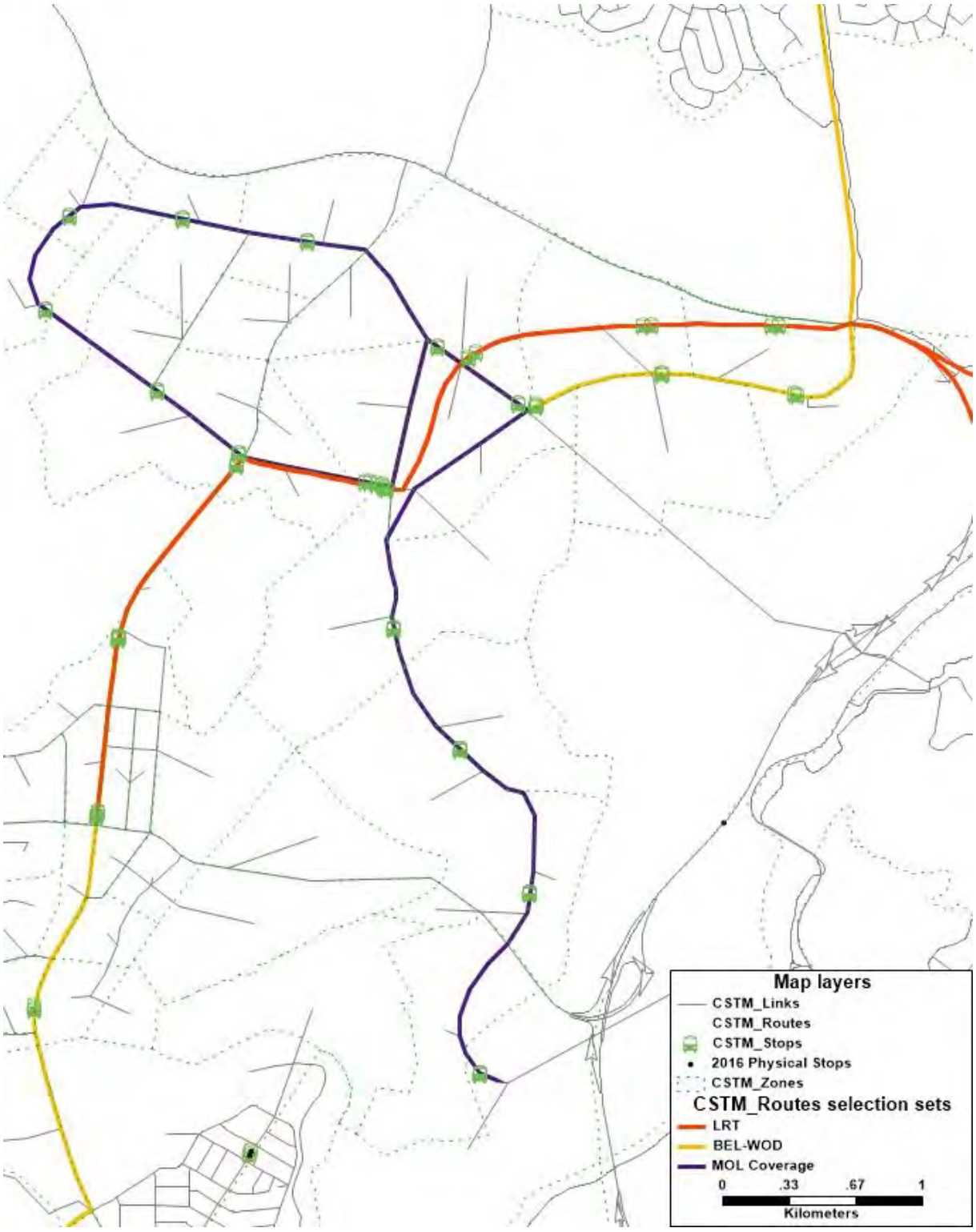


Figure A.8 Light rail alignment – Project Option 2

APPENDIX B

MODEL OUTPUTS

B1 BASE CASE RESULTS

The year 2041 model as received was considered as the Base Case scenario for this project. The Base Case scenario as supplied includes a bus line coded within the study area. It also includes Bindubi Street Extension, The Northern Collector and a local road connecting northern neighbourhoods to John Gorton Drive and the Southern Collector that runs north-south through the precinct.

PUBLIC TRANSPORT RIDERSHIP

Figure B.1 Public Transport Ridership – Base Case – AM Peak

Figure B.2 Public Transport Ridership – Base Case – PM Peak

VOLUME OVER CAPACITY RATIO

The volume to capacity (V/C) ratio is a measure that reflects the level of congestion on a road link given the modelled traffic and modelled road capacity. When the V/C ratio reaches 1, this indicates that the road is at capacity.

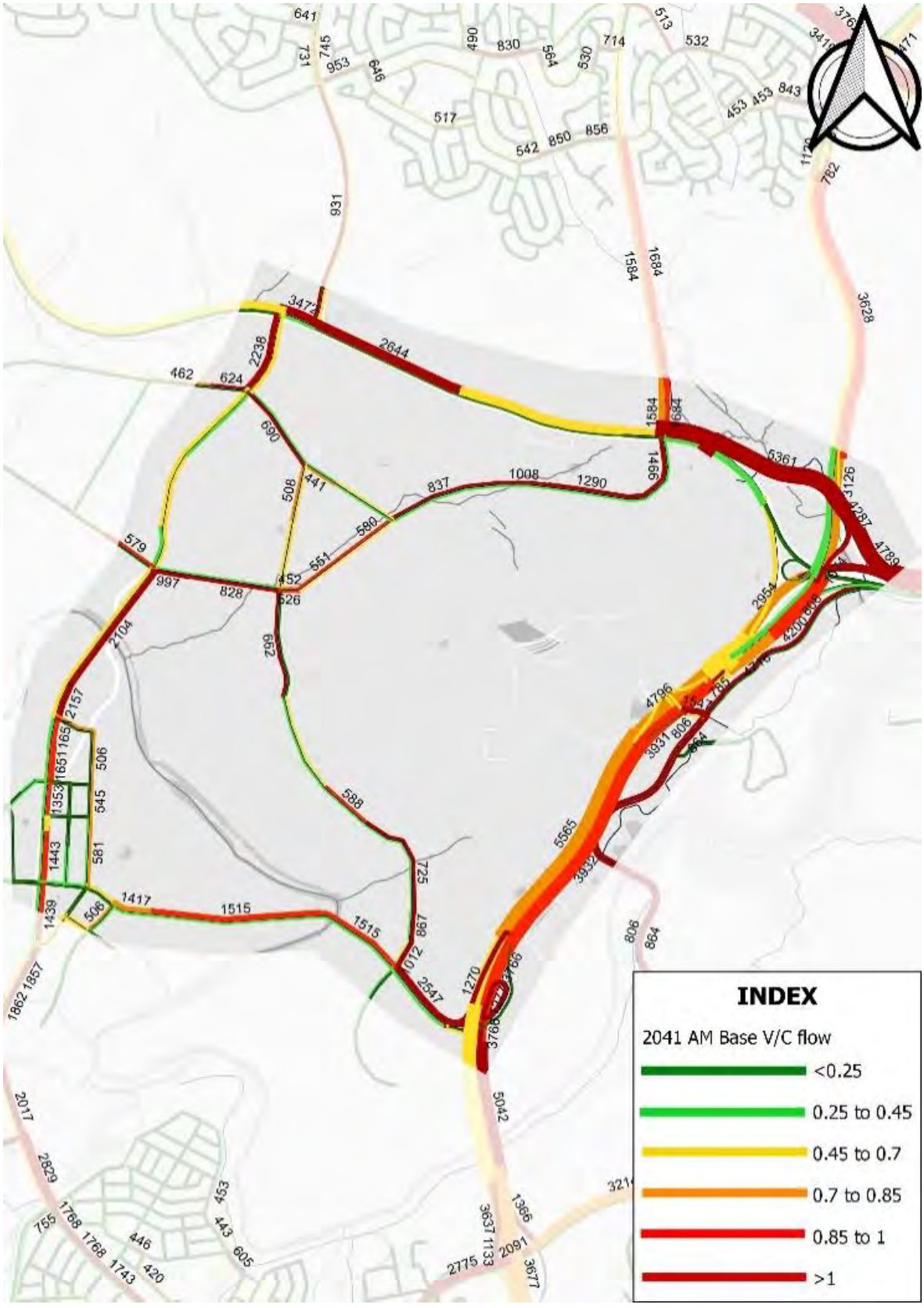


Figure B.3 Volume over capacity ratios – Base Case – AM Peak

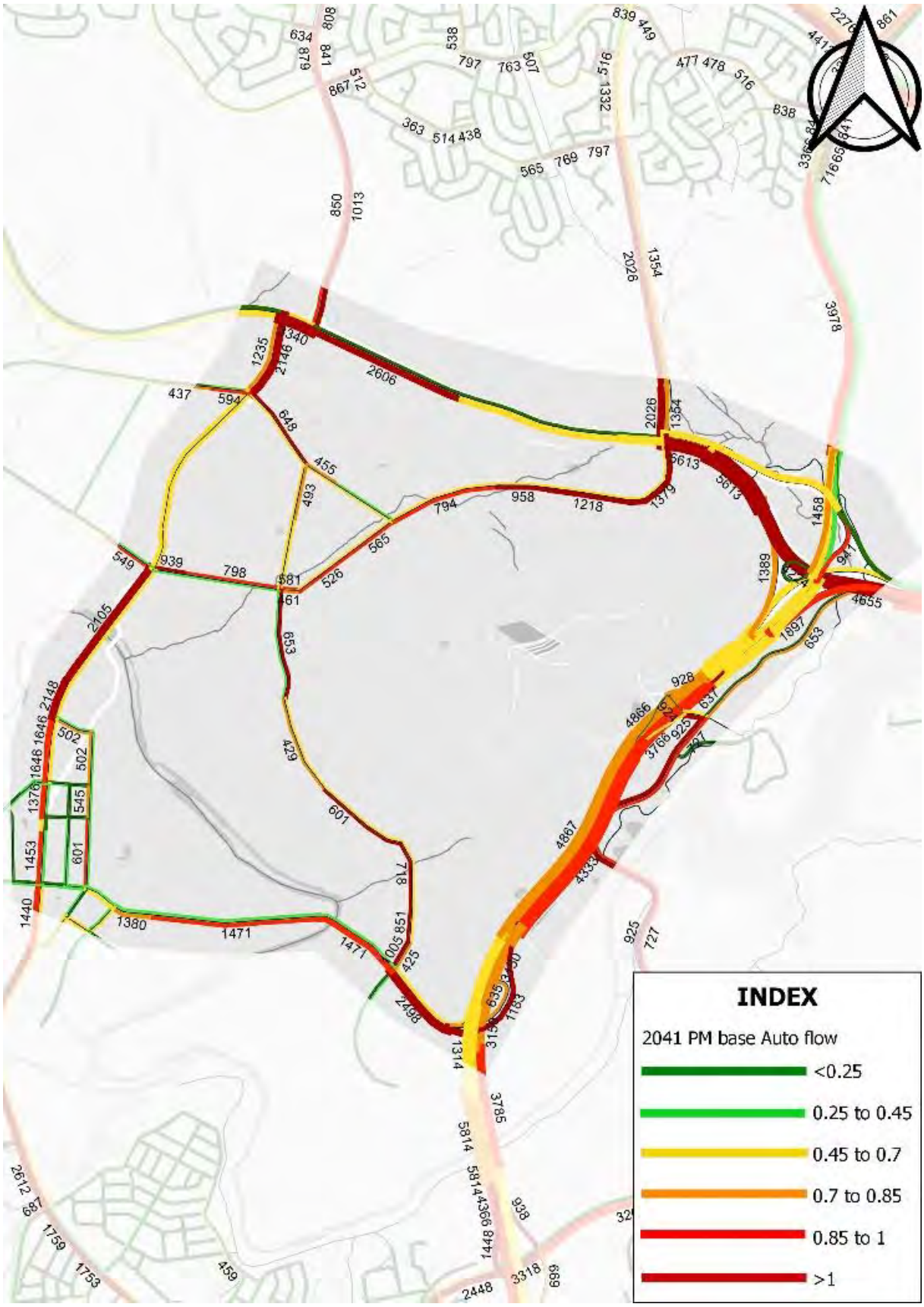


Figure B.4 Volume over capacity ratios – Base Case – PM Peak

B2 COMPARISON OF PROJECT OPTIONS AGAINST BASE CASE

VOLUME DIFFERENCE PLOTS

Figure B.5 and Figure B.8 show AM and PM peaks volume difference plots for the study are between the Base Case and project options. The figures indicated that compared to the Base Case, both project options show some traffic volume difference at internal roads. However, the difference in traffic volumes at the link level are very small. Along surrounding roads, the difference in the traffic volumes between the Base Case and the project options are very small or insignificant.

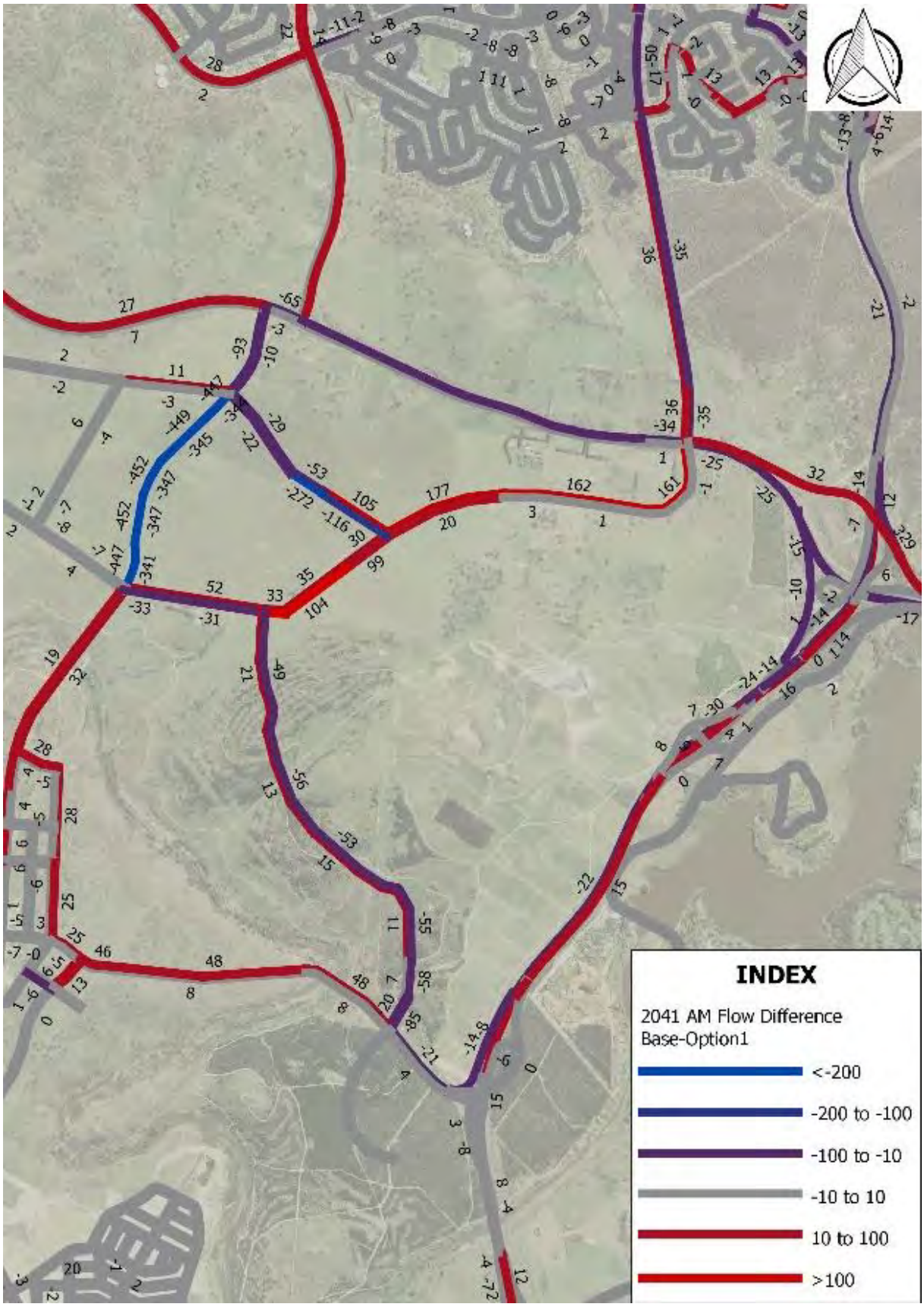


Figure B.5 Traffic Volume difference – AM Peak (Base Case – Project Option 1)

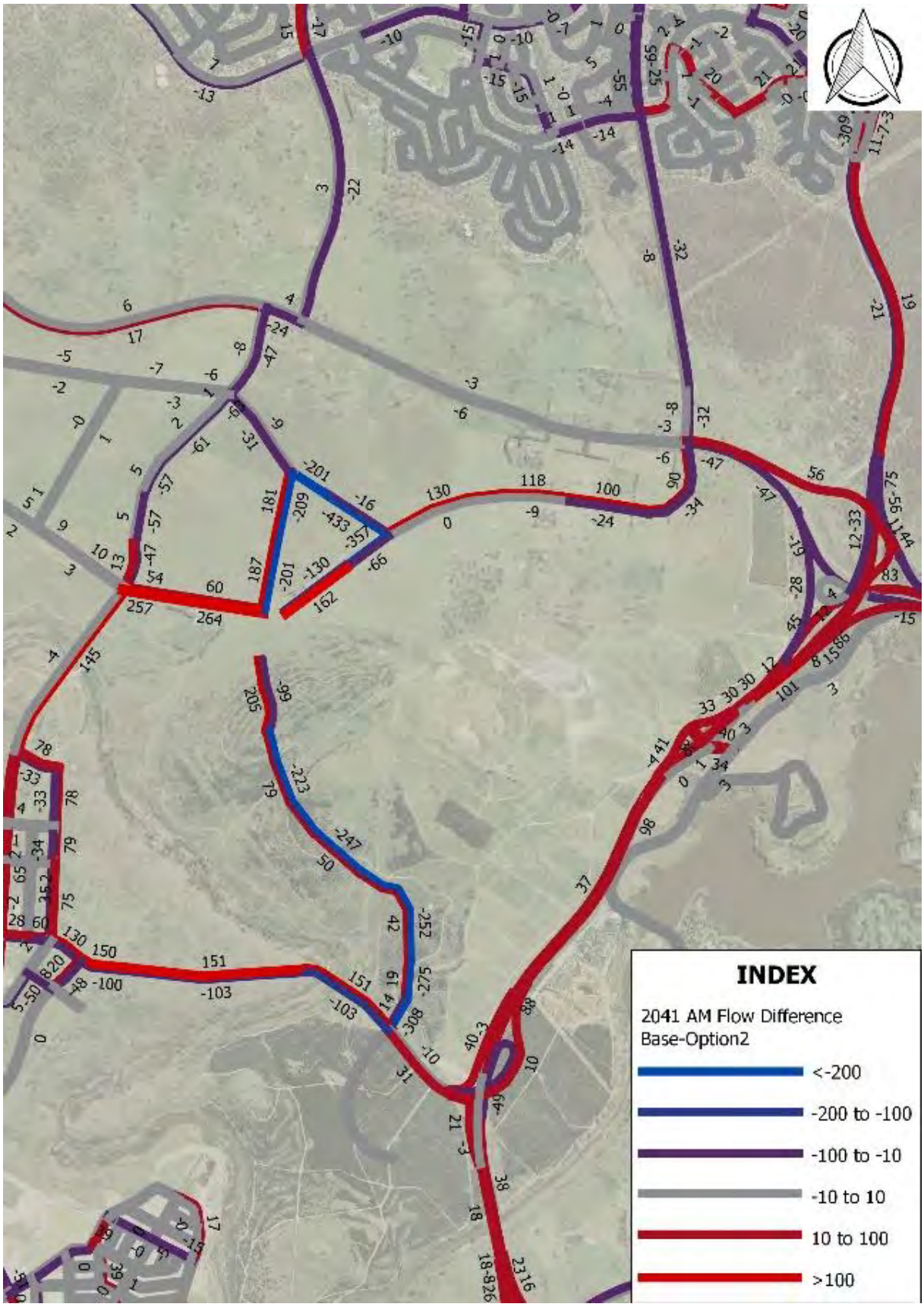


Figure B.6 Traffic Volume difference – AM Peak (Base Case – Project Option 2)

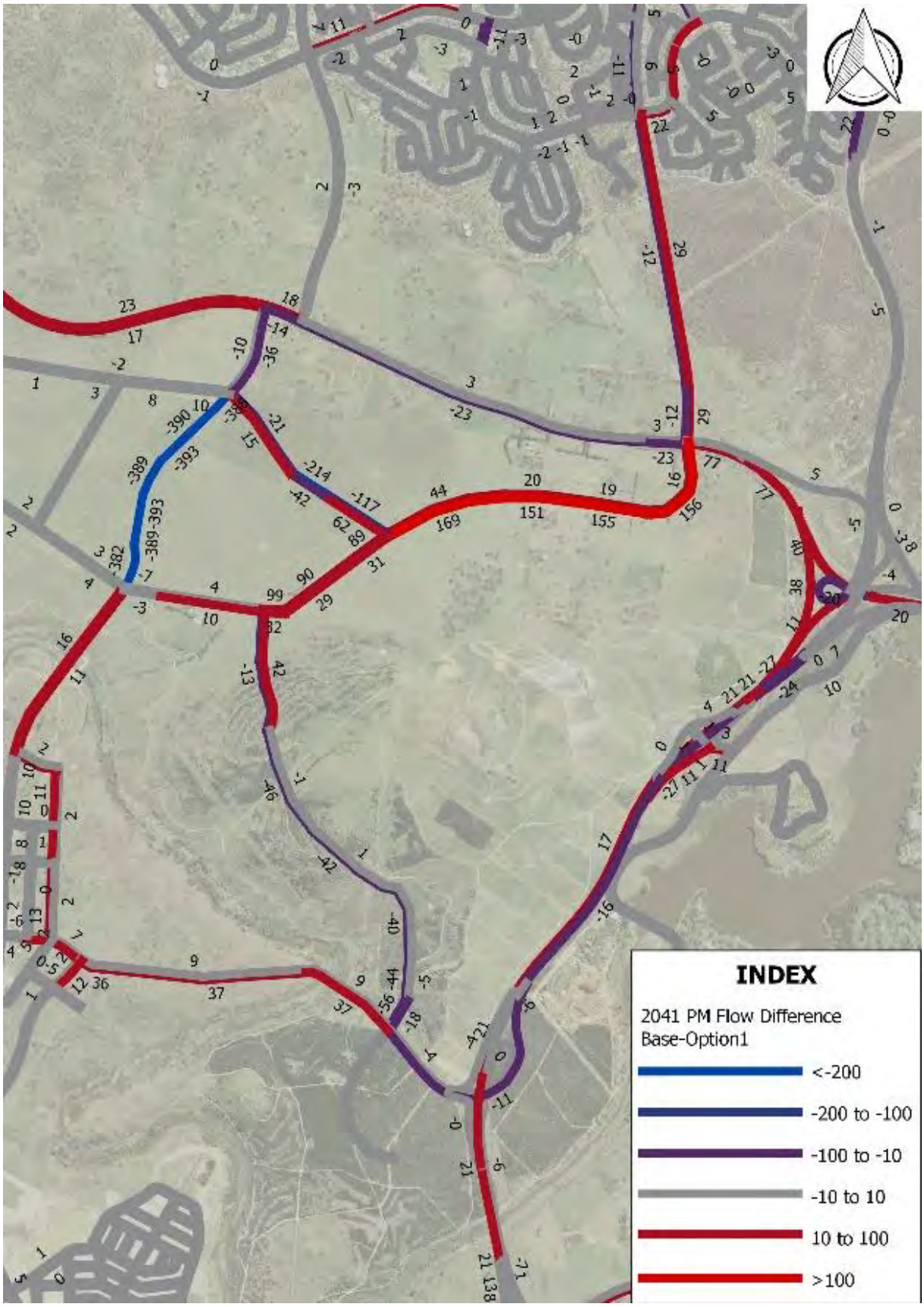


Figure B.7 Traffic Volume difference – PM Peak (Base Case – Project Option 1)

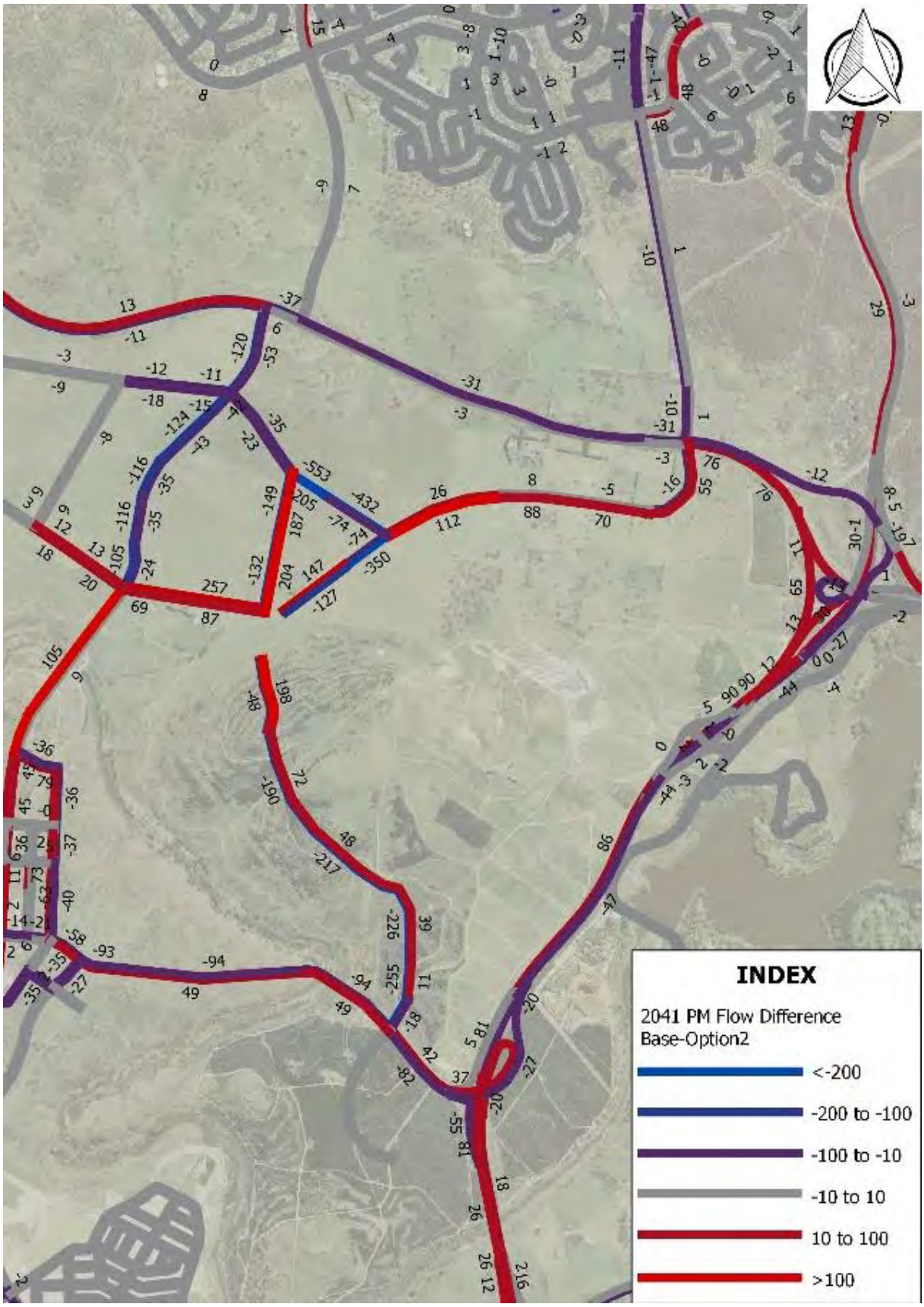


Figure B.8 Traffic Volume difference – PM Peak (Base Case – Project Option 2)

PERFORMANCE OF KEY CORRIDOR WITHIN STUDY AREA

The congested speed and V/C ratio on a section of major roads corridor within the Molonglo Valley Stage 3 development are presented in Table B.1 and Table B.4 for the AM and PM peaks respectively. In general, the tables indicate that the project results in decrease in congested speed and increase in V/C ratio on majority of key road corridors within the study area when compared to Base Case.

Table B.1 Performance metrics along key corridors– AM Peak – Inbound

CORRIDOR	CONGESTED SPEED(KPH)			V/C		
	BASE CASE	P. OPT 1	P. OPT 2	BASE CASE	P. OPT 1	P. OPT 2
Bindubi Street Extension	69	59	59	0.35	0.4	0.41
Northern Collector	49	49	24	0.27	0.46	0.99
Southern Collector	47	46	19	0.65	0.74	1.02
Collector/Local Road	69	59	49	0.33	0.31	0.34
John Gorton Dr	68	66	68	0.46	0.66	0.49

Table B.2 Performance metrics along key corridors – AM Peak – Outbound

CORRIDOR	CONGESTED SPEED(KPH)			V/C		
	BASE CASE	P. OPT 1	P. OPT 2	BASE CASE	P. OPT 1	P. OPT 2
Bindubi Street Extension	7	7	6	1.26	1.21	1.27
Northern Collector	47	49	47	0.62	0.45	0.65
Southern Collector	47	49	49	0.42	0.4	0.29
Collector/Local Road	23	7	34	1.04	1.23	0.94
John Gorton Dr	68	63	68	0.52	0.78	0.51

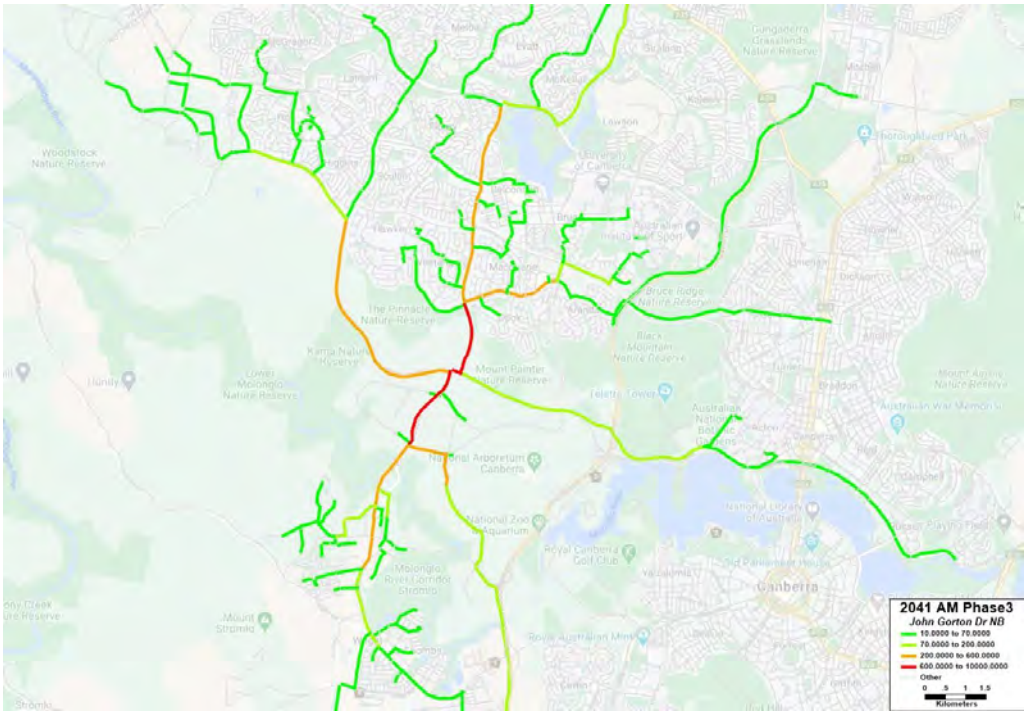
Table B.3 Performance metrics along key corridors – PM Peak – Inbound

CORRIDOR	CONGESTED SPEED(KPH)			V/C		
	BASE CASE	P. OPT 1	P. OPT 2	BASE CASE	P. OPT 1	P. OPT 2
Bindubi Street Extension	9	9	6	1.2	1.15	1.24
Northern Collector	48	48	46	0.59	0.48	0.71
Southern Collector	48	48	49	0.55	0.55	0.43
Collector/Local Road	32	10	38	1	1.13	0.9
John Gorton Dr	67	63	67	0.53	0.77	0.56

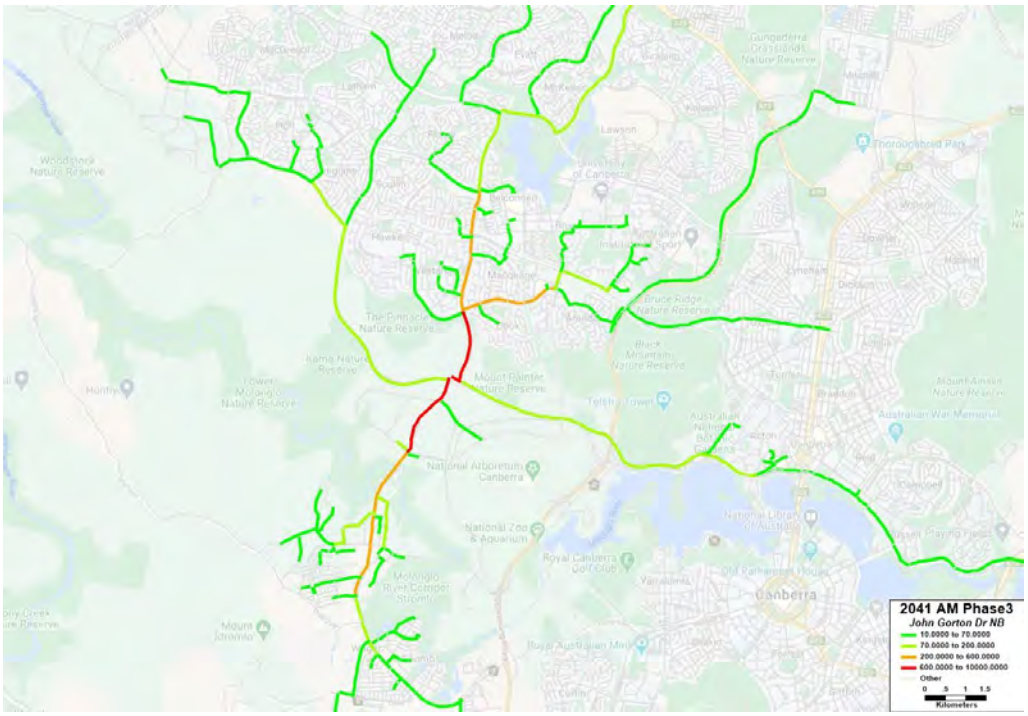
Table B.4 Performance metrics along key corridors – PM Peak - Outbound

CORRIDOR	CONGESTED SPEED(KPH)			V/C		
	BASE CASE	P. OPT 1	P. OPT 2	BASE CASE	P. OPT 1	P. OPT 2
Bindubi Street Extension	67	57	57	0.54	0.59	0.61
Northern Collector	49	48	13	0.35	0.55	1.07
Southern Collector	46	44	18	0.72	0.79	1.03
Collector/Local Road	49	59	49	0.36	0.39	0.33
John Gorton Dr	67	63	67	0.53	0.76	0.6

