7 Assessed Options - Riverside Edge Road

7.1 Background

A key consideration for the intersection arrangement on the EWA is access to the southern M3E precinct. The options design approach was based on the objective to provide two access points into this precinct. Provision of two access points to this precinct is considered good design practice, the rationale for this approach being centred on:

- Emergency access – having two access points into the southern precinct will allow emergency vehicles improved access for incident response including bushfire response, particularly if one access point becomes inaccessible
- Emergency Egress – provision of two access points allows for improved egress from the southern precinct in the event of emergency evacuation being required
- Network redundancy – should the EWA / M3E intersection be closed either due to an incident or for maintenance, a secondary access allows for an alternate access route.

During the design development options for the approach to this secondary access were considered. These alternatives and their key considerations are summarised in Table 7-1.

Table 7-1 M3E southern precinct - second access alternatives

Alternative	Discussion
Grade separated north-south crossing of EWA between M3E connector road and Tuggeranong Parkway	
Description	The River Road underpass at the eastern end of the EWA alignment provides the opportunity for a grade separated access to the southern precinct under the EWA.
Considerations	• Adjustment to the currently proposed River Road underpass structure will be required – increase in clearance and widening • Does not impact on the operation of the EWA • Require increases in the level of the EWA, with implications for fill requirements • Will require extension of the new M3E northern precinct road network into (or near) the Arboretum
Adoption of Alternative	Not adopted – this alternative inserts the road network into the Arboretum. There is a high degree of certainty that this approach would be strongly opposed by Arboretum stakeholders.
Grade separated north-south crossing of EWA between M3E connector and Molonglo River Bridge	
Description	Provision of an additional structure to provide grade separation of a north south link either under or over the EWA
Considerations	• Provision of an additional bridge over the EWA or a bridge, box or BEBO arch structure under the EWA, with significant cost implications. • Does not impact on the operation of the EWA • Topography is not conducive to a transverse grade separated crossing in this location and will require significant cut or fill.
Adoption of Alternative	Not adopted – this alternative was not considered viable to due to local topography. The EWA options that were considered are all subject to significant side / cross slopes which isn't conducive to either a bridge overpass or an underpass.
Signalised intersection with EWA between M3E connector and Molonglo River Bridge	
Description	A secondary access to the southern precinct could be provided by a signalised intersection.
Considerations	• An all movement intersection (providing for left and right turn movements into and out of the southern M3E precinct) increases the EWA footprint and cut / fill requirements • The proximity of the signalised intersection would require extension of the dual carriageway onto the Molonglo River Bridge. • Introducing a second signalised intersection on the EWA would worsen network performance.

Alternative	Discussion
Adoption of Alternative	Not adopted – The proximity between the potential second signalised intersection and: a) the M3E connector road intersection; and b) the Molonglo river bridge is problematic. There is insufficient room between the intersections to properly allow for required movements without having negative implications for the M3E intersection, the Molonglo River bridge, and network performance.
Grade separated north-south crossing of EWA under Molonglo River Bridge	
Description	Provision of an access road under the Molonglo River Bridge adjacent to the eastern abutment creating a grade separated link between the northern and southern M3E precincts.
Considerations	• Relatively low cost option as no new structures are proposed • Does not impact on the operation of the EWA • Facilitates access to the MVIS odour control facility • Can potentially link into the boundary edge roads that are likely to be incorporated into the M3E urban masterplan • Incurs into the Molonglo River corridor
Adoption of Alternative	Adopted for further assessment – Option is considered to have lowest cost implications and is likely to tie in well to the local road network.

The preferred approach for further assessment took the form of a riverside edge road. This riverside edge road was intended to connect the local road networks of the M3E northern and southern precincts by providing a direct link between the two areas, and by extension provide a secondary access to the southern precinct. It was intended that this link has a design speed of 60 km/h, providing a single shared path and 2 x 3.5m lanes to accommodate emergency vehicles and services vehicles for the MVIS odour control facility.

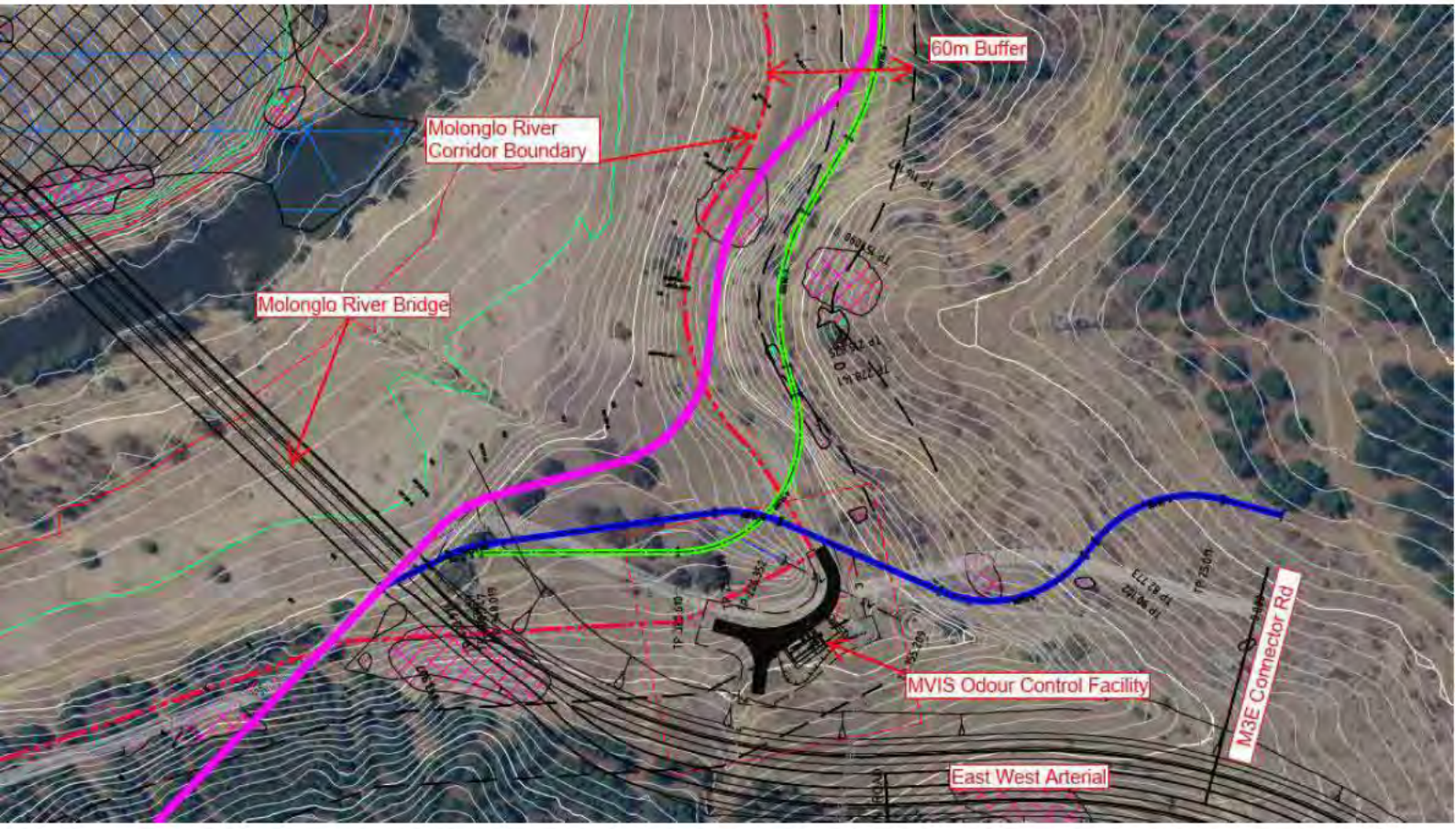

Figure 7-1 – Riverside edge road options

Three options were investigated for the riverside edge road. These options are coded Blue, Green and Pink and are indicated in Figure 7-1 (the Molonglo River Corridor boundary shown as a red dash). Design sketches of the plan and long sections of the options are provided in Appendix B, inclusive of a notional edge road alignment for the M3E southern precinct and link into the River Road underpass / access track.

7.2 Blue Option

The Blue option links the southern M3E precinct to the northern leg of the M3E connector road, forming a T intersection (likely a left in – left out arrangement). The alignment of the Blue option is broadly parallel with the EWA, although curvilinear geometry was required to increase the route length and ensure that it has compliant vertical grading as it climbs the existing terrain. Considerations and features of the Blue option include:

- A maximum grade of 12% for approximately 220m which is at the limit of what is allowed by the ACT Estate Development Code for vehicular traffic and is much steeper than recommended for accessibility requirements.
- Would likely require a skewed abutment of the Molonglo River Bridge (or alternatively extension of the proposed bridge).
- There is a substantial level difference between the proposed alignment and the MVIS odour control facility which is likely to result in a relatively steep access to the facility from the proposed road, or alternatively reconfiguration of the access arrangements.
- Given its link into the M3E connector road, there are concerns that the Blue option will induce 'rat running' of the north-south movement between sub-precincts, routing relatively high traffic volumes along local roads (the proposed left in – left out arrangement of the M3E connector road intersection would be an effort to mitigate this risk).
- A material deficit as the alignment is almost entirely in fill

Given that the development of the M3E urban master planning activity was in its early stages of development at time of writing, it is unclear how consistent the Blue option is with the intended layout of the local road network of the M3E northern precinct.

7.3 Green Option

The Green option creates a riverside edge road that (for the most part) sits within the 60 m buffer between the Molonglo River corridor and the developable zone of M3E. Again, the alignment of the Green option is also curvilinear in response to the relatively steep local terrain. Considerations and features of the Green option include:

- The lowest incursion into the Molonglo River Corridor of all considered options.
- A maximum grade of 11% for approximately 80m. Whilst this is also a steep (albeit compliant) grade and unsuitable for accessibility requirements, the incline is significantly shorter than the Blue option.
- Would likely require a skewed abutment of the Molonglo River Bridge (or alternatively extension of the proposed bridge).
- There is a substantial level difference between the proposed alignment and the MVIS odour control facility which is likely to result in a relatively steep access to the facility from the proposed road, albeit less severe than the Blue Option.
- The alignment has a combination of cut and fill areas
- Linkage into and edge road located in the 60m Molonglo River Corridor buffer that is understood to be intended as part of the M3E urban masterplan, creating a consistent approach to a riverside edge road for the M3E development.

7.4 Pink Option

The Pink option generally adopts a similar philosophy to the Green Option, albeit with a different approach to road geometry. The Pink option provide gentler road geometry (both horizontally and vertically), whilst also located within the 60 m buffer between the Molonglo River corridor and the developable zone of M3E. Considerations and features of the Pink option include:

- Significantly higher impact on the Molonglo River Corridor than other considered options.
- A maximum grade of 7.5% for approximately 100m. This grade is substantially more desirable than that provided in other options.
- No implications for the Molonglo River Bridge.
- As the alignment is further away from the MVIS odour control facility there is more scope to provide more desirable access arrangement to the facility than in other options.
- The alignment has a combination of cut and fill areas.
- Linkage into and edge road located in the 60m Molonglo River Corridor buffer that is understood to be intended as part of the M3E urban masterplan, creating a consistent approach to a riverside edge road for the M3E development.

7.5 Options analysis outcomes

The three options that were developed for the riverside edge road were qualitatively assessed in consultation with EPSDD and IDPG. The Green option was assessed as being the preferred alternative as it provided the best overall outcomes on balance of all considerations. The basis of this decision centred on the Green option:

- Minimising impact on the Molonglo River corridor (significantly lower impact than the Pink option)
- Being less likely to induce rat running than the Blue option
- Having shallower and shorter vertical grades than the Blue option
- Being most consistent with the edge road philosophy (ie and local perimeter road on the buffer edge) that is likely to form part of the M3E urban master plan than the other options.

Having identified the Green option as the preferred approach, consultation with PCS was undertaken on 16 September 2020. PCS staff raised concerns over the incursion of the proposed riverside edge road into the Molonglo River Corridor, noting if possible, a preference for the project team to identify a secondary access solution for the southern M3E precinct that did not enter the river corridor.

In response to this feedback the project team investigated the provision of a secondary unsignalised left in – left out intersection between the Molonglo River bridge and the M3E connector road intersection. This additional priority controlled intersection option is considered viable and has been incorporated into preferred option for the project (refer Section 6.6.4.3).

8 Strategic Transport Modelling

SMEC utilised the Canberra Strategic Transport Model (CSTM) to assess the road network options in the 2041 AM and PM peak periods. The assessment was carried out for two land use scenarios, which were the current development assumptions and a higher development scenario with land use development in the Western Edge area. A brief summary of the modelling process and outcomes is presented in this report. Detailed model outputs and analysis are attached in Appendix F. Outputs from the CSTM were also used to inform the traffic microsimulation modelling detailed in Chapter 9.

8.1 Modelling Process

8.1.1 Review and Update of Existing Models

The models supplied to SMEC by TCCS were reviewed with a focus on the Molonglo area, and a number of minor issues were found. These issues were discussed with TCCS and EPSDD and it was agreed that several updates would be made to the models. These changes were applied to the Do Nothing scenario and have been replicated across all model scenarios.

8.2 Scenarios

This project included strategic transport modelling using the CSTM of the 20 scenarios shown in Table 8-1. Note that Option 6 is functionally the same as Option 3 in terms of strategic modelling and has not been run as a separate scenario. A detailed description of the network options is presented in Chapter 6 and is not replicated here.

Table 8-1 Modelled Scenarios

Year	Road Network Option	Without Western Edge		With Western Edge	
		AM Peak	PM Peak	AM Peak	PM Peak
2041	Do Nothing	✓	✓	✓	✓
	Base	✓	✓	✓	✓
	Option 3	✓	✓	✓	✓
	Option 4	✓	✓	✓	✓
	Option 5	✓	✓	✓	✓
	Option 6	-	-	-	-

8.3 Land Use Scenarios

8.3.1 Without Western Edge

The CSTM without the Western Edge development uses the base land use assumptions in the default CSTM 2041 AM and PM peak scenarios. No changes were made to land use in any of the road network scenarios tested.

8.3.2 With Western Edge

The western edge development includes the following landuse located to the west of Molonglo:

- 25,000 population
- 1,500 employment (one group centre and six local centres)
- 14,000m^2 retail space (one group centre and six local centres)
- 3,600 school enrolments (six schools)

In the western edge scenarios, the EWA is extended further west to provide a second access point, along with Uriarra Road, to the western edge development. Both EWA and Uriarra Road are modelled as arterial roads with two lanes each way.

8.4 Summary of Model Findings

The modelling showed that the options developed in this project provided largely similar results on a network-wide level. All options provided a substantial improvement in performance over the Do Nothing case with reductions in both Vehicle Kilometres Travelled and Vehicle Hours Travelled, which indicates a more direct and efficient road network. Option 3 appeared to operate marginally better than other options in the AM peak, but slightly behind 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 the Western Edge development):

- All arterial roads in and out of Molonglo operate over capacity in both peak periods, whether or not the East-West Arterial is constructed.
- 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 generally operates with some spare capacity between the town centre and Molonglo 3 East Connector 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, which causes congestion that leads to further impacts across the network as people try to avoid the congested 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 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 between Civic and Belconnen via Belconnen Way instead of William Hovell Drive and Parkes Way.
- 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.
- The development of the Western Edge, reduces traffic operating speeds in the EWA scenarios below that of the Do Nothing (without Western Edge scenario).

8.4.1 Additional Comments on the Strategic Transport Modelling

A number of general comments about the CSTM are noted:

- The CSTM does not account for peak spreading to address additional congestion in future years.
- There is room for improvement in the public transport network modelling in the CSTM. In particular, the Western Edge development does not have any public transport coverage. Planning of the public transport and assumptions around expected mode share should inform the planning of road network capacity.
- 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.
- 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.

9 Traffic Operations Modelling

9.1 Introduction

Microsimulation modelling was conducted for Molonglo East-West Arterial using Aimsun Next 8.3.

9.2 Study Area

The extents of the study area for the microsimulation modelling is shown in Figure 9-1. In the Base Case it includes Tuggeranong Parkway between Cotter Road and Glenloch Interchange and includes the interchanges of Tuggeranong Parkway with Cotter Road and Forest Drive. To the east, the John Gorton Drive – Holborow Avenue intersection is included.

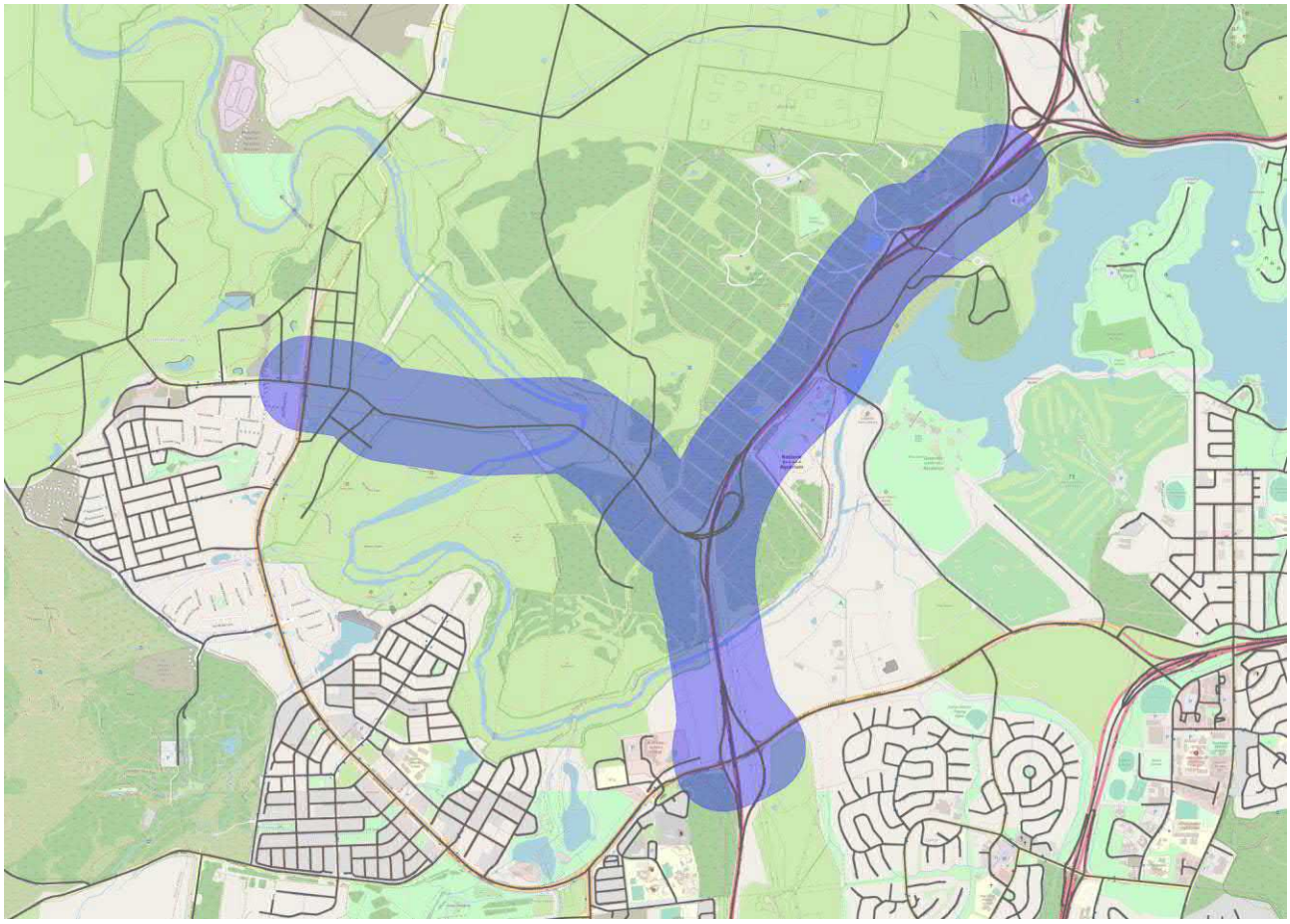

Figure 9-1 Microsimulation Model Study Area

9.3 Base Model Calibration

The Aimsun microsimulation model was calibrated to a 2019 base case for both the weekday AM and weekday PM peaks, meeting the requirements of the *ACT Microsimulation Modelling Guidelines* link and turn volume validation targets. In addition, some effort was made to calibrate the peak queue development and propagation at the Cotter Road and Forest Drive interchanges. The detail of the base model development and calibration can be found in the *Base Model Development Report* (refer Appendix H).

