Do Nothing (With Western Edge)

Figure 23 and Figure 25 show the 2041 AM and PM Do Nothing (With Western Edge) flow and V/C respectively while Figure 24 and Figure 26 show the differences between the Do Nothing and Do Nothing (With Western Edge) scenarios in 2041 AM and PM peaks respectively. The development of the Western Edge area has a substantial impact on traffic volumes across the network in the Molonglo area, with a smaller impact across parts of the surrounding arterial road network. The Do Nothing network already operates largely over capacity without that further development.

Observations of the 2041 AM Do Nothing (With Western Edge) model include:

- All roads out of Molonglo operate over capacity.
- William Hovell Drive eastbound, west of John Gorton Drive, has spare capacity
- William Hovell Drive eastbound, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive eastbound, from Kingsford Smith Drive to Clunies Ross Street operate over capacity.
- Tuggeranong Parkway operates over capacity southbound and with some spare capacity northbound.
- Much of John Gorton Drive, Coulter Drive and Bindubi Street Extension operate at or above capacity.
- A number of local roads in Macquarie, Cook and Aranda are operating near or at capacity, likely indicating rat-running to avoid William Hovell Drive and Belconnen Way.
- Development of the Western Edge reduces traffic on William Hovell Drive (west of Coulter Drive) due to increased congestion on William Hovell Drive (east of Coulter Drive) and Parkes Way. The traffic that had been using William Hovell Drive now uses Belconnen Way or other east-west links further north. Traffic southbound on John Gorton Drive has decreased, likely due to trip destinations being fulfilled by people travelling from the Western Edge instead of Belconnen.

In 2041 PM Do Nothing (With Western Edge), the following observations have been made:

- All roads into Molonglo operate over capacity.
- William Hovell Drive westbound, west of John Gorton Drive, operates below capacity.
- William Hovell Drive westbound, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive westbound, from Clunies Ross Street to Kingsford Smith Drive operate at or over capacity.
- Tuggeranong Parkway generally operates below capacity.
- Much of John Gorton Drive and Bindubi Street Extension operate at or above capacity.
- A number of local roads in Macquarie, Cook and Aranda are operating over capacity, likely indicating rat-running to avoid William Hovell Drive and Belconnen Way.
- Development of the Western Edge increases traffic on most roads in the area, but decreases traffic on William Hovell Drive westbound (west of Coulter Drive), Coulter Drive (northbound) and Gungahlin Drive, likely due to trip destinations being fulfilled by people travelling to the Western Edge instead of Belconnen.

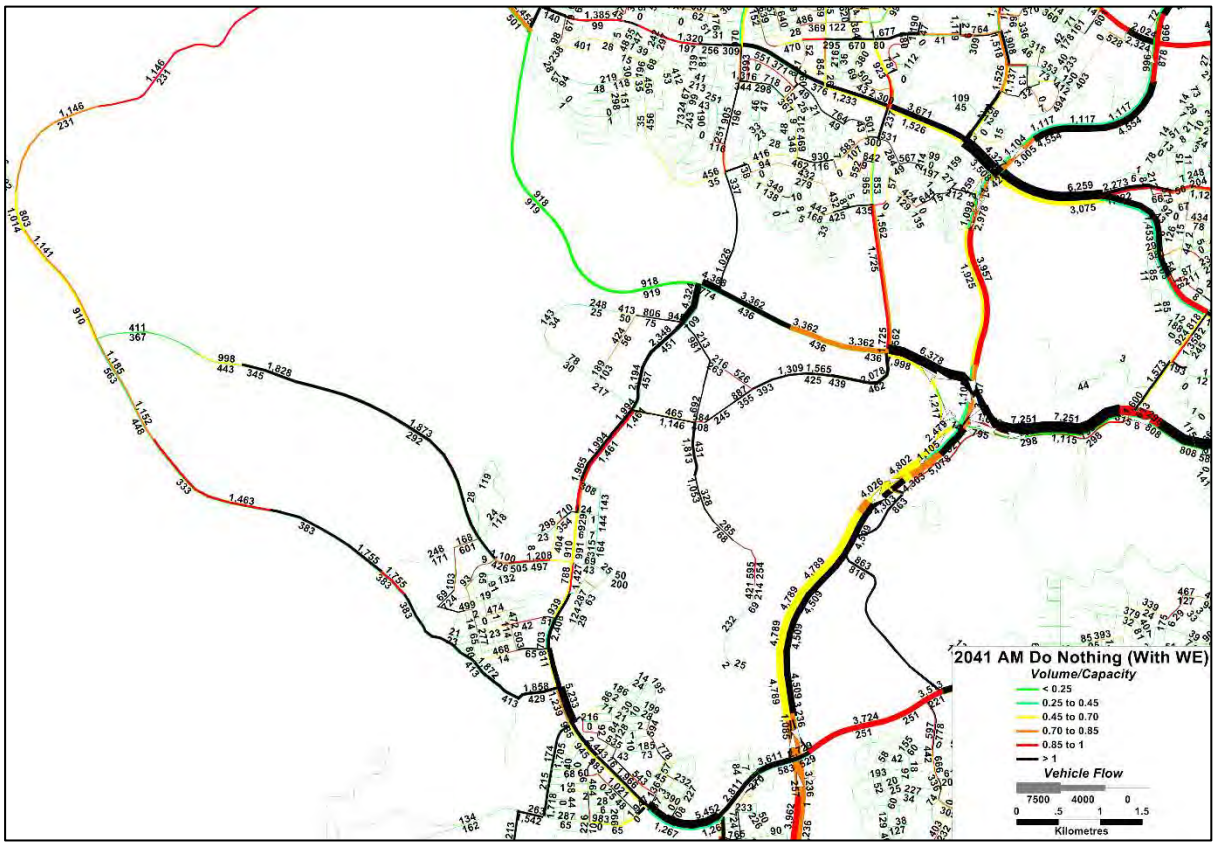


Figure 23: 2041 AM Do Nothing (With Western Edge) Flow and V/C

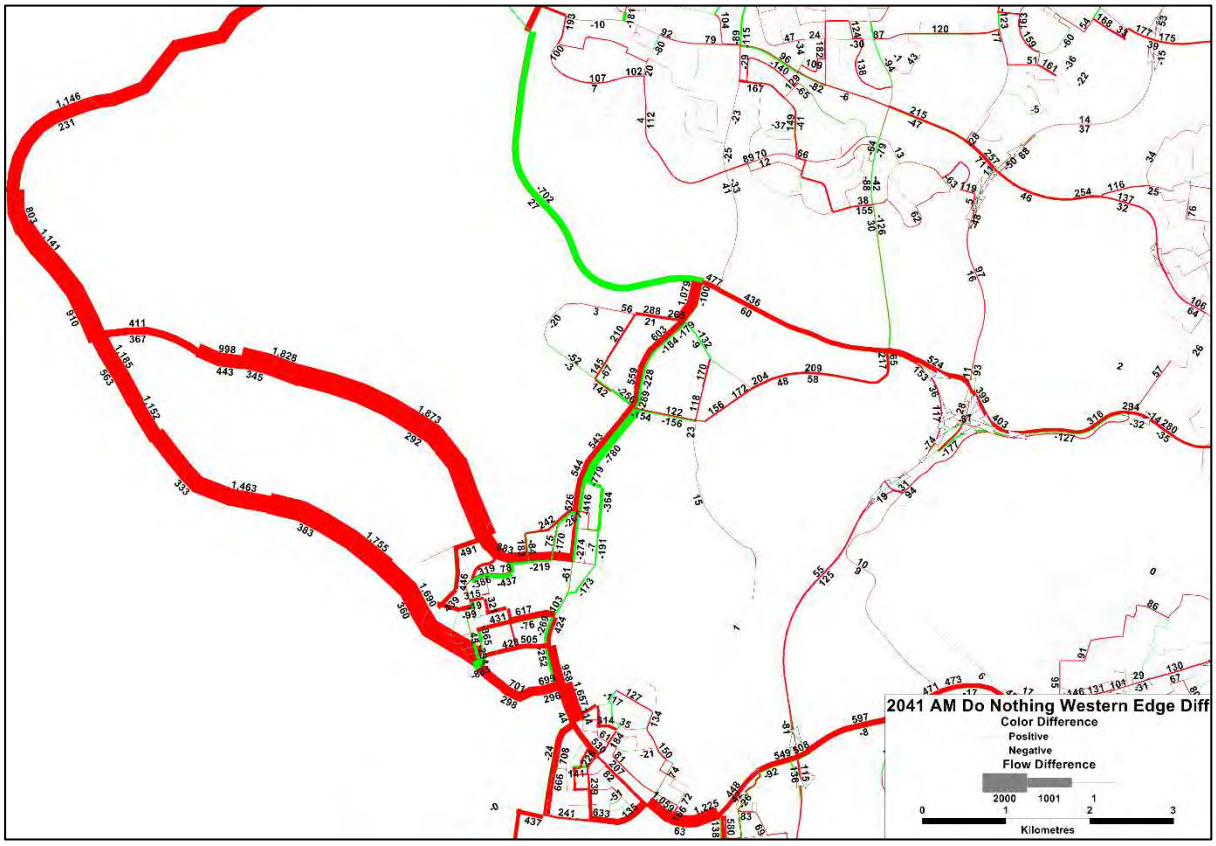


Figure 24: 2041 AM Do Nothing to Western Edge Difference

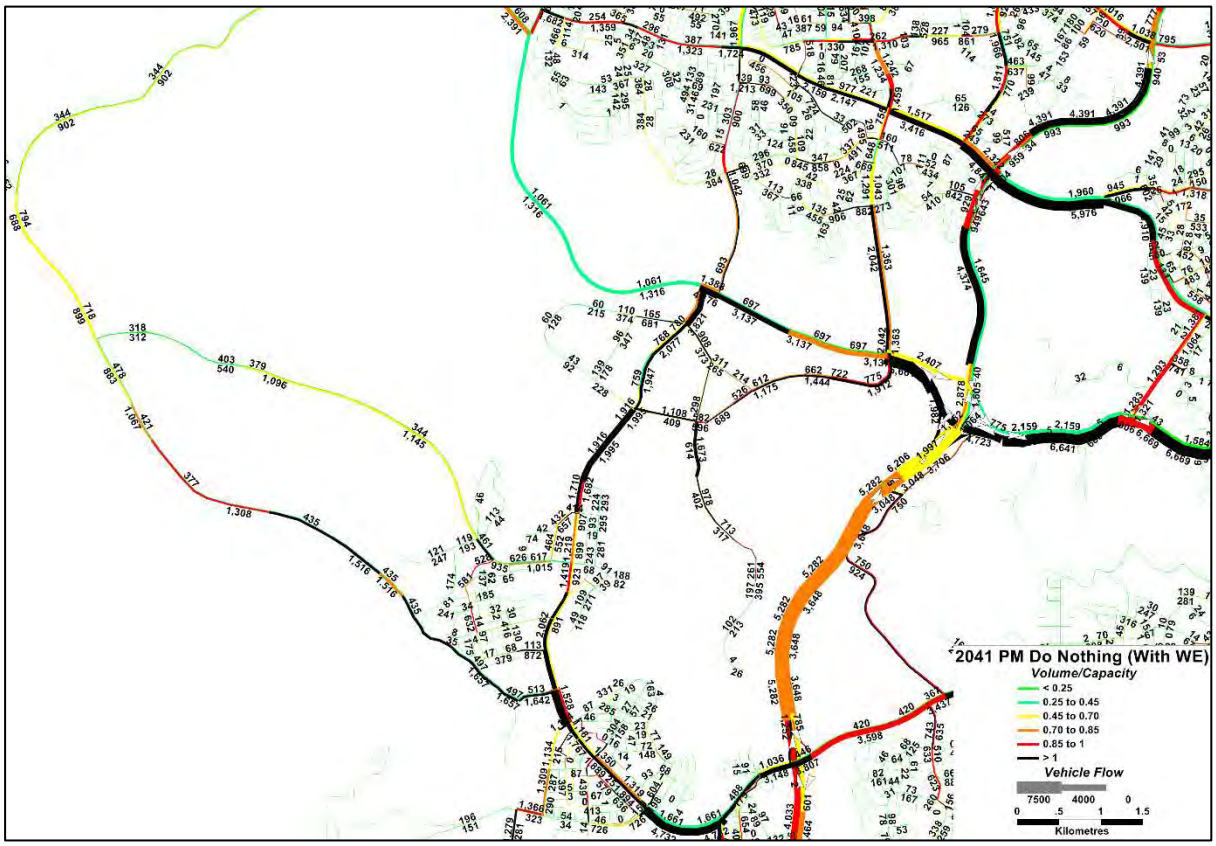


Figure 25: 2041 PM Do Nothing (With Western Edge) Flow and V/C

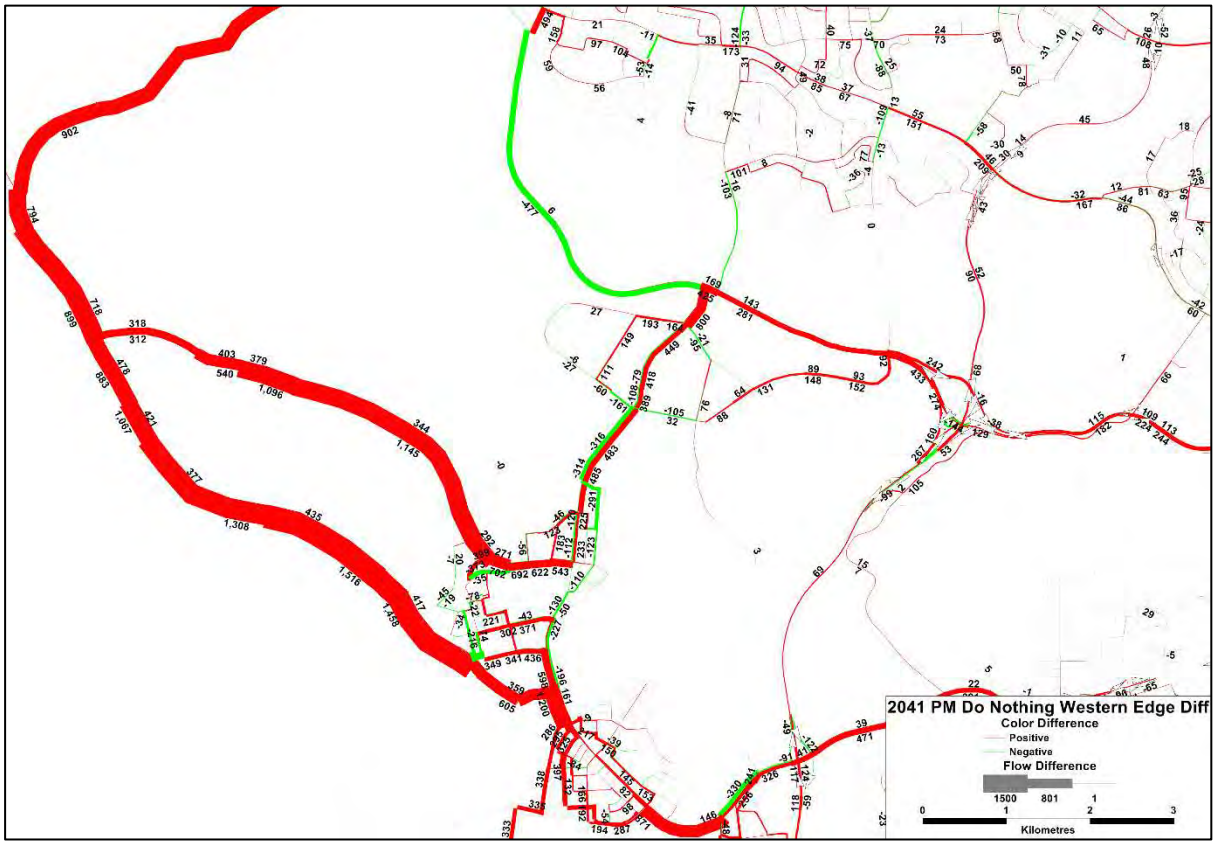


Figure 26: 2041 PM Do Nothing to Western Edge Flow Difference

Base Case (With Western Edge)

Figure 27 and Figure 29 show the 2041 AM and PM Base Case (With Western Edge) flow and V/C respectively while Figure 28 and Figure 30 show the differences between the Base Case and Base Case (With Western Edge) scenarios in 2041 AM and PM peaks respectively. The development of the Western Edge area has a substantial impact on traffic volumes across the network in the Molonglo area, with a smaller impact across parts of the surrounding arterial road network.

