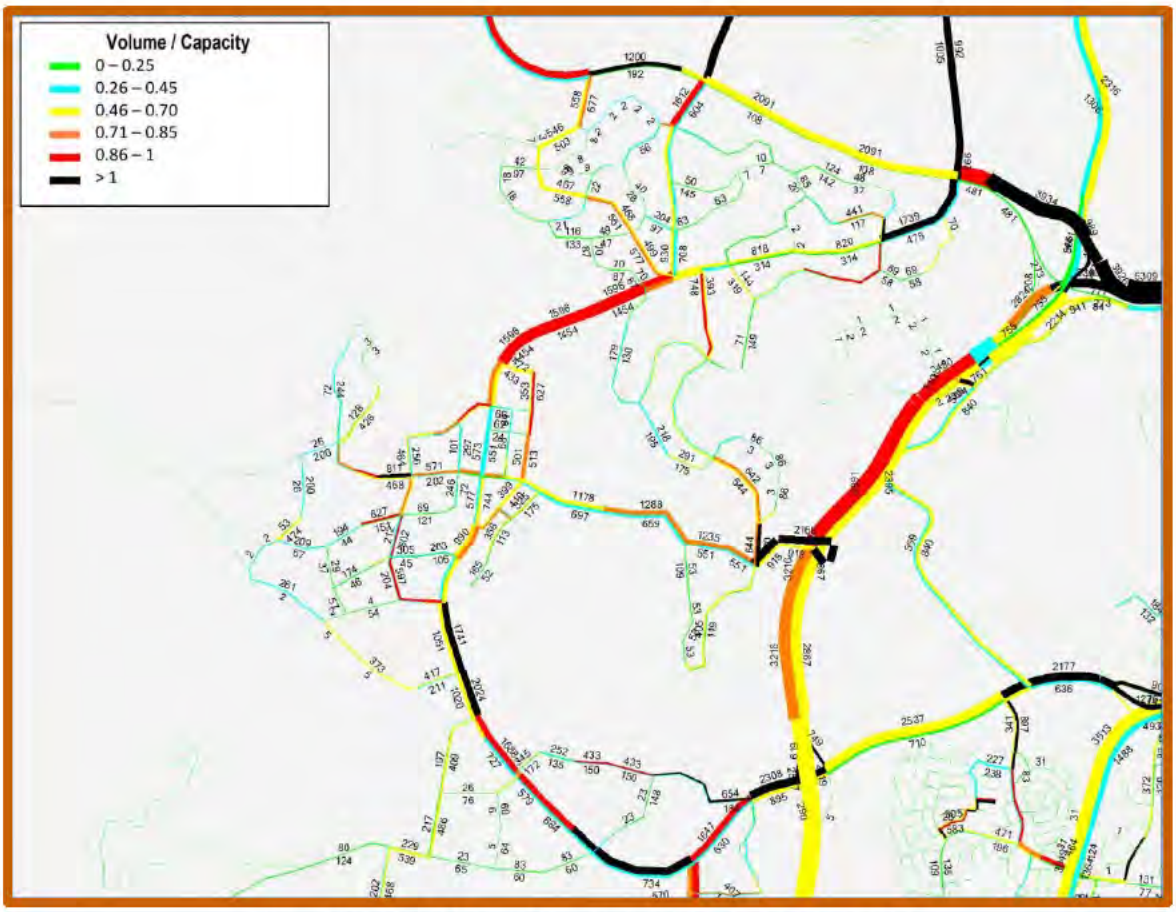

Figure 15: 2031 AM Peak Hour Traffic Volumes and Congestion

In the 2031 AM Peak Hour, Figure 15 shows that there is expected to be some congestion inside Molonglo, especially along John Gorton Drive. Again, as with the other years, the connections to the surrounding road network are operating above capacity.

3.4 Consultation and Value Management Workshop

During the course of this project, regular fortnightly progress meetings have been conducted to provide project updates to EDD (and SSP) and also to seek clarifications on some issues that have been identified. Occasional ad-hoc meetings have also been held when urgent matters need to be resolved immediately.

A Value Management Workshop was held on 21 May 2012, wherein SMEC presented the preliminary thoughts on the alignments of the proposed Stage 3 arterial roads. This meeting was attended by representatives of the following ACT Government agencies:

- Shared Services Procurement
- Economic Development Directorate
- Territory and Municipal Services Directorate
- Environment and Sustainable Development Directorate
- Land Development Agency

At the meeting, the preliminary findings of the project were presented. Discussions included the following topics:

- Arterial road alignments and staging
- Public transport arrangements
- Strategic transport modelling
- Provision of cycle paths
- Environmental impacts

Feedback received from the attendees at the meeting was then used by SMEC to refine the options developed up to that point in the project.

4 ARTERIAL ROAD ALIGNMENTS

Previous studies in the Molonglo area have defined three potential arterials roads, which are:

- John Gorton Drive (formerly North-South Arterial)
- East-West Arterial
- Coulter Drive Extension

Constraints, including design standards, topography and environmental constraints have been identified and preliminary alignments for these arterial roads have been developed.

The proposed road network is shown in Appendix A.

Plan and longitudinal section drawings of the arterial roads are shown in Appendix B.

4.1 Road Hierarchy

Two levels of road hierarchy were considered in this study. The three main arterial roads were investigated in detail. In addition, lower order roads, probably collector roads, were also considered. While the brief only asked for arterial road alignments, it was considered necessary to include some consideration of the lower order roads to ensure that the proposed arterial road alignments could be integrated into a complete road network.

Figure 16 shows a summary of the proposed road alignments. Note that the sub-arterial/collector/local road alignments are indicative only and provide proof of concept for the arterial road network.

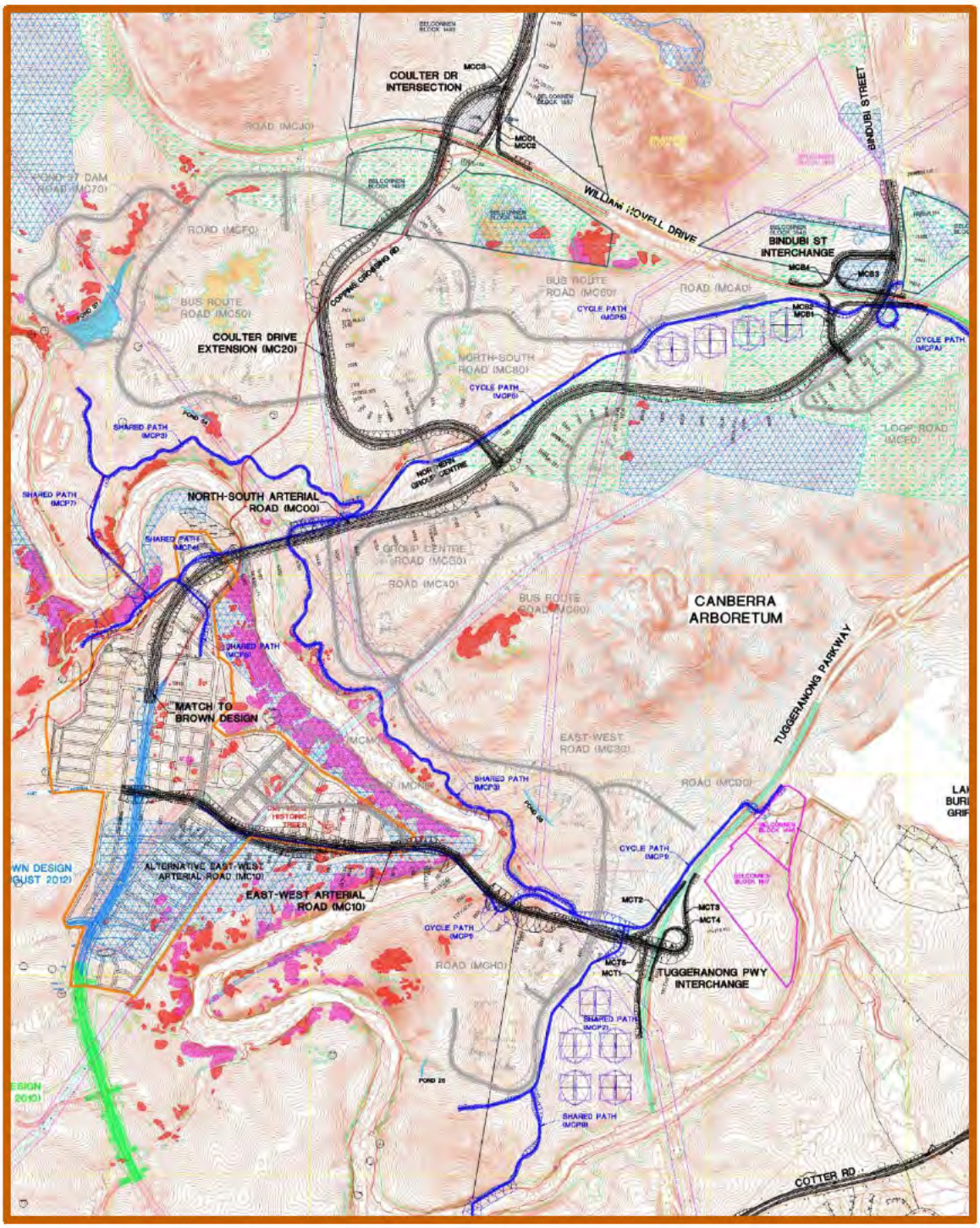

Figure 16: Road Hierarchy

The colour coding for Figure 16 is as follows: black – arterial roads; grey – sub-arterial/collector/local roads; blue – cycleways; light blue – JGD (Brown Consulting design, future); green – JGD (GHD design, currently under construction).

4.2 John Gorton Drive (JGD)

Formerly referred to as North-South Arterial (NSA), EDD has advised that the entire length of NSA will be named John Gorton Drive.

4.2.1 JGD Constraints and Opportunities

The principal constraints and opportunities in the JGD corridor are shown in Figure 17.

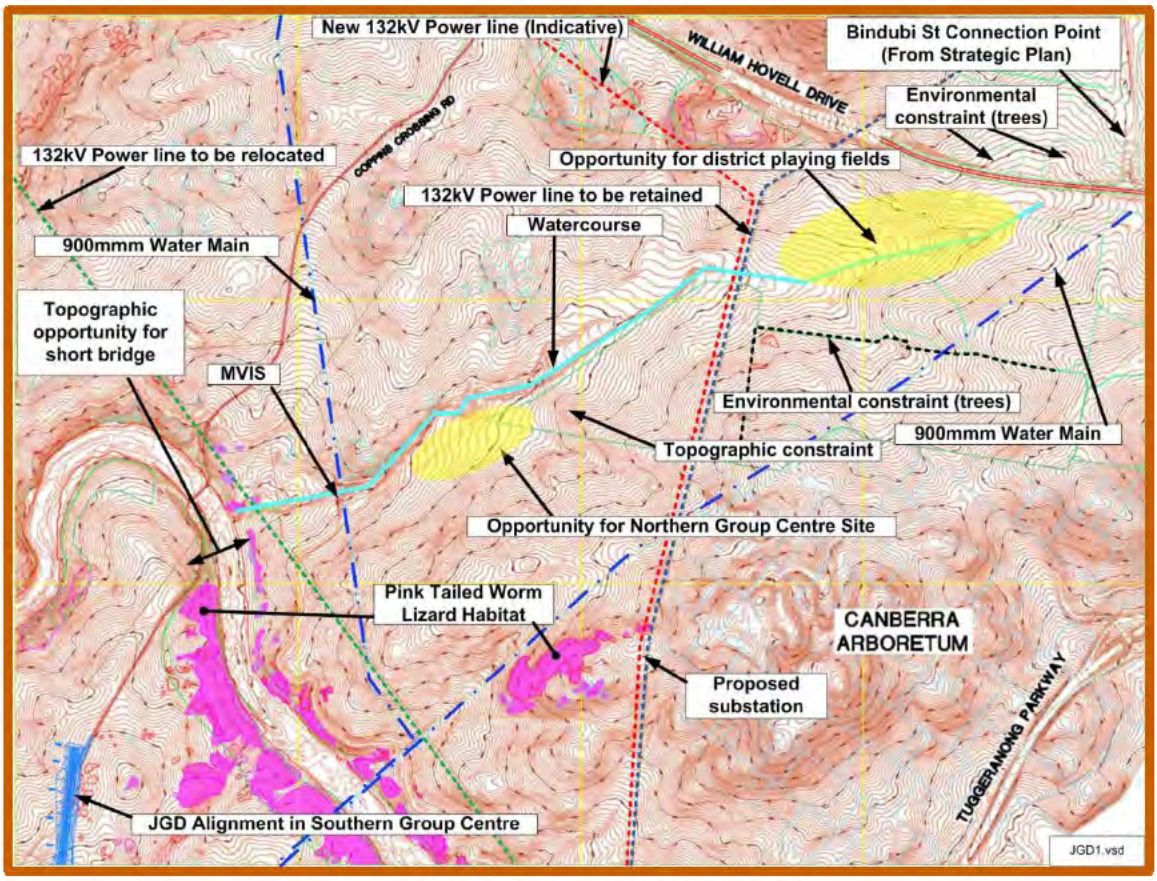

Figure 17: JGD Constraints and Opportunities

The primary controls on the alignment comprise the following:

- JGD alignment in Molonglo 2 Group Centre
- Bindubi Street (nominated connection in Molonglo Structure Plan)
- Pink Tailed Worm Lizard Habitat
- Tree conservation area
- MVIS
- Terrain and natural watercourses

Secondary controls comprise the following:

- Northern Group Centre site
- 900 mm water mains
- 132 kV transmission lines for retention
- District playing fields site

Tertiary controls comprise:

- 132 kV transmission line (for future relocation) – avoiding this may allow their relocation to be deferred
- Coppins Crossing Road – this will need to continue in operation until one carriageway of JGD provides an alternative route

As shown in Figure 18 the recommended alignment for JGD is near the transmission tower. It appears likely that construction of the road can occur without relocation of the tower, especially if the western carriageway only were constructed in the initial stage, however the vertical clearance needs to be checked following survey at the next stage of design. Retention of the tower if both carriageways are constructed would be subject to ground survey, detailed design, and agreement with ActewAGL regarding clearances (both vertical and horizontal). The crash barriers required for the bridge could be extended to the east to protect the tower.

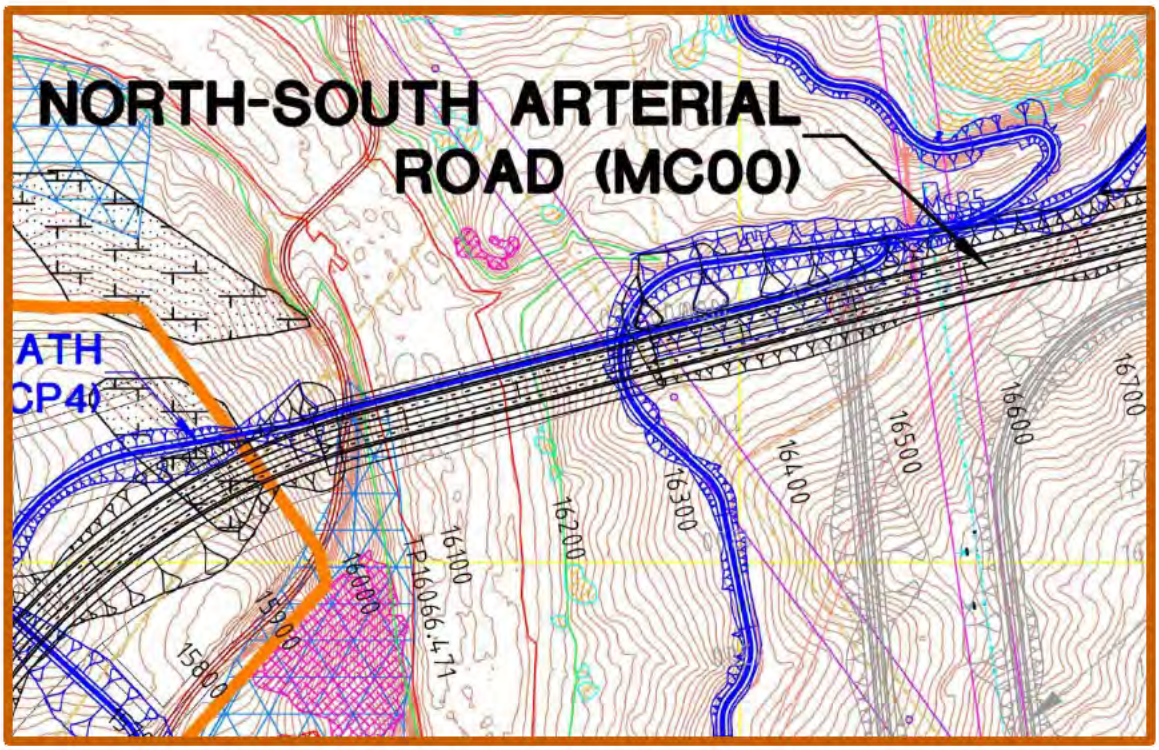

Figure 18: JGD and 132 kV Transmission and Water Main Easements (Pink Lines)

Figure 19: 132 kV Transmission Tower Adjacent to JGD

Figure 20: Coppins Crossing Road (South of Molonglo River)

4.2.2 JGD Horizontal Alignment

The proposed JGD horizontal alignment concept is shown in Figure 21. The southern end of JGD in this study is connected to the existing design of JGD in the Molonglo 2 Group Centre. At the northern end, the connection is to Bindubi Street in accord with the structure plan.

