

APPENDIX

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TRAFFIC AND TRANSPORT REPORT



Traffic and Transport Report

Dunheved Road Upgrade – Additional Traffic Analysis (Final version)

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APPENDIX A SIDRA MODELS

Terms and Definitions

Term	Meaning
SIDRA model	Traffic modelling software developed by SIDRA SOLUTIONS. The software has the ability to analyse individual intersections in isolation or in a network, which is suitable for a corridor like Dunheved Road.
Base Year Model	Traffic model which has been developed to reflect current (or base) year peak traffic conditions. For the purpose of this study, the base year is 2020.
Priority control	A control type for an intersection, which refers to Give-Way or STOP sign arrangements, as opposed to roundabout or traffic signal controls.
SCATS signal data	SCATS stands for the Sydney Coordinated Adaptive Traffic System, which is a traffic signal system developed by Transport for NSW (TfNSW) formerly Roads and Maritime Services (RMS). SCATS signal data refers to data collected by traffic signals, including signal cycle times, traffic signal phases and traffic counts.
Throughput	Refers to traffic volume through a road mid-block, or intersection. It should be noted that throughput is not the same as the demand. It is a portion of the demand that managed to arrive at the intersection or mid-block section of the road
DOS	Degree of Saturation
JTW	Journey to Work
LOS	Level of Service
Modelling Guidelines	Roads and Maritime Services' (now TfNSW) Traffic Modelling Guideline, Version 1.0, February 2013
NSW	New South Wales
SMEC	SMEC Australia Pty Ltd
STFM	Sydney Strategic Traffic Forecasting Model
TfNSW	Transport for NSW
PCC	Penrith City Council

1 Introduction

1.1 Background

SMEC is engaged by Penrith City Council (PCC) to undertake traffic analyses and modelling to inform upgrade design process for the Dunheved Road corridor.

The corridor (shown in Figure 1-1) provides access to Richmond Road to the west and Forrester Road to the east, which are increasingly experiencing added pressure as traffic volumes increase.

The traffic and transport assessment involves intersection modelling using the SIDRA 8 traffic network modelling function to model the existing base year, future base case, and to test a number of upgrade design options, covering both weekday AM and PM peak periods.

The main purpose in developing these models is to employ suitable tools to inform evidence-based decision making and identify optimum upgrade solution for the entire Dunheved Road corridor.

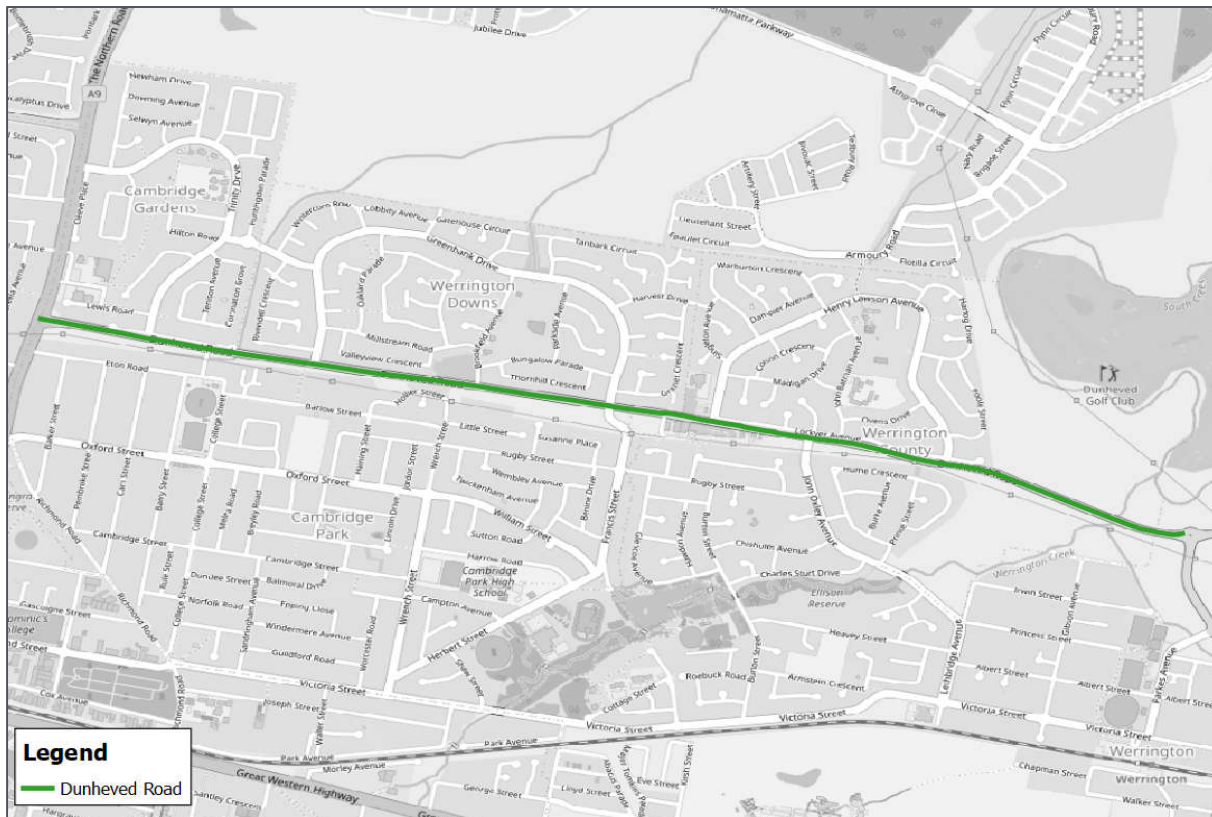


Figure 1-1: Dunheved Road Corridor

1.2 Purpose of this Report

The key objective of this report is to document the key features of final preferred option 1 and to report on the performance results and provide advice to the project team based on the modelling outcomes.