Observations of the 2041 AM Base Case (With Western Edge) model include:

- All roads out of Molonglo operate over capacity.
- William Hovell Drive eastbound, west of John Gorton Drive, has spare capacity
- William Hovell Drive eastbound, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive eastbound, from Kingsford Smith Drive to Clunies Ross Street operate at or over capacity.
- Tuggeranong Parkway generally operates close to capacity in both directions. Southbound between EWA and Cotter Road operates over capacity.
- Much of John Gorton Drive, Coulter Drive and Bindubi Street Extension operate near or at capacity.
- A number of local roads in Macquarie, Cook and Aranda are operating over capacity, likely indicating rat-running to avoid William Hovell Drive and Belconnen Way.
- Development of the Western Edge reduces traffic on William Hovell Drive (west of Coulter Drive) due to increased congestion on William Hovell Drive (east of Coulter Drive) and Parkes Way, but by a smaller amount than in the Do Nothing case. The traffic that had been using William Hovell Drive now uses Belconnen Way or other east-west links further north. Traffic southbound on Coulter Drive and John Gorton Drive has decreased, likely due to trip destinations being fulfilled by people travelling from the Western Edge instead of Belconnen to the Molonglo Town Centre.

In 2041 PM Base Case (With Western Edge), the following observations have been made:

- All roads into Molonglo operate over capacity.
- William Hovell Drive westbound, west of John Gorton Drive, operates below capacity.
- William Hovell Drive westbound, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive westbound, from Clunies Ross Street to Kingsford Smith Drive operate at or over capacity.
- Tuggeranong Parkway generally operates well but is close to capacity southbound and over capacity northbound around Cotter Road.
- Much of John Gorton Drive and Bindubi Street Extension operate at or above capacity.
- A number of local roads in Macquarie, Cook and Aranda are operating over capacity, likely indicating rat-running to avoid William Hovell Drive and Belconnen Way.
- Development of the Western Edge increases traffic on most roads in the area, but decreases traffic on William Hovell Drive westbound (west of Coulter Drive), Coulter Drive (northbound) and Gungahlin Drive, likely due to trip destinations being fulfilled by people travelling to the Western Edge instead of Belconnen.

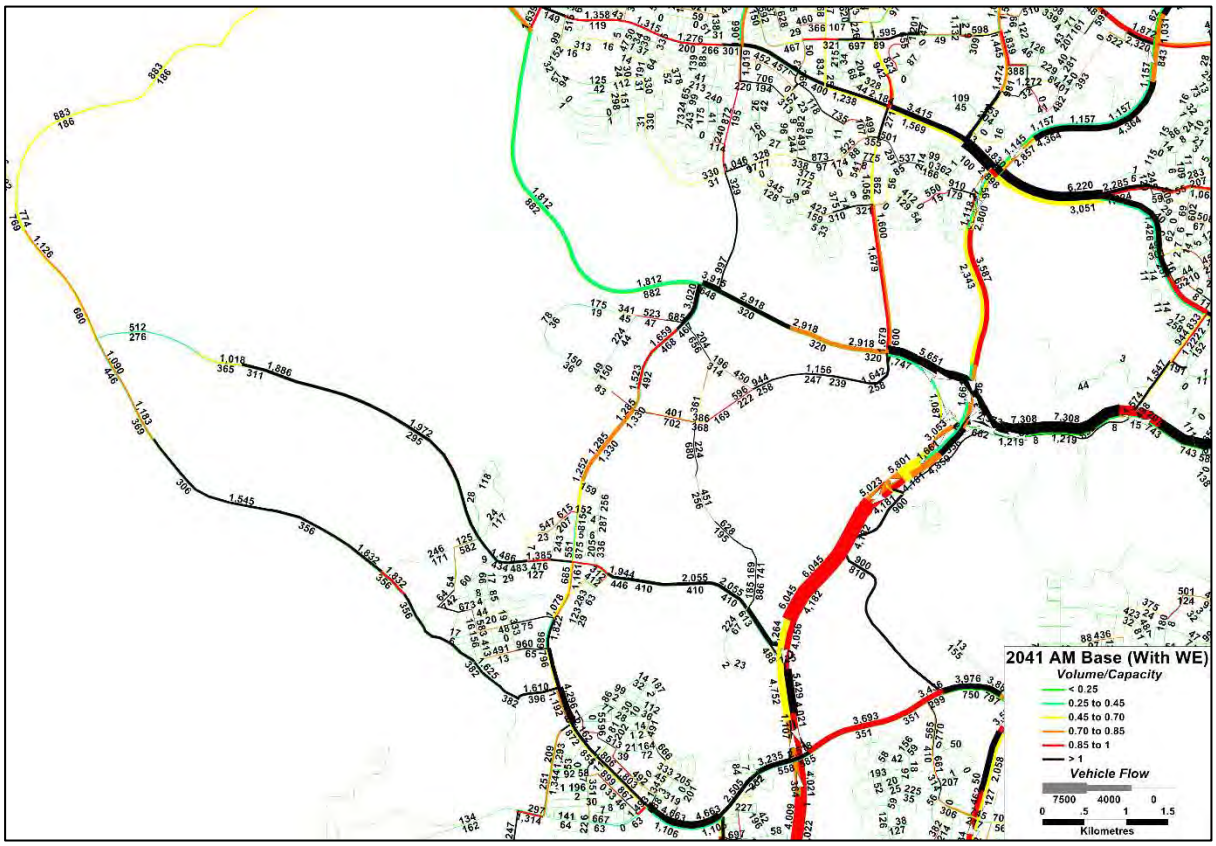


Figure 27: 2041 AM Base Case (With Western Edge) Flow and V/C

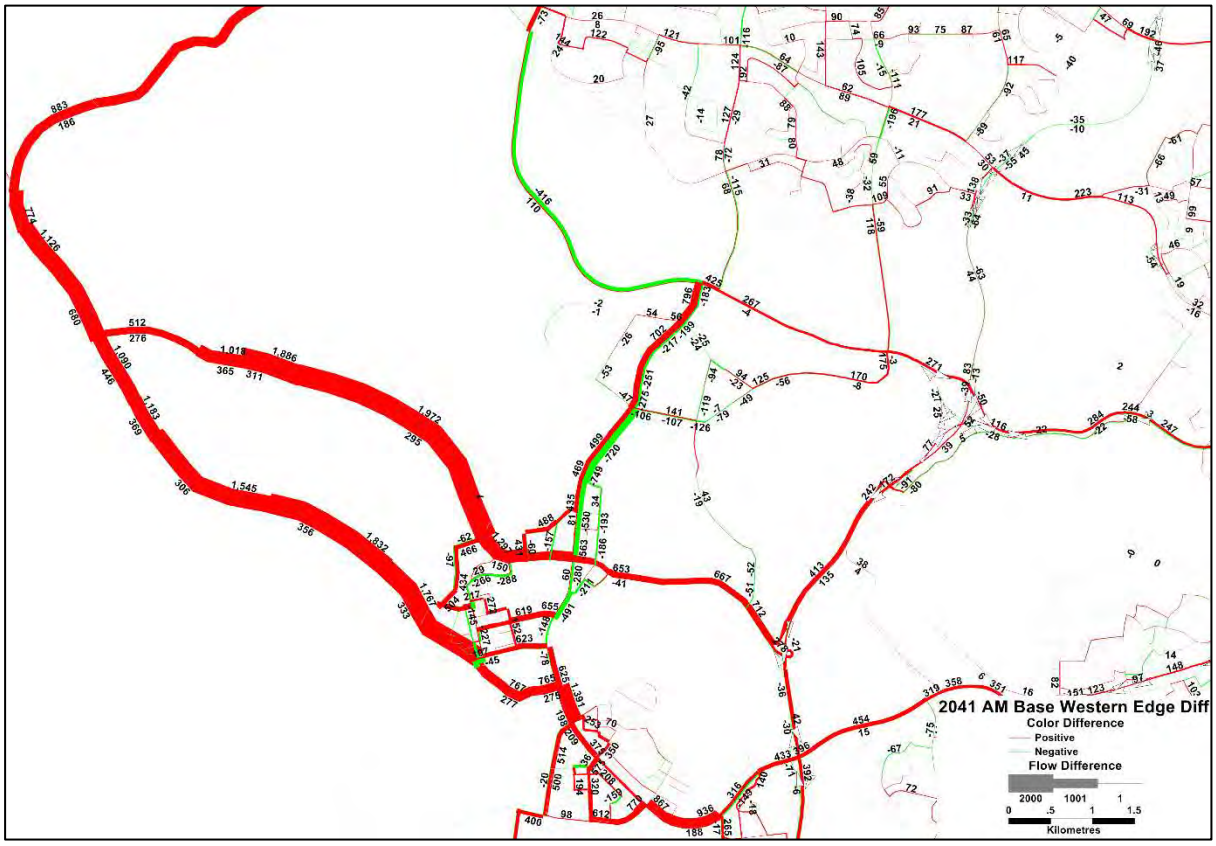


Figure 28: 2041 AM Base Case to Western Edge Difference

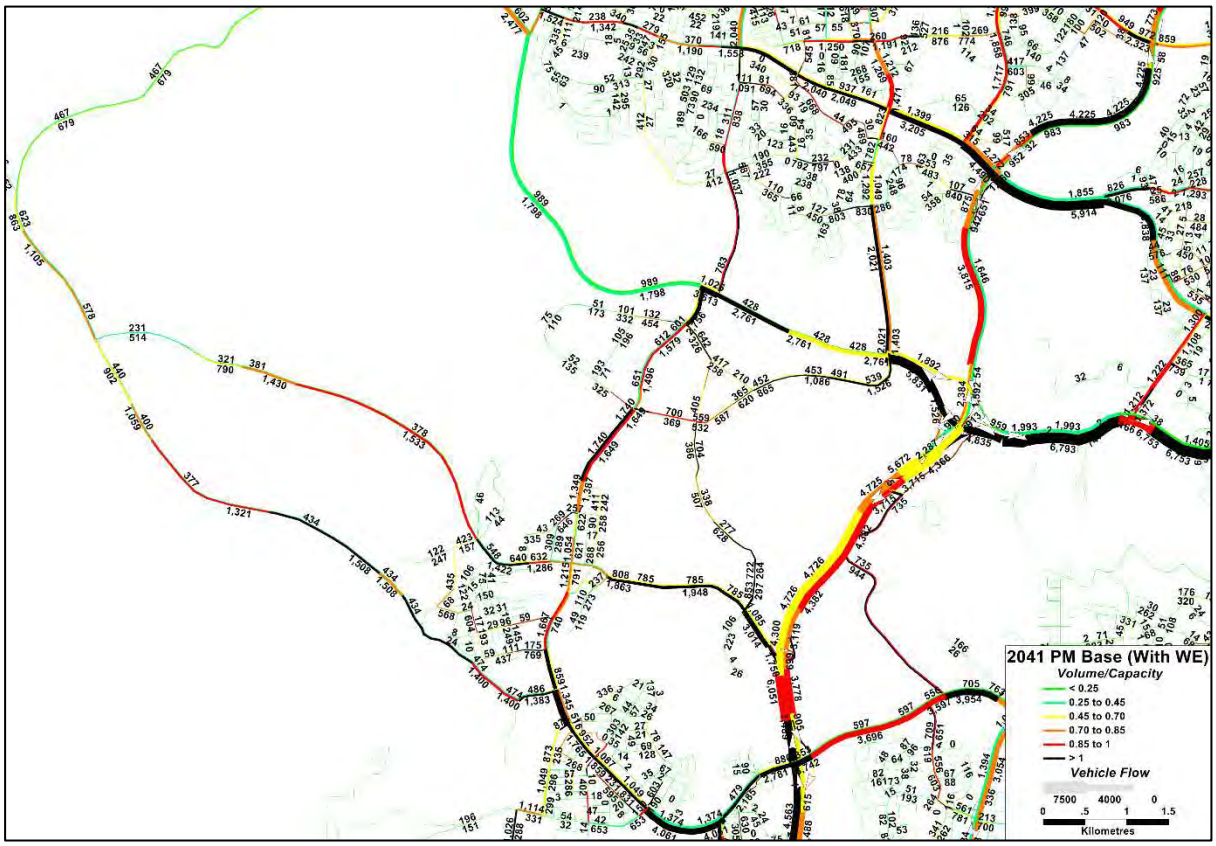


Figure 29: 2041 PM Base Case (With Western Edge) Flow and V/C

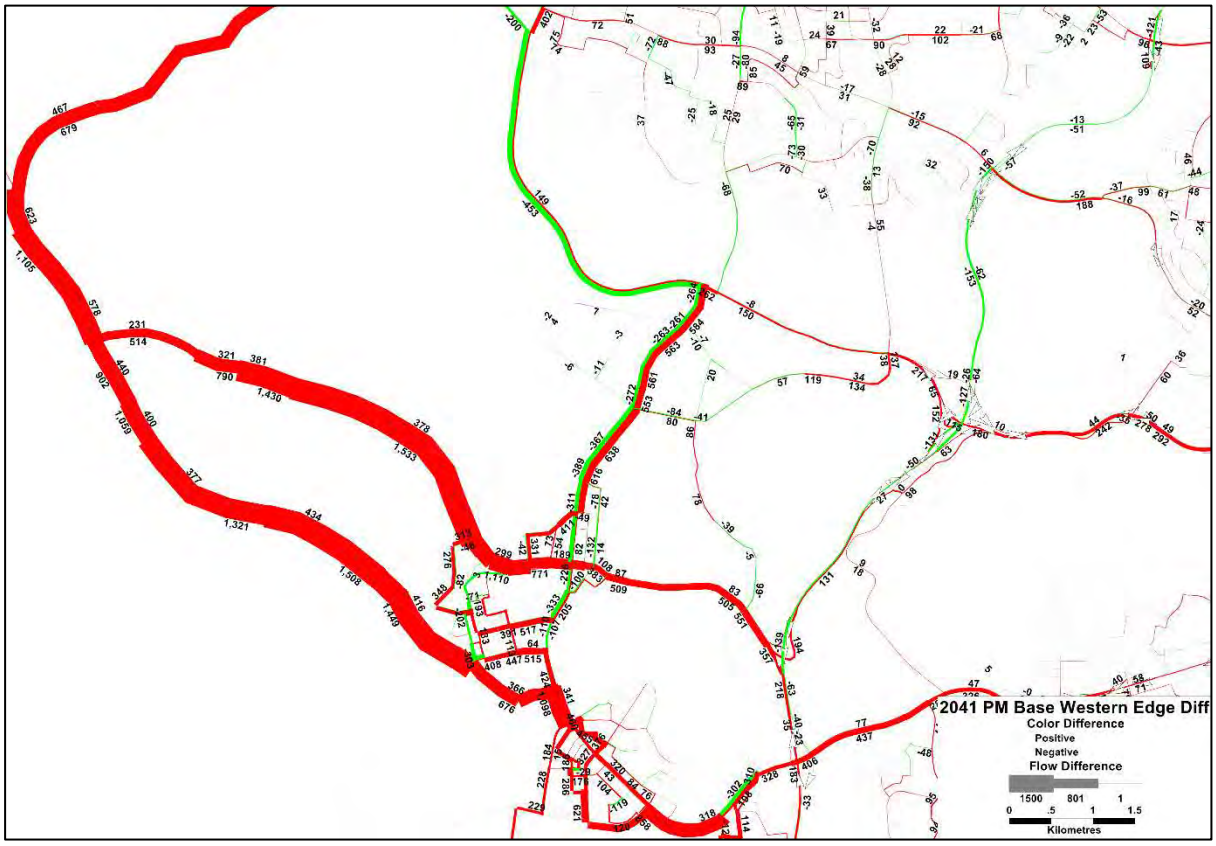


Figure 30: 2041 PM Base Case to Western Edge Flow Difference

Option 3 (With Western Edge)

Figure 31 and Figure 33 show the 2041 AM and PM Option 3 (With Western Edge) flow and V/C respectively while Figure 32 and Figure 34 show the differences between the Option 3 and Option 3 (With Western Edge) scenarios in 2041 AM and PM peaks respectively. The development of the Western Edge area has a substantial impact on traffic volumes across the network in the Molonglo area, with a smaller impact across parts of the surrounding arterial road network.

Observations of the 2041 AM Option 3 (With Western Edge) model include:

- All roads out of Molonglo operate over capacity.
- William Hovell Drive eastbound, west of John Gorton Drive, has some spare capacity
- William Hovell Drive eastbound, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive eastbound, from Kingsford Smith Drive to Clunies Ross Street operate at or over capacity.
- Tuggeranong Parkway generally operates close to capacity in both directions. The northern ramps at Cotter Road operate over capacity.
- Much of John Gorton Drive, Coulter Drive and Bindubi Street Extension operate at or above capacity.
- A number of local roads in Macquarie, Cook and Aranda are operating over capacity, likely indicating rat-running to avoid William Hovell Drive and Belconnen Way.
- Development of the Western Edge reduces traffic on William Hovell Drive (west of Coulter Drive) due to increased congestion on William Hovell Drive (east of Coulter Drive) and Parkes Way. The traffic that had been using William Hovell Drive now uses Belconnen Way or other east-west links further north. Traffic southbound on John Gorton Drive and Coulter Drive has decreased, likely due to trip destinations being fulfilled by people travelling from the Western Edge instead of Belconnen.