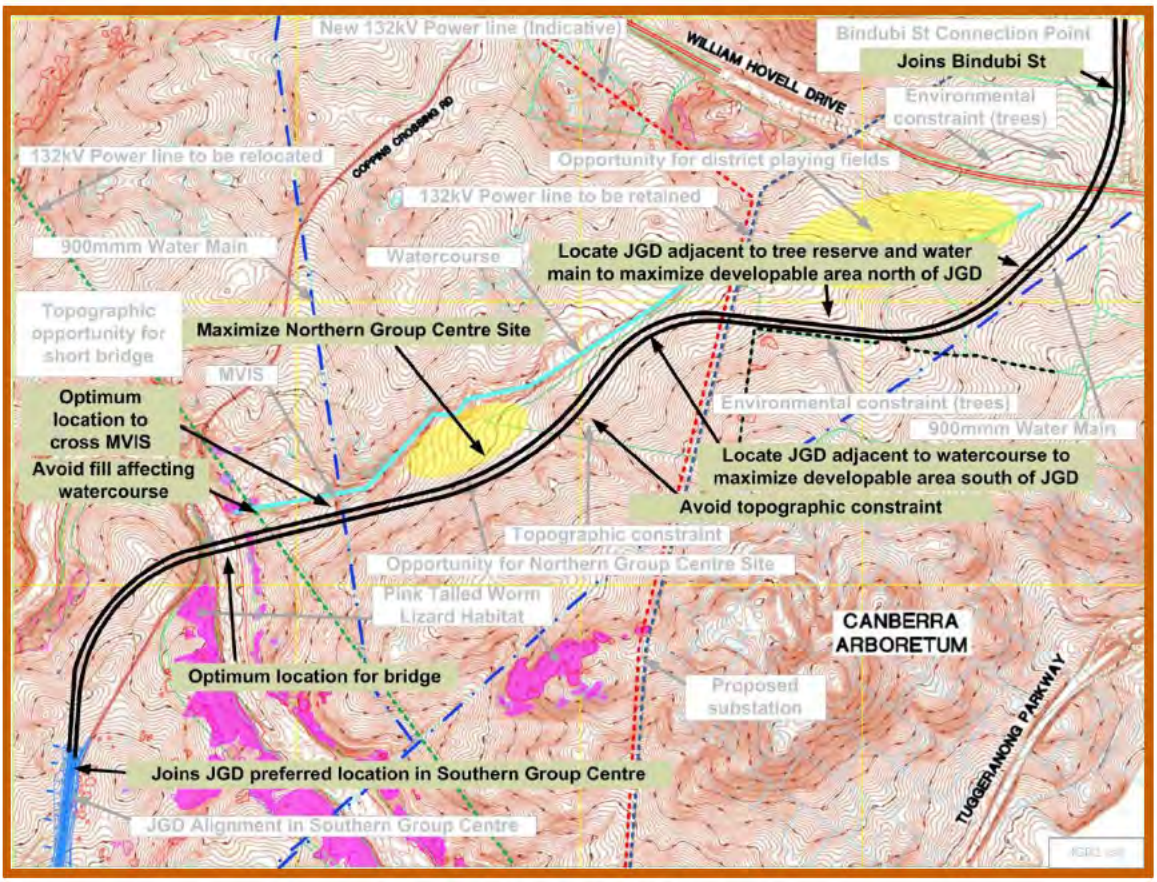

Figure 21: JGD Horizontal Alignment

4.2.3 JGD Vertical Alignment

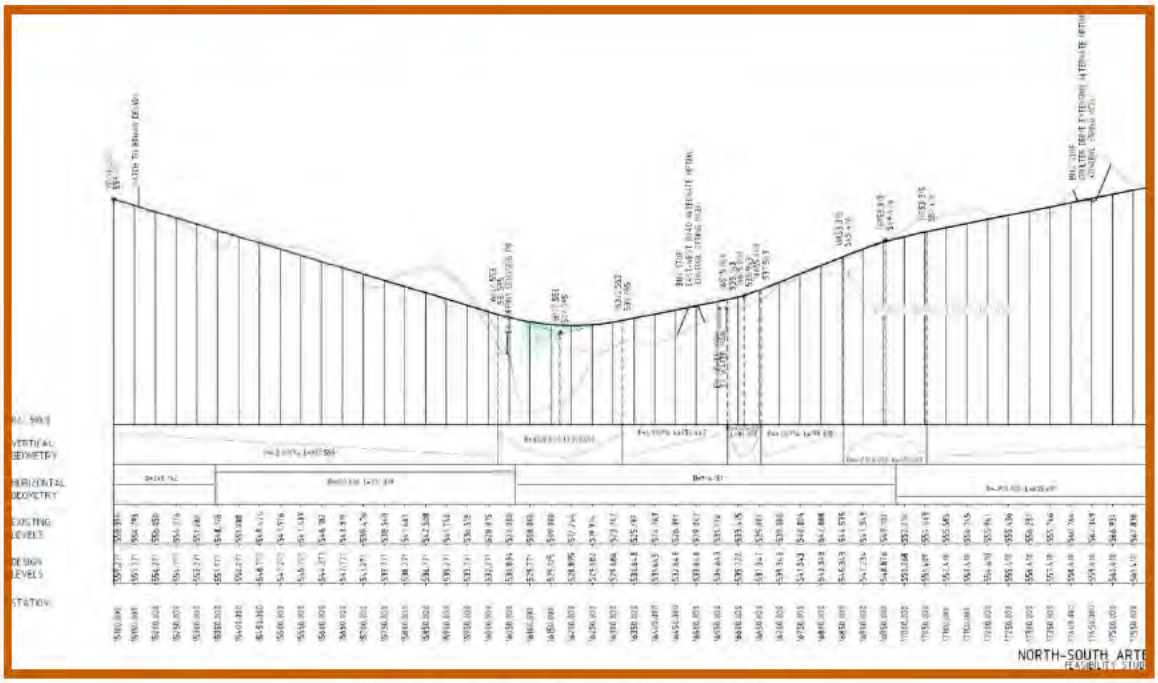

Figure 22: JGD Vertical Alignment (1/2)

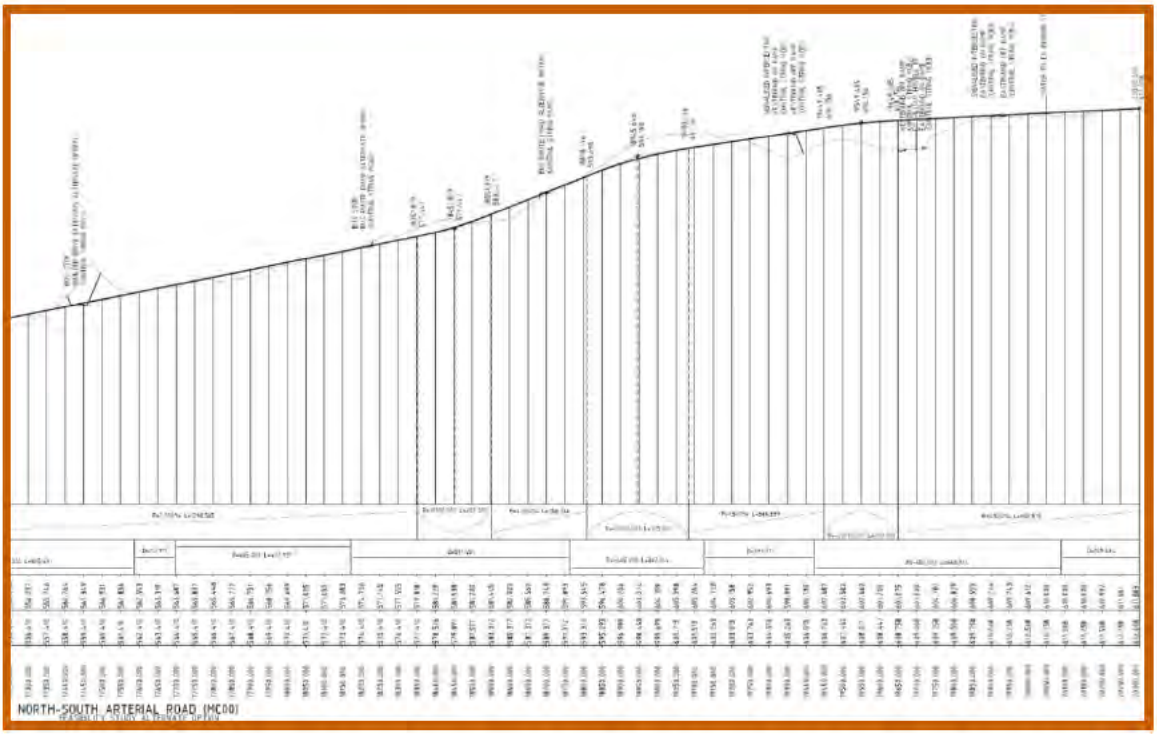

Figure 23: JGD Vertical Alignment (2/2)

The gradient of JGD through the M2CG shown in the concept design provided to SMEC on 7 February utilises a 3% gradient, and the JGD concept design has matched this grade.

4.2.4 JGD Intersections

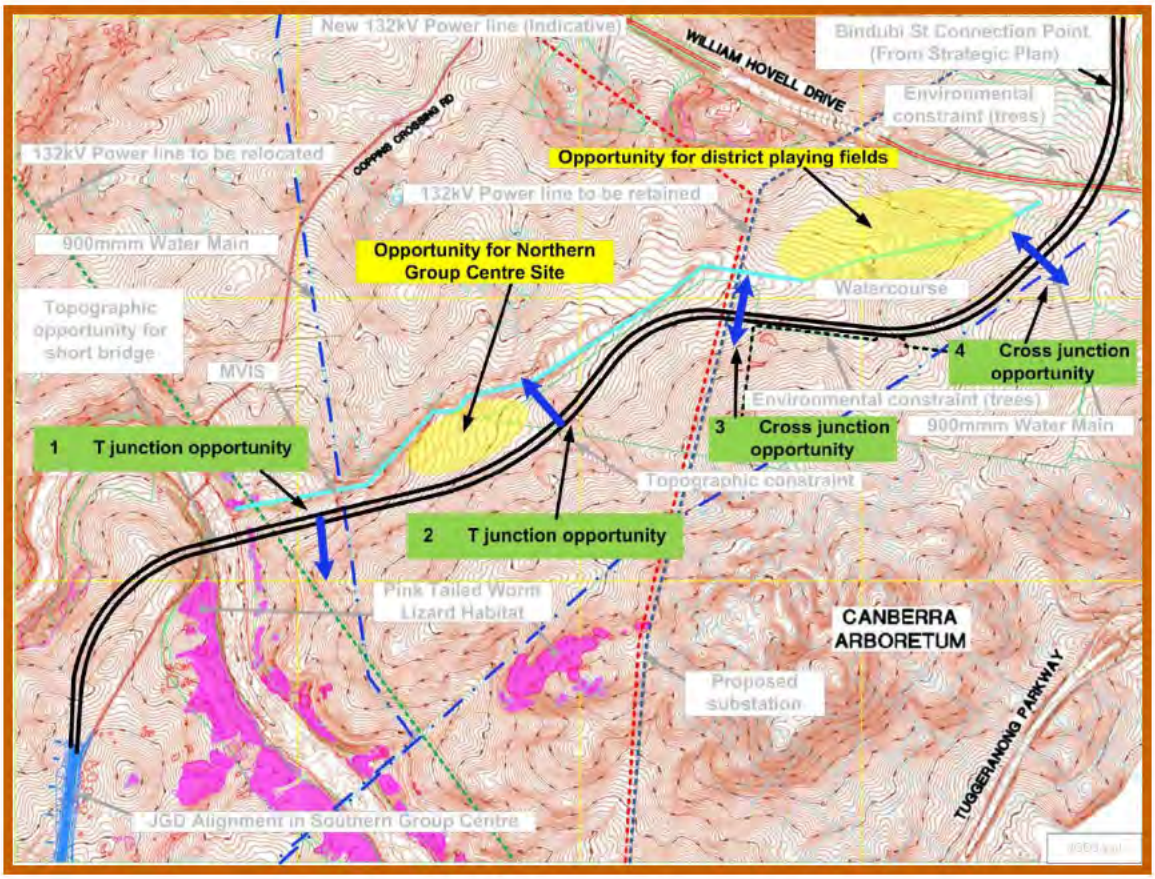

Figure 24: JGD Intersection Opportunities

The junction locations were developed in conjunction with the development of the horizontal and vertical alignments. Figure 24 shows the following junction opportunities:

1. T-junction north of Molonglo River
2. T-junction east of Northern Group Centre
3. Cross junction adjacent to 132 kV power lines
4. Cross junction near William Hovell Drive

Junction 1 is a T-junction as the watercourse/open space area on the northern side of JGD would require a bridge to cross. The T junction is located west of the 900 mm water main in a location that should avoid the need for right turn lanes affecting the Molonglo River bridges.

Junction 1 is located on a straight so that normal crossfall applies, and stormwater issues can be avoided[1].

Junction 2 is also a T-junction as the topography on the southern side of JGD is too steep for a cross junction. In addition, this junction is a suitable connection point for the Coulter Drive Extension (CDE). A continuation of CDE is considered inappropriate

[1] The risk of stormwater running downhill on intersecting roads and across the through road carriageways during extreme rainfall can be minimized/precluded by grading side roads with a sag vertical curve before the junction. This provides a low point where excess water can overflow the side road kerb and reach an overland flow channel. The provision of a sag in the downhill side road profile may be inhibited if the carriageway closest to the intersecting road does not slope down.

because it could encourage inappropriate use of CDE and the EWA by traffic that should use William Hovell Drive and the Tuggeranong Parkway. In addition, a route across the hill to the south of the junction would increase noise, energy use, and carbon dioxide emissions. To allow a cross intersection to be safely connected, the JGD alignment would need to be moved to the north, making the Northern Group Centre site too small.

Junction 2 is located on the inside of a horizontal curve, so any stormwater issues can be avoided.

A service road for the Northern Group Centre adjacent to JGD would reduce the developable area of the site. Queues from CDE/JGD signals would potentially block egress from a service road. Group Centre access from CDE is therefore recommended.

Junction 3 is located adjacent to the 132 kV power-line easement and a tree preservation area. It is located on a straight so that drainage issues are avoided.

Junction 4 is located on a straight so that drainage issues are avoided. The location provides convenient access to a developable area south of JGD. The northern side of the junction provides an opportunity to connect ramps from the William Hovell Drive/JGD/Bindubi Street interchange.

These junctions were located to provide opportunities for traffic signals to be coordinated. As shown in Figure 25, co-ordination is not perfect. If northbound progression is provided, the southbound progression is available for traffic using the westbound exit from William Hovell Drive. The bandwidth of the green decreases southbound as the achievable intersection spacing is not uniform. (This diagram does not include an intersection at chainage 18700).

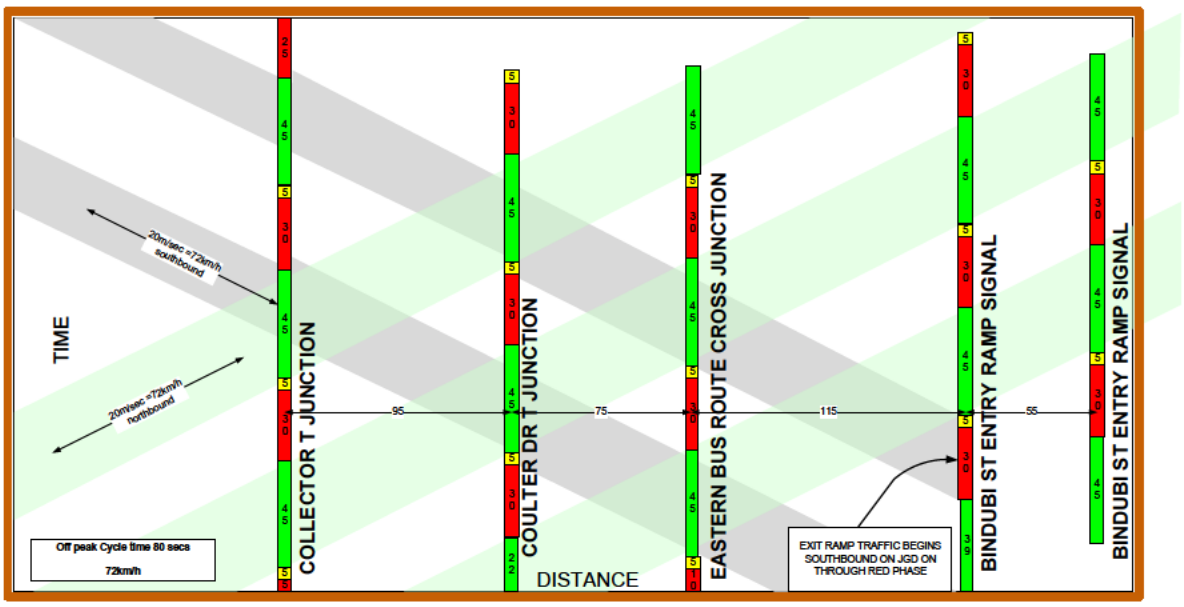

Figure 25: JGD Signal Progression

4.2.5 District Playing Fields Option 1

Figure 26 shows one of three options considered for the district playing fields. Other options are shown in Figure 28 and Figure 31.

SMEC was advised of this location for the playing fields at the outset of the study and it was taken into account in the development of the JGD alignment and the interchange configuration. There is also a potential opportunity for further urban development in the area between the playing fields and JGD. The terrain however is not suited to playing fields, which should ideally be located on relatively flat land. Furthermore, the proposed location is directly on top of an existing waterway, which would cause drainage issues. However, this option is being presented here simply as a preliminary idea and it still needs to be investigated further.