9.4 Future Options Scenarios

The Canberra Strategic Transport Model (CSTM) was used to develop growth for each of the design options between 2019 and 2041. This growth was applied to the 2019 AM and PM Base Case origin-destination (OD) matrices to obtain 2041 AM and PM OD matrices for the microsimulation model. For each zone, the relative growth method was preferred, with absolute growth used as an alternative if relative growth resulted in an excessive growth rate. The total hourly peak volumes in each of the scenarios is shown in Table 9-1.

Table 9-1 Future Network Demand by Scenario

Scenario	2041 AM	2041 PM
Do Nothing	15,923	16,052
Option 3	19,338	18,754
Option 4	19,354	18,767
Option 5	19,210	18,773
Option 7	19,338	18,754

9.4.1 Do Nothing

The full extent of the 2041 Do Nothing model is shown in Figure 9-2. The network is the same as the calibrated Base Case model with the addition of a third lane on Tuggeranong Parkway northbound from the Cotter Road northbound on-ramp (as a lane-add) to the Forest Drive northbound off-ramp (as a diverge and downstream merge).

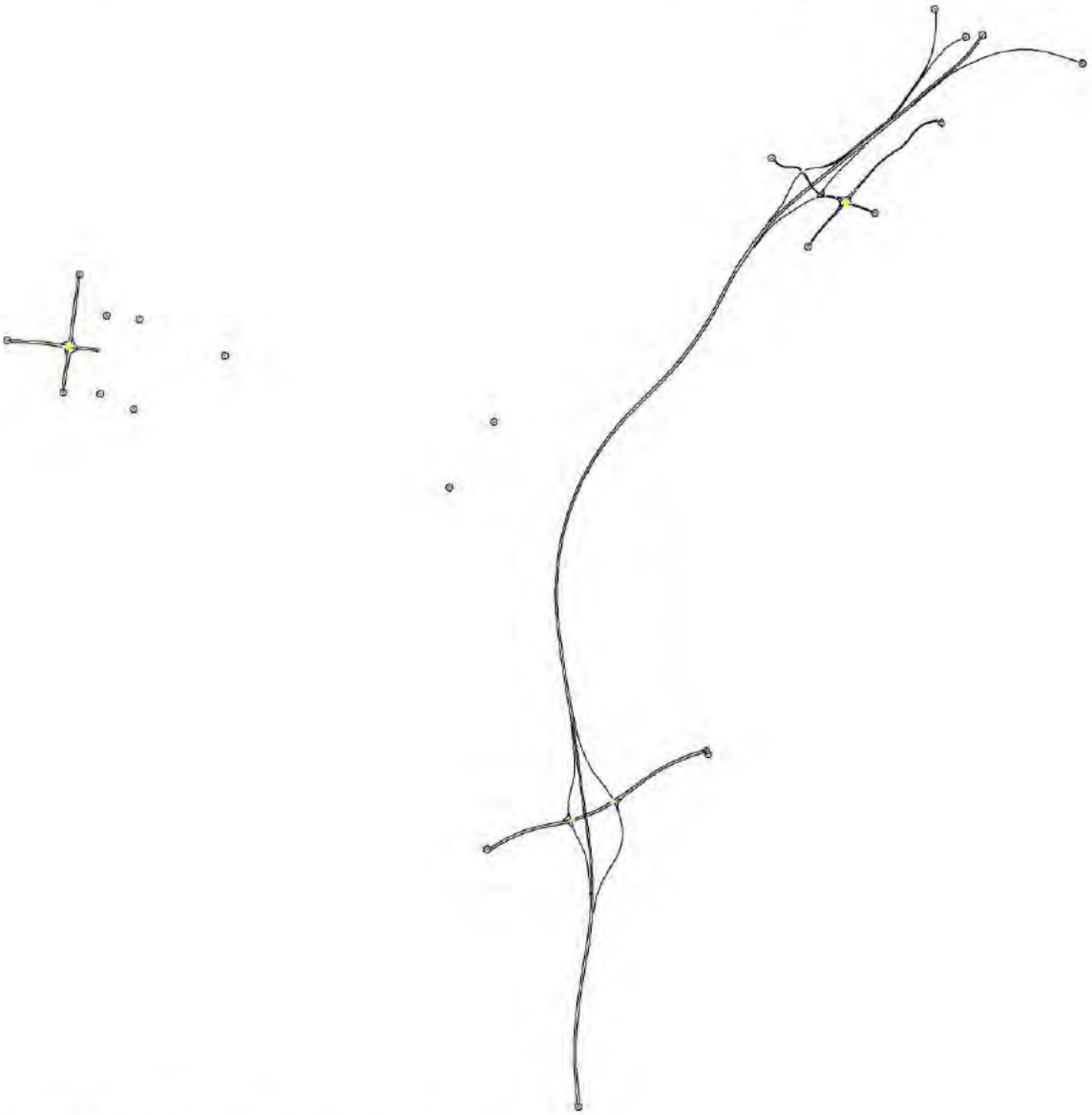

Figure 9-2 Do Nothing Microsimulation Model

9.4.2 All Options: Tuggeranong Parkway Northbound Widening

In all options, Tuggeranong Parkway northbound is assumed to be widened to three lanes between Cotter Road and Forest Drive. During the course of the project, it was identified that the northbound on-ramp from EWA to

Tuggeranong Parkway performed poorly as a merge and, by agreement with TCCS, was converted to a lane-add with an upstream merge on Tuggeranong Parkway from three lanes back to two. Tuggeranong Parkway northbound thus takes the following form in all EWA Options as shown in Figure 9-3 on Option 3:

- Tuggeranong Parkway northbound remains two lanes south of the Cotter Road northbound off-ramp (red)
- The Cotter Road northbound on-ramp joins as a lane-add, widening Tuggeranong Parkway to three lanes (orange)
- The EWA northbound off-ramp diverges and Tuggeranong Parkway remains three lanes (yellow)
- Tuggeranong Parkway merges from three lanes to two on approach to the point at which the EWA northbound on-ramp joins (green)
- The EWA northbound on-ramp joins as a lane-add, widening Tuggeranong Parkway back to three lanes (blue)
- The Forest Drive northbound off-ramp diverges and Tuggeranong Parkway remains three lanes, merging back to two before reaching the Forest Drive overpass (purple).

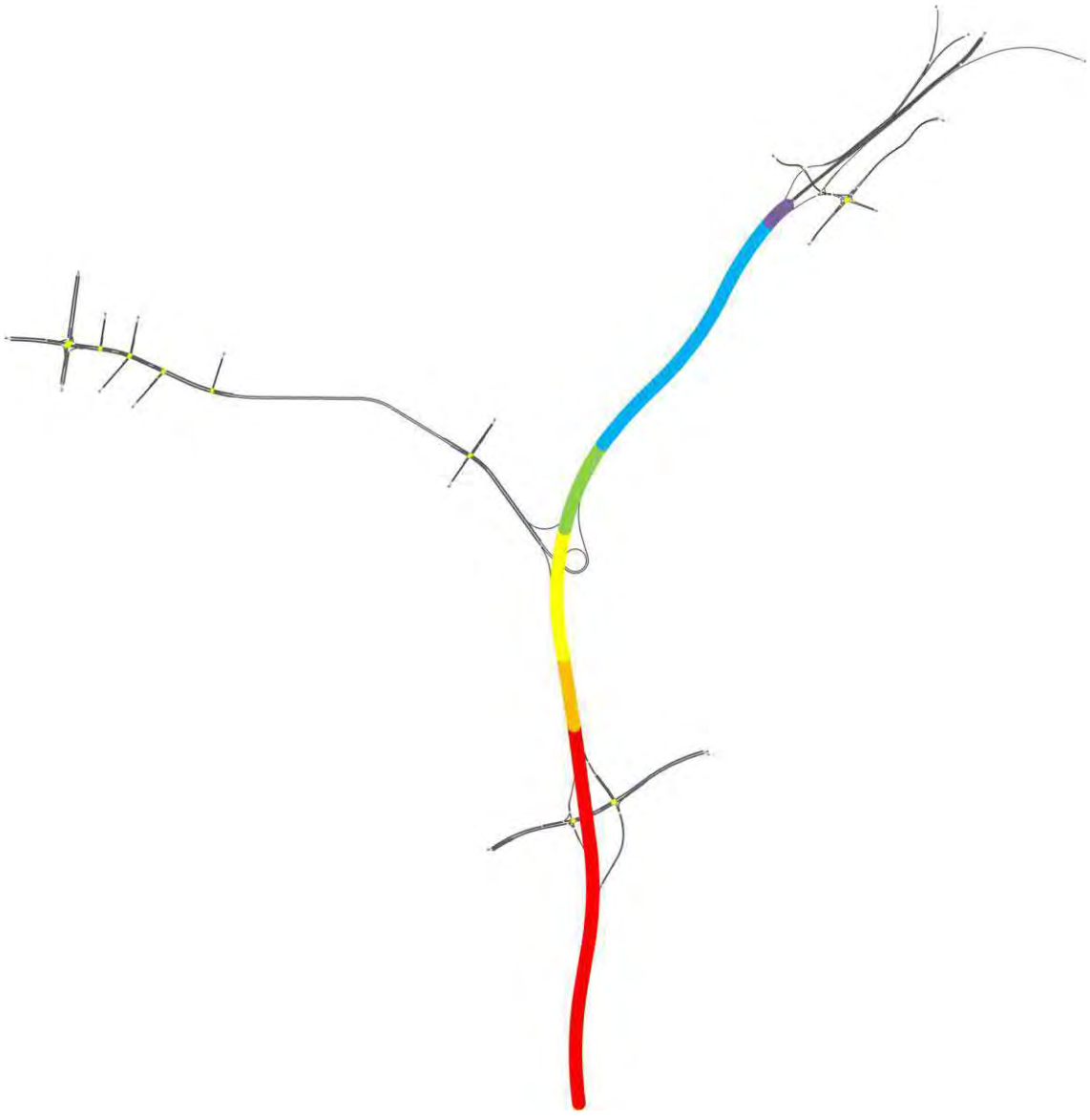

Figure 9-3 Tuggeranong Parkway Northbound Widening

9.4.3 All Options: Cotter Road Interchange and Tuggeranong Parkway Auxiliary Lanes

The inclusion of East-West Arterial in the road network results in significant changes to travel patterns as discussed in Section 8. One of the consequences of this is that there is a large increase in traffic approaching Cotter Road on the southbound off-ramp from Tuggeranong Parkway. As such, all the Options scenario models include an upgrade to the

Cotter Road – Tuggeranong Parkway southbound ramps intersection. Currently, there are three lanes approaching Cotter Road with one dedicated left turn lane, one dedicated right turn lane and a shared lane providing two turning lanes for each movement. An upgrade is required to provide two dedicated lanes for each turning movement, along with a geometric realignment to improve the turning speeds and hence capacity of each movement, as the turning radii are currently reasonably tight. The existing layout is shown in Figure 9-4 while the upgraded layout is shown in Figure 9-5.

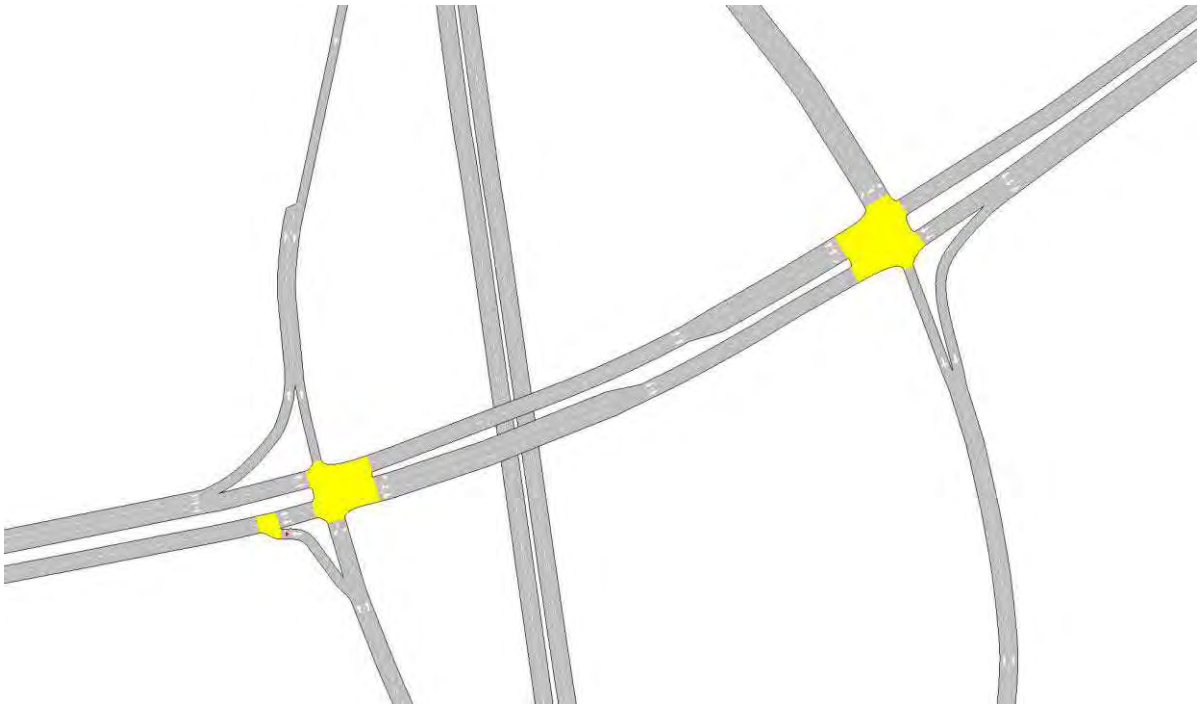

Figure 9-4 Cotter Road Interchange (Existing)

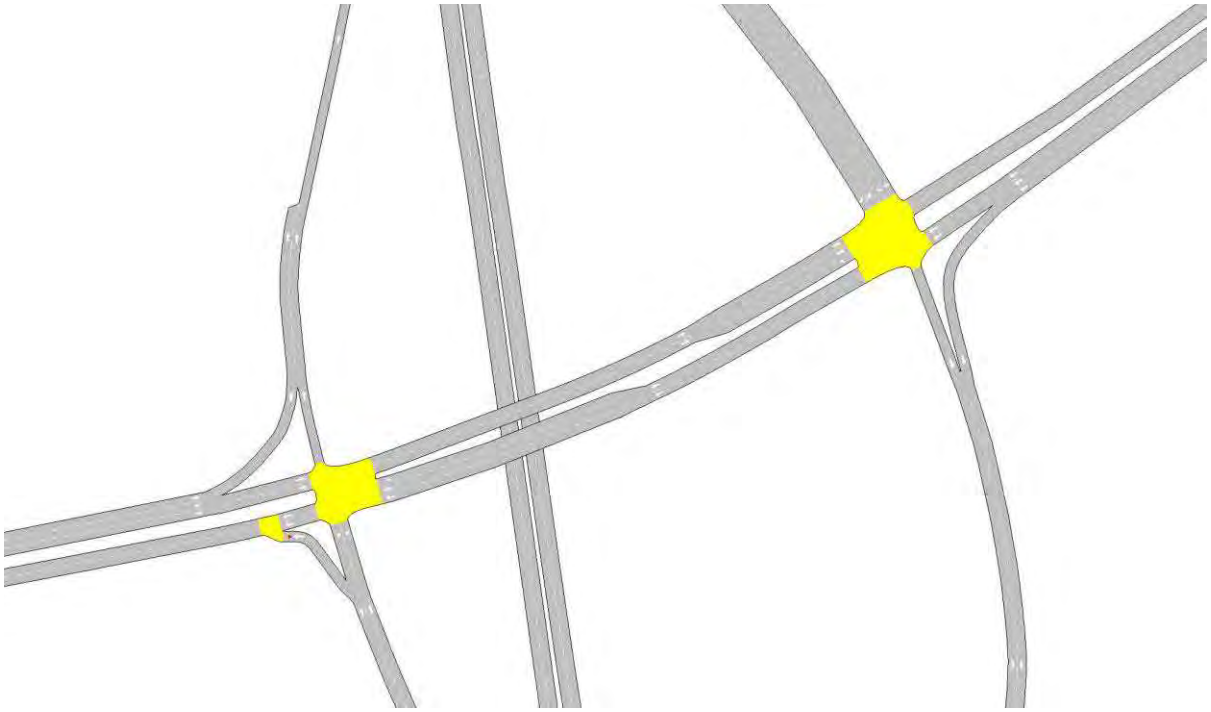

Figure 9-5 Cotter Road Interchange (Upgraded)

In addition, auxiliary lanes are required between the EWA and Cotter Road interchanges and two lanes are required for the southbound Cotter Road off-ramp exit, as shown in Figure 9-6 for Options 3 and 5 and in Figure 9-7 for Option 4.

In Options 3 and 5, on Tuggeranong Parkway northbound the section between the Cotter Road northbound on-ramp and the EWA northbound off-ramp is lane balanced, with a lane-add entering the segment and a ramp diverge leaving it. The ramp configuration for Option 4 negates the need for auxiliary lanes by diverting traffic between the two interchanges and is described in detail in Section 9.4.5.