2 Preferred Option 1

Option 1 was agreed as final preferred option with both Penrith City Council and TfNSW. Modelling results showed option 1 has no obvious capacity issue on Dunheved Rd corridor and at its key intersections with satisfactory intersection LOS and delay. Below are the key intersections layouts for option 1.

2.1 Dunheved Rd / Richmond Rd

It was agreed with Penrith City Council (PCC) that Dunheved Rd / Richmond Rd intersection will be signal control with dedicated bus bay on both sides of Richmond Rd. Figure 2-1 below shows the preferred design of the intersection of Dunheved Rd / Richmond Rd.

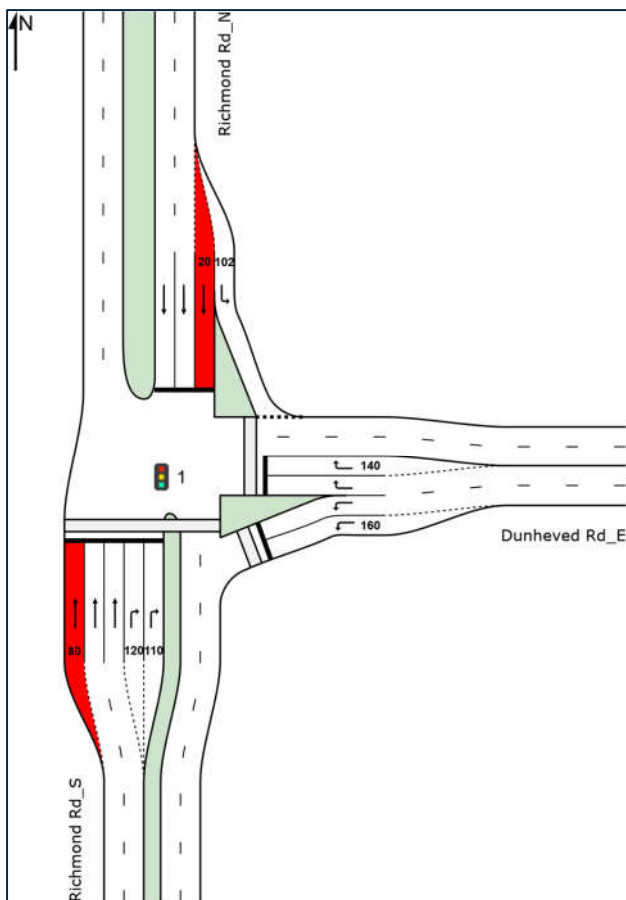


Figure 2-1 Dunheved Rd / Richmond Rd intersection layout

The key features of this intersection include:

- Dedicated bus lane on northbound and southbound on Richmond Rd
- Dunheved Rd has been upgraded to have dual left turn lanes and dual right turn lanes in place at the stop line
- Dunheved Rd has been upgraded to have two lanes each direction at midblock

2.2 Dunheved Rd / Trinity Dr

It was agreed with Penrith City Council (PCC) that Dunheved Rd / Trinity Dr intersection will be priority control with right turn out movement ban from Trinity Dr. Left turn in, left turn out and right turn in movements will be available at this intersection. Right turn out traffic has been redistributed via Eton Rd going southbound. Figure 2-2 below shows the preferred design of the intersection of Dunheved Rd / Trinity Dr.

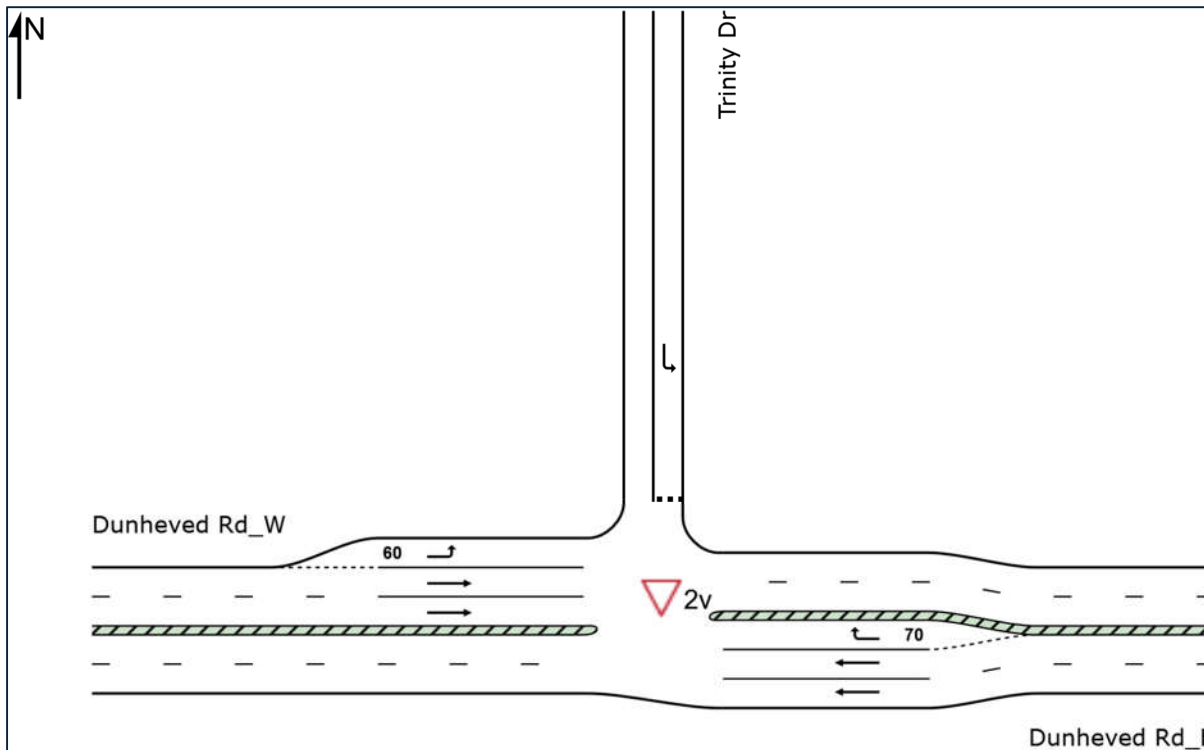


Figure 2-2 Dunheved Rd / Trinity Dr intersection layout

The key features of this intersection include:

- Signal free (priority control)
- Right turn out banned at this intersection
- Dunheved Rd has been upgraded to have two lanes each direction at midblock

2.3 Dunheved Rd / Tasman St

It was agreed with Penrith City Council (PCC) that Dunheved Rd / Tasman St intersection will be signal control. It was also agreed right turn out movement will be banned at this intersection. The right turn out traffic will be redistributed to Francis St. Figure 2-3 below shows the preferred design of the intersection of Dunheved Rd / Tasman St.

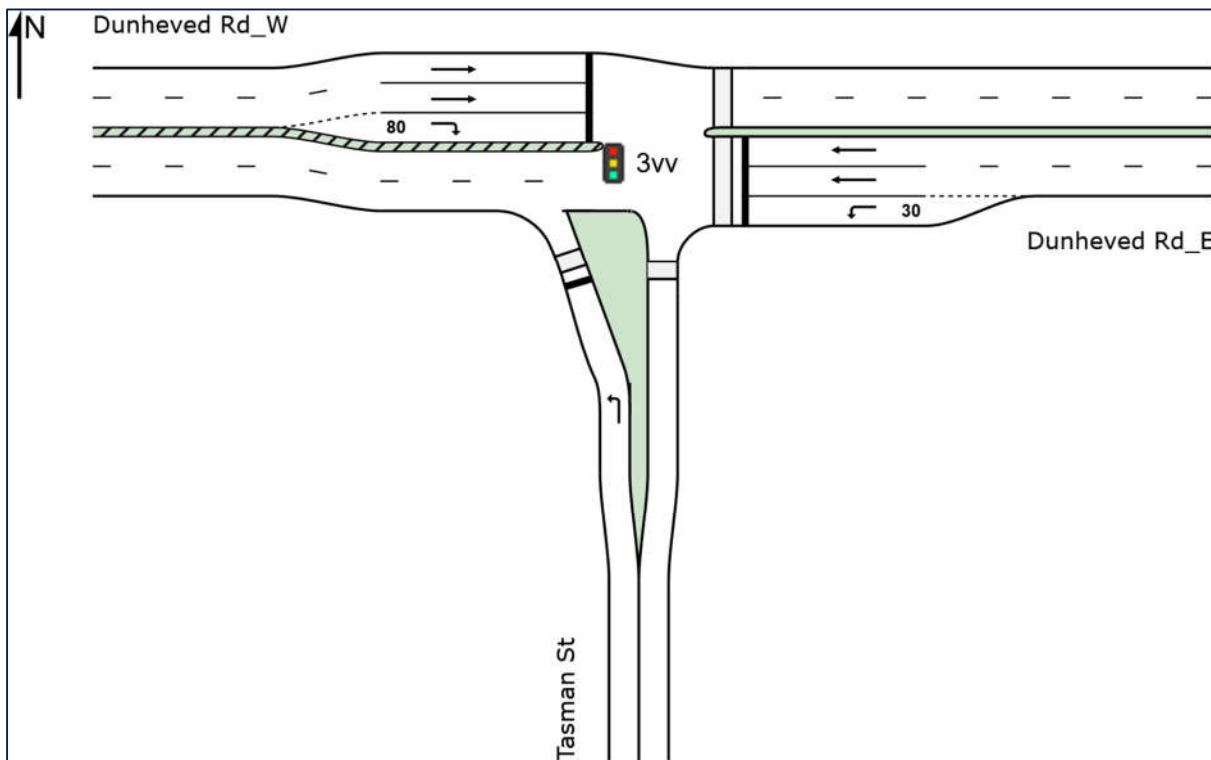


Figure 2-3 Dunheved Rd / Tasman St intersection layout

The key features of this intersection include:

- Signal control
- Right turn out ban from Tasman St
- Staged pedestrian crossing on eastern approach of Dunheved Rd

2.4 Dunheved Rd / Francis St

It was agreed with Penrith City Council (PCC) that Dunheved Rd / Francis St intersection will be signal control with dual right turn out from Francis St. It was also agreed double diamond phasing will be used for this intersection. Figure 2-4 below shows the preferred design of the intersection of Dunheved Rd / Francis St.