In 2041 PM Option 3 (With Western Edge), the following observations have been made:

- All roads into Molonglo operate over capacity.
- William Hovell Drive westbound, west of John Gorton Drive, operates below capacity.
- William Hovell Drive westbound, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive westbound, from Clunies Ross Street to Kingsford Smith Drive operate at or over capacity.
- Tuggeranong Parkway generally operates close to capacity and over capacity southbound between Lakeside Interchange and the EWA.
- Much of John Gorton Drive and Bindubi Street Extension operate close to capacity.
- A number of local roads in Macquarie, Cook and Aranda are operating over capacity, likely indicating rat-running to avoid William Hovell Drive and Belconnen Way.
- Development of the Western Edge increases traffic on most roads in the area, but decreases traffic on William Hovell Drive westbound (west of Coulter Drive), Coulter Drive (northbound) and Gungahlin Drive, likely due to trip destinations being fulfilled by people travelling to the Western Edge instead of Belconnen.

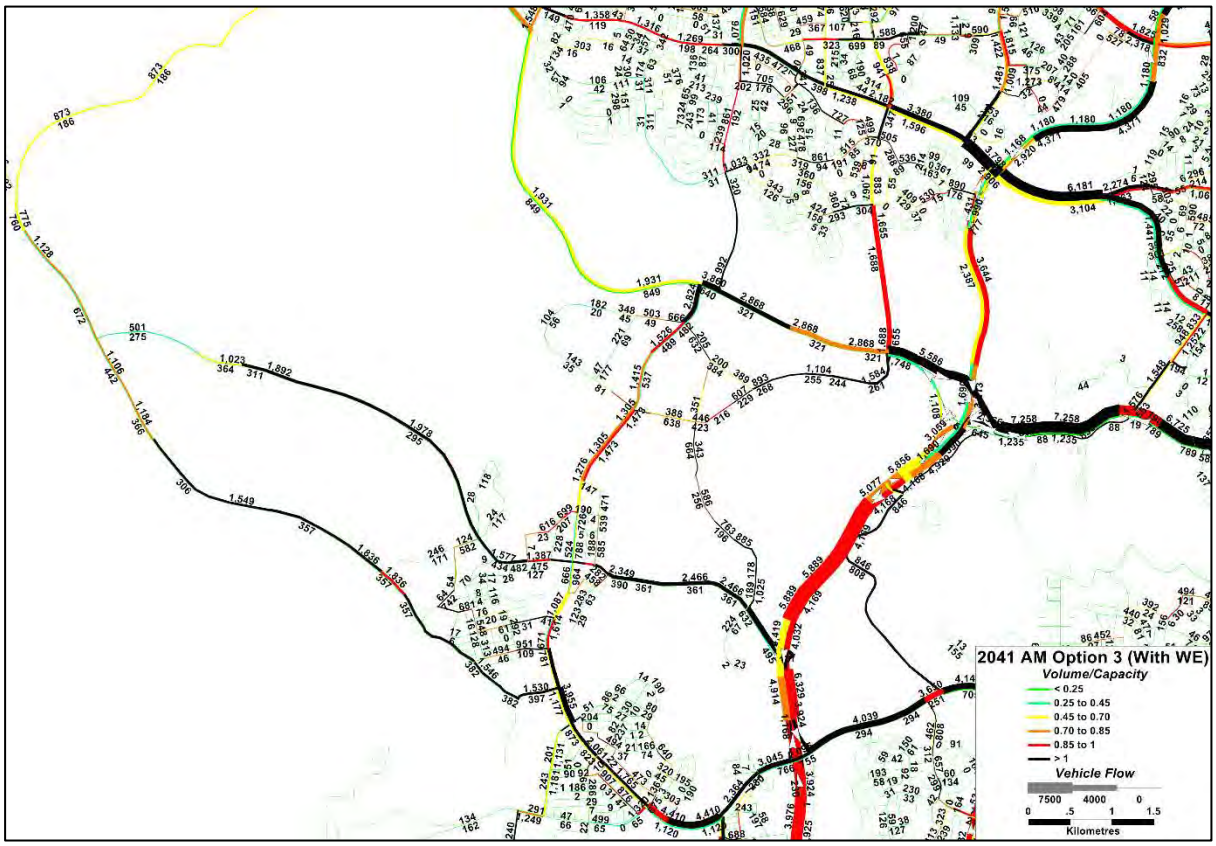


Figure 31: 2041 AM Option 3 (With Western Edge) Flow and V/C

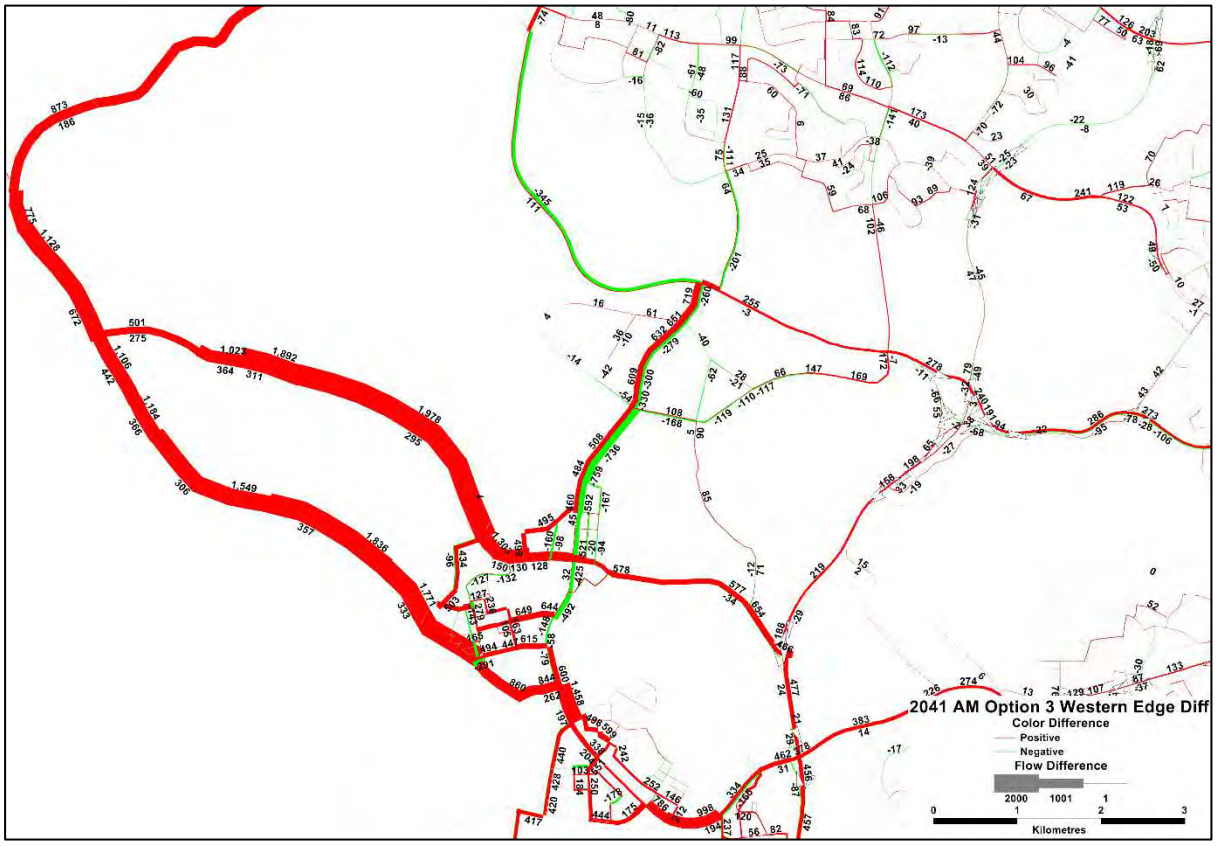


Figure 32: 2041 AM Option 3 to Western Edge Difference

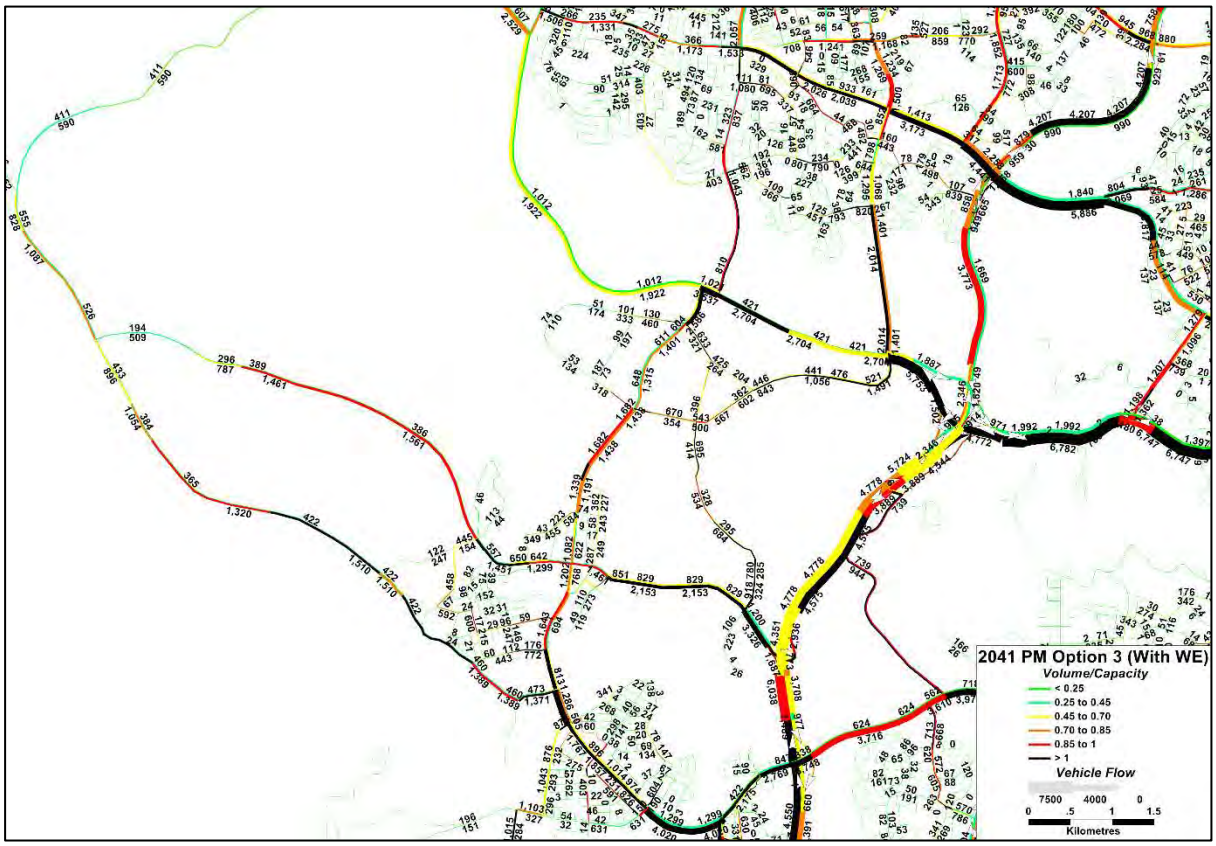


Figure 33: 2041 PM Option 3 (With Western Edge) Flow and V/C

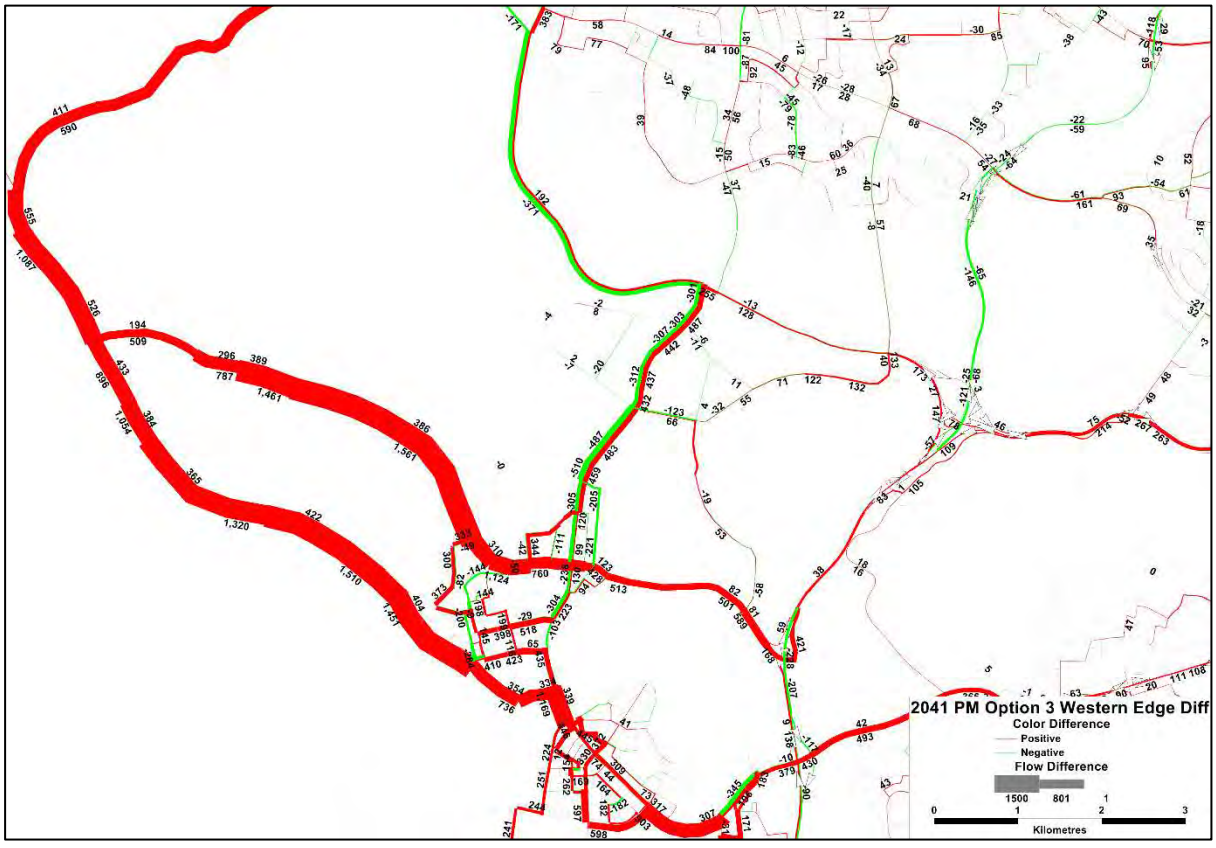


Figure 34: 2041 PM Option 3 to Western Edge Flow Difference

Option 4 (With Western Edge)

Figure 35 and Figure 37 show the 2041 AM and PM Option 4 (With Western Edge) flow and V/C respectively while Figure 36 and Figure 38 show the differences between the Option 4 and Option 4 (With Western Edge) scenarios in 2041 AM and PM peaks respectively. The construction of the East-West Arterial has a substantial impact on traffic volumes across the network in the Molonglo area, with a smaller impact across parts of the surrounding arterial road network.

Observations of the 2041 AM Option 4 (With Western Edge) model include:

- All roads out of Molonglo operate over capacity.
- William Hovell Drive eastbound, west of John Gorton Drive, has spare capacity
- William Hovell Drive eastbound, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive eastbound, from Kingsford Smith Drive to Clunies Ross Street operate at or over capacity.
- Tuggeranong Parkway generally operates below capacity in both directions.
- Much of John Gorton Drive, Coulter Drive and Bindubi Street Extension operate at or above capacity.
- A number of local roads in Macquarie, Cook and Aranda are operating over capacity, likely indicating rat-running to avoid William Hovell Drive and Belconnen Way.
- Development of the Western Edge reduces traffic on William Hovell Drive (west of Coulter Drive) due to increased congestion on William Hovell Drive (east of Coulter Drive) and Parkes Way. The traffic that had been using William Hovell Drive now uses Belconnen Way or other east-west links further north. Traffic southbound on John Gorton Drive and Coulter Drive has decreased, likely due to trip destinations being fulfilled by people travelling from the Western Edge instead of Belconnen.

In 2041 PM Option 4 (With Western Edge), the following observations have been made:

- All roads into Molonglo operate over capacity.
- William Hovell Drive westbound, west of John Gorton Drive, operates below capacity.
- William Hovell Drive westbound, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive westbound, from Clunies Ross Street to Kingsford Smith Drive operate at or over capacity.
- Tuggeranong Parkway generally operates well but is over capacity between Lakeside Interchange and EWA.
- Much of John Gorton Drive and Bindubi Street Extension operate at or above capacity.
- A number of local roads in Macquarie, Cook and Aranda are operating over capacity, likely indicating rat-running to avoid William Hovell Drive and Belconnen Way.
- Development of the Western Edge reduces traffic on William Hovell Drive (west of Coulter Drive) due to increased congestion on William Hovell Drive (east of Coulter Drive) and Parkes Way. Traffic northbound on John Gorton Drive has decreased, likely due to trip destinations being fulfilled by people travelling to the Western Edge instead of Belconnen.