B3 SELECT LINK PLOTS

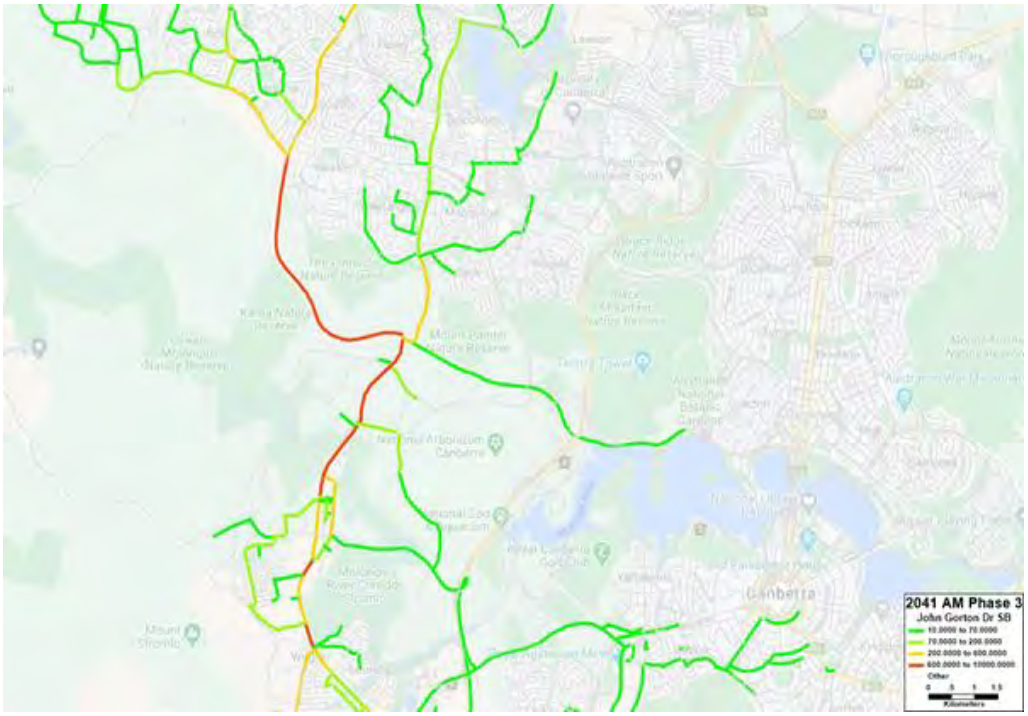


Project Option 1

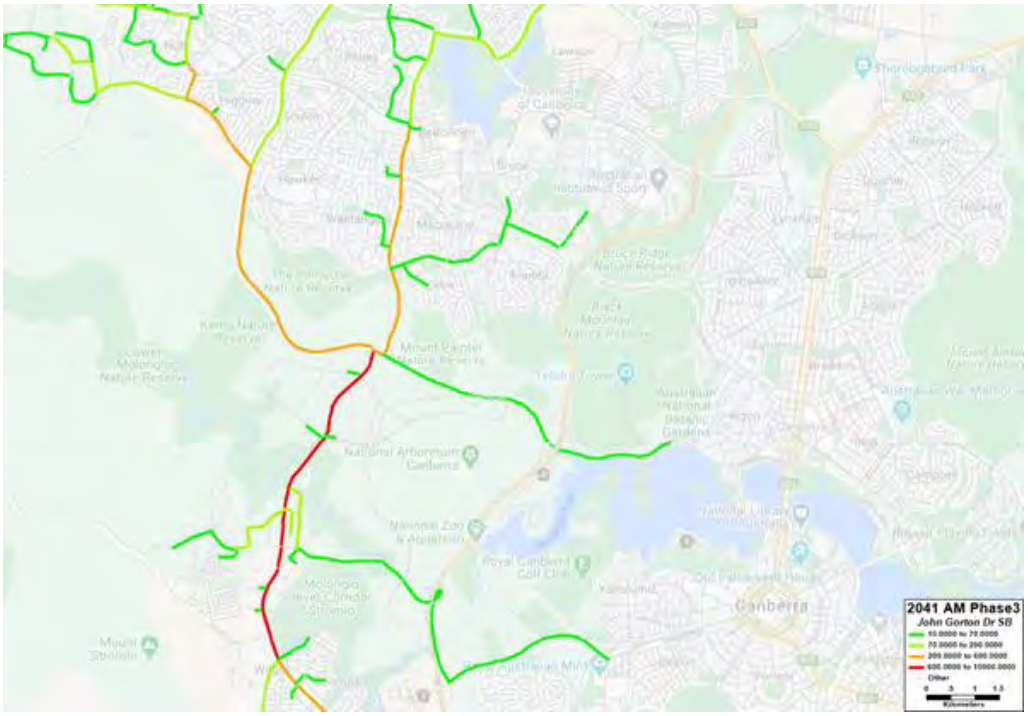


Project Option 2

Figure B.9 John Gorton Drive – Northbound

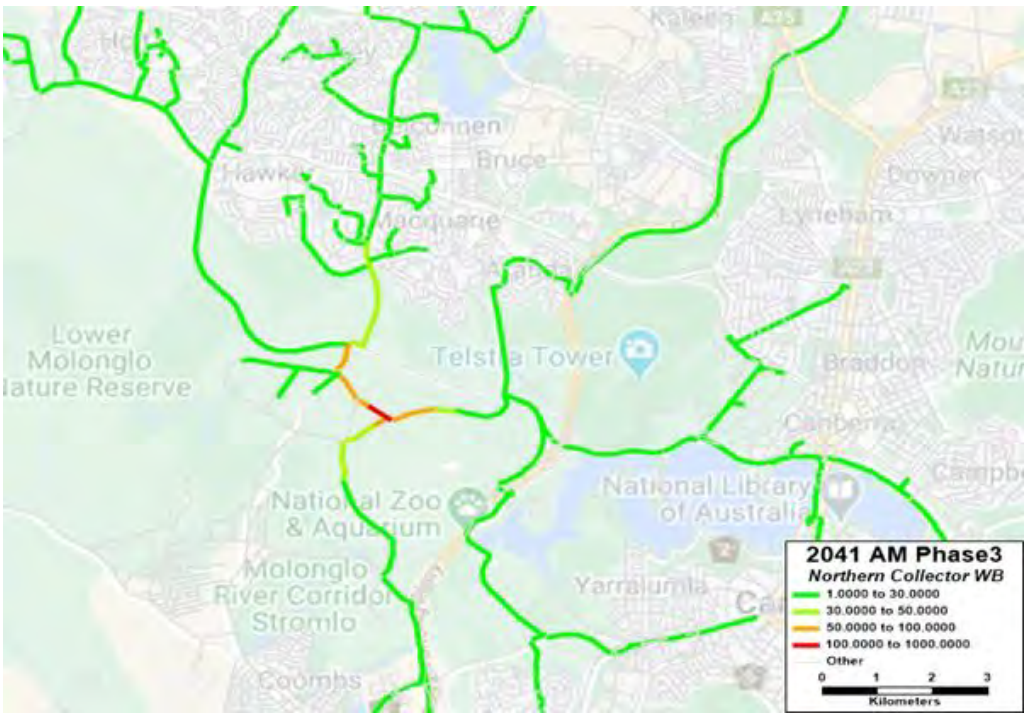


Project Option 1

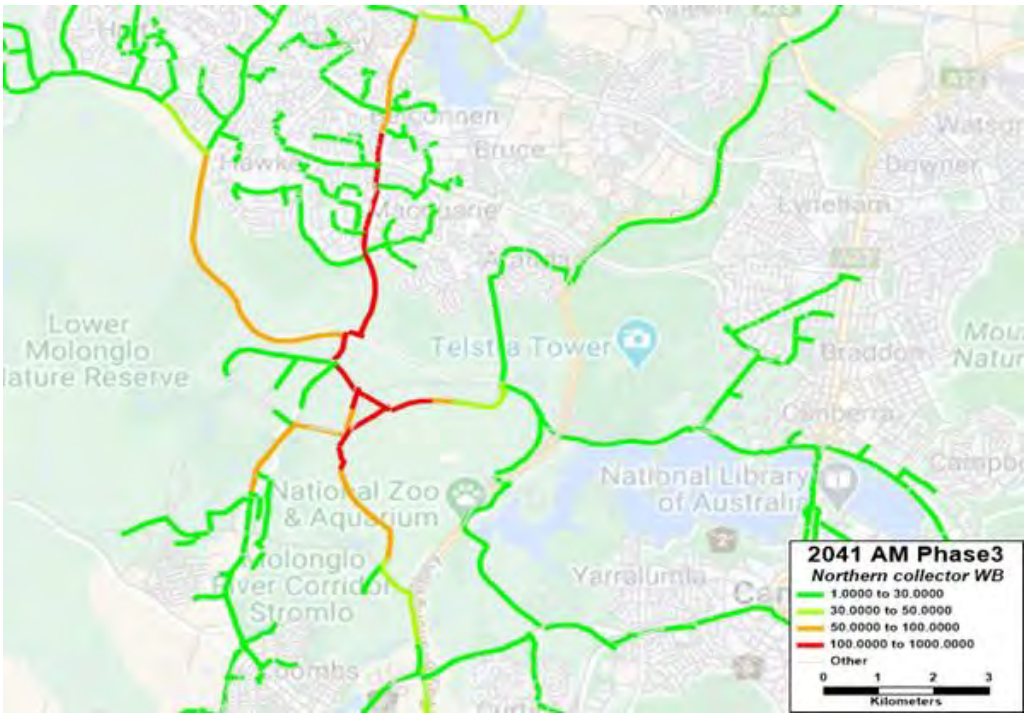


Project Option 2

Figure B.10 John Gorton Drive – Southbound

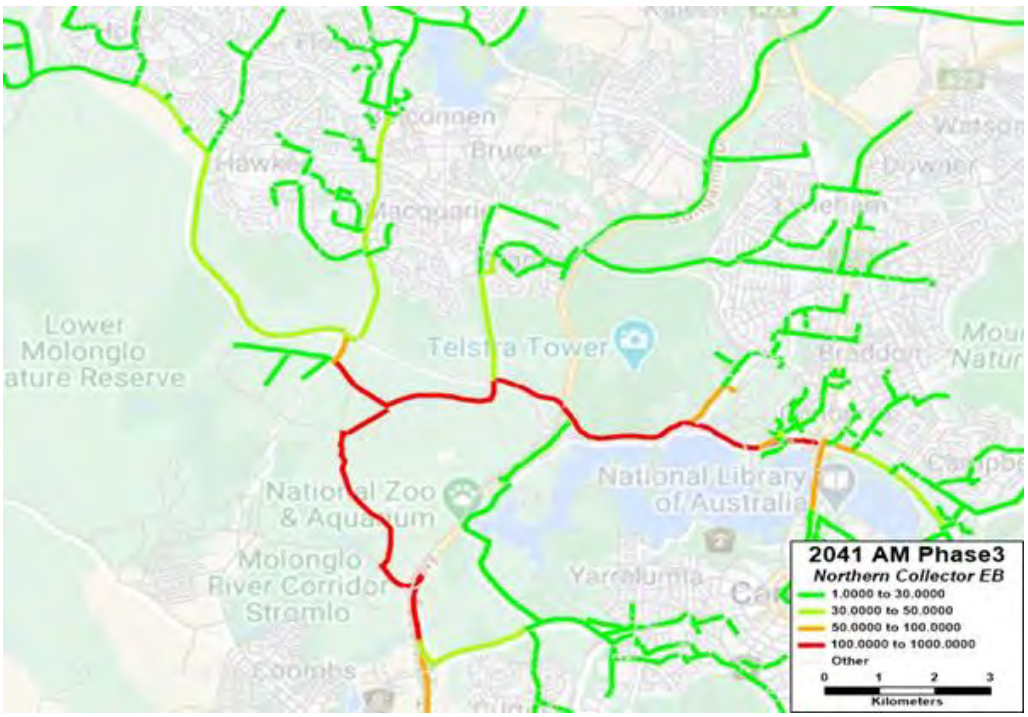


Project Option 1

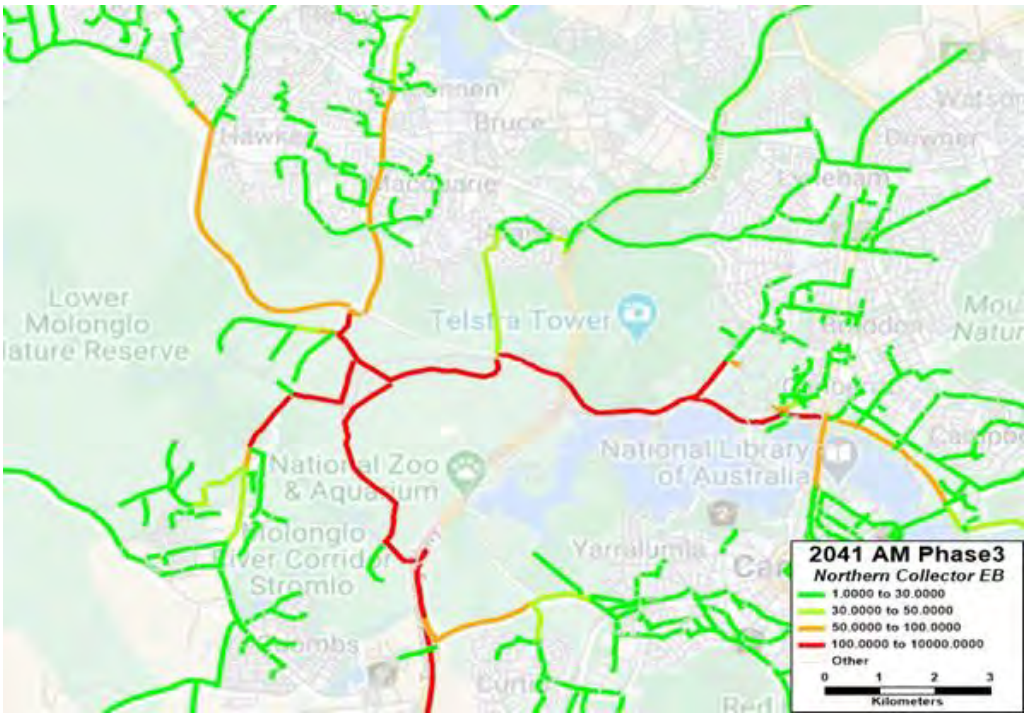


Project Option 2

Figure B.11 Northern Collector – Westbound

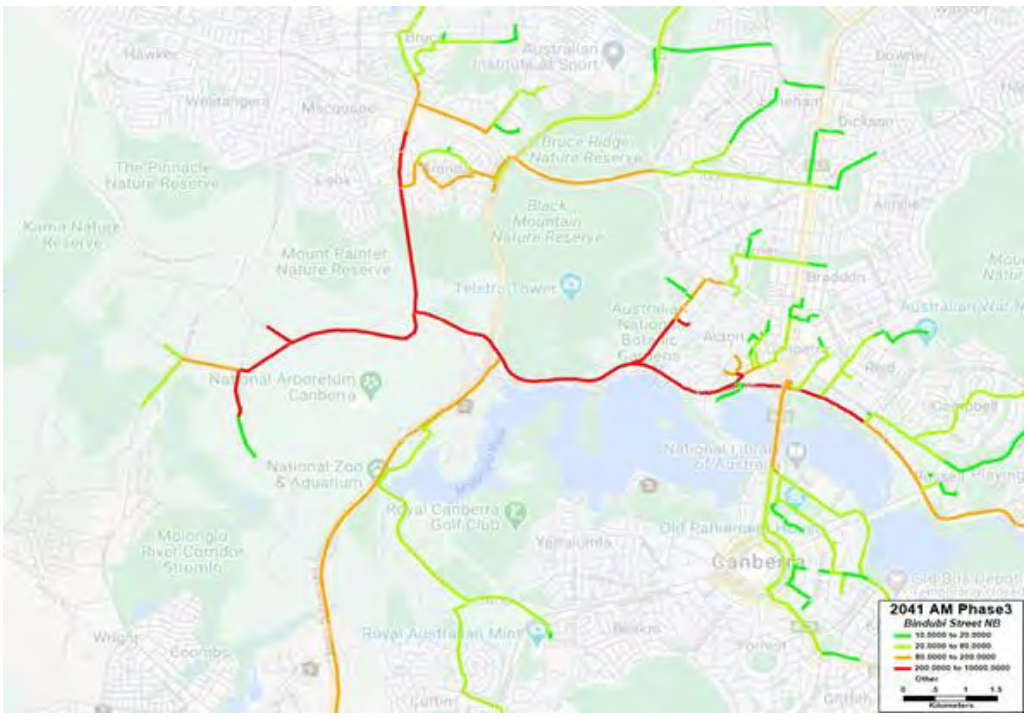


Project Option 1

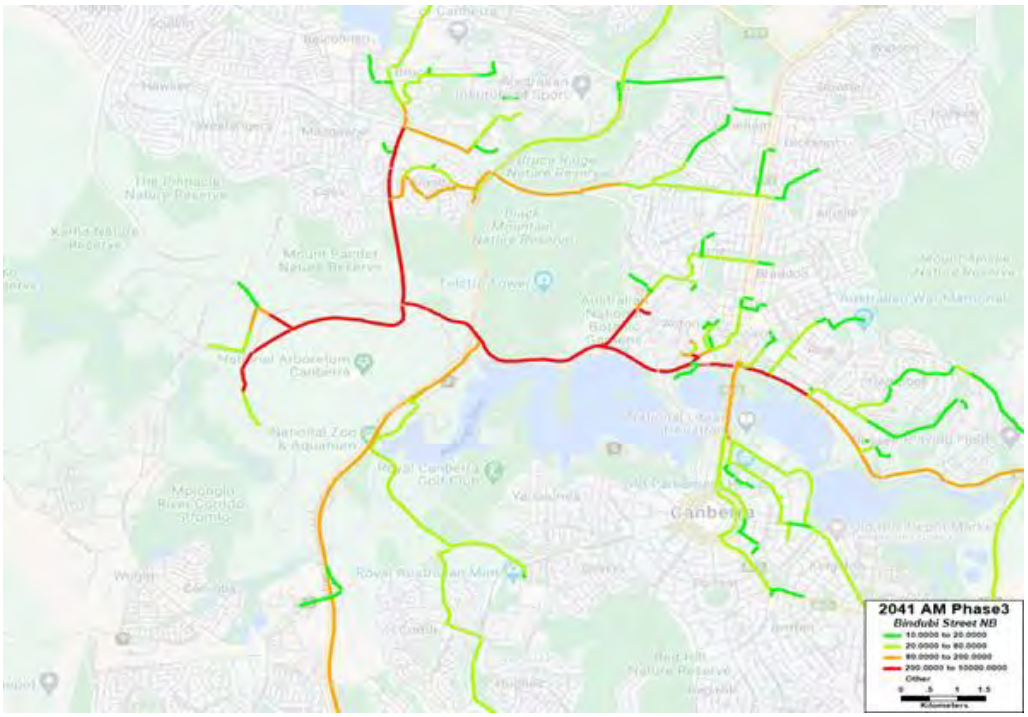


Project Option 2

Figure B.12 Northern Collector – Eastbound

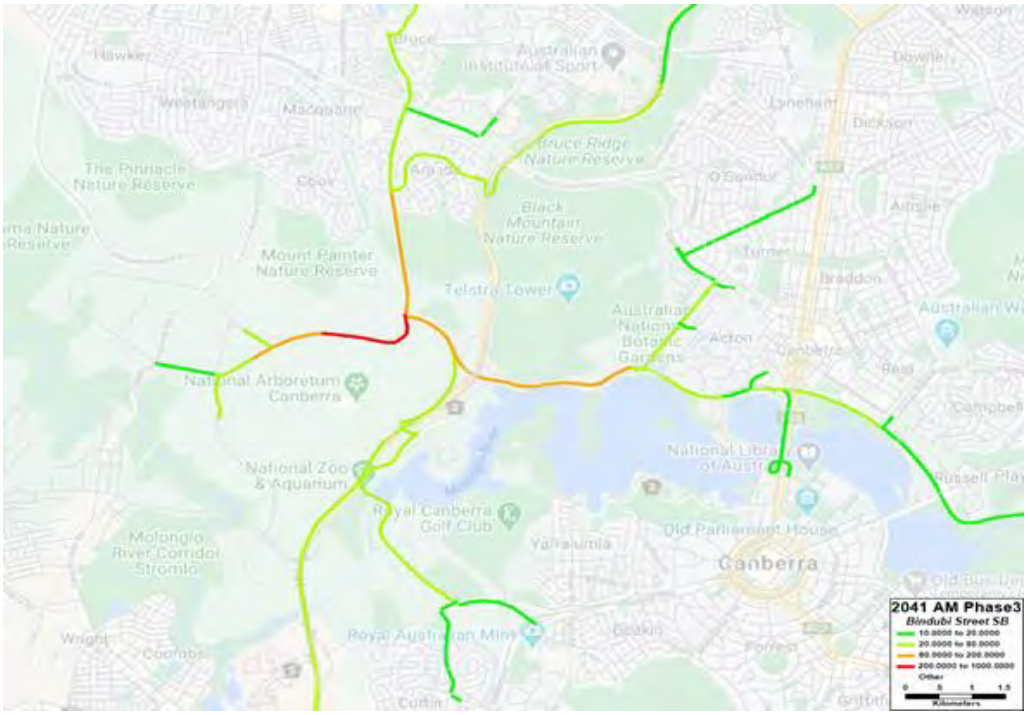


Project Option 1

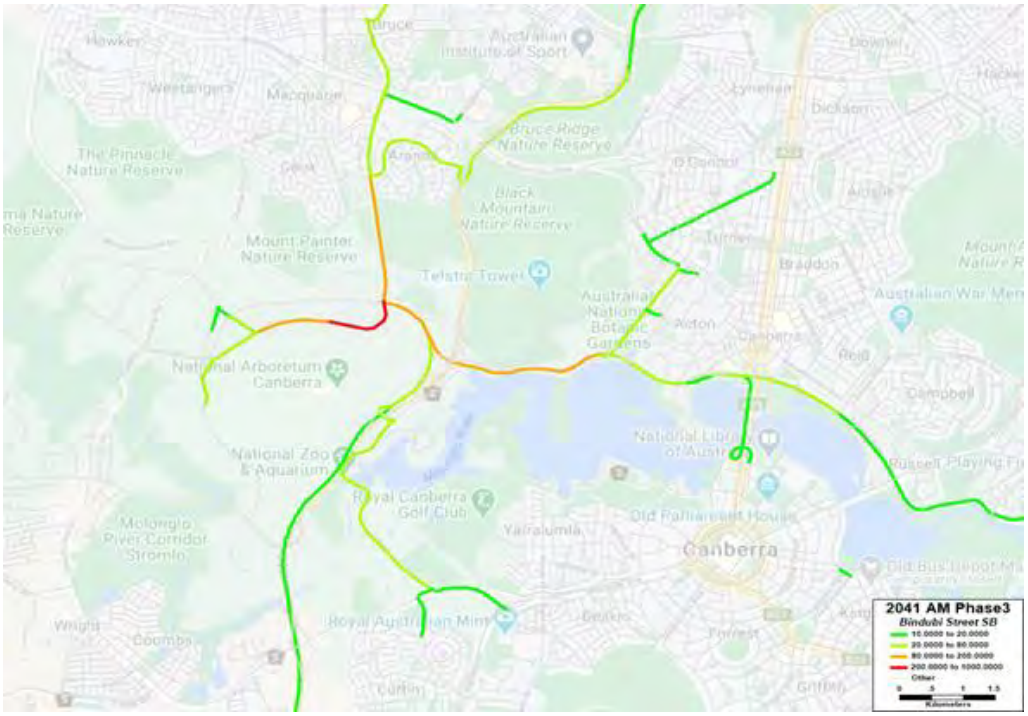


Project Option 2

Figure B.13 Bindubi Street extension – Northbound

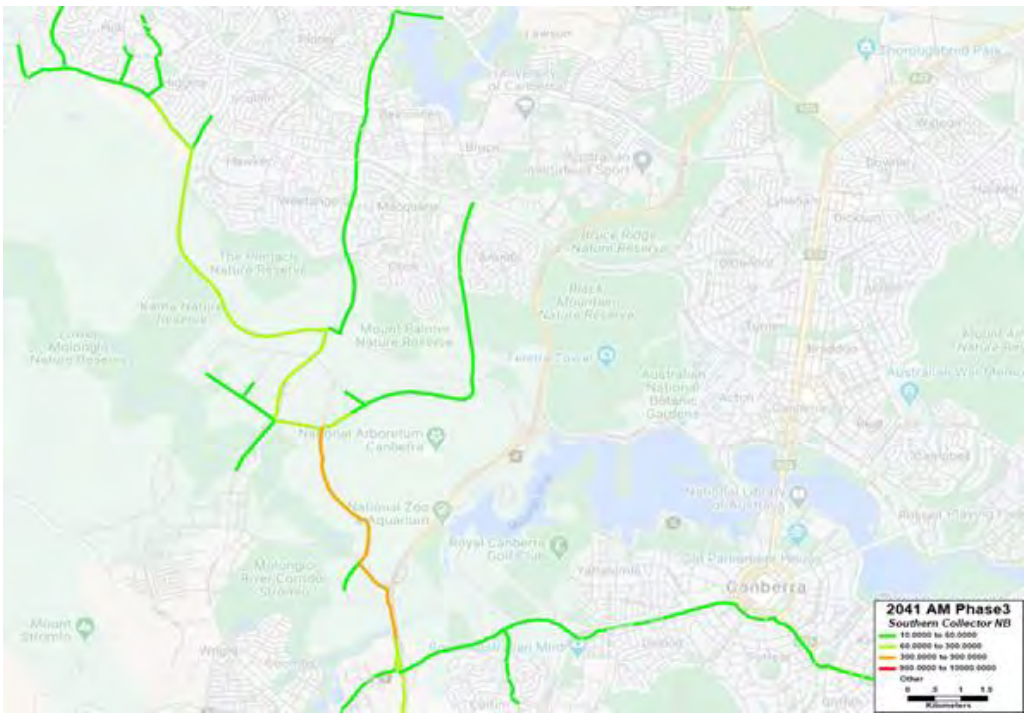


Project Option 1

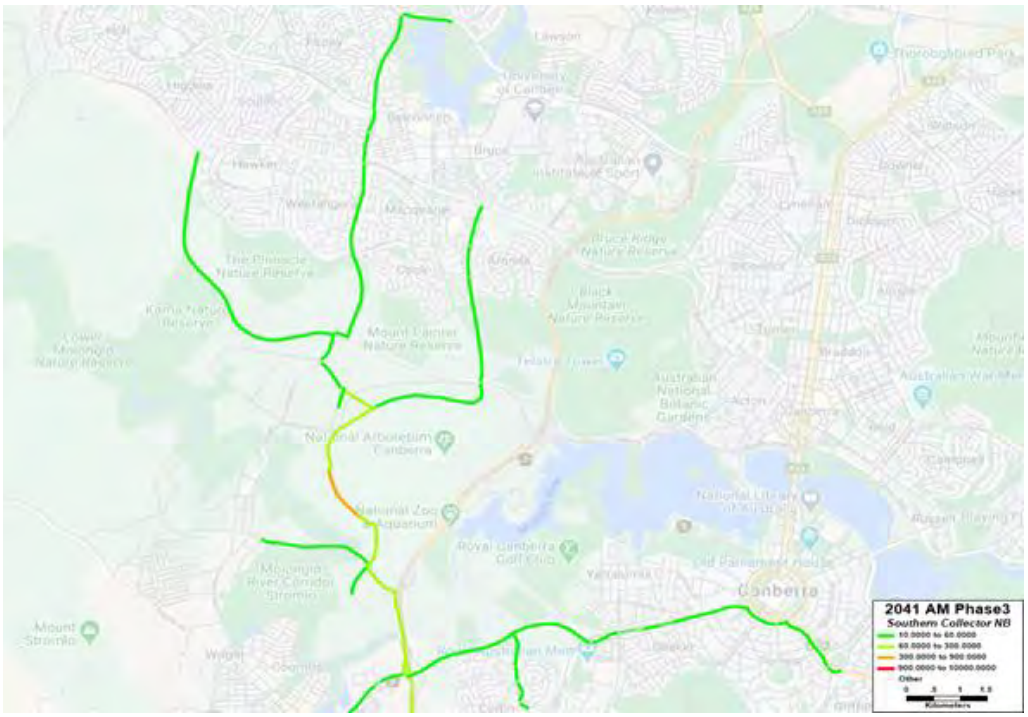


Project Option 2

Figure B.14 Bindubi Street extension – Southbound

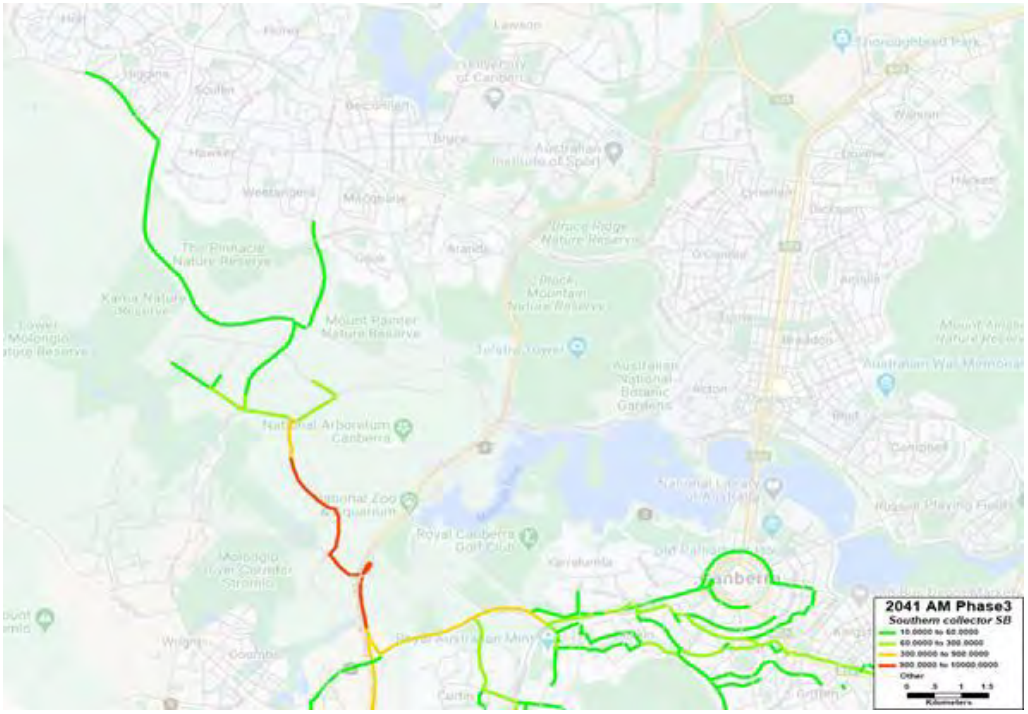


Project Option 1

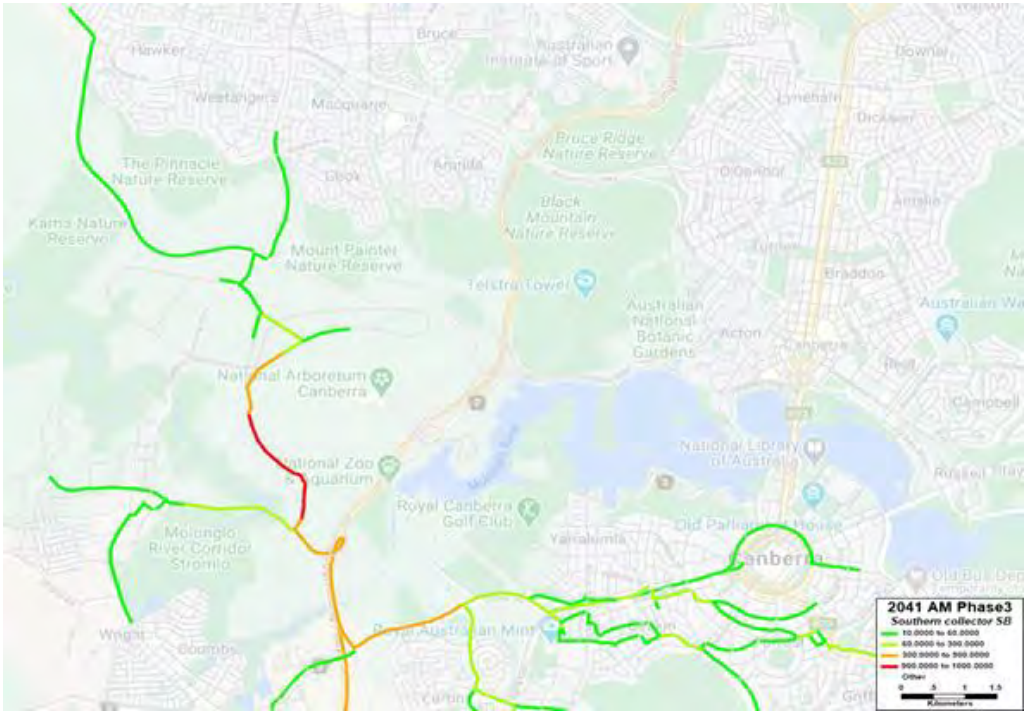


Project Option 2

Figure B.15 Southern Collector – Northbound



Project Option 1



Project Option 2

Figure B.16 Southern Collector – Southbound

B4 ROAD USAGE

The road usage in terms of spare capacity of road network is analysed to identify any capacity augmentation in the study area for the year 2041. Below tables compares the spare capacity amongst base and both the options.