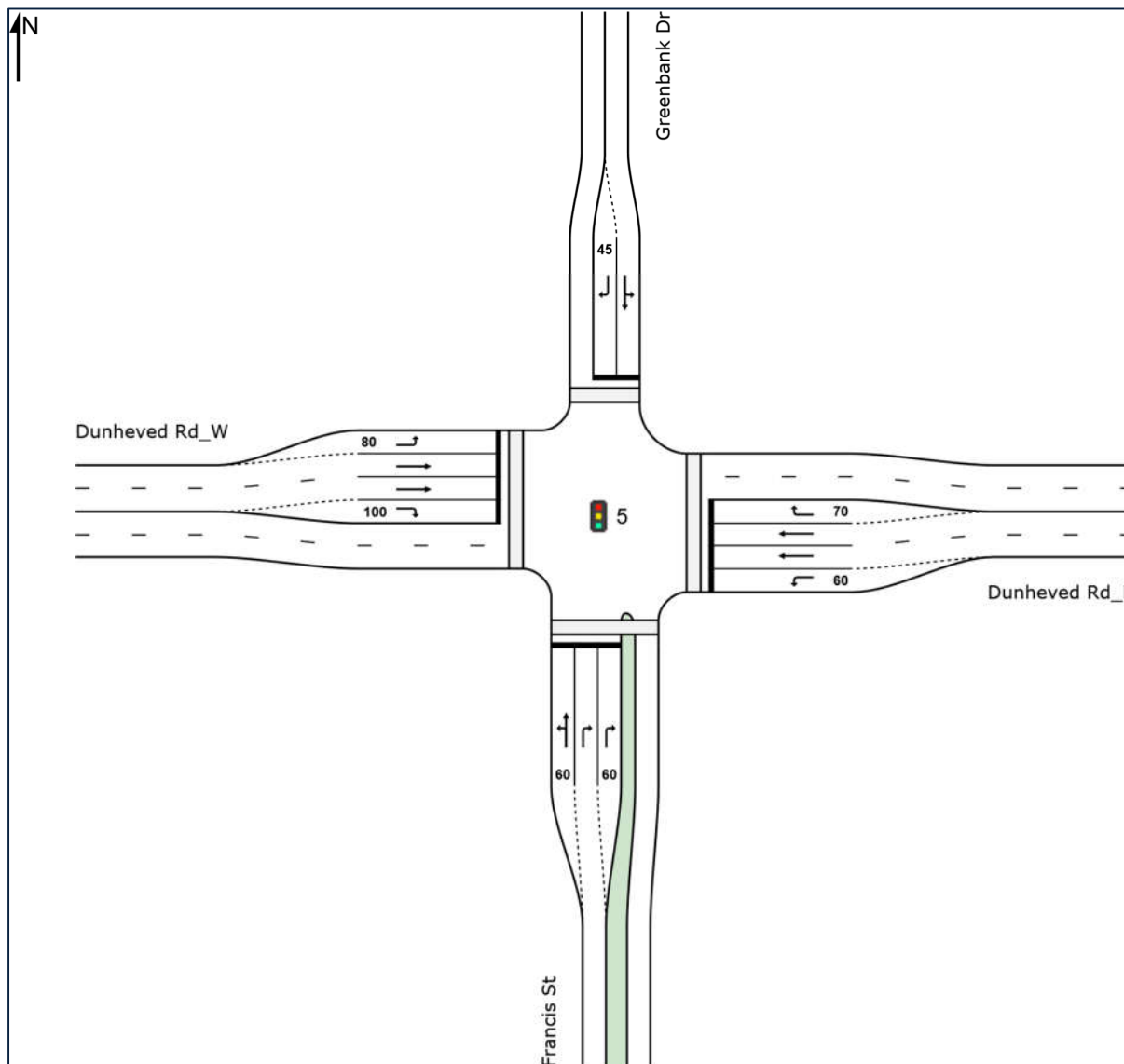


Figure 2-4 Dunheved Rd / Francis St intersection layout

The key features of this intersection include:

- Signal control
- Dual right turns out from Francis St approach
- Double diamond signal phasing arrangement
- Pedestrian crossings on all approaches

2.5 Dunheved Rd / John Oxley Ave

It was agreed with Penrith City Council (PCC) that Dunheved Rd / John Oxley Ave intersection will be priority control with right turn out movement ban from John Oxley Ave. Left turn in, left turn out and right turn in movements will be available at this intersection (similar as Trinity Dr intersection). Figure 2-5 below shows the preferred design of the intersection of Dunheved Rd / John Oxley Ave.