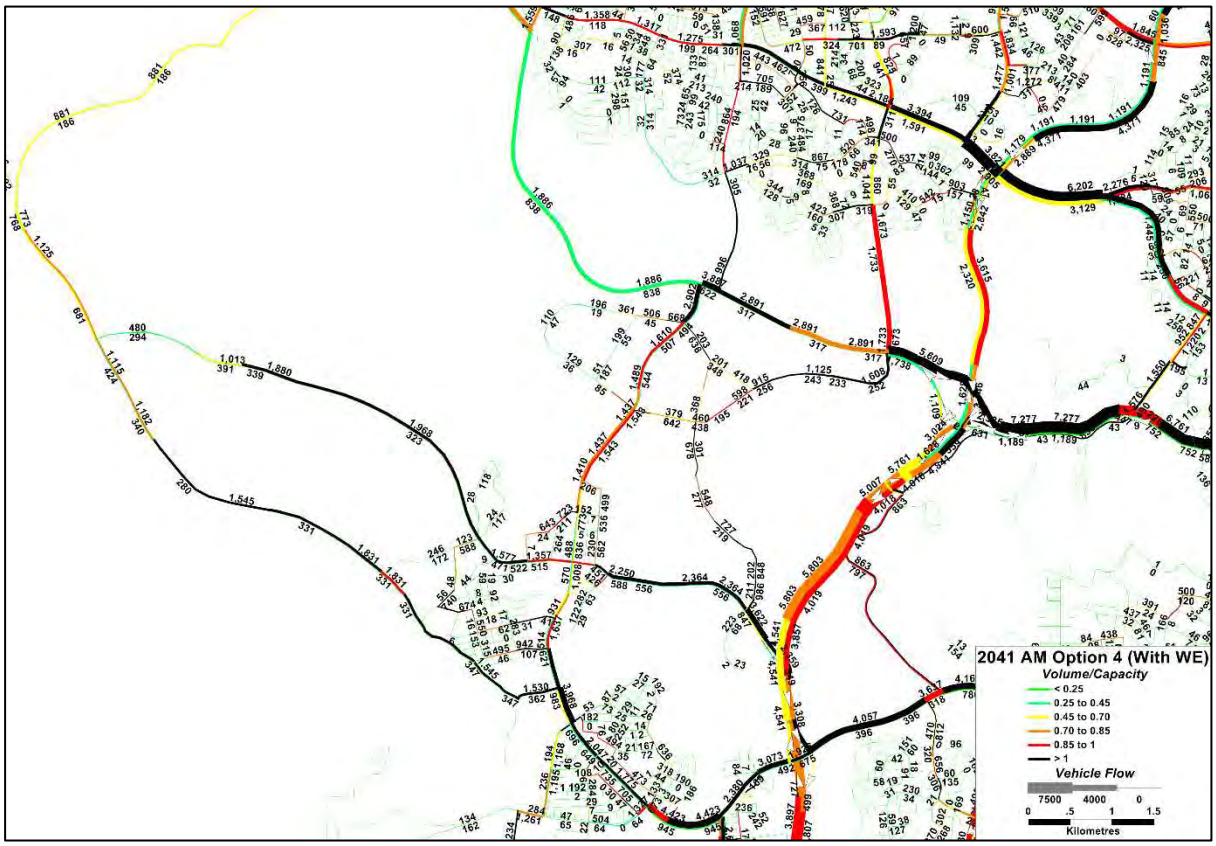


Figure 35: 2041 AM Option 4 (With Western Edge) Flow and V/C

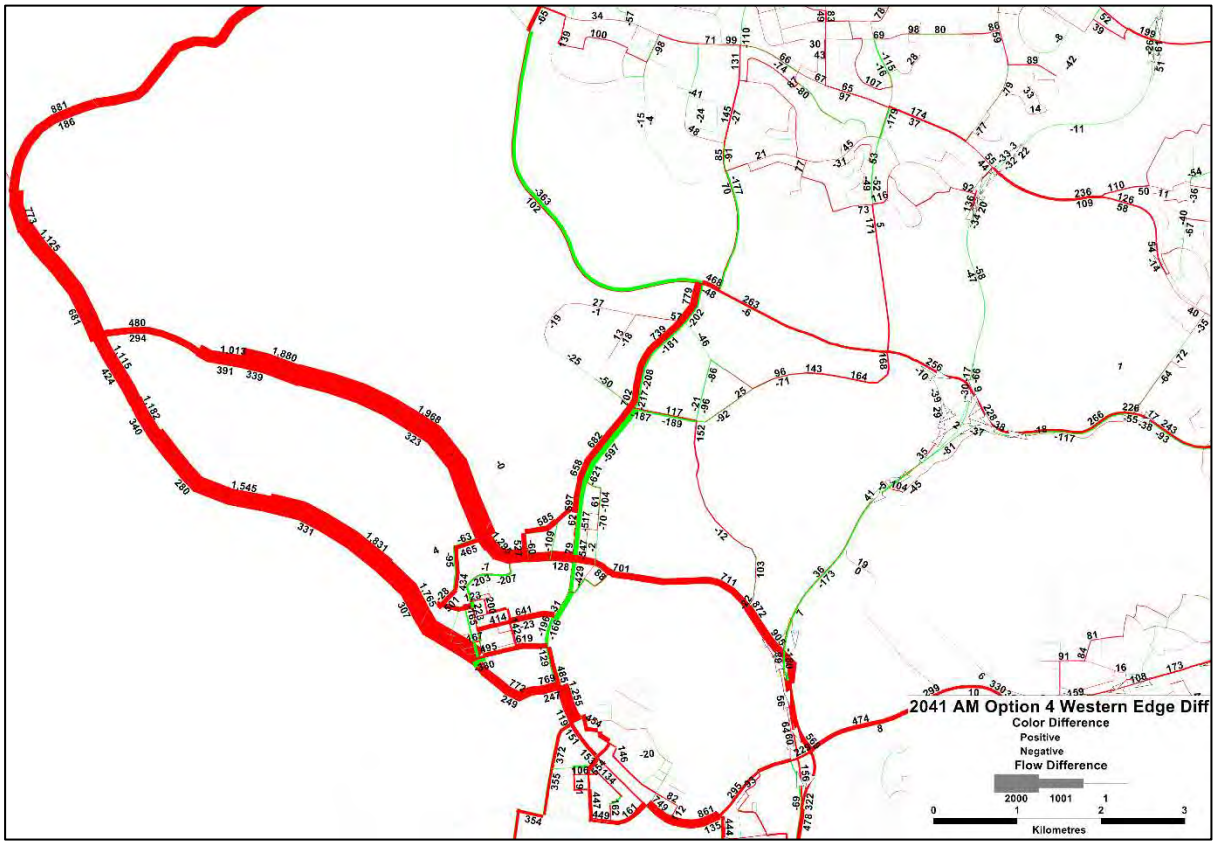


Figure 36: 2041 AM Option 4 to Western Edge Difference

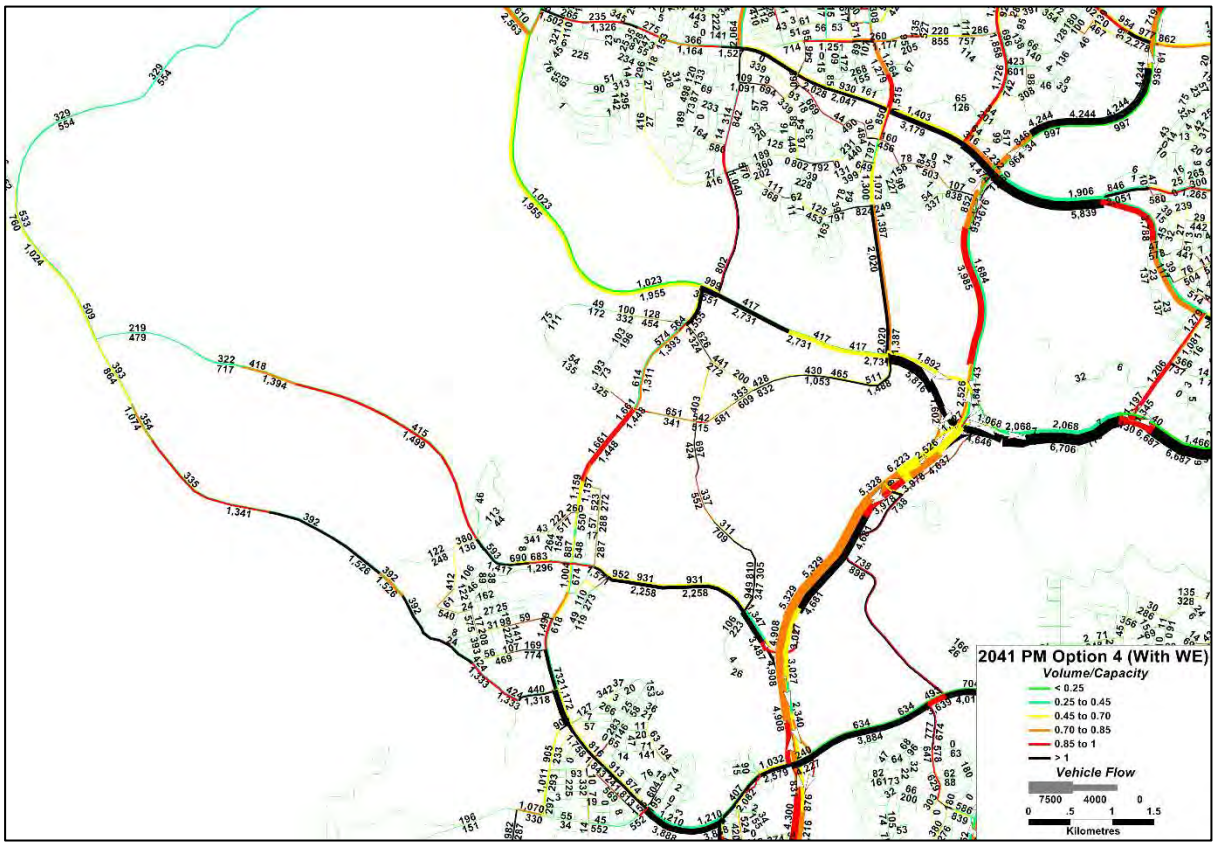


Figure 37: 2041 PM Option 4 (With Western Edge) Flow and V/C

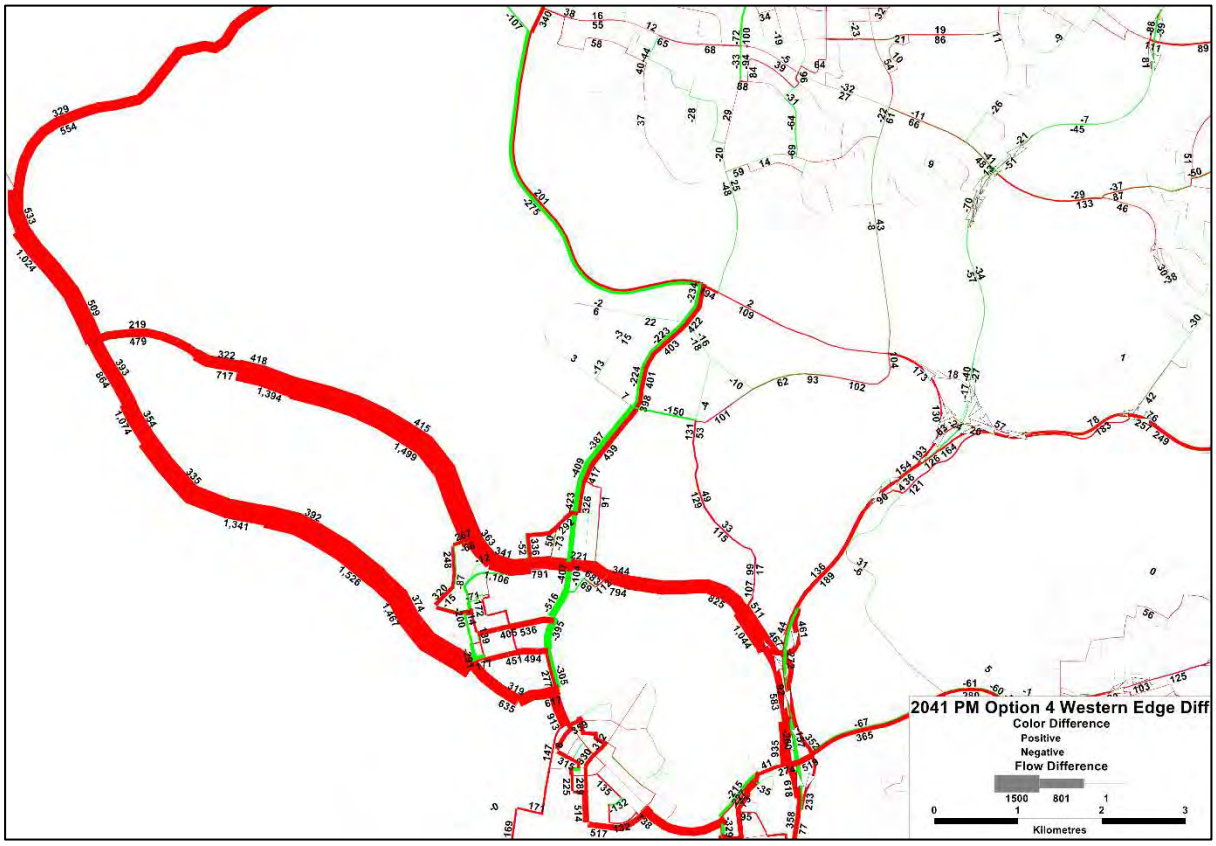


Figure 38: 2041 PM Option 4 to Western Edge Flow Difference

Option 5 (With Western Edge)

Figure 39 and Figure 41 show the 2041 AM and PM Option 5 (With Western Edge) flow and V/C respectively while Figure 40 and Figure 42 show the differences between the Option 5 and Option 5 (With Western Edge) scenarios in 2041 AM and PM peaks respectively. The construction of the East-West Arterial has a substantial impact on traffic volumes across the network in the Molonglo area, with a smaller impact across parts of the surrounding arterial road network.

Observations of the 2041 AM Option 5 (With Western Edge) model include:

- All roads out of Molonglo operate over capacity.
- William Hovell Drive eastbound, west of John Gorton Drive, has spare capacity
- William Hovell Drive eastbound, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive eastbound, from Kingsford Smith Drive to Clunies Ross Street operate at or over capacity.
- Tuggeranong Parkway generally operates close to capacity in both directions.
- Much of John Gorton Drive, Coulter Drive and Bindubi Street Extension operate at or above capacity.
- A number of local roads in Macquarie, Cook and Aranda are operating over capacity, likely indicating rat-running to avoid William Hovell Drive and Belconnen Way.
- Development of the Western Edge reduces traffic on William Hovell Drive (west of Coulter Drive) due to increased congestion on William Hovell Drive (east of Coulter Drive) and Parkes Way. The traffic that had been using William Hovell Drive now uses Belconnen Way or other east-west links further north. Traffic southbound on John Gorton Drive and Coulter Drive has decreased, likely due to trip destinations being fulfilled by people travelling from the Western Edge instead of Belconnen.

In 2041 PM Option 5 (With Western Edge), the following observations have been made:

- All roads into Molonglo operate over capacity.
- William Hovell Drive westbound, west of John Gorton Drive, operates below capacity.
- William Hovell Drive westbound, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive westbound, from Clunies Ross Street to Kingsford Smith Drive operate at or over capacity.
- Tuggeranong Parkway generally operates well but is close to capacity south of Cotter Road.
- Much of John Gorton Drive and Bindubi Street Extension operate at or above capacity.
- A number of local roads in Macquarie, Cook and Aranda are operating over capacity, likely indicating rat-running to avoid William Hovell Drive and Belconnen Way.
- Development of the Western Edge reduces traffic on William Hovell Drive (west of Coulter Drive). The traffic that had been using William Hovell Drive now uses Belconnen Way or other east-west links further north. Traffic northbound on John Gorton Drive, William Hovell Drive, Coulter Drive and Gungahlin Drive has decreased, likely due to trip destinations being fulfilled by people travelling to the Western Edge instead of Belconnen.