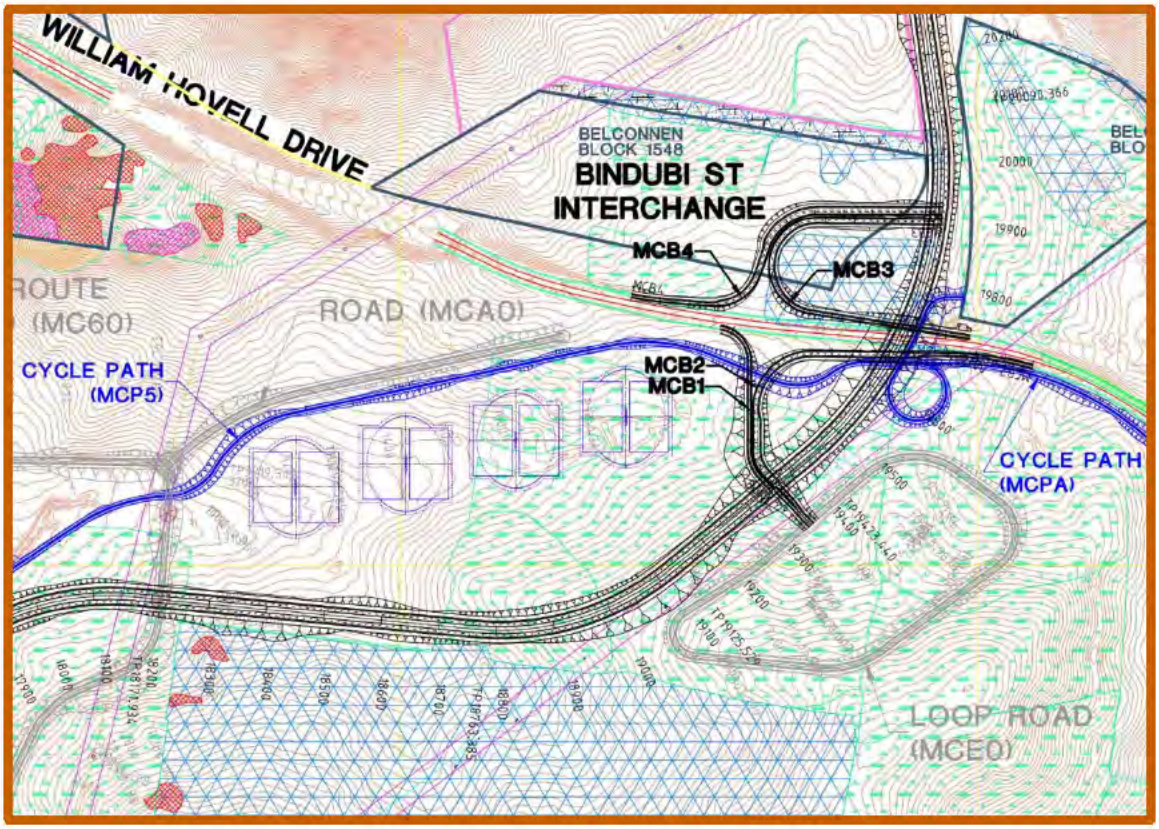

Figure 26: District Playing Fields Option 1

4.2.6 William Hovell Drive – JGD/Bindubi Street Interchange

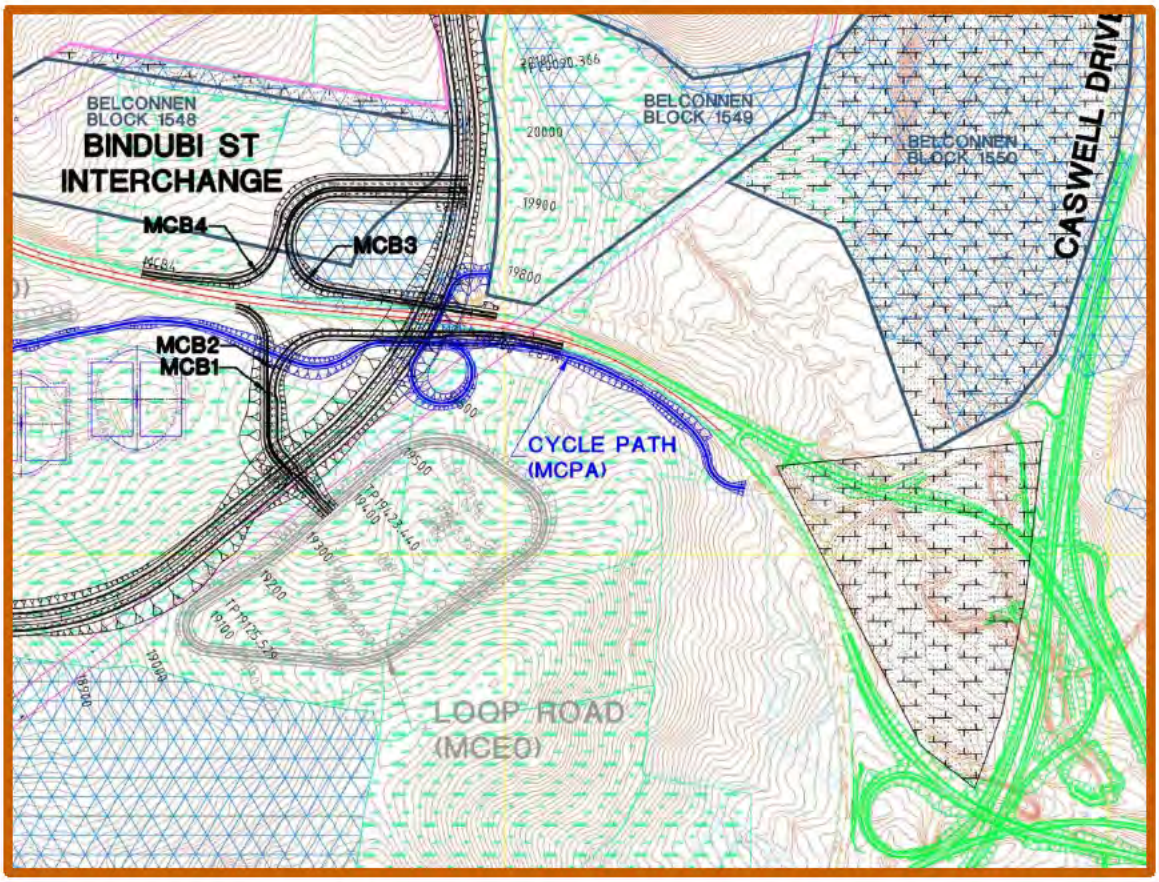

Figure 27: Folded Diamond Interchange Location and Layout

A folded diamond interchange is recommended as it maximises the distance between this interchange and Glenloch Interchange. The provision of a loop ramp for the eastbound entry to William Hovell Drive would facilitate a bus bypass of ramp metering signals which are expected to be desirable because of the congestion expected at the merge during the AM peak period.

4.3 William Hovell Drive – JGD/Bindubi Street Interchange Alternative Arrangement

An alternative alignment for JGD was investigated as requested by the client. The objective of the alternative was to facilitate the location of district playing fields north of William Hovell Drive (straddling the existing alignment of Bindubi Street). This was intended to increase the yield (amount of saleable land) of Molonglo 3. It required replacement of the proposed folded diamond interchange with a tight diamond, as shown in Figure 28.

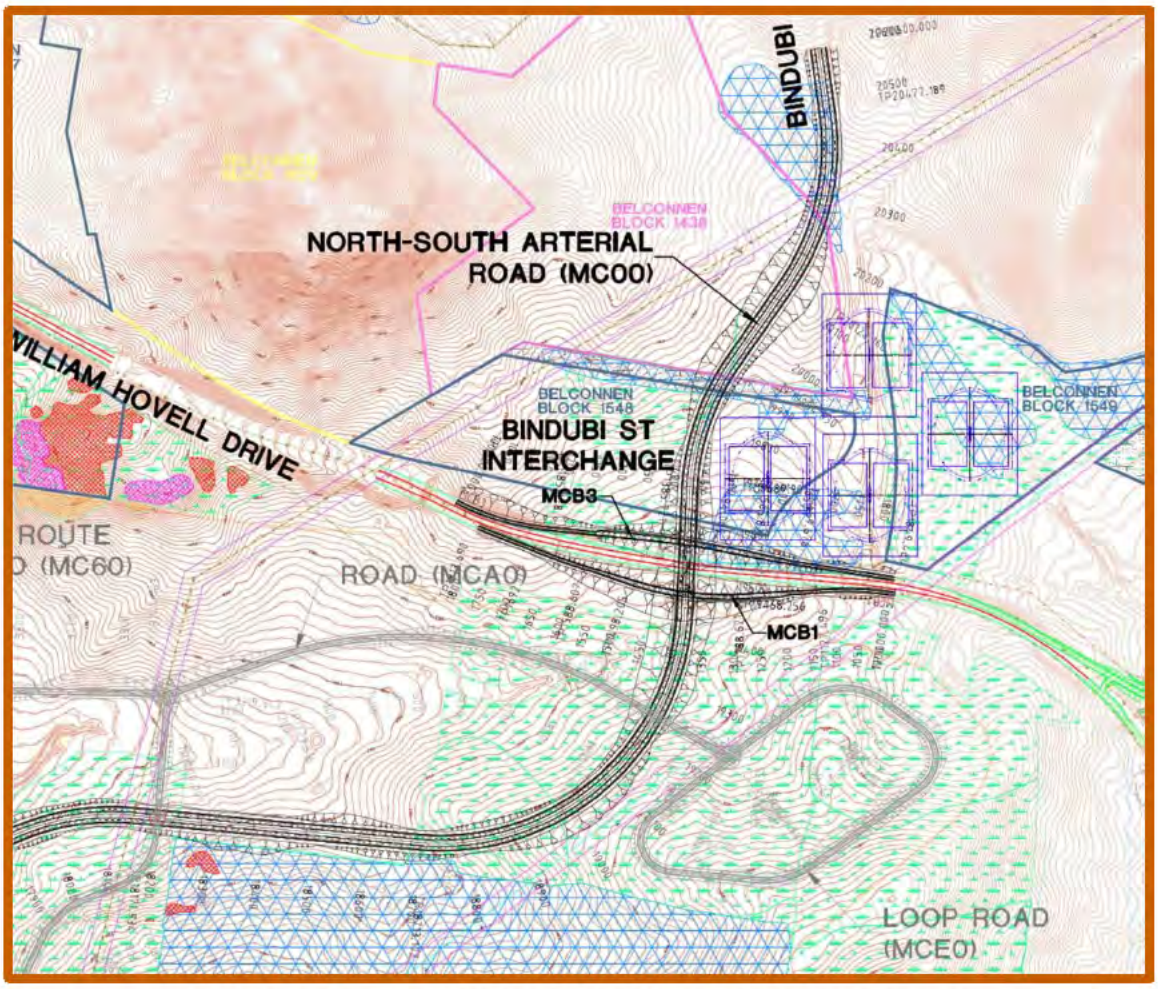

Figure 28: Alternative JGD Alignment with District Playing Fields Option 2

The vertical geometry of the proposed alternative JGD and Bindubi Street alignment is shown in Figure 29.

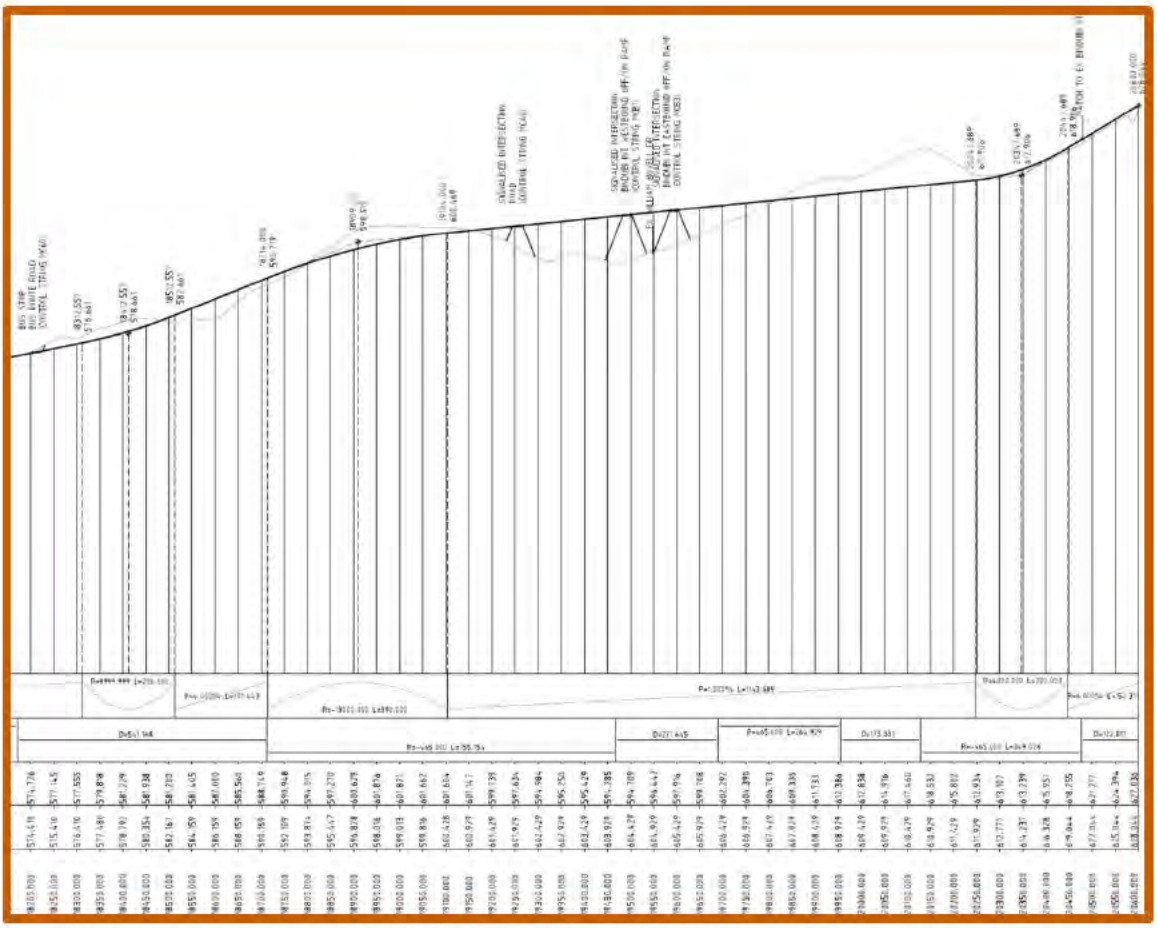

Figure 29: JGD Vertical Alignment for Alternative Design

The alternative alignment has the following characteristics:

- It requires the reconstruction of a significant length of Bindubi Street with a consequent increase in cost.
- The east facing on- and off-ramps are physically closer to Glenloch Interchange. The reduction in westbound weaving length will exacerbate operational problems in the PM peak on William Hovell Drive.
- The alternative JGD alignment's horizontal geometry, vertical geometry and adjacent water main required the collector road for the development area south of the JGD/William Hovell Drive interchange to be on a high fill (inappropriate for a residential area).
- Environmental and community issues could potentially arise if the district playing fields were located north of William Hovell Drive.
- The realignment of JGD/Bindubi Street requires the district playing fields to be located north of William Hovell Drive, separating them from Molonglo. The fields would also be built on ecologically sensitive land that the folded diamond was designed to avoid.

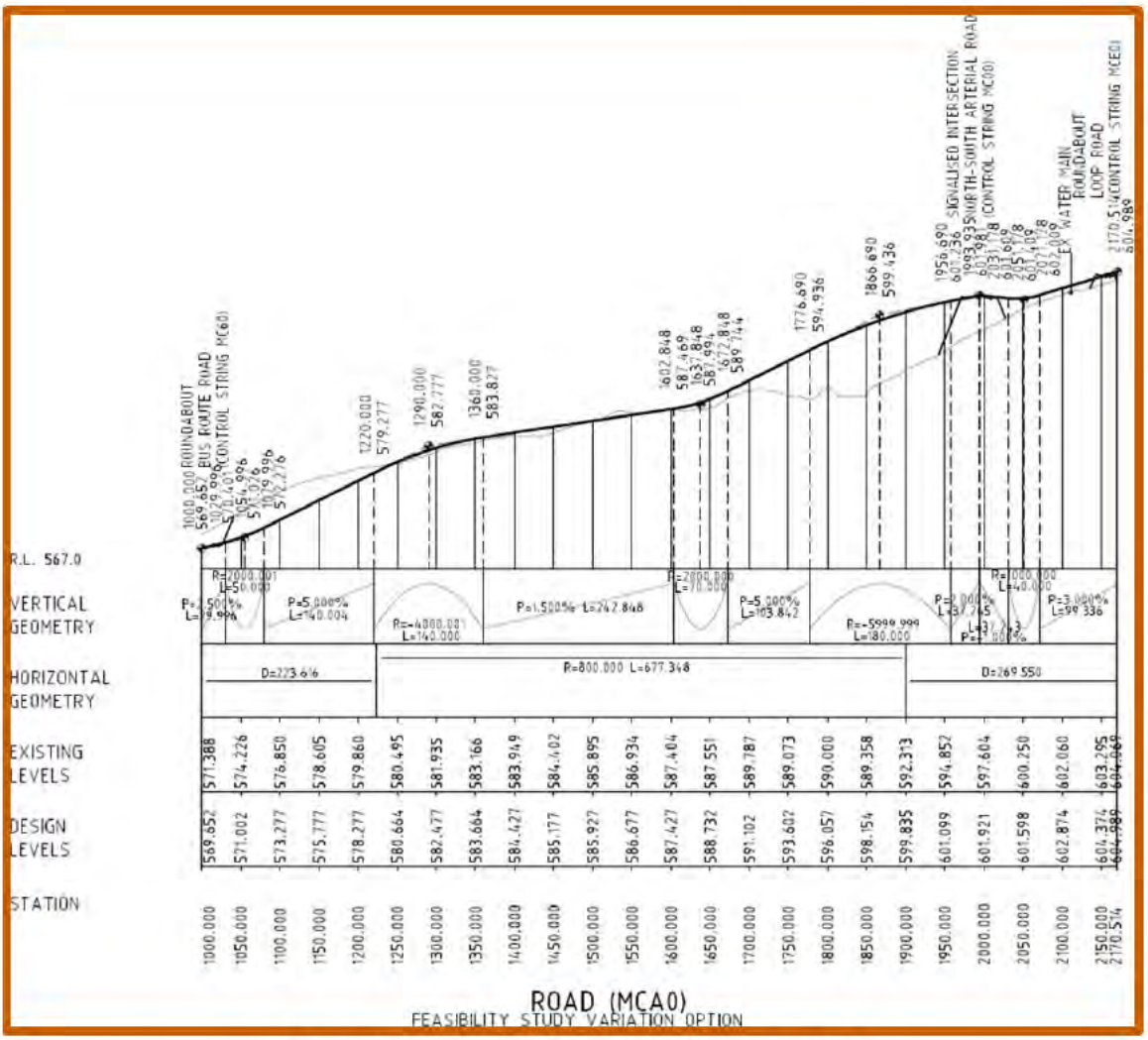

Figure 30: Vertical Alignment for MCA0 Collector Road

Accordingly, following discussions with the client, this alternative was judged to be ineffective in improving the viability of the development.

Another site which could be considered for the district playing fields (Option 3) is west of the Tuggeranong Parkway and south of the proposed EWA as shown in Figure 31. As this area has been used as pine forest, it is unlikely to have environmental constraints to its use for playing fields, but this would require assessment. Heritage assessment would also be required. As with other candidate sites, a considerable volume of earthworks would be required to provide playing surfaces.