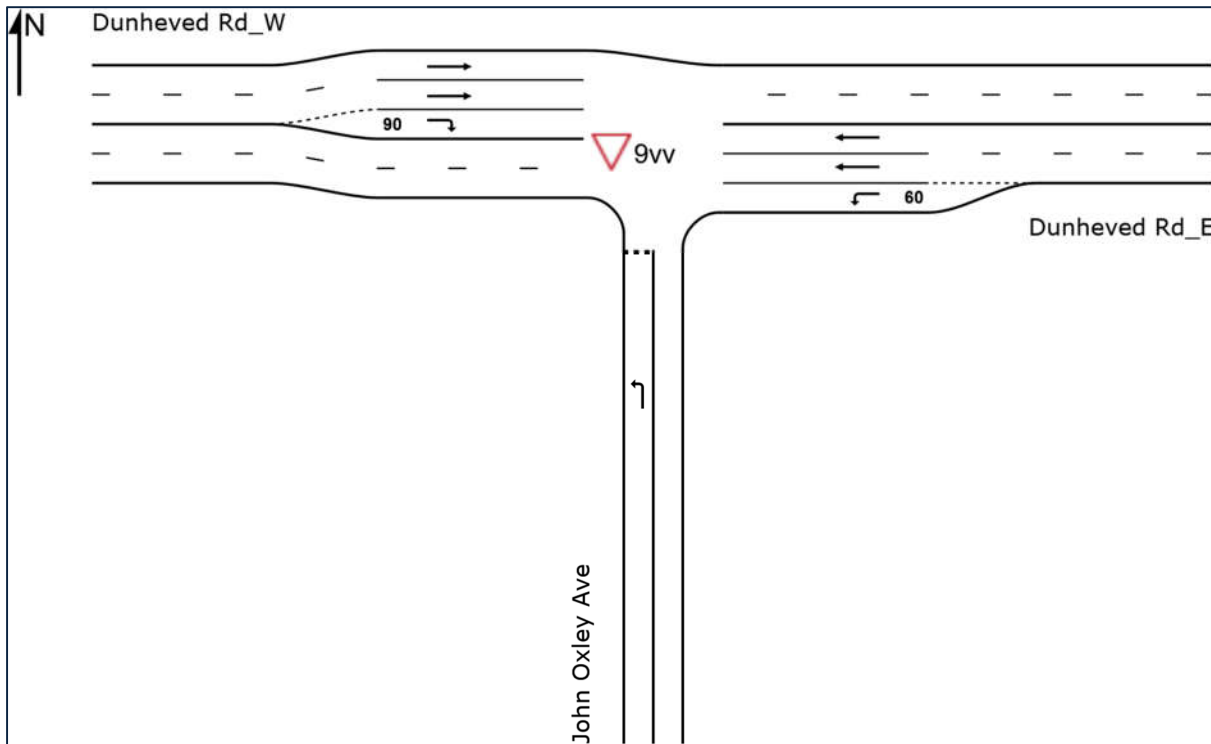


Figure 2-5 Dunheved Rd / John Oxley Ave intersection layout

The key features of this intersection include:

- Signal free (priority control)
- Right turn out banned at this intersection
- Dunheved Rd has been upgraded to have two lanes each direction at midblock

2.6 Dunheved Rd / John Batman Ave

It was agreed with Penrith City Council (PCC) that Dunheved Rd / John Batman Ave intersection will be upgraded to be signal control. Figure 2-6 below shows the preferred design of the intersection of Dunheved Rd / John Batman Ave.

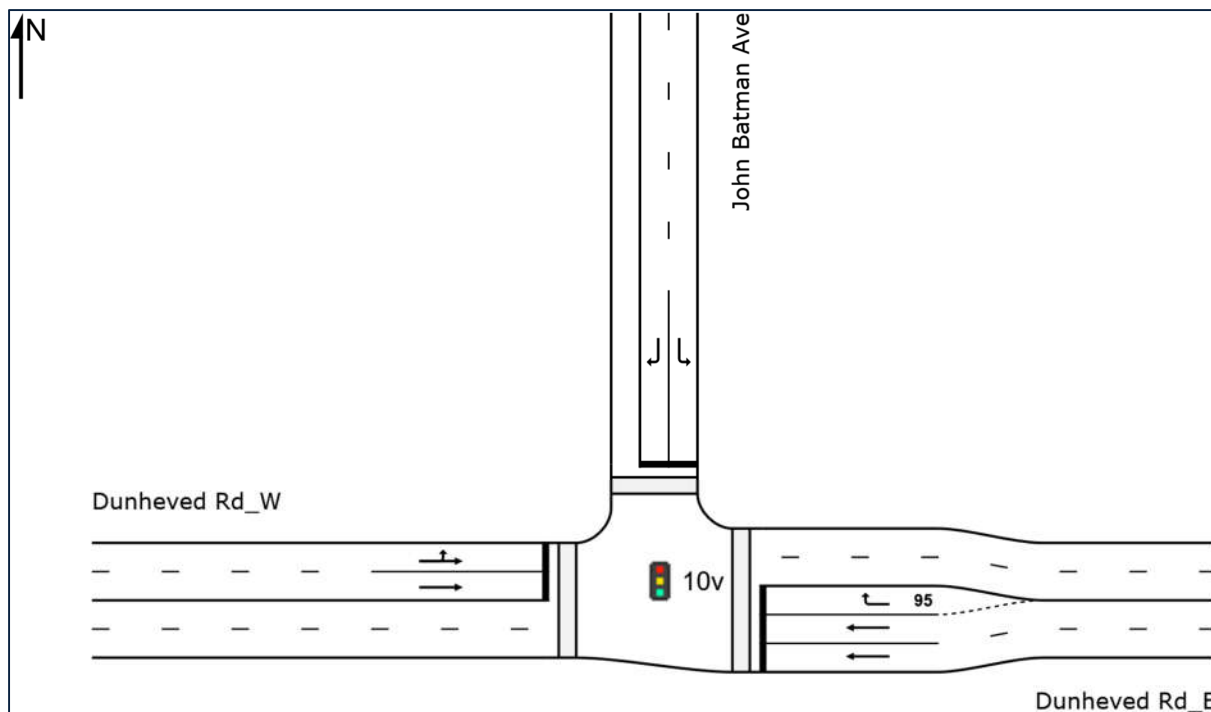


Figure 2-6 Dunheved Rd / John Batman Ave intersection layout

The key features of this intersection include:

- Signal control
- Short (approximately 95m) dedicated right turn bay on eastern approach
- Pedestrian crossings on all approaches

Figure 2-7 below shows Option 1 road network geometry.