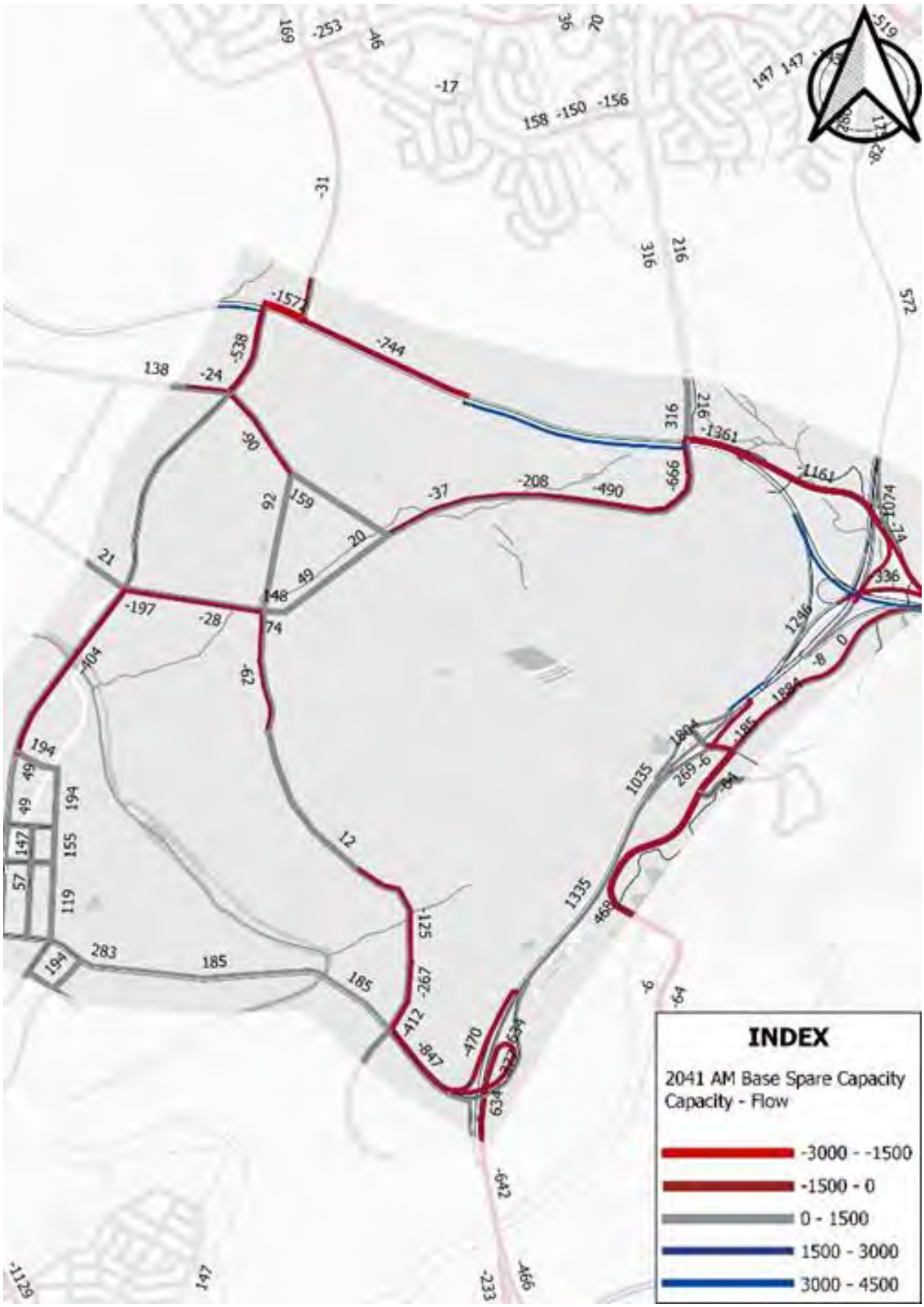


Figure B.17 Road usage – Base Case – AM Peak

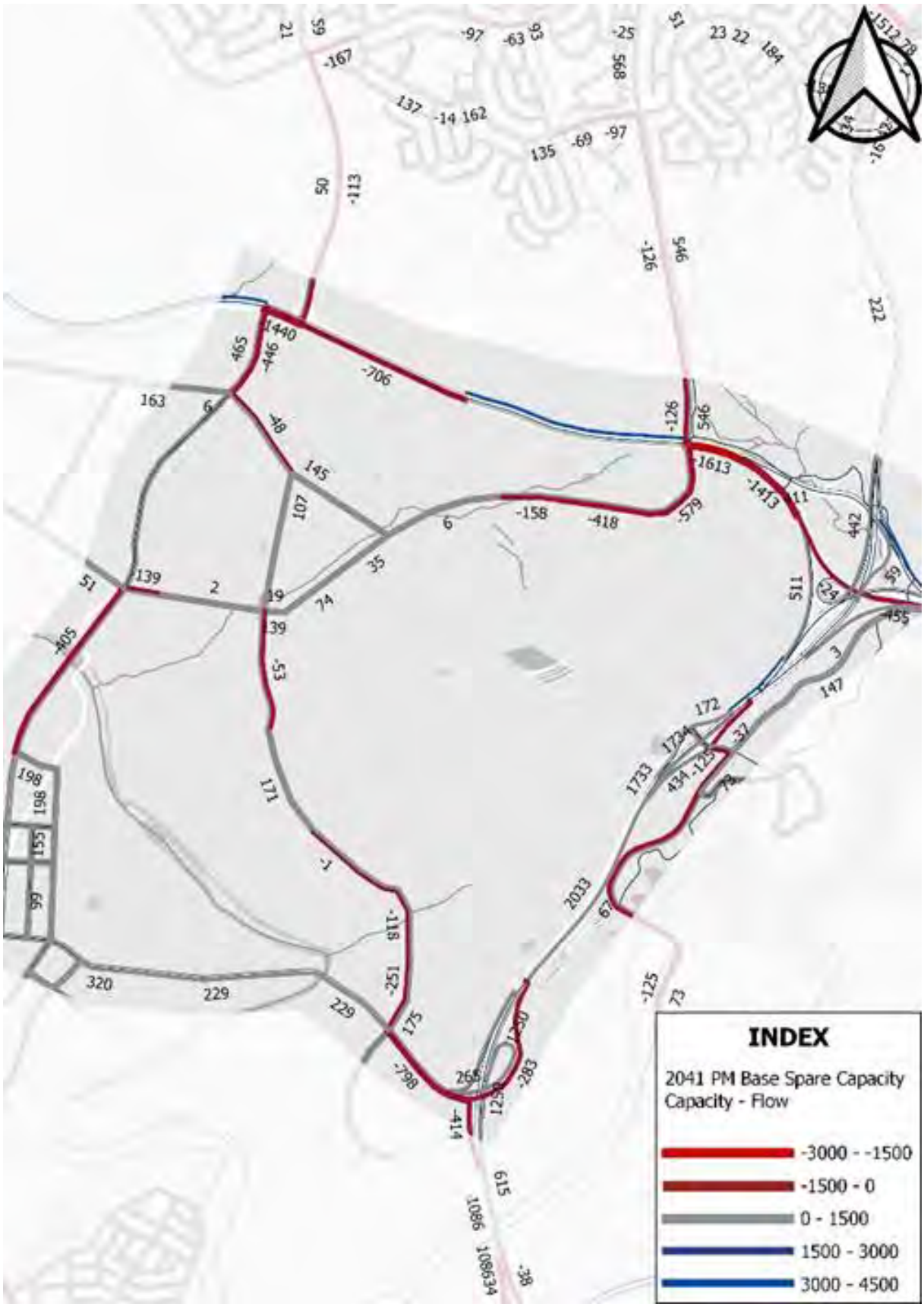


Figure B.18 Road usage – Base Case – PM Peak

Figure B.19 Road usage – Project Option 1 – AM Peak

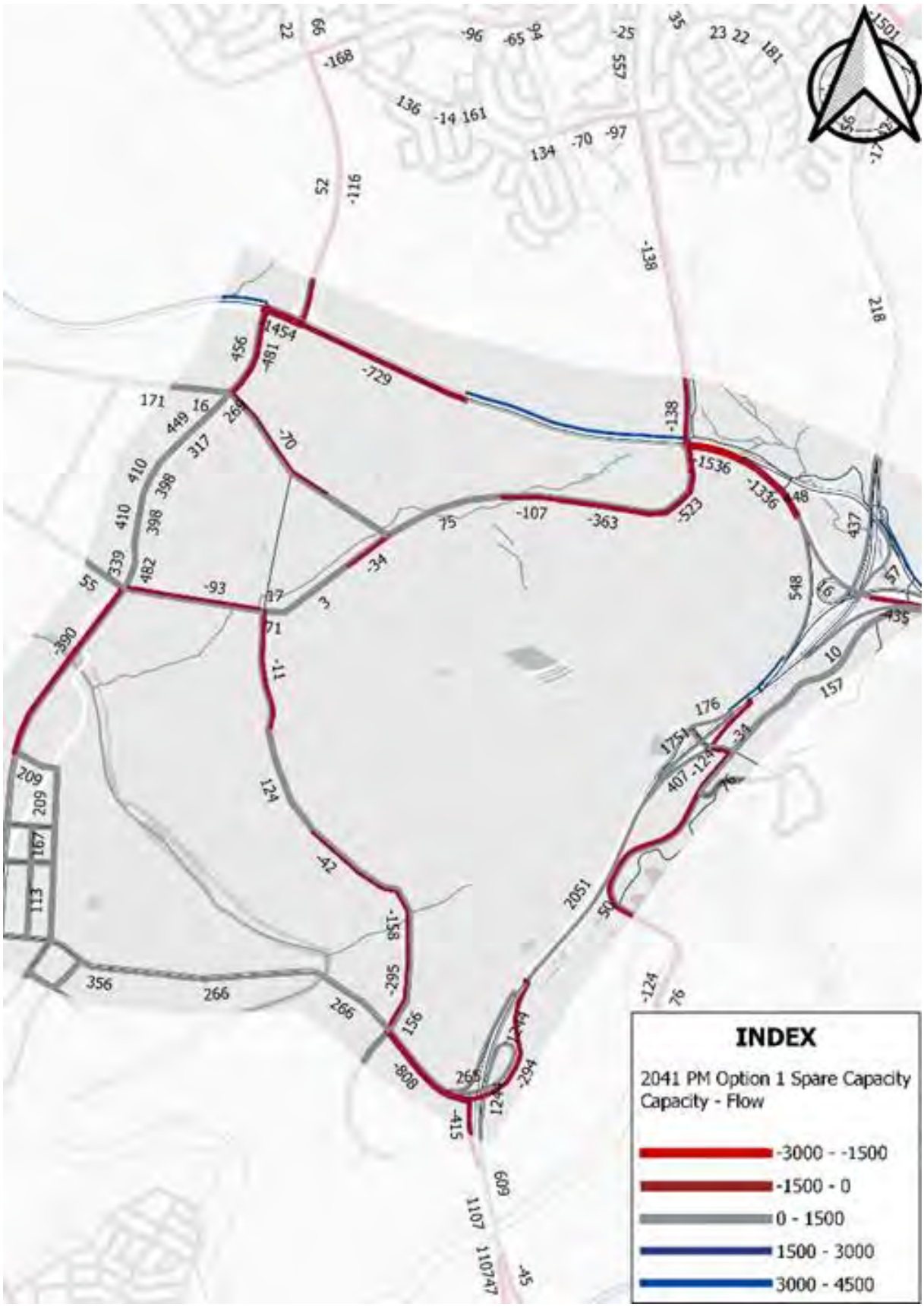


Figure B.20 Road usage – Project Option 1 – AM Peak

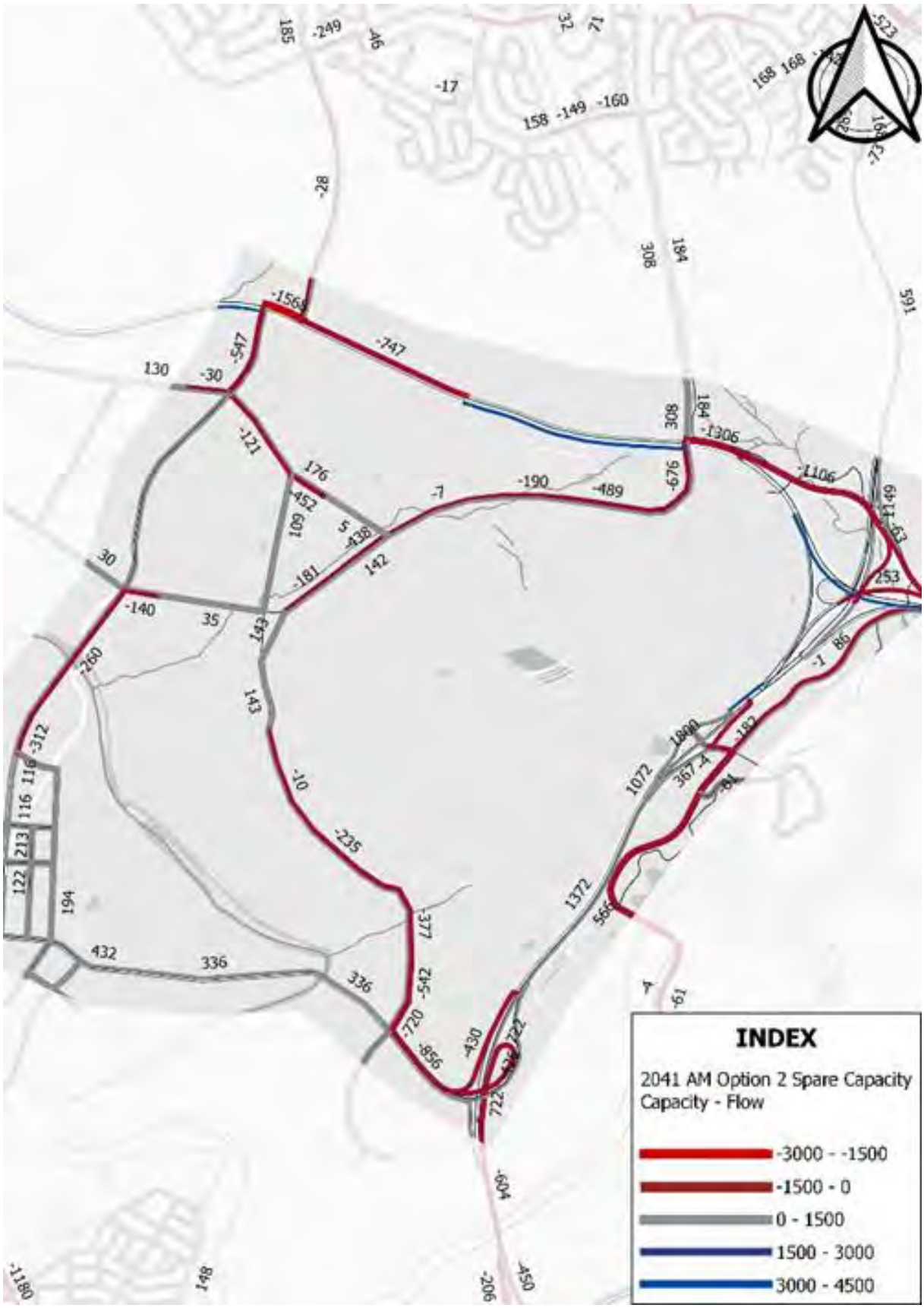


Figure B.21 Road usage – Project Option 2 – AM Peak

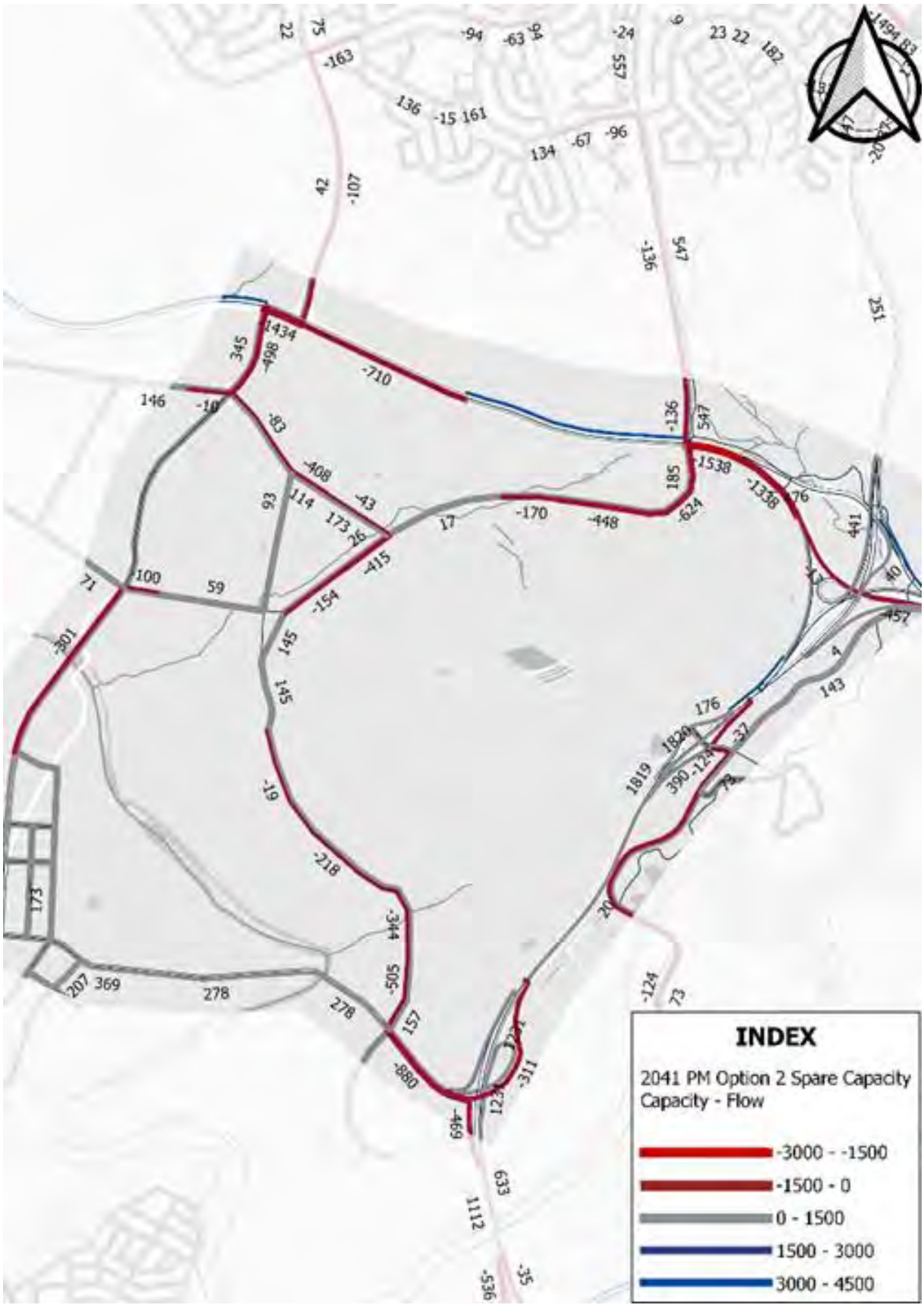


Figure B.22 Road usage – Project Option 2 – PM Peak

B5 NETWORK STATISTICS

Table B.5 Comparison of network statistics – AM Peak

STATISTIC	BASE	OPTION 1	OPTION 2
Person Trip Total	209,600	209,600	209,600
Total PT Trips	24,094	24,192	24,349
Total Car Trips	143,784	143,737	143,562
Total Bike Trips	13,076	13,087	13,115
Park and Ride Demand	25,267	25,099	24,207
Park and Ride Capacity	863	863	863
Total PT Mode Split (%)	11.5	11.54	11.62
Total Bicycle Mode Split (%)	6.24	6.24	6.26
Auto Vehicle Kilometres Travelled	1,804,179	1,803,302	1,800,080
Auto Vehicle Hours Travelled	65,402	65,596	65,579
Auto Average Speed	27.59	27.49	27.45
Auto Average Trip Length (km)	12.55	12.55	12.54
Auto Average Trip Time (minutes)	27.29	27.38	27.41
Bicycle Vehicle Kilometres Travelled	81,448	81,471	81,104
Bicycle Vehicle Hours Travelled	1,858	1,861	1,852
Bicycle Average Speed	43.85	43.77	43.79
Bicycle Average Trip Length	15.27	15.29	15.09

Table B.6 Comparison of network statistics – PM Peak

STATISTIC	BASE	OPTION 1	OPTION 2
Person Trip Total	191,120	191,120	191,120
Total PT Trips	18,872	19,008	18,842
Total Car Trips	142,288	142,192	142,348
Total Bike Trips	11,204	11,187	11,233
Park and Ride Demand	11	11	11
Park and Ride Capacity	863	863	863
Total PT Mode Split (%)	9.87	9.95	9.86
Total Bicycle Mode Split (%)	5.86	5.85	5.88
Auto Vehicle Kilometres Travelled	1,747,329	1,745,192	1,747,096
Auto Vehicle Hours Travelled	51,708	51,644	52,556
Auto Average Speed	33.79	33.79	33.24
Auto Average Trip Length (km)	12.28	12.27	12.27
Auto Average Trip Time (minutes)	21.8	21.79	22.15
Bicycle Vehicle Kilometres Travelled	110,243	110,154	110,690
Bicycle Vehicle Hours Travelled	2,760	2,757	2,772
Bicycle Average Speed	39.94	39.95	39.93
Bicycle Average Trip Length	13.49	13.51	13.5

APPENDIX F

NOISE ASSESSMENT REPORT

Design
for a better
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ENVIRONMENT, PLANNING AND SUSTAINABLE DEVELOPMENT DIRECTORATE

MOLONGLO EAST PLANNING AND INFRASTRUCTURE STUDY

PRELIMINARY TRANSPORT NOISE IMPACT ASSESSMENT

MARCH 2021

Question today
Imagine tomorrow
Create for the future

Molonglo East Planning and Infrastructure Study
Preliminary transport noise impact assessment

Environment, Planning and Sustainable Development Directorate

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REV	DATE	DETAILS
A	28/01/2021	Conceptual traffic noise report
B	05/03/2021	Final

	NAME	DATE	SIGNATURE
Prepared by:		05/03/2021	
Reviewed by:		05/03/2021	
Approved by:		05/03/2021	

TABLE OF CONTENTS

1 PROJECT BACKGROUND

This report summarises the transport noise assessment to support the Molonglo 3 East Planning and Infrastructure Study. This preliminary assessment addresses the potential road noise impact on future residential receivers due to existing and future major road corridors as well as a possible public transit corridor. This assessment has been undertaken in general accordance with:

- Roads ACT Noise Management Guidelines (NMG).
- NSW Rail Infrastructure Noise Guideline (RING).
- Single Dwelling Housing Development Code (SDHDC).
- Multi Unit Housing Development Code (MUHDC).

In addition, project outcomes from other recent residential subdivisions in terms of road traffic noise management strategies have also been considered in this assessment.

1.1 STUDY AREA

The Project Study Area is illustrated in Figure 1.1, being the area located east of John Gorton Drive, west of the National Arboretum and Tuggeranong Parkway, north of the Molonglo River and south of William Hovell Drive. The site is approximately 6.5 kilometres from the Canberra city centre. The developable area of Molonglo 3 East is approximately 480 hectares. Preliminary land use and future development conceptual planning has been undertaken for the study area to achieve a target of up to 9,900 dwellings based on the contours, topographic features, and known infrastructure constraints.

Figure 1.1 Study location

2 PLANNING REQUIREMENTS

The relevant noise criteria applicable to the project site have been established in accordance with the following documents.

2.1 ROADS ACT NOISE MANAGEMENT GUIDELINES

Proposed noise sensitive developments located adjacent to arterial or major collector roads in the ACT are to be planned, designed, and constructed in line with the Noise Management Guidelines (NMG).

The NMG provides road traffic noise planning guideline levels for new developments based on the land / building usage. Based on our interpretation of the NMG, the proposed project is classified as 'New Developments on Existing Roads' and the noise planning guidelines applicable are as follows:

- External noise levels for proposed noise sensitive residential developments located adjacent to arterial or major collector roads (based on existing conditions at the receiver):
  - 60 dBA daytime $L_{eq,\ 15\text{-}hour}$. from 7 am to 10 pm (1 metre from façade).
  - 55 dBA $Leq_{,\ 9\text{-}hour}$ from 10 pm to 7 am (1 metre from façade).

OR

- Internal noise levels that meet the Australian Standard AS 2107.
- Internal noise levels provided in AS 2107:2000 relevant to the Whitlam development are outlined in Table 2.1

Table 2.1 AS2107:2000 relevant internal noise levels

OCCUPANCY TYPES	AS2107 SATISFACTORY DESIGN SOUND LEVEL		PROPOSED PROJECT ASSESSMENT LEVEL
	RECOMMENDED	MAXIMUM	
Sleeping areas[1]	30 dBA	40 dBA	≤35 dB $L_{Aeq\text{-}9h}$ (night-time)
Living areas[1]	35 dBA	45 dBA	≤40 dB $L_{Aeq\text{-}15h}$ (daytime)

(1) Based on recommended design targets for the category of *Houses and apartments near major road*.

AS2107 uses the L_{Aeq} descriptor, which describes a steady state sound level of equivalent energy to the time varying noise level over a given period. The time period used for assessment purposes should be representative of the time period that the building will be in use. This assessment will be based on the predicted $L_{Aeq\text{-}15min}$ for daytime (7 am to 10 pm) and night time (10 pm to 7 am) as the basis for assessing living areas and bedrooms respectively.

The sound transmission loss performance of the façade of the development shall be designed to achieve the recommended internal noise levels shown in Table 2.1.

2.2 NSW RAIL INFRASTRUCTURE NOISE GUIDELINE

It is understood that dedicated inter-town public transit corridor has been identified for the Project Area that may take the form of a bus or light rail infrastructure. The NMG is expected to be applicable if the transit corridor takes the form of a bus service. If a light rail system is adopted, it is expected that RING will be applicable per stage 1 light rail in the ACT. This document presents noise trigger levels for a project. If these levels are likely to be exceeded as a result of the rail development, noise mitigation measures would need to be considered.

Trigger levels are presented for new rail developments and re-developments of existing rail lines.

The RING recommends the following airborne noise criteria for redeveloped rail line:

Table 2.2 Airborne residential noise trigger levels for redevelopment of new light rail line

TYPE OF DEVELOPMENT	NOISE TRIGGER LEVELS (EXTERNAL) dBA	
	Day (7am to 10pm)	**Night (10pm to 7am)**
New light rail line developments	Precited rail noise levels exceed:	
	60 $L_{Aeq,\ 15\text{-}hour}$	50 $L_{Aeq,\ 9\text{-}hour}$
	80 L_{Amax} (1)	

(1) LAmax refers to the maximum noise level not exceeded for 95 per cent of rail pass-by events

In assessing noise levels emitted by the project at residential receiver locations, the outdoor noise level to be addressed is that prevailing at a location 1 metre in front of the most affected building facade. Any 'internal noise level' refers to the noise level at the centre of the habitable room that is most exposed to the noise source and applies with windows open sufficiently to provide adequate ventilation.

2.3 OPERATIONAL VIBRATION CRITERIA – LIGHT RAIL

Vibration criteria have been determined in accordance with the NSW *Assessing Vibration: A Technical Guideline*; these are summarised in Table 2.3.
Rail traffic is generally classified as an intermittent vibration source.

Table 2.3 Vibration criteria for rail traffic

RECEIVER TYPE	TIME PERIOD	INTERMITTENT VIBRATION DOSE LEVEL (VDV MS1.75)	
Residential	Day (7am to 10pm)	0.2	0.4
	Night (10pm to 7am)	0.13	0.26

2.4 ACT HOUSING DEVELOPMENT CODES

With regard to potential noise intrusion to the proposed residential units, Rule 67 of the MUHDC and Rule 42 of the SDHDC states that:

Where a block has one or more of the following characteristics:

1 *identified in a precinct code as being potentially affected by noise from external sources*

2 ***adjacent to a road carrying or forecast to carry traffic volumes greater than 12,000 vehicles per day***

3 *located in a commercial zone*

4 *adjacent to a commercial or industrial zone*

dwellings should be constructed to comply with the relevant sections of all of the following:

5 *AS/NZS 2107:2000 – Acoustics – Recommended design sound levels and reverberation times for building interiors (the relevant satisfactory recommended interior design sound level)*

6 *AS/NZS 3671 – Acoustics – Road Traffic Noise Intrusion Building Siting and Design*

For other than road traffic noise, compliance with this rule is demonstrated by a noise management plan prepared by a member of the Australian Acoustical Society with experience in the assessment of noise, and endorsed by the EPA. For

other than road traffic noise, the noise level immediately adjacent to the dwelling is assumed to be the relevant noise zone standard specified in the ACT Environment Protection Regulation 2005.

For road traffic noise, compliance with this rule is demonstrated by an acoustic assessment and noise management plan, prepared by a member of the Australian Acoustical Society with experience in the assessment of road traffic noise, and endorsed by the ACT Government entity responsible for Transport Planning.

As emboldened in the quotation above, the proposed development triggers Rule 67 by being identified as being located adjacent to a road carrying traffic volumes greater than 12,000 vehicles per day. Details of the predicted vehicle count on the arterial roads around the Molonglo 3 East site are presented later in this report. It should be noted that AS2107:2000 currently referenced in the SDHDC and MUHDC has been superseded by a revised issue dated 2016. The older version was however referenced in this NMP as per required by the SDHDC and MUHDC.

2.5 ROAD TRAFFIC NOISE INTRUSION

AS 3671:1989 *Acoustics – Road traffic noise intrusion – Building siting and construction* (AS3671) is concerned with road traffic noise intrusion to buildings near to major roads. AS3671 provides guidelines for determining necessary building envelope constructions to achieve the internal noise levels recommended in AS2107.

Table 2.4 outlines the recommended building construction categories required to achieve satisfactory internal noise levels for a residential building, as per AS2107 (see Table 2.1). This is a guideline only, and the actual reduction afforded will depend upon the frequency content of the noise. Where significant low frequency noise is evident, the guidelines in AS3671 may not be sufficient.

Table 2.4 AS3671 residential building construction categories

BUILDING TYPE	RESIDENTIAL BUILDING CONSTRUCTION CATEGORY			
	Category 1	Category 2	Category 3	Category 4
External road traffic noise level, dB L_{Aeq}	≤45	>45 ≤60	>60 ≤75	>75
Most onerous proposed project assessment level, dB L_{Aeq}	Sleeping areas ≤35	Sleeping areas ≤35	Sleeping areas ≤35	Sleeping areas ≤35
Resulting necessary Traffic Noise Reduction (TNR)	≤10	>10 ≤25	>25 ≤35	>40

According to AS3671, the categories referenced in Table 2.4 are:

- Category 1 – Standard construction: openings including open windows may comprise up to 10% of the exposed façade.
- Category 2 – Standard construction except for lightweight elements or all glass facades (both of which require acoustic advice). Windows, doors and other openings should be closed.
- Category 3 – Special construction as advised in the Standard. Windows, doors and other openings should be closed.
- Category 4 – Special acoustic advice should be sought.

3 NOISE ASSESSMENT

To help inform possible project constraints due to road traffic noise intrusion, high level computer noise modelling has been conducted based on available information. This has been conducted using the SoundPLAN (version 8.2) acoustic prediction software, using the Calculation of Road Traffic Noise (CoRTN) algorithm.

3.1 MODELLED PARAMETERS – ROADS

The modelled parameters and information which will contribute to the establishment of the noise model and execution of the noise predictions are summarised in Table 3.1. The model assesses the traffic noise impact of proposed rows of residential buildings with direct frontages to the arterial road, as well as the required setback distance from the road of subsequent building rows, in order to meet the external traffic noise level criteria.

Table 3.1 Noise model parameters

ITEM	DESCRIPTION
3-dimensional ground topography data for the future design ground level of the assessment area	Data from https://elevation.fsdf.org.au/ downloaded January 2021
Roads covered by the modelling/ assessment	Roads external to the Project: John Gorton Drive, William Hovell Drive, Tuggeranong Parkway, future East West Arterial Roads internal to the Project: Northern Collector, Southern Collector(1) and Bindubi Street Extension Link between the Northern and Southern Collector past the Group Centre is excluded from modelling due to its low volume and low speed. As noted in MUHDC, roads carrying <12000 vehicles per day typically does not trigger a noise intrusion assessment
CAD drawings indicating currently proposed layout of the subdivision	No detailed subdivision layout or future road centerlines available. Assessment based on the preferred structure plan as identified in Figure 3.1 and manual tracing of road alignment based on aerial imagery
CAD drawings indicating the centrelines of the proposed collector road, Bindubi Street extension, East West Arterial	
Traffic volume and mix forecast along the proposed arterial road	(1) It is acknowledged that the collector roads internal to the Project are forecasted to carry <12000 vehicles and technically does not trigger a noise assessment. It is however included in the high level noise modelling to assess the associated project risk. Table 3.2
Sign-posted speed limit	
Design year for noise assessment purposes	Year 2041
Road pavement type	Dense graded asphalt
Percentage of 18-hour volume over 24-hour volume	94%
Percentage of heavy vehicles (including bus and truck traffic)	Up to 3% on collector roads internal to the Project Up to 5% on arterial roads external to the Project

Correction factor to account for potential façade reflection at 1 m in front of building façade	+2.5 dB

(2) It is acknowledged that the collector roads internal to the Project are forecasted to carry <12000 vehicles and technically does not trigger a noise assessment. It is however included in the high level noise modelling to assess the associated project risk.

Table 3.2 Traffic forecast and speed

ROAD	AM PEAK VOLUME	ESTIMATED DAILY VOLUME	SPEED KM/H
William Hovell Drive, west of Bindubi Street	3002	30020	80
William Hovell Drive, east of Bindubi Street	7096	70960	80
Bindubi Street extension	1375	13750	60
Northern Collector	988	9880	50
Southern Collector	833	8330	50
John Gordon Drive	3249	32490	80
Tuggeranong Parkway	9548	95480	100
East West Arterial	3203	32030	80
Link between the Northern and Southern Collector past the Group Centre	687	6870	40

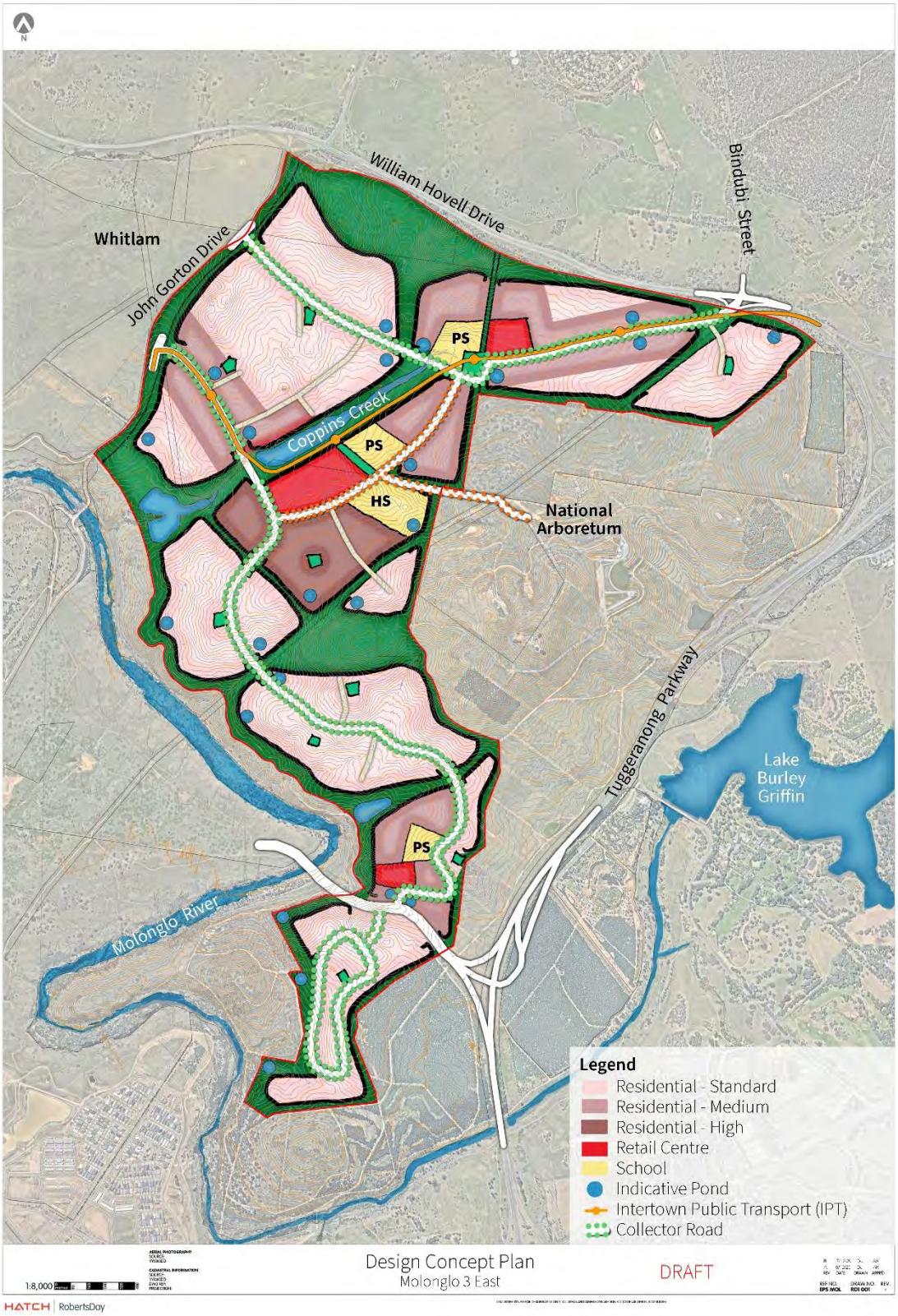


Figure 3.1 Currently preferred structure plan

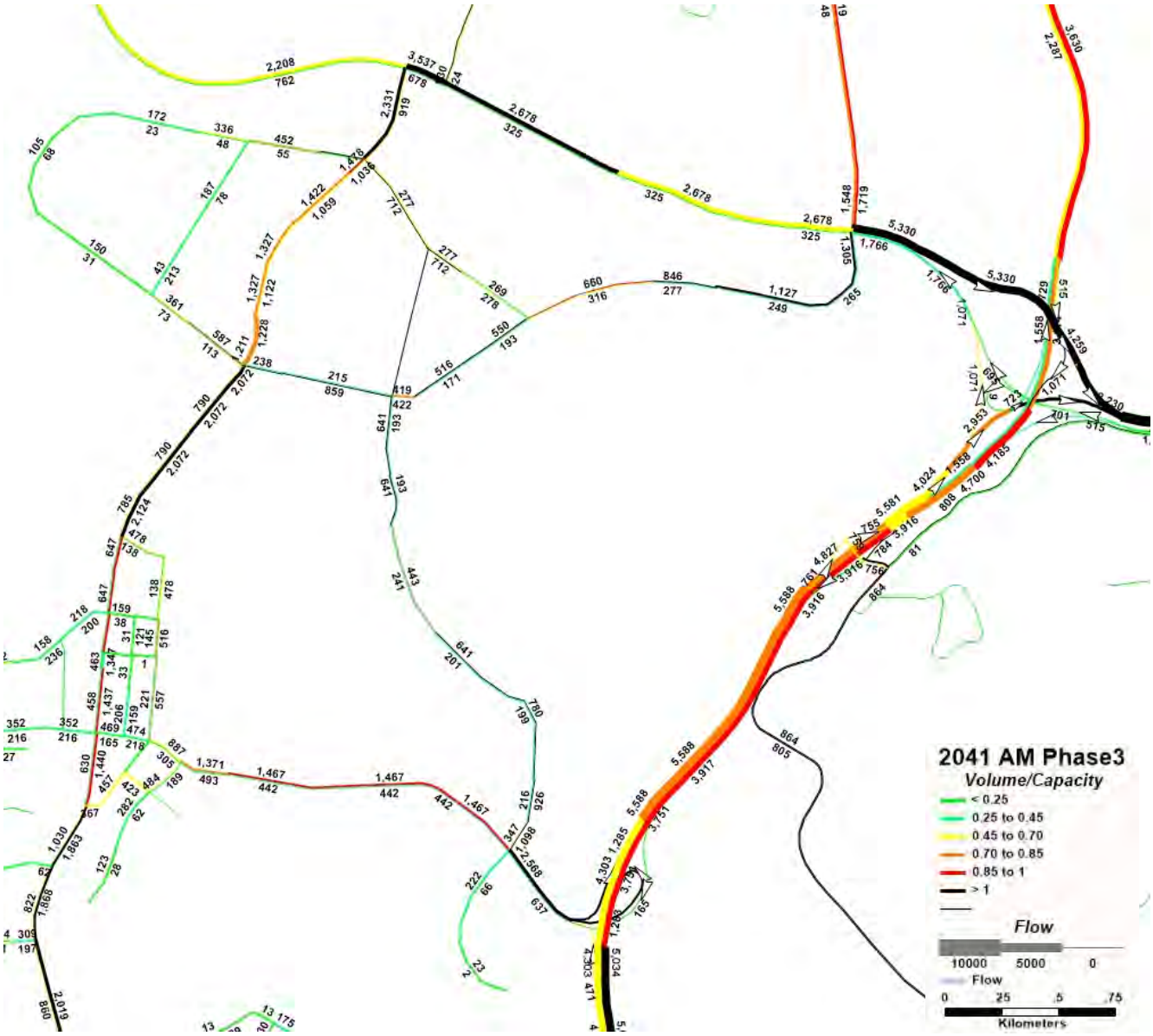
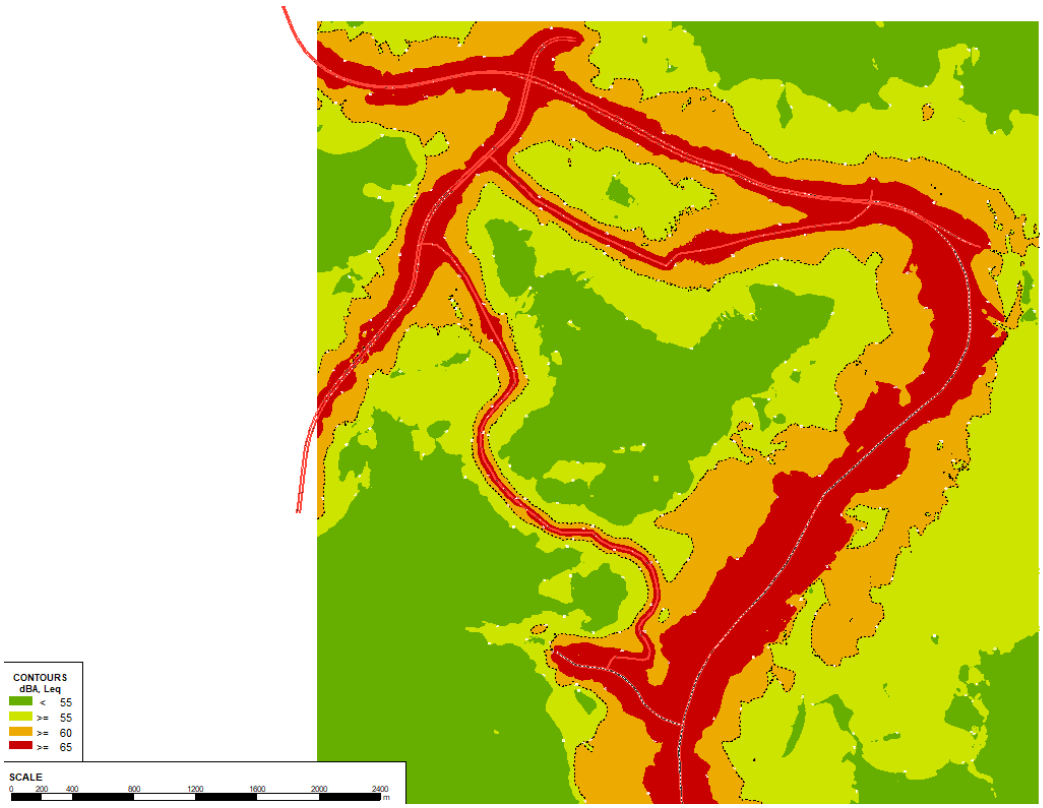


Figure 3.2 AM Peak traffic forecast

3.2 ROAD NOISE PREDICTION RESULTS

Noise contour maps were calculated at 10 metre grid spacing and 1.5 meters above ground to provide a graphical representation of the road traffic noise impact on Molonglo 3 East. The 60 dBA $L_{eq,\ 15\text{-}hour}$ contour lines, corresponding to the day time planning guidelines discussed in Section 2.1, is plotted graphically and presented in Appendix A and includes noise reflected from building facades. The day time condition is expected to represent the worst case scenario of road noise impact. The night time condition is therefore not assessed further in this report.

The results of the noise contour plots indicate the estimated area along major roads where the external road traffic noise planning guideline levels are likely to be exceeded (i.e. within the > 60 dBA daytime $L_{eq,\ 15\text{-}hour}$, Figure 3.3). It is observed that the primary road traffic noise intrusion risk is dominated by roads external to the possible Molonglo 3 East development area i.e. John Gorton Drive, William Hovell Drive, Tuggeranong Parkway and the future East West Arterial. Based on these results, discussion of road noise mitigation strategies for future residential receivers are provided in Section 4.



(Note: Areas covered in Orange and Red exceed NMG external road noise planning guideline level)

Figure 3.3 Preliminary indicative day time L_{Aeq} noise contour

3.3 INTER-TOWN PUBLIC TRANSIT CORRIDOR

As previously discussed, the following options of the public transit corridor will be assessed differently:

- Bus infrastructure assessed per NMG:
  - Key factors that influence the associated noise impact include traffic volume, speed, road surface, elevation, distance to nearest planned receivers and topography.
- Light rail infrastructure per RING:
  - Key factors that influence noise and vibration impact include service frequency, vehicle types, speed profile, rail discontinuities, curving and flanging noise, warning bells.
  - If a light rail infrastructure is proposed, a comprehensive noise and vibration assessment is expected required as part of an Environment Impact Statement (EIS), which will likely address key noise and vibration impact constraints and mitigation consideration.

As planning process progresses and when the form of the public transit system is confirmed, this will be subject to further assessment.

4 MITIGATION DISCUSSION

This section provides a discussion on possible mitigation options available to reduce the potential road noise impact on future residential developments.

These are investigated in the following order, which is generally the preferred order during such investigation:

- Planning of residential subdivision/ set back distances (generally most preferable and recommended first).
- Mitigation at the source.
- Mitigation along the noise transfer path.
- Mitigation at the receiver (generally least preferable).

4.1 PLANNING OF THE RESIDENTIAL SUBDIVISION

During the earliest stages of planning of the new residential subdivisions directly adjacent to the subject transport corridors, it is recommended that considerations be given to providing the setback distances where possible. Typical approaches may include (but not limited to) positioning of landscape buffer zones, internal access roads or the like between the arterial road and the nearest residential blocks and planning of less noise-sensitive land uses on areas closest to the arterial road. With regard to light rail infrastructure, as a rough indication based on the EIS for stage 1, a setback distance of at least 100 metres between the light railway and sensitive receivers is required to meet the relevant trigger levels.

However, increasing the setback distance will in some instances notably reduce the development yield of the proposed subdivisions. It is therefore typically not feasible to solely rely on setback distances to manage road and rail noise impact.

4.2 MITIGATION AT NOISE SOURCE

For a road noise source, this option typically involves strategies such as using a quieter road pavement type or reducing the speed limit. It should be noted that a quieter road pavement type has the potential to provide up to 2 dB in noise reduction (e.g. when comparing the use of low noise Stone Mastic Asphalt against Dense Graded Asphalt). This option has however been previously rejected by Transport Canberra and City Services Directorate due to requirement to maintain the pavement surface in future maintenance.

From an acoustic perspective, it is recommended further consultation be carried out with the relevant stakeholders to explore feasibility of this option, including discussing option of resealing the existing arterial roads (John Gorton Drive, William Hovell Drive and Tuggeranong Parkway), as well as consider this for the future East West Arterial.

It should be noted that quieter road pavement is not recommended for the collector roads internal to the Molonglo 3 East development area as the effectiveness will be limited as speed limits are ≤ 60 km/hr.

From a light rail perspective, during the relevant noise and vibration impact assessment process, considerations vehicle types, trackform, speed profile etc. are expected to be undertaken to ensure all feasible and reasonable source control measures are implemented. Assuming that a planning process for a light rail system will occur after development of the Molonglo 3 East project, the light rail project will generally be considered responsible in providing noise and vibration mitigation.

4.3 MITIGATION ALONG THE NOISE TRANSFER PATH

This option typically involves the use of noise barrier(s) to break direct line of sight between the road and traffic and receivers. It should be noted that noise barriers are typically most effective if they are close to the source or the receiver.

The most common types of barriers are typically in the form of solid property boundary fences and/or road-side barriers (earth mound or noise wall). It is however noted that existing underground infrastructure along existing road corridors will likely limit opportunities in implementing noise barriers closer to the road. Where possible, consideration of noise barriers should be carried out in conjunction with other stakeholders along new roads and public transit routes to ensure early provisions are coordinated.

Noise barrier examples in the ACT typically take the form of masonry construction (e.g. Cotter Road stage 2, Clarrie Hermes Drive, Majura Parkway) and lighter weight transparent panels (e.g. Gundaroo Drive duplication).

It is however acknowledged that construction of noise walls has been deemed undesirable from an urban design and estate amenity aspect for nearby Whitlam estate. Earth mounds are however typically considered less intrusive visually and therefore should be further considered. For light rail infrastructure, barriers are also commonly considered to be unsuitable from an urban planning perspective.

4.4 MITIGATION AT THE RECEIVER

This mitigation strategy would aim to achieve compliance with the internal noise levels specified in Section 2.1. This typically involves strategic configuration of site layout and providing a building envelope with sufficient sound insulation properties. Careful and considered design and planning of the residential development can provide suitable acoustic amenity to future residents.

Recent other new subdivisions in the ACT (e.g. Whitlam and Ginninderry) have proposed mitigation at the receiver as the preferred option, in order to reduce the potential road noise impact and permit the desired urban design along the arterial roads. Accepting an external noise level that is higher than the relevant planning guidelines and providing appropriate internal acoustic amenity through the building envelope design, is generally accepted as an acceptable approach in mitigating the noise impact for dwellings located near a major transport corridor. This is consistent with typical previous approaches in the ACT for both single dwelling and multi-unit sites.

The responsibility to provide mitigation would therefore lie with future developers of the land blocks (as captured by the ACT Single Dwelling Housing Development Code and the Multi Unit Housing Development Code). Future developers should be encouraged to make acoustic considerations during early planning stages. This may include space planning to locate acoustic sensitive spaces (e.g. bedrooms) away from the road and making cost allowances for glazing systems that have higher sound insulation performances. Residential blocks fronting the arterial road or public transit corridors will be most exposed from potential transport noise. However, these buildings will also provide shielding to the dwellings situated behind to allow dwellings in subsequent rows to comply with the planning guidelines for external noise. To facilitate this, the minimum building heights of the most exposed row of dwellings should be determined prior to land release with appropriate planning and development controls applied to those blocks to ensure individual dwelling developers comply with the requirements.