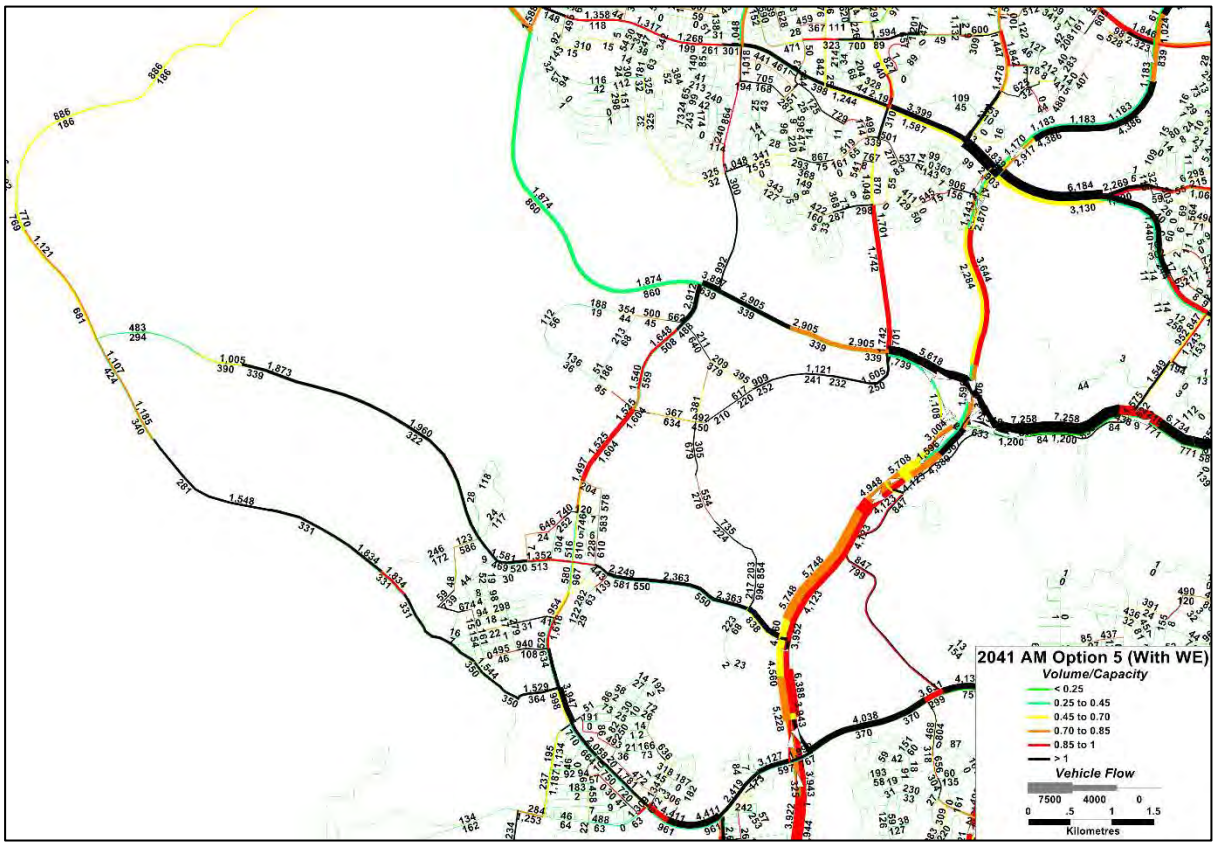


Figure 39: 2041 AM Option 5 (With Western Edge) Flow and V/C

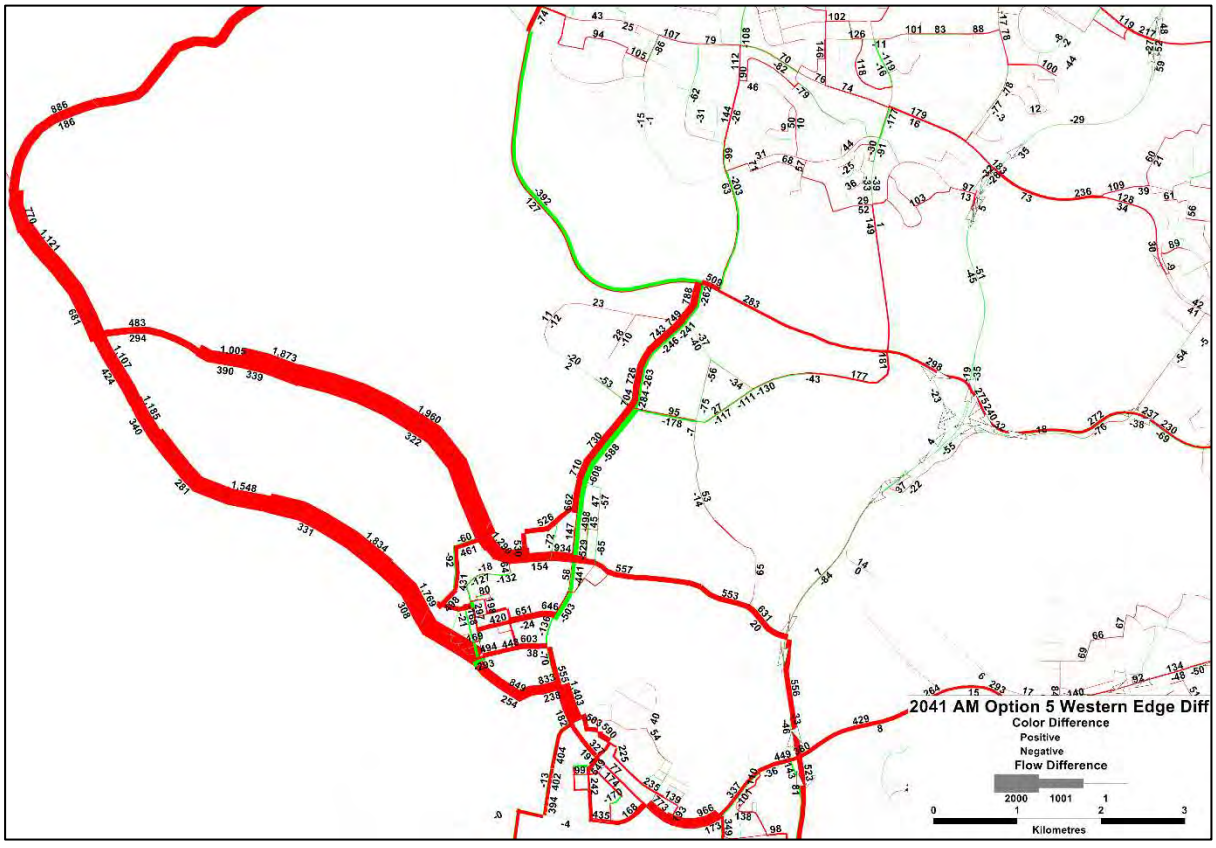


Figure 40: 2041 AM Option 5 to Western Edge Difference

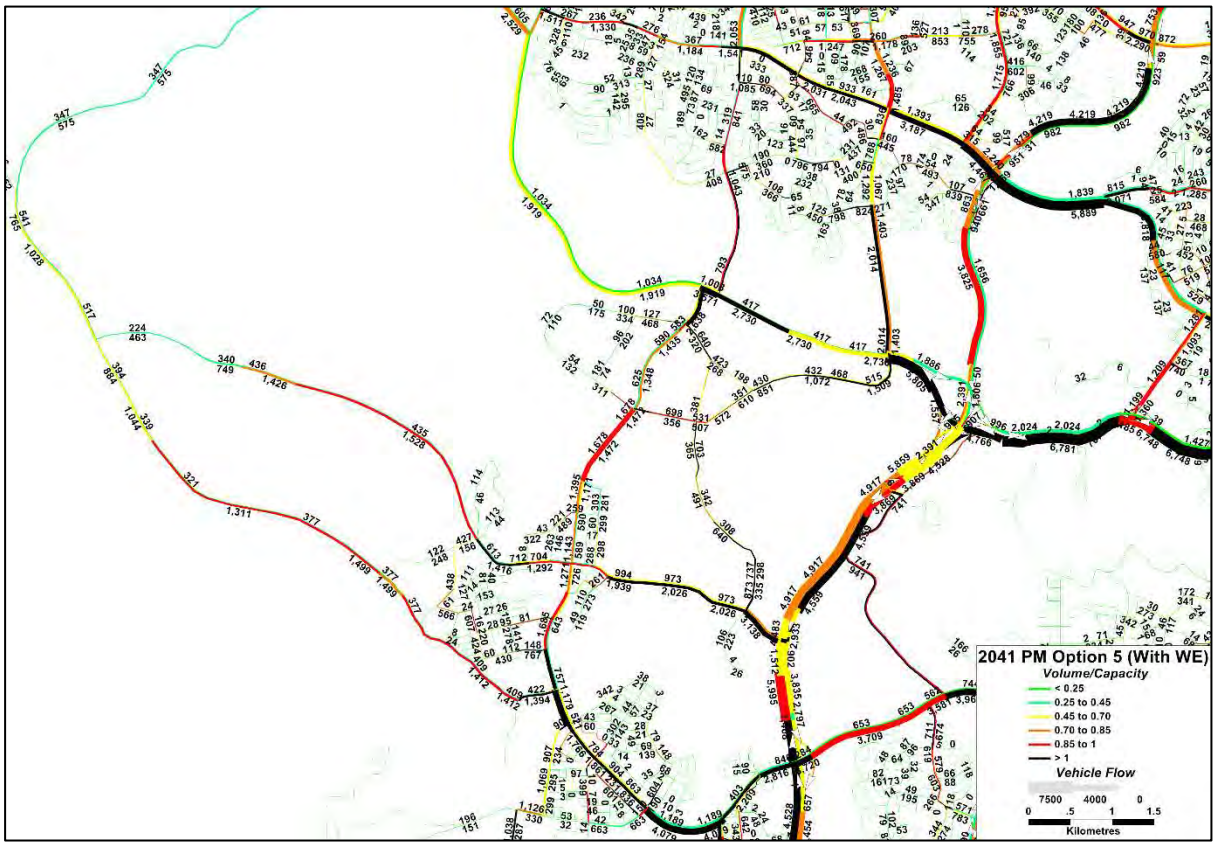


Figure 41: 2041 PM Option 5 (With Western Edge) Flow and V/C

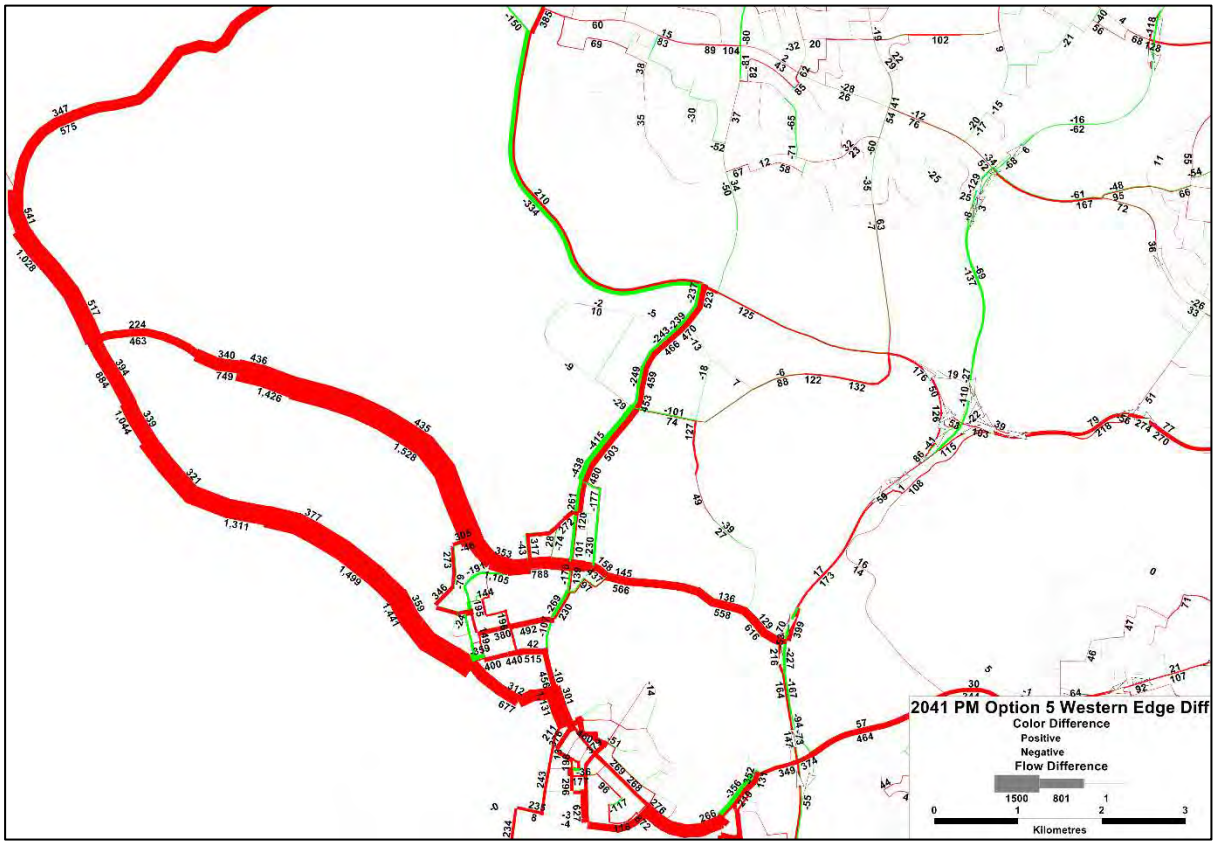


Figure 42: 2041 PM Option 5 to Western Edge Flow Difference

Summary of findings

The modelling showed that the options developed in this project provided largely similar results on a network-wide level. Option 3 appeared to operate marginally better than other options in the AM peak, but not as well as Option 4 in the PM peak. A number of observations were made that were applicable to all scenarios in the AM and PM Peaks (without Western Edge):

- All arterial roads in and out of Molonglo operate over capacity in both peak periods.
- William Hovell Drive west of John Gorton Drive has spare capacity, likely because of the congestion further east making it preferable to travel to Civic via Belconnen Way instead.
- William Hovell Drive, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive, between Kingsford Smith Drive and Clunies Ross Street operate at or over capacity.
- Tuggeranong Parkway generally operates close to capacity in both directions.
- Much of John Gorton Drive and Bindubi Street Extension operate at or above capacity.
- East-West Arterial operates with some spare capacity between the town centre and Molonglo 3 Distributor road and above capacity around the Tuggeranong Parkway interchange.
- Construction of the EWA reduces traffic on nearly all roads in Molonglo, William Hovell Drive (between Coulter Drive and Bindubi Street), Bindubi Street and Belconnen Way. Traffic increases on Tuggeranong Parkway, William Hovell Drive (west of Coulter Drive), Gungahlin Drive, Parkes Way and Cotter Road (east of Tuggeranong Parkway). Traffic also decreases on a number of local roads in Hawker, Weetangera, Macquarie, Cook and Aranda, indicating better arterial capacity and less rat-running.

The development of the Western Edge area causes substantial additional traffic in the Molonglo area. Even without the Western Edge, many arterial roads in the area operate at or above capacity in the 2041 peak periods and the additional traffic causes very high congestion and low operating speeds. General observations that were consistent across all of the Western Edge scenarios include:

- All roads into and out of Molonglo operate over capacity.
- William Hovell Drive west of John Gorton Drive has spare capacity, likely because of the congestion further east making it preferable to travel to Civic via Belconnen Way instead.
- William Hovell Drive, east of John Gorton Drive, and Parkes Way generally operate at or over capacity.
- Belconnen Way and Barry Drive, between Kingsford Smith Drive and Clunies Ross Street operate at or over capacity.
- Tuggeranong Parkway generally operates close to capacity in both directions.
- Much of John Gorton Drive and Bindubi Street Extension operate at or above capacity.
- East-West Arterial (west of Molonglo) and Uriarra Road operate at or over capacity in both peak periods.
- Development of the Western Edge reduces traffic on William Hovell Drive (west of Coulter Drive) due to increased congestion on William Hovell Drive (east of Coulter Drive) and Parkes Way. The traffic that had been using William Hovell Drive now uses Belconnen Way or other east-west links further north. Traffic on John Gorton Drive (north of the town centre) decreases, likely due to trip destinations being fulfilled by people travelling to and from the Western Edge instead of Belconnen.

Additional Comments

- The CSTM does not account for peak spreading to address additional congestion in future years.
- The ACT Government has made a commitment to increasing the mode share of public transport and active travel modes. Providing large amounts of additional capacity for car travel will not encourage mode shift. However, sufficient capacity should be provided to allow for the amount of road traffic expected assuming that the mode share targets are met.
- Providing sufficient road network capacity to easily accommodate peak hour traffic tends to lead to overspend on road infrastructure which is underutilised during off-peak times.
- The impact of future vehicle technologies, particularly connected and autonomous vehicles (CAVs), is currently not easily modelled but should be considered in all medium to long term road and public transport network planning activities. CAVs are expected to drastically change travel patterns and road network capacities and should therefore be considered especially when planning for a transport network that is expected to operate 20-30 years into the future.