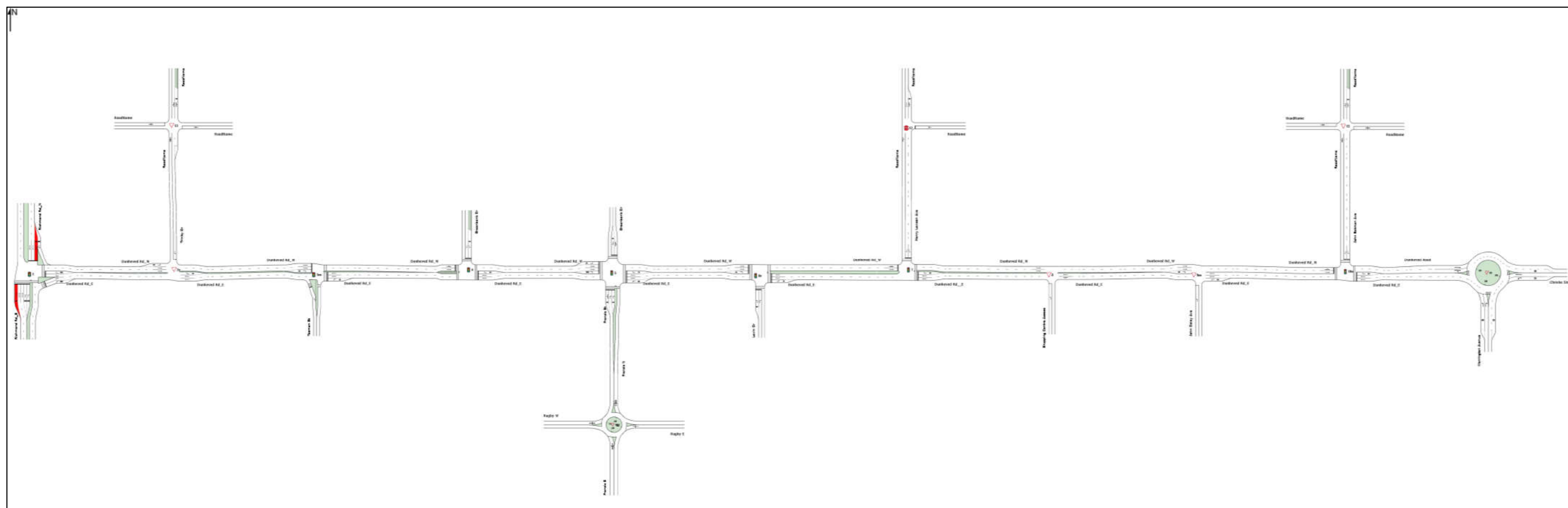


Figure 2-7 Option 1 network layout

Figure 2-8 and Figure 2-9 below show the traffic demand for Option 1 during 2036 AM and PM peak period.