In addition, considerations can be given to preparing Noise Management Plans that provides guidance on building envelope construction for land blocks expected to exceed the external road noise planning guideline levels or light rail noise trigger levels. This approach has been taken for projects such as Whitlam and Ginninderry. This is expected to improve general project outcome and reduce the need for individual acoustic assessment to be undertaken by individual land developers.

4.5 FUTURE FURTHER STUDIES

It should be further noted the assessment reported in this deliverable is high level in nature and that noise and vibration impact due to road, bus, rail (where applicable) will be subject to further detailed assessment as the planning phases of the Molonglo 3 East project progresses (e.g. Estate Development Plans, Development Applications, EIS).

5 CONCLUSIONS

WSP Australia Pty Ltd (WSP) has conducted a transport noise impact assessment as part of the Molonglo 3 East Planning and Infrastructure Study.

A road noise contour map showing indicative noise levels for the 60 dBA $L_{eq, 15\text{-hour}}$ guideline levels have been plotted for reference. This show the potential residential blocks that are most exposed to the arterial road traffic noise without mitigation.

To manage transport noise, it is recommended that the following assessment process be followed:

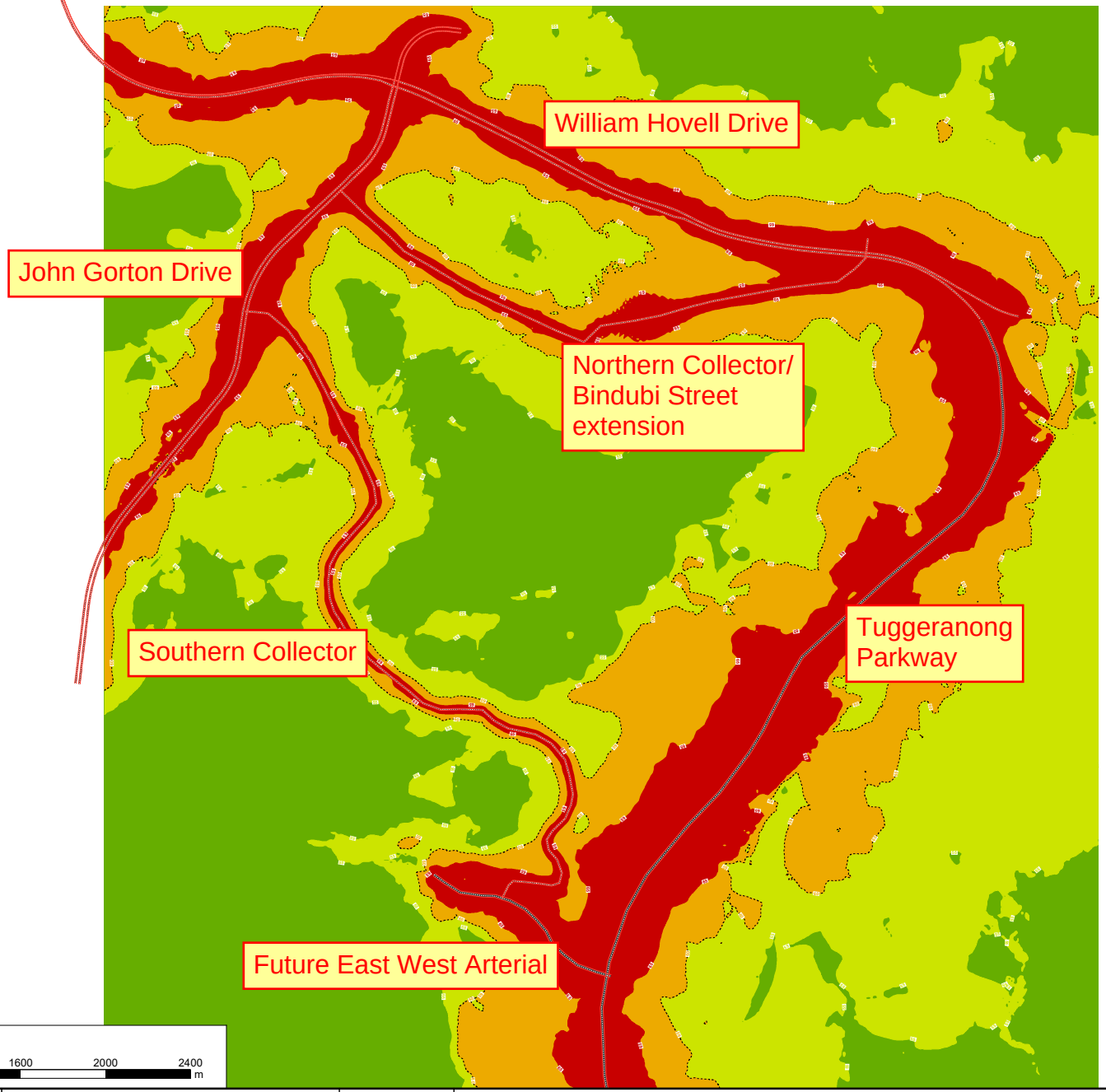
- Planning of residential subdivision/ set back distances (generally most preferable and recommended first).
- Mitigation at the source.
- Mitigation along the noise transfer path.
- Mitigation at the receiver (generally least preferable).

Based on past projects that addresses road traffic noise, it is however understood that mitigation at the receiver has been viewed as the most viable option to reduce the potential road noise impact on future residential developments. This would involve dwelling design of the blocks addressing the assessed noise from the arterial road. This is expected similar to managing possible light rail noise and vibration with the addition of consideration by the light rail project on at-source noise control options.

It is noted that noise treatment at the receiver is consistent with typical previous approaches in the ACT for both single dwelling and multi-unit sites. The responsibility to provide noise mitigation would therefore lie with future developers of the land blocks (as captured by the ACT Single Dwelling Housing Development Code and the Multi Unit Housing Development Code).

APPENDIX A

DAY TIME L_{eq} NOISE CONTOUR MAP



CONTOURS
dBA, Leq

<	55
>=	55
>=	60
>=	65

SCALE

0 200 400 800 1200 1600 2000 2400 m

Date: 1/27/2021	Prediction Algorithm: CORTN
Appendix: A	Prediction Height:
Map Number: 1	Coordinate System: UTM Zone 55 WGS84
Client:	Author:

N

Molonglo 3 East Planning and Infrastructure Study
Preliminary Road Noise Impact Assessment

APPENDIX G

STAKEHOLDER PRESENTATIONS:

1 - BIG IDEAS

Molonglo 3 East

Innovations Workshop

11 May 2020

Session 1

INTRODUCTIONS

WELCOME

INNOVATIONS WORKSHOP FOR THE MOLONGLO 3 EAST PLANNING AND INFRASTRUCTURE STUDY

WSP IN COLLABORATION WITH ROBERTS DAY HAVE BEEN ENGAGED BY EPSDD FOR THE STUDY

THIS WORKSHOP IS A KEY STAKEHOLDER ENGAGEMENT ACTIVITY FOR THE STUDY

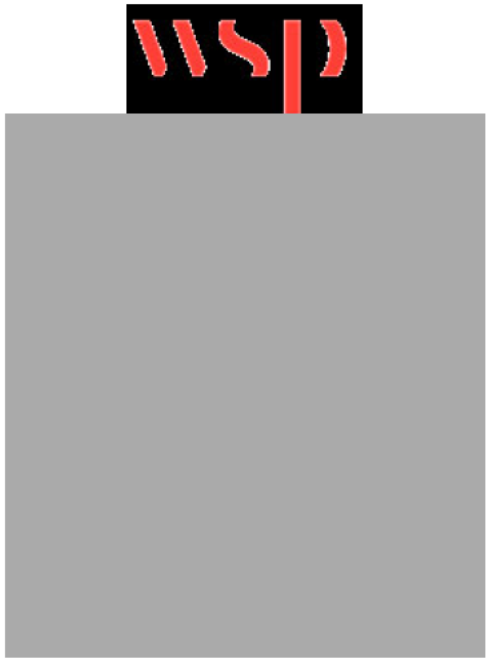
Molonglo 3 East

AGENDA

AGENDA	TIME	RESPONSIBILITY
SESSION 01 – Introduction (9.30- 10am)		
Introduction/ Objectives of this Workshop	10 min	Study Team WSP
Overview of Project Timing/ Drivers	10 min	DS and PP) (6 slide PPP)
Questions and Clarifications	10 min	ALL
SESSION 02 - Unique Discoveries & Big Ideas (10- 10.35am including buffer		
Unique Site Observations and Considerations • Movement & Place • Urban Interface • Water Management and Services	10 min	RD and PP
'BIG IDEAS' and Desired Urban Design Outcomes (5 minute presentations)		
• Identity & Place Ideas	5 min	RD
• EPSDD Aspirations	10 min	PP DS
• Mini Q	5min	All
BREAK (10.35-10.45am including buffer)		
SESSION 03 – Opportunities, Challenges and Innovative Solutions		
INTRO- RESILIENCE AS THE FOUNDATION OF MOLONGLO EAST	10 min	WSP/ RD
STREAM 1- MOVEMENT & PLACE	10.40- 11am **including buffer**	
• A Different Approach	5 min	WSP
• Future Proofing Transit Oriented Design	5 min	RD
• Mini Q	5 min	All
STREAM 2- URBAN INTERFACE AND DEVELOPMENT POTENTIAL	11- 11.25am **including buffer**	
• Seams Vs. Barriers	5 min	RD
STREAM 3- WATER MANAGEMENT AND SERVICES	11.25- 11.45am **including buffer**	
• Hydrology Innovations	5 min	WSP
• Civil Engineering Innovations (W S E G C)	5 min	WSP
• Mini Q	5 min	All
BREAK (11.45- 12pm)		
SESSION 04 – Visioning (12- 12.30pm)		
Ideas for Testing- Establishing the Principles (summary of the session and butter paper visioning)	12pm	RD/ All
Next Steps	12.25pm	PP DS

EPSDD, WSP and Roberts Day.

INTRODUCTIONS



ACT Government

Patrick Paynter
Dave Richardson
Daniel Santosuosso
Kerry Browning
Miloje Beljic
Meagan Cousins
Simon Tennent
Simon Cox
Tim Elliott
Amalie Shawcross
Colin Maher
Gerard Coffey
Peter Steele
Benjamin Hubbard

Jerome Catbagan
Tim Wyatt
Meaghan Russell
Michaela Watts
Sophie Clement
Steven Gianakis
Mohammadali Lashkari
Leigh Crocker
Vanessa Barnett
Gabriel Joseph
Lesley Cameron
Eliza Larson
Carl Pillig

OBJECTIVES

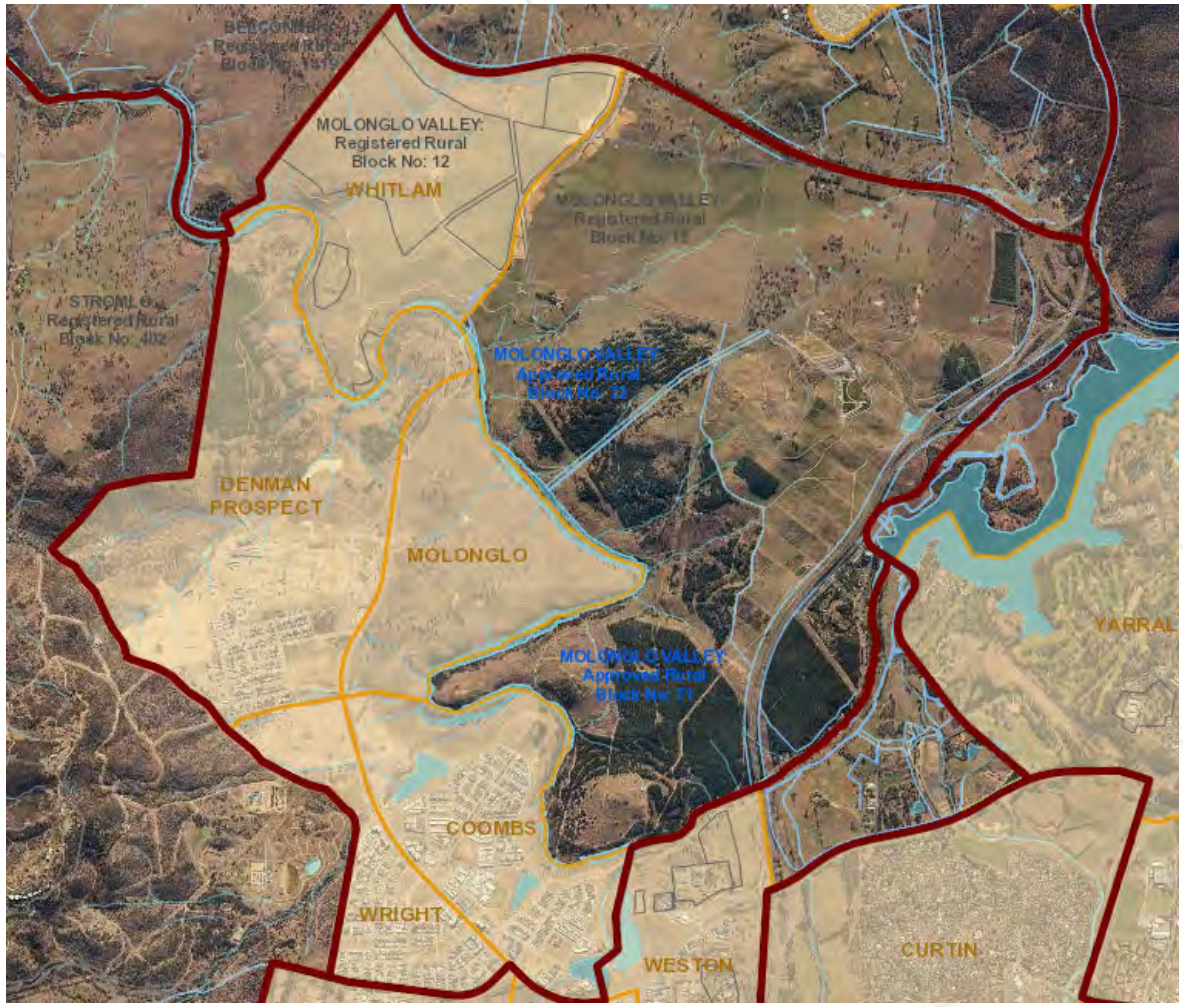
STUDY OBJECTIVES:

1. EXPLORE OPTIONS TO ACHIEVE AN INTEGRATED PLANNING, URBAN DESIGN AND INFRASTRUCTURE OUTCOME FOR MOLONGLO 3 EAST AND TO RECOMMEND A PREFERRED OUTCOME.
2. IDENTIFY THE ELEMENTS OF THE PREFERRED OUTCOME AND BASED ON PLANNING PRINCIPLES AND POLICIES THAT SET THE PLANNING, URBAN DESIGN AND ENGINEERING INFRASTRUCTURE DIRECTIONS, DESCRIBE HOW THESE WILL DELIVER AN INTEGRATED DESIGN OUTCOME FOR THE AREA.
3. CLEARLY DESCRIBE AND ILLUSTRATE THE INTEGRATED PLANNING AND ENGINEERING REQUIREMENTS IN SUFFICIENT DETAIL TO INCORPORATE INTO A TERRITORY PLAN STATUTORY CONCEPT PLAN.

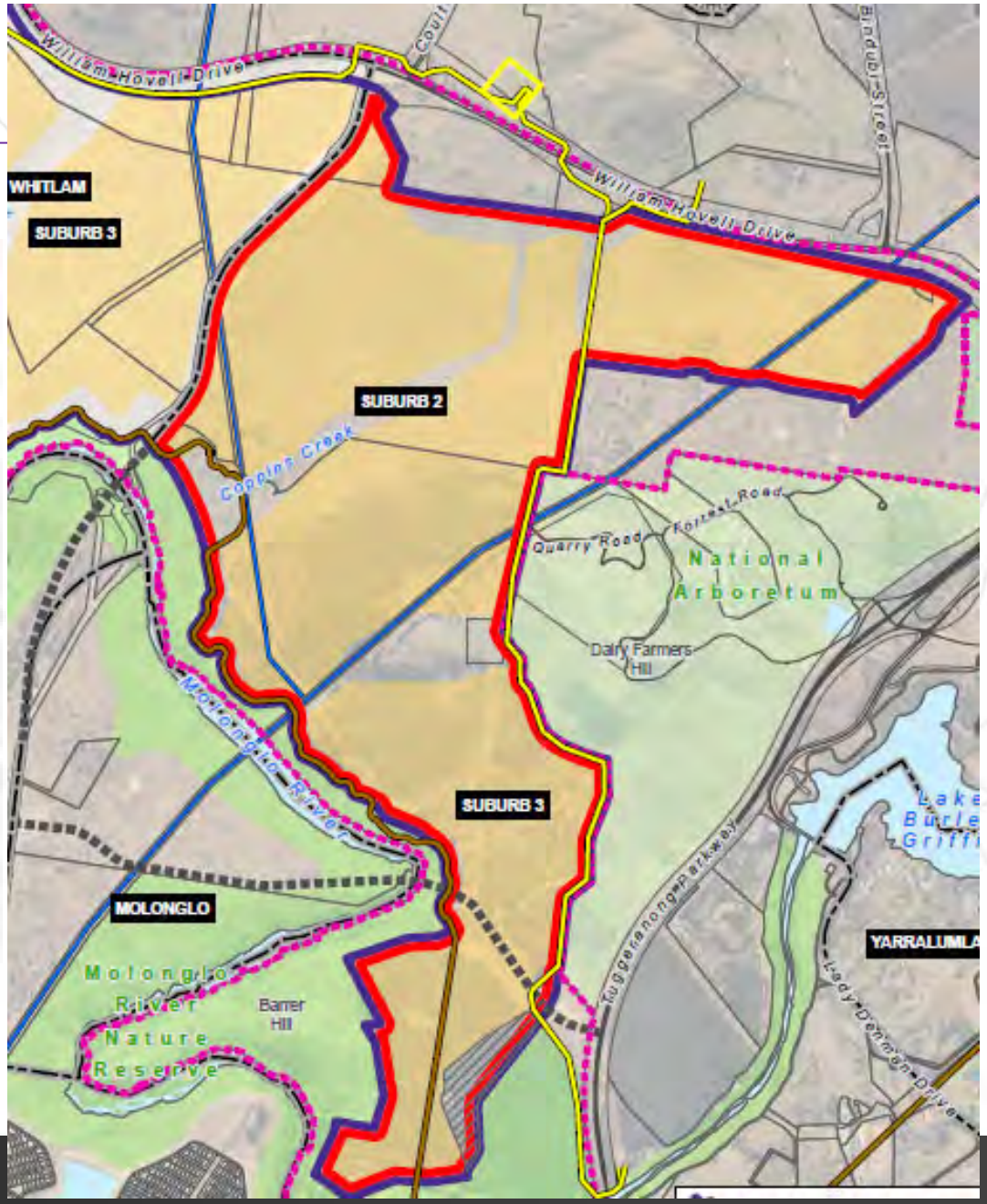
WORKSHOP OBJECTIVES:

- EXPLORE IDEAS IN AN INTEGRATED MANNER
- ULTIMATELY, INFORM THE DESIGN AND ALTERNATIVE APPROACHES
- INFORM ACCEPTABLE LEVELS OF INNOVATION

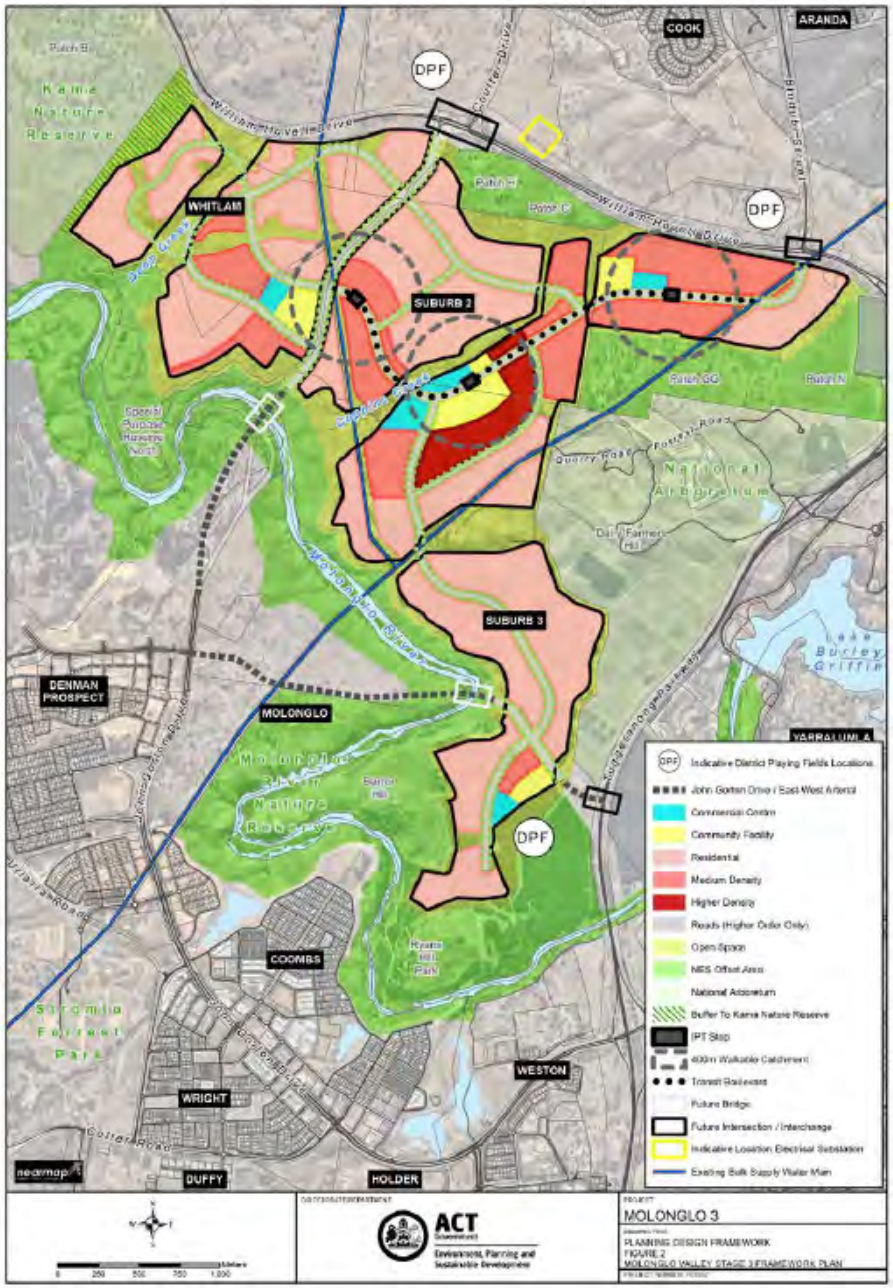
ACTMAPI – SITE PLAN – aerial photo June 2019



MOLONGLO 3 EAST CONTEXT



MOLONGLO PLANNING AND DESIGN FRAMEWORK



https://www.planning.act.gov.au/__data/assets/pdf_file/0003/1348005/Molonglo-Planning-and-Design-Framework-Stage3-ACCESS.pdf

MOLONGLO ENVIRONMENTAL VALUES

Molonglo Valley Plan for the Protection of Matters of National Environmental Significance

NES PLAN

SEPTEMBER 2011

Vegetation

Legend

- Strategic Assessment Area
- Proposed Development Area - East Molonglo

Vegetation

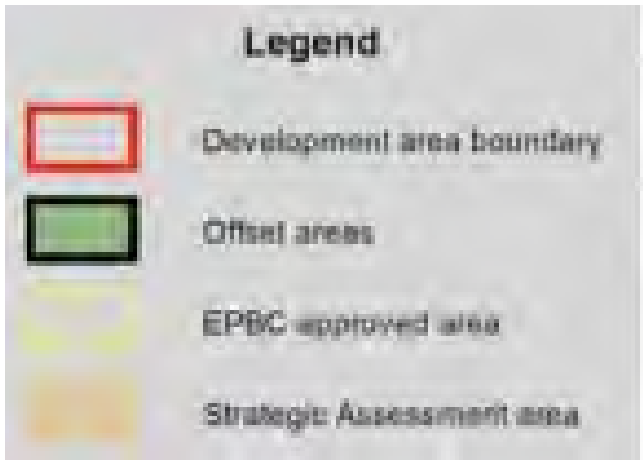
- EPBC Box-Gum Woodland (High)
- EPBC Box-Gum Woodland (Medium)
- EPBC Box-Gum Woodland (Low)
- EPBC Box-Gum Woodland (Very Low)
- Natural Temperate Grassland

MOLONGLO ENVIRONMENTAL VALUES OFFSETS

Molonglo Valley Plan for the Protection of Matters of National Environmental Significance

NES PLAN

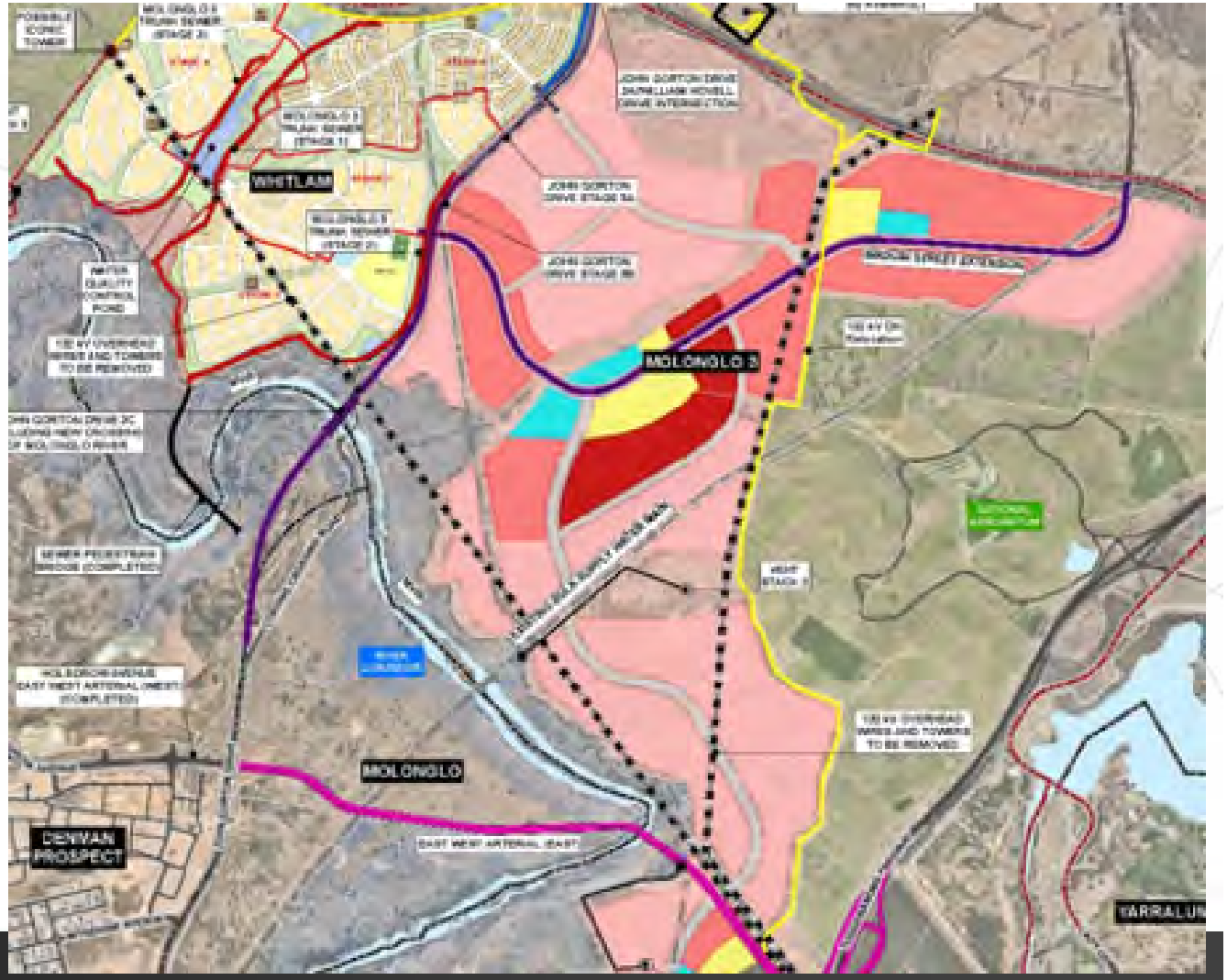
SEPTEMBER 2011



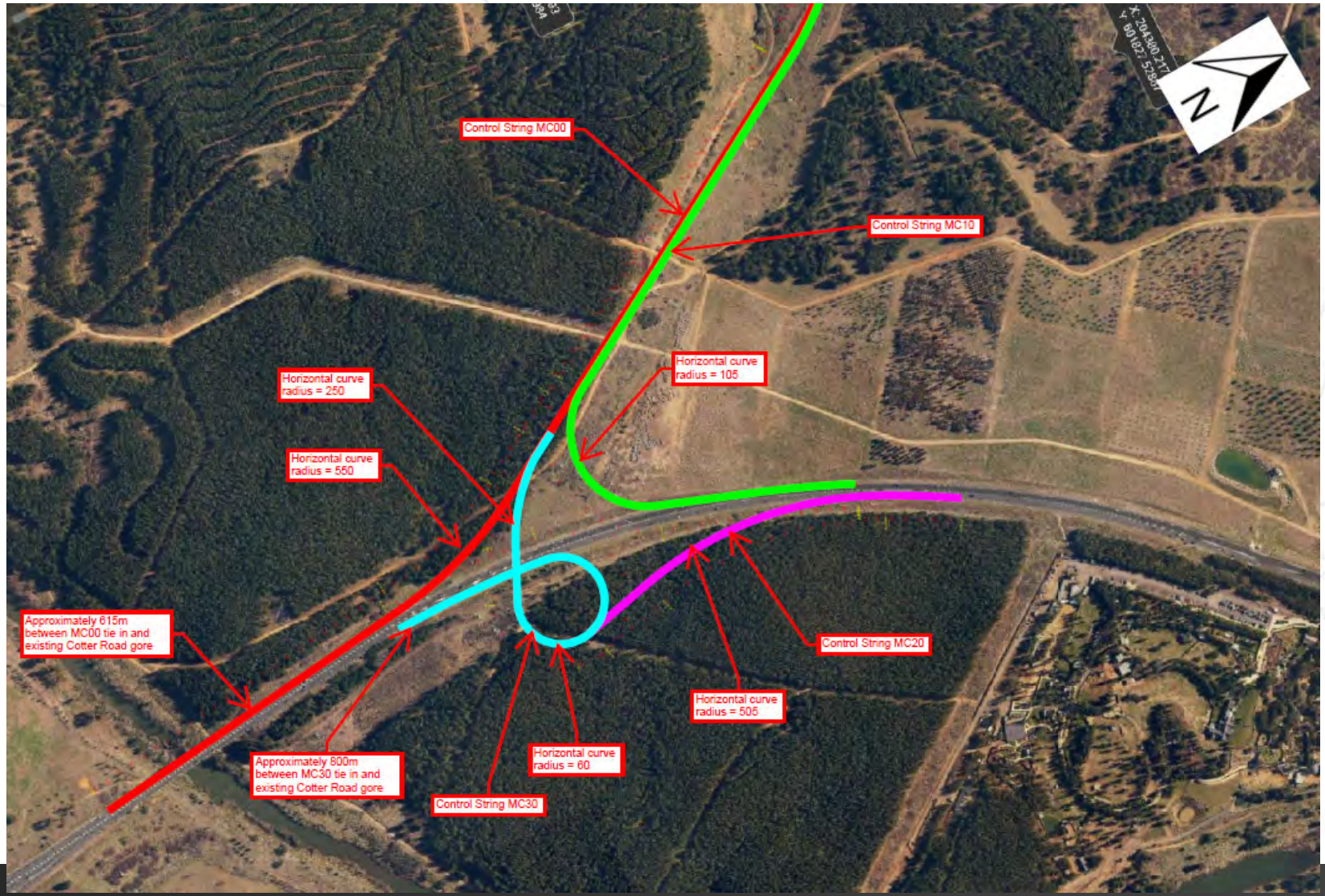
WHITLAM


STAGE 1
STAGE 2
Future Development
Future Development
N
LEGEND
Single Residential Blocks
Community Facility
Multi Unit
Mixed Use
Local Centre
Public Open Space
Medium Density Multi Unit
Estate Boundary
Stage Boundary
Easement
Playground/Recreational Space
Existing Trees
Open Space Trees
Pond/Creek

MOLONGLO INFRASTRUCTURE PROJECTS



CONCURRENT PROJECTS
FUTURE - EAST WEST ARTERIAL



Session 1

QUESTIONS & CLARIFICATIONS

Session 2

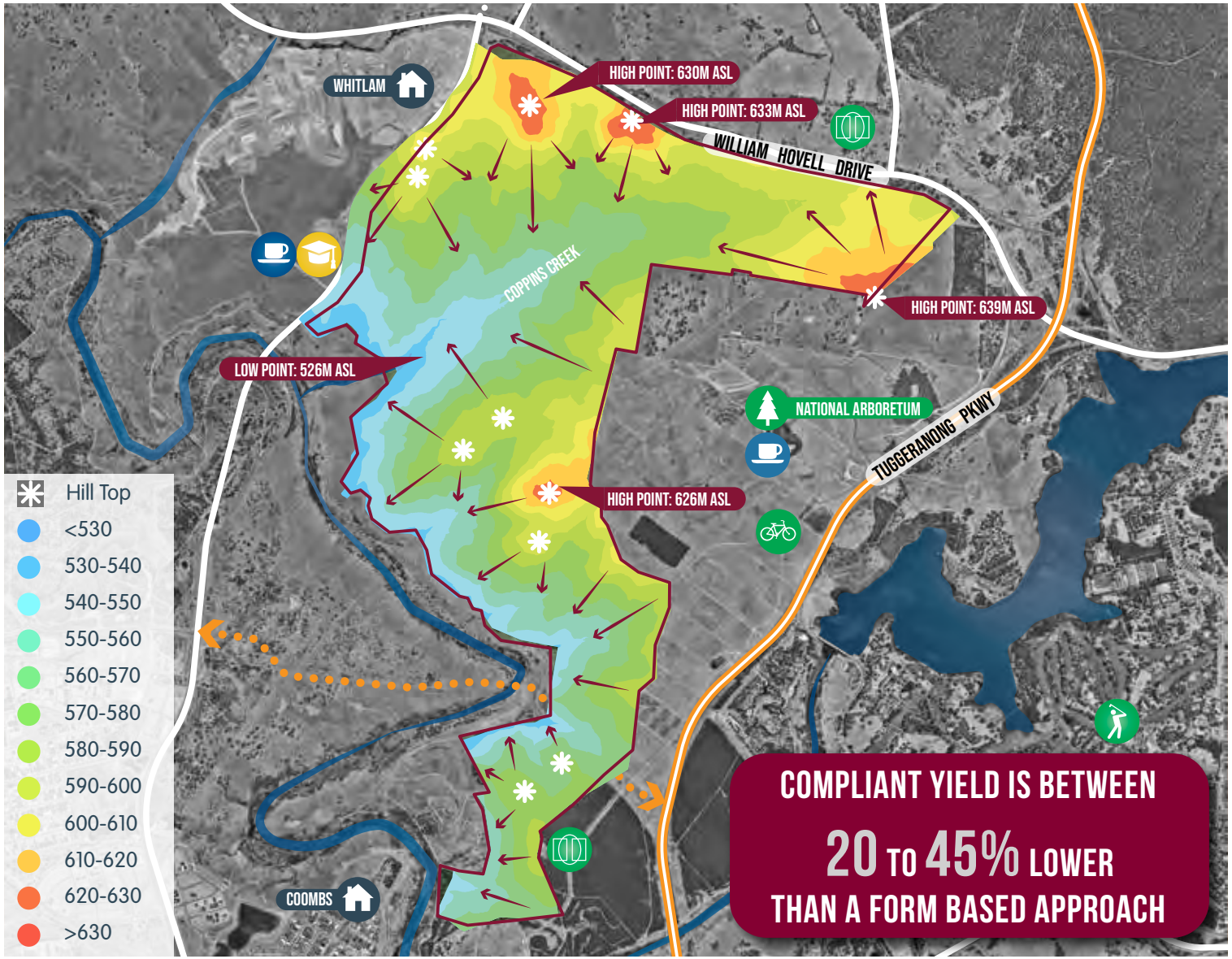
UNIQUE OBSERVATIONS

NOT BUSINESS AS USUAL

40% SOUTH-FACING SLOPE

66% POOR BLOCK COMPLIANCE ORIENTATION

80% COMBINED POOR ORIENTATION & SLOPE



Molonglo 3 East

INTERFACES

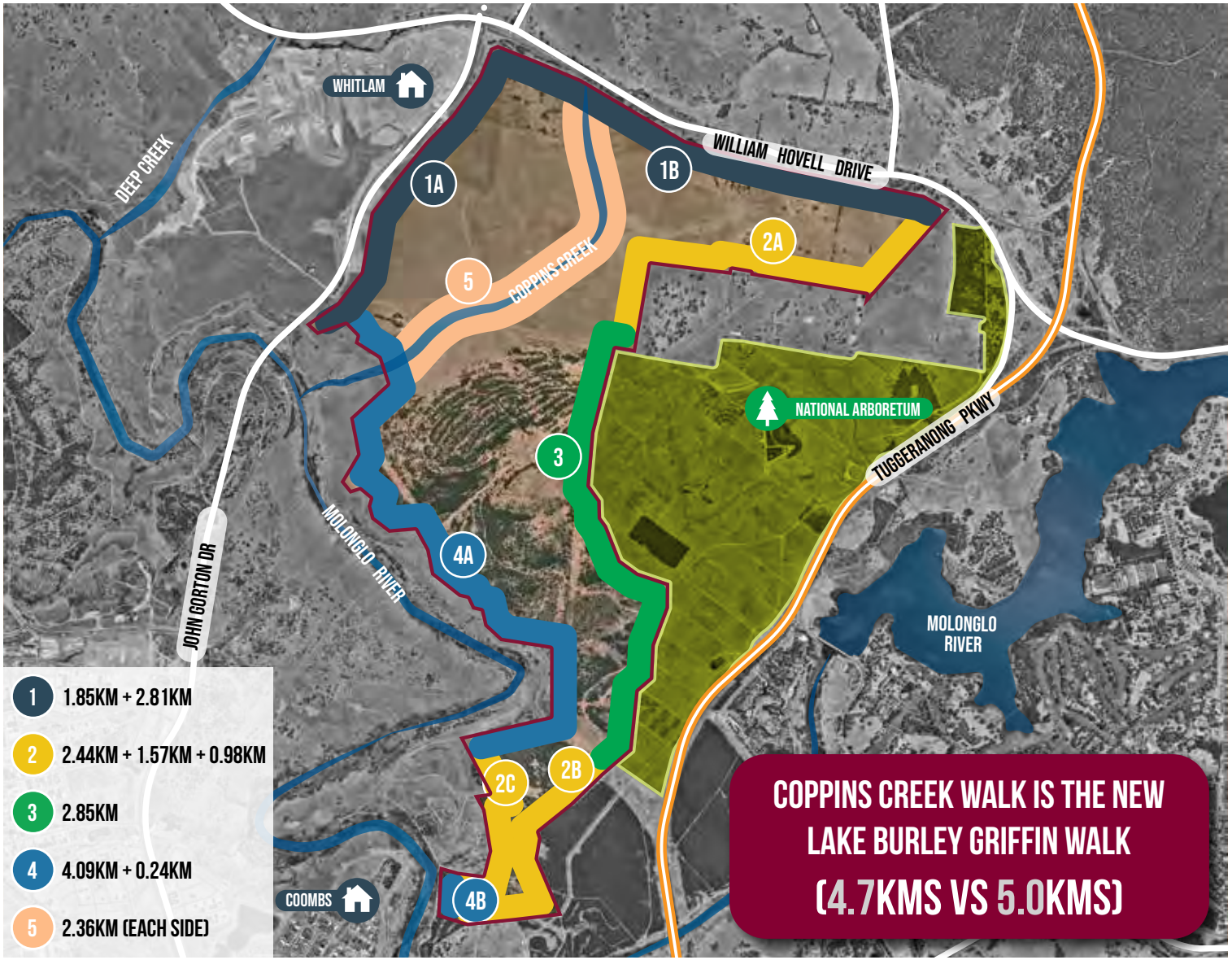
A variety of unique interface characters