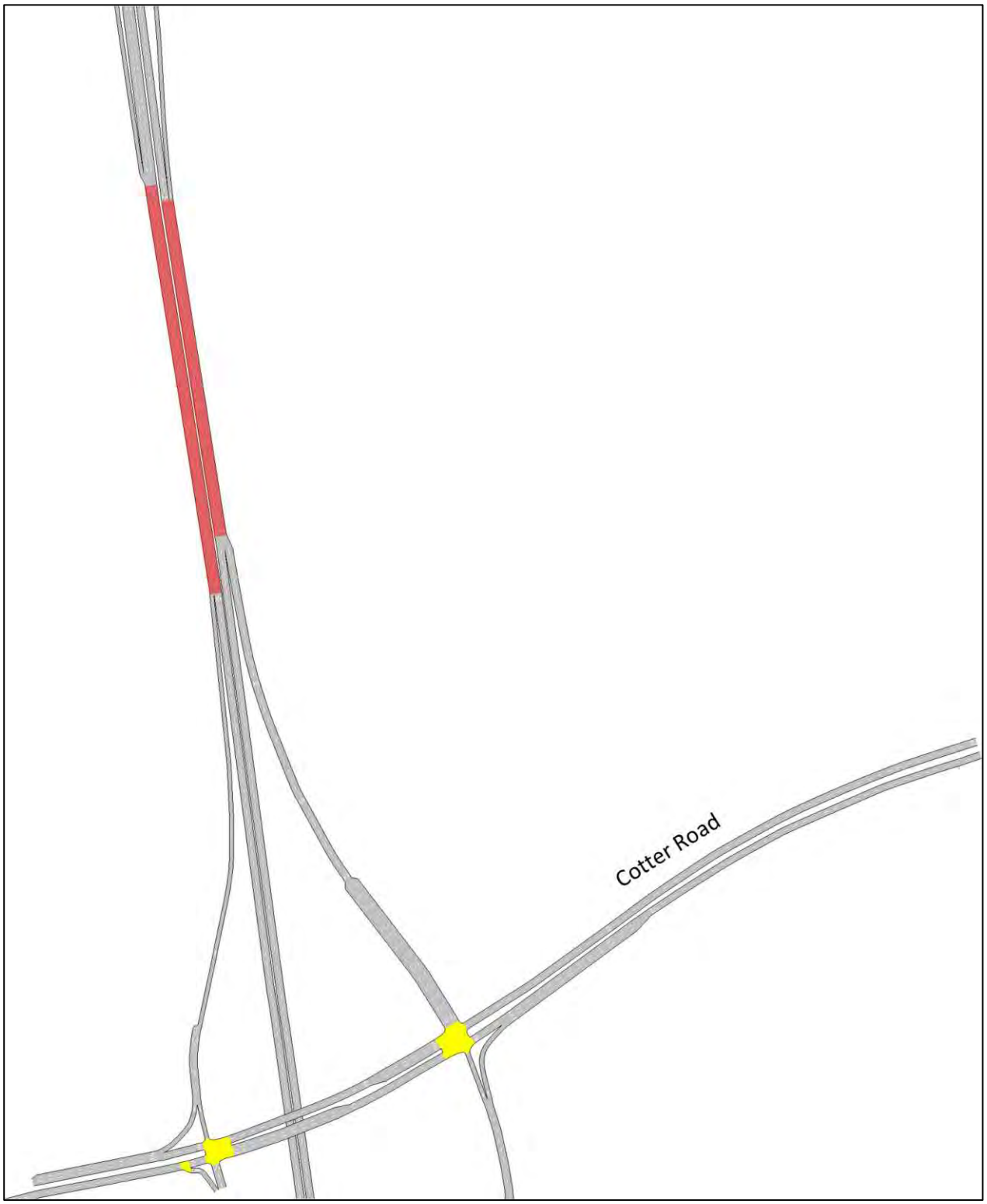

Figure 9-6 Tuggeranong Parkway Auxiliary Lanes and Cotter Road SB Off-ramp Detail (Options 3 and 5)

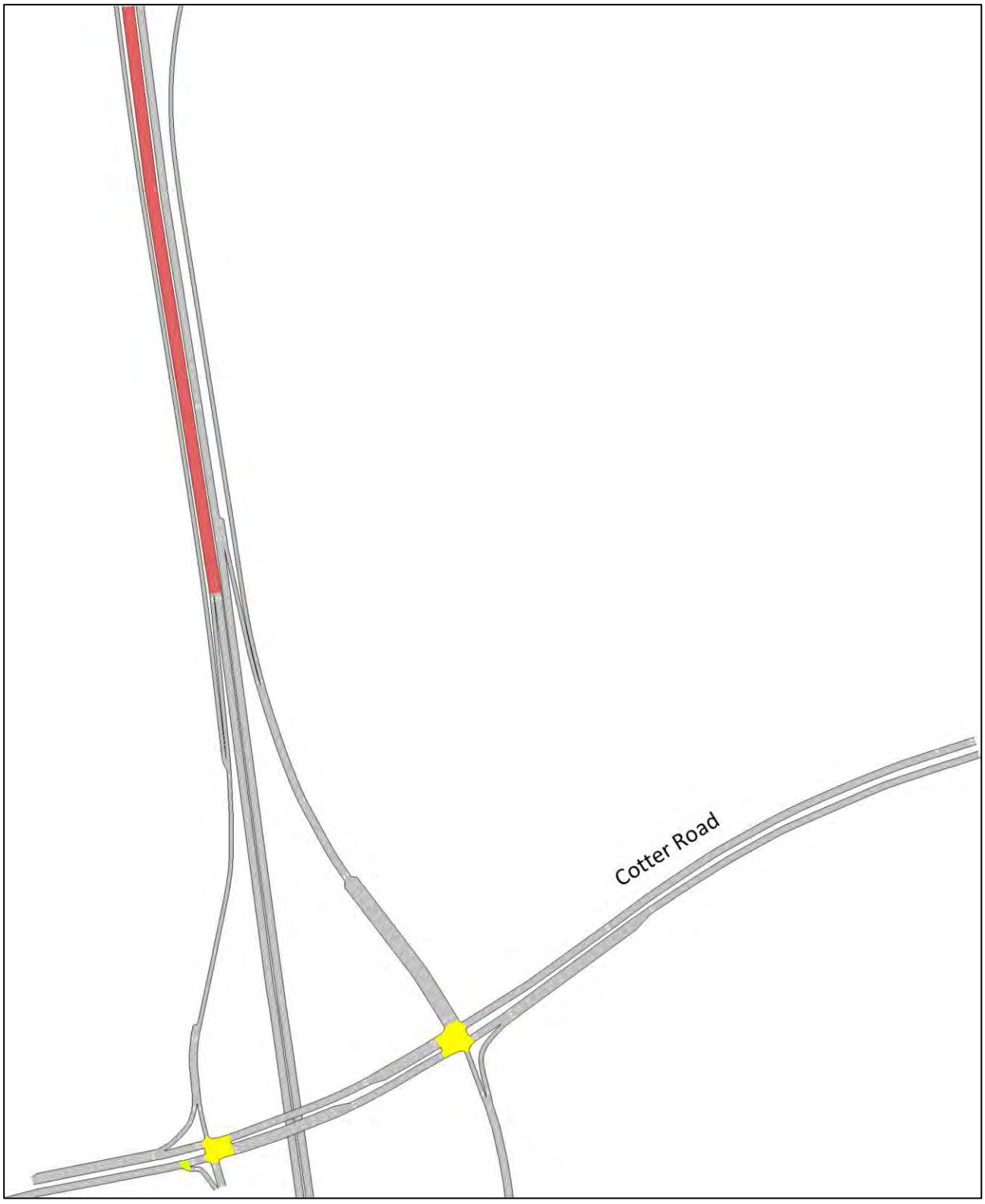

Figure 9-7 Tuggeranong Parkway Widening and Cotter Road SB Off-ramp Detail (Option 4)

9.4.4 EWA Option 3

Option 3 connects to Tuggeranong Parkway with a fully grade-separated "trumpet" interchange, as shown in Figure 9-8.

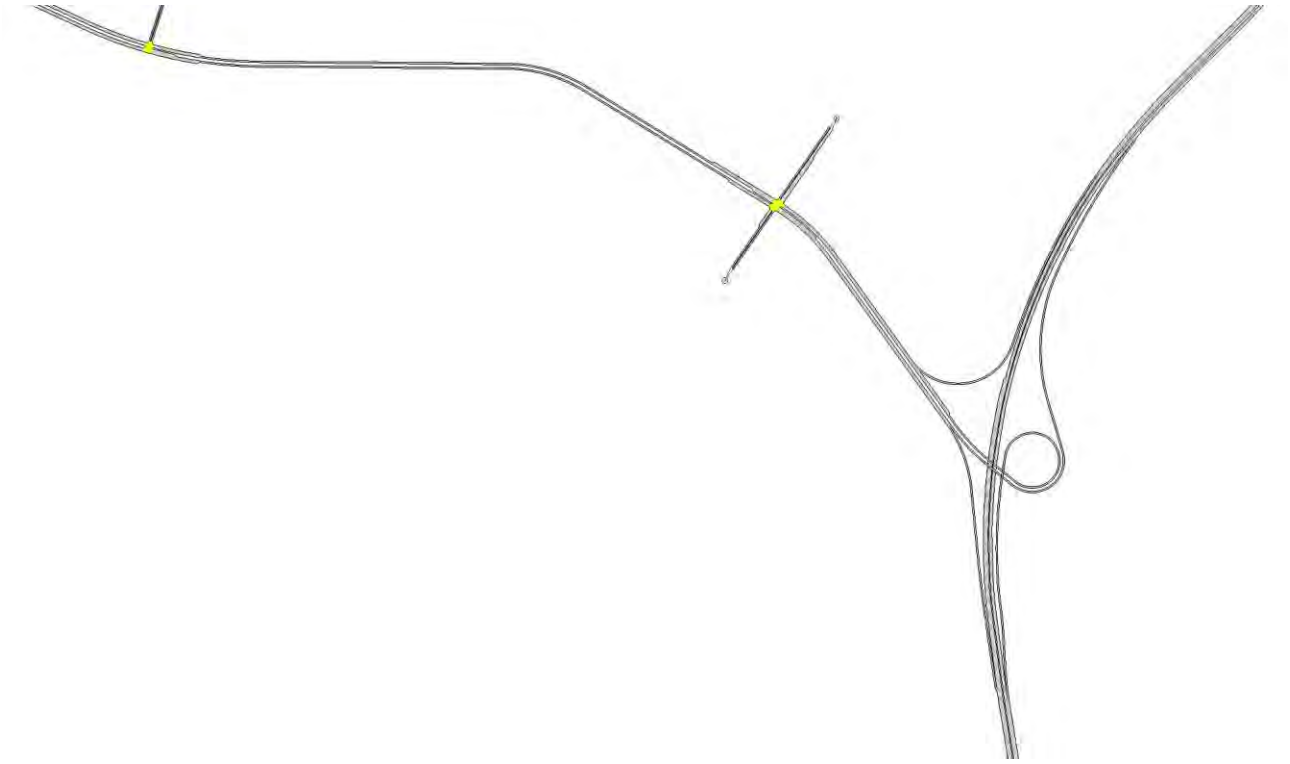

Figure 9-8 Option 3 Interchange Overview

9.4.5 EWA Option 4

Option 4 connects to Tuggeranong Parkway using semi-direct ramps with a signalised at-grade intersection where the southbound off- and on-ramps cross, as shown in Figure 9-9. In addition, the configuration of the ramps between East-West Arterial and Cotter Road compels vehicles accessing EWA both to and from the south to travel through the Cotter Road interchange, as shown in Figure 9-7.

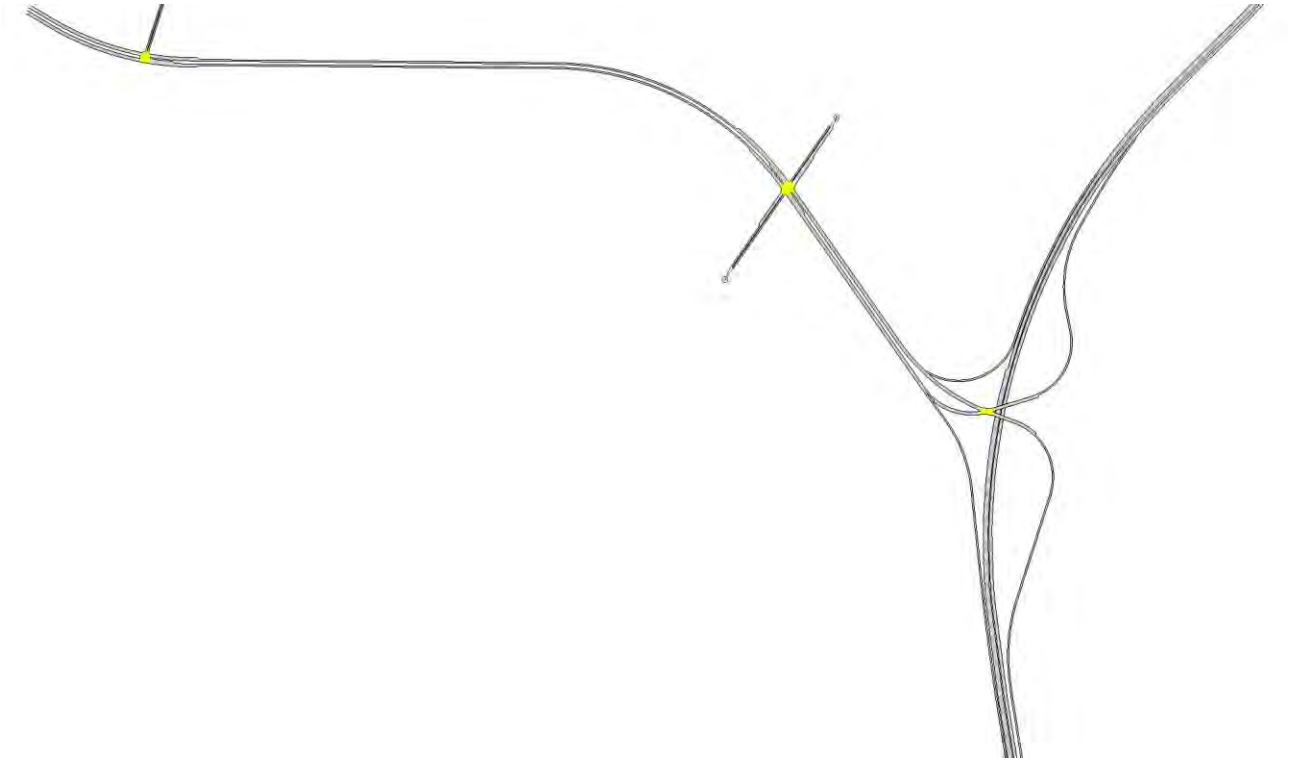

Figure 9-9 Option 4 Interchange Overview

9.4.6 EWA Option 5

Option 5 connects to Tuggeranong Parkway using a conventional split diamond interchange similar to the existing Cotter Road interchange, as shown in Figure 9-10.

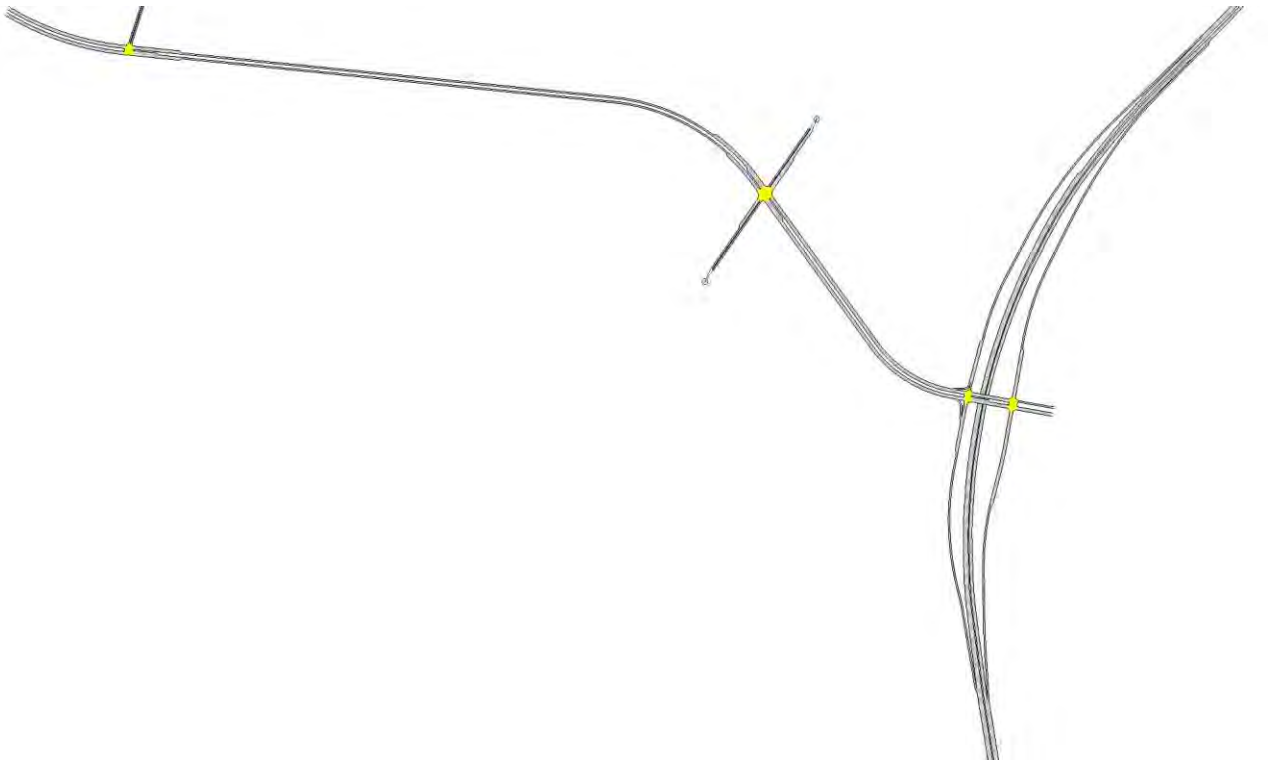

Figure 9-10 Option 5 Interchange Overview

9.4.7 EWA Option 6

Option 6 is a hybrid of Option 3 east of the M3E intersection and Option 5 to the west. As Options 3 and 5 are considered very similar west of the M3E intersection from an operational perspective, the operational performance of Option 6 is assumed the same as Option 3. Hence, it was not considered necessary to model Option 6 independently from Option 3.