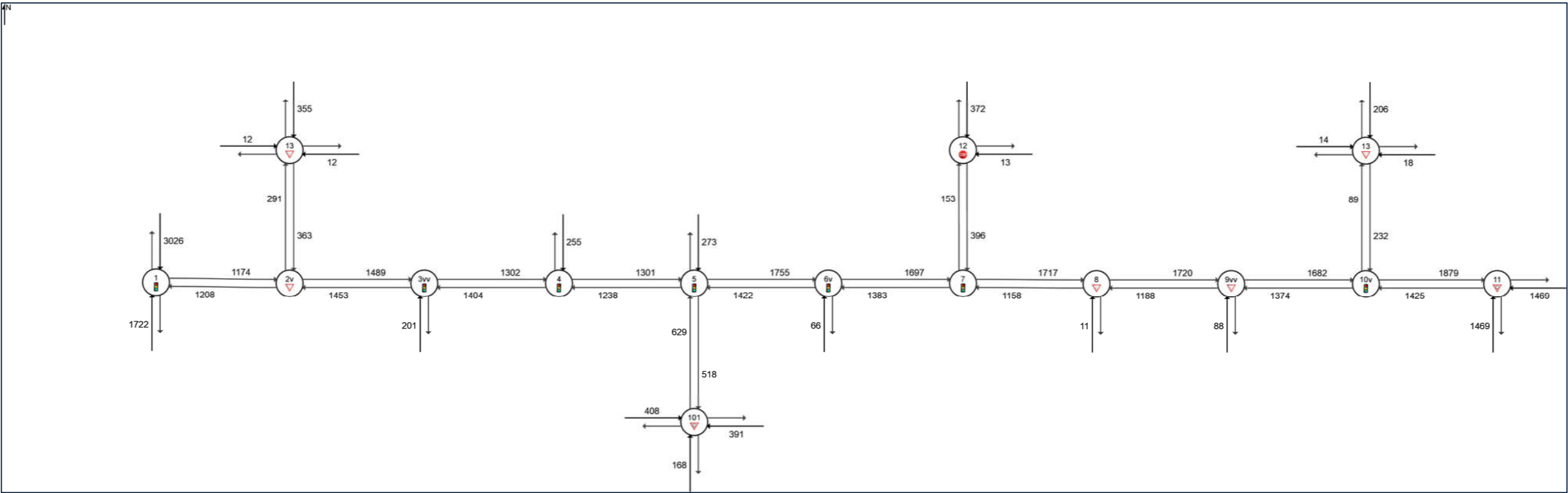


Figure 2-8 Option 1 2036 AM peak traffic demand

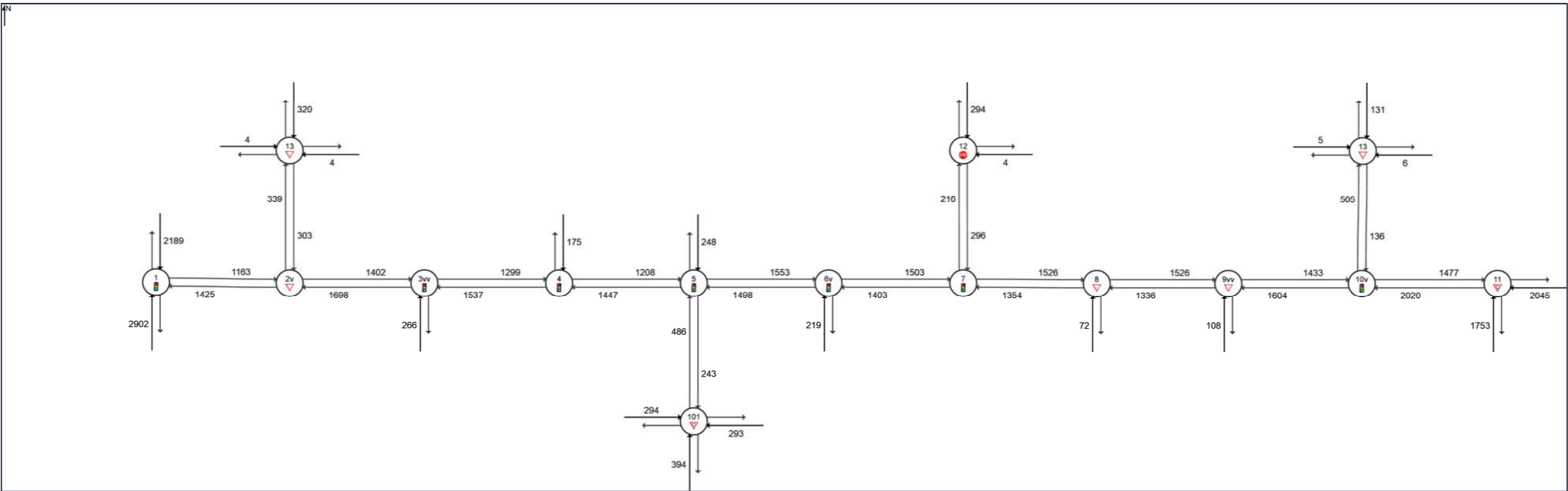


Figure 2-9 Option 1 2036 PM peak traffic demand

Table 2-1 and Table 2-2 below show the intersection performance for Option 1.

Table 2-1: Option 1 2036 AM peak Intersection performance

Intersection	Control type	2036 Option 1 AM peak Results			
		Avg Delay (s)	DoS	LoS	95 th Percentile Queue Length (m)
Richmond Rd/ Dunheved Rd	Signal	201	1.35	F	1,585 (north approach through)
Dunheved Rd/ Trinity Dr	Priority	49	0.92	D	54 (east approach right turn)
Local Dunheved Rd/ Trinity Dr	Priority	11	0.16	A	1 (west approach)
Dunheved Rd/ Tasman St	Signal	14	0.55	A	136 (East approach through)
Dunheved Rd/ Greenbank Dr	Signal	7	0.57	A	74(north approach right turn)
Dunheved Rd/ Greenbank Dr/ Francis St	Signal	33	0.85	C	192 (east approach through)
Francis St / Rugby St	Priority	12	0.45	A	26 (Eastern approach)
Dunheved Rd/ Lavin Cres	Signal	3	0.62	A	34 (west approach right turn)
Dunheved Rd/ Henry Lawson Ave	Signal	11	0.77	A	107 (east approach through)
Henry Lawson Ave/ Lockyer Ave	Priority	11	0.10	A	88 (north approach through)
Dunheved Rd/ Shopping centre access	Priority	6	0.48	A	1 (east approach)
Dunheved Rd/ John Oxley Ave	Priority	36	0.66	C	6 (west approach right turn)
Dunheved Rd/ John Batman Ave	Signal	14	0.92	A	143(west approach through)
Lockyer Ave/ John Batman Ave	Priority	7	0.05	A	64(north approach left turn and through)
Dunheved Rd/ Christie St/ Werrington Ave	Roundabout	279	1.29	F	1243 (west approach through)

Table 2-2: Option 1 2036 PM peak Intersection performance

Intersection	Control type	2036 Option 1 PM peak Results			
		Avg Delay (s)	DoS	LoS	95 th Percentile Queue Length (m)
Richmond Rd/ Dunheved Rd	Signal	124	1.20	F	924 (north approach through)
Dunheved Rd/ Trinity Dr	Priority	34	0.84	C	38(east approach right turn)
Local Dunheved Rd/ Trinity Dr	Priority	10	0.16	A	1 (south approach)
Dunheved Rd/ Tasman St	Signal	21	0.58	B	217 (east approach through)
Dunheved Rd/ Greenbank Dr	Signal	9	0.52	A	75(east approach through)
Dunheved Rd/ Greenbank Dr/ Francis St	Signal	29	0.73	C	127(east approach through)
Francis St / Rugby St	Priority	11	0.40	A	20 (south approach)
Dunheved Rd/ Lavin Cres	Signal	10	0.81	A	134 (west approach through)
Dunheved Rd/ Henry Lawson Ave	Signal	17	0.66	B	220(west approach through)
Henry Lawson Ave/ Lockyer Ave	Priority	10	0.10	A	46(north approach through)
Dunheved Rd/ Shopping centre access	Priority	6	0.40	A	2 (south approach)
Dunheved Rd/ John Oxley Ave	Priority	34	0.52	C	97(west approach through)
Dunheved Rd/ John Batman Ave	Signal	21	0.80	B	147 (west approach)
Lockyer Ave/ John Batman Ave	Priority	8	0.22	A	1 (north approach left turn and through)
Dunheved Rd/ Christie St/ Werrington Ave	Roundabout	272	1.28	F	1,151 (south approach left turn)