TOTAL INTERFACES BOUNDARY =

21.59KM

ITEMS EVERY 200M TO STIMULATE PEOPLE TO WALK FURTHER

100+ INTERESTING ITEMS REQUIRED FOR BOUNDARY



Molonglo 3 East

INFRASTRUCTURE & CONNECTIVITY

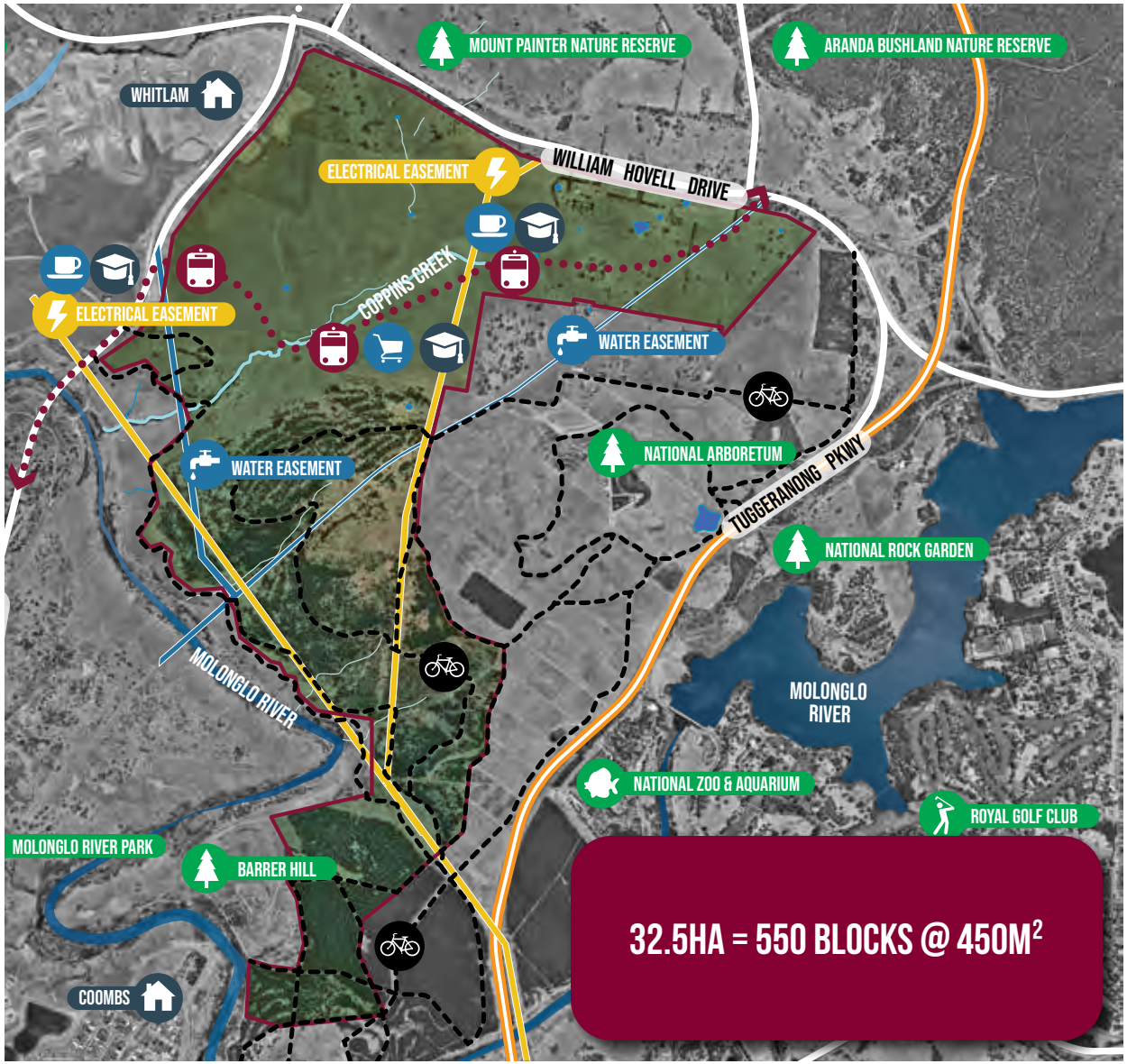
EASEMENT = 21.4HA

EASEMENT = 11.1HA

ELECTRICAL EASEMENT IS THE EQUIVALENT OF:

- 107 KICK AROUND SPACES
- 214 PLAYSPACES
- 300 BASKETBALL COURTS

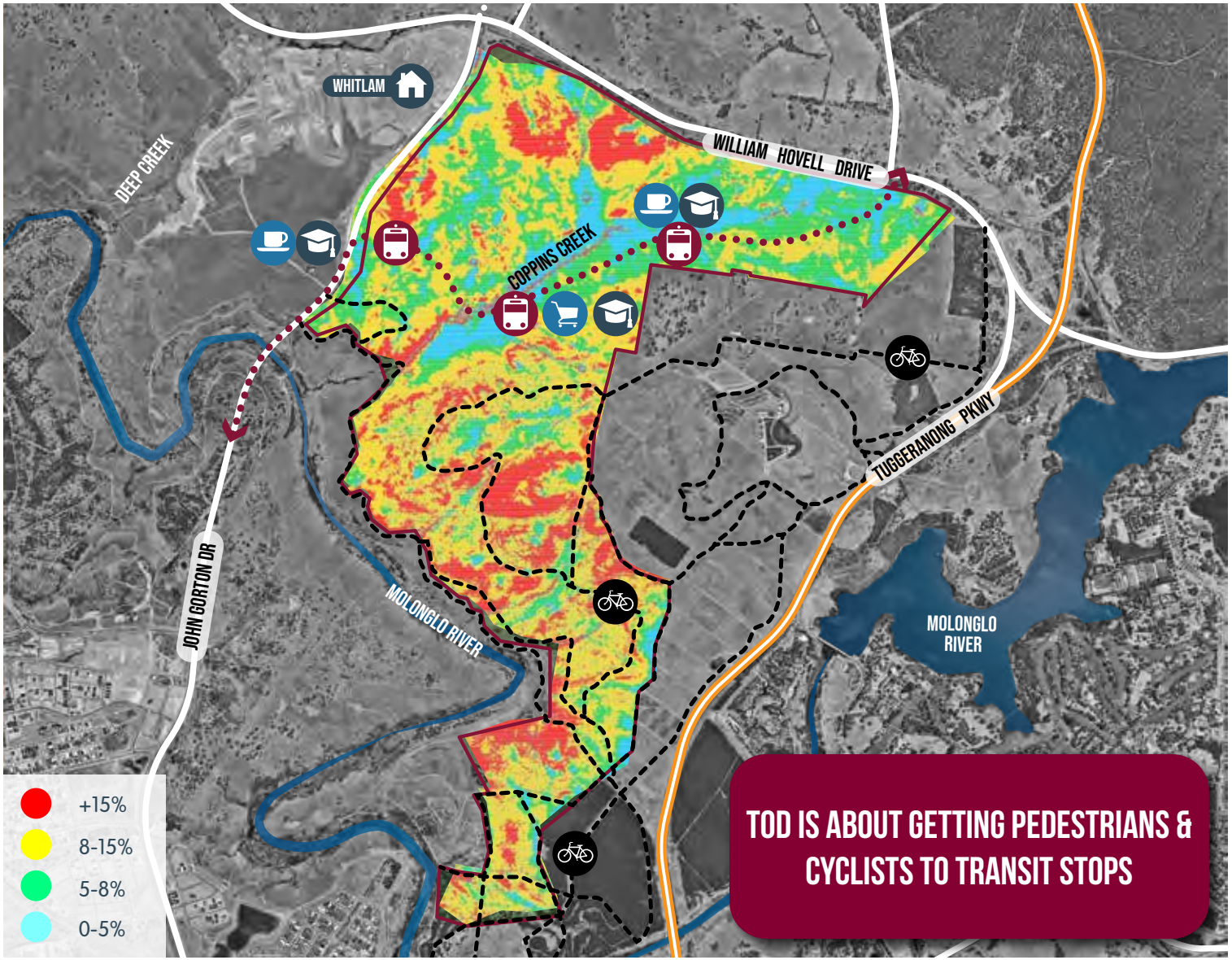
PLACE	AREA
4 GAZEBO + 2 BBQ	720M²
BAD-MINTON	340M²
TENNIS	620M²
BASKET-BALL	720M²
PLAY SCAPE	1,000M²
PLAZA	2,000M²
KICK AROUND SPACE	2,000M² +



TRANSIT ORIENTED DESIGN

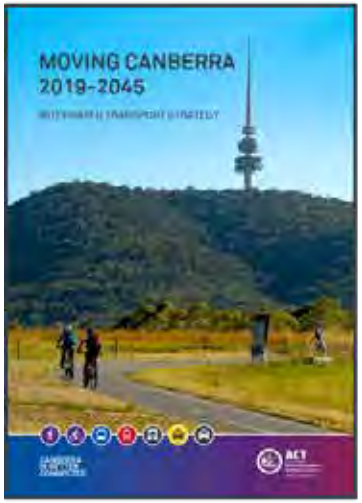
5-15%

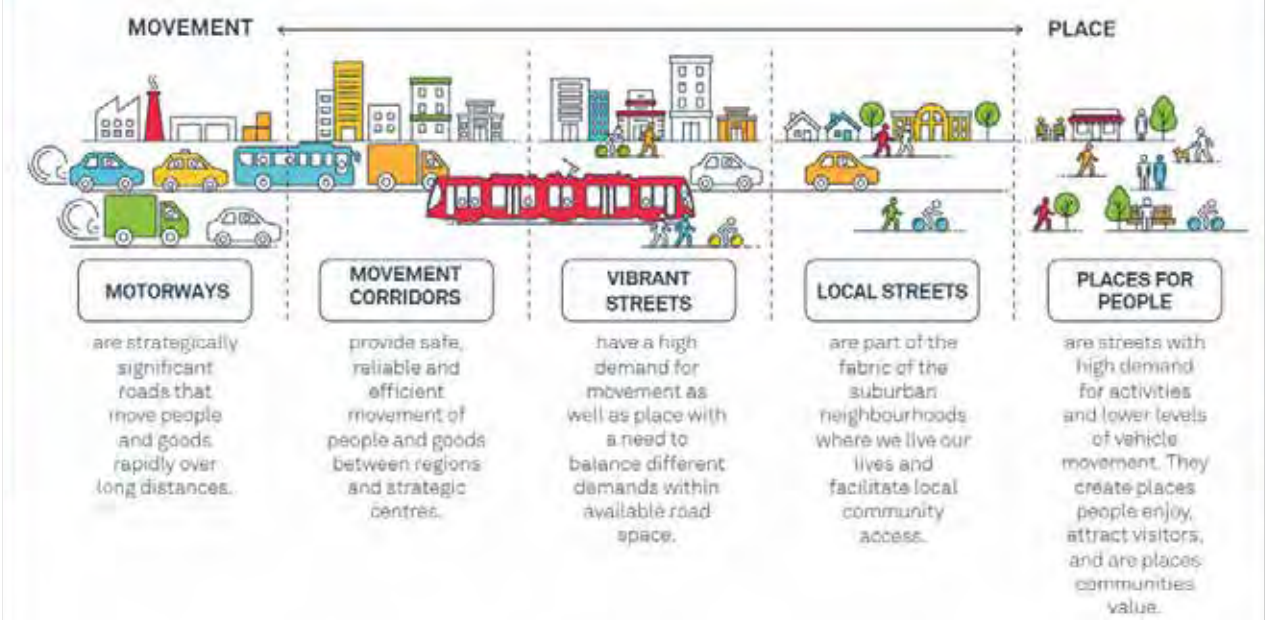
GRADIENT OF EXISTING PATHS



Molonglo 3 East

ACT MOVEMENT & PLACE

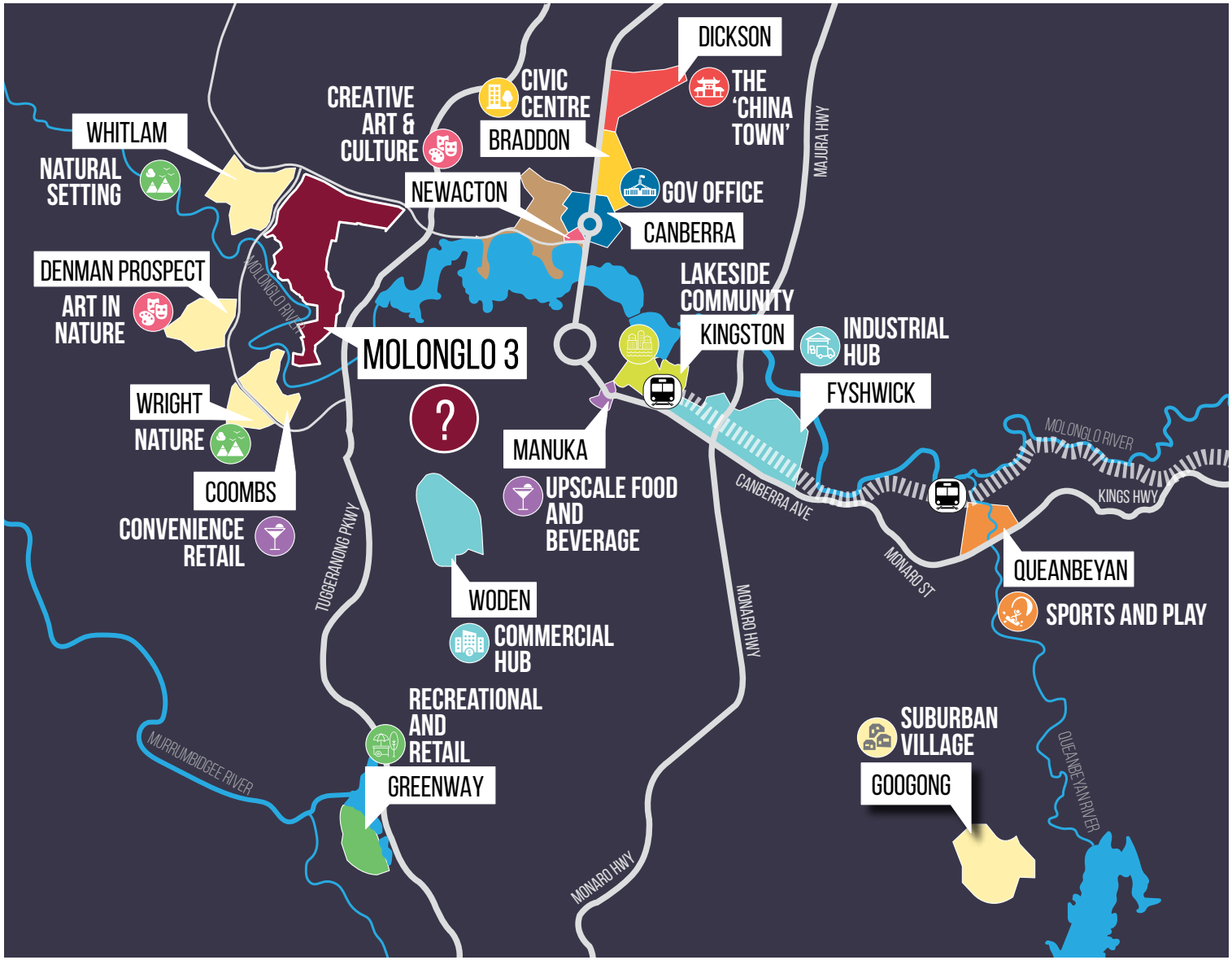




Session 2

BIG IDEAS

PLACE & IDENTITY



Molonglo 3 East

THE HEALTHY NEW TOWN

1. DECISION MAKING AND INFRASTRUCTURE INVESTMENT SHOULD GIVE PRIORITY TO PEDESTRIANS, CYCLISTS, LIGHT RAIL USERS AND DRIVERS
2. FOCUS ON MODERN LOCAL FOOD PRODUCTION/ ECONOMY
3. STREETS ARE SHARED SPACES CREATING PLACES TO LINGER WITHIN, MOVE THROUGH AND CONDUCT BUSINESS ON

Molonglo 3 East

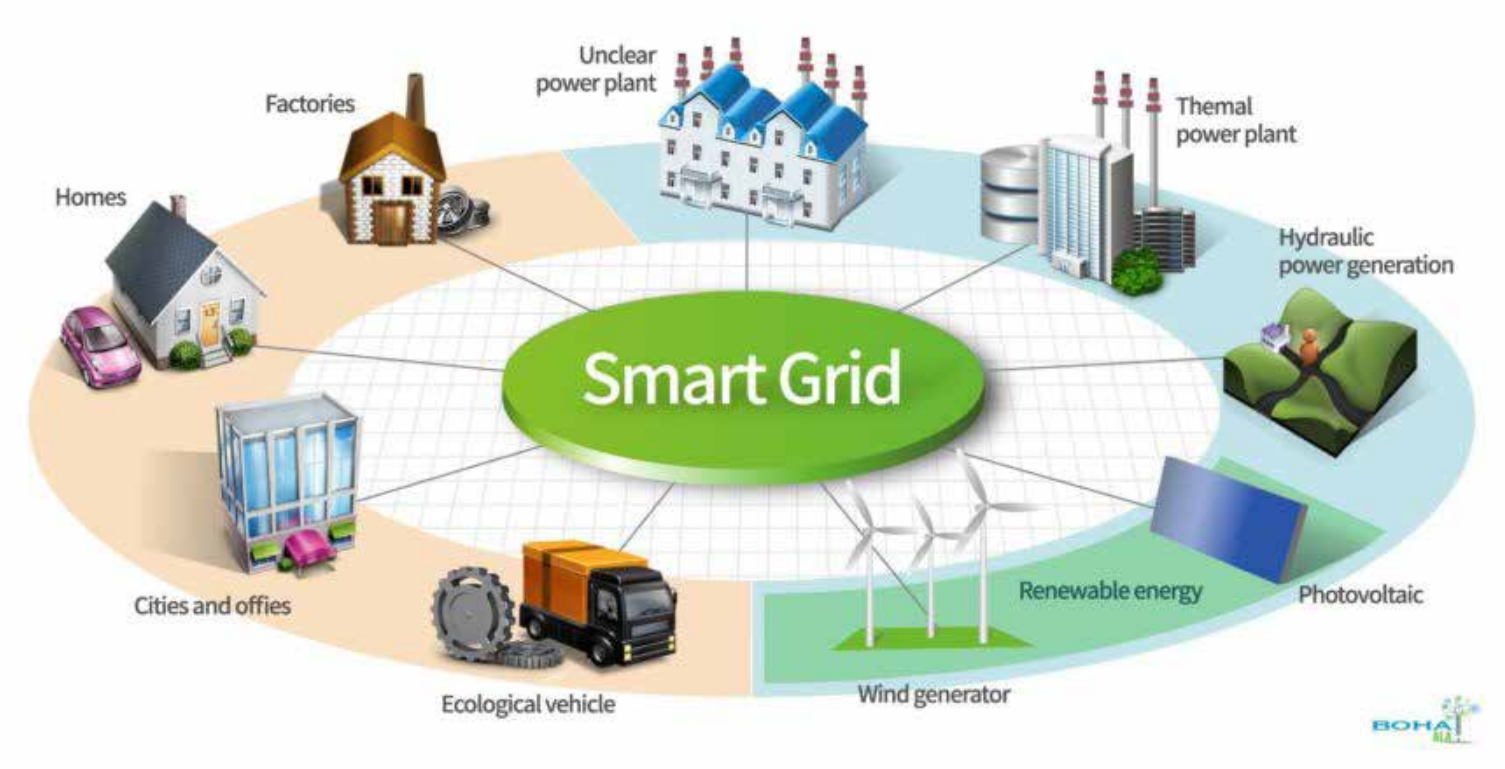
THE ECO- NEW TOWN

1. THE TOWN CONNECTED TO, AND CELEBRATING, NATURE
2. FOCUS ON BRINGING THE RIVER, CREEK, MOUNTAINS AND THE ARBORETUM INTO THE SITE
3. PROMOTE AWARENESS OF THE NATURAL SYSTEMS WITHIN AND AROUND MOLONGLO
4. UTILISE INNOVATIVE SUSTAINABLE TECHNOLOGY TO OPTIMIZE LAND AND LEAVE THE PLANET BETTER OFF THAN WHEN WE STARTED

Molonglo 3 East

THE INNOVATIVE NEW TOWN

1. FUTURE- PROOF FOR CHANGING LIFESTYLE NEEDS AND TOWN-MAKING TRENDS
2. THINK NEXT-PRACTICE…RATHER THAN BEST PRACTICE OR BUSINESS AS USUAL
3. POSITION MOLONGLO WHERE IT WANTS TO BE IN 10, 20, 50 YEARS…



THE DESTINATION NEW TOWN

1. THE NEW TOWN SHOULD ENDEAVOUR TO FILL MARKET GAPS- TO LEAD NOT FOLLOW
2. CREATE AMENITY TO ESTABLISH A POINT OF DIFFERENCE
3. MOLONGLO AS A DESTINATION TO LIVE, WORK, PLAY AND VISIT
4. COMPLETE DON'T COMPETE

Molonglo 3 East

A NEW TOWN FOR WELL BEING

1. THE CITY SHOULD STRIVE TO MAXIMIZE JOY AND MINIMIZE HARDSHIP
2. IT SHOULD LEAD US TO HEALTH RATHER THAN SICKNESS
3. IT SHOULD OFFER US REAL FREEDOM TO LIVE, MOVE AND BUILD OUR LIVES
4. IT SHOULD BUILD RESILIENCE AGAINST ECONOMIC OR ENVIRONMENTAL SHOCKS
5. IT SHOULD BE FAIR HOW IT APPORTIONS SPACE, SERVICES, MOBILITY AND COSTS
6. IT SHOULD ENABLE US TO STRENGTHEN SOCIAL BONDS

Molonglo 3 East

EPSDD ASPIRATIONS

Session 2

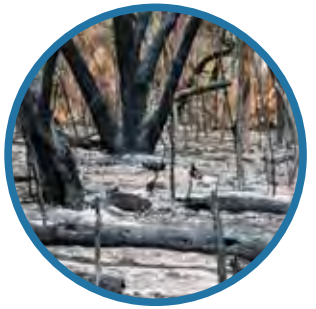
MINI Q

Session 3

OPPORTUNITIES, CHALLENGES & INNOVATIVE SOLUTIONS

RESILIENCE

- **CLIMATE CHANGE –** MORE EXTREME WEATHER EVENTS
- **CLIMATE CHANGE –** HOTTER AND DRIER
- **SOCIETY –** DENSIFICATION – WE ARE GREENFIELDS, TRY TO OVERCOME THE NEGATIVES OF 'URBAN SPRAWL'
- **RESOURCES –** WATER SCARCITY
- **TECHNOLOGY –** CONNECTIVITY
- **TECHNOLOGY –** DIGITAL EXPECTATIONS
- **SOCIETY –** HEALTH AND WELLBEING
- **SOCIETY –** INDIGENOUS INFLUENCE



INFRASTRUCTURE CAPACITY

SHARED ZONE / CAR FREE

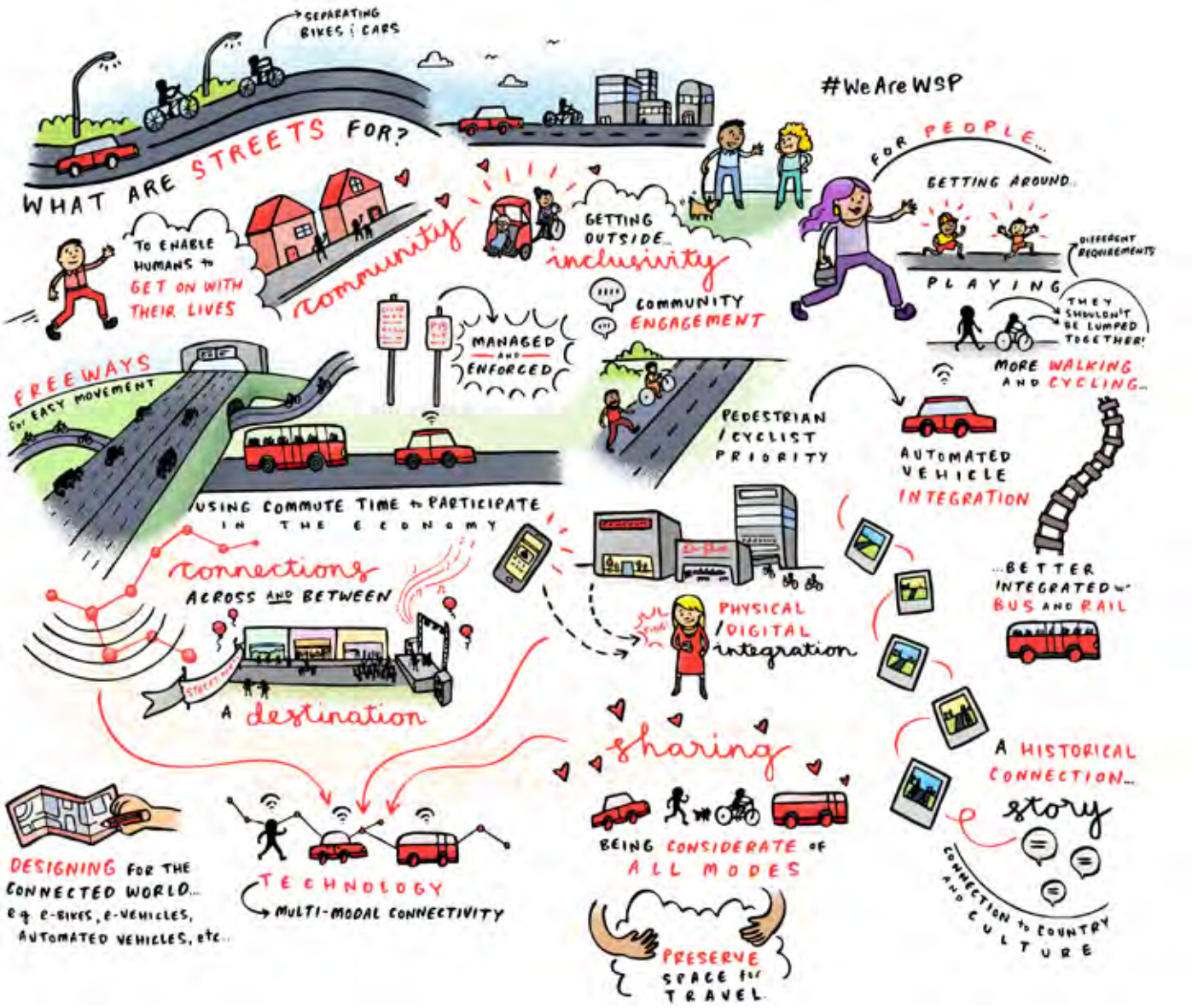
CREATIVE MIXED-USE

Molonglo 3 East

Stream 1

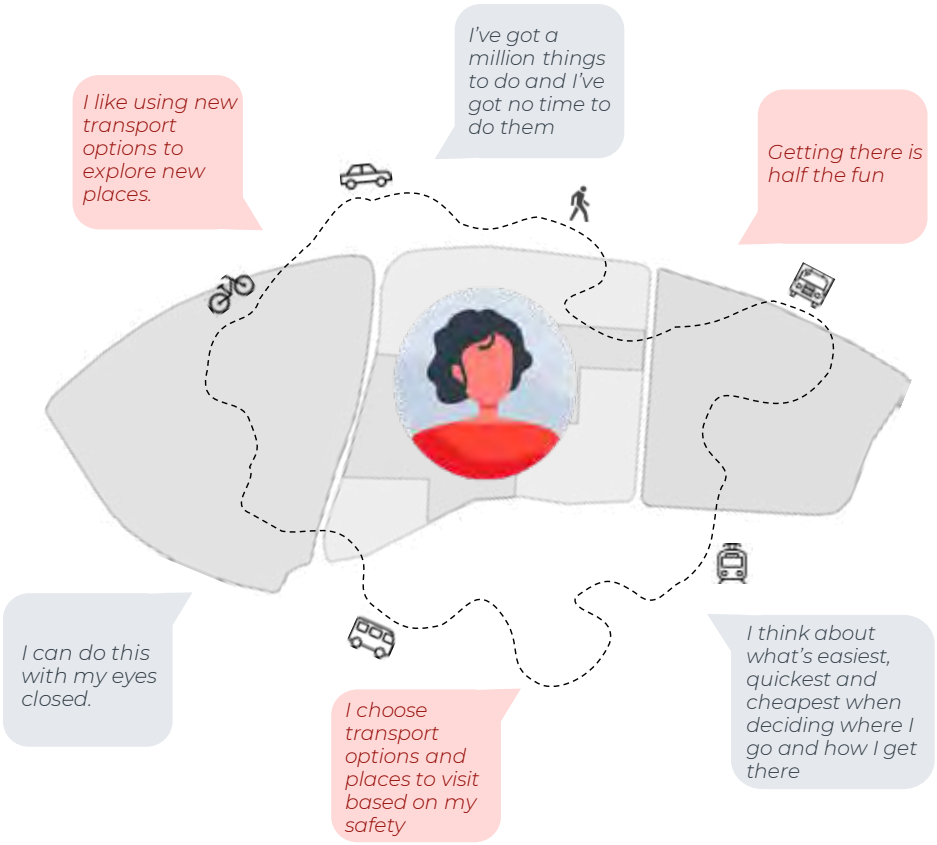
MOVEMENT & PLACE

MOVEMENT + PLACE



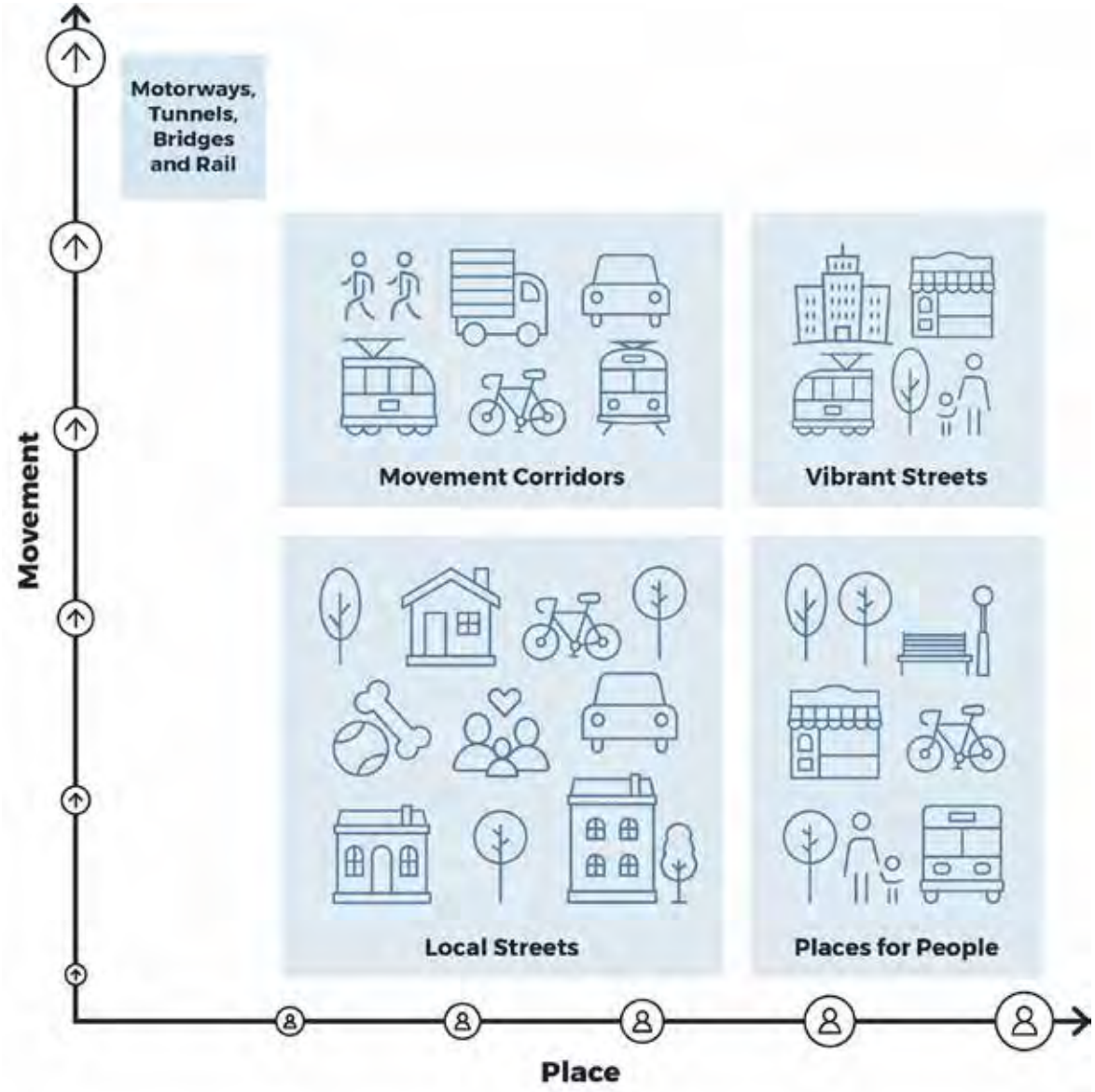
Molonglo 3 East

USER MINDSETS



When a **USER** chooses to go to a **PLACE** the way they **TRAVEL** is guided by their **MINDSET**

FRAMEWORK MATRIX

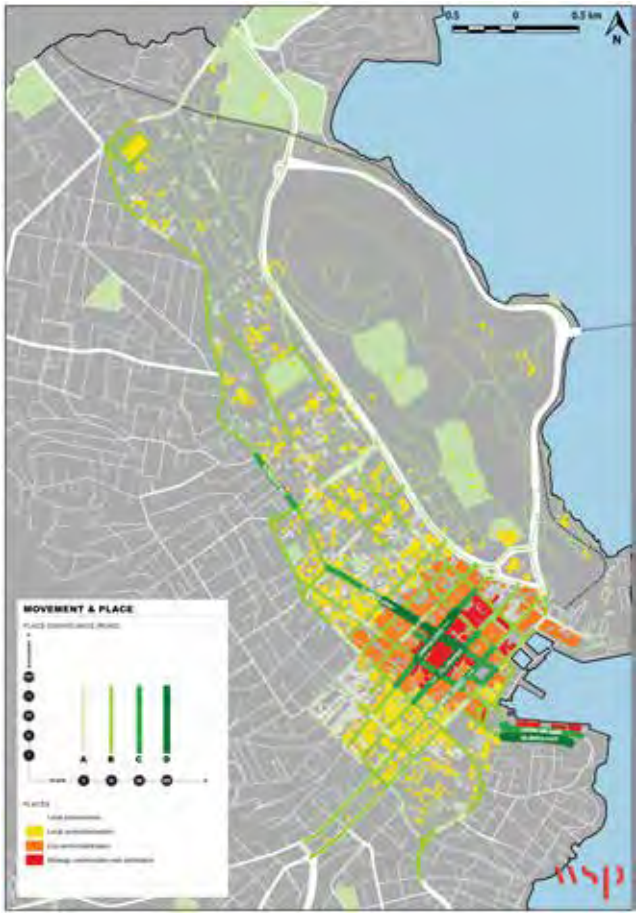


Molonglo 3 East

MOVEMENT AND PLACE MAPS

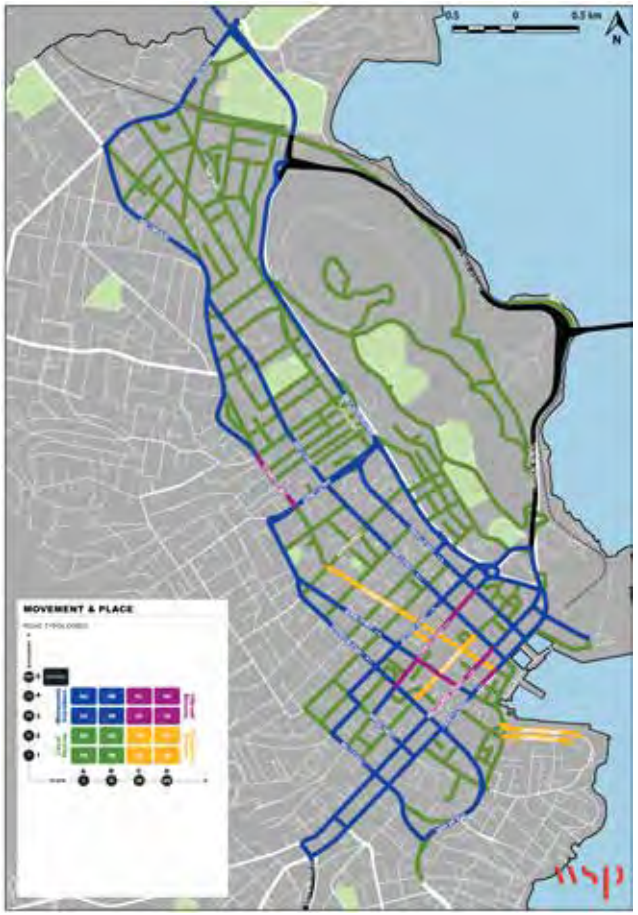
Journey network

+



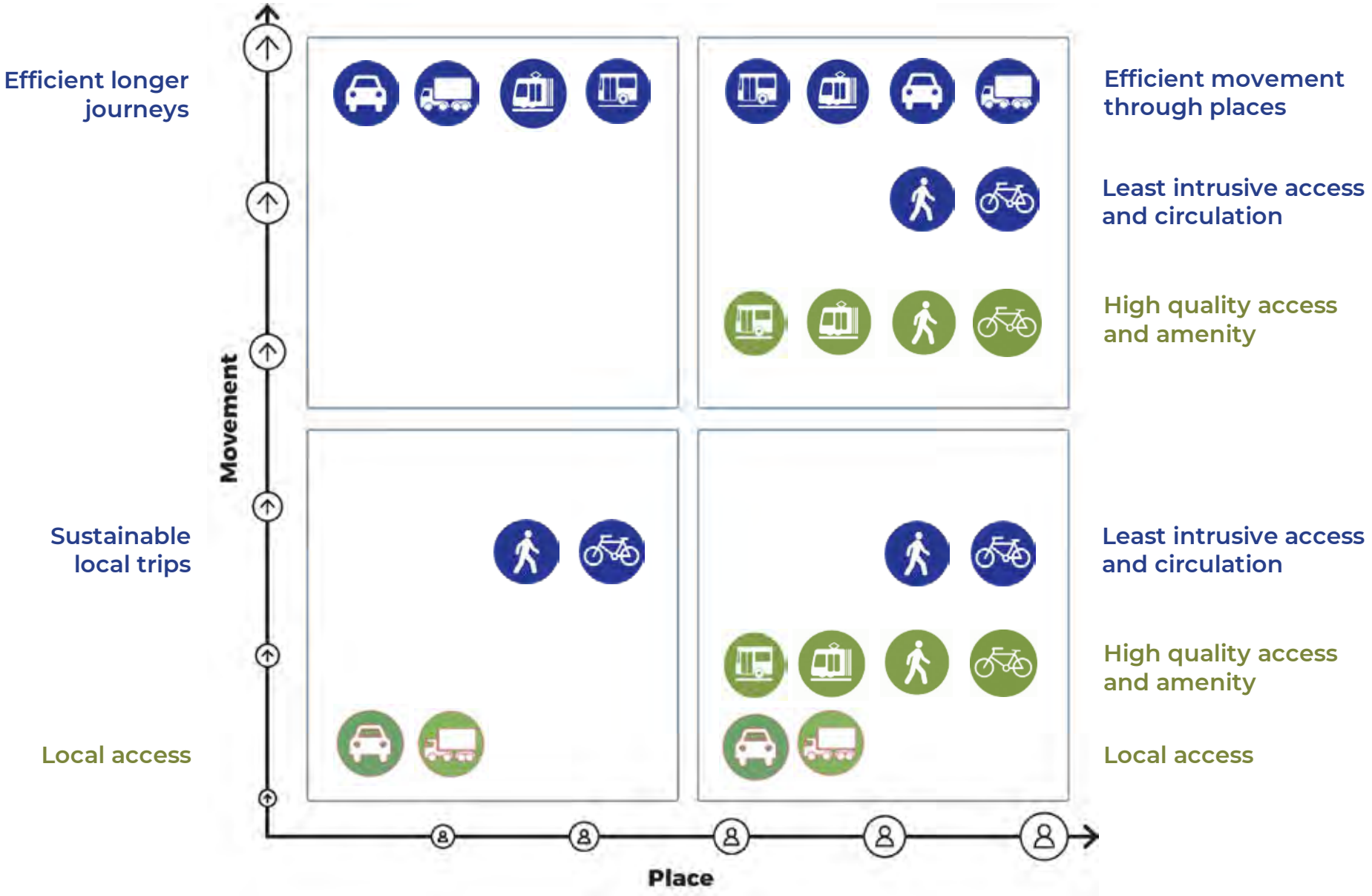
Activity places

=



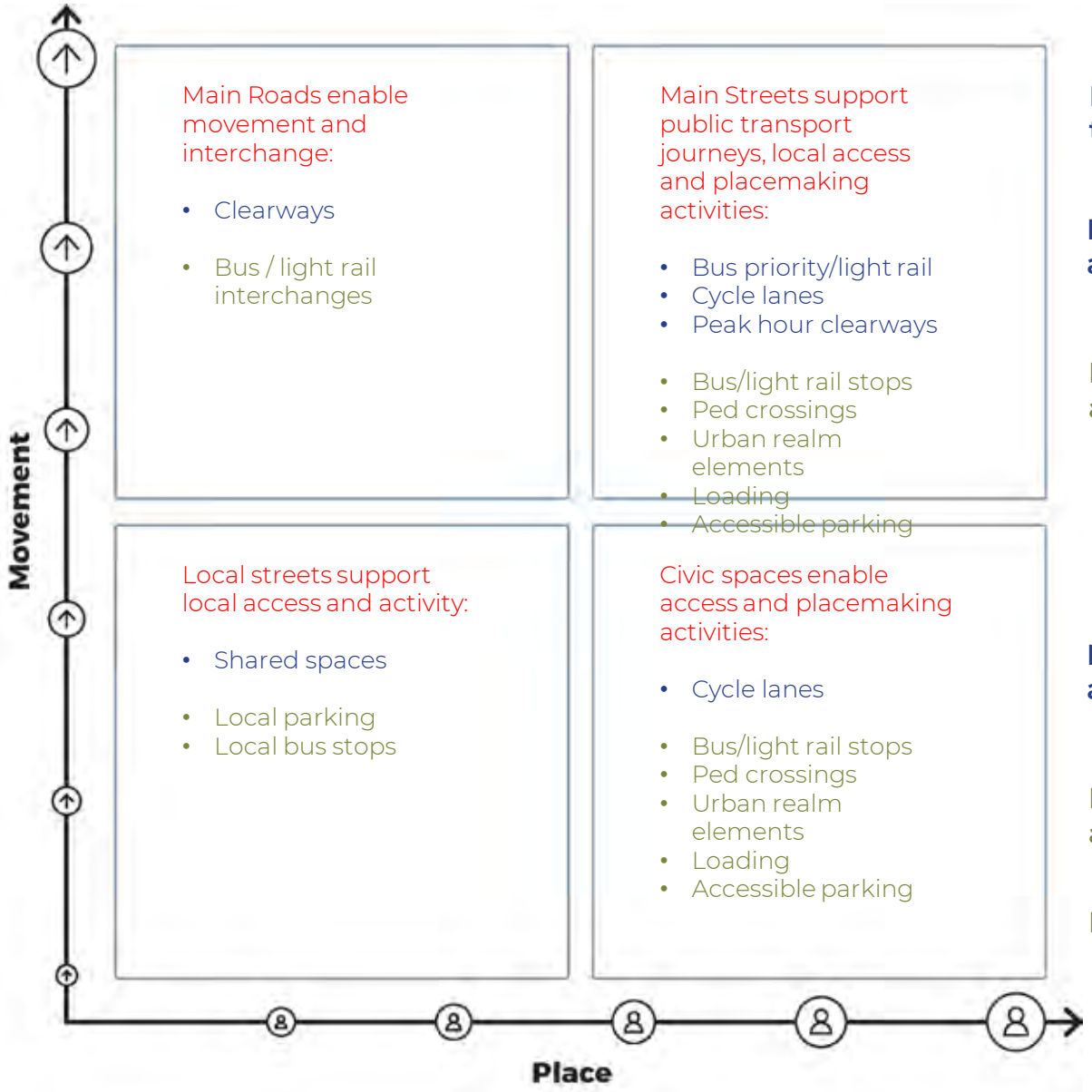
Movement and Place street classifications