9.5 Performance Assessment

9.5.1 Overall Network Performance

The overall network performance statistics for each scenario model are shown in Table 9-2. These show the following statistical measures:

- Demand: The total number of vehicles attempting to use the network during the peak hour
- Total Travel Distance: The total distance travelled by vehicles in the network (aka Vehicle Kilometres Travelled)
- Total Travel Time: The total time spent by vehicles in the network (aka Vehicle Hours Travelled), separated into:
  - Released: Time spent by vehicles travelling through the network during the simulation period
  - Unreleased (including unmet demand): Time spent by vehicles that have attempted to enter the network but are stuck in their origin zone due to congestion during the simulation period
- Average Speed: Total Distance divided by Total Travel Time

Table 9-2 EWA Options Microsimulation Bulk Performance Statistics

Option	Year	Demand	Total Travel Distance [km]	Total Travel Time [hr]		Average Speed [km/h]
				Released	Unreleased	
Do Nothing	2041 AM	15,923	55,684	1,499	1,105	21.4
	2041 PM	16,052	49,265	2,380	635	16.3
Option 3	2041 AM	19,338	62,557	2,814	1,080	16.1
	2041 PM	18,754	65,574	1,897	745	24.8
Option 4	2041 AM	19,354	63,518	2,761	1,242	15.9
	2041 PM	18,767	59,053	1,901	1,226	18.9
Option 5	2041 AM	19,210	61,451	2,856	1,057	15.7
	2041 PM	18,773	64,640	1,924	761	24.1

The overall network performance assessment indicates the following:

- Traffic demand on Tuggeranong Parkway is very high in 2041 and its operation is very near capacity.
- The addition of EWA changes the travel patterns dramatically, with all EWA Options exhibiting worse performance than Do Nothing in the AM peak period, but Options 3 and 5 significantly outperform Do Nothing in the PM peak period.
- All EWA options have issues in the AM peak period, with average network speeds of 15-16 km/h.
- Options 3 and 5 perform reasonably well in the PM peak period, with average network speeds of 24-25 km/h.
- Option 4 is poorly suited for PM peak traffic conditions. The need for all EWA interchange traffic travelling to and from the south to also use Cotter Road interchange substantially increases demand at the latter, which overloads it.

9.5.2 EWA Option 3

The queues at the interchange at the end of each peak simulation periods are shown in Figure 9-11. These show that Tuggeranong Parkway is very busy in both peak periods. In 2041 AM the demand for the southbound on-ramp from EWA is very strong, exceeding the capacity of the on-ramp, even with a lane add and auxiliary lane where it meets Tuggeranong Parkway, which causes a queue to propagate along EWA and past the M3E intersection. In the PM, the interchange is clear.

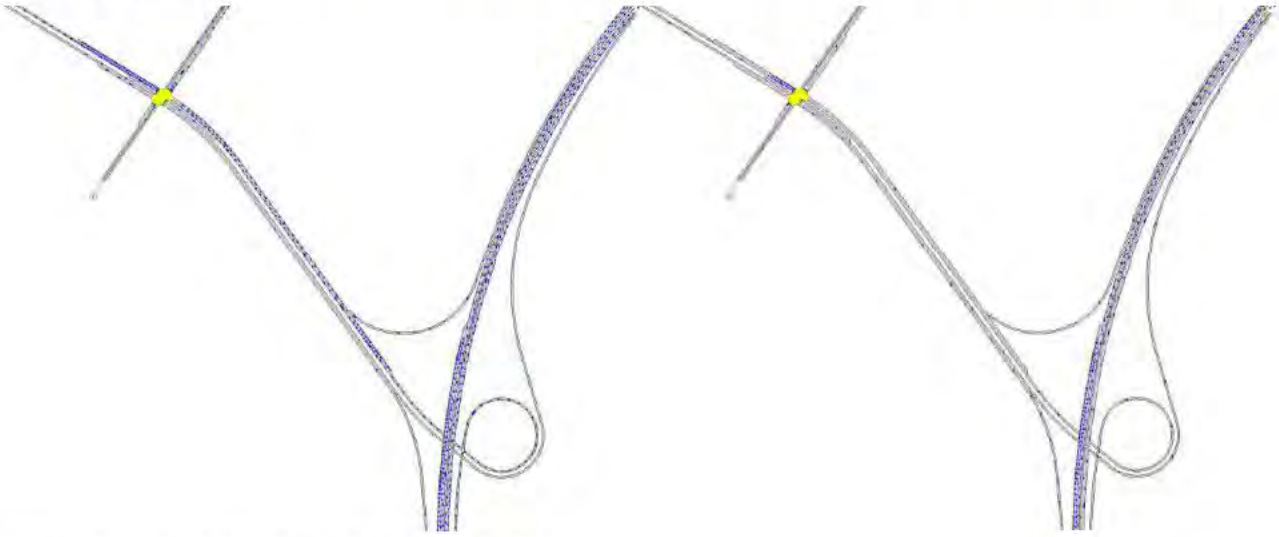

Figure 9-11 Option 3 2041 Queues (Left: AM, Right: PM)

9.5.3 EWA Option 4

The queues at the interchange in each of the peak simulation periods are shown in Figure 9-12. The configuration of the ramps between EWA interchange and Cotter Road interchange results in problems in both peak periods. In the

AM, a solid queue is visible propagating from the southbound on-ramp. This queue extends a significant distance along EWA. In the PM, Tuggeranong Parkway appears clear because the Cotter Road interchange is overloaded, and this causes blockages on Tuggeranong Parkway northbound approaching the interchange.

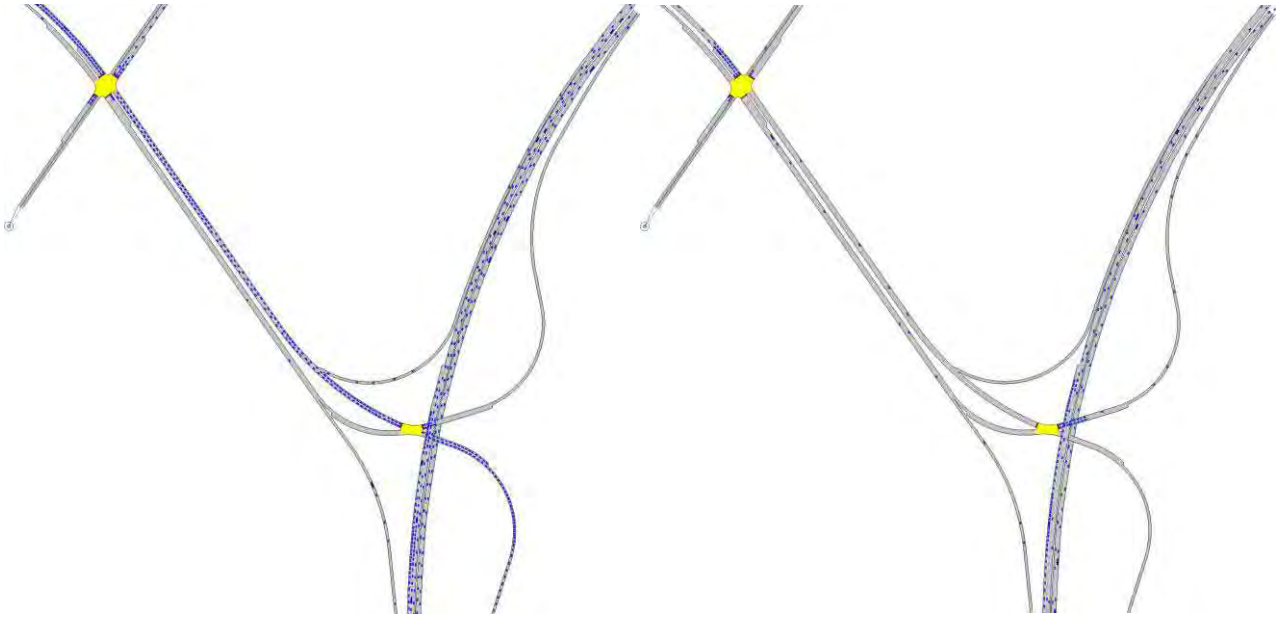

Figure 9-12 Option 4 2041 Queues (Left: AM, Right: PM)

9.5.4 EWA Option 5

The queues at the end of the simulation period are shown in Figure 9-13. Tuggeranong Parkway is busy in both periods. In the AM peak, a queue is visible on the southbound on-ramp but it does not propagate through the interchange. The demand for the ramp is slightly less in Option 5 than the other options due to the effect of the design on the strategic modelling; the route is slightly longer and has more intersections on it, which reduces its capacity in the CSTM. The interchange therefore operates well with the modelled traffic but applying the Option 3 traffic to this scenario would most likely result in similar queuing to Option 3.

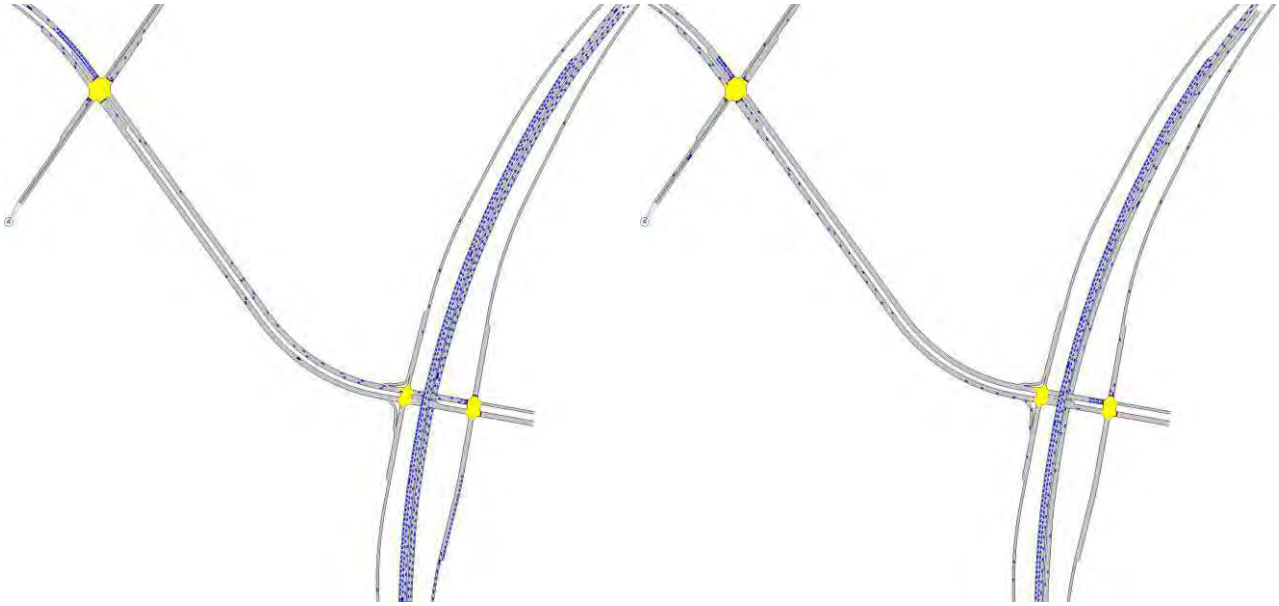

Figure 9-13 Option 5 2041 Queues (Left: AM, Right: PM)

9.6 EWA-M3E Intersection Options Modelling (SIDRA Intersection)

In parallel to the Aimsun microsimulation modelling of the complete EWA alignment, the intersection of East-West Arterial with the Molonglo 3E connector road was modelled in two configurations using SIDRA Intersection 8 to identify which configuration is likely to offer better performance. As discussed above, these two options are a four-way intersection and a staggered-T intersection. The lane configurations are broadly similar with lane lengths and types selected to optimise performance. Both options have slip lanes for left turns with signalised pedestrian crossings. The staggered-T intersection separates the M3E approaches such that any traffic between the two must also use a section of EWA, however the benefit it provides is that it can operate with fewer signal phases than the four-way intersection and thus each intersection is more efficient.

9.6.1 Four-way Intersection

The proposed four-way intersection layout is shown in Figure 9-14.

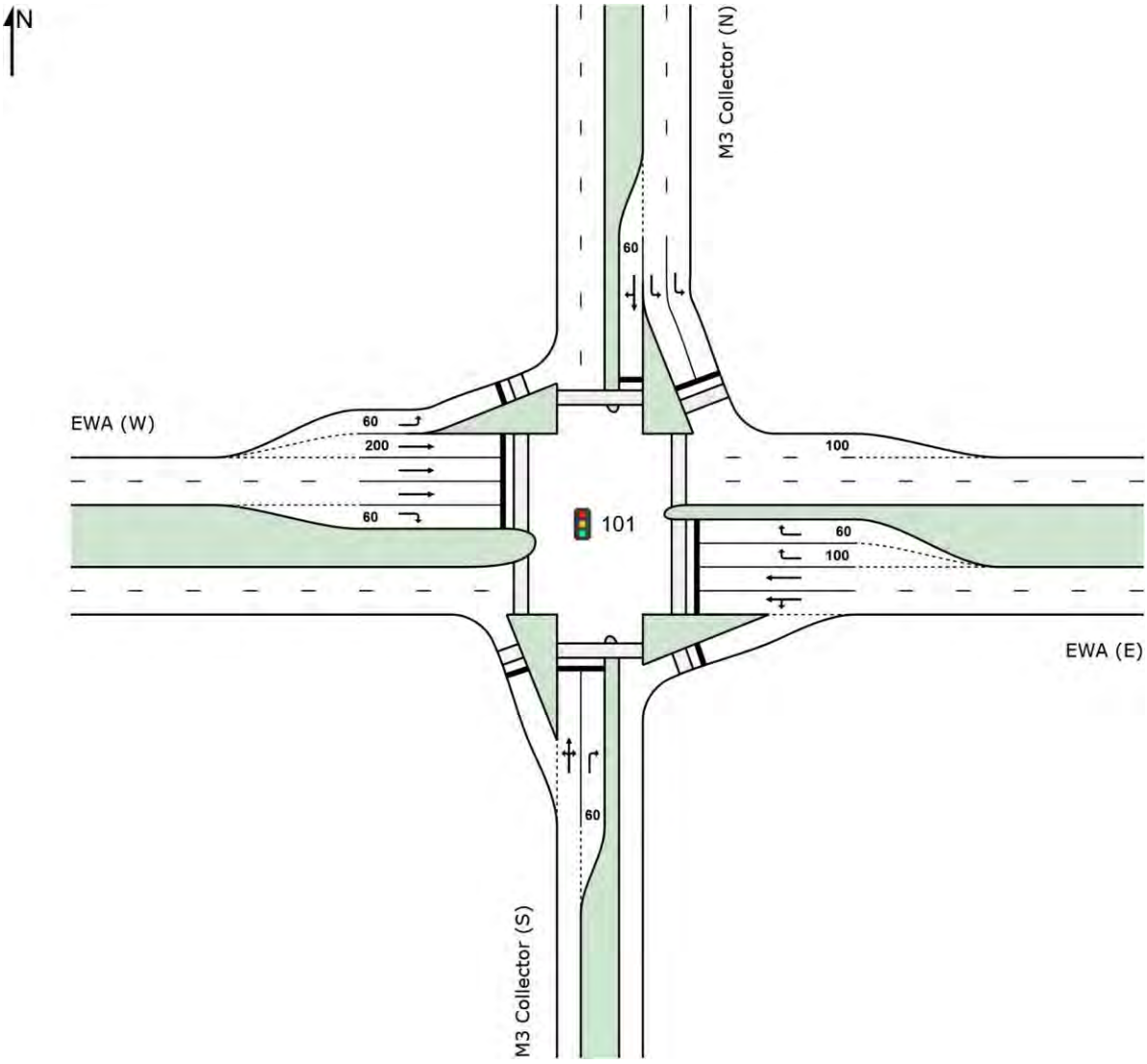

Figure 9-14 EWA-M3E Four-way Intersection Layout

The turning volumes for the four-way intersection are taken from the accompanying Option 7 microsimulation model and are shown in Figure 9-15.

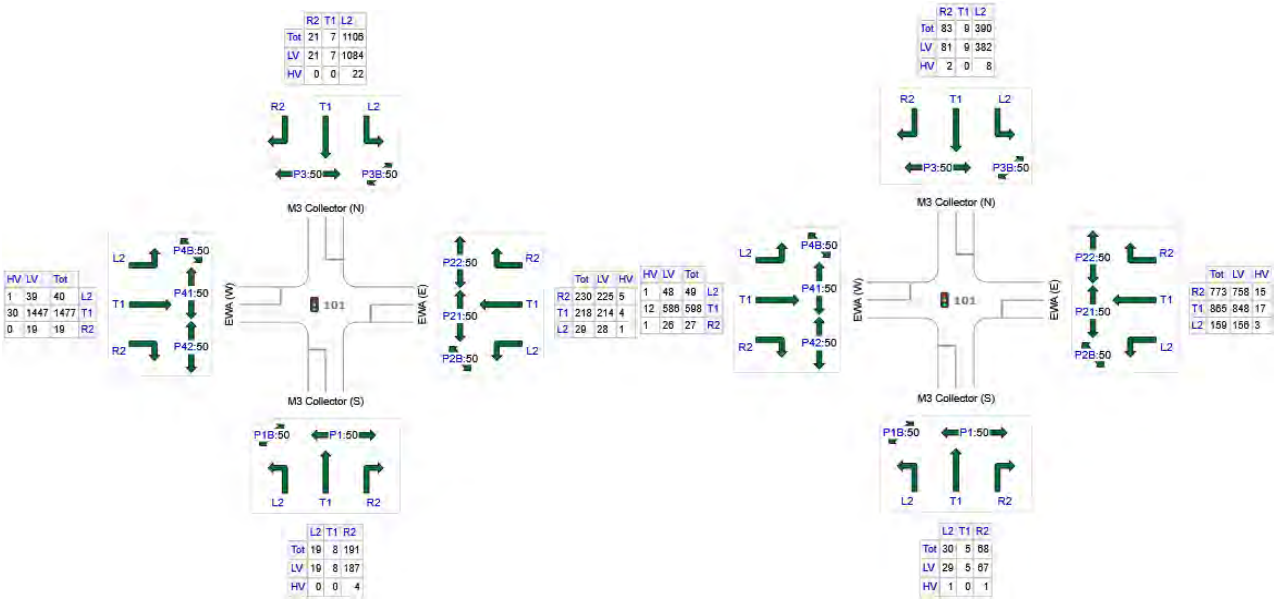

Figure 9-15 EWA-M3E Four-way Intersection Turn Volumes (Left: AM, Right: PM)

The traffic pattern through the intersection necessitates a signal phasing arrangement that provides additional time for the movements between EWA (east) and M3E (north). The selected phasing is shown in Figure 9-16 and is used for both 2041 AM and 2041 PM. The green times calculated by SIDRA are included in the phasing summaries in Appendix G.