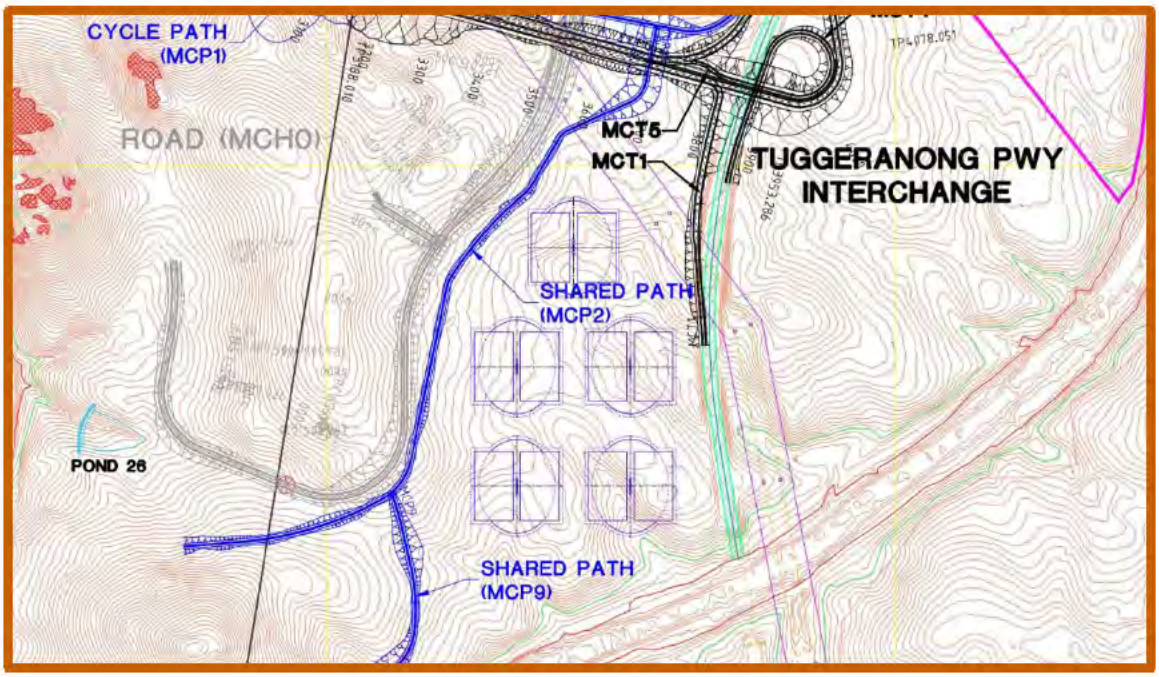

Figure 31: District Playing Fields Option 3

Option 3 could potentially be the most promising site as the land is not intended for residential development (unlike Option 1) and does not require additional arterial road infrastructure (unlike Option 2).

4.4 Coulter Drive Extension (CDE)

4.4.1 Strategic Issues

A continuation of CDE south of JGD is considered unsuitable because it could encourage inappropriate use of CDE and the EWA by traffic that should use William Hovell Drive and the Tuggeranong Parkway. In addition, a route across the hill to the south of the junction would increase noise, energy use, and carbon dioxide emissions. To allow a cross intersection to be safely connected, the JGD alignment would need to be moved to the north, making the Northern Group Centre site too small. Accordingly, a T-junction is recommended.

4.4.2 CDE Constraints and Opportunities

The principal constraints and opportunities in the CDE corridor are shown in Figure 32.

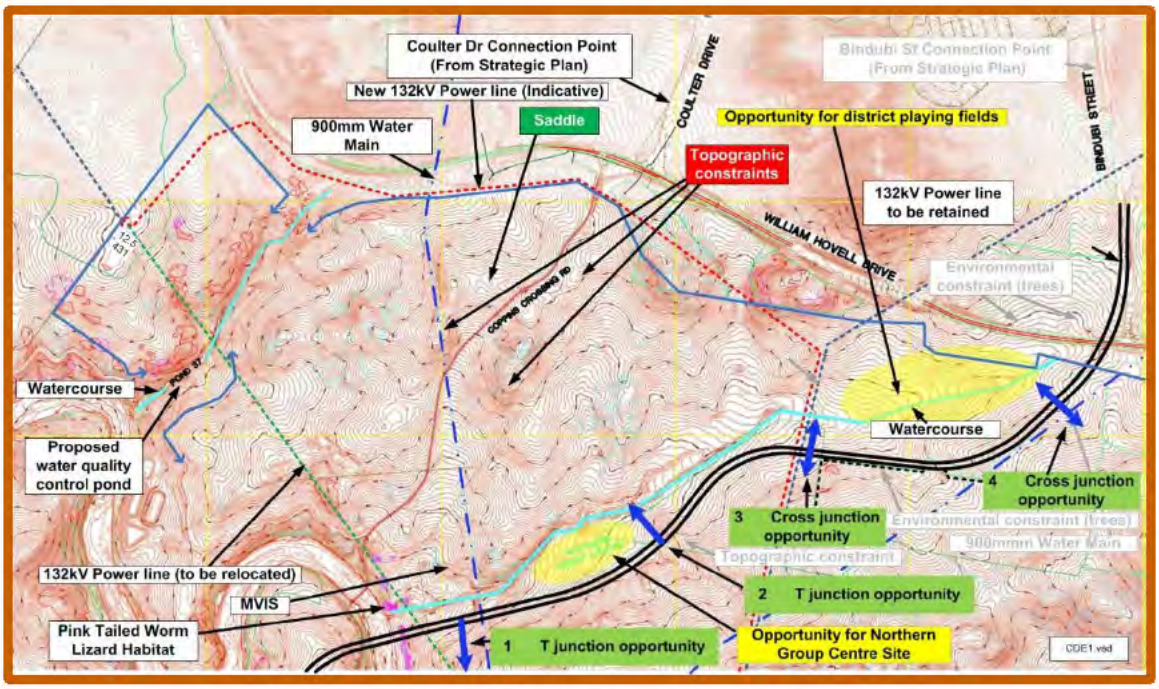

Figure 32: CDE Constraints and Opportunities

The primary controls on the CDE alignment include:

- 900 mm water main
- MVIS
- Access requirements for development (shown in Figure 33)
- Intersection opportunities on John Gorton Drive

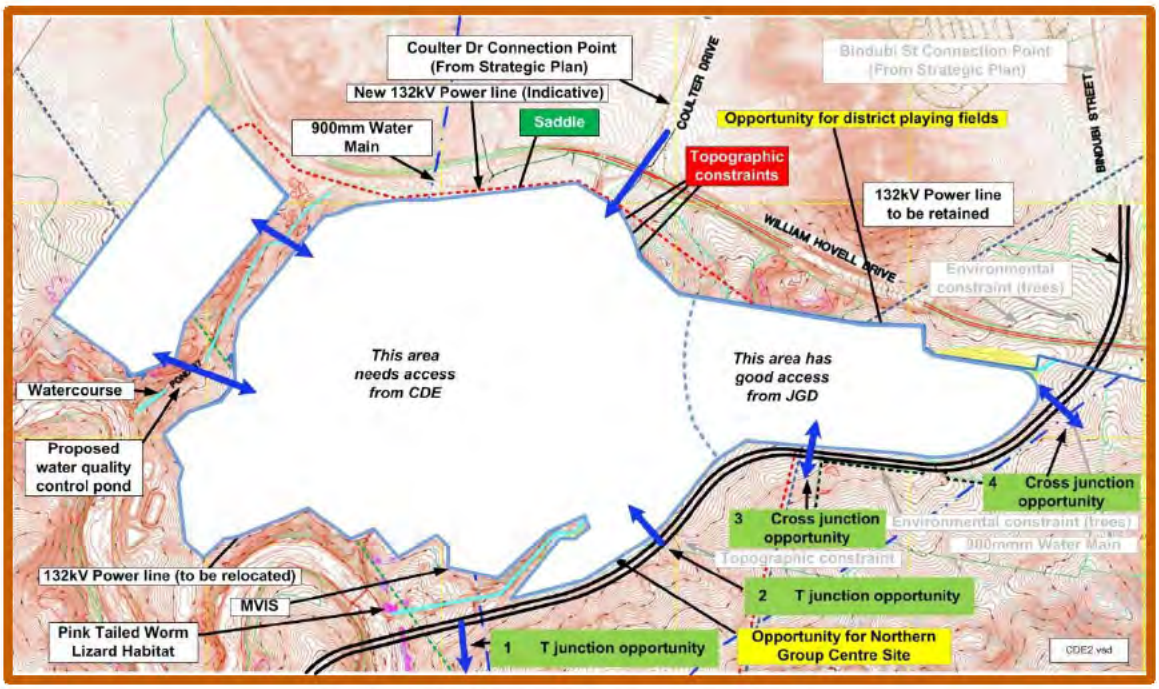

Figure 33: Developable Land North of JGD

4.4.3 CDE Horizontal Alignment

The recommended CDE horizontal alignment is shown in Figure 34. The alignment uses the existing Coppins Crossing Road intersection with William Hovell Drive as the preferred connection point.

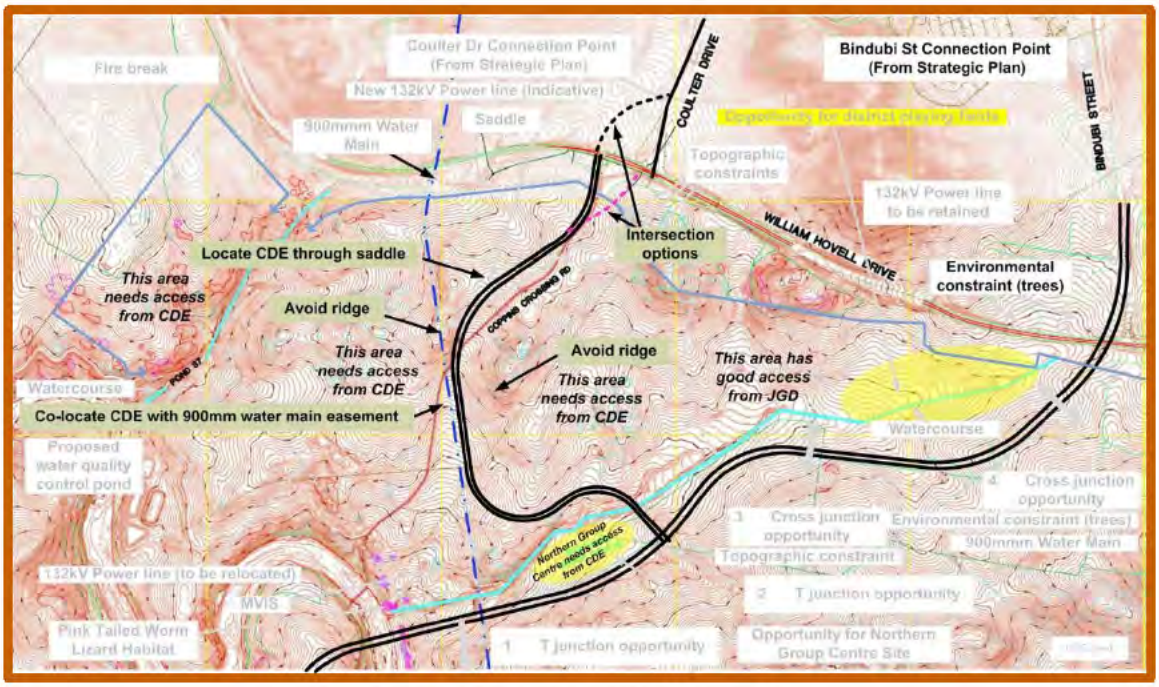

Figure 34: CDE Horizontal Alignment

At the southern end the alignment joins JGD at a location which makes provision for the Northern Group Centre.

In the central part of the alignment, the CDE is located with a westerly swerve in the alignment so the arterial is within a reasonable distance of the western parts of the proposed residential areas so as to limit the distance travelled on collector roads.

An existing 900 mm diameter water supply trunk main is followed where this corresponds with a topographic opportunity to cross a ridge near a saddle.

As well as facilitating access to the western residential areas, the relatively indirect alignment assists in discouraging through traffic.

4.4.4 CDE Vertical Alignment

The proposed vertical alignment for CDE is shown in Figure 35 and Figure 36. The maximum grade on CDE is 5% for about 700 m. This is longer than the desirable maximum of 600 m (per Austroads). This length is necessary as the site constraints preclude shortening the length of upgrade.

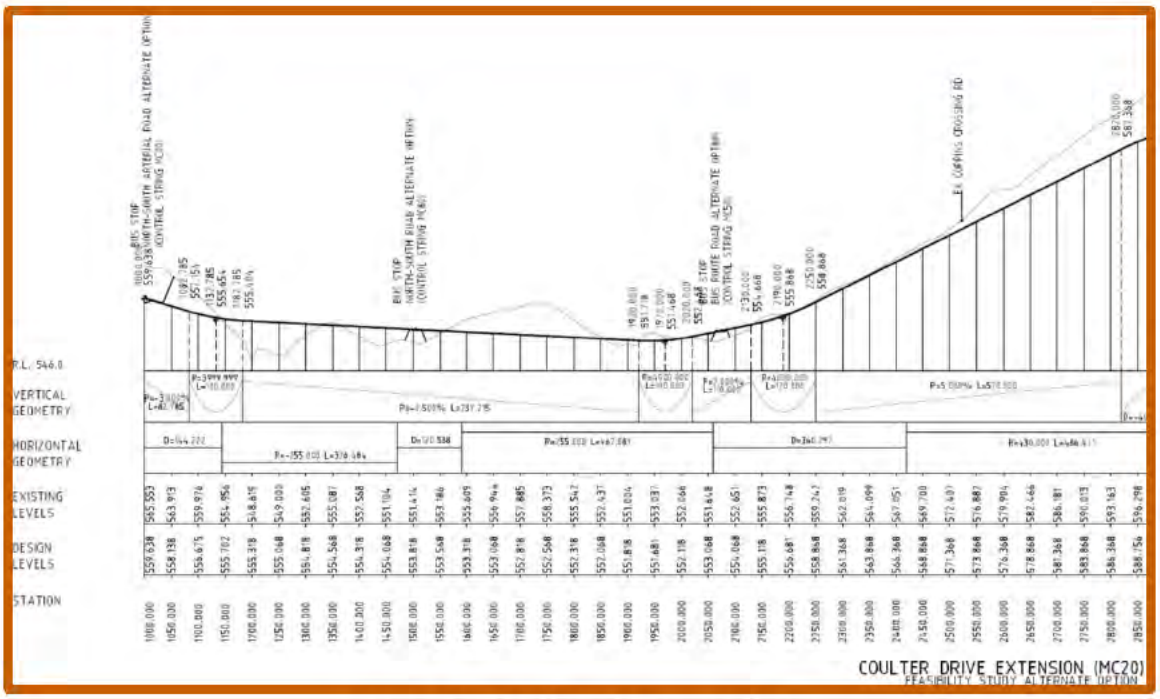

Figure 35: CDE Vertical Alignment (1/2)

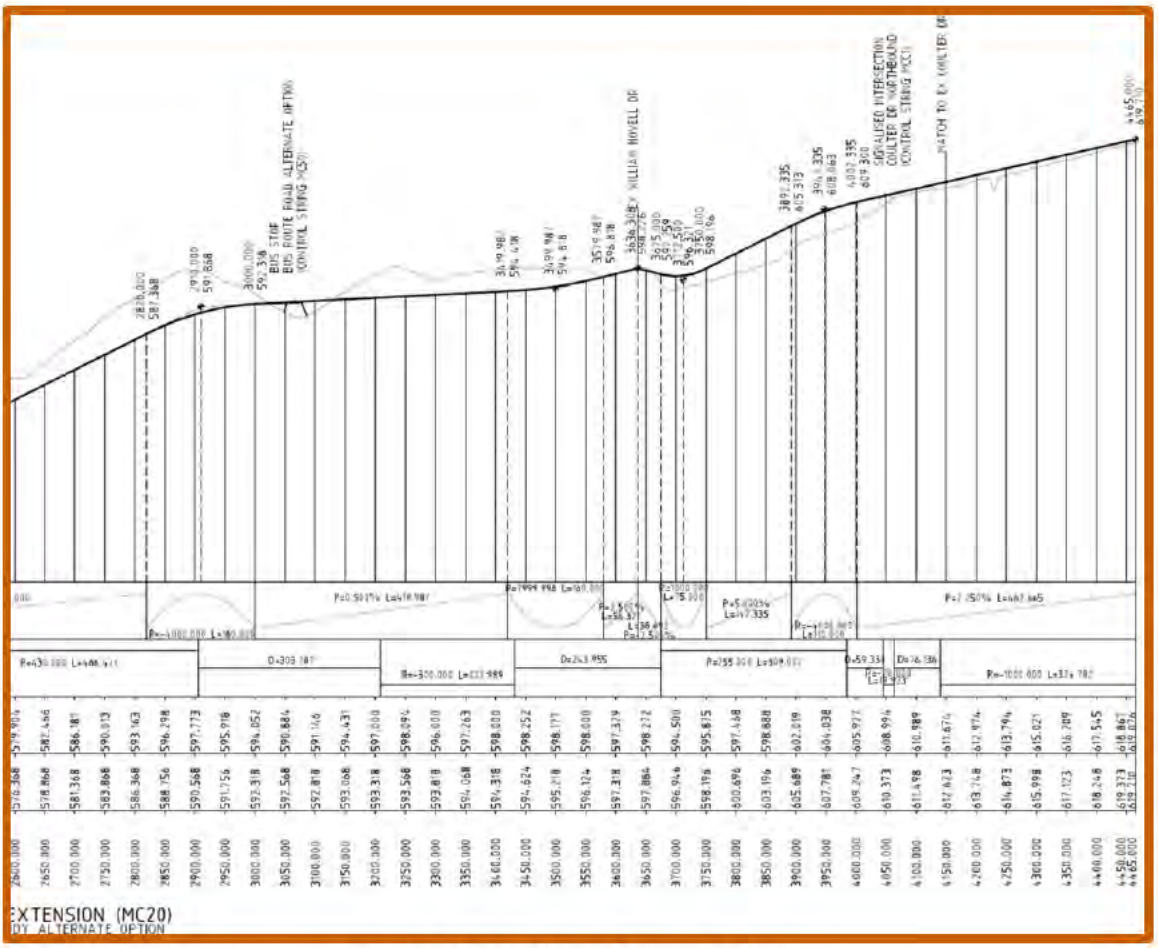

Figure 36: CDE Vertical Alignment (2/2)

4.4.5 CDE Intersections

As shown in Figure 37, the red zone is unsuitable for intersections as the CDE grade is too steep (up to 5%) and has a crest that restricts visibility. In addition, the terrain either side of CDE is steep.