Appendix G M3E Connector Rd Intersection – SIDRA Analysis

PHASING SUMMARY

Site: 101 [EWA - M3 4-Way 2041 AM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

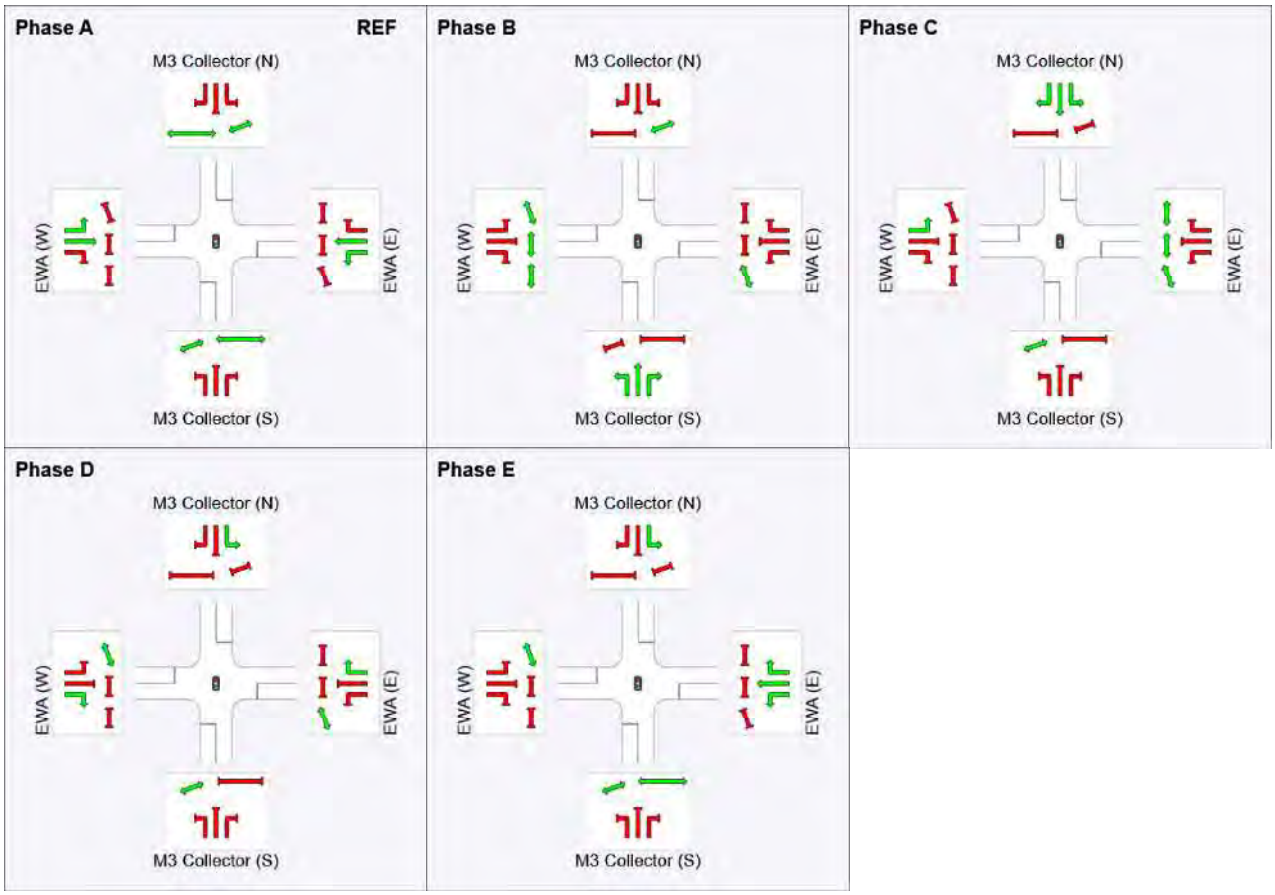
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Hybrid
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D, E
Output Phase Sequence: A, B, C, D, E

Phase Timing Summary

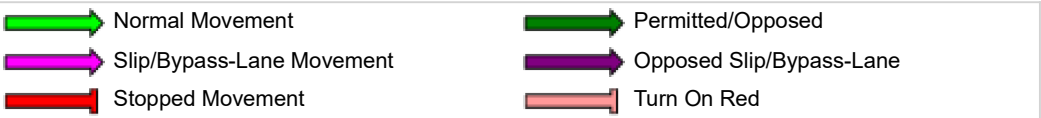
Phase	A	B	C	D	E
Phase Change Time (sec)	0	58	77	96	115
Green Time (sec)	52	13	13	13	29
Phase Time (sec)	58	19	19	19	35
Phase Split	39%	13%	13%	13%	23%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: 101 [EWA - M3 4-Way 2041 PM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

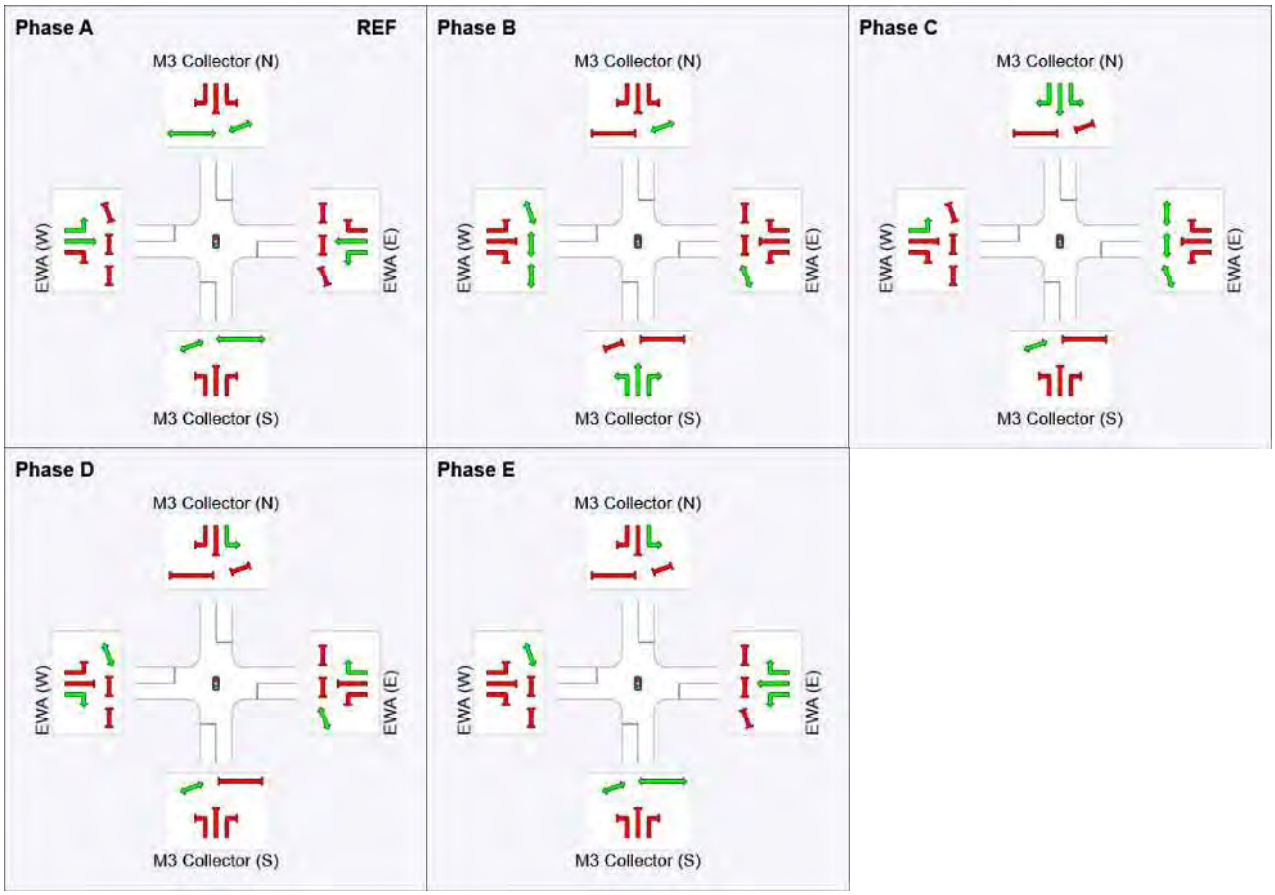
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Hybrid
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D, E
Output Phase Sequence: A, B, C, D, E

Phase Timing Summary

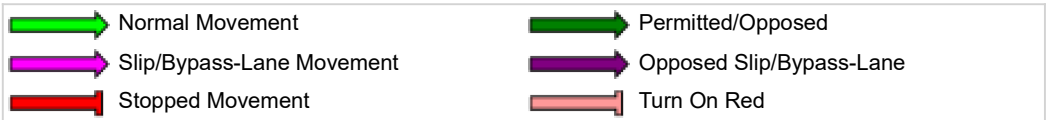
Phase	A	B	C	D	E
Phase Change Time (sec)	0	18	31	44	56
Green Time (sec)	12	7	7	6	8
Phase Time (sec)	18	13	13	12	14
Phase Split	26%	19%	19%	17%	20%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



PHASING SUMMARY

Site: 101 [EWA - M3 Split T (West) 2041 AM]

Network: N101 [Split T 2041 AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

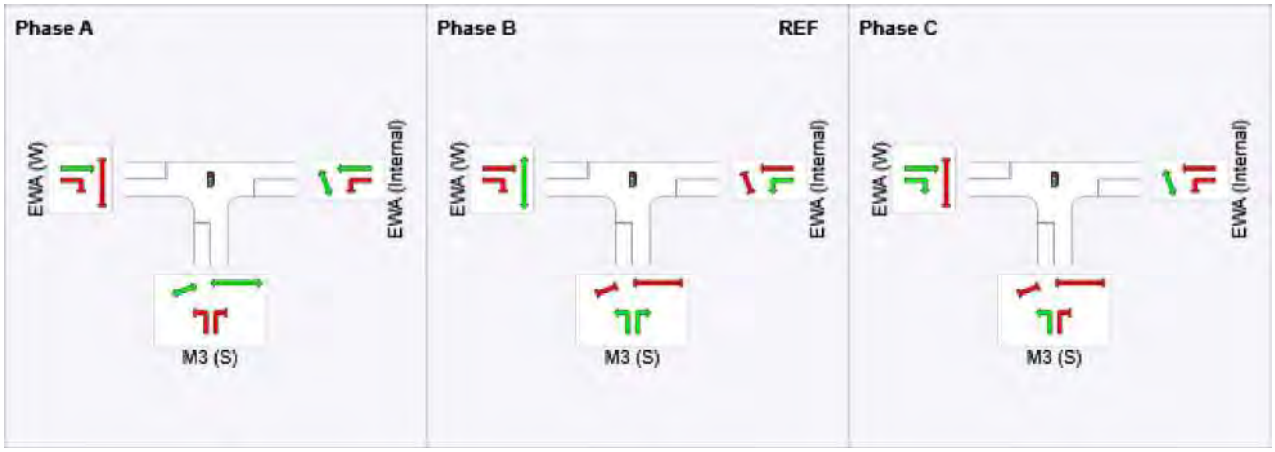
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	28	0	16
Green Time (sec)	26	10	6
Phase Time (sec)	32	16	12
Phase Split	53%	27%	20%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

PHASING SUMMARY

Site: 101 [EWA - M3 Split T (East) 2041 AM]

Network: N101 [Split T 2041 AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

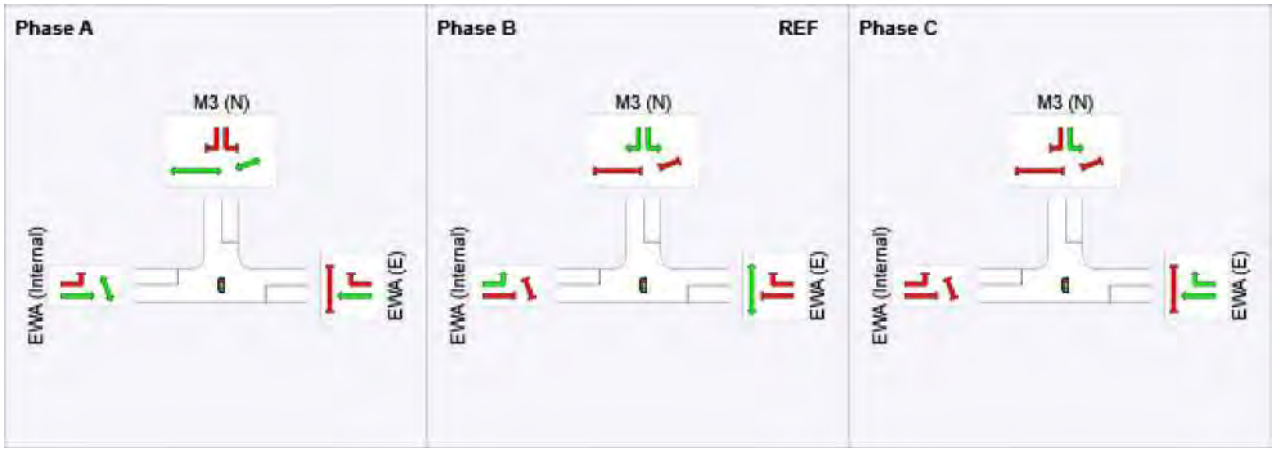
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	30	0	18
Green Time (sec)	24	12	6
Phase Time (sec)	30	18	12
Phase Split	50%	30%	20%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

PHASING SUMMARY

Site: 101 [EWA - M3 Split T (West) 2041 PM]

Network: N101 [Split T 2041 PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

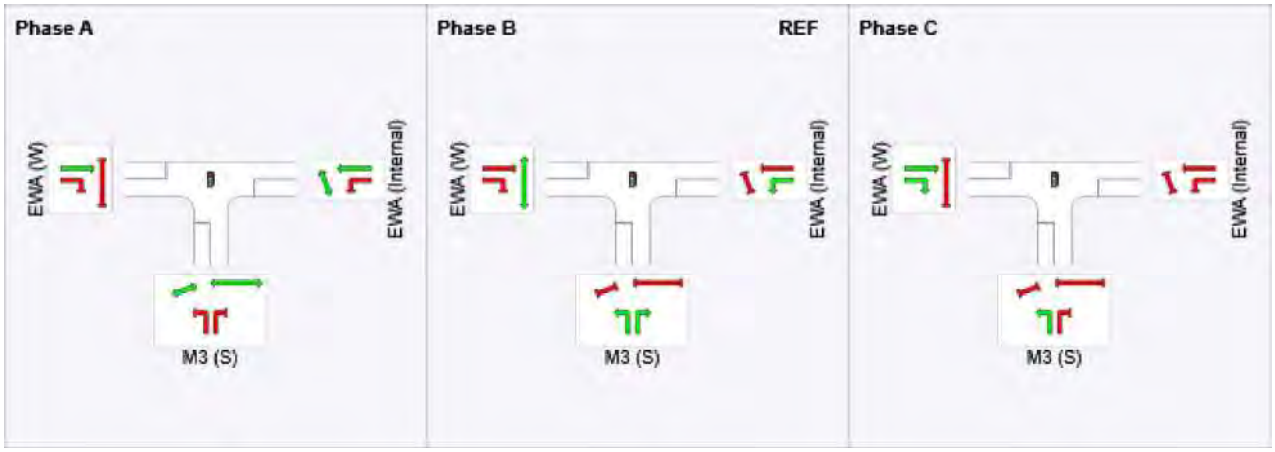
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	27	0	15
Green Time (sec)	27	9	6
Phase Time (sec)	33	15	12
Phase Split	55%	25%	20%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

PHASING SUMMARY

Site: 101 [EWA - M3 Split T (East) 2041 PM]

Network: N101 [Split T 2041 PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

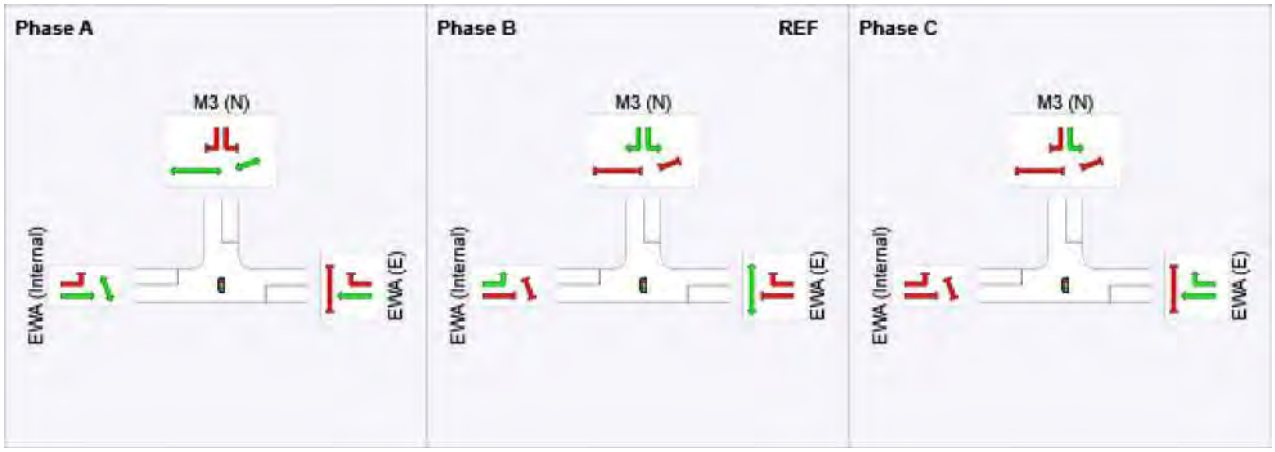
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	43	0	18
Green Time (sec)	11	12	19
Phase Time (sec)	17	18	25
Phase Split	28%	30%	42%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