MOVEMENT AND PLACE: USER PRIORITIES

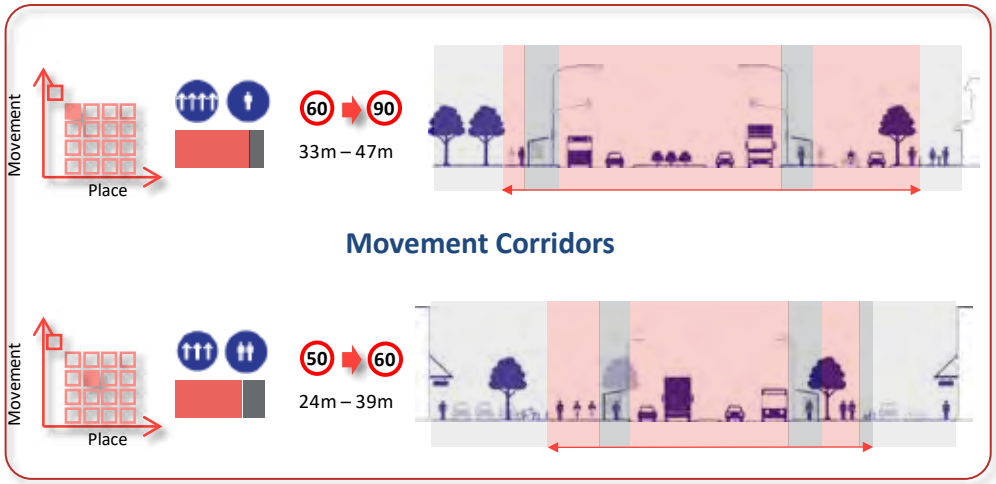


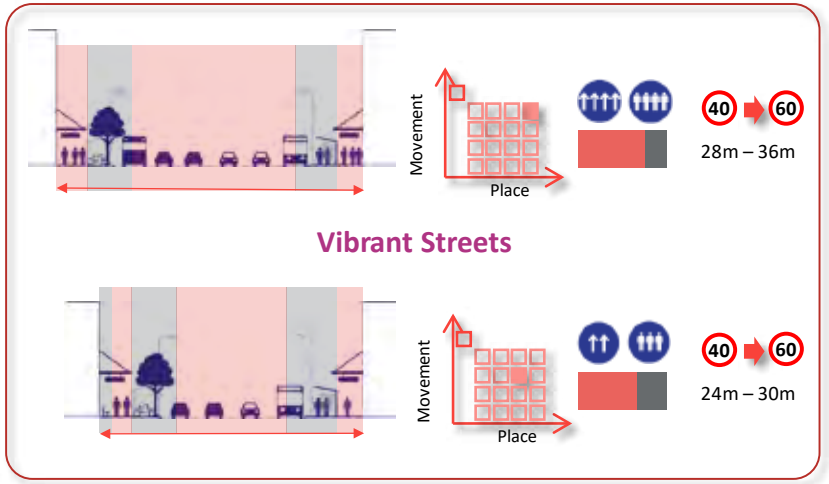
Molonglo 3 East

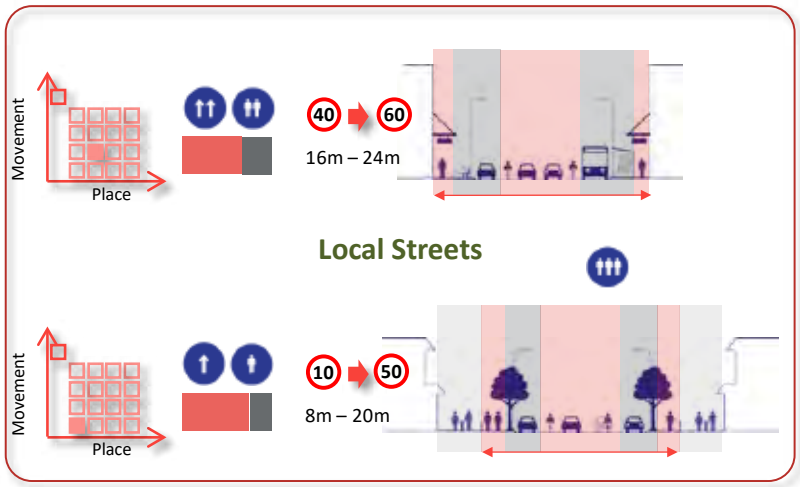
MOVEMENT AND PLACE: DESIGN FEATURES

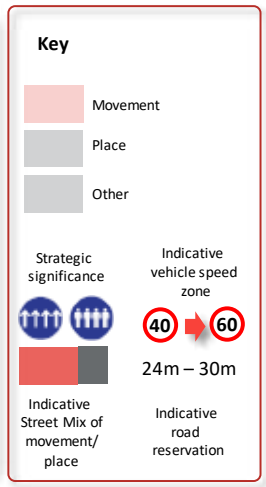


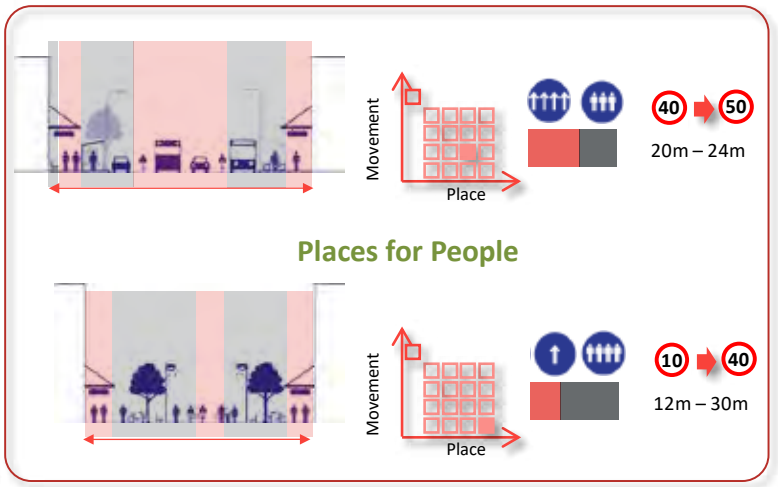

Movement
Place
80
110
30m – 55m
Motorways


Movement
Place
60
90
33m – 47m
Movement Corridors
Movement
Place
50
60
24m – 39m


Movement
Place
40
60
28m – 36m
Vibrant Streets
Movement
Place
40
60
24m – 30m


Movement
Place
40
60
16m – 24m
Local Streets
Movement
Place
10
50
8m – 20m


Key
Movement
Place
Other
Strategic significance
Indicative vehicle speed zone
40
60
24m – 30m
Indicative Street Mix of movement/ place
Indicative road reservation

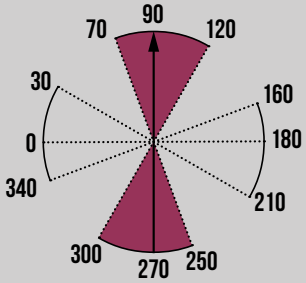

Movement
Place
40
50
20m – 24m
Places for People
Movement
Place
10
40
12m – 30m

URBANITY INDEX

BUSINESS AS USUAL

URBANITY MODEL

CODE REFORM FOR MISSING MIDDLE



PROVIDE FORM BASED CODE FOR COMPACT DEVELOPMENT

GREATER VARIETY OF ALTERNATIVE DWELLING CHOICES:

- MICRO-LOTS
- DUPLEX
- TERRACES
- MANOR HOUSES

PERSONA ANALYSIS & LIFESTYLE RESPONSE

SLOPE RESPONSIVE HOUSING

Molonglo 3 East

LIGHT RAIL GROUP CENTRE INTEGRATION

Molonglo 3 East

OVER AND UNDER THE RAIL

Molonglo 3 East

Stream 1

MINI Q

Stream 2

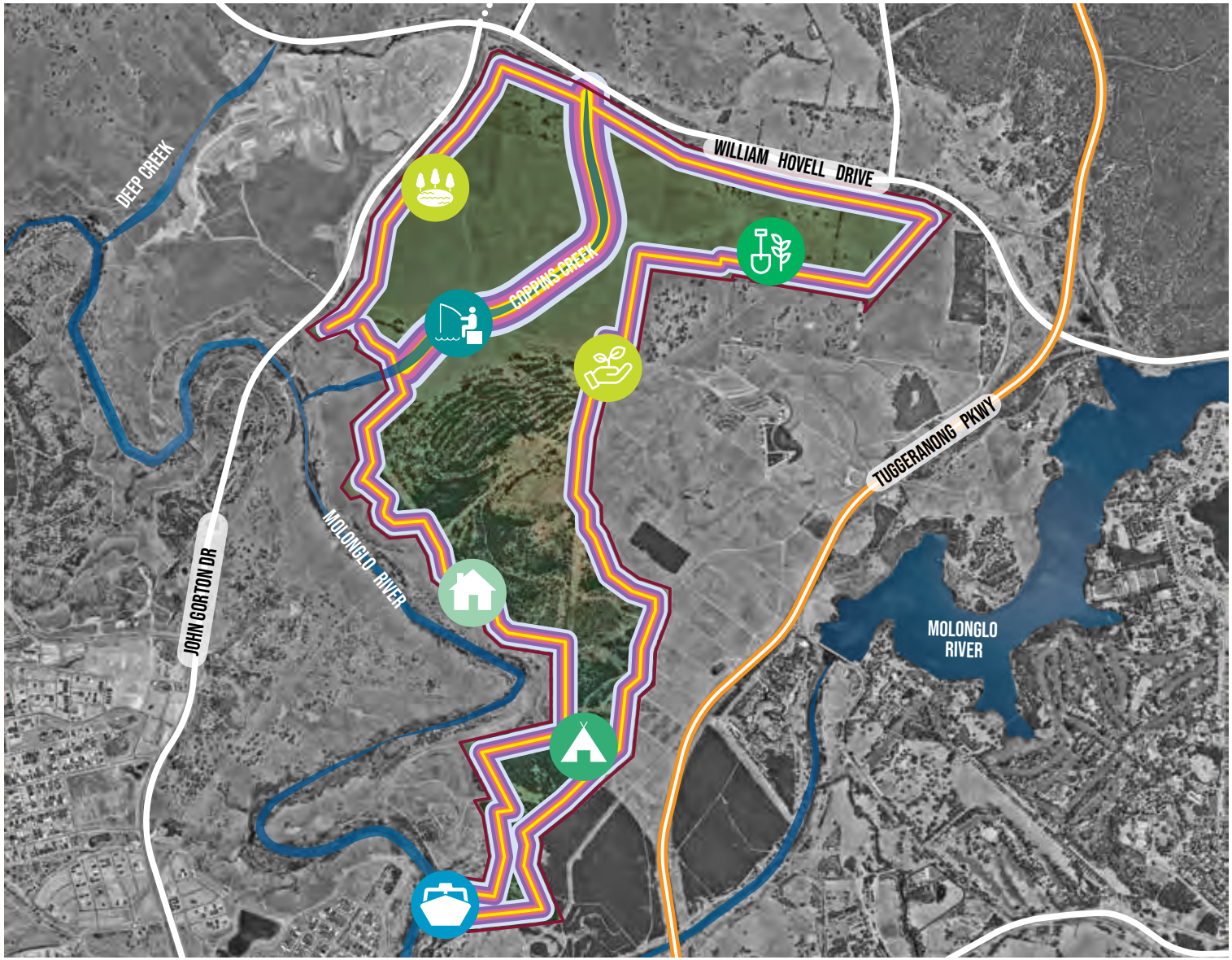
URBAN INTERFACE & DEVELOPMENT POTENTIAL

Molonglo 3 East

SEAMS VS BARRIERS

Interface Toolkit

- FRUIT TREES
- WATERFRONT PROMENADE
- PIER
- LANDSCAPE NURSERY
- CAMP-GROUND
- HOBBY FARM
- ECO-HOUSING



Molonglo 3 East

100 THINGS TO DO

Molonglo 3 East

100 WAYS TO CONNECT

Molonglo 3 East

COPPINS CREEK INTERFACE RESPONSE

Molonglo 3 East

21ST CENTURY BUSHFIRE INTERFACE

+

Molonglo 3 East

Stream 2

PLANNING

PLANNING REFORM

1. ACT CURRENTLY OPERATES ON A RULES-BASED SYSTEM
   - RULES DEFINE THE OUTCOME
   - LITTLE FLEXIBILITY FOR DEVELOPERS BUT CERTAINTY FOR PUBLIC

2. TERRITORY PLAN REVIEW – MOVING TOWARDS PERFORMANCE BASED PLANNING

3. DEVELOPMENT ASSESSED ON MERITS AND HOW IT MEETS PERFORMANCE CRITERIA
   - FOCUS ON OUTCOME RATHER THAN PROCESS
   - PROVIDES FLEXIBILITY FOR DEVELOPERS BUT UNCERTAINTY FOR PUBLIC

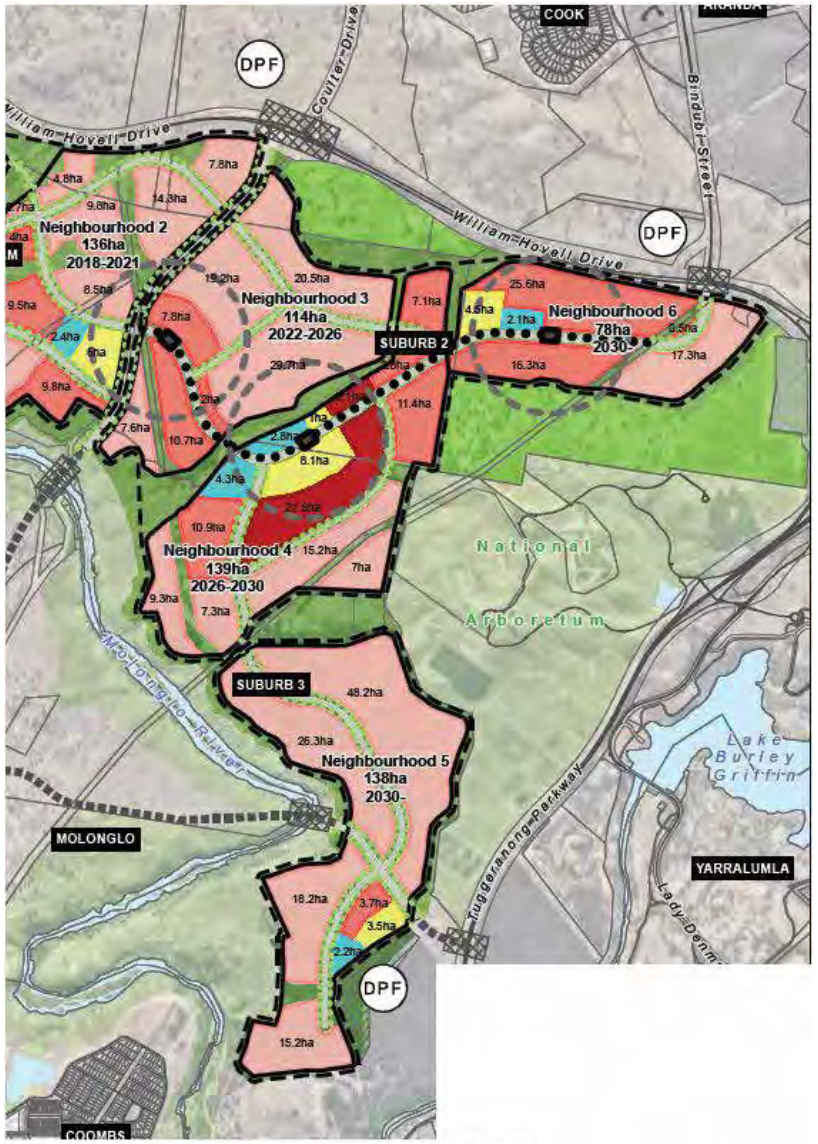
PERFORMANCE BASED PLANNING

1. CONCEPT PLAN FORMS THE BASIS FOR RULES AND CRITERIA.

2. ESTATE DEVELOPMENT CODE DOES NOT PRODUCE AN EFFICIENT OUTCOME

3. THIS WOULD BECOME A REFERENCE POINT FOR PERFORMANCE BASED PLANNING.

4. WHAT'S THE ULTIMATE PLANNING OUTCOME AND WHAT IS THE LIGHTEST TOUCH WAY TO ACHIEVE IT?



DRAFT PLANNING DESIGN FRAMEWORK LAYOUT (SOURCE: EPSDD)

21ST CENTURY COMMUNITY INFRASTRUCTURE

1. PHYSICAL AND DIGITAL SPACES WHERE THE COMMUNITY CAN ACCESS COMMUNITY AND SOCIAL SERVICES

2. ACT INFRASTRUCTURE PLAN 2020
   - PHYSICAL, SOCIAL AND DIGITAL INFRASTRUCTURE

3. COMMUNITY INFRASTRUCTURE CAN PROVIDE A 'THIRD PLACE'

4. DIGITAL ACCESS TO SERVICES/PROMOTING DIGITAL EQUITY AND DIGITAL LITERACY

5. WHAT IS THE ROLE OF A PHYSICAL PLACE?

WHO IS RESPONSIBLE?

1. PUBLIC, PRIVATE OR NOT-FOR-PROFIT SECTOR PROVISION

2. OPERATION VS CONSTRUCTION AND MAINTENANCE

3. RETURN ON INVESTMENT

4. SECURE ANCHOR SERVICE OR PARTNERS

Molonglo 3 East

WHAT IS ACTUALLY NECESSARY?

1. OPPORTUNITY TO RATIONALISE PROVISION OF CERTAIN INFRASTRUCTURE

2. WHAT CAN MOLONGLO SPECIALISE IN FOR COMMUNITY INFRASTRUCTURE?
   - WHAT ORGANISATIONS ARE ASKING FOR SPACE?

3. APPLIES TO RECREATIONAL/OPEN SPACE MORE THAN OTHER TYPES OF COMMUNITY INFRASTRUCTURE.
   - SPORTSGROUNDS PRIVILEGED OVER OTHER OPEN SPACE
   - LINEAR PARKS FOR WALKING, RUNNING AND CYCLING
   - TURN UP AND PLAY

PERFORMANCE BASED APPROACH

1. CAN MOLONGLO PROVIDE FEWER SERVICES BETTER?

2. FOUR DETERMINING FACTORS:
   - QUALITY OF INFRASTRUCTURE
   - DISTRIBUTION OF INFRASTRUCTURE
   - QUANTITY OF INFRASTRUCTURE
   - SCALE OF INFRASTRUCTURE

3. INFORMED BY COMMUNITY NEEDS ASSESSMENT

Molonglo 3 East

Stream 2

MINI Q

Stream 3

WATER MANAGEMENT & SERVICES

HYDROLOGY

KEY TO STORMWATER MANAGEMENT WILL BE STRATEGICALLY ALIGNING WITH THE TRANSPORTATION CORRIDORS AND PLACE MAKING MASTERPLAN – TOPOGRAPHY DRIVEN

Molonglo 3 East

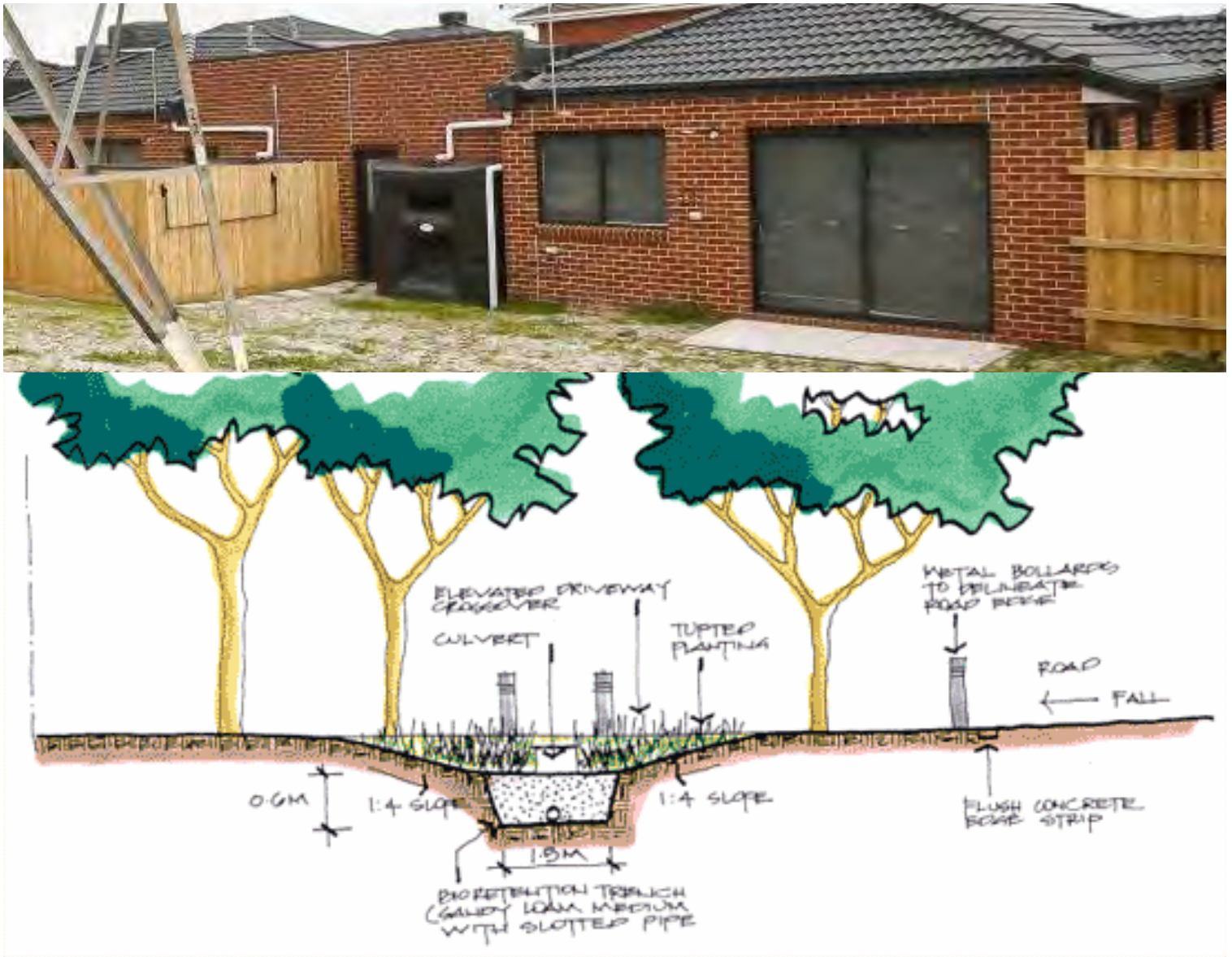
INFRASTRUCTURE

EASEMENTS –

MAKING BEST USE WATER AND ELECTRICAL EASEMENTS

Molonglo 3 East

DIVERSIONS OF KEY INFRASTRUCTURE



I.E 900MM DIA TRUNK WATER AND O/H POWER AND STORMWATER

STORMWATER TREATMENT WSUD LOOKING AT COMMUNITY FACILITIES RATHER THAN PLOT-BY-PLOT

Stream 3

MINI Q

Stream 4

VISIONING

RobertsDay

APPENDIX G

STAKEHOLDER PRESENTATIONS:

2 - OPTIONS WORKSHOP

Molonglo 3 East

Options Workshop

July 2020

RobertsDay WSP elton consulting

Session_01

INTRODUCTION

MOLONGLO 3

WELCOME

STRUCTURE PLAN OPTIONS WORKSHOP

FOR THE MOLONGLO 3 EAST PLANNING AND INFRASTRUCTURE STUDY

AGENDA

SESSION_01 - **INTRODUCTION / OBJECTIVES**

SESSION_02 - **CHARACTER AREAS**

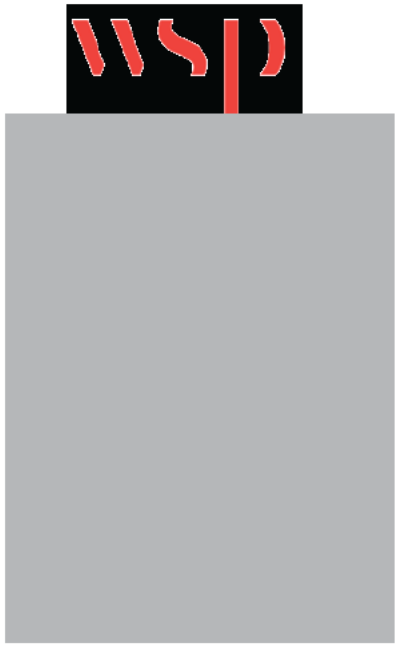
SESSION_03 - **STRUCTURE PLAN OPTIONS**

SESSION_04 - **TRANSPORT**

SESSION_05 - **INFRASTRUCTURE**

SESSION_06 - **NEXT STEPS**

INTRODUCTIONS

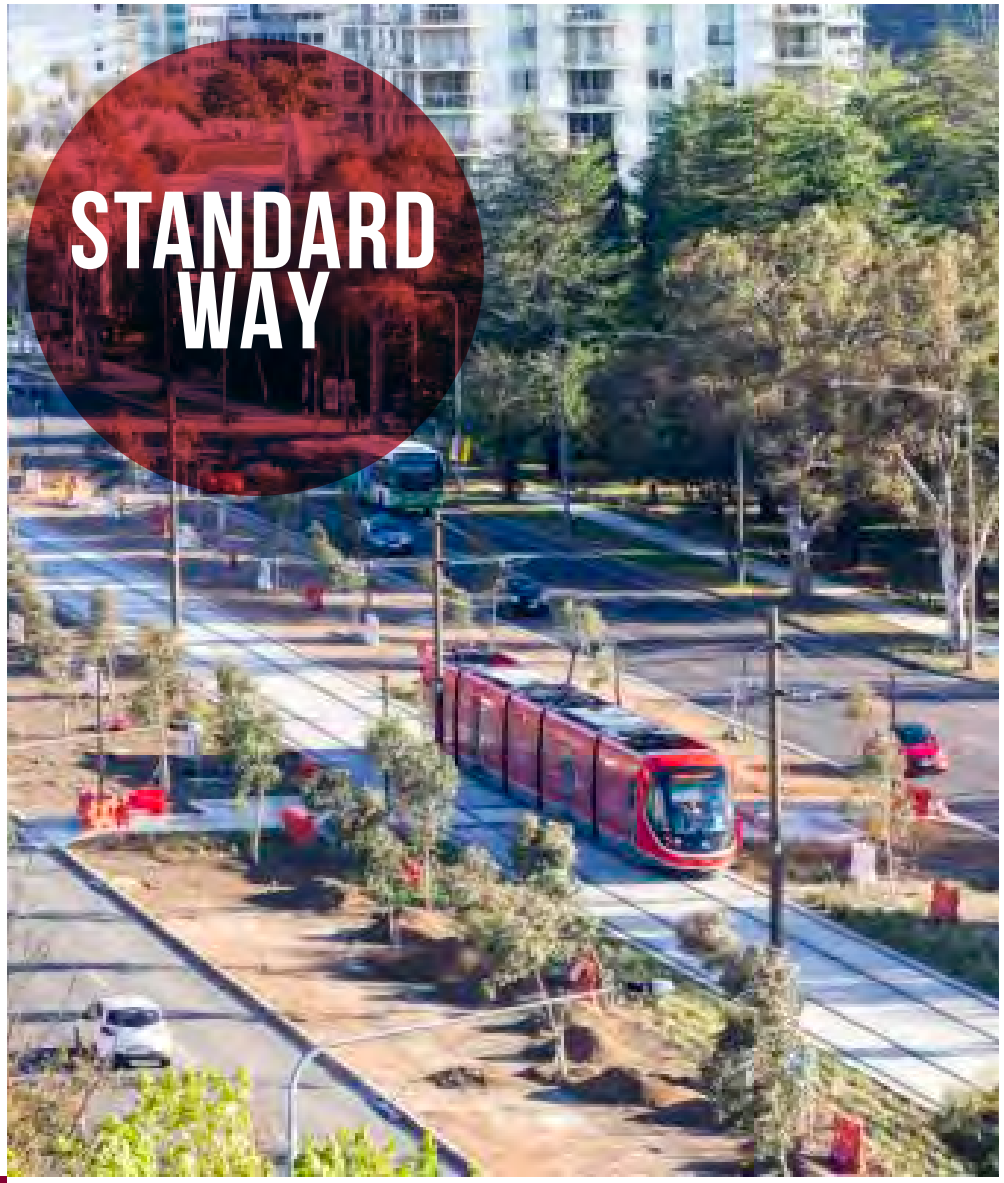


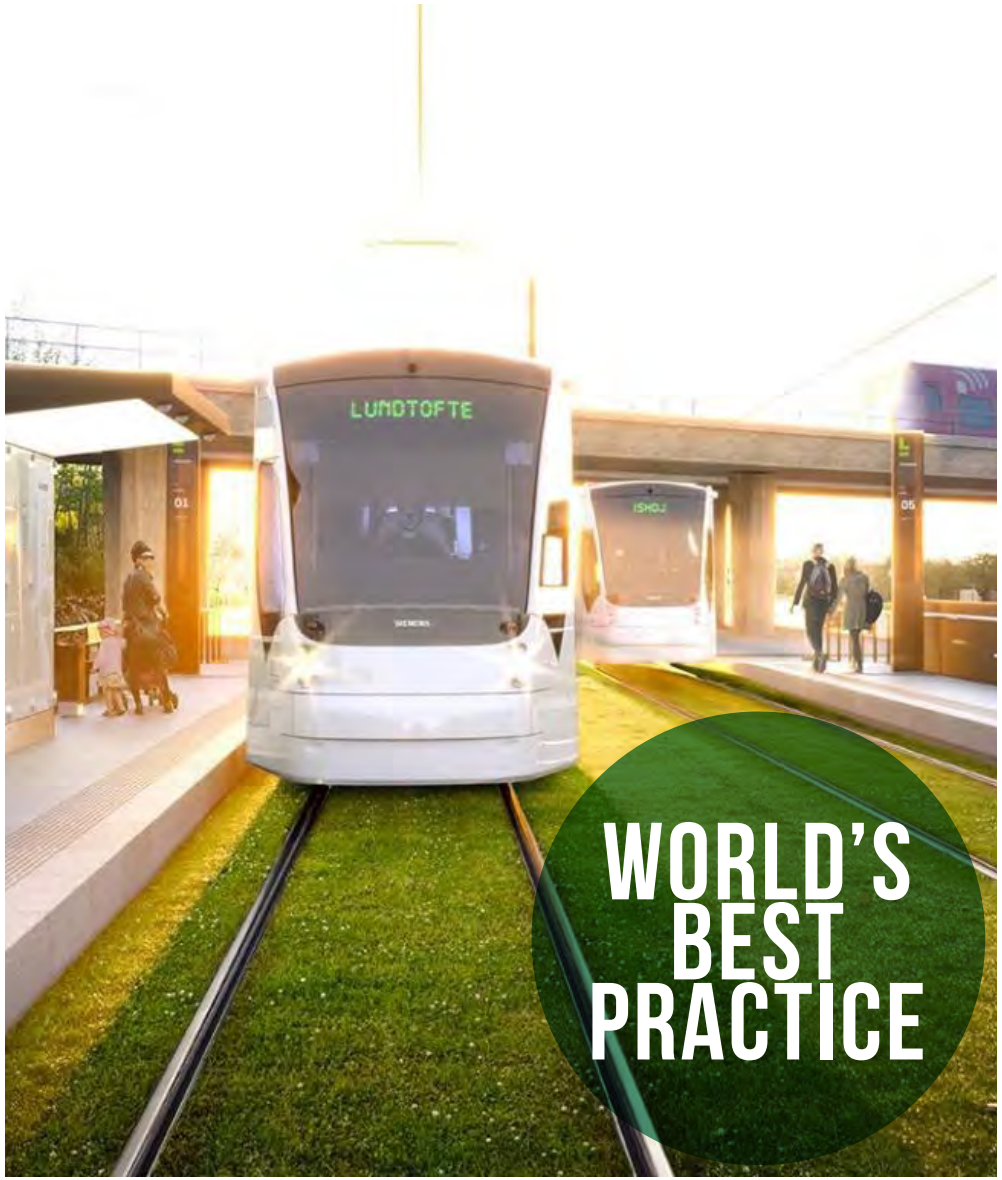
Beljic, Miloje
Paynter, Patrick
Cousins, Meagan
Browning, Kerry
Santosuosso, Daniel
Powell, Rebecca
Richardson, Dave
Tennent, Simon
Cox, Simon
Russell, Meaghan
Watts, Michaela
Larson, Eliza
Clement, Sophie
Gianakis, Steven
Lashkari, Mohammadali
Elliott, Tim
Saddler, Scott
Stewart, Alison

Maher, Colin
Pearson, Julie
Coffey, Gerard
Steele, Peter
Catbagan, Jerome
Wyatt, Tim
Barnett, Vanessa
Joseph, Gabriel
Bell, Jeff
Starrs, Danswell
Cameron, Lesley
Piani, Adrian
Crocker, Leigh
Pillig, Carl
Chandramohan, Chandra
Lutwyche, John
Hambrick, Carrell

PROJECT VISION & OBJECTIVES

CONVENTIONAL VS REFORM



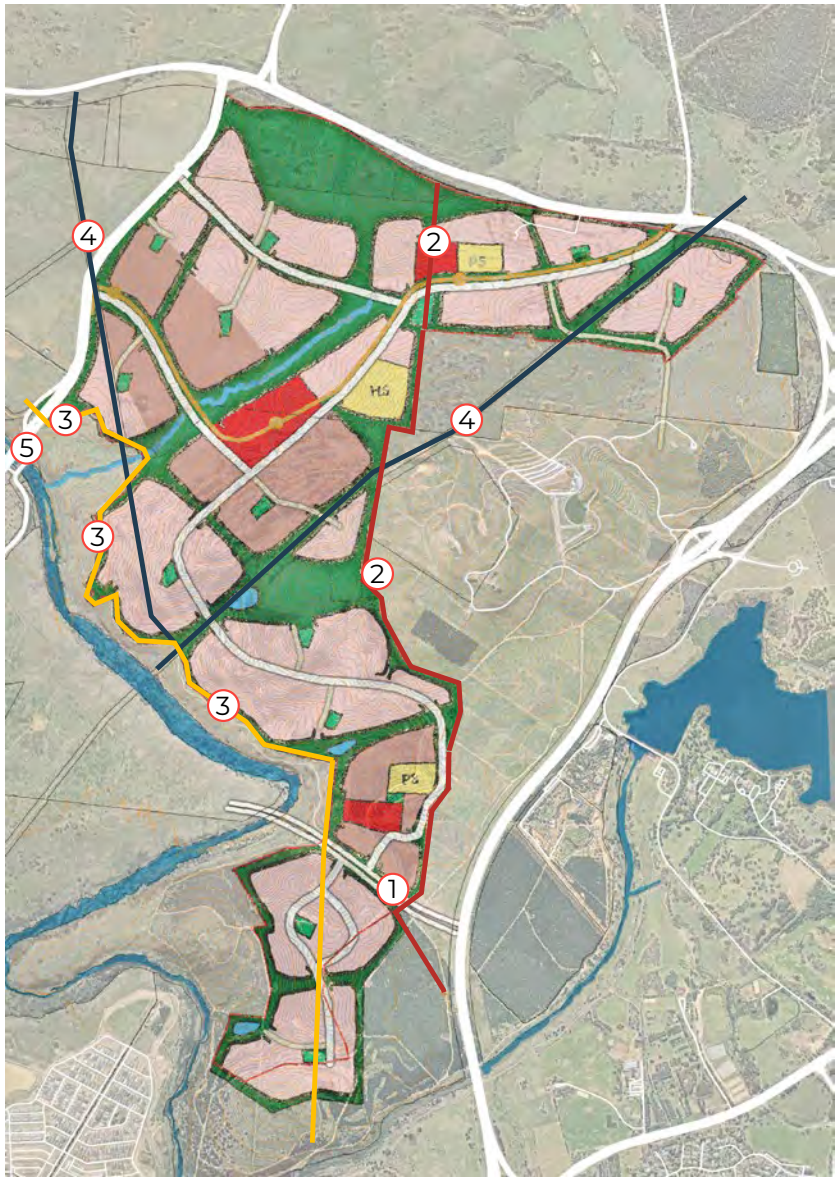


INTERFACE PROJECT ASSUMPTIONS

KEY UNKNOWN INTERFACES

1. EAST-WEST ARTERIAL (STAGGERED INTERSECTION)
2. 132KV UNDERGROUNDING
3. EXISTING SEWER
4. WATER MAIN
5. JOHN GORTON DRIVE