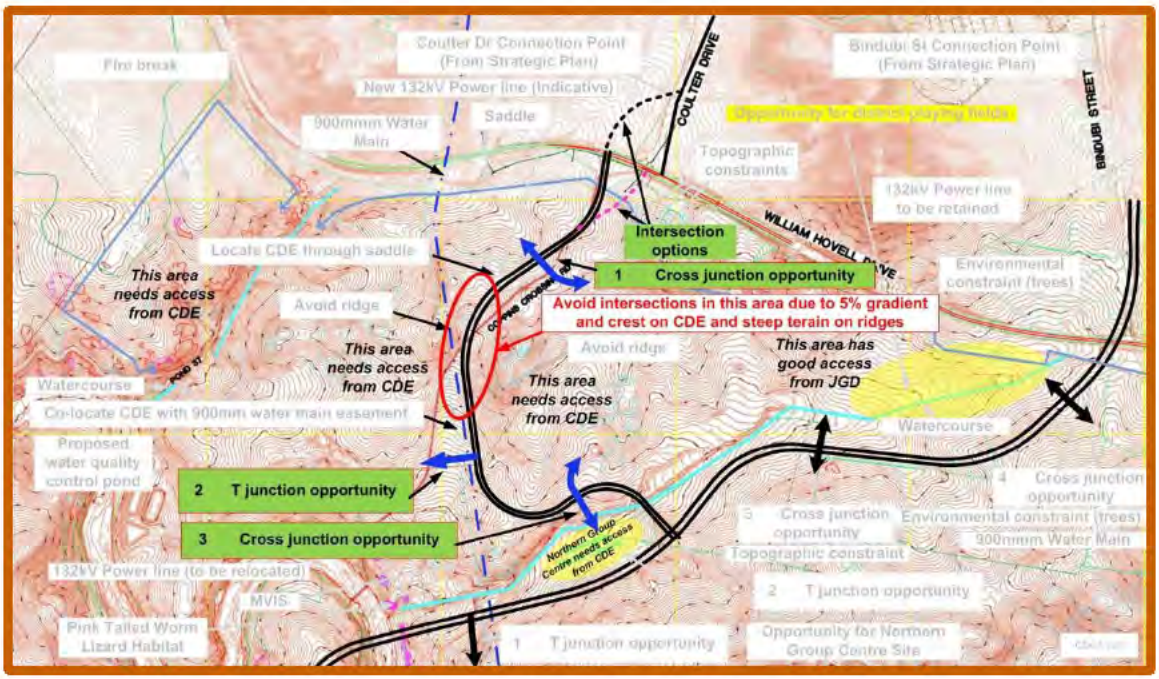

Figure 37: CDE Intersection Opportunities

At the northern end, CDE uses the existing Coppins Crossing Road intersection with William Hovell Drive as the preferred connection point.

Intersection opportunities have been allowed for as follows:

1. Cross junction where CDE is straight and on a low fill.
2. T junction where CDE is straight and where a cross junction is not required due to access being available from Intersection No. 3.
3. Cross junction where CDE is straight and which provides access to the Molonglo 2 Group Centre as well land north of CDE.

4.4.6 William Hovell Drive – CDE Intersection

The proposed intersection configuration between William Hovell Drive and CDE is shown in Figure 38. Options for the treatment of this junction are discussed in Section 6.2.

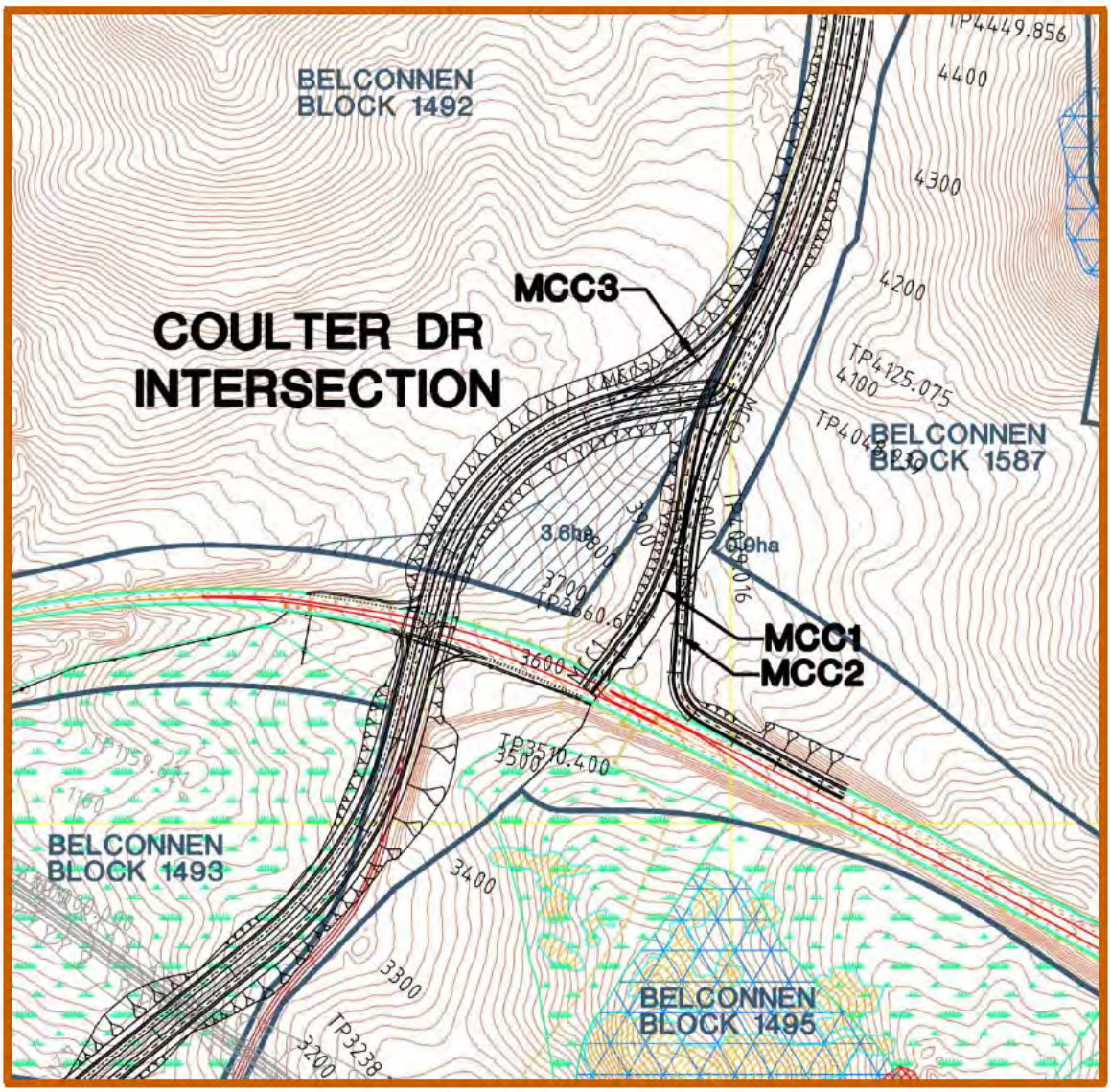

Figure 38: Ultimate At-grade Intersection (three sets of signals)

4.4.7 Interim Connection to William Hovell Drive

The existing staggered T-junction arrangement may be able to be retained as the initial junction layout. However, the capacity of the staggered T is likely to be low and the intersection will need to be upgraded to include the additional link in the north-east quadrant in the future. Further discussion of the traffic modelling and staging of the arterial network are included in Chapters 6 and 11, respectively.

4.5 East-West Arterial (EWA)

4.5.1 EWA Constraints and Opportunities

The principal constraints and opportunities in the East-West Arterial corridor are shown in Figure 39.

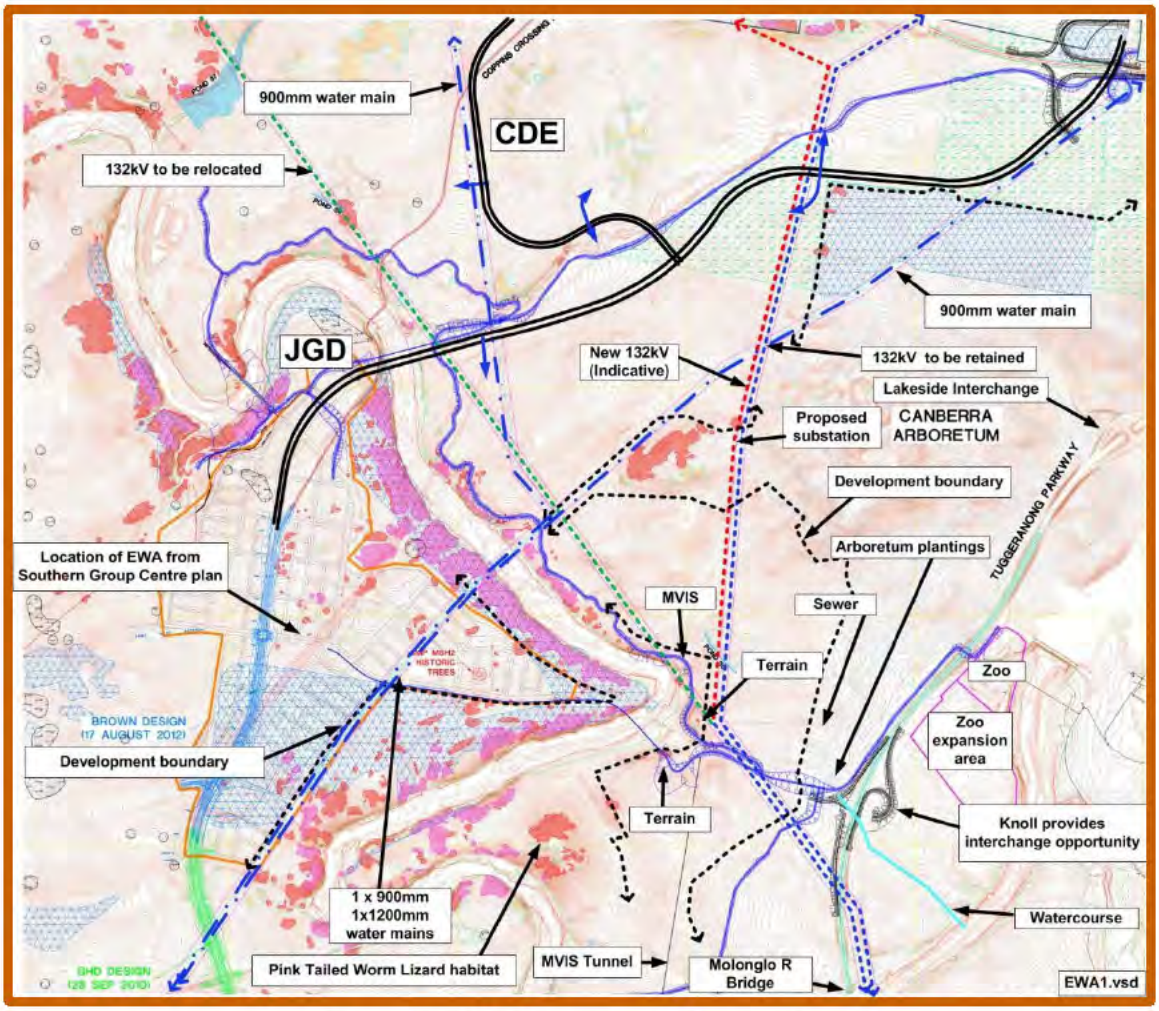

Figure 39: EWA Constraints and Opportunities

See Appendix A for up to date Molonglo 2 proposals.

Primary controls on the East-West Arterial alignment include:

- PTWL habitat
- Molonglo 2 Group Centre development
- Development boundary
- Topography
- River crossing opportunities

4.5.2 EWA Horizontal Alignment

The proposed EWA horizontal alignment concepts and the alignment options for the EWA in the M2CG are shown in Figure 40 and Figure 41 respectively. An alternative that encroaches on the River Reserve is shown as well as an option outside the Reserve. The advantage of the alternative alignment is that the topography is more favourable, and earthworks are reduced, improving development opportunities adjacent to the road. The area of developable land is also increased. It should be noted however that this alternative alignment encroaches on the Box Gum Woodland to the south. This needs to be taken into account in the NES Biodiversity Budget should this alignment be ultimately chosen.

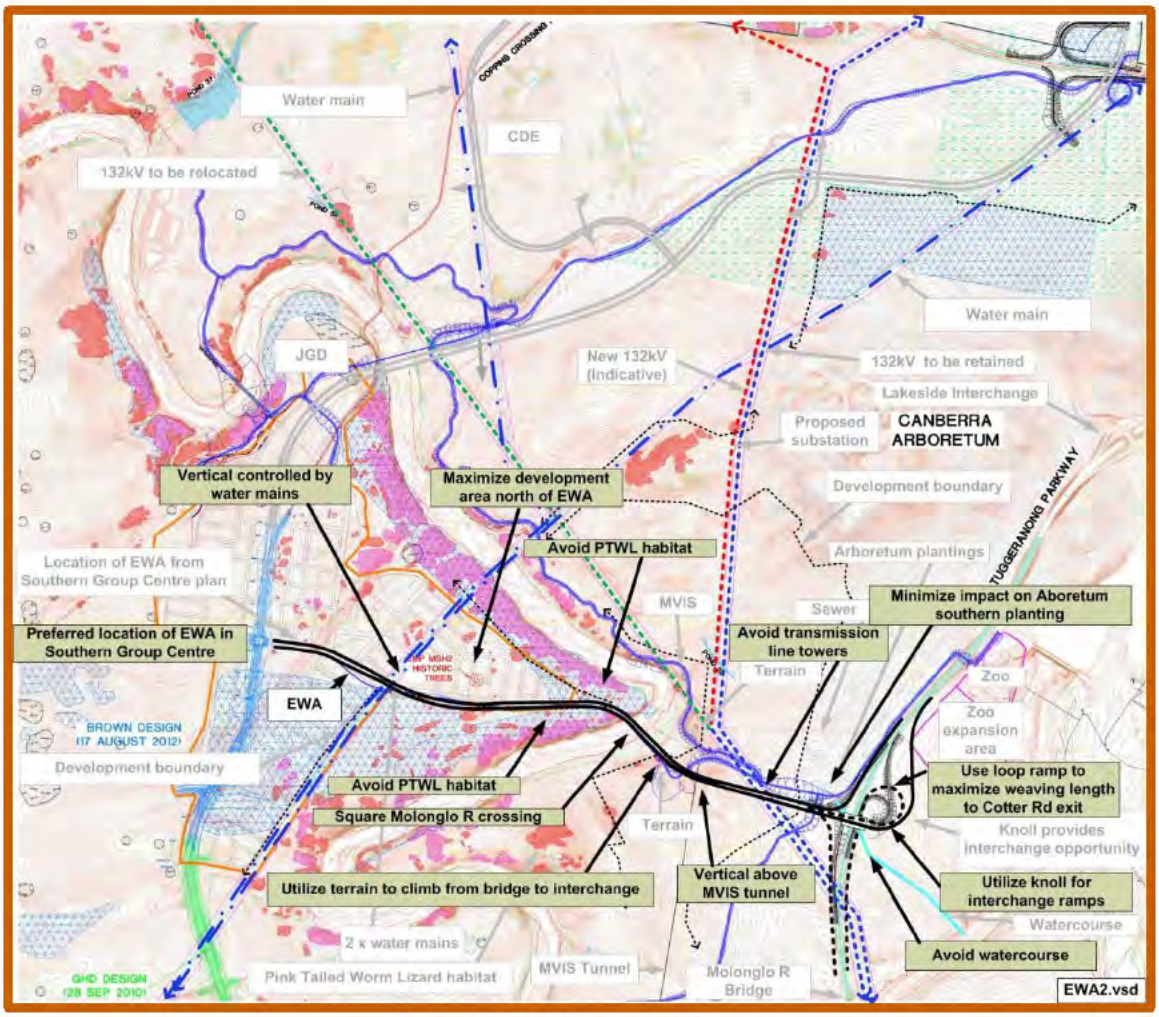

Figure 40: EWA Horizontal Alignment

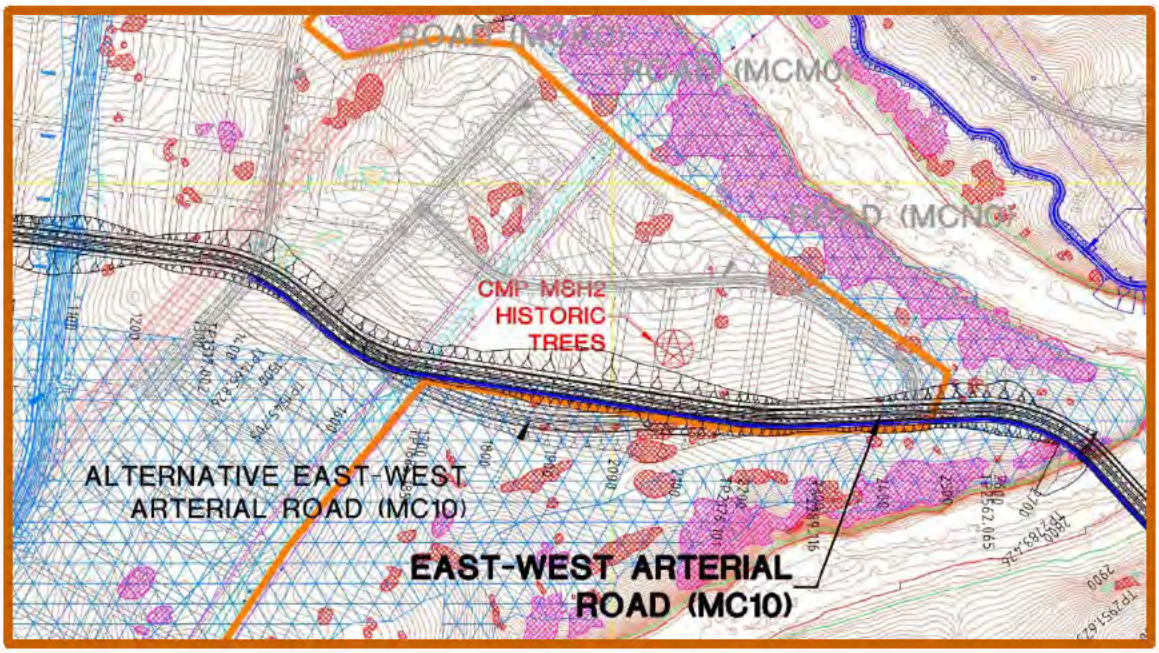

Figure 41: EWA Alignment Options

4.5.3 EWA Vertical Alignment

The proposed EWA vertical alignment is shown in Figure 42. An alternative vertical alignment concept is also shown in Figure 43, which requires reduced fill in the Molonglo 2 Group Centre (M2GC.)