MOVEMENT SUMMARY

Site: 101 [EWA - M3 4-Way 2041 AM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: M3 Collector (S)												
1	L2	20	2.0	0.722	81.8	LOS F	8.7	61.7	1.00	0.84	1.11	26.1
2	T1	8	2.0	0.722	76.2	LOS F	8.7	61.7	1.00	0.84	1.11	25.8
3	R2	201	2.0	0.722	81.8	LOS F	8.7	61.7	1.00	0.84	1.11	26.0
Approach		229	2.0	0.722	81.6	LOS F	8.7	61.7	1.00	0.84	1.11	26.0
East: EWA (E)												
4	L2	31	2.0	0.117	21.4	LOS B	4.1	29.5	0.48	0.47	0.48	49.6
5	T1	229	2.0	0.117	14.8	LOS B	4.2	29.8	0.48	0.43	0.48	54.0
6	R2	242	2.0	0.207	46.0	LOS D	6.4	45.3	0.77	0.76	0.77	35.3
Approach		502	2.0	0.207	30.2	LOS C	6.4	45.3	0.62	0.59	0.62	42.9
North: M3 Collector (N)												
7	L2	1164	2.0	0.912	51.7	LOS D	55.8	397.6	0.91	0.91	0.99	33.1
8	T1	7	2.0	0.183	70.1	LOS E	2.1	14.6	0.96	0.72	0.96	27.2
9	R2	22	2.0	0.183	75.7	LOS F	2.1	14.6	0.96	0.72	0.96	27.6
Approach		1194	2.0	0.912	52.3	LOS D	55.8	397.6	0.91	0.91	0.99	33.0
West: EWA (W)												
10	L2	42	2.0	0.053	21.9	LOS B	1.2	8.8	0.61	0.69	0.61	46.2
11	T1	1555	2.0	0.921	61.3	LOS E	50.4	359.2	0.97	0.98	1.11	32.3
12	R2	20	2.0	0.126	75.9	LOS F	1.4	9.8	0.96	0.71	0.96	27.2
Approach		1617	2.0	0.921	60.5	LOS E	50.4	359.2	0.96	0.97	1.10	32.4
All Vehicles		3542	2.0	0.921	54.8	LOS D	55.8	397.6	0.90	0.89	0.99	33.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
P1B	South Slip/Bypass Lane Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
P21	East Stage 1	53	69.3	LOS F	0.2	0.2	0.96	0.96
P22	East Stage 2	53	69.3	LOS F	0.2	0.2	0.96	0.96
P2B	East Slip/Bypass Lane Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
P3B	North Slip/Bypass Lane Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
P41	West Stage 1	53	69.3	LOS F	0.2	0.2	0.96	0.96
P42	West Stage 2	53	69.3	LOS F	0.2	0.2	0.96	0.96

P4B	West Slip/Bypass Lane Crossing	53	31.8	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		526	65.5	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EWA - M3 4-Way 2041 PM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: M3 Collector (S)												
1	L2	32	2.0	0.295	39.2	LOS C	1.8	13.1	0.96	0.74	0.96	37.5
2	T1	5	2.0	0.295	33.6	LOS C	1.8	13.1	0.96	0.74	0.96	36.8
3	R2	72	2.0	0.295	39.2	LOS C	1.8	13.1	0.96	0.74	0.96	37.2
Approach		108	2.0	0.295	38.9	LOS C	1.8	13.1	0.96	0.74	0.96	37.3
East: EWA (E)												
4	L2	167	2.0	0.760	29.7	LOS C	17.2	122.5	0.94	0.88	1.01	44.4
5	T1	911	2.0	0.760	23.0	LOS B	17.4	124.2	0.94	0.87	1.01	48.1
6	R2	814	2.0	0.778	35.0	LOS C	14.1	100.7	0.98	0.91	1.12	39.5
Approach		1892	2.0	0.778	28.8	LOS C	17.4	124.2	0.96	0.89	1.06	43.7
North: M3 Collector (N)												
7	L2	411	2.0	0.299	17.6	LOS B	5.4	38.8	0.64	0.73	0.64	47.8
8	T1	9	2.0	0.526	34.7	LOS C	3.4	24.1	0.99	0.77	1.00	36.4
9	R2	87	2.0	0.526	40.3	LOS C	3.4	24.1	0.99	0.77	1.00	37.2
Approach		507	2.0	0.526	21.8	LOS B	5.4	38.8	0.70	0.74	0.71	45.3
West: EWA (W)												
10	L2	52	2.0	0.104	18.0	LOS B	0.9	6.1	0.78	0.71	0.78	48.6
11	T1	629	2.0	0.742	32.1	LOS C	8.7	61.9	0.99	0.86	1.11	43.4
12	R2	28	2.0	0.181	40.6	LOS C	1.0	6.9	0.96	0.71	0.96	37.0
Approach		709	2.0	0.742	31.4	LOS C	8.7	61.9	0.97	0.85	1.08	43.5
All Vehicles		3217	2.0	0.778	28.6	LOS C	17.4	124.2	0.92	0.85	1.00	43.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P1B	South Slip/Bypass Lane Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P21	East Stage 1	53	29.3	LOS C	0.1	0.1	0.92	0.92
P22	East Stage 2	53	29.3	LOS C	0.1	0.1	0.92	0.92
P2B	East Slip/Bypass Lane Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P3	North Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P3B	North Slip/Bypass Lane Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P41	West Stage 1	53	29.3	LOS C	0.1	0.1	0.92	0.92
P42	West Stage 2	53	29.3	LOS C	0.1	0.1	0.92	0.92

P4B	West Slip/Bypass Lane Crossing	53	12.3	LOS B	0.0	0.0	0.83	0.83
All Pedestrians		526	27.6	LOS C			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EWA - M3 Split T (West) 2041 AM]

Network: N101 [Split T 2041 AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: M3 (S)														
1	L2	20	2.0	20	2.0	0.030	18.7	LOS B	0.2	1.6	0.66	0.66	0.66	47.1
3	R2	209	2.0	209	2.0	0.772	36.1	LOS C	4.1	29.4	1.00	0.93	1.27	27.7
Approach		229	2.0	229	2.0	0.772	34.6	LOS C	4.1	29.4	0.97	0.91	1.22	29.7
East: EWA (Internal)														
4	L2	38	2.0	38	2.0	0.124	33.1	LOS C	0.7	4.8	0.99	0.74	0.99	31.9
5	T1	252	2.0	252	2.0	0.151	5.5	LOS A	0.7	5.0	0.33	0.26	0.33	59.7
Approach		289	2.0	289	2.0	0.151	9.1	LOS A	0.7	5.0	0.41	0.33	0.41	53.5
West: EWA (W)														
11	T1	1597	2.0	1597	2.0	0.741	9.0	LOS A	10.4	74.3	0.74	0.69	0.77	52.1
12	R2	20	2.0	20	2.0	0.109	34.5	LOS C	0.3	2.5	0.94	0.70	0.94	39.4
Approach		1617	2.0	1617	2.0	0.741	9.4	LOS A	10.4	74.3	0.75	0.69	0.77	51.7
All Vehicles		2136	2.0	2136	2.0	0.772	12.0	LOS A	10.4	74.3	0.72	0.67	0.77	48.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P1B	South Slip/Bypass Lane Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P2B	East Slip/Bypass Lane Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		211	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EWA - M3 Split T (East) 2041 AM]

Network: N101 [Split T 2041 AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: EWA (E)														
5	T1	260	2.0	260	2.0	0.113	5.5	LOS A	1.0	7.1	0.45	0.37	0.45	58.0
6	R2	242	2.0	242	2.0	0.661	37.9	LOS C	2.3	16.6	1.00	0.83	1.16	38.3
Approach		502	2.0	502	2.0	0.661	21.1	LOS B	2.3	16.6	0.72	0.59	0.79	43.6
North: M3 (N)														
7	L2	1164	2.0	1164	2.0	0.864	28.5	LOS C	12.9	91.9	0.95	0.95	1.13	41.9
9	R2	29	2.0	29	2.0	0.080	27.2	LOS B	0.4	3.1	0.84	0.70	0.84	32.1
Approach		1194	2.0	1194	2.0	0.864	28.5	LOS B	12.9	91.9	0.94	0.94	1.12	41.7
West: EWA (Internal)														
10	L2	51	2.0	51	2.0	0.138	31.7	LOS C	0.9	6.3	0.98	0.75	0.98	32.5
11	T1	1756	2.0	1756	2.0	0.818	11.3	LOS A	9.2	65.6	0.74	0.69	0.80	51.7
Approach		1806	2.0	1806	2.0	0.818	11.9	LOS A	9.2	65.6	0.75	0.69	0.81	50.9
All Vehicles		3502	2.0	3502	2.0	0.864	18.8	LOS B	12.9	91.9	0.81	0.76	0.91	45.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3B	North Slip/Bypass Lane Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4B	West Slip/Bypass Lane Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		211	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EWA - M3 Split T (West) 2041 PM]

Network: N101 [Split T 2041 PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: M3 (S)														
1	L2	32	2.0	32	2.0	0.049	19.6	LOS B	0.4	2.7	0.69	0.68	0.69	46.6
3	R2	77	2.0	77	2.0	0.280	31.3	LOS C	1.3	9.2	0.93	0.75	0.93	29.9
Approach		108	2.0	108	2.0	0.280	27.9	LOS B	1.3	9.2	0.86	0.73	0.86	35.6
East: EWA (Internal)														
4	L2	167	2.0	167	2.0	0.609	37.3	LOS C	3.2	22.6	1.00	0.81	1.03	30.1
5	T1	998	2.0	998	2.0	0.576	6.1	LOS A	4.0	28.4	0.47	0.41	0.47	58.7
Approach		1165	2.0	1165	2.0	0.609	10.6	LOS A	4.0	28.4	0.55	0.47	0.55	51.6
West: EWA (W)														
11	T1	681	2.0	681	2.0	0.272	4.8	LOS A	2.6	18.4	0.45	0.39	0.45	59.2
12	R2	28	2.0	28	2.0	0.155	34.8	LOS C	0.5	3.5	0.95	0.71	0.95	39.3
Approach		709	2.0	709	2.0	0.272	6.0	LOS A	2.6	18.4	0.47	0.40	0.47	57.0
All Vehicles		1983	2.0	1983	2.0	0.609	9.9	LOS A	4.0	28.4	0.54	0.46	0.54	51.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P1B	South Slip/Bypass Lane Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P2B	East Slip/Bypass Lane Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		211	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EWA - M3 Split T (East) 2041 PM]

Network: N101 [Split T 2041 PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: EWA (E)														
5	T1	1078	2.0	1078	2.0	0.467	7.2	LOS A	5.4	38.4	0.60	0.53	0.60	55.1
6	R2	814	2.0	814	2.0	0.702	27.5	LOS B	6.8	48.7	0.94	0.87	1.00	43.0
Approach		1892	2.0	1892	2.0	0.702	16.0	LOS B	6.8	48.7	0.74	0.67	0.77	47.2
North: M3 (N)														
7	L2	411	2.0	411	2.0	0.196	11.0	LOS A	1.7	12.3	0.46	0.68	0.46	52.3
9	R2	97	2.0	97	2.0	0.264	28.3	LOS B	1.5	10.9	0.88	0.76	0.88	31.5
Approach		507	2.0	507	2.0	0.264	14.3	LOS A	1.7	12.3	0.54	0.70	0.54	48.8
West: EWA (Internal)														
10	L2	57	2.0	57	2.0	0.155	31.5	LOS C	1.0	7.0	0.98	0.75	0.98	32.6
11	T1	701	2.0	701	2.0	0.701	22.4	LOS B	4.2	30.0	0.92	0.78	0.96	41.1
Approach		758	2.0	758	2.0	0.701	23.1	LOS B	4.2	30.0	0.92	0.77	0.97	40.3
All Vehicles		3157	2.0	3157	2.0	0.702	17.4	LOS B	6.8	48.7	0.75	0.70	0.78	45.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3B	North Slip/Bypass Lane Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4B	West Slip/Bypass Lane Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		211	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

NETWORK SUMMARY

Network: N101 [Split T 2041 AM]

New Network
Network Category: (None)
Network Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

Network Performance - Hourly Values

Performance Measure	Vehicles	Per Unit Distance	Pedestrians	Persons
Network Level of Service (LOS)	LOS C			
Travel Time Index	7.43			
Speed Efficiency	0.77			
Congestion Coefficient	1.30			
Travel Speed (Average)	46.1 km/h		2.3 km/h	43.7 km/h
Travel Distance (Total)	3855.4 veh-km/h		13.3 ped-km/h	4639.7 pers-km
Travel Time (Total)	83.6 veh-h/h		5.7 ped-h/h	106.1 pers-h/h
Desired Speed	60.0 km/h			
Demand Flows (Total for all Sites)	5638 veh/h		421 ped/h	7187 pers/h
Arrival Flows (Total for all Sites)	5638 veh/h		421 ped/h	7187 pers/h
Demand Flows (Entry Total)	3542 veh/h			
Midblock Inflows (Total)	0 veh/h			
Midblock Outflows (Total)	0 veh/h			
Percent Heavy Vehicles (Demand)	2.0 %			
Percent Heavy Vehicles (Arrival)	2.0 %			
Degree of Saturation	0.864			
Control Delay (Total)	25.47 veh-h/h		2.85 ped-h/h	33.42 pers-h/h
Control Delay (Average)	16.3 sec		24.4 sec	16.7 sec
Control Delay (Worst Lane)	37.9 sec			
Control Delay (Worst Movement)	37.9 sec		24.4 sec	37.9 sec
Geometric Delay (Average)	1.8 sec			
Stop-Line Delay (Average)	14.5 sec			
Queue Storage Ratio (Worst Lane)	0.66			
Total Effective Stops	4101 veh/h		380 ped/h	5301 pers/h
Effective Stop Rate	0.73	1.06 per km	0.90	0.74
Proportion Queued	0.78		0.90	0.78
Performance Index	187.0		7.8	194.8
Cost (Total)	3056.52 $/h	0.79 $/km	150.19 $/h	3206.71 $/h
Fuel Consumption (Total)	440.6 L/h	114.3 mL/km		
Fuel Economy	11.4 L/100km			
Carbon Dioxide (Total)	1040.2 kg/h	269.8 g/km		
Hydrocarbons (Total)	0.101 kg/h	0.026 g/km		
Carbon Monoxide (Total)	1.375 kg/h	0.357 g/km		
NOx (Total)	1.250 kg/h	0.324 g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values

Performance Measure	Vehicles	Pedestrians	Persons
Demand Flows (Total for all Sites)	2,706,190 veh/y	202,105 ped/y	3,449,533 pers/y
Delay	12,227 veh-h/y	1,367 ped-h/y	16,040 pers-h/y
Effective Stops	1,968,470 veh/y	182,295 ped/y	2,544,459 pers/y
Travel Distance	1,850,581 veh-km/y	6,381 ped-km/y	2,227,078 pers-km/y
Travel Time	40,146 veh-h/y	2,731 ped-h/y	50,906 pers-h/y
Cost	1,467,129 $/y	72,092 $/y	1,539,221 $/y
Fuel Consumption	211,504 L/y		
Carbon Dioxide	499,301 kg/y		
Hydrocarbons	48 kg/y		
Carbon Monoxide	660 kg/y		
NOx	600 kg/y		

NETWORK SUMMARY

Network: N101 [Split T 2041 PM]

New Network
Network Category: (None)
Network Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