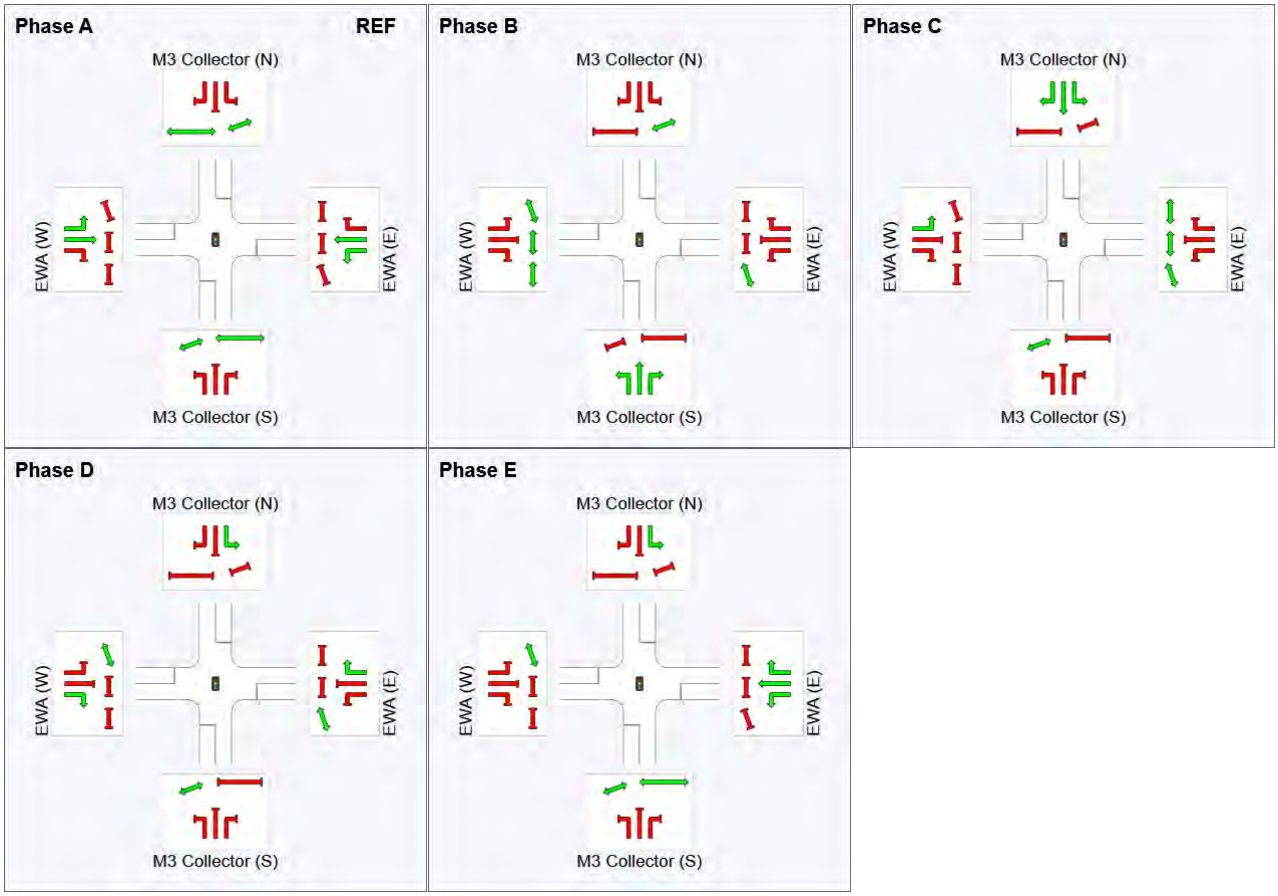

Figure 9-16 EWA-M3E Four-way Intersection Signal Phasing

9.6.2 Staggered-T intersection

The proposed staggered-T intersection layout is shown in Figure 9-17. This layout was modelled using SIDRA Intersection's network modelling functionality, which considers signal coordination & progression and the impact of queue propagation between adjacent intersections.

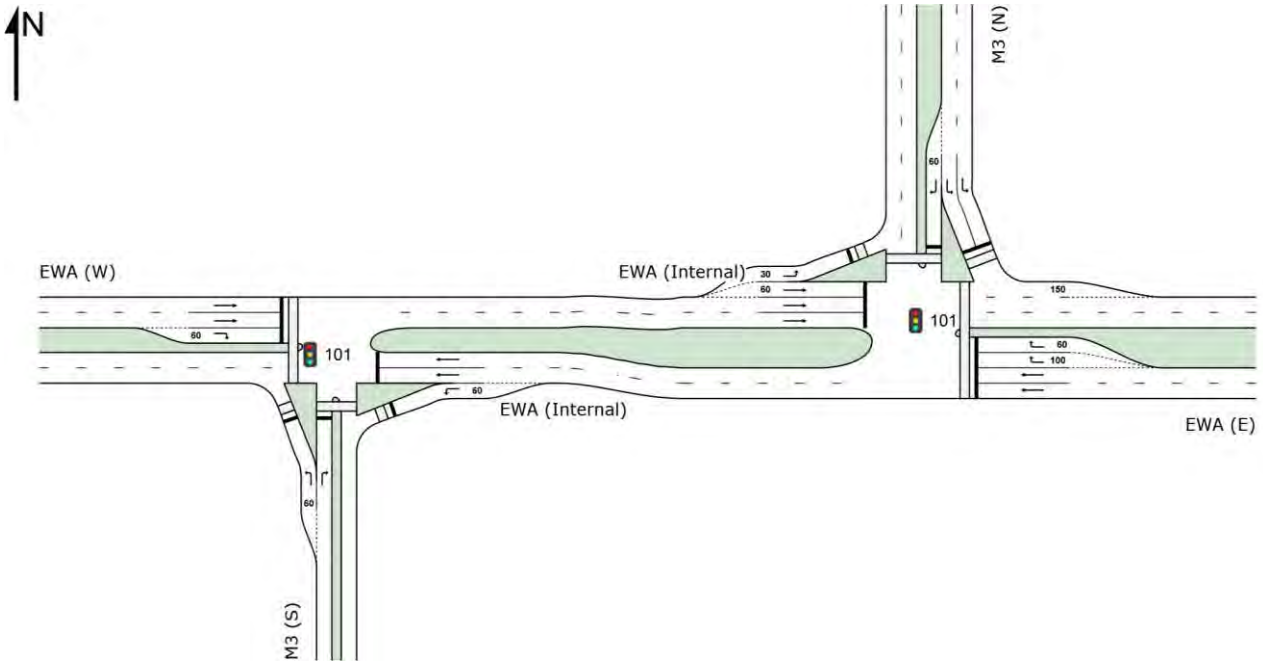

Figure 9-17 EWA-M3E Staggered-T Intersection Layout

The turning volumes for the four-way intersection are taken from the accompanying Option 7 microsimulation model and are shown in Figure 9-18 for 2041 AM and in Figure 9-19 for 2041 PM.

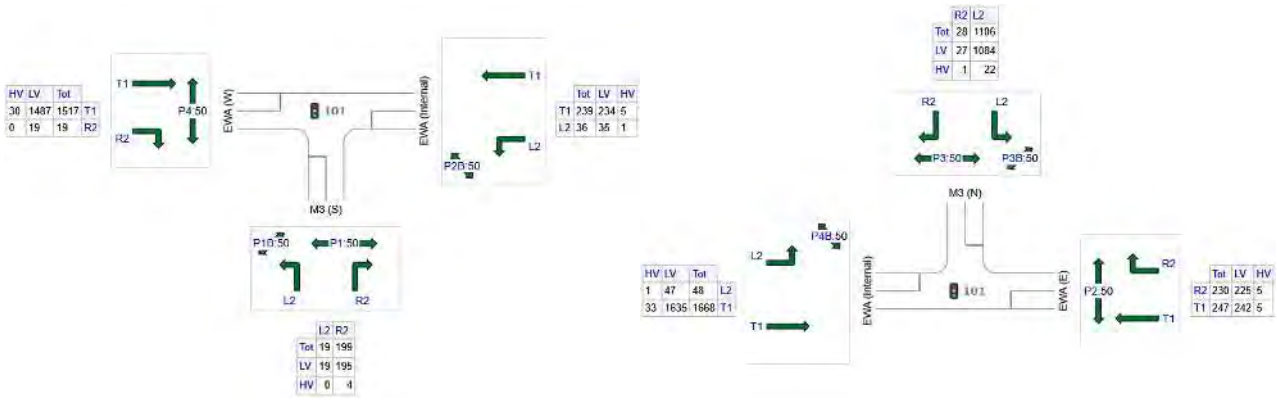

Figure 9-18 EWA-M3E Staggered-T Intersection Turn Volumes (2041 AM)

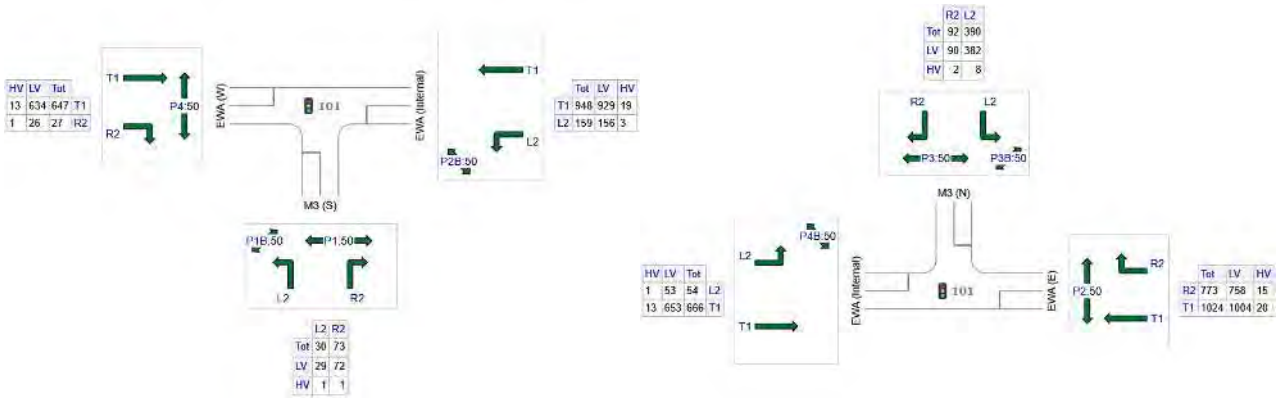

Figure 9-19 EWA-M3E Staggered-T Intersection Turn Volumes (2041 PM)

The traffic pattern through the intersection necessitates a signal phasing arrangement that provides additional time for the movements between EWA (east) and M3E (north). The selected phasing is shown in Figure 9-20 for the western intersection and for Figure 9-21 for the eastern intersection. This phasing is used for both 2041 AM and 2041 PM. It can be seen that the staggered-T phasing is much more efficient than the four-way intersection phasing and this has benefits in reducing green time lost during phase transitions, while the coordination of the two sites also adds some versatility to the phasing. The green times were calculated by SIDRA using the optimum cycle time method are included in the phasing summaries in Appendix G.

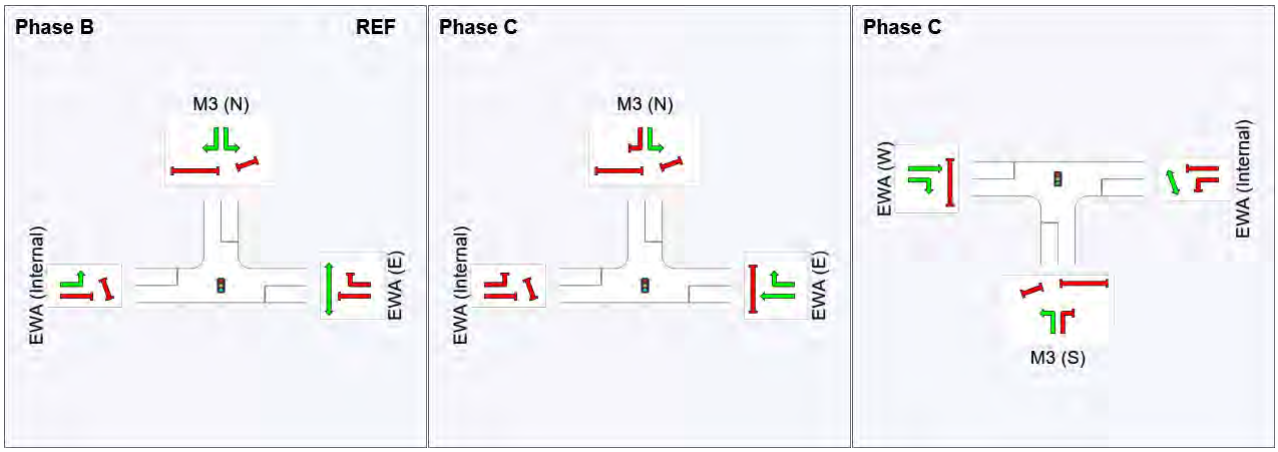

Figure 9-20 EWA-M3E Staggered-T Intersection Signal Phasing (West)

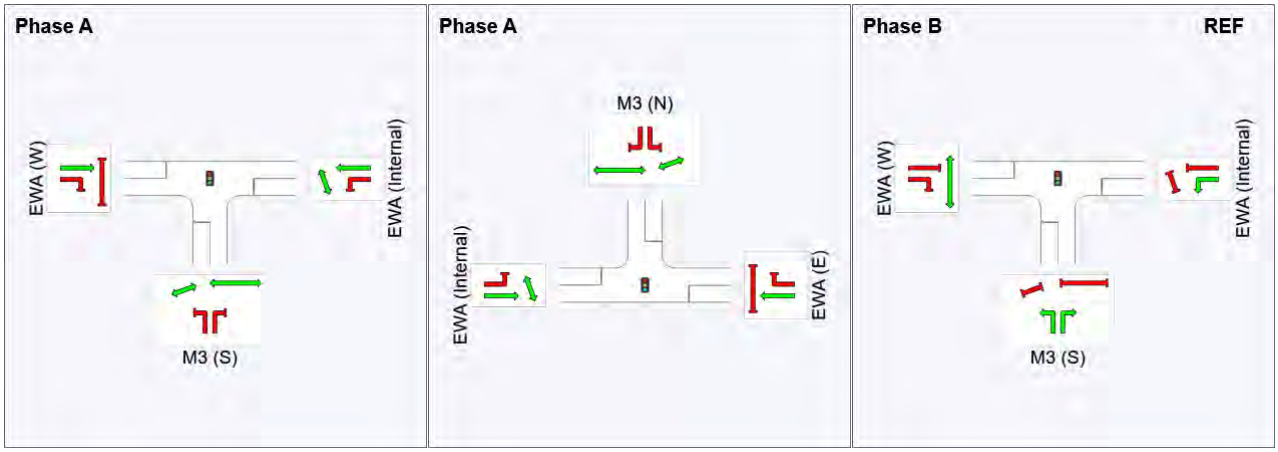

Figure 9-21 EWA-M3E Staggered-T Intersection Signal Phasing (East)

9.6.3 Performance Comparison

The intersection modelling performance results are shown in Table 9-3. The staggered-T intersection results are a combination of the individual site results within each network, with the overall network performance included in the "Overall" rows of the table. The Level of Service (LoS)for individual intersections is determined from average delay using the Delay (RTA NSW) method while LoS for networks is determined from speed efficiency, which is a measure of the average speed as a proportion of desired speed. The reported LoS for "Overall" thus includes the network speed efficiency result.

The SIDRA modelling indicates that the staggered-T option performs significantly better than the four-way option in the 2041 AM peak period, with less than half the overall delay and 95th percentile queues on the west and north approaches that are approximately 300 metres shorter. The staggered-T option also outperforms the four-way option in the 2041 PM peak period but to a lesser degree.

Table 9-3 EWA-M3E Intersection Performance Results

Period	Scenario	Intersection	Cycle Time [s]	Average Delay [s]	Level of Service	95th Percentile Queue [m]			
						S	E	N	W
2041 AM	Four-way	N/A	150	54.8	D	62	45	398	359
	Staggered-T	West	60	12.0	A	29	5	-	74
		East	60	18.8	B	-	17	92	66
		Overall	*60*	*25.5*	*C (77%)*	-	-	-	-
2041 PM	Four-way	N/A	70	28.6	C	13	124	39	62
	Staggered-T	West	60	9.9	A	9	28	-	18
		East	60	17.4	B	-	49	12	30
		Overall	*60*	*20.7*	*C (79%)*	-	-	-	-

9.7 EWA-M3E Intersection Options Modelling (Aimsun)

Further to the SIDA modelling of the intersection, their expected performance was tested in greater detail. The Aimsun model was used to evaluate the performance of the EWA-M3E intersection in both 2041 peaks.

9.7.1 Four-way cross road intersection arrangement

The results for the four-way cross road intersection are provided in Table 9-4. As can be seen, this configuration operations well in both peaks with average delays of 25.6 seconds in the AM peak and 19.3 seconds in the PM Peak with an overall LoS C in both peaks.

Table 9-4 Four-way Intersection Performance (Aimsun)

Approach	Movement	2041 AM			2041 PM		
		Count	Delay	LoS	Count	Delay	LoS
M3EC South	Left	15	73.1	E	34	31.9	E
	Through	8	70.6	E	6	38.8	E
	Right	211	72.8	E	64	29.9	E
EWA East	Left	36	6.8	A	166	6.7	A
	Through	247	14.7	B	1022	14.7	B
	Right	209	34.7	C	831	20.4	C
M3EC North	Left	1152	17.3	B	366	11.6	B
	Through	6	75.3	E	8	38.8	E
	Right	20	88.5	F	67	45.5	F
EWA West	Left	30	3.9	A	45	10.7	A
	Through	1437	24.5	C	554	29.1	C
	Right	17	62.7	E	27	35.5	E
	Total	**3387**	**25.6**	**C**	**3190**	**19.3**	**C**

9.7.2 Staggered T intersection arrangement

The results for the individual staggered T intersection are provided in Table 9-5 and Table 9-6, with equivalent total delays per completed movement for the Staggered T option provided in Table 9-7 . As can be seen from the total delays, the Aimsun analysis indicates that there is minimal performance difference between four-way cross road intersection and the staggered T arrangement.

Table 9-5 Staggered-T West Intersection Performance (Aimsun)

Approach	Movement	2041 AM			2041 PM		
		Count	Delay	LoS	Count	Delay	LoS
M3EC South	Left	15	13.4	B	35	16.2	B
	Right	220	30.7	C	71	24.9	C
EWA East	Left	42	6.2	A	174	0.5	A
	Through	265	12.2	B	1084	7.0	B
EWA West	Through	1529	15.5	B	592	8.0	B
	Right	17	37.6	D	27	33.6	D
Total		**2087**	**16.6**	**B**	**1983**	**7.9**	**B**

Table 9-6 Staggered-T East Intersection Performance (Aimsun)

Approach	Movement	2041 AM			2041 PM		
		Count	Delay	LoS	Count	Delay	LoS
EWA East	Through	281	3.6	A	1183	8.4	A
	Right	206	22.8	C	818	24.2	C
M3EC North	Left	1096	18.6	B	367	5.9	B
	Right	25	30.9	C	75	23.0	C
EWA West	Left	39	6.5	A	50	14.6	A
	Through	1687	17.3	B	616	24.0	B
Total		**3335**	**16.9**	**B**	**3108**	**15.8**	**B**

Table 9-7 Equivalent total delays per completed movement for the Staggered (Aimsun)

Approach	Movement	2041 AM			2041 PM		
		Count	Delay	LoS	Count	Delay	LoS
M3EC South	Left	15	13.4	B	34	16.2	B
	Through	8	37.2	D	6	39.5	D
	Right	211	48.0	D	64	49.0	D
EWA East	Left	36	9.8	A	166	8.9	A
	Through	247	15.8	B	1022	15.3	B
	Right	209	22.8	C	831	24.2	C
M3EC North	Left	1152	18.6	B	366	5.9	B
	Through	6	37.1	D	8	23.5	D
	Right	20	43.1	D	67	30.0	D
EWA West	Left	30	22.0	C	45	22.6	C
	Through	1437	32.8	C	554	32.0	C
	Right	17	37.6	D	27	33.6	D
Total		**3387**	**26.7**	**C**	**3190**	**20.5**	**C**

10 Cost Estimates

10.1 Order of Cost Estimate

10.1.1 Basis of Estimate

An opinion of the order of cost to deliver the Est West Arterial upgrade options was been developed based on proposed design solution detailed in the options drawings contained in Appendix A. The estimate is preliminary in nature based on high level option concepts sketches of key infrastructure components associated with the proposed route alignments. It therefore should be used as an indicative guide of potential project costs only. Furthermore, it should be noted that the purpose of the order of cost estimate is for comparison between options, and as such the estimate methodology has ensure that consistent assumptions have been made across options.