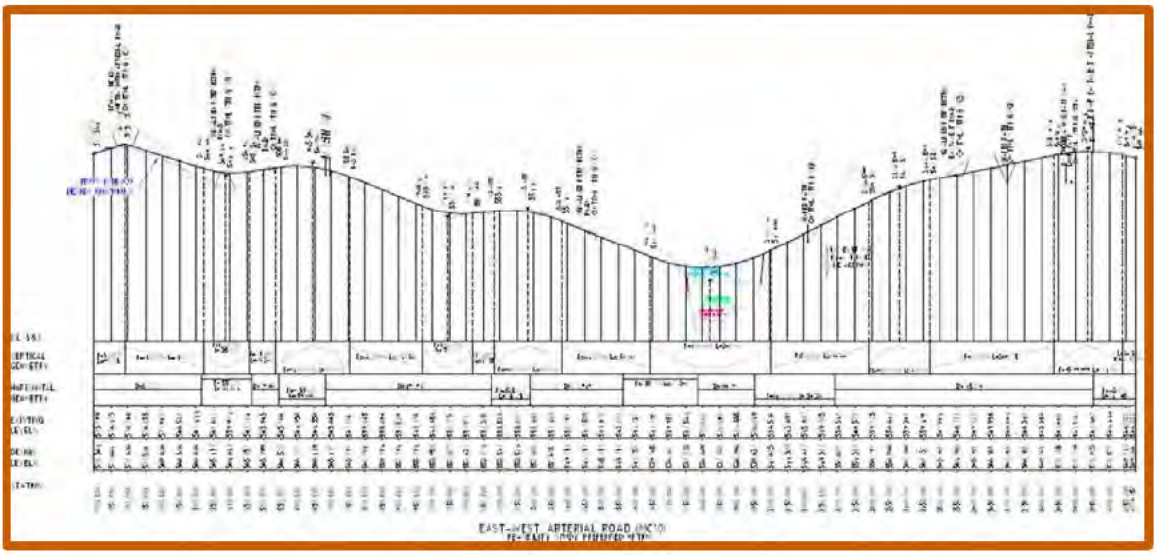

Figure 42: EWA Vertical Alignment

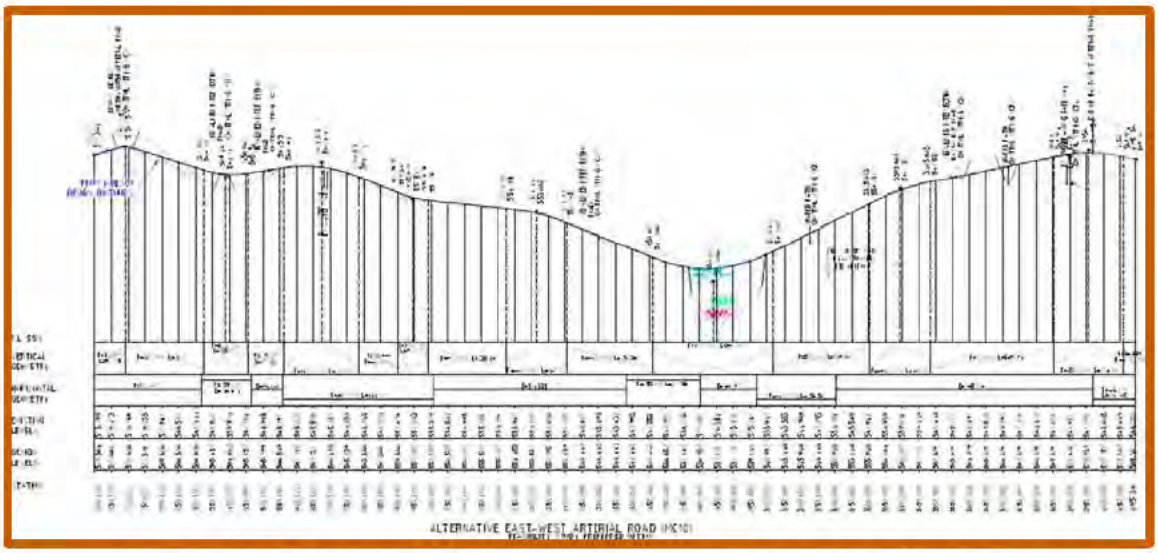

Figure 43: EWA Vertical Alignment (Alternative with Reduced Fill in M2CG)

4.5.4 EWA Intersections

West of the Molonglo River, intersection locations in the M2CG have been nominated by the client, and are shown in Figure 41. The M2CG T-junction closest to the Molonglo River is on a 4% grade and bus stops should not be co-located with this intersection as the maximum grade for a stop is 2.5%. Bus stops can be located on the flatter grades further west.

East of the Molonglo River, the intersection with MC30 sub-arterial road is located relatively close to the Tuggeranong Parkway so that the intersection and possible bus stops are on a flat grade.

4.5.5 EWA Alignment Options at Molonglo River

After consultations with Dr. Will Osborne and the TAMSD River Park team, a number of Molonglo River crossing options were developed for the EWA.

Figure 44 shows the options tested for the EWA bridge over the Molonglo River. The recommended option (black) minimises bridge length and impacts on the PTWL habitat. This option also has significantly less cut requirements compared to the green or red options.

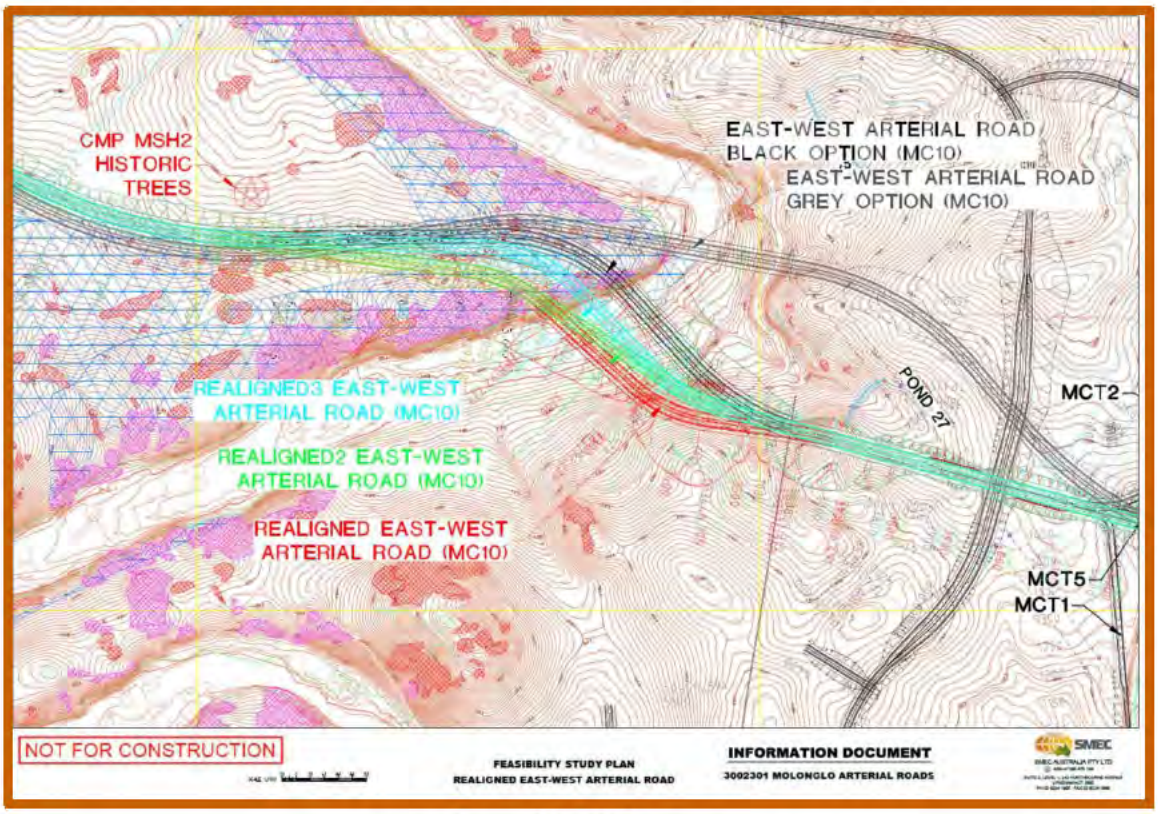

Figure 44: EWA Options

4.5.6 EWA – Tuggeranong Parkway Interchange and Eastern Connection Options

As discussed in Section 6.1, several options for the EWA east of the Tuggeranong Parkway were tested, including full or partial interchange with the Tuggeranong Parkway, no interchange (flyover), with links to either Lady Denman Drive or Cotter Road.

The option of a trumpet interchange is shown in Figure 45. The loop entry ramp is proposed in order to maximise the weaving length to the Cotter Road exit ramp. The layout also suits the terrain.

The eastbound approach to the loop is via a curved exit lane form the EWA in order to slow vehicles before they encounter the loop.

If access to the land south of the zoo (east of Tuggeranong Parkway) were required, the interchange could be a diamond layout.

The provision of south facing ramps at this interchange will require a third lane for safe operation, involving widening the Tuggeranong Parkway Bridge over the Molonglo River. This widening is desirable before the EWA is constructed as Cotter Road ramp volumes are increasing as Molonglo population grows.

The EWA impacts on the arboretum boundary and plantations. This area has recently been planted even though the EWA has been part of the Molonglo Structure Plan for several years. The recommended location minimises these impacts.

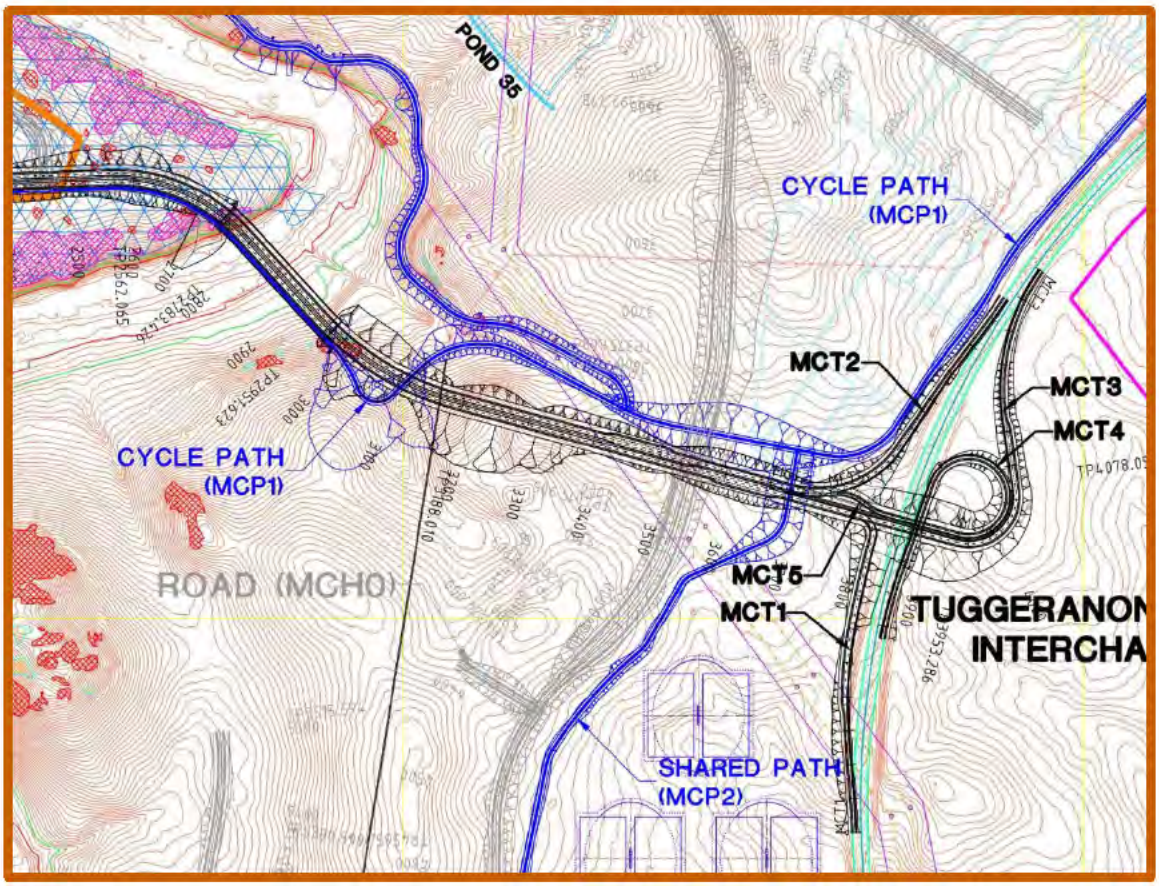

Figure 45: EWA-Tuggeranong Parkway Trumpet Interchange

The direct connection of East-West Arterial to Tuggeranong Parkway provides an opportunity to incorporate this design into a larger program of integrated parkway management, a system that includes the following measures:

- Coordinated system of ramp and intersection signals to manage access to parkway and assist in preventing flow breakdown (and speed recovery should congestion develop)
- Traveller information
- Incident management
- Lane use management
- Variable speed limits

The interchange of East-West Arterial and Tuggeranong Parkway (and also John Gorton Drive/Bindubi Street with William Hovell Drive) also provides an opportunity to implement ramp metering. This has the following aims and benefits:

- Improve bus operations on parkway
- Optimise parkway throughput, travel speed and travel time reliability by dispersing platoons and limiting entry volume so volume is within the bottleneck capacity
- Improve safety by reducing stop-start, improved merging and weaving
- Encouraging alternate routes for shorter trips in peak periods

4.6 Preliminary Earthworks Calculations

A preliminary cut-and-fill balance exercise was undertaken based on the proposed arterial road alignments. The results are shown in Table 7.

The earthworks calculations are based on a simple template running the length of each road, and are a comparison of the finished design surface to the existing surface. Pavement boxing, auxiliary lanes and turning lanes at intersections are not considered in the calculations. The effect of pavement boxing will be to increase the cut volume in full cut and sidling cut situations and reduce the fill volume assuming the pavement material is imported. The lower pavement levels may also be available on site but that level of detail has not been considered in the calculations.

A contingency of approximately 40% should be used when estimating construction values based on the provided earthwork calculations.

Table 7: Preliminary Cut-and-Fill Balance Calculation Results

Name	Length of Section [m]	Cut Volume [m^3]	Fill Volume [m^3]	Difference [m^3]
North-South Arterial Road (Including Bridge)	4,890	394,720	-435,824	-41,104
Coulter Drive Extension	3,450	443,469	-184,873	258,596
WHD – Coulter Drive Interchange	1,105	937	-25,453	-24,516
East-West Arterial Road (Including Bridge)	2,730	235,968	-329,360	-93,391
WHD – JGD/Bindubi Street Interchange	2,464	13,009	-71,180	-58,170
Tuggeranong Parkway – EWA Interchange	1,954	14,854	-73,122	-58,269
Total	**16,592**	**1,102,957**	**-1,119,811**	**-16,854**

4.7 High Voltage Power Line Clearance

In the absence of detailed survey, the clearance at the locations where the arterials roads pass under the power lines is not known. During the detailed design phase, surveys will determine the actual clearance above the proposed alignments, especially on the East-West Arterial. If it is found that there is insufficient clearance, there are a number of options available. The first to consider is to lower the road alignment. This would be compared with increasing the height of the adjacent pylons to provide the required clearance. One of these is likely to be the cheapest/easiest option. The other options are to realign either the East-West Arterial or the power lines. Given the number of constraints (Pink-Tailed Worm Lizard habitat, road gradient, bridge level, bridge length, earthworks) identified during the development of the arterial road alignment, realigning the road is not recommended. Similarly, the probable cost and difficulty of realigning the power line is unlikely to be justified without significant other supporting reasons in addition to the road alignment.

5 SUB-ARTERIAL, COLLECTOR AND LOCAL ROADS

5.1 Sub-Arterial Road JGD-EWA (MC30)

This road is expected to carry a significant volume of traffic, and this factor, as well as the steep topography, will require special attention to the design and location of property access. Potential noise issues may also require special design and siting requirements. Medium density development with driveways and site layout ensuring vehicles only enter the road in a forward direction are recommended. A drawing of the proposed sub-arterial road, MC30, is shown in Figure 46.

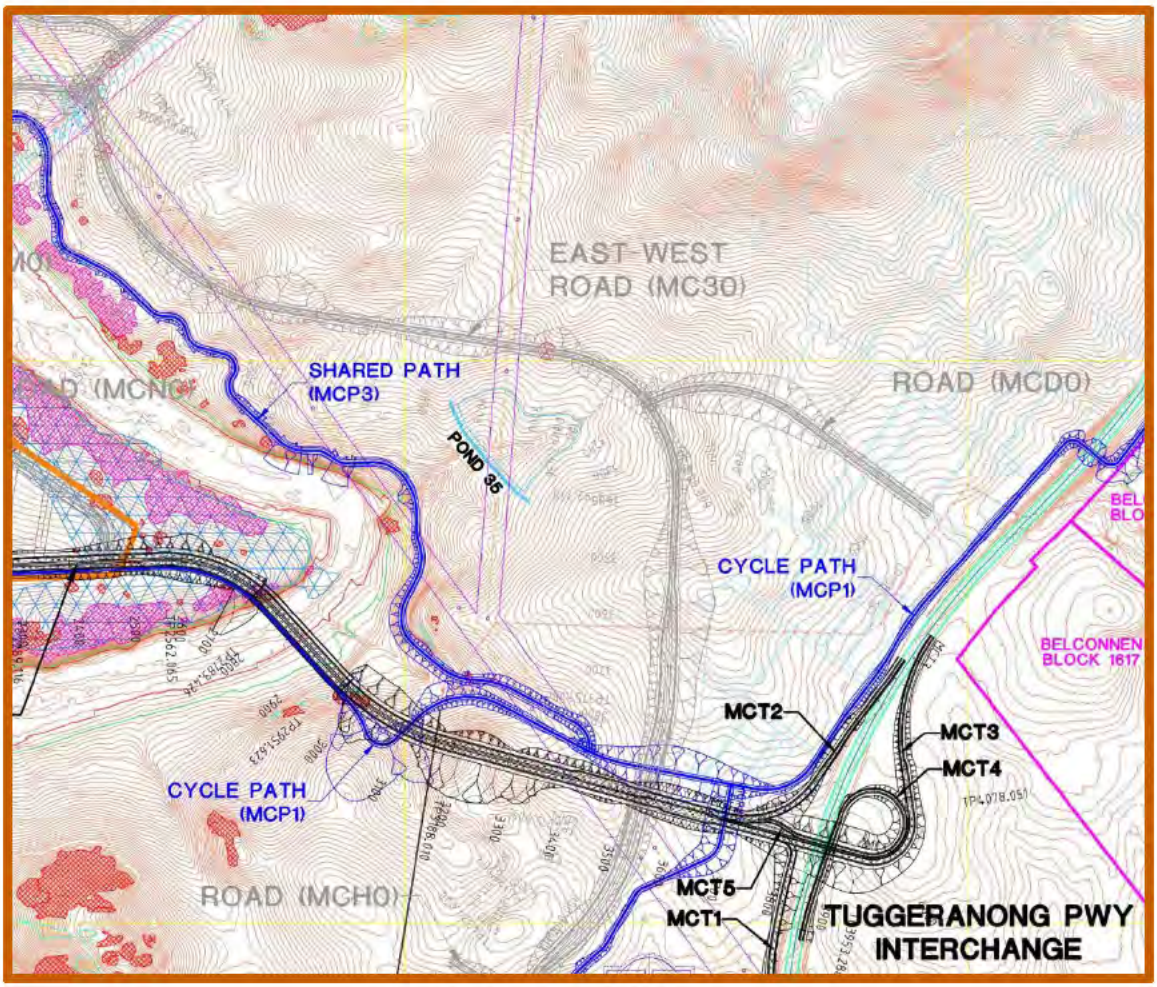

Figure 46: Sub-Arterial MC30 Alignment

The space on MC10 between the parkway and MC30 is necessarily limited due to the need to have the MC30 intersection on a 2% grade and with adequate sight distance. Locations further from the Parkway would place the intersection of the Molonglo River bridge western approach where the grade is too steep.