Figure 2-10 and Figure 2-11 below show network performance under Option 1

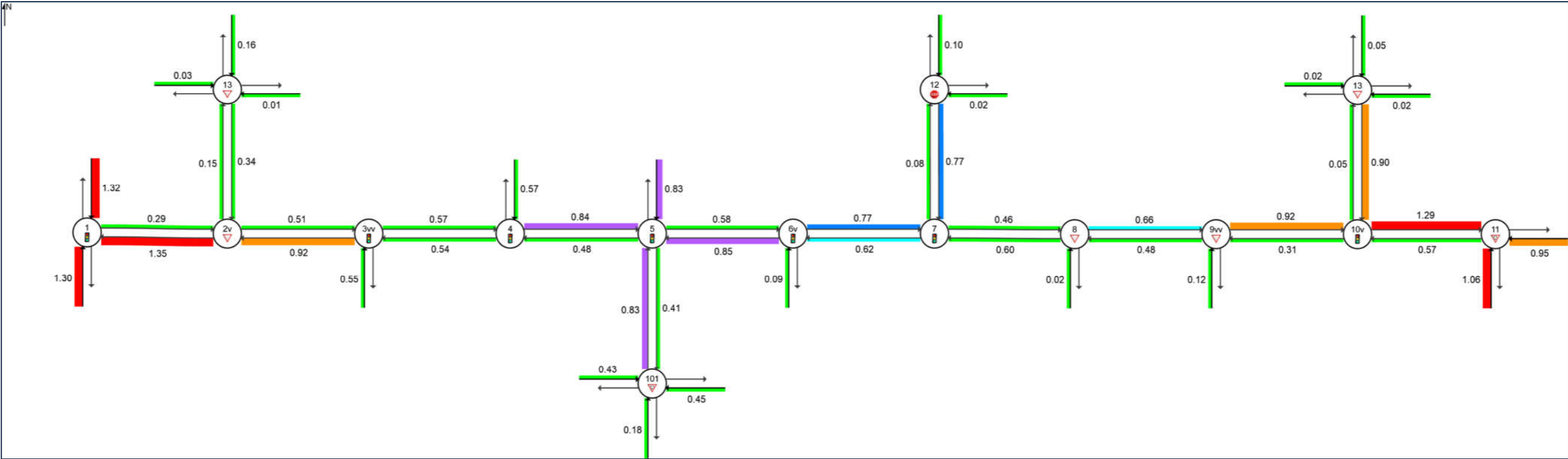


Figure 2-10 Option 1 2036 AM peak network performance

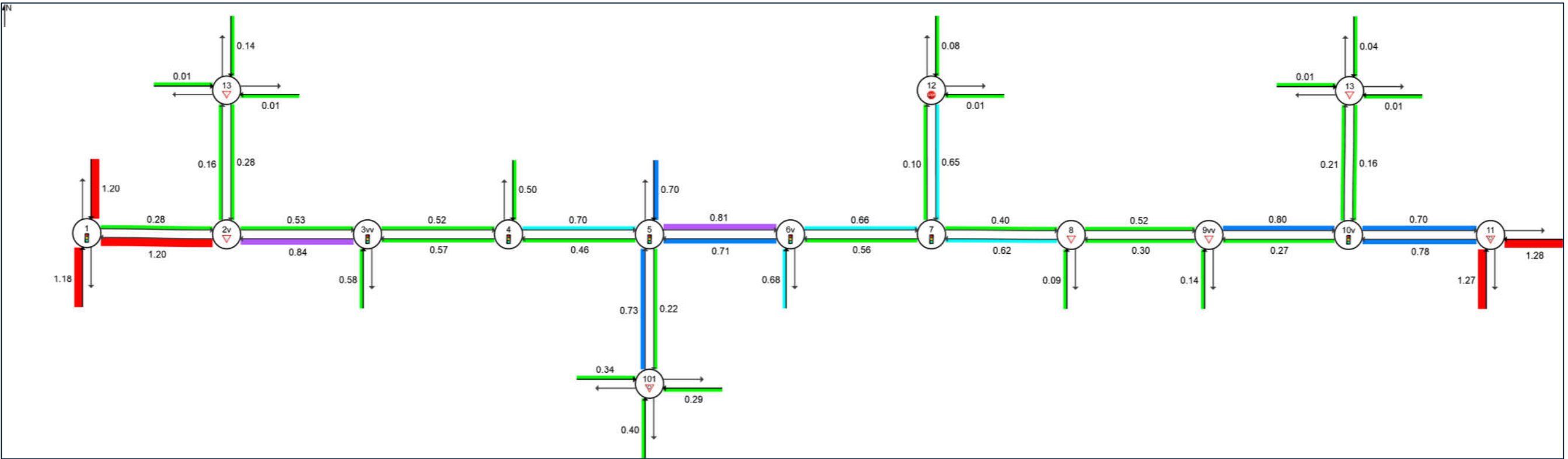


Figure 2-11 Option 1 2036 PM peak network performance

As can be seen from the above modelling results, there were no major capacity / congestion issues observed along Dunheved Road corridor for all key intersections.

3 Conclusion

SMEC has been engaged by Penrith City Council (PCC) to undertake a series of options testing in the purpose of finding the optimum design solution so to inform the wider project team as well as key stakeholders. Option 1 was agreed to be the final preferred option.

It was agreed with TfNSW that only one can be signal control for Dunheved Rd / John Oxley Ave intersection and Dunheved Rd / John Batman Ave intersection, and it was agreed that Dunheved Rd / John Batman Ave intersection is designed as signal control. The preferred option also assumes Dunheved Rd / John Oxley Ave intersection will be designed as priority control with right turn out ban. It was also agreed Tasman St intersection will be signal control with right turn out ban. Option 1 was agreed to be preferred option based on all eight sensitivity tests modelling outcomes. This preferred option includes below key features:

- Trinity Dr Right turn out ban
- Tasman St intersection became signal control
- Left In Left Out+Right turn in with priority control configuration at John Oxley Ave intersection
- Right turn out traffic at John Oxley Ave has been redistributed to Francis St intersection
- Rugby St / Francis St intersection added in original network
- Network cycle time is fixed as 120 seconds
- Francis St intersection has double diamond signal phasing arrangement.

Network modelling results showed that preferred Option 1 would operate satisfactorily with no obvious road network capacity / congestion issues under projected 2036 AM and PM peak traffic conditions.

It should be noted that the proposed upgrade of Dunheved Rd corridor will not adversely impact the intersection performance of Dunheved Rd / Richmond Rd. Modelling indicated that both Dunheved Rd / Richmond Rd and Dunheved Rd / Christie St intersections are expected to have capacity issues in future year which is mainly due to the capacity issue of which are outside of the study area.

SIDRA Models

SIDRA models are provided electronically

local people
global experience

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