10.1.2 Construction Contingency

A Construction Contingency allowance of 40% has been made for unknowns that may occur during construction due to latent conditions or issues with the documentation. This contingency is based on deterministic methods

10.1.3 Summary of Estimate

A summary of the order of cost estimates (2020 dollars) for each of the considered options is contained in Table 10-1.

Table 10-1 Options assessment order of cost estimate ($June 2020)

Project Option	$/ Excl. GST
Option 3	
Option 4	
Option 5	
Option 6	

10.2 Estimate Assumptions

The assumptions made during the development of the order of cost estimate are detailed below.

10.2.1 Estimate Inclusions

The order of cost estimate for each of the project options includes:

- Site clearance
- Bulk earthworks
- Retaining walls (as applicable)
- Street lighting including conduits
- Stormwater drainage
- Landscaping to verge including drainage
- Landscaping to median strip including drainage
- Incidental works including fencing, gates, and the like
- Road works including subgrade preparation, subbase, and base course
- Pedestrian footpaths
- Segregated one-way cycle way
- Bridge works
- Road furniture such as crash barriers and the like

- Line and pavement marking
- Road signage
- Signalised intersection works on Tuggeranong Parkway Intersection as indicated on drawings
- Preliminaries (15%)
- Traffic Management (6%)
- Design and Management Fees (15%)
- Procurement and Project Management Fees (12%)

10.2.2 Estimate Exclusions

The order of cost estimate for each of the project options excludes the following items:

- Escalation beyond estimate date
- New In-ground services
- Diversion / Relocation of existing services
- Demolition of existing services
- 2 lane cycle highway - Assumed delivered under separate project
- Tuggeranong Parkway northbound third lane - Assumed delivered under separate project
- Alterations to Tuggeranong Parkway to suit new bridge works over Molonglo River - Assumed delivered under separate project
- Cotter Road connector road onto Tuggeranong Parkway – Assumed delivered under separate project
- Signalised intersection for connector road into residential area
- Signalised intersection with the Molonglo 3 East connector road

11 Multi Criteria Analysis

11.1 Multi Criteria Analysis

A multi criteria analysis is an evaluation procedure that is used to assess a suite of options in an effort identify the most appropriate option for further consideration. The analysis can consider both quantifiable measures and intangible (qualitative) criteria together to create a comparative score for each of the considered options, with the highest scoring option being the most appropriate for further consideration and development.

The MCA process scores each option against a set of criteria that have been identified as important in the context of the project. Through consultation with the assessment team, these criteria are agreed and weighted as function of their relative importance and relevance to the project, with the product of score and weighting for each criteria aggregated for each option to generate an overall score.

A multi criteria analysis with associated options development and an evaluation workshop was used on the EWA study to comparatively evaluative the four project options and identify a preferred option. The MCA method identified in the Transport for NSW *Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives* (June 2018) was adopted for the East West Arterial studyy, consisting of the following steps:

1) Define Objectives & Options
2) Define Criteria
3) Weight Criteria
4) Options Scoring
5) Aggregate Results & Rank
6) Sensitivity Analysis

The identified objective of the MCA was to engage with key stakeholders to assess the relative merits of the developed options and their elements to identify a preferred option

11.2 Workshop Details

A Multi Criteria Analysis (MCA) workshop was held on the 11th June 2020. It was hosted in a virtual environment through the MS Teams platform and attended by the following project team members and key stakeholder representatives:

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-
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-
-
-

The workshop provided attendees with briefing on the constraints, planning and transport context of the EWA, presentation of the options, an outline of the MCA process, discussion on the proposed MCA weightings, and finally a session on scoring the options. The workshop presentation, including annotated findings is included in Appendix J.

11.3 MCA Criteria

11.3.1 Evaluation Criteria

Ten criteria were considered throughout the MCA process. To ensure that the process was consistent with the ACT Triple Bottom Line (TBL) framework, these ten criteria were divided into the following TBL categories:

- Environmental
- Social
- Economic

The ten criteria that were considered in the MCA process and the some of the key considerations associated with each of the criteria are outlined in Table 11-1.

Table 11-1 MCA evaluation criteria

TBL Category	Criteria	Considerations
Environment	Ecology	Road infrastructure footprint has the potential to impact on: • Pink tail worm lizard habitat • Box gum woodland • Molonglo River corridor
	Heritage	Road infrastructure footprint has the potential to impact on: • Aboriginal PADs (Potential Archaeological Deposits) and sites of known finds • European heritage sites
	Visual Impact	Visual impacts of roads, embankments and structural elements on: • View corridors along the Molonglo River corridor • Views from elevated areas of the Arboretum • Interface with the Arboretum
Social	Road User Safety	• Vehicle interaction and weaving requirements • Road geometry • Intersection and interchange arrangements • Interface with vulnerable road users
	Arboretum Plantings	• Impacts on existing plantings within the Arboretum • Impacts on existing plantings within the Tuggeranong Parkway corridor • Potential locations for new planting / tree relocations
	Active travel	• Connectivity with existing and proposed active travel network • Accommodation with the proposed Molonglo Cycle Highway • Corridor geometry that facilitates active travel, primarily desirable vertical grades
Economic	Traffic	Transport network performance, both on the proposed EWA, but also on the broader network, measured by: • Vehicle hours and kilometres travelled (VHT and VKT) • Average speed
	Construction & whole of life costs	• Capital costs associated with delivery of the infrastructure • Whole of life costs associated with the operation and maintenance of the infrastructure throughout the asset life cycle.
	Impacts of construction	• Network operation during construction (including active and public transport) • Social impacts during construction (residents, social infrastructure access)
	Development potential	• The amount and quality of the developable area remaining in Molonglo following the construction of the EWA and associated infrastructure • The standard of access arrangements into future development areas.

11.3.2 Other Criteria

In addition to the above criteria, there are numerous other evaluation criteria that are relevant to the EWA options. these criteria include:

- Emergency Services – Response Access
- Emergency Services – Bushfire Response
- Public Transport
- Major Utility infrastructure
- Contamination
- Noise impacts
- Local connectivity
- Water quality

Whilst these criteria are regarded as important considerations for the EWA, it was believed unlikely that there would be substantive differences between the options. As such these criteria were not incorporated into the MCA as they would contribute the identification of a preferred option and tend to dilute the strength of other criteria.

11.4 Weightings

Prior to the workshop the project team discussed and developed proposed weightings to be adopted for the MCA assessment criteria. These weightings were generated using the Pairwise Analysis Technique. In this assessment, the importance of one criteria was individually compared to the importance of each of the other criteria within its TBL category. The importance of one compared to the other was rated in accordance with a ranking system. The range of values used in the ranking system were:

- 3 = high importance;
- 2 = medium importance; and
- 1 = low importance.

Table 11-2 through Table 11-4 below shows the raw results of the analysis. By way of example to assist with interpretation of the results of the pairwise analysis, Ecological impacts (En1) was considered more important than Visual Impacts (En3), and the strength of the relative importance was rated high, hence En1 scored 3 points (ie 3.En1).

Table 11-2 Pairwise Analysis Results – Environment criteria

Criteria	En1	En2	En3
En1 Ecology	-	-	-
En2 Heritage	1.En1	-	-
En3 Visual Impacts	3.En1	3En2	-

Table 11-3 Pairwise Analysis Results – Social criteria

Criteria	S1	S2	S3
S1 Road User Safety	-	-	-
S2 Arboretum Plantings	2.S1	-	-
S3 Active Travel	1.S1	1.S2	-

Table 11-4 Pairwise Analysis Results – Economic criteria

Criteria	Ec1	Ec2	Ec3	Ec4
Ec1 Network Operation	-	-	-	-
Ec2 Construction & Whole of Life Costs	1.Ec1	-	-	-
Ec3 Traffic Impacts during Construction	3.Ec1	3.Ec2	-	-

Ec4 Development Potential	2.Ec1	1.Ec2	2.Ec4	-

Each of the three TPL categories was assigned an allocation of the overall MCA scoring, and within each of these TBL categories a % weighting for each criteria was obtained from the pairwise analysis. The final weightings were adjusted to ensure that a minimum weighting of 3% was adopted for each category. A copy of the raw and final weightings resulting from the pairwise analysis is incorporated in Table 11-5. These weightings were circulated to stakeholders prior to the MCA workshop and were adopted in the MCA analysis.

Table 11-5 MCA Weightings

Criteria	Result	Weighting				
		Raw	TBL Proportion of MCA Allocation	Criteria Proportion of MCA Allocation	Min 3%	TCCS Weightings
En1 Ecology	4.En1	57%	25%	14%	13%	10%
En2 Heritage	3.En2	43%		11%	9%	7%
En3 Visual Impacts	0.En3	0%		0%	3%	3%
S1 Road User Safety	3.S1	75%	15%	11%	8%	15%
S2 Arboretum Plantings	1.S2	25%		4%	4%	2%
S3 Active Travel	0.S3	0%		0%	3%	8%
Ec1 Network Operation	6.Ec1	50%	60%	30%	28%	25%
Ec2 Construction & Whole of Life Costs	4.Ec.2	33%		20%	19%	15%
Ec3 Traffic Impacts during Construction	0.Ec3	0%		0%	3%	5%
Ec4 Development Potential	2.Ec4	17%		10%	10%	10%
Total		100%	100%	100%	100%	100%

Feedback on these weightings was provided by TCCS prior to the MCA workshop. TCCS provided suggested alternative weighting (also indicated in Table 11-5) which were tested as a sensitivity scenario in the MCA scoring process.

11.5 Options Scoring of Criteria

Each option was scored on a 1 to 5 scale to rank them from a very poor performing option (1) to a moderate performing option (3) to an option that performs very well (5) against each of the key criteria based on discussion by attendees at the MCA workshop. A score of 3 was targeted as the median score for each criteria to ensure that none was assigned an inflated or understated value in the MCA process. Total scores of each option for a given criteria have been calculated as the product of the score and weighting (ie Score x Weighting) and documented in the following section to the nearest 0.1 of a point.

Attendees in the MCA workshop provided feedback on Option 3, 4 and 5 and the resultant scoring is presented below. The scoring yielded very close outcomes between options 3 and 5, and as a result Option 6 was developed (a hybrid of Option 3 & 5) which generally incorporated the highest scoring elements of both the original options. The results for Option 6 are also presented following, however this option was not discussed in the MCA workshop, and scores for Option 6 were based on the rationale and arguments presented for the relevant elements of Options 3 & 5.

11.5.1 Ecology

The primary consideration for the ecological impacts related to the footprint of the considered options, and their interface with zones of ecological value. The construction footprint of Option 3 was considered to have significant impact on box gum woodland on the Molonglo River Peninsula and on continuous Pink Tail Worm Lizard habitat (and associated buffers) and as such scored poorly. Option 4 was considered worse still for these impacts and was considered outside of the threshold that could be supported by PCS. Option 5 crosses the Molonglo River Corridor further to the south, has a smaller impact on the box gum woodland and isolated Pink Tail Worm Lizard habitats, and as such was considered the best performing option for this criterion. Option 6 adopted the scoring of Option 5 as it

incorporates the same alignment through the Molonglo River corridor. The scoring for the ecology criteria is provided in Table 11-6.

Table 11-6 Ecology Scores

	Option 3	Option 4	Option 5	Option 6
Score	2	1	5	5
Weight	13%			
Total	0.3	0.1	0.6	0.6

11.5.2 Heritage

The primary heritage impacts were associated with construction footprint on the Molonglo River Peninsula. Option 3 bisected the known PAD site, although to impact the fewest know archaeological finds. Option 4 impacts on the highest density of pits with known artefacts, and Option 5 has a slightly higher impact on known heritage finds. It was decided that Option 4 was a very poor option in regard to heritage impacts. Option 5 was considered a better option from a heritage perspective than Option 3 as it impacts on a smaller on the overall PAD site, and Option 3 severs the PAD site and known finds and as such is more likely to have a detrimental impact on heritage values. Option 6 adopted the scoring of Option 5 as it incorporates the same alignment through the Molonglo River corridor. The scoring for the heritage criteria is provided in Table 11-7, noting that it was agreed with ACT Heritage Unit post workshop as they were an apology for the session.

Table 11-7 Heritage Scores

	Option 3	Option 4	Option 5	Option 6
Score	3	1	4	4
Weight	10%			
Total	0.3	0.1	0.4	0.4

11.5.3 Visual Impacts

The Molonglo River Bridge and associated embankments are relatively high in Option 3 which impacts view corridors in the river corridor. Option 4, whilst lower would require significantly more cut, potentially incising the landscape, and in addition has a large footprint for the Parkway interchange which tends to compromise the aspect from the Arboretum. The compact nature of the interchange in Option 5 was considered to be advantageous for views from the Arboretum, although it was noted that the Molonglo River Bridge was relatively high. Option 6 adopted the scoring of Option 3 as it incorporates the same interchange arrangement as Option 3 which was the most significant consideration in these criteria. Scoring was relatively tight for all options. The scoring for the visual impact criteria is provided in Table 11-8.

Table 11-8 Visual impact scores

	Option 3	Option 4	Option 5	Option 6
Score	3	2	4	3
Weight	3%			
Total	0.1	0.1	0.1	0.1

11.5.4 Road User Safety

The discussion on road user safety centered around likely accident rates for different road elements such as road geometry, intersection and interchange configurations, and weave movements. As the options are generally similar from the m3E connector road and to the west, the focus of this discussion primarily related to the EWA to the west of the M3E connector road intersection and the Tuggeranong Parkway and the associated interchanges.

Option 3 incorporates free flow ramps into the EWA interchange which are preferable from a safety perspective as they eliminate interaction between vehicles at intersections and stopping. However, Option 3 also includes a loop

ramp, which research indicates have poorer accident performance than conventional ramps. Furthermore, Option 3 has a relatively short weave length on the Tuggeranong Parkway which has safety implications. Option 6 adopted the scoring of Option 3 as it incorporates the same interchange arrangement as Option 3.

Option 4 eliminates the weave movement on the Parkway through its CD arrangement and as a result was considered the safest of the options assessed, although it was noted that more vehicles will need to traverse signalised intersections in this option (both at the skewed ramp crossover and at the Cotter Rd interchange), which tempered its scoring to an extent.

Option 5 was considered the worst performing option as it had both the shortest weave length and two additional signalised intersections. The scoring for the road user safety criteria is provided in Table 11-9. It is noted that Option 5 originally scored a 3 in the workshop, however there was agreement that further assessment would be undertaken based on feedback from participants on safety research of interchanges, which subsequently led to a change in score.

Table 11-9 Road user safety scores

	Option 3	Option 4	Option 5	Option 6
Score	3	4	2	3
Weight	9%			
Total	0.3	0.4	0.2	0.3

11.5.5 Arboretum Plantings

The options were rated on their relative impact on existing plantings of the Arboretum, notwithstanding that some plantings are within the Tuggeranong Parkway gazetted road corridor. Option 4 was considered to have the greatest impact on these plantings, followed by Option 5 then Option 3. Option 6 adopted the scoring of Option 3 as it incorporates the same interchange arrangement, and by extension the same Arboretum impact as Option 3. The scoring for the impacts on Arboretum plantings criteria is provided in Table 11-10.

Table 11-10 Arboretum planning impact scores

	Option 3	Option 4	Option 5	Option 6
Score	4	1.5	3	4
Weight	4%			
Total	0.1	0.1	0.1	0.1

11.5.6 Active Travel

The discussion on active travel primarily related to geometry and the degree to which the option required interface between vehicles and vulnerable road users. Option 3 provides full grade separation between paths and the cycle highway and the EWA and ramp carriageways to the east of the M3E intersection, and as such was considered to be the best performing option in this criteria. Option 4 has one likely at-grade conflict point and Option 5 has two at-grade interfaces between general traffic and active travellers. The implications of at grade crossings were considered to outweigh minor differences in path geometry and grading. Option 6 adopted the scoring of Option 3 as it incorporates the same interchange arrangement as Option 3. The scoring for the active travel criteria is provided in Table 11-11Table 11-10.

Table 11-11 Active travel scores

	Option 3	Option 4	Option 5	Option 6
Score	4	1.5	3	4
Weight	4%			
Total	0.1	0.1	0.1	0.1

11.5.7 Network Operation

This criteria was based on quantitative outputs of the traffic model. The primary metric used for comparison was the average speed across both peaks (corrected for an allowance of vehicles that are outside the traffic model) which combines the VHT and VKT measures. Using this metric, it was found that Option 3 performs slightly better than Option 5, with Option 4 performing the worst. Option 6 adopted the scoring of Option 3 as it incorporates the same interchange arrangement as Option 3, the interchange arrangement being the primary influence of network performance. The scoring for the network operation criteria is provided in Table 11-12.

Table 11-12 Network operation scores

	Option 3	Option 4	Option 5	Option 6
Score	3.5	2	3	3.5
Weight	29%			
Total	1.0	0.6	0.9	1.0

11.5.8 Construction and Whole of Life Costs

Capital costs for each of the options was derived from estimates of order of costs. In addition, a high-level assessment of forecast pavement maintenance costs was undertaken (pavements being considered the primary ongoing cost throughout the asset life). These estimates indicated that Option 3 ($234M – undiscounted Whole of Life cost in 2020 AUD) was likely to be the lowest cost option, following by Option 5 ($248M), then Option 6 ($254M) and Option 4 ($280M). The scoring for the construction and whole of life cost criteria is provided in Table 11-13.

Table 11-13 Construction and whole of life cost scores

	Option 3	Option 4	Option 5	Option 6
Score	4	1	3	3
Weight	20%			
Total	0.8	0.2	0.6	0.6

11.5.9 Traffic Impacts during Construction

It was concluded during the MCA workshop that all options were likely to perform similarly for this criterion. As such it was decided to drop the criteria out of the assessment process and adjust the weightings accordingly.

11.5.10 Development Potential

The main considerations for this criterion where:

1) How much developable area would be left following the construction of the EWA, both to the west of the Molonglo River and to the east of the Tuggeranong Parkway (albeit that the area to the south of the Zoo currently has no proposed development, and
2) How the EWA interchange facilitates access to the east of the Tuggeranong Parkway

The primary objective of Option 5 was to maximise developable area by minimising the construction footprint of the EWA. It achieves this by hugging the box gum woodland to the west of the river and using a compact diamond interchange at the Tuggeranong Parkway. Furthermore, this diamond interchange best suits a future connection into the land to the east of the Parkway. For these reasons Option 5 performs significantly better than others in this criterion.

Option 3 has a significant interchange footprint but could be retrofitted to provide a connection to the east. Conversely it will be highly challenging to provide access to the east in the future for Option 4. The scoring for Option 6 was considered to lie between Options 3 and 5 as it achieved the positive outcomes of Option 5 west of the river, but not to the east. The scoring for the network operation criteria is provided in Table 11-14.