5.2 Collector Roads

Collector road alignments were developed to provide connections from the arterial roads to local streets. The collector roads have been located so that most residences are conveniently served by local buses using the collector.

If sections of collector road near arterial roads are expected to have volumes significantly in excess of 6000 vehicles/day, the heavily trafficked section should be treated the same as a sub-arterial as described for MC30.

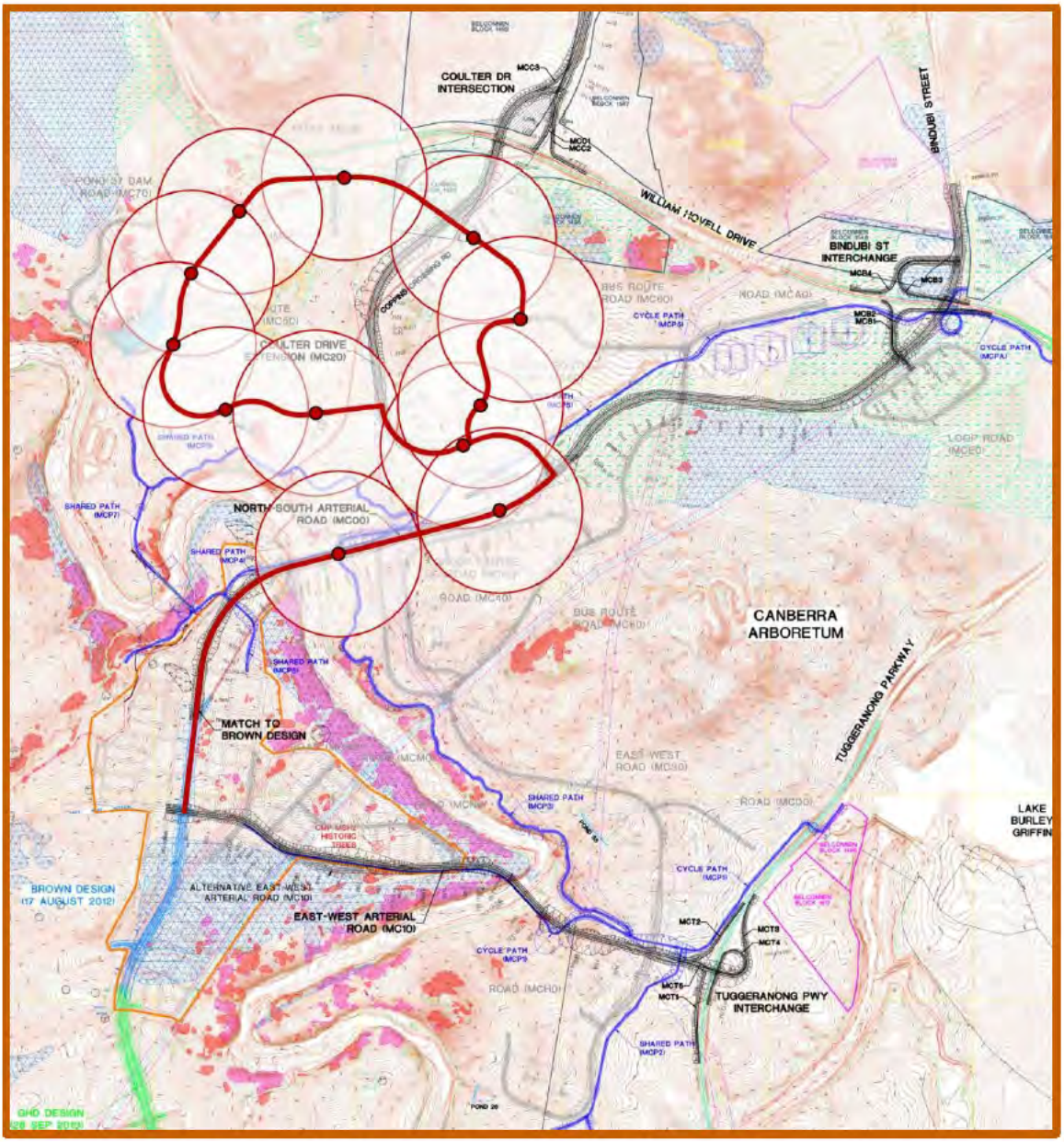

Figure 47: Western Local Bus Route and Stops (Assumed Maximum Walking Distance = 400 m)

To meet Disability Discrimination Act (DDA) requirements, the collector roads have been located so that bus stops can be provided on a longitudinal grade of 2.5% or less as recommended in the *Draft Guideline for assessing compliance of bus stops with the Disability Standards for Accessible Public Transport 2002*. This requirement is shown in Figure 48.

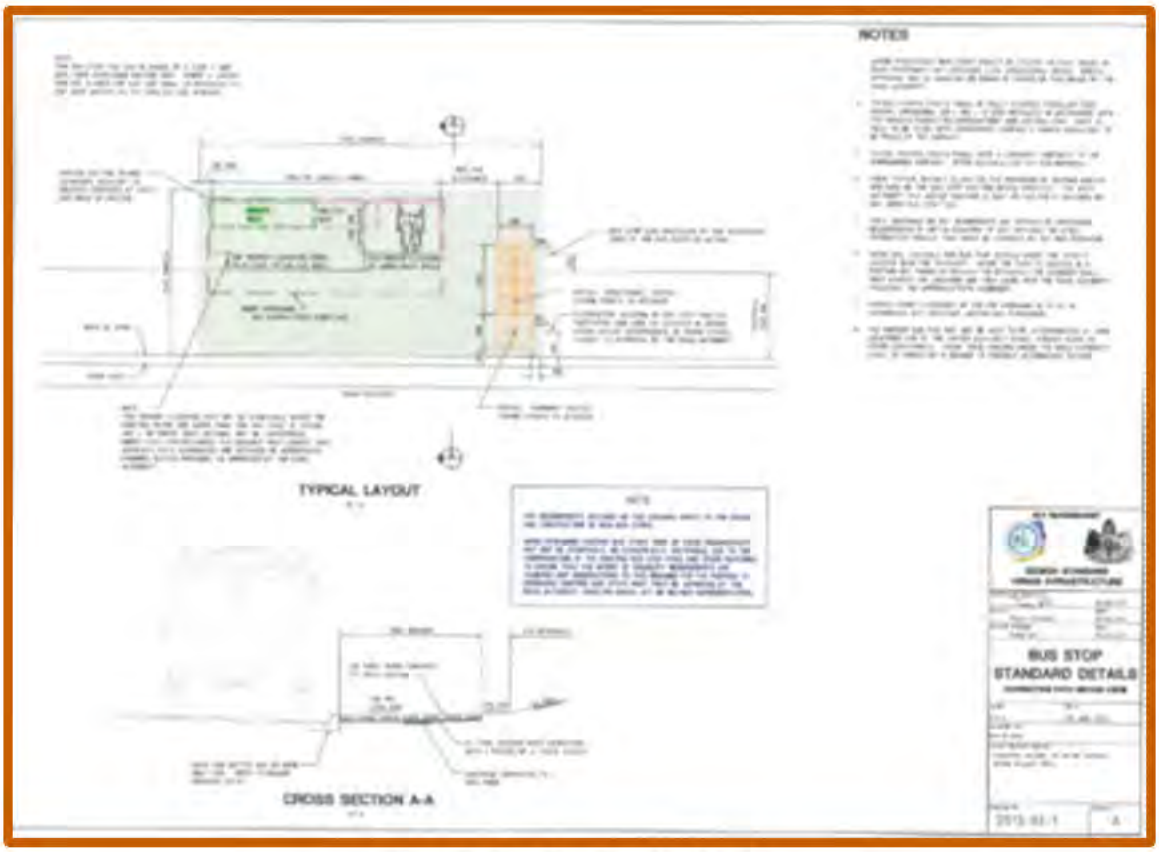

Figure 48: Bus Stop Standard Details

The collector roads have been located so that bus stops can be provided on a longitudinal grade of 2.5% or less. The maximum gradient on collector roads is generally 5% so that on road cycling is accommodated. A section of MC60 requires 6%. The collector roads' gradient is kept to 4% as much as possible so that intersections can be provided.

Figure 49 shows the potential coverage of bus stops serviced by a local route in the eastern side of Molonglo. This local route is assumed to allow residents in Molonglo to access the southern group centre and Rapid routes on John Gorton Drive.

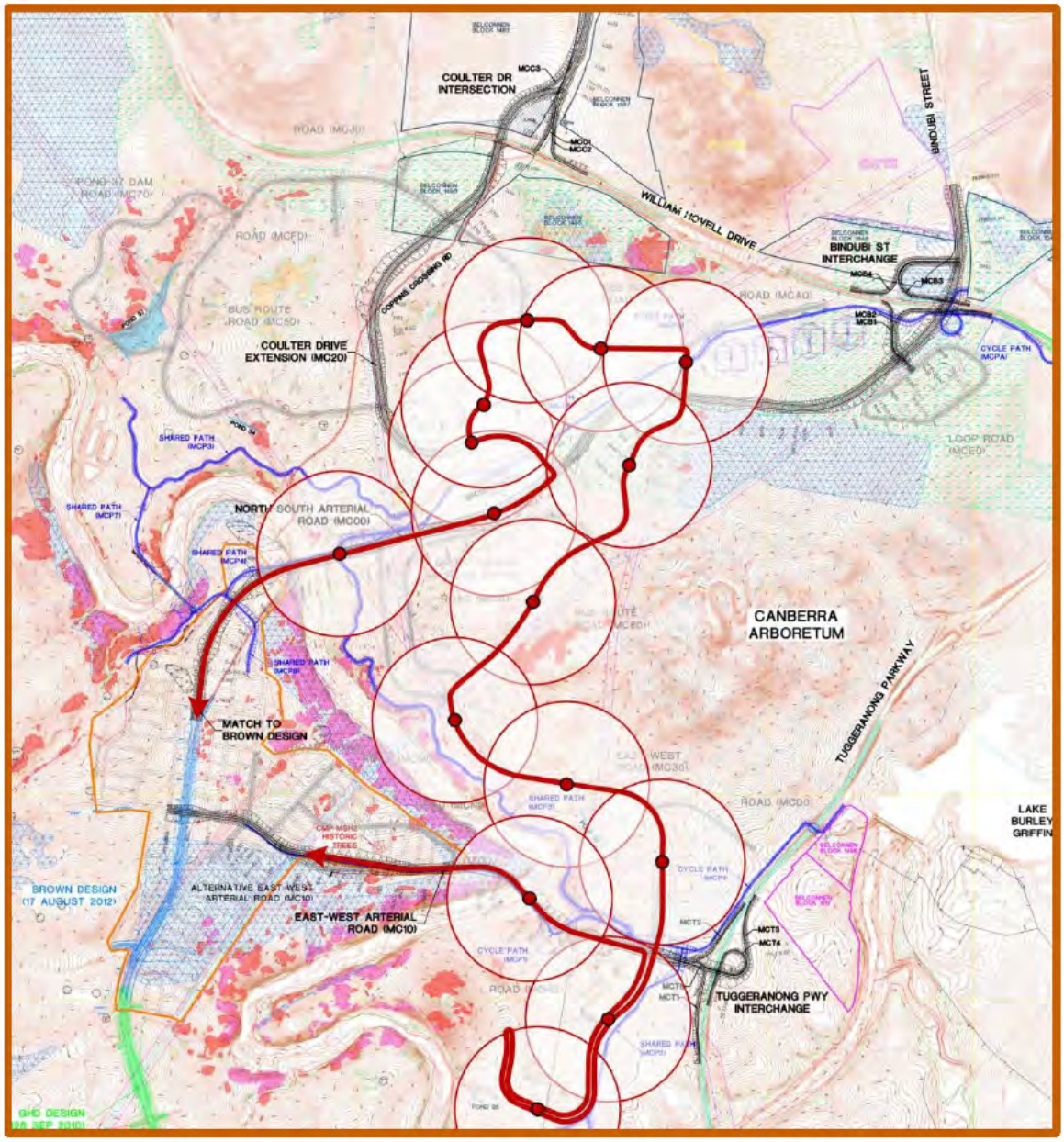

Figure 49: Eastern Local Bus Route and Stops (Assumed Maximum Walking Distance = 400 m)

Figure 50 shows the potential coverage of bus stops serviced by a local route in the western side of Molonglo. As with the eastern route, this local route is assumed to allow residents in Molonglo to access the southern group centre and Rapid routes on John Gorton Drive.

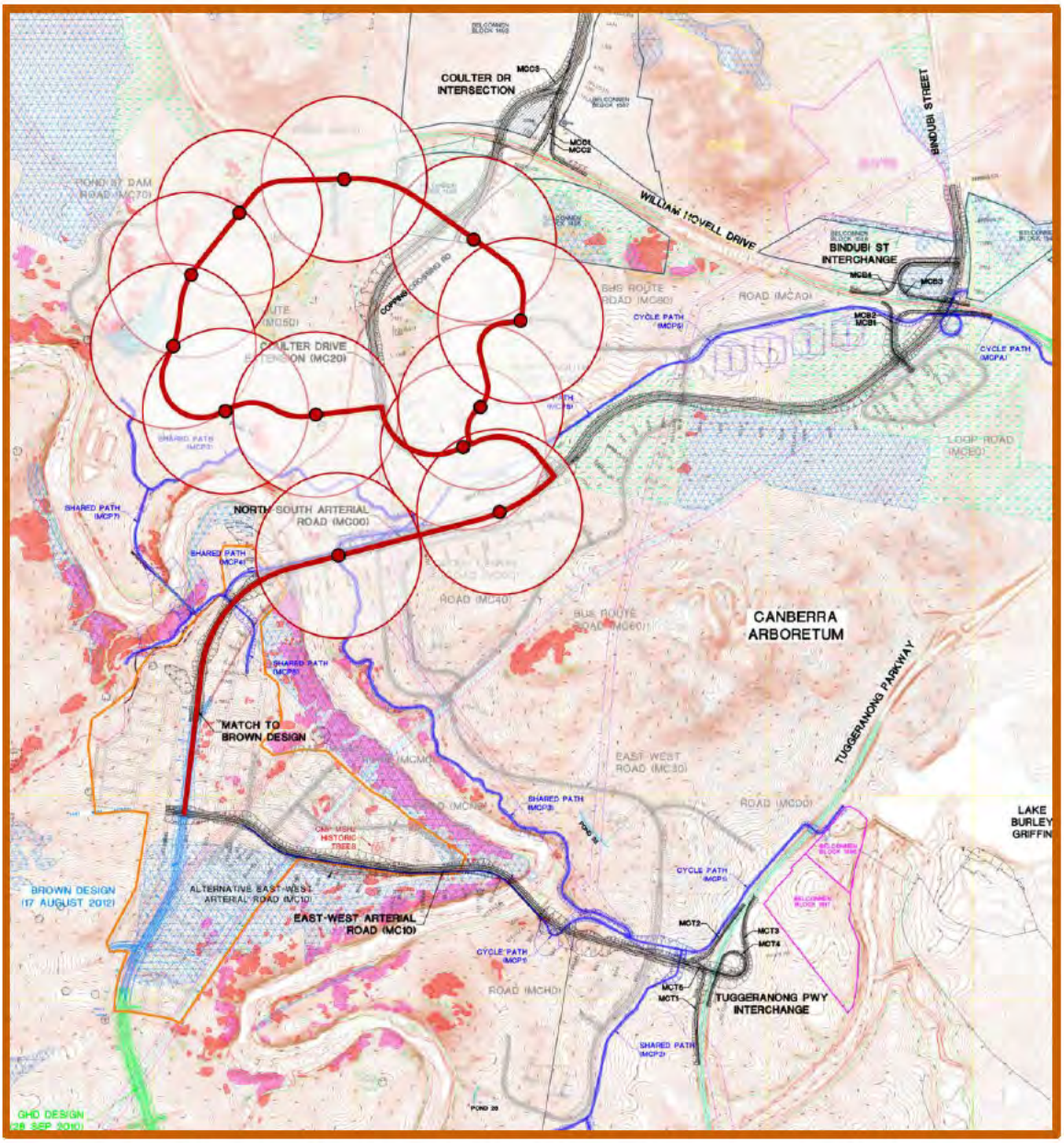

Figure 50: Western Local Bus Route and Stops (Assumed Maximum Walking Distance = 400 m)

As well as bus stops on collector roads, bus stops serviced by local and Rapid buses will be provided on arterial roads, giving the coverage shown in Figure 51 and Figure 52.

A composite diagram of local and Rapid services is shown in Figure 53.