- UNKNOWN: ARBORETUM CONNECTIONS - SECONDARY ACCESS



Session_02

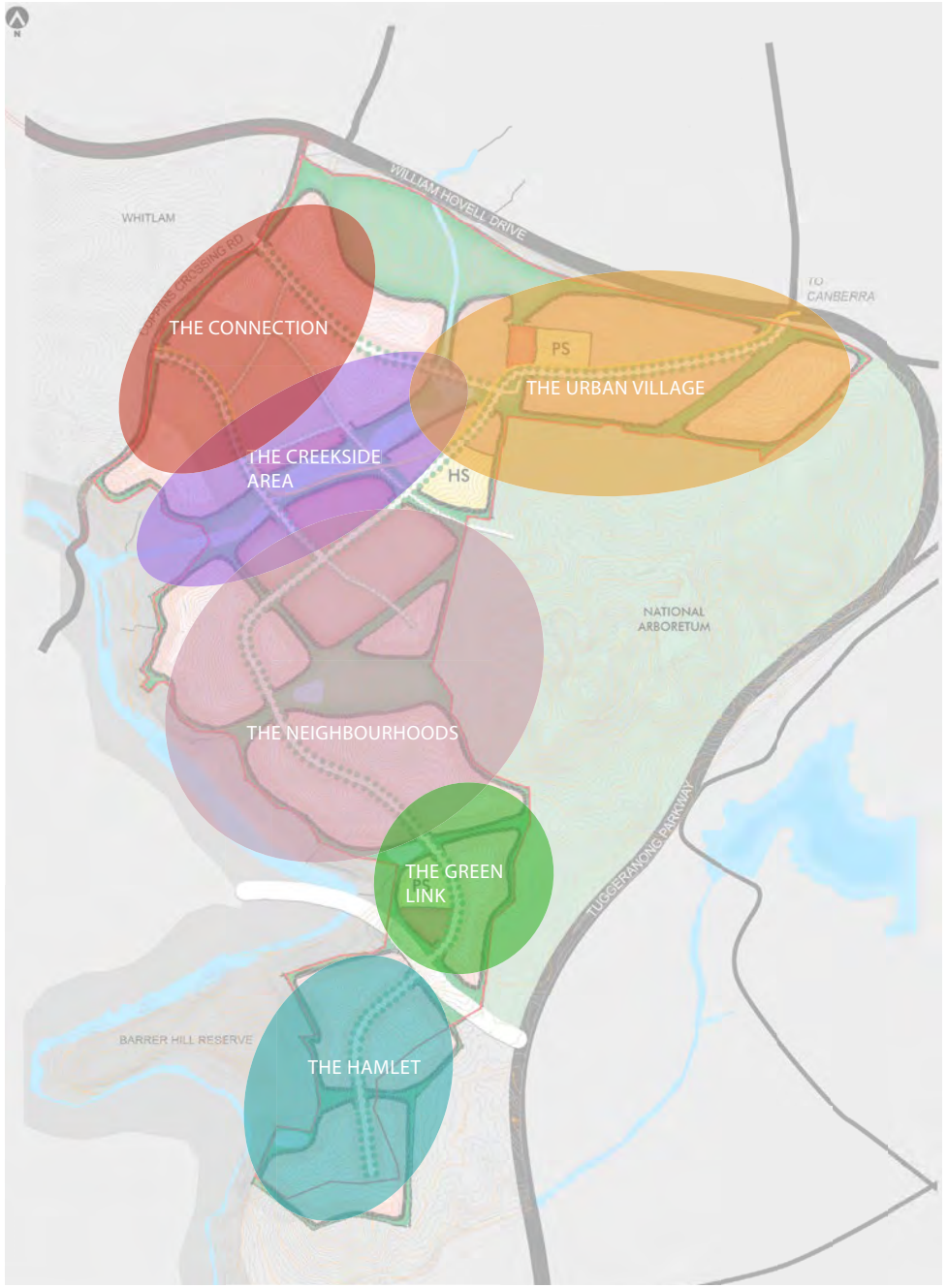
CHARACTER AREAS

MOLONGLO 3

CHARACTER AREAS

The unique Principles and Guidelines for the Character Areas may include:

- **Context Sensitive Streets**
- **Slope Responsive Building Typologies**
- **Acceptable interface solutions:** *Molonglo River, Arboretum, Coppins Creek*
- **Landscape Character**



CHARACTER AREAS

CHARACTER AREAS VISION

THE HAMLET

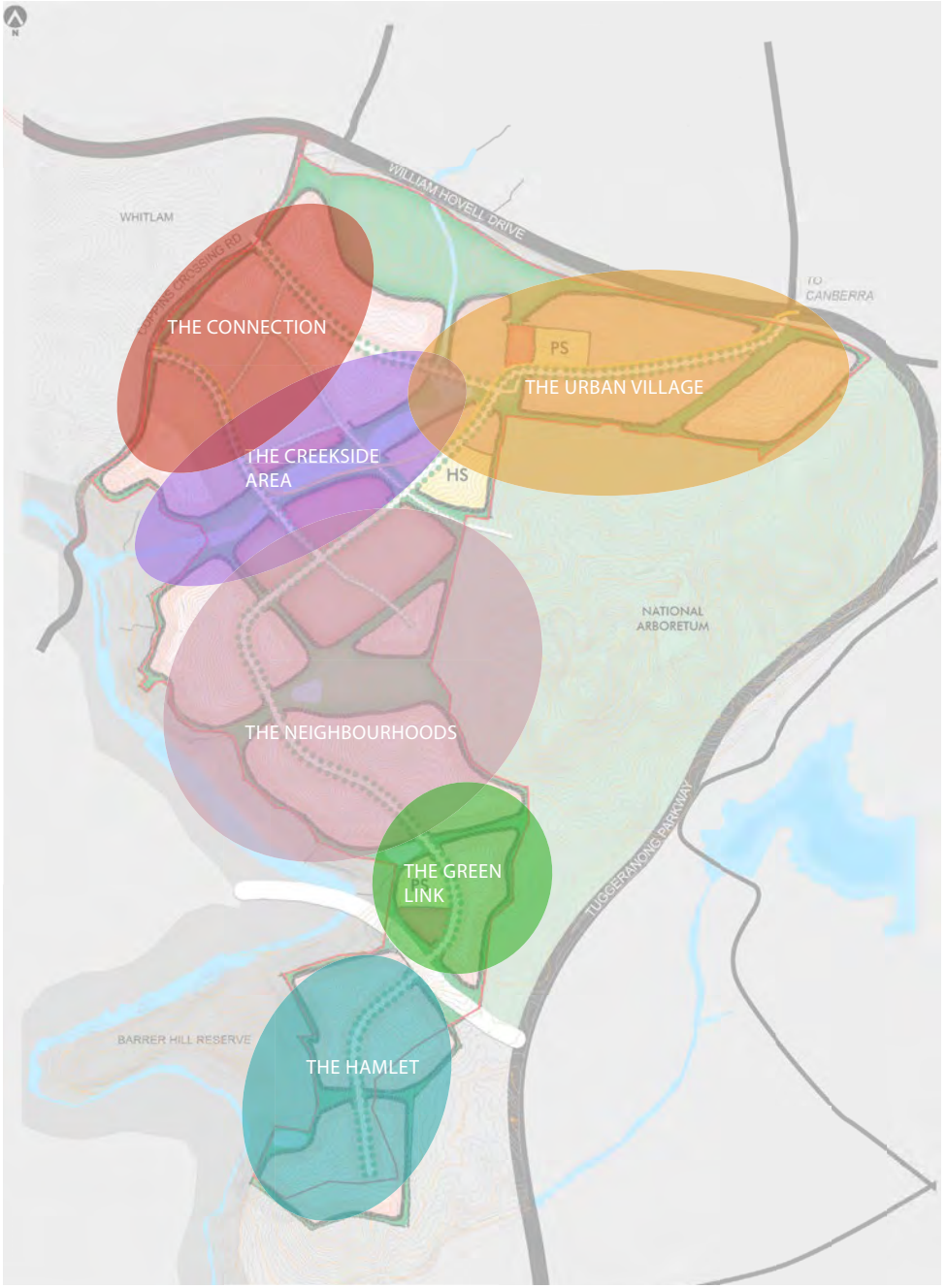
- The Hamlet provides an opportunity to connect on a closer, more intimate scale.
- It's a place to pause, reflect and enjoy the best that life has to offer.
- Ample planting and 'old pine' forests will help give the community an established and secluded feel.
- The Hamlet is the gateway to the protected Molonglo River corridor, with focus given to the environmental qualities.
- This quiet community will enjoy large blocks, views in each direction of surrounding hills and River, as well as close access to the city and transport.

THE NEIGHBOURHOODS

- The Neighbourhoods is the spot for families who want cricket in the yard, and kids playing in the street.
- Sat between the National Arboretum and a large open park, families can ride their bikes, take a walk or picnic under a tree.
- It's a slower pace of life here, away from the hustle and bustle of the city and with lots of space to explore.
- It features traditional 'garden city' open front yards, wide footpaths, shaded and active travel

THE CONNECTION

- Adjoining key arterial roads, the Connection is the spot to be to access all of Canberra
- With undulating views, and still close to the amenity of the Urban Village, the Connection will link residents to the broader Molonglo region



CHARACTER AREAS

CHARACTER AREAS VISION

THE GREENLINK

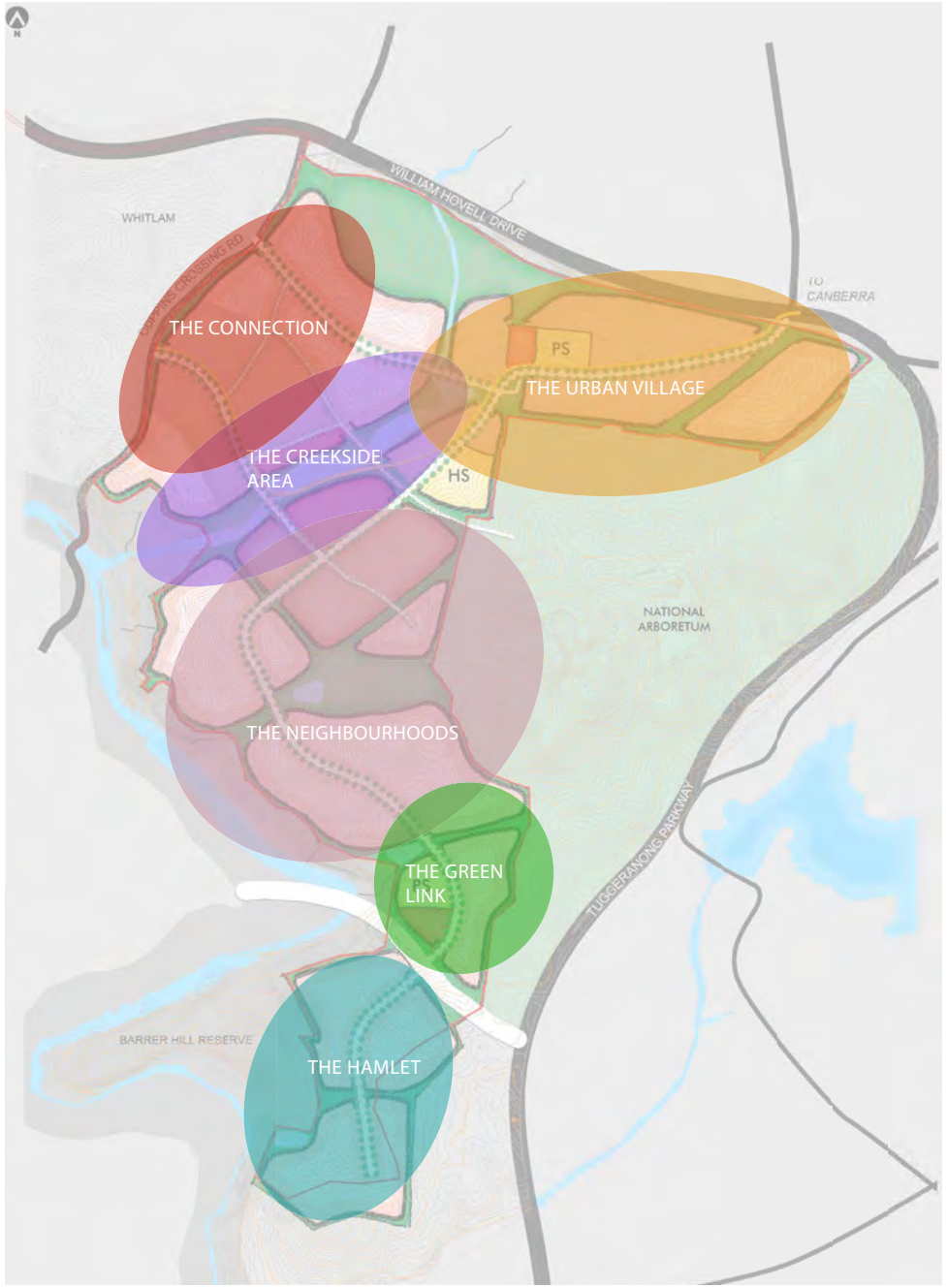
- The Green Link is the place to learn and play.
- Located on a small green perch between the Molonglo River corridor and a primary school, it gives opportunity to explore outdoors and understand the lessons provided by nature.
- The Green Link touches lightly, with smaller footprints that maintain a strong connection to the environment.
- It provides a place to get lost in the landscape, with priority given to the pedestrian over petrol.

THE URBAN VILLAGE

- The Urban Village is a place to live and play
- It's a fringe-dweller, it's offbeat, but don't let that put you off
- With direct links to the city, it will attract younger crowds. It throws away rigidity, and provides a place for free expression and creative endeavours
- It comes alive at night, providing a bright, bubbling beacon within Molonglo
- There's a volume of adaptable spaces, allowing the village to grow, change and develop over time and with shifting needs

THE CREEKSIDE AREA

- The village is diverse, multicultural and inviting— it's the heart of Molonglo
- It provides a place to meet, get together, connect and share a meal
- It's active all day, and into the night with local businesses providing a place to shop, eat, drink, wind down, have fun and get to know your community
- It's protected from the elements, with urban connection to the foreshore
- It's a good neighbour – providing amenity for residents, while being sensitive to its surrounds
- It's the quieter, family-friendly sister to the urban village. It's easy to get to, accessible, and you don't need a car



CHARACTER AREAS

INSPIRATION

	THE HAMLET	THE NEIGHBOURHOODS	THE CONNECTION	THE GREENLINK	THE URBAN VILLAGE	THE CREEKSIDE AREA
HOUSING						
ACTIVATION						
LANDSCAPE / STREETSCAPE						

Session_03

STRUCTURE PLAN OPTIONS

MOLONGLO 3

CONTEXT


BELCONNEN
BELCONNEN WAY
COULTER DR
BINDUBI ST
DICKSON
FUTURE LIGHT RAIL
LIGHT RAIL STAGE 1
NORTHBOURNE AVE
MT AINSLIE
WILLIAM HOVELL DR
WHITLAM
TELSTRA TOWER
CIVIC
WHITLAM LOCAL CENTRE
FUTURE LIGHT RAIL
CITY HILL
PARKES WAY
NATIONAL ARBORETUM
JOHN GORTON DR
TUGGERANONG PKWY
MOLONGLO TOWN CENTRE
FUTURE ARTERIAL
DENMAN PROSPECT
PARLIAMENT HOUSE
ADELAIDE AVE
COOMBS
FUTURE LIGHT RAIL

OVERVIEW

OPTION 1 - BUSINESS AS USUAL

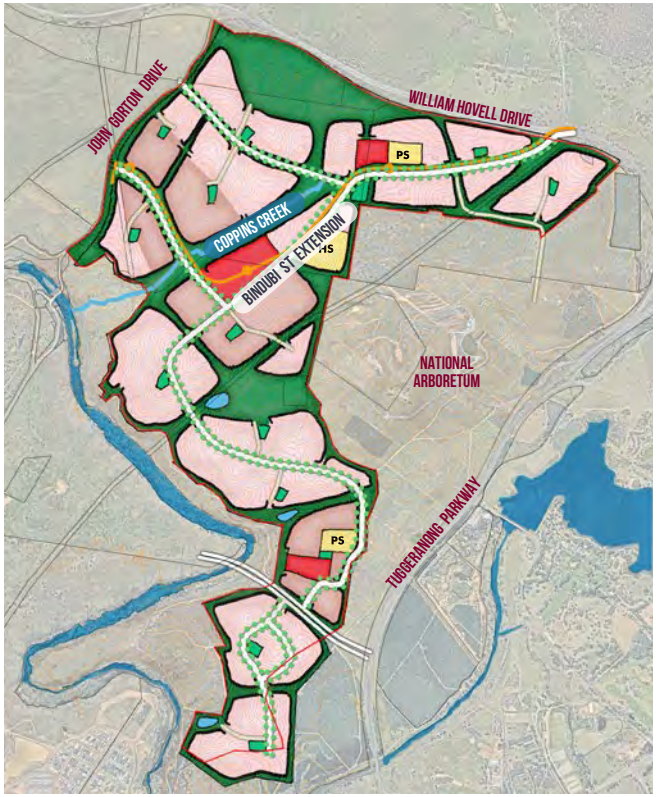
Traditional layout with Public Transport Corridor following Bindubi Street Collector Road through site.

OPTION 2 - PUBLIC TRANSPORT CREEK CROSSING

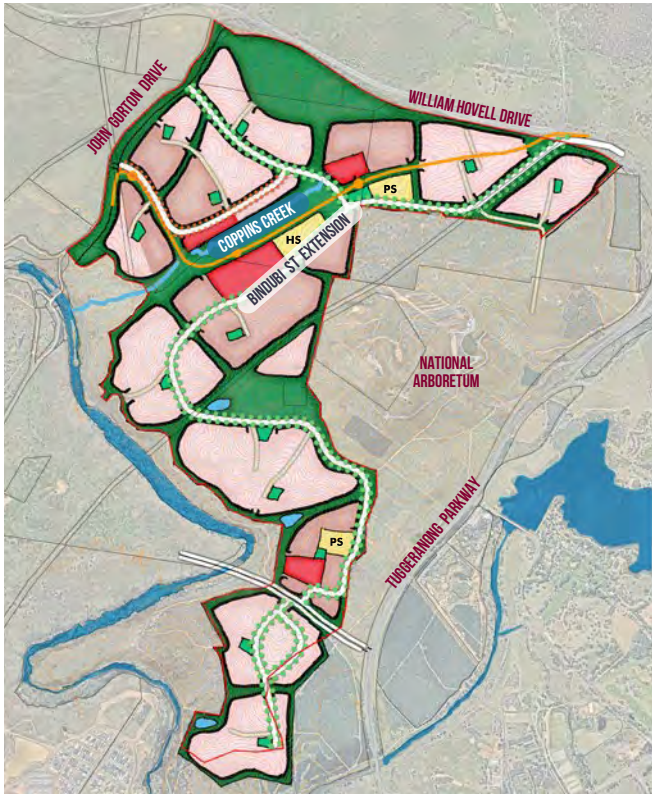
Limit Coppins Creek crossing to Public Transport and Active Travel only.

OPTION 3 - SLOW SPEED ENVIRONMENT

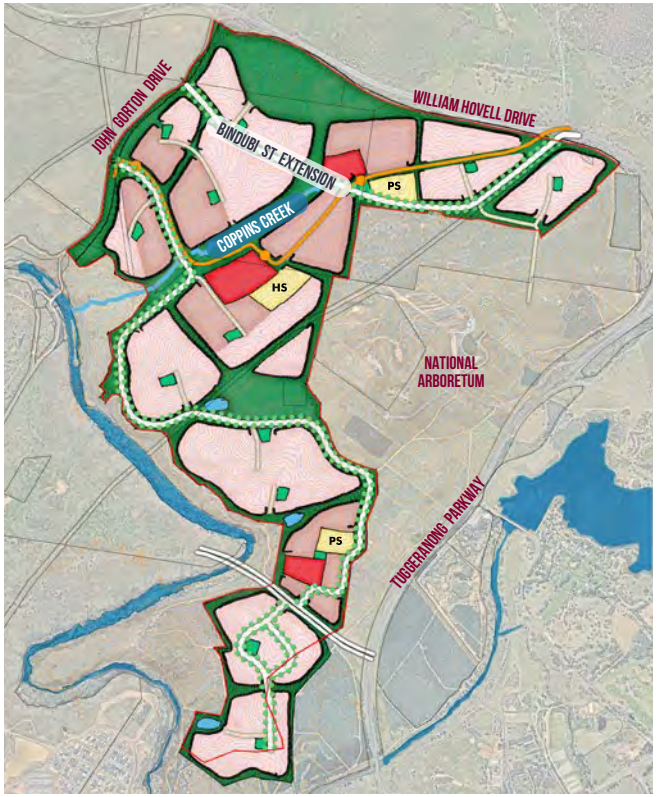
Prohibit Collector Road past/through the Group Centre, and provide Collector Roads to edge of neighbourhoods to encourage a Slow Speed environment.



OPTION 1



OPTION 2

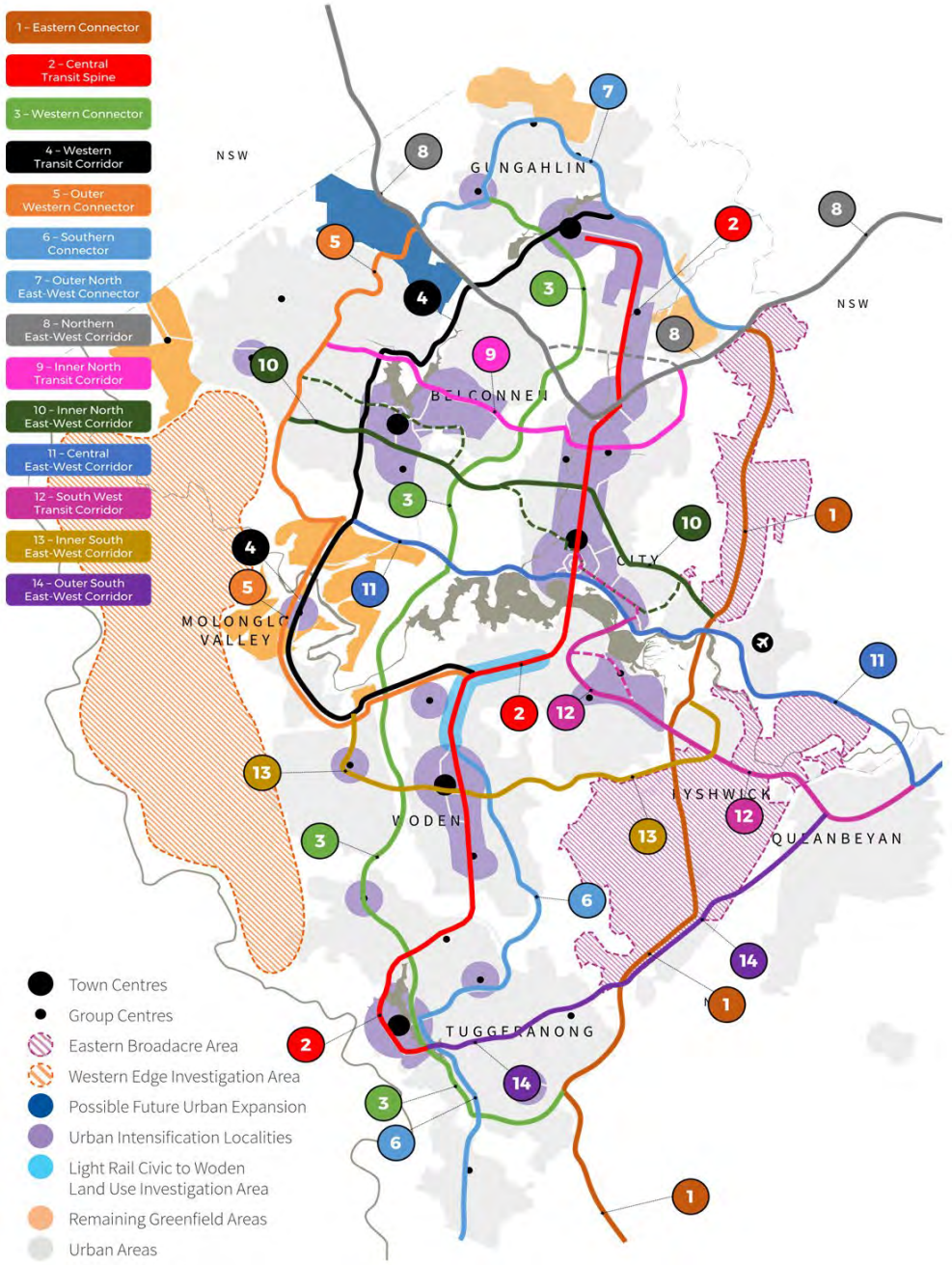


OPTION 3

TRANSPORT NETWORK CONTEXT

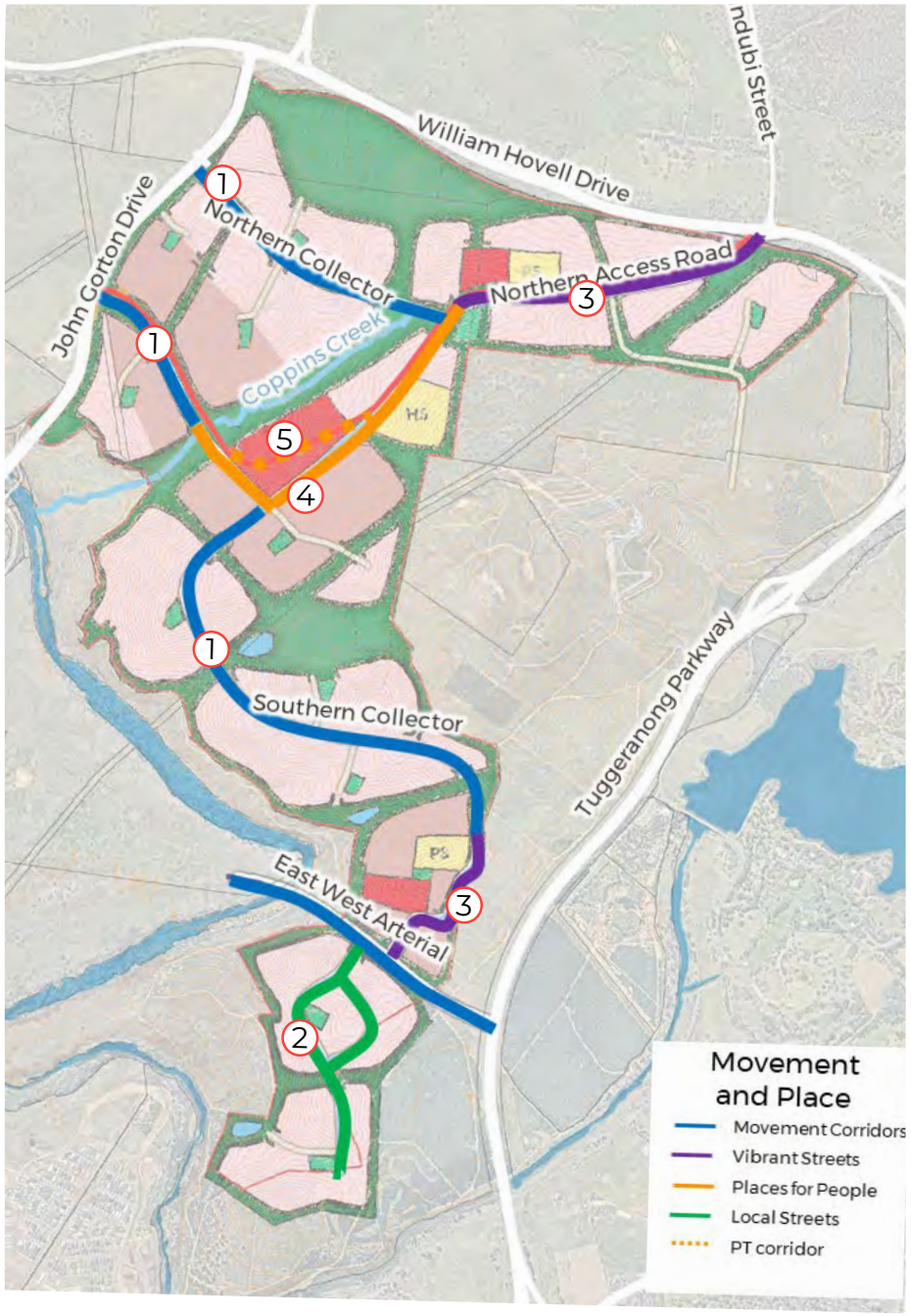
BOUNDING ROADS:

- **William Hovel Drive: 11| Central East-West Corridor**
- **John Gorton Drive: 4 | Western Transit Corridor and 5 | Outer Western Connector**
- **Tuggeranong Parkway: 3 | Western Connector**



MOVEMENT AND PLACE

1. **Collector roads form the Movement Corridors through the precinct. The bounding roads are also serve a primarily movement function.**
2. **Local Streets have a lower movement function**
3. **Around the local centres are vibrant places**
4. **Places for people should be focussed through the group centre, prioritising place function over movement**
5. **Public transit is decoupled from the road corridor and can continue to provide a high place function**



OPTION 1

Business As Usual

CONVENTIONAL
NEIGHBOURHOOD DESIGN

11.2KM KEY ROADS

3.5KM RAPID TRANSIT

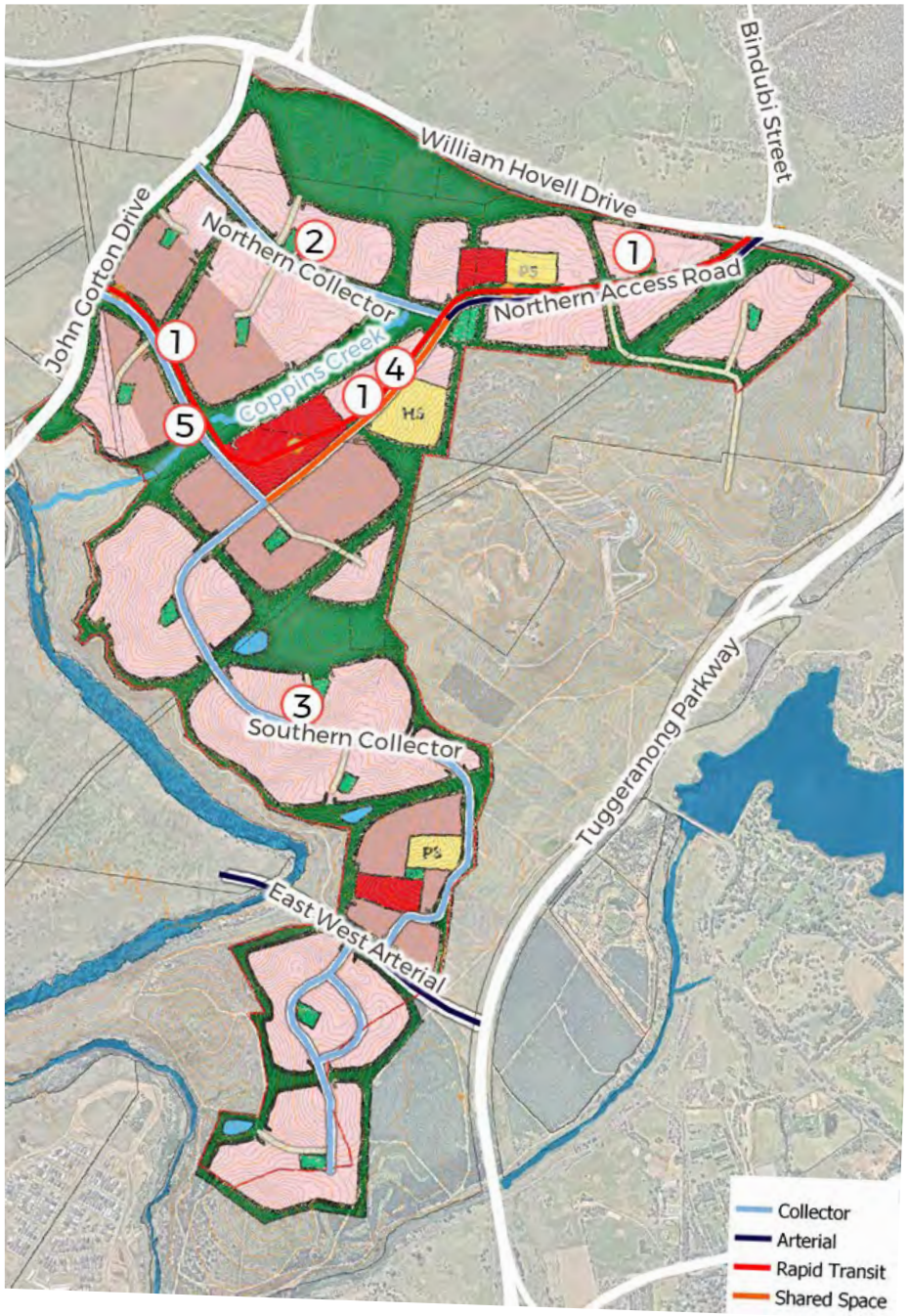
MEDIUM DENSITY HOUSING

1. Based on the proof of concept
2. Light Rail following Bindubi Street except within Group Centre
3. Collector Roads through the middle of neighbourhoods

OPTION 1

OPTION 1_TRANSIT

1. **Major active transport and public transport spine**
2. **Northern collector**
3. **Southern collector**
4. **Potential for a shared zone only with active and public transport links**
5. **Potential for an active and public transport only bridge**



OPTION 2

Public Transport Creek Crossing

ACTIVE TRAVEL
BRIDGE CREEK CROSSING

SEPARATE
RAPID TRANSIT CORRIDOR

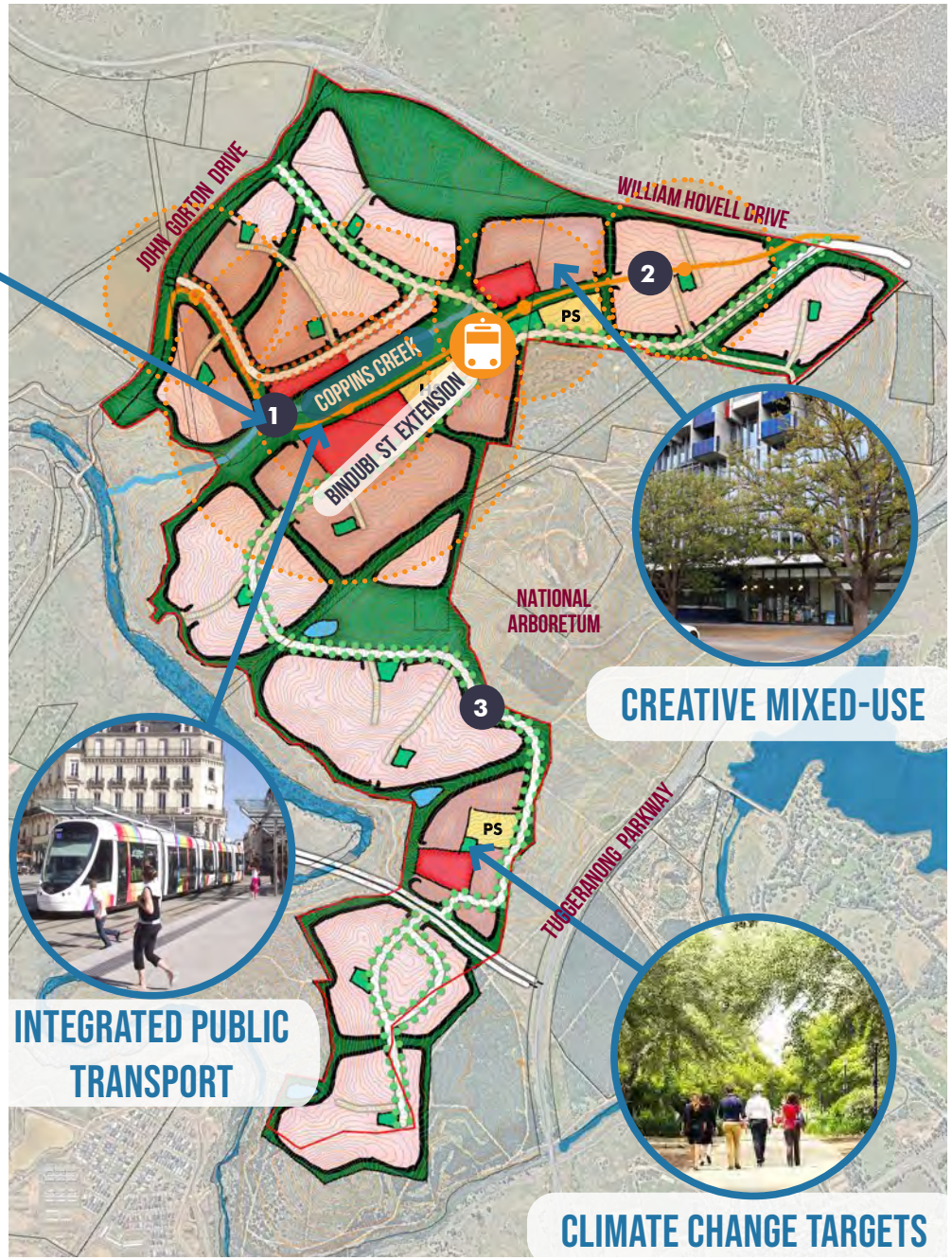
10.5KM KEY ROADS

1.4KM MINOR ROADS

3.5KM RAPID TRANSIT

ACTIVE TRAVEL / PUBLIC TRANSPORT CREEK CROSSING

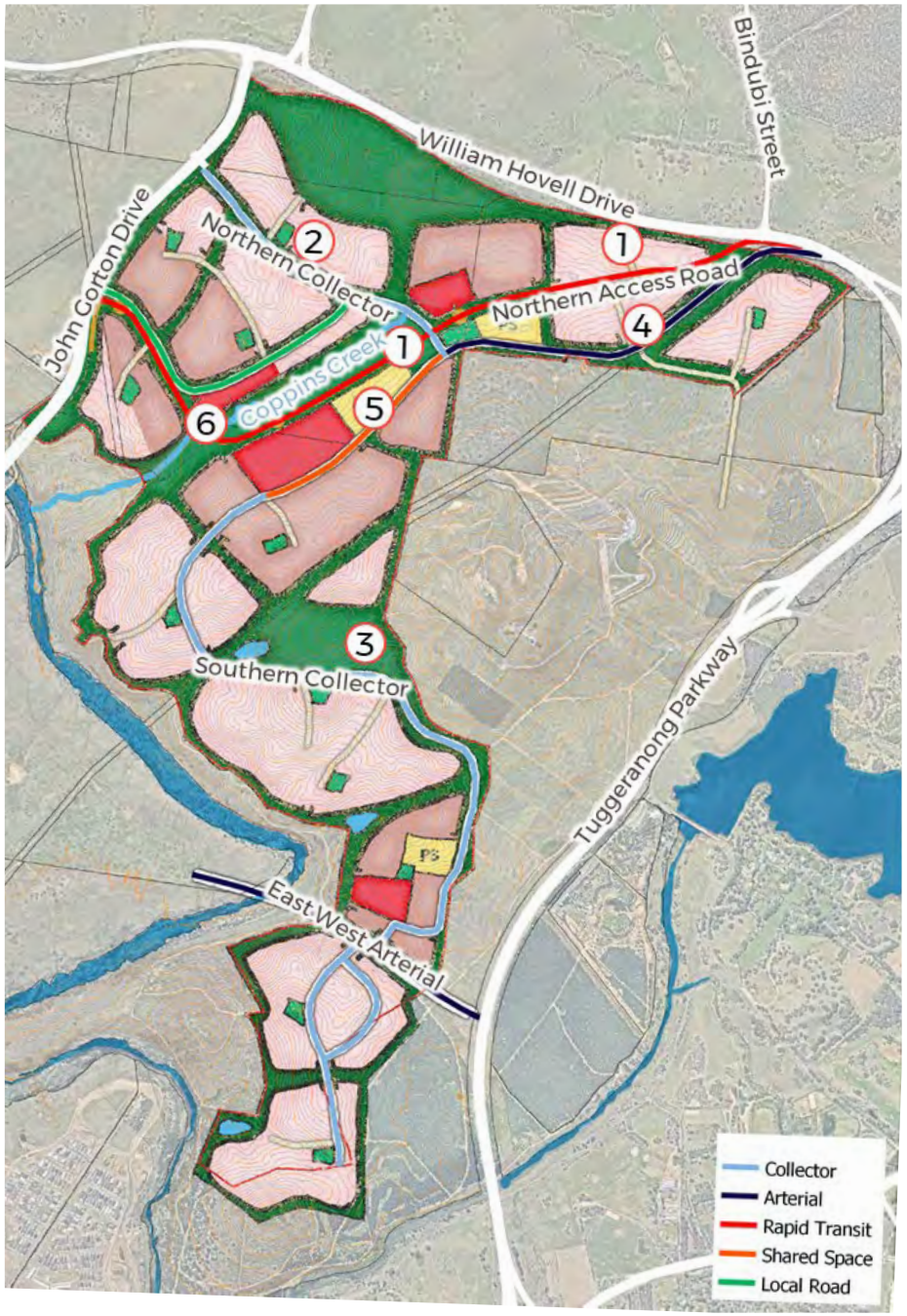
1. Only allow the Light Rail and Active Travel to cross Coppins Creek at the southern end
2. Light Rail does not follow alignment of collector road but is within its own corridor and follows along creek corridor
3. Collector Road within *'The Neighbourhood'* character area is on the edge to allow for creation of slow speed environments