Table 11-14 Development potential scores

	Option 3	Option 4	Option 5	Option 6

Score	3	2	5	4
Weight	10%			
Total	0.3	0.2	0.5	0.4

11.6 Overall Option Scoring

The scoring for each of the criteria described above was combined to give an overall weighted score for each Option. In addition, the scoring was also assessed for the weightings recommended by TCCS to understand if that had implications for the results.

The overall scoring originally indicated a notionally tied result during the workshop between Option 3 and Option 5. Option 5 scored marginally better (69/100) than Option 3 (67/100) for the original weightings, however were exactly equal when the TCCS weightings were considered (both 67/100). Option 4 scored considerably worse than these two options and was removed from consideration. When weightings were recalibrated to account for the removal of the Traffic Impacts during construction criteria the overall result remained inconclusive. The overall scoring from the workshop is provided in Table 11-15.

Table 11-15 Overall MCA scores (Out of 100 - Original Options)

Weighting	Option 3	Option 4	Option 5
All Criteria			
Original Weightings	67	36	69
TCCS Weightings	67	42	67
Recalibration for removal of Traffic Impacts during Construction criteria			
Original Weightings	66	35	69
TCCS Weightings	67	41	66

11.7 Sensitivity Analysis

A sensitivity analysis was undertaken to assess the impact of varying the weightings for each category ranking. The weighting of each criteria was revised by ±20% to determine if variability in the weightings would impact on the resultant preferred option. Results of this analysis are documented in Table 11-16. In all scenarios Option 5 performed marginally better than Option 3, with Option 4 consistently the wort performing option.

Table 11-16 Sensitivity analysis outcomes

Sensitivity Scenario	Option 3	Option 4	Option 5
En1 Ecology + 20%	3.25	1.75	3.52
En1 Ecology - 20%	3.31	1.78	3.41
En2 Heritage + 20%	3.28	1.75	3.48
En2 Heritage - 20%	3.28	1.78	3.45
En3 Visual Impacts + 20%	3.28	1.77	3.47
En3 Visual Impacts - 20%	3.28	1.76	3.46
S1 Road User Safety + 20%	3.28	1.81	3.44
S1 Road User Safety - 20%	3.28	1.72	3.49
S2 Arboretum Plantings + 20%	3.29	1.76	3.46
S2 Arboretum Plantings - 20%	3.27	1.77	3.47
S3 Active travel + 20%	3.29	1.77	3.46
S3 Active travel - 20%	3.28	1.76	3.47
Ec1 Network Operation + 20%	3.35	1.81	3.49

Sensitivity Scenario	Option 3	Option 4	Option 5
Ec1 Network Operation - 20%	3.21	1.72	3.44
Ec2 Construction & Whole of Life Costs + 20%	3.34	1.74	3.47
Ec2 Construction & Whole of Life Costs - 20%	3.22	1.79	3.46
Ec3 Traffic Impacts during Constion + 20%	3.28	1.77	3.47
Ec3 Traffic Impacts during Constion - 20%	3.41	1.83	3.60
Ec4 Development Potential + 20%	3.34	1.81	3.56
Ec4 Development Potential - 20%	3.34	1.79	3.48

11.8 Consideration of Option 6

As the original outcomes of the MCA process failed to identify a clear highest scoring option, consideration was given to a hybrid option that combined the highest scoring elements of Options 3 and 5. This option – Option 6 – was found to be unambiguously the best performing option. The final scores for the MCA process, inclusive of all considered options is provided in Table 11-17.

Table 11-17 Final MCA scoring

Weighting	Option 3	Option 4	Option 5	Option 6
Original Weightings - Aggregate Score	3.28	1.77	3.47	3.67
Original Weightings - Score out of 100	66	35	69	73
TCCS Weightings (Score out of 100)	67	41	66	73

12 Conclusions and Next Steps

12.1 Study Findings

12.1.1 Constraints analysis

This Options Study has identified numerous constraints that exist within the envelope of the various EWA corridor options. These constraints include:

- Geotechnical considerations
- Planning requirements (both Territory and National)
- Local ecology
- Heritage values
- Contamination

Some of these constraints are significant and have impacted on the design development and options selection process. Consultation has been undertaken with relevant stakeholders to better understand the nature of these constraints and inform the optioneering process.

12.1.2 Options Development

The options assessment process has involved the development of four discrete options for the EWA and the associated interchange with the Tuggeranong Parkway. Strategic traffic modelling has indicated that a single two-lane carriageway is sufficient for forecast volumes west of the M3E connector road, and a dual carriageway is required to the east. Microsimulation modelling indicates that all the options are viable from an operation perspective, although further analysis is required to ensure that weave lengths on the Tuggeranong Parkway and EWA are sufficient.

12.1.3 Options Assessment

A multicriteria analysis of the four options was undertaken to identify a candidate for a preferred option to be taken to strategic design. An initial assessment in an MCA workshop of Options 3-5 was inconclusive and failed to identify a clear stand out option. In response, a hybrid of Options 3 and 5 was developed that combined the strongest performing features of the two constituent options. Upon further multi criteria analysis, Option 6 was found to be demonstrably the strongest option for the considered criteria.

12.2 Next Steps

12.2.1 Preferred Option

Option 6 as described in this Options Study is considered the preferred candidate option to proceed to further design. Ratification of Option 6 as the preferred option was confirmed by EPSDD and IDPG on 23 July 2020.

12.2.2 Strategic Design

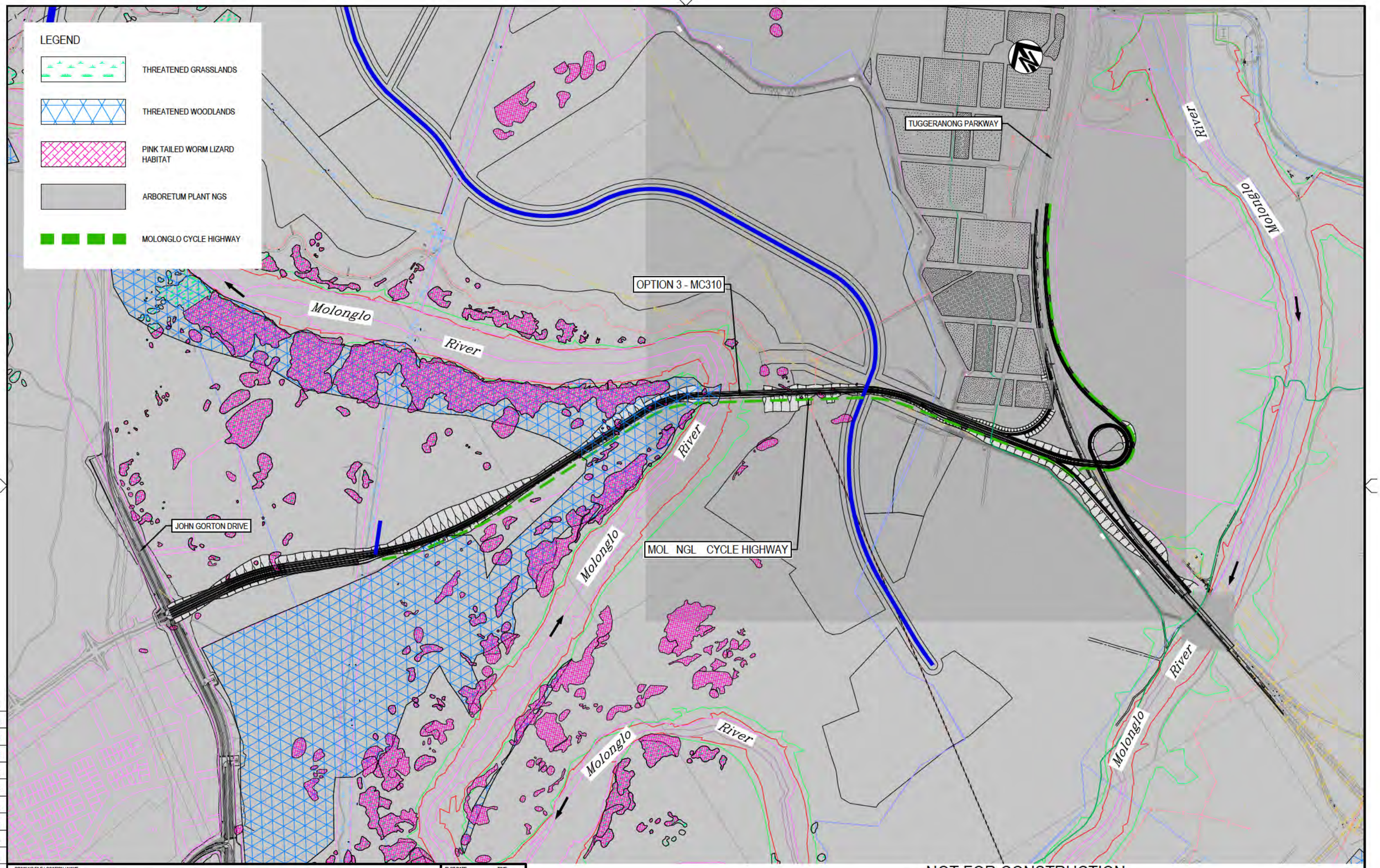
Volume 2 of this Feasibility Study documents the strategic design of the preferred option. There are several items that will addressed as part of the strategic design development, including:

- Final microsimulation traffic modelling of the preferred option
- Weave analysis of conflicting vehicle movements on:
    1) Both directions of the Tuggeranong Parkway between the EWA interchange and the Cotter Rd interchange
    2) The westbound direction of the EWA between the Tuggeranong Parkway and the M3E connector road
- Refinement of the EWA alignment to improve geometric outcomes and material balance and testing of cross road geometry
- Provision of increased road design detail on the EWA alignment
- Bridge design of the Molonglo River Bridge and the Tuggeranong Parkway bridge
- Commentary on potential landscape provisions
- Further consultation with stakeholders
- Further consideration of utility impacts

- Noise modelling of the EWA alignment

Further to the development of the strategic design, Volume 2 of the Feasibility Study will report on the order of cost estimates for the preferred option and investigate the economic viability of the EWA.

Appendix A Design Option Sketches – EWA



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DRAFTER	C. DAWSON
DRAFTING CHECK	K. CURLEY
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PROJECT TITLE
MOLONGLO EAST WEST ARTERIAL
CONCEPT FEASIBILITY STUDY

OPTION 3 ALIGNMENT
SCOPE OF WORKS

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AS SHOWN	FEASIBILITY STUDY	3002754-0301	01

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JOHN GORTON DRIVE

SIGNALISED INTERSECTION FOR CONNECTOR ROAD INTO RESIDENTIAL AREA (LOCATION TO BE CONFIRMED)

OPTION 3 - MC310

Molonglo River

Molonglo River

JOINS SHEET 2

LEGEND

- THREATENED GRASSLANDS
- THREATENED WOODLANDS
- PINK TAILED WORM LIZARD HABITAT
- ARBORETUM PLANT NGS
- MOLONGLO CYCLE HIGHWAY

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SMEC PROJECT No 3002754

CLIENT:

PROJECT TITLE: MOLONGLO EAST WEST ARTERIAL CONCEPT FEASIB LITY STUDY

OPTION 3 ALIGNMENT SHEET 1

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SIGNALISED INTERSECTION WITH THE MOLONGLO 3 EAST CONNECTOR ROAD (LOCATION TO BE CONFIRMED)

OPTION 3 - MC310

MOLONGLO RIVER BRIDGE

TUGGERANONG PARKWAY

TUGGERANONG PARKWAY NORTHBOUND THIRD LANE

Molonglo River

Molonglo River

JOINS SHEET 1

JOINS SHEET 3

LEGEND

- THREATENED GRASSLANDS
- THREATENED WOODLANDS
- PINK TAILED WORM LIZARD HABITAT
- ARBORETUM PLANT NGS
- MOLONGLO CYCLE HIGHWAY

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CLIENT

PROJECT TITLE

MOLONGLO EAST WEST ARTERIAL
CONCEPT FEASIB LITY STUDY

OPTION 3 ALIGNMENT
SHEET 2

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TUGGERANONG PARKWAY

OPTION 3 - MC310

SINGLE TWO WAY CARRIAGEWAY BRIDGE OVER TUGGERANONG PARKWAY

BRIDGE - TO BE WIDENED TO ACCOMMODATE A THIRD NORTHBOUND LANE AS PART OF A SEPARATE PROJECT

Molonglo River

JOINS SHEET 2

TUGGERANONG PARKWAY NORTHBOUND THIRD LANE

OPTION 3 - MC310

CYCLEWAY UNDERPASS PARKWAY EXIT RAMP

JOINS SHEET 2

LEGEND

- THREATENED GRASSLANDS
- THREATENED WOODLANDS
- PINK TA LED WORM LIZARD HABITAT
- ARBORETUM PLANTINGS
- MOLONGLO CYCLE HIGHWAY

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MOLONGLO EAST WEST ARTERIAL CONCEPT FEASIB LITY STUDY

OPTION 3 ALIGNMENT SHEET 3

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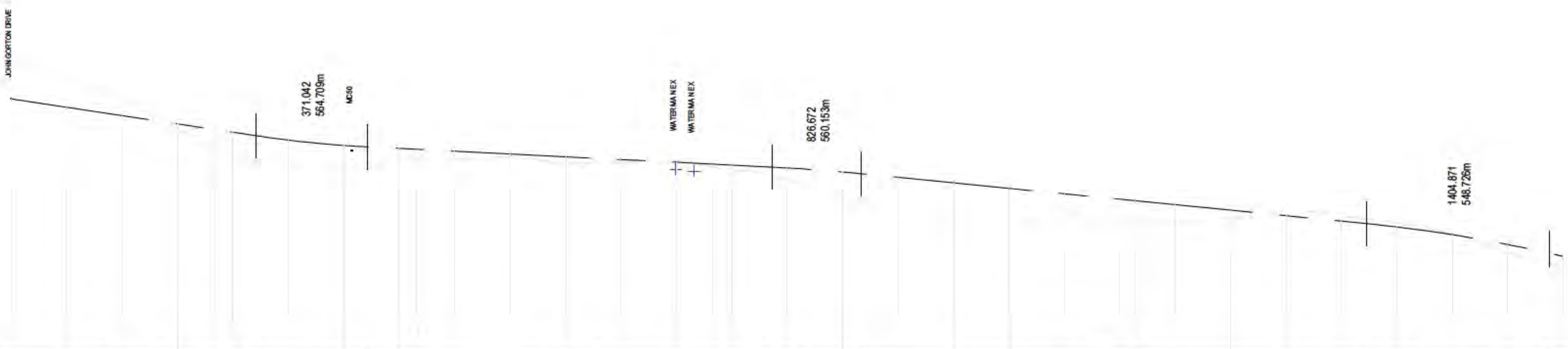

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EXTERNAL REFERENCE FILES: X_3002754_SMEC_a1, X_2754_LS_OPT_03 MC310_01

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
01	10.06.2020	DRAFT MCA WORKSHOP - FOR INFORMATION ONLY	WVR 001	D.T.

TITLE	NAME
DRAFTER	C. DAWSON
DRAFTING CHECK	K. CURLEY
DESIGNER	M. WATSON
DESIGN CHECK	TBC
PROJECT MANAGER	D. TONGE
PROJECT DIRECTOR	D. KEEP

SCALES AT A1 SIZE DRAWING
HORIZ. 1:2500 25 0 25 50 75 100 125 m
VERT. 1:1000 10 0 10 20 30 40 50 m

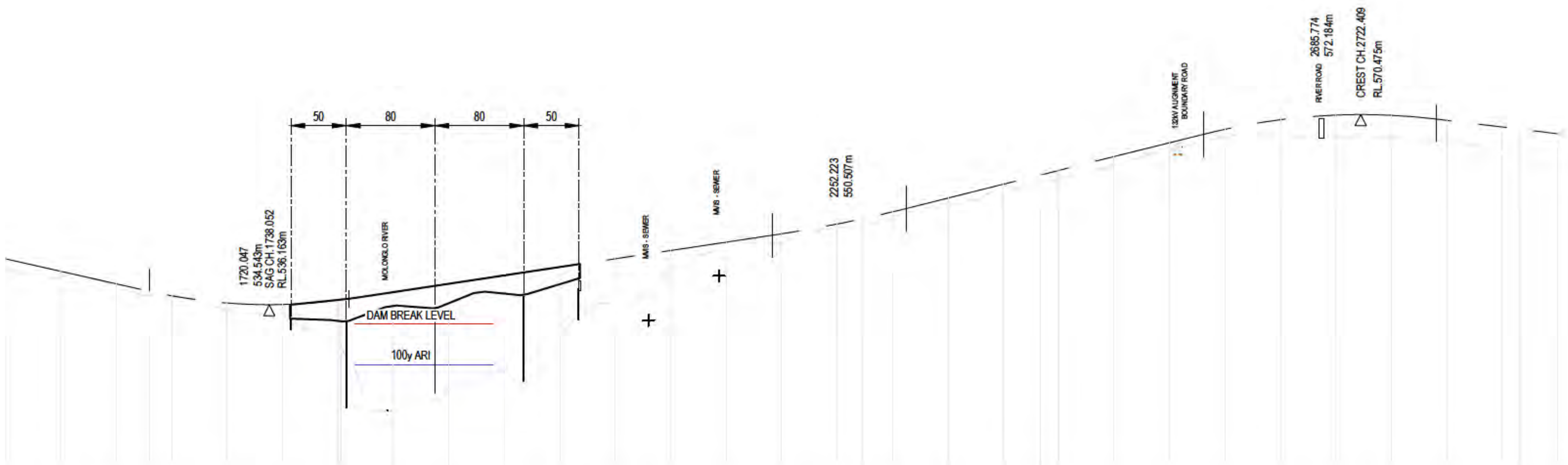
DESIGNER
SMEC
Member of the Surbana Jurong Group
SMEC AUSTRALIA PTY LTD
© ABN 47 065 475 149
SUITE 2, LEVEL 1, 243 NORTHBOURNE AVENUE
LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002754

CLIENT

PROJECT TITLE
MOLONGLO EAST WEST ARTERIAL
CONCEPT FEASIBILITY STUDY
OPTION 3 ALIGNMENT - WESTBOUND
LONGITUDINAL SECTON CONTROL LINE MC310
SHEET 1

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	FEASIBILITY STUDY	3002754-0321	01

A1 150 mm ON ORIGINAL



DATUM R.L.501.000

VERTICAL ALIGNMENT: G=-4.500% L=142.676 | L=180.000 K=24.001 | G=3.000% L=382.176 | L=120.000 K=59.989 | G=5.000% L=268.551 | L=210.000 K=28.327 | G=-2.413% L=484.378

HORIZONTAL ALIGNMENT: R=320.000 | R=400.000 | R=-400.000

STATION	DESIGN LEVELS	EXISTING LEVELS
1500	544.446	542.427
1550	542.196	541.203
1600	539.946	539.458
1630	538.598	537.778
1650	537.778	537.622
1700	536.465	535.238
1750	536.193	533.412
1800	536.963	528.719
1803	537.033	528.214
1850	538.442	517.000
1900	539.941	520.924
1950	541.441	524.478
2000	542.941	530.549
2050	544.441	536.579
2100	545.941	542.308
2150	547.440	547.136
2200	548.945	547.406
2250	550.718	549.854
2273	551.678	550.458
2300	552.908	551.797
2350	555.396	554.331
2400	557.896	557.000
2433	559.553	558.068
2450	560.396	559.000
2500	562.896	561.373
2550	565.396	564.198
2600	567.830	566.362
2650	569.550	566.833
2700	570.386	566.314
2750	570.341	566.273
2800	569.428	565.676
2850	568.221	563.791
2866	567.835	562.929
2900	567.014	561.438

LONGITUDINAL SECTION ALONG CONTROL MC310

NOT FOR CONSTRUCTION

DRAWING FILE LOCATION / NAME: V:_Vault\Projects\3002\3002754\110_CADD\CAD\DWG\01_CONCEPT_FEASIBILITY\3002754-0322.dwg
PLOT DATE: 10 Jun 2020 TIME: 18:34:28

EXTERNAL REFERENCE FILES: X_3002754_SMEC_a1, X_2754_LS_OPT_03 MC310_02

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
01	10.06.2020	DRAFT MCA WORKSHOP - FOR INFORMATION ONLY	WVR 001	D.T.