Network Performance - Hourly Values								
Performance Measure	**Vehicles**		**Per Unit Distance**		**Pedestrians**		**Persons**	
Network Level of Service (LOS)	LOS C							
Travel Time Index	7.72							
Speed Efficiency	0.79							
Congestion Coefficient	1.26							
Travel Speed (Average)	47.7	km/h			2.3	km/h	44.9	km/h
Travel Distance (Total)	3498.1	veh-km/h			13.3	ped-km/h	4211.1	pers-km
Travel Time (Total)	73.3	veh-h/h			5.7	ped-h/h	93.7	pers-h/h
Desired Speed	60.0	km/h						
Demand Flows (Total for all Sites)	5140	veh/h			421	ped/h	6589	pers/h
Arrival Flows (Total for all Sites)	5140	veh/h			421	ped/h	6589	pers/h
Demand Flows (Entry Total)	3217	veh/h						
Midblock Inflows (Total)	0	veh/h						
Midblock Outflows (Total)	-9	veh/h						
Percent Heavy Vehicles (Demand)	2.0	%						
Percent Heavy Vehicles (Arrival)	2.0	%						
Degree of Saturation	0.702							
Control Delay (Total)	20.69	veh-h/h			2.85	ped-h/h	27.68	pers-h/h
Control Delay (Average)	14.5	sec			24.4	sec	15.1	sec
Control Delay (Worst Lane)	37.3	sec						
Control Delay (Worst Movement)	37.3	sec			24.4	sec	37.3	sec
Geometric Delay (Average)	2.0	sec						
Stop-Line Delay (Average)	12.5	sec						
Queue Storage Ratio (Worst Lane)	0.30							
Total Effective Stops	3127	veh/h			380	ped/h	4132	pers/h
Effective Stop Rate	0.61		0.89	per km	0.90		0.63	
Proportion Queued	0.67				0.90		0.68	
Performance Index	153.8				7.8		161.6	
Cost (Total)	2556.76	$/h	0.73	$/km	150.19	$/h	2706.95	$/h
Fuel Consumption (Total)	373.0	L/h	106.6	mL/km				
Fuel Economy	10.7	L/100km						
Carbon Dioxide (Total)	880.6	kg/h	251.7	g/km				
Hydrocarbons (Total)	0.084	kg/h	0.024	g/km				
Carbon Monoxide (Total)	1.177	kg/h	0.336	g/km				
NOx (Total)	1.031	kg/h	0.295	g/km				

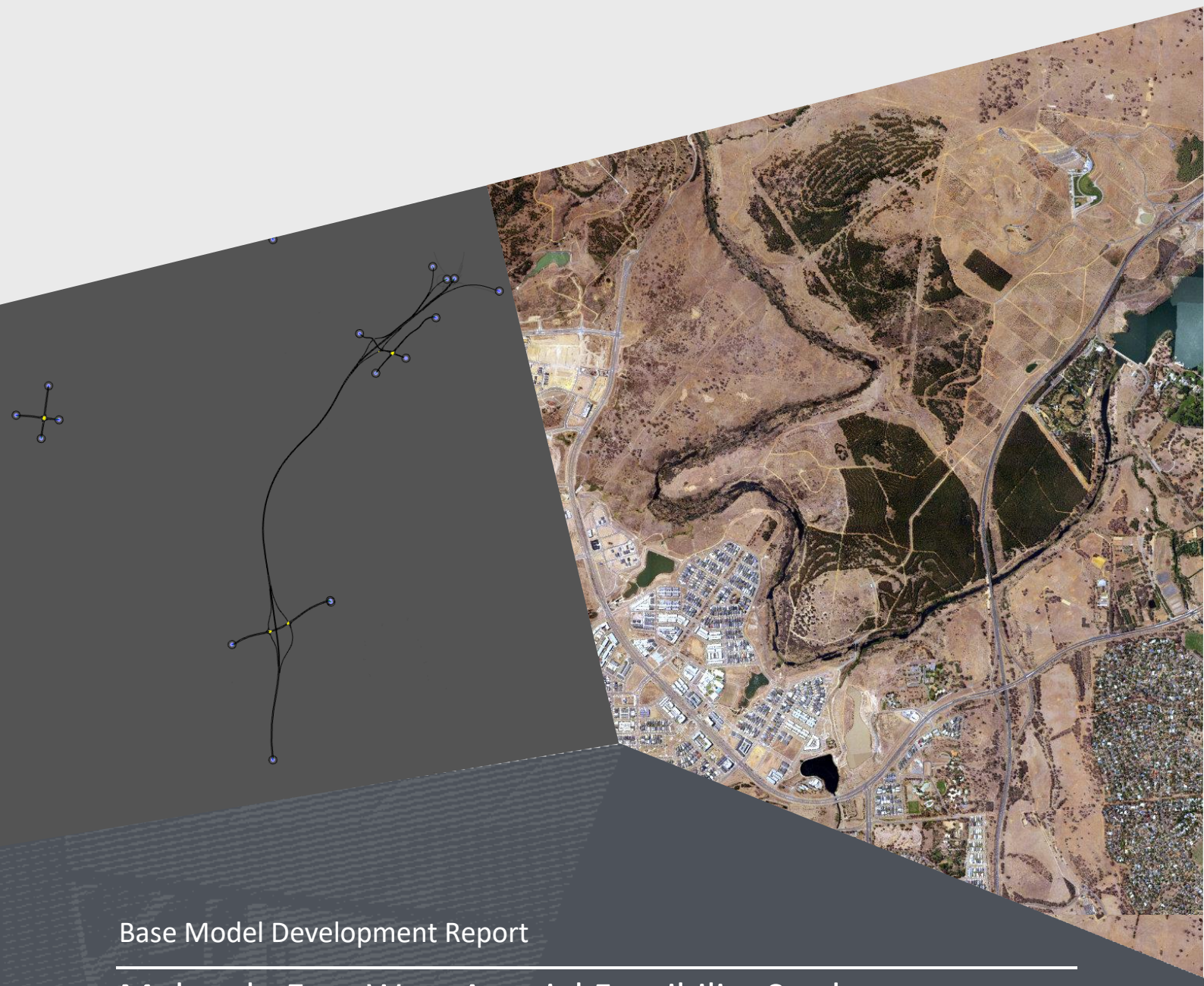
Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values						
Performance Measure	**Vehicles**		**Pedestrians**		**Persons**	
Demand Flows (Total for all Sites)	2,467,201	veh/y	202,105	ped/y	3,162,745	pers/y
Delay	9,933	veh-h/y	1,367	ped-h/y	13,287	pers-h/y
Effective Stops	1,501,010	veh/y	182,295	ped/y	1,983,507	pers/y
Travel Distance	1,679,112	veh-km/y	6,381	ped-km/y	2,021,315	pers-km/y
Travel Time	35,205	veh-h/y	2,731	ped-h/y	44,976	pers-h/y
Cost	1,227,244	$/y	72,092	$/y	1,299,337	$/y
Fuel Consumption	179,025	L/y				
Carbon Dioxide	422,697	kg/y				
Hydrocarbons	40	kg/y				
Carbon Monoxide	565	kg/y				
NOx	495	kg/y				

Appendix H Microsimulation Model Calibration – Technical Note

SMEC
Member of the Surbana Jurong Group

local people
global experience



Base Model Development Report

Molonglo East-West Arterial Feasibility Study

Prepared for IDPG
5 June 2020

SMEC INTERNAL REF. 3002754

Document Control

Document:	Base Model Development Report
File Location:	X:\Projects\3002754 Molonglo EWA Feasibility Study\092 Aimsun Modelling\Calibration Report\3002754 Molonglo EWA Base Model Development Report Rev2a.docx
Project Name:	Molonglo East-West Arterial Feasibility Study
Project Number:	3002754
Revision Number:	3

Revision History

REVISION NO.	DATE	PREPARED BY	REVIEWED BY	APPROVED FOR ISSUE BY
0	06/05/2020			Doug Tonge
1	08/05/2020			Doug Tonge
2	25/05/2020			
3	05/06/2020			

Issue Register

DISTRIBUTION LIST	DATE ISSUED	NUMBER OF COPIES
IDPG	05/06/2020	Electronic
EPSDD	05/06/2020	Electronic
TCCS	05/06/2020	Electronic
SMEC Canberra	05/06/2020	Electronic

SMEC Company Details

Approved by:	Doug Tonge		
Address:	Level 1, 243 Northbourne Avenue, Lyneham ACT 2602		
Signature:			
Tel:	(02) 6234 1923	Fax:	(02) 6234 1966
Email:	@smec.com	Website:	www.smec.com

Important Notice

This report is provided pursuant to a Consultancy Agreement between SMEC Australia Pty Limited ("SMEC") and IDPG, under which SMEC undertook to perform a specific and limited task for IDPG. This report is strictly limited to the matters stated in it and subject to the various assumptions, qualifications and limitations in it and does not apply by implication to other matters. SMEC makes no representation that the scope, assumptions, qualifications and exclusions set out in this report will be suitable or sufficient for other purposes nor that the content of the report covers all matters which you may regard as material for your purposes.

This report must be read as a whole. The executive summary is not a substitute for this. Any subsequent report must be read in conjunction with this report.

The report supersedes all previous draft or interim reports, whether written or presented orally, before the date of this report. This report has not and will not be updated for events or transactions occurring after the date of the report or any other matters which might have a material effect on its contents or which come to light after the date of the report. SMEC is not obliged to inform you of any such event, transaction or matter nor to update the report for anything that occurs, or of which SMEC becomes aware, after the date of this report.

Unless expressly agreed otherwise in writing, SMEC does not accept a duty of care or any other legal responsibility whatsoever in relation to this report, or any related enquiries, advice or other work, nor does SMEC make any representation in connection with this report, to any person other than IDPG. Any other person who receives a draft or a copy of this report (or any part of it) or discusses it (or any part of it) or any related matter with SMEC, does so on the basis that he or she acknowledges and accepts that he or she may not rely on this report nor on any related information or advice given by SMEC for any purpose whatsoever.

Contents

Appendices

Tables

Figures

1 Introduction

1.1 Background

SMEC was engaged by IDPG to conduct a feasibility study for the proposed East-West Arterial (EWA) connecting the Molonglo Town Centre to the Tuggeranong Parkway.

The proposed arterial road will include signalised intersection(s) in the Molonglo Town Centre and in the Molonglo 3 peninsula area, a new bridge over the Molonglo River and a grade separated interchange at the Tuggeranong Parkway. The alignment, intersection arrangements and interchange layout are the subject of this study.

This study includes micro-simulation modelling of the EWA and Tuggeranong Parkway between (and including) its interchanges with Cotter Road and Forest Drive.

1.2 Project Objective

The microsimulation model has been developed to understand the operation of the EWA and its impact on the existing interchanges at Cotter Road and Forest Drive on the Tuggeranong Parkway in the AM and PM peak periods in 2041. The objective of the study is to develop a preferred concept to inform the reservation of a transport corridor in the Territory Plan.

1.3 Study Area

The project area is located in Molonglo between John Gorton Drive to the west and Tuggeranong Parkway to the east. The site is extends to the Cotter Road interchange in the south and to the Forest Drive interchange in the north.

The area modelled for this study was agreed with EPSDD and comprises parts of the following major roads:

- John Gorton Drive
- East-West Arterial
- Cotter Road
- Molonglo 3 Collector Road
- Tuggeranong Parkway
- Forest Drive
- Lady Denman Drive

The area covered by the model is shown in Figure 1.

Figure 1: Model Study Area

2 Existing Conditions

2.1 Data Collection

Traffic surveys were undertaken to inform the calibration and validation steps of the traffic modelling process. These surveys are fundamental to validity of the model and comprised the following:

- Intersection counts:
  - SCATS loop detector data (24-hour, 7-day data)
  - Manual turn counts

Counts of movements across loop detectors at the following intersections were conducted during the month of November 2019:

- Cotter Road Interchange (west)
- Cotter Road Interchanges (east)
- Forest Drive/Lady Denman Drive
- John Gorton Drive/Holborow Avenue/East-West Arterial

Manual intersection turning counts for movements at the Tuggeranong Parkway – Forest Drive interchange ("Lakeside Interchange") were conducted by Datacol from 9 to 11 May 2017. These were provided by TCCS. To align with the 2019 SCATS counts, they have been scaled to match the volumes at the adjacent Lady Denman Drive – Forest Drive intersection.

2.2 Existing Conditions Assessment

Based on site observations, the modelled area generally operates well, with some intermittent queueing on the ramps around Cotter Road and Lady Denman Drive. The intersection of John Gorton Drive and Holborow Avenue (and EWA) generally operates well in the peak periods. On most days, the mainline of Tuggeranong Parkway operates below capacity, at or above the speed limit, with some congestion at the ramp merge and diverge areas.

3 Model Inputs and Assumptions

3.1 Software

Aimsun Next version 8.4 was used for this study. All modelling was conducted using the microsimulation functionality with stochastic route choice.

3.2 Time Periods and Profiles

The modelling was conducted for the weekday AM and PM peak periods, which were:

- AM Peak: 08:00 to 09:00
- PM Peak: 17:00 to 18:00

A 30 minute warm-up period was used before the model period.

It is important in microsimulation modelling that the traffic demand that is being produced by the model matches real-world traffic demand as closely as possible. The intersection turning movement counts were available in 15-minute time segments in both the AM and PM peak periods. Demand profiles for the microsimulation models were developed using this information to model the effect of the changes in immediate traffic demand throughout the assignment period. The profiles for the AM and PM peak periods are shown in Table 1.

Table 1: AM and PM Peak Traffic Demand Profile

AM PEAK		PM PEAK	
PERIOD	**PROPORTION**	**PERIOD**	**PROPORTION**
08:00 – 08:15	25.0%	17:00 – 17:15	24.0%
08:15 – 08:30	26.4%	17:15 – 17:30	26.9%
08:30 – 08:45	25.5%	17:30 – 17:45	25.6%
08:45 – 09:00	23.1%	17:45 – 18:00	23.5%
Total	**100.0%**	**Total**	**100.0%**

3.3 Vehicle Types

The model uses default vehicle types. These vehicle types are intended to represent a typical urban network in ACT or NSW.

The vehicular composition is based on an assumption that 2% of vehicles on the road are heavy vehicles during the AM and PM peak periods. The following vehicle types are present:

- Light vehicles (LV)
- Heavy vehicles (HV)

A separate origin-destination (OD) matrix was developed for each vehicle class during OD matrix estimation in Aimsun.

3.4 Traffic Zones

The zone structure in the model is based on the zones in the CSTM, with additional zones added where roads enter the model area. The model has 15 zones. Details of the zones are shown in Table 2.

Table 2: Aimsun Zone Details

ZONE TYPE	DESCRIPTION/LOCATION
External	John Gorton Drive (north)
External	Holborow Avenue
External	John Gorton Drive (south)
External	East-West Arterial
External	Cotter Road (west)
External	Tuggeranong Parkway (south)
External	Cotter Road (east)
External	Lady Denman Drive (south)
External	Forest Drive (east)
External	Lady Denman Drive (north)
External	Parkes Way – Tuggeranong Parkway ramp
External	Tuggeranong Parkway Southbound (north)
External	Tuggeranong Parkway Northbound (north)
External	Tuggeranong Parkway – William Hovell Drive (west)
External	Forest Drive (west)

3.5 Road Types

The following road types are present in the model:

- Highway:
  - Tuggeranong Parkway
- Arterial:
  - Cotter Road
  - John Gorton Drive
  - Holborow Avenue
  - East West Arterial
- Collector:
  - Lady Denman Drive
  - Forest Drive

3.6 Calibration and Validation Criteria/Targets

For the model to be considered fit-for-purpose, it must meet the calibration and validation criteria summarised in Table 3 for the average of five seed runs.

Table 3: Microsimulation model calibration and validation criteria (from ACT Microsimulation modelling guidelines)

ITEM	CRITERIA	TARGET	NOTES
Link and turn volumes	GEH<5	>=85%	Model volumes will be compared to traffic volumes. The primary traffic data have come from SCATS, which is a low accuracy data source and may be difficult to match.
	GEH>10	>=100%	
	Observed vs modelled hourly flows plot	R^2>0.95	
		Slope = 1 ± 0.05	
Travel time	Journey time average	Average modelled journey time of specific routes, generally broken into sections, to be within 15% or one minute (whichever is greater)	No journey time data are available.
	Journey time variability	Average and 95 per cent confidence intervals to be plotted for observed and modelled travel times for each journey time route	No journey time data are available.
Signalised intersections	Cycle time	Average modelled cycle time for each one-hour period to be within 10% of observed average cycle time for the same one-hour period	
Queue length	Queue length at key intersections	Comparisons of observed and modelled queues at key locations within the study area	No queue length data are available

3.7 Other Travel Modes

The model includes the following bus routes, which have been coded according to their timetabled runs:

- 180
- 181

Pedestrians and cyclists are not included in this modelling exercise.

3.8 Other Inputs and Assumptions

The following standard settings and input parameters for microsimulation modelling in ACT have been applied:

- Units: Metric
- Rule of the Road: Left hand traffic
- Coordinate System: ACT Standard Grid (EPSG: 5824)
- Warm up/Cool down time: 30min warm up
- Simulation Time Step: 0.8sec
- Reaction Time Step: 1.2sec
- Reaction Time at Traffic Lights: 1.2sec
- Vehicle types: car, truck and bus
- Stochastic route choice model: fixed using travel times calculated under free-flow conditions