OPTION 2

OPTION 2_TRANSIT

1. **Mass transit corridor decoupled from the road corridor**
2. **Northern collector**
3. **Southern collector**
4. **Northern Access road**
5. **Shared zone and high quality pedestrian spaces**
6. **Active travel and public transit only bridge**



OPTION 3

Northern Bindubi Street Connection

SLOW SPEED
NEIGHBOURHOODS

585M ADDITIONAL
DEVELOPABLE CREEK FRONTAGE

10.8KM KEY ROADS

3.5KM RAPID TRANSIT

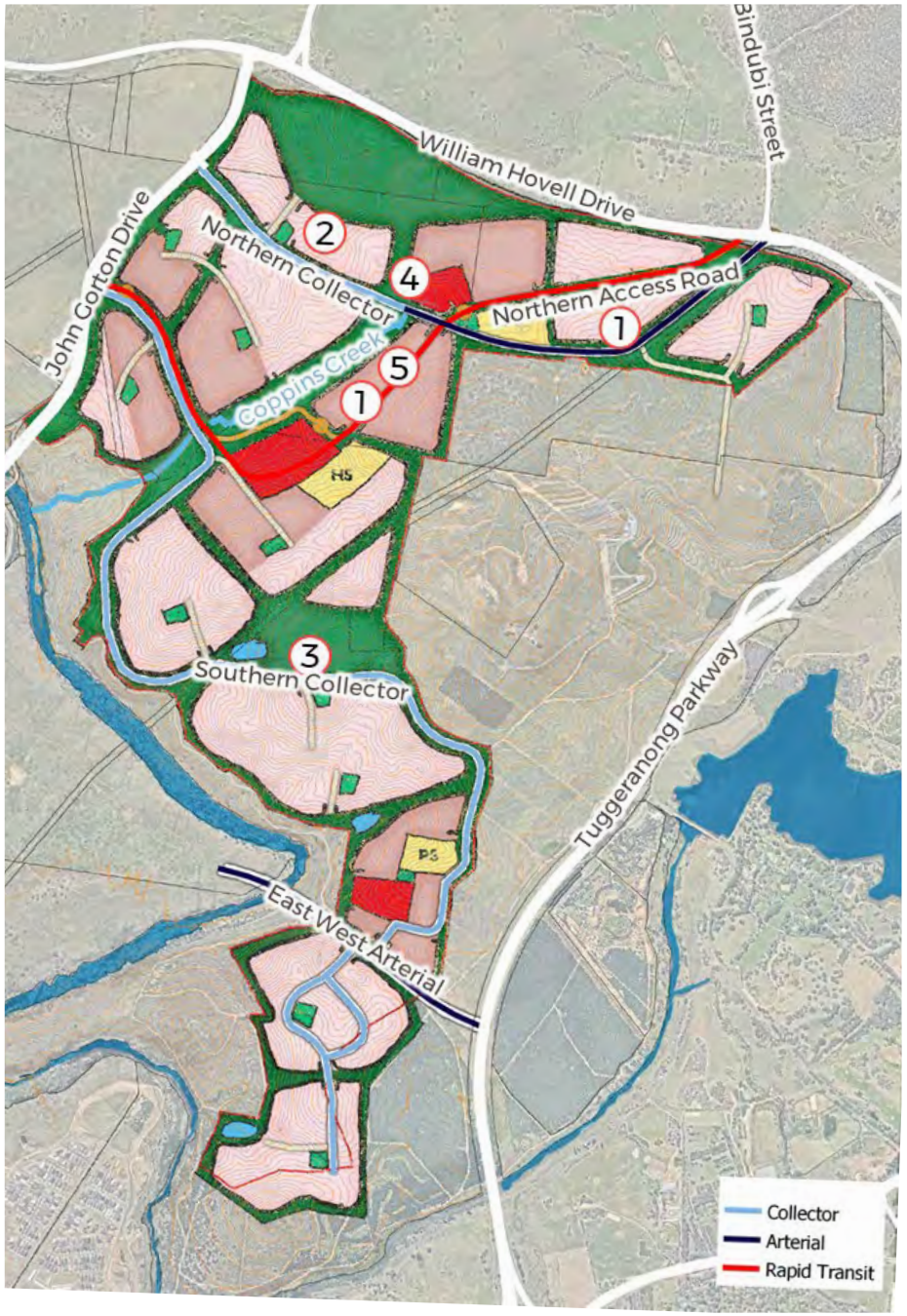
CREEKFRONT PROMENADE

1. This option looks at limiting *'Rat Running'* through or past the Group Centre by not providing Collector Roads through the middle of the site
2. Bindubi Street connects at the northern intersection on John Gorton Drive (not a beneficial route for 'rat running')
3. Create a slow speed environment around the Group Centre and prioritise public transport / active travel
4. Light Rail in separate corridor from Collector Roads
5. Put Collector Roads on edge of *'The Neighbourhoods'* Character Area for Slow Speed Environments

OPTION 3

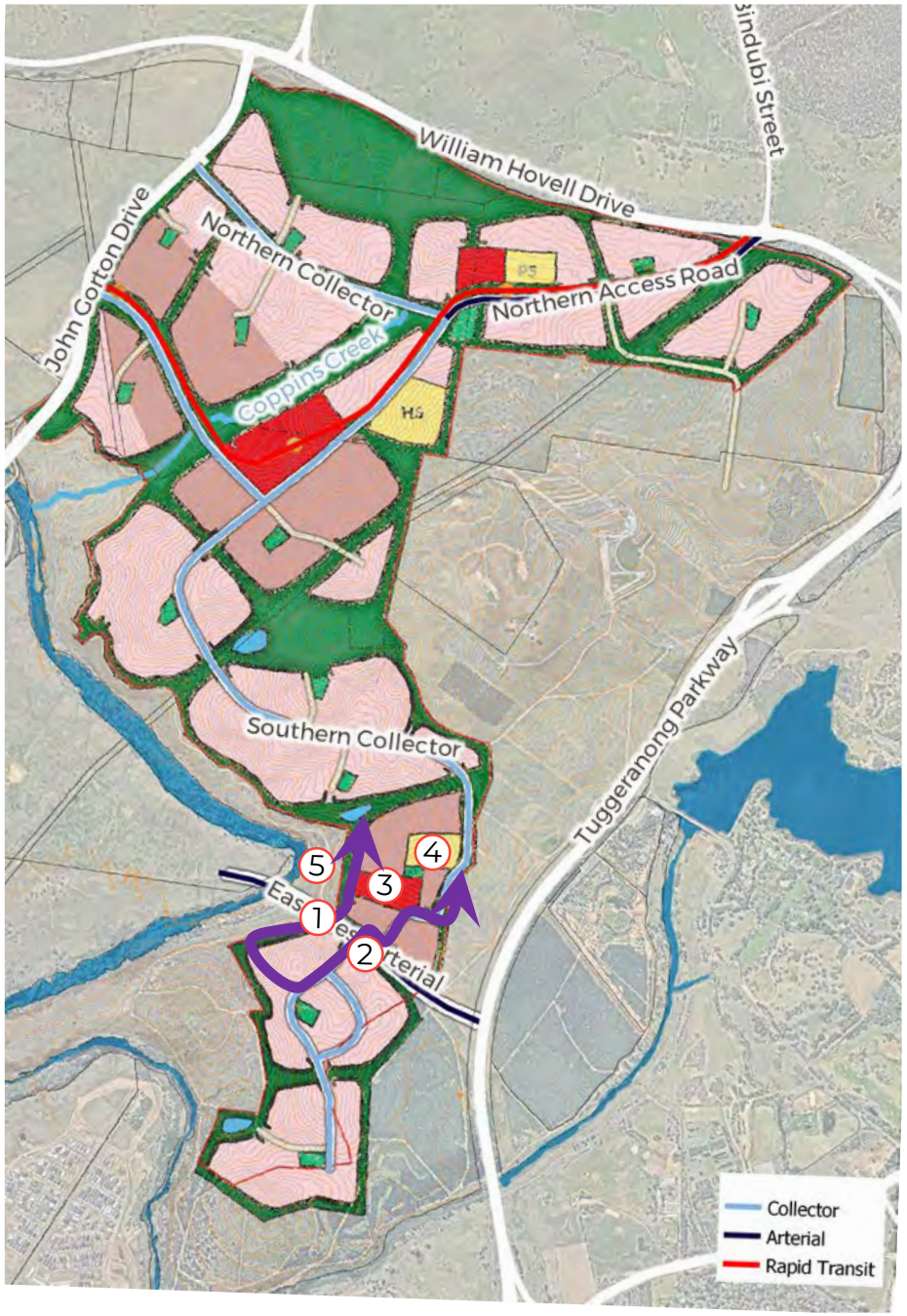
OPTION 3_TRANSIT

1. **Major active transport and public transport spine**
2. **Northern collector**
3. **Southern collector**
4. **Priority bridge to reduce rat running**
5. **Shared zone opportunity**



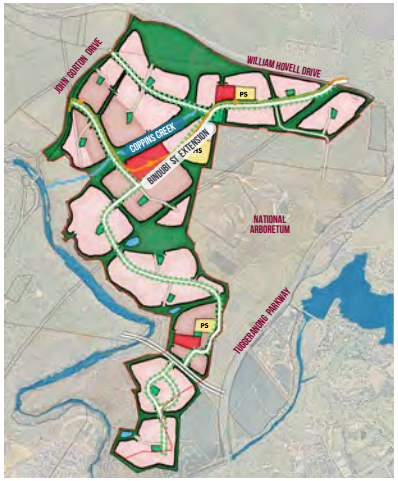
OPTIONAL SOUTHERN ACCESS CONFIGURATION

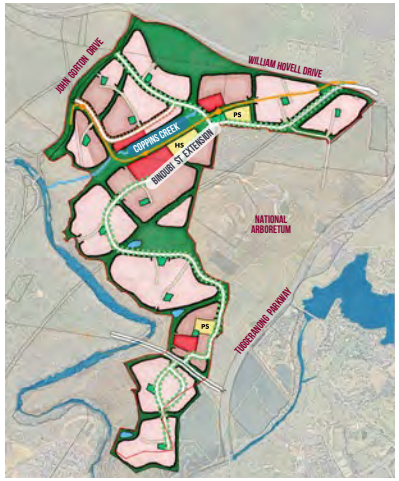
1. **Underpass option**
2. **Proposed at grade staggered intersection**
3. **Local Centre**
4. **Primary School**
5. **Molonglo River Corridor connections**

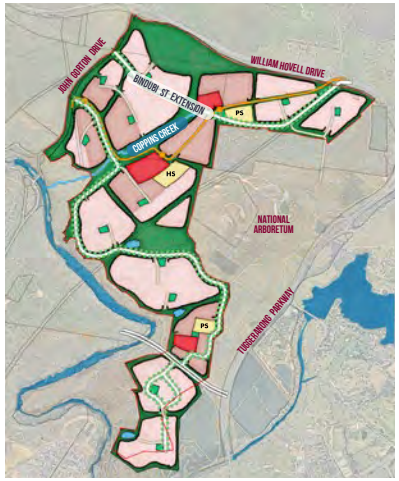


OPTION COMPARISON

	OPTION 1	OPTION 2	OPTION 3
ENVIRONMENTAL		10% Increase in tree canopy	10% Increase in tree canopy
ROADS SURFACE	X m^2	X m^2	X m^2
TRANSPORT SERVICES	Baseline patronage	% Increase in Public Transport / Active Travel	% Increase in Public Transport / Active Travel
COMMUNITY CONNECTIONS	0.8km Bus Route Interface directly with Aboretum	2.7km Bus Route Interface directly with Aboretum / major open space	4.0km Bus Route Interface directly with Molonglo River Corridor / Aboretum
DENSITY	87.5 HA	102.3 HA	104.6 HA
ACTIVATION / INVESTMENT	1,085m Retail along IPT	701m Retail Along IPT	744m Retail Along IPT





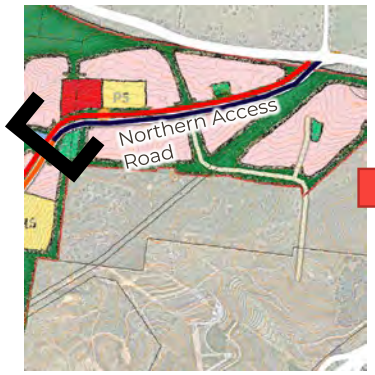


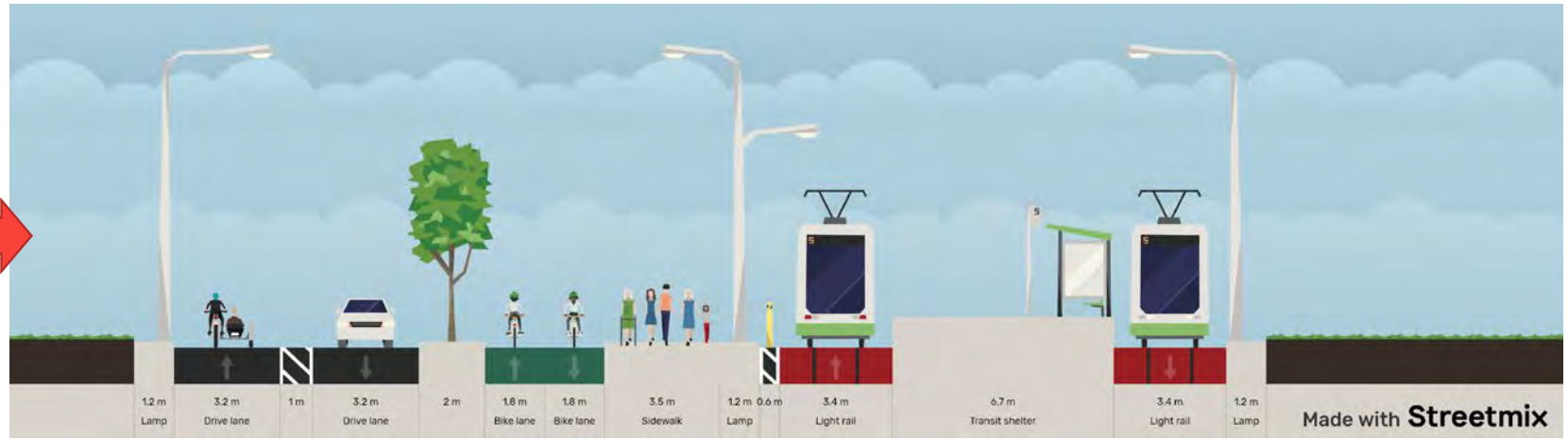
Session_04

TRANSPORT

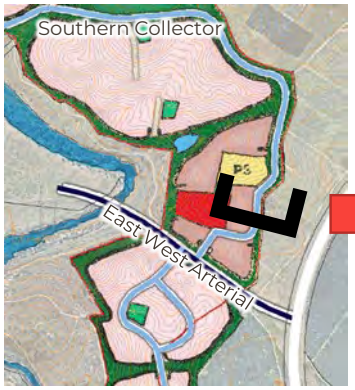
MOLONGLO 3

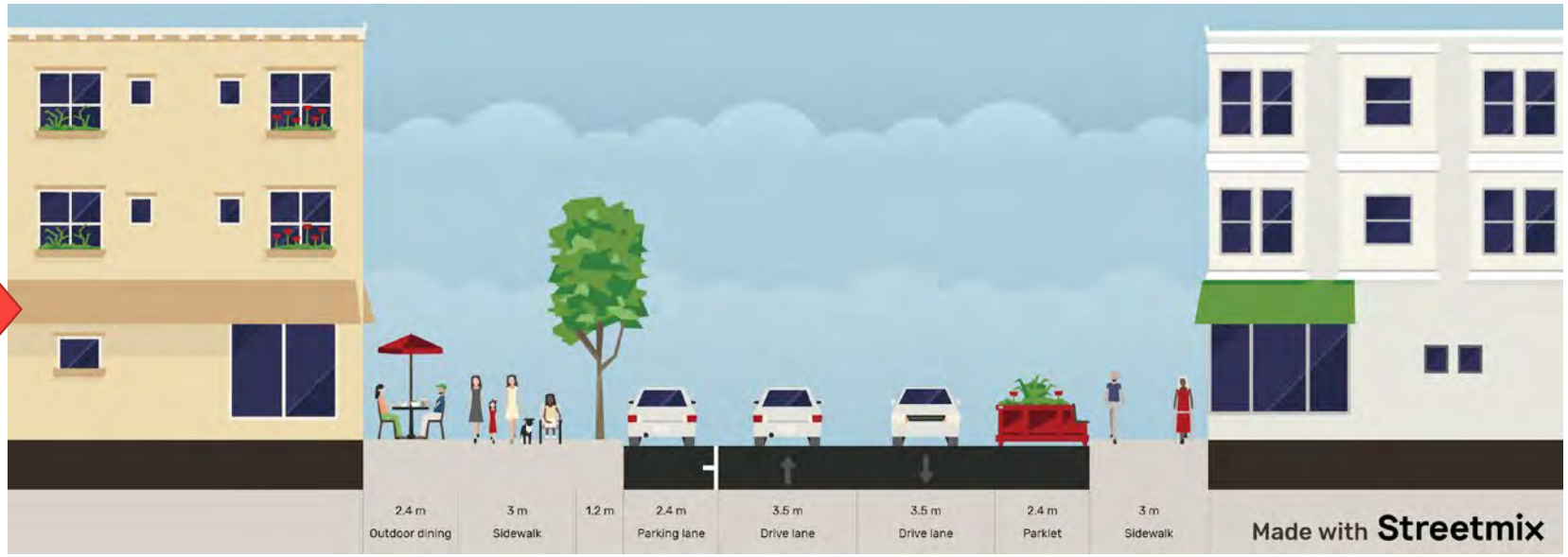
CROSS SECTIONS





NORTHERN ACCESS ROAD

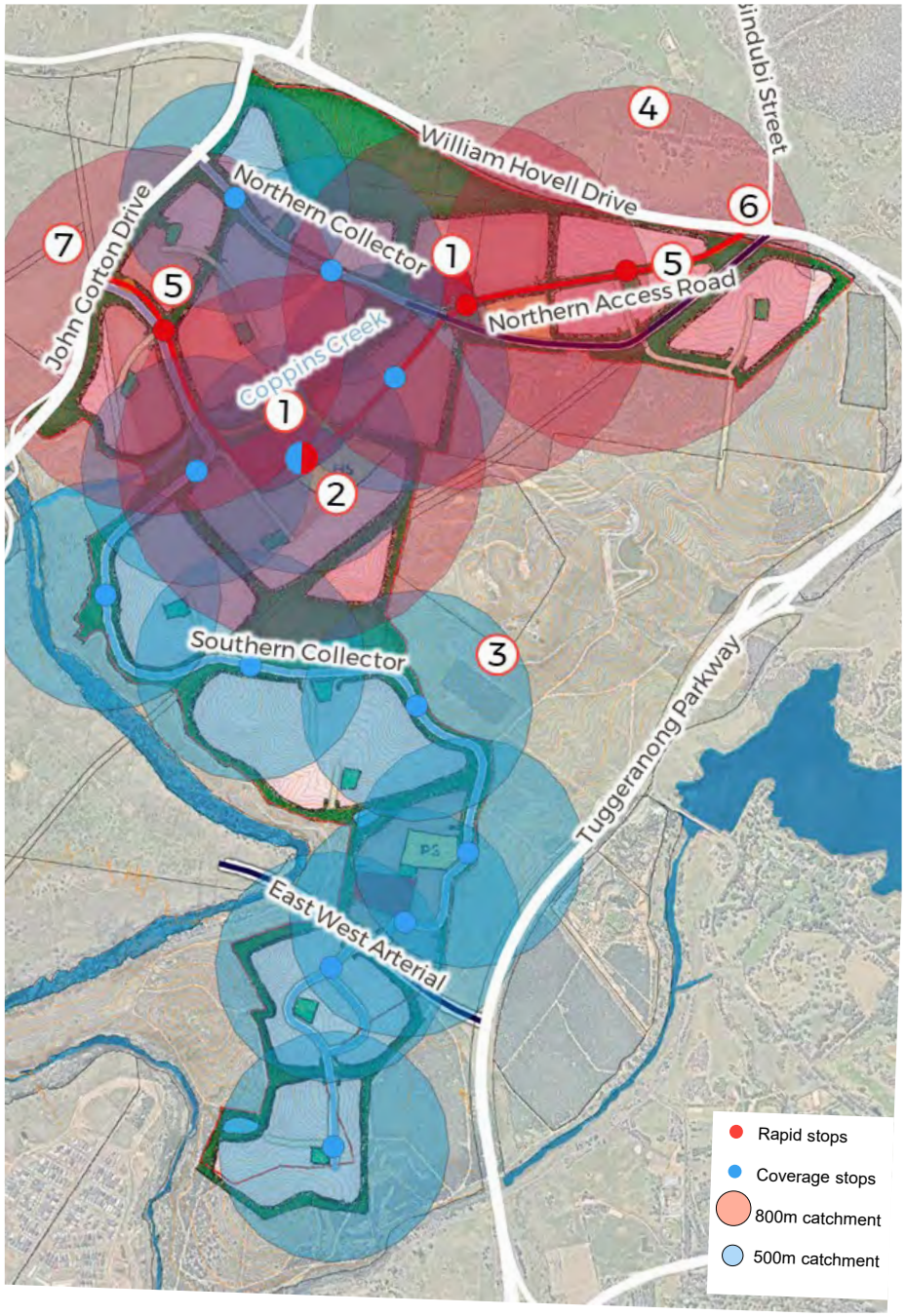




SOUTHERN COLLECTOR

PUBLIC TRANSIT NETWORK

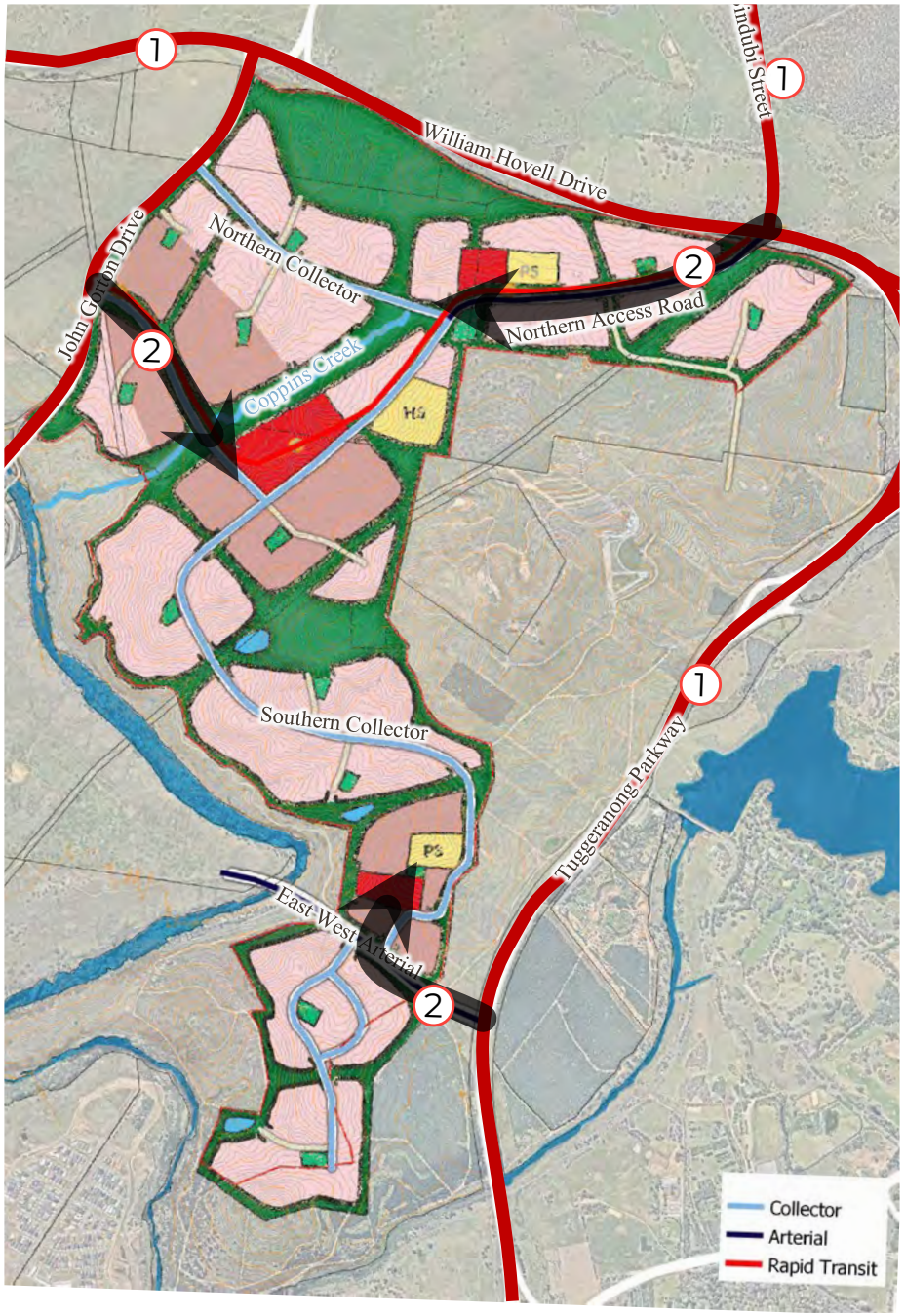
1. Increases place making opportunities around the local centre and group centre
2. Interchange opportunity with rapid route
3. 500m catchments
4. 800m catchments
5. Rapid stops in residential zones
6. Priority provided at Bindubi/William Hovell intersection
7. Interchange with John Gorton Drive designed for Rapid Transit



FREIGHT NETWORK

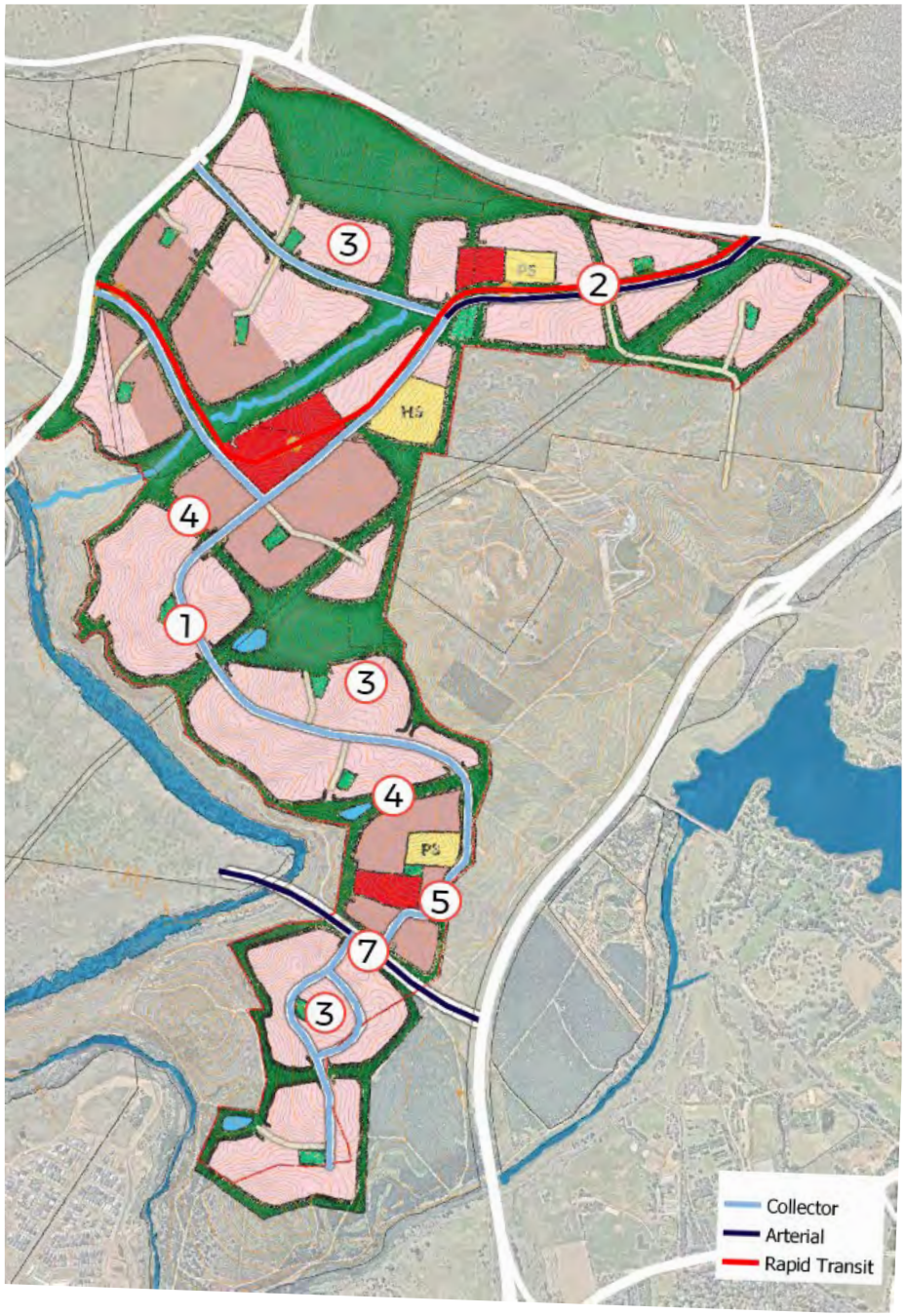
1 **Existing B-double approved routes**

2 **Proposed freight routes**



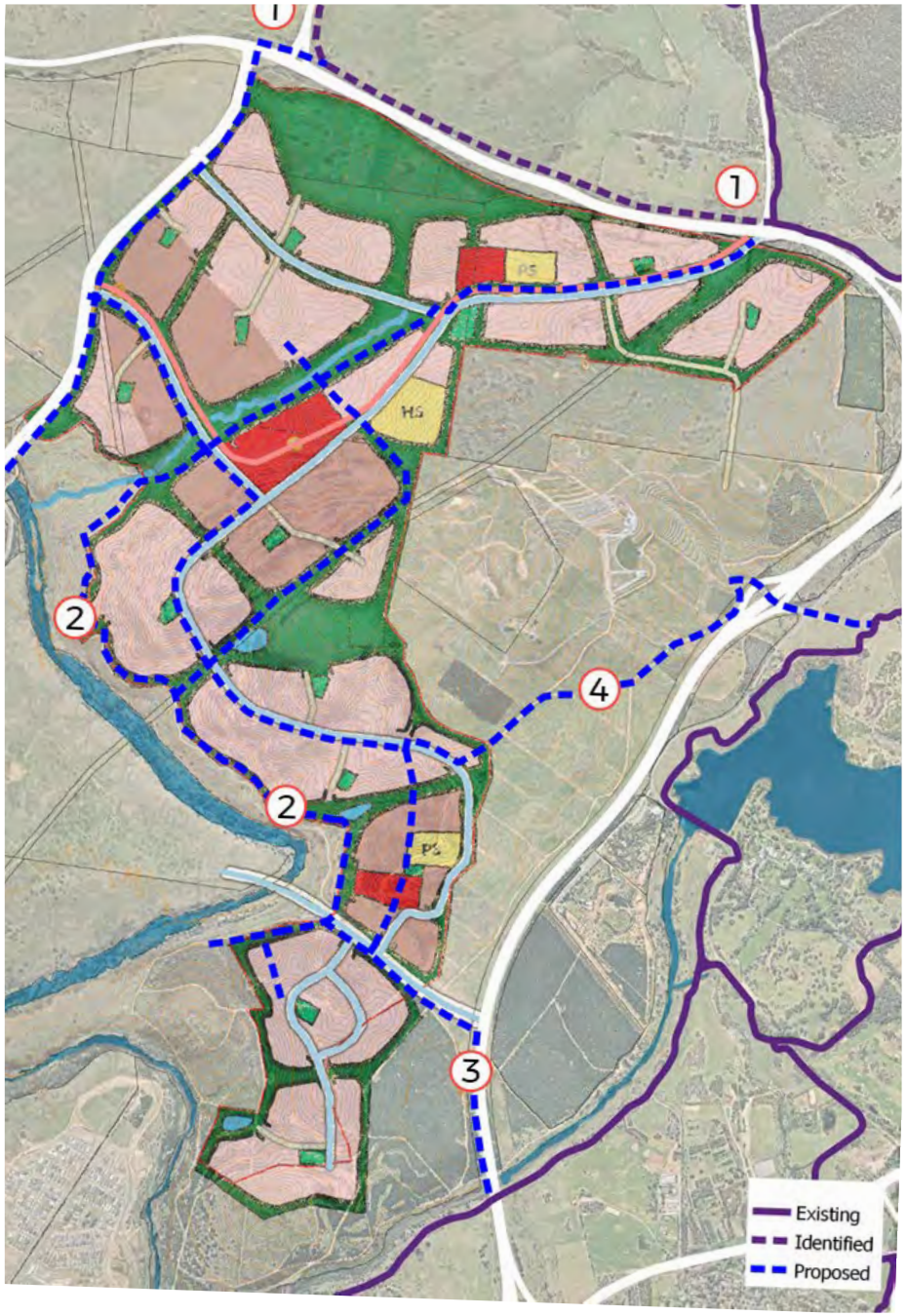
PEDESTRIAN NETWORK

1. Direct parallel routes on Movement Corridors
2. Wide pedestrian footpaths with multiple crossing opportunities
3. Prioritised pedestrian facilities in local streets
4. Recreational paths integrated with green links
5. Optional multi-user underpass
6. High quality and permeable streetscapes
7. Safe crossing points provided across East West arterial



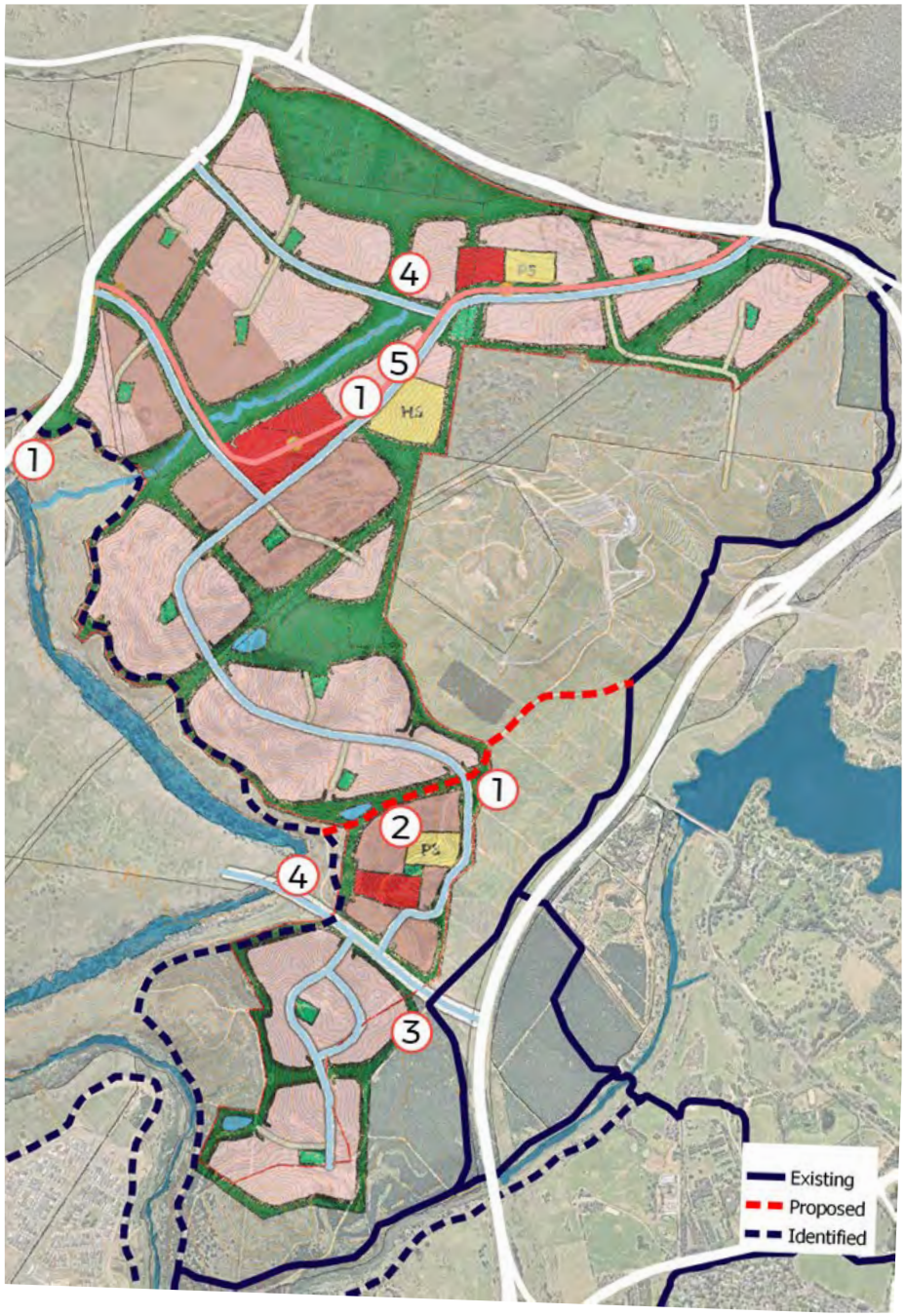
CYCLING NETWORK

1. Northern connections to existing cycle network
2. Recreational cycleway on Molonglo Riverfront
3. Southern connections to existing cycle network
4. Connection via the National Arboretum



EQUESTRIAN NETWORK

1. Provision of Signalised Equestrian crossing
2. Green link connections to Arboretum and eastern horse trails
3. Grade separation of East West over existing horse trail
4. Adequate clearance for horses and riders under proposed loop road underpass



Session_05

INFRASTRUCTURE

MOLONGLO 3