TITLE	NAME
DRAFTER	C. DAWSON
DRAFTING CHECK	K. CURLEY
DESIGNER	M. WATSON
DESIGN CHECK	TBC
PROJECT MANAGER	D. TONGE
PROJECT DIRECTOR	D. KEEP

SCALES AT A1 SIZE DRAWING
HORIZ. 1:2500 25 0 25 50 75 100 125 m
VERT. 1:1000 10 0 10 20 30 40 50 m

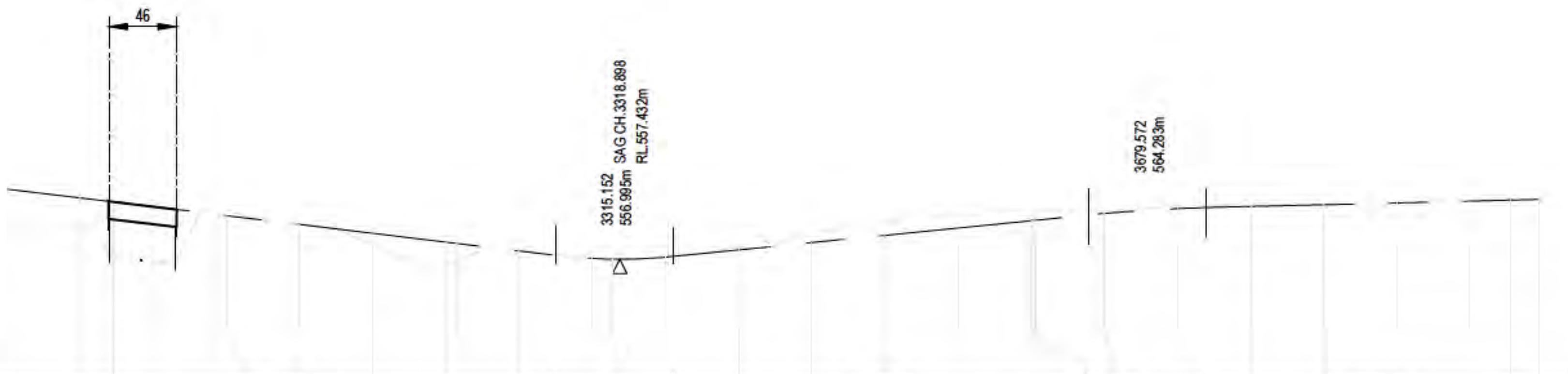
DESIGNER: SMEC
Member of the Surbana Jurong Group
SMEC AUSTRALIA PTY LTD
© ABN 47 065 475 149
SUITE 2, LEVEL 1, 243 NORTHBOURNE AVENUE
LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002754

CLIENT

PROJECT TITLE: MOLONGLO EAST WEST ARTERIAL
CONCEPT FEASIBILITY STUDY
OPTION 3 ALIGNMENT - WESTBOUND
LONGITUDINAL SECTON CONTROL LINE MC310
SHEET 2

SCALE: AS SHOWN | PHASE: FEASIBILITY STUDY | PROJECT / DRAWING No.: 3002754-0322 | REVISION: 01

A1 150 mm ON ORIGINAL



DATUM R.L.541.000

VERTICAL ALIGNMENT: G=-2.413% L=484.378 | L=80.000 K=18.127 | G=2.000% L=284.420 | L=80.000 K=53.318 | G=0.500% L=227.709

HORIZONTAL ALIGNMENT: R=-400.000 | R=-65.000 | R=400.000 | R=1310.000

STATION	DESIGN LEVELS	EXISTING LEVELS
2900	567.014	561.438
2950	565.807	562.000
2972	565.267	557.933
3000	564.601	557.000
3042	563.577	564.000
3050	563.394	564.000
3100	562.187	562.157
3150	560.981	559.377
3200	559.774	556.923
3207	559.593	557.182
3250	558.567	558.769
3300	557.531	557.360
3314	557.439	557.248
3350	557.699	557.989
3400	558.692	559.000
3450	559.692	561.000
3500	560.692	562.424
3550	561.692	563.252
3600	562.692	564.000
3601	562.703	564.000
3603	562.752	564.000
3650	563.682	564.000
3700	564.349	564.735
3750	564.635	564.809
3800	564.885	564.922
3850	565.135	565.089
3900	565.384	565.396
3928	565.522	565.597
3947	565.621	565.825

LONGITUDINAL SECTION ALONG CONTROL MC310

NOT FOR CONSTRUCTION

DRAWING FILE LOCATION / NAME: V:_Vault\Projects\3002\3002754\110_CADD\CAD\DWG\01_CONCEPT_FEASIBILITY\3002754-0323.dwg

PLOT DATE: 10 Jun 2020 TIME: 18:35:04

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
01	10.06.2020	DRAFT MCA WORKSHOP - FOR INFORMATION ONLY	WVR 001	D.T.

TITLE	NAME
DRAFTER	C. DAWSON
DRAFTING CHECK	K. CURLEY
DESIGNER	M. WATSON
DESIGN CHECK	TBC
PROJECT MANAGER	D. TONGE
PROJECT DIRECTOR	D. KEEP

SCALES AT A1 SIZE DRAWING: HORIZ. 1:2500 (25 0 25 50 75 100 125 m); VERT. 1:1000 (10 0 10 20 30 40 50 m)

DESIGNER: SMEC — Member of the Surbana Jurong Group. SMEC AUSTRALIA PTY LTD, ABN 47 065 475 149, SUITE 2, LEVEL 1, 243 NORTHBOURNE AVENUE, LYNEHAM ACT 2602 AUSTRALIA. SMEC PROJECT No 3002754

CLIENT:

PROJECT TITLE: MOLONGLO EAST WEST ARTERIAL CONCEPT FEASIBILITY STUDY

OPTION 3 ALIGNMENT - WESTBOUND LONGITUDINAL SECTON CONTROL LINE MC310 SHEET 3

SCALE: AS SHOWN | PHASE: FEASIBILITY STUDY | PROJECT / DRAWING No. 3002754-0323 | REVISION 01

TUGGERANONG PARKWAY

EXISTING TUGGERANONG PARKWAY BRIDGE
- TO BE RECONFIGURED TO ACCOMMODATE SOUTHBOUND MOVEMENTS ONLY
- TWO SOUTHB UND PARKWAY LANES AND CONNECTOR ROAD LINK TO COTTER ROAD INTER CHANGE (SINGLE LANE)

Molonglo

River

SIGNALISED INTERSECTION

ALTERNATIVE
CYCLE HIGHWAY ARRANGEMENT WITH UNDERPASS UNDER RAMP
(AVOIDS AT GRADE INTERSECTION)

JOINS SHEET 2

OPTION 4 - MC410

TWO SINGLE CARRIAGEWAY BRIDGES OVER TUGGERANONG PARKWAY

LEGEND

- THREATENED GRASSLANDS
- THREATENED WOODLANDS
- PINK TAILED WORM LIZARD HABITAT
- ARBORETUM PLANT NGS
- MOLONGLO CYCLE HIGHWAY

OPTION 4 - MC410

CYCLEWAY UNDERPASS OF PARKWAY EXIT RAMP

NEW TUGGERANONG PARKWAY BRIDGE OVER MOLONGLO RIVER
- TO ACCOMMODATE NORTHBOUND MOVEMENTS ONLY
- THREE NORTHBOUND LANES AND CONNECTOR ROAD LINK FROM COTTER ROAD INTERCHANGE (SINGLE LANE)

JOINS SHEET 2

NOT FOR CONSTRUCTION

DRAWING FILE LOCATION / NAME	V:_Vault\Projects\3002\3002754\110_CADD\CAD\DWG\01_CONCEPT_FEASIBILITY\3002754-0413.dwg
PLOT DATE	10 Jun 2020
TIME	18:44:20

EXTERNAL REFERENCE FILES

3002754_SMEC_A1
J754_SURVX_00
J754_SURVX_01A
J754_SURVX_01B
J754_SURVX_02
J754_SURVX_DTC
J754_CULVERTS
J754_ENVRO_CONSTRAINTS
J754_ENVRO_BRT
J754_ENVRO_GRASSLAND
J754_ENVRO_WATER
J754_ENVRO_THREAT_WOODLAND
J754_ENVRO_THREAT_FAUNA
J754_MODLO_FLOOD_LEVELS
J754_MODLO_FLOOD_DEPTH
XXD-TUGGERANONG
J754_CONTX
J753_XD_01A
J753_XD_01B
J754_UTILX_01A
J754_FRAME_OPT_04
J753_ESS_01
J753_XD
J753_339_XD
J753_339_P
J753_330_XD
J753_330_P
J754_LEG_DRWING
J754_LEG_TXT

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
C	10.06.2020	DRAFT MCA WORKSHOP - FOR INFORMATION ONLY	WVR 001	D.T.

J754_CONCEPT_PLAN
J754_DES_TUGG_PWY_SEW_04
J754_DES_CAD_CRT_04
J754_LAD_ALTMAT_2020

TITLE	NAME
DRAFTER	C. DAWSON
DRAFTING CHECK	K. CURLEY
DESIGNER	M. WATSON
DESIGN CHECK	TBC
PROJECT MANAGER	D. TONGE
PROJECT DIRECTOR	D. KEEP

SCALES AT A1 SIZE DRAWING

SCALE 1:2000 20 0 20 40 60 80 100 m

DESIGNER

SMEC
Member of the Surbana Jurong Group
SMEC AUSTRALIA PTY LTD
© ABN 47 065 475 149
SUITE 2, LEVEL 1, 243 NORTHBOURNE AVENUE
LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002754

CLIENT

PROJECT TITLE
MOLONGLO EAST WEST ARTERIAL
CONCEPT FEASIB LITY STUDY

OPTION 4 ALIGNMENT
SHEET 3

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	FEASIB LITY STUDY	3002754-0413	01

150mm ON ORIGINAL
A1

COTTER ROAD

TUGGERANONG PARKWAY

SOUTHBOUND OFF RAMP

JOINS SHEET 3

TUGGERANONG PARKWAY SERVICE ROAD

NORTHBOUND ON RAMP

TUGGERANONG PARKWAY BRIDGE WIDENING

River

Molonglo

COTTER ROAD

TUGGERANONG PARKWAY

150mm ON ORIGINAL

A1

DRAWING FILE LOCATION / NAME
V:_Vault\Projects\3002\3002754\110_CADD\CAD\DWG\01_CONCEPT_FEASIBILITY\3002754-0414.dwg

PLOT DATE 10 Jun 2020 TIME 18:46:36

NOT FOR CONSTRUCTION

EXTERNAL REFERENCE FILES

3002754_SMEC_p1
C_ZP54_SURV_00
C_ZP54_SURV_01A
C_ZP54_SURV_01B
C_ZP54_SURV_02
C_ZP54_SURV_01C
C_ZP54_CULTURAL
C_ZP54_ENVIRO_CONSTRAINTS
C_ZP54_ENVIRO_INT
C_ZP54_ENVIRO_GRASSLAND
C_ZP54_ENVIRO_WOODLAND
C_ZP54_ENVIRO_THREAT_WOODLAND
C_ZP54_ENVIRO_THREAT_FAUNA
C_ZP54_HYDRO_FLOODLEVELS
C_ZP54_HYDRO_CATCHMENT
XCOD_TUGGERANONG
C_ZP54_CONTX
C_TCU_3D_01A
C_TCU_3D_01B
C_ZP54_LITIGU_01A
C_ZP54_FRAME_OPT_04
C_TCU_EXG_OPT_04
C_TCU_EXG_01A
C_TCU_3D_XD
C_TCU_3D_P
C_TCU_3D_XD
C_TCU_3D_P
C_ZP54_SHT_TXT_OPT_04
C_ZP54_PAV_OPT_04
C_ZP54_PAV_01A
C_ZP54_CONCEPT_PLAN
C_ZP54_DBB_TUGG_PWY_SERV_RD
C_ZP54_DBB_CAD_OPT_04
C_ZP54_MID_ACTIVE_CORR

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
P2	10.06.2020	DRAFT MCA WORKSHOP - FOR INFORMATION ONLY	WVR 001	D.T.

TITLE	NAME
DRAFTER	C. DAWSON
DRAFTING CHECK	K. CURLEY
DESIGNER	M. WATSON
DESIGN CHECK	TBC
PROJECT MANAGER	D. TONGE
PROJECT DIRECTOR	D. KEEP

SCALES AT A1 SIZE DRAWING

SCALE 1:2000 20 0 20 40 60 80 100 m

DESIGNER

SMEC

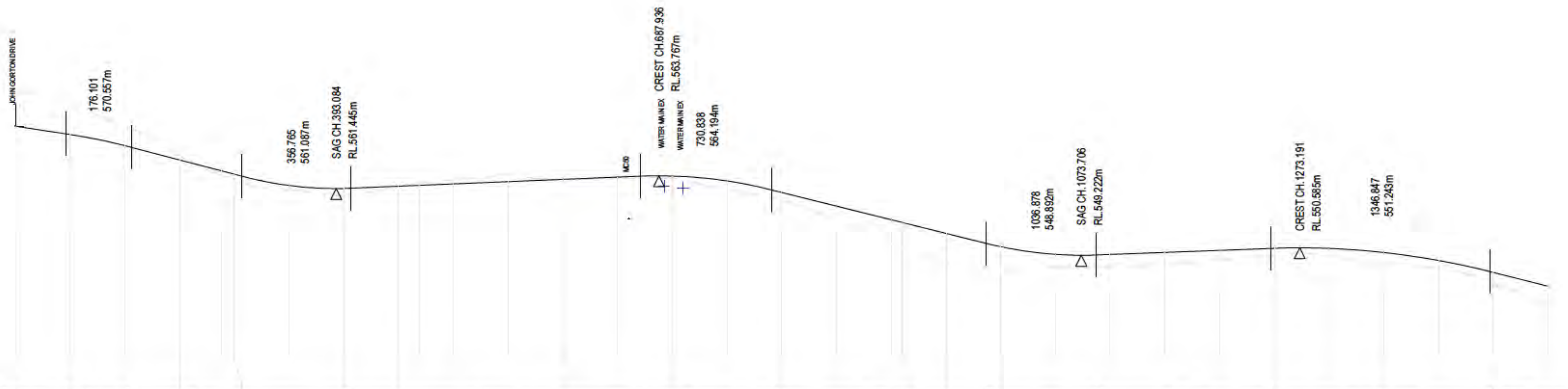
Member of the Surbana Jurong Group
SMEC AUSTRALIA PTY LTD
© ABN 47 065 475 149
SUITE 2, LEVEL 1, 243 NORTHBOURNE AVENUE
LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002754

CLIENT

PROJECT TITLE
MOLONGLO EAST WEST ARTERIAL
CONCEPT FEASIBILITY STUDY

OPTION 4 ALIGNMENT
SHEET 4

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	FEASIB LITY STUDY	3002754-0414	01



DATUM R.L.524.000

VERTICAL ALIGNMENT

G=-3.000% L=46.101 | L=60.000 K=26.762 | G=-5.242% L=100.664 | L=100.000 K=16.467 | G=0.831% L=264.073 | L=120.000 K=20.580 | G=-5.000% L=196.041 | L=100.000 K=17.366 | G=0.759% L=159.968 | L=200.000 K=34.731 | G=-5.000% L=170.347

HORIZONTAL ALIGNMENT

R=457.000 | R=-600.000

STATION	DESIGN LEVELS	EXISTING LEVELS
100	572.840	578.552
150	571.337	576.848
200	569.297	572.929
250	566.683	567.492
288	564.692	563.916
300	564.062	563.166
350	562.009	561.198
400	561.460	560.296
450	561.861	561.841
469	562.021	562.478
500	562.277	563.095
550	562.692	563.888
600	563.107	563.026
600	563.111	563.026
650	563.523	563.341
700	563.731	563.386
750	562.831	561.095
800	560.736	559.212
850	558.236	555.993
900	555.736	551.307
910	555.218	550.443
950	553.236	548.167
1000	550.786	546.699
1050	549.383	547.115
1100	549.371	547.040
1150	549.750	547.658
1200	550.130	548.353
1250	550.507	549.233
1300	550.481	549.030
1350	549.735	547.843
1400	548.270	546.767
1450	546.086	544.175
1500	543.586	539.953

LONGITUDINAL SECTION ALONG CONTROL MC410

NOT FOR CONSTRUCTION

DRAWING FILE LOCATION / NAME: V:_Vault\Projects\3002\3002754\110_CADD\CAD\DWG\01_CONCEPT_FEASIBILITY\3002754-0421.dwg

PLOT DATE: 10 Jun 2020 TIME: 18:47:40

EXTERNAL REFERENCE FILES: 3002754_SMEC_a1; 3002754_LS_OPT_04 MC410_01

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
01	10.06.2020	DRAFT MCA WORKSHOP - FOR INFORMATION ONLY	WVR 001	D.T.

TITLE	NAME
DRAFTER	C. DAWSON
DRAFTING CHECK	K. CURLEY
DESIGNER	M. WATSON
DESIGN CHECK	TBC
PROJECT MANAGER	D. TONGE
PROJECT DIRECTOR	D. KEEP

SCALES AT A1 SIZE DRAWING
HORIZ. 1:2500 25 0 25 50 75 100 125 m
VERT. 1:1000 10 0 10 20 30 40 50 m

DESIGNER

SMEC
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© ABN 47 065 475 149
SUITE 2, LEVEL 1, 243 NORTHBOURNE AVENUE
LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002754

CLIENT

PROJECT TITLE
MOLONGLO EAST WEST ARTERIAL
CONCEPT FEASIBILITY STUDY

OPTION 4 ALIGNMENT - WESTBOUND
LONGITUDINAL SECTON CONTROL LINE MC410
SHEET 1

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	FEASIBILITY STUDY	3002754-0421	01

A1 150 mm ON ORIGINAL