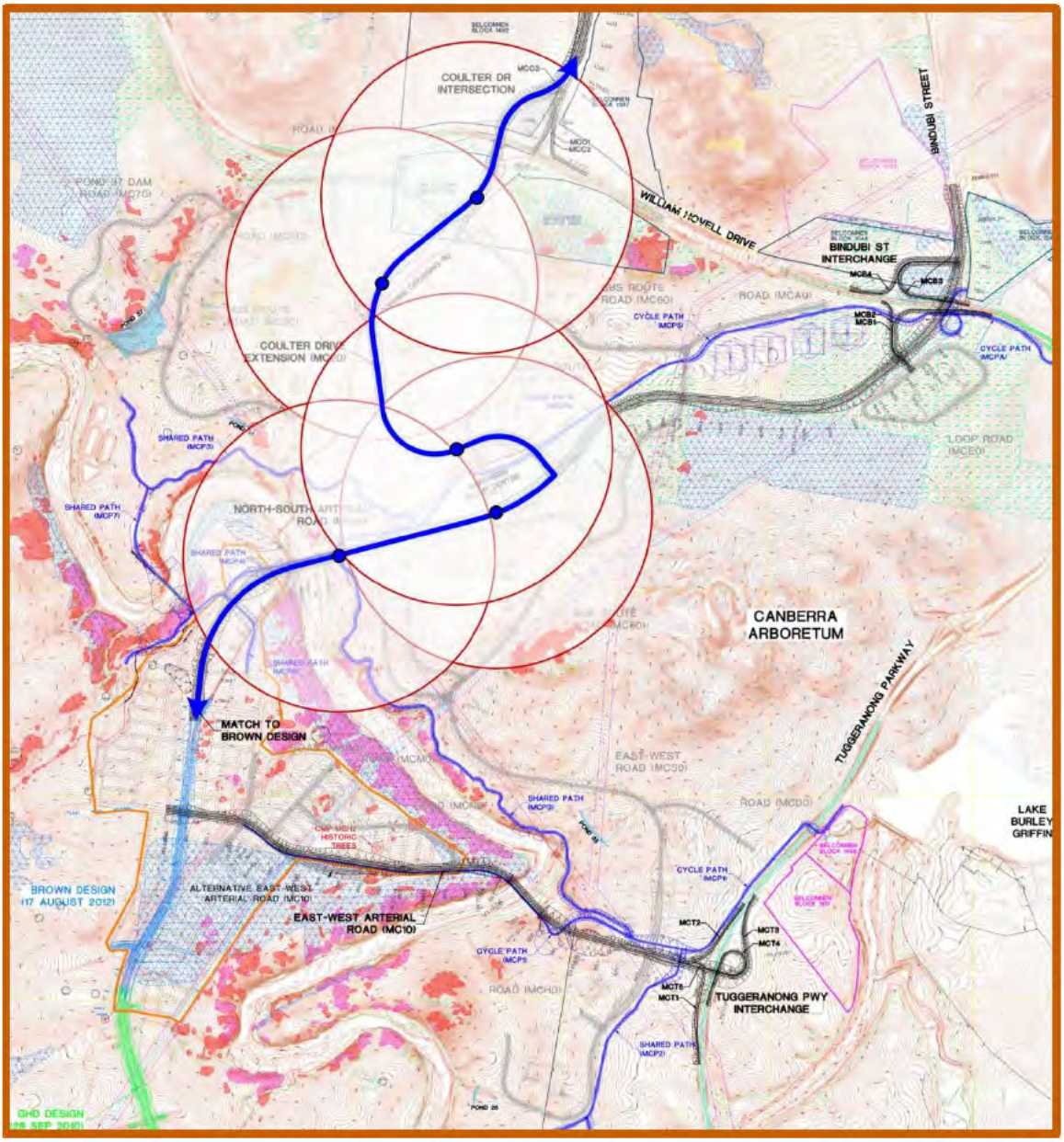

Figure 51: CDE Rapid Bus Route and Stops (Assumed Maximum Walking Distance = 750 m)

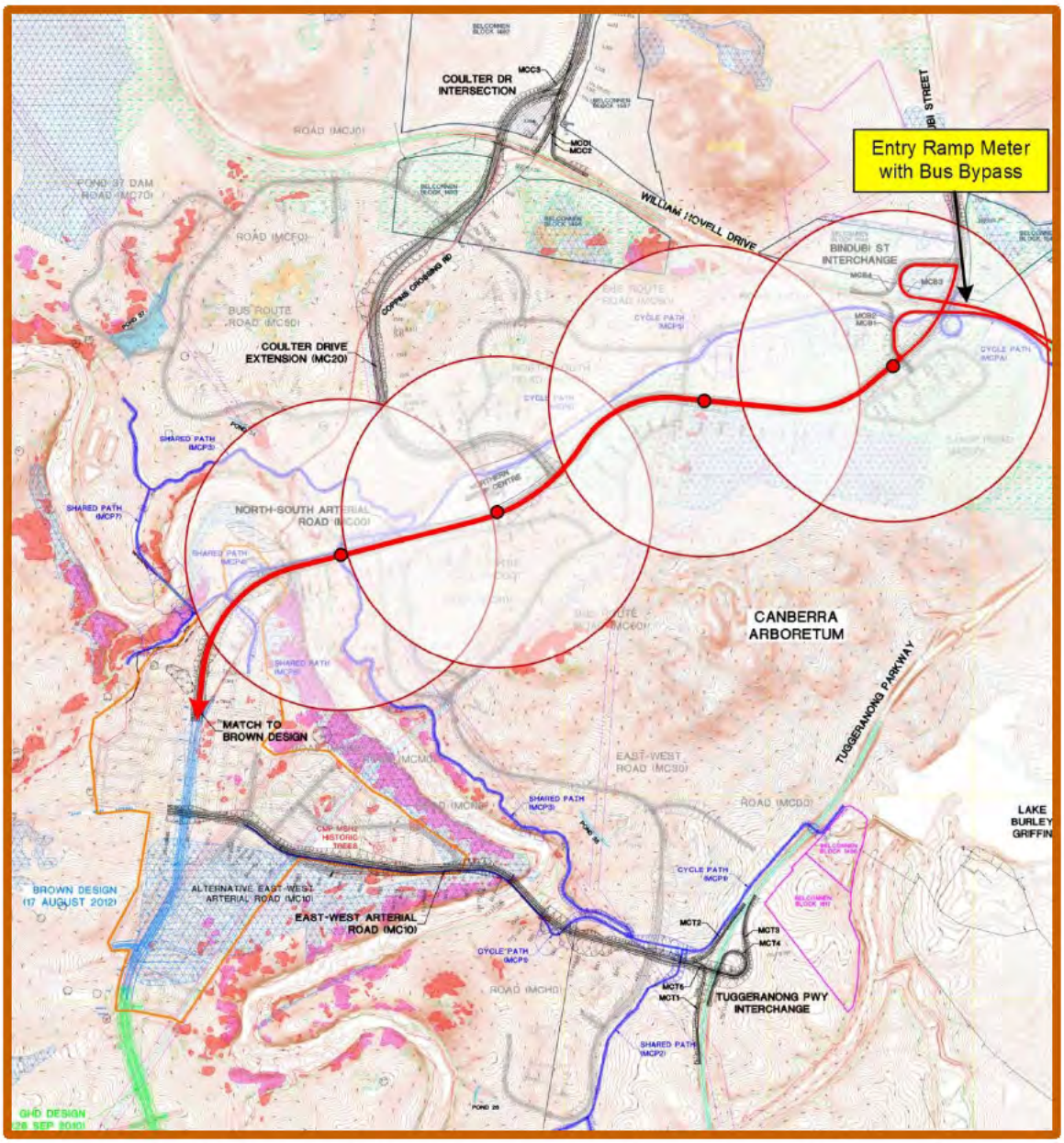

Figure 52: JGD Rapid Bus Route and Stops (Assumed Maximum Walking Distance = 750 m)

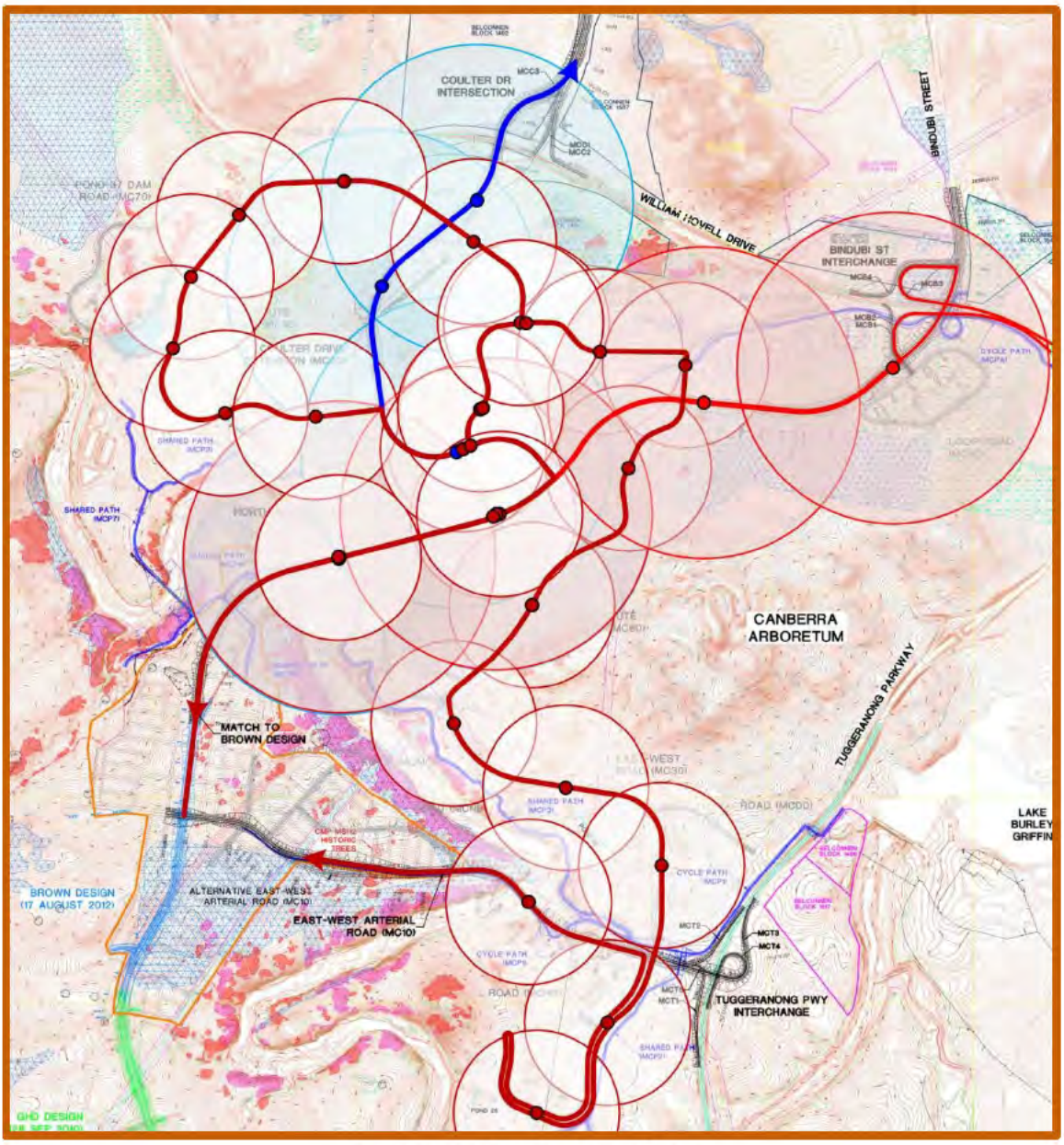

Figure 53: All Bus Routes and Stops

The collector roads include:

- Eastern Collector Road JGD-Sub-Arterial (MC60)
- District Playing Fields Collector (MCA0)
- Western Loop Collector (MC50)
- Eastern Loop Collector (MC80)

Part of MC60 is non-compliant with Rule 8 of the Residential Subdivision Development Code in that travel from some areas exceeds 1200 m to reach CDE. The recommended location of CDE is as far west as topography and other constraints permit. The resulting street network is considered to meet C8 in that a convenient route is provided albeit for a greater distance than R8 specifies.

Depending on the street layout, dwellings in the area relatively distant from CDE may have shorter routes available than using MC60.

If this non-conformance is deemed unacceptable, a solution may be to provide a link between MC60 and William Hovell Drive adjacent to the 900 mm water main.

The District Playing Fields Collector alignment should be modified if the playing fields are located elsewhere as suggested in Section 4.3 and shown in Figure 31.

5.3 Local Roads

Indicative alignments and profiles have been prepared in some areas. While outside the scope of this study, this was undertaken to demonstrate that the land can be accessed. The alignments will require modification when the subdivision layout is prepared, and other access arrangements may be preferred.

The complete road network, showing the proposed arterials, collectors and local roads, is shown in Appendix A. The local roads include:

- Western Edge Local Street (MC70)
- Access points to MC50, MCF0 and MCJ0
- Hill Street Adjacent to JGD (MC40)
- Loop Road South of JGD North of the Arboretum (MCE0)
- NGC access (MCG0)
- Possible connection to Arboretum (MCD0) from the sub-arterial MC30
- Access point to MC30 (MCH0)

An additional local road may be required accessing JGD at about chainage 18700 depending on land use north of JGD. Such a connection would be two steps down in the road hierarchy. An intersection at this location would be on a grade of 4% and if bus stops were co-located, these would need to be off the JGD carriageway so that the platforms were at an acceptable grade (2.5% for bus, 2% for light rail station). It may be desirable to extend collector MCA0 to link with the junction at chainage 18700.

6 TRAFFIC AND TRANSPORT ASSESSMENT

6.1 Strategic Transport Modelling

Strategic modelling has been conducted for the following time periods:

- 2016 AM peak hour
- 2021 AM peak hour
- 2031 AM peak hour

Various scenarios have been modelled and are discussed in the following sections.

6.1.1 2016 AM Modelling Results

One scenario has been modelled for the 2016 AM peak period. This scenario includes works south of the Molonglo River only. John Gorton Drive has not been extended past the group centre and the existing low level river crossing on Coppins Crossing Road is still in operation.

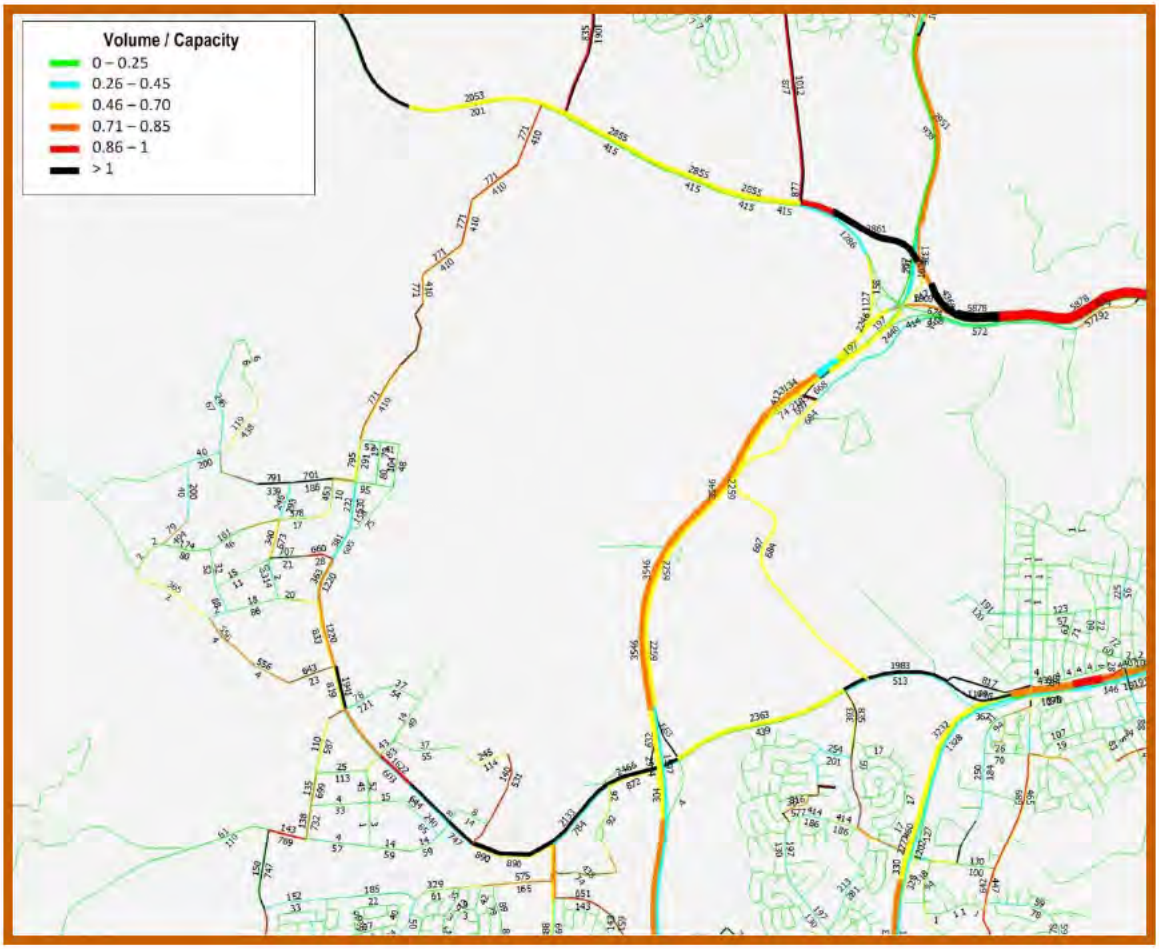

Figure 54: 2016 AM Volumes

From Figure 54, it can be seen that a number of roads in the area are operating near to, or above, capacity. These include William Hovell Drive eastbound (west of Coulter Drive), Coulter Drive southbound, Bindubi Street southbound, William Hovell Drive/Parkes Way through Glenloch Interchange and John Gorton Drive eastbound (west of Tuggeranong

Parkway). The river crossing section of Coppins Crossing Road is also expected to operate over capacity.

6.1.2 2021 AM Modelling results

Two staging options have been modelled for the 2021 AM scenario. These are:

- **JGD to Coulter Drive**
  This scenario includes the extension of John Gorton Drive and Coulter Drive extension to their proposed intersection location to provide connectivity to William Hovell Drive. This option is shown in Figure 55.
- **JGD to Bindubi Street**
  This scenario includes the completion of John Gorton Drive to the intersection of Bindubi Street and William Hovell Drive. It also includes the construction of the interchange proposed for the long term at this location. This option is shown in Figure 56.
- **Coppins Crossing Road Only**
  Coppins Crossing Road remains the only direct connection from Molonglo to William Hovell Drive. It is assumed that Coppins Crossing Road remains one lane each way. This option is shown in Figure 57.

The land use assumptions for these options are discussed in Section 3.3.2 and are given in Table 6.

6.1.2.1 JGD to Coulter Drive

The 2021 AM peak hour volumes for this scenario are shown in Figure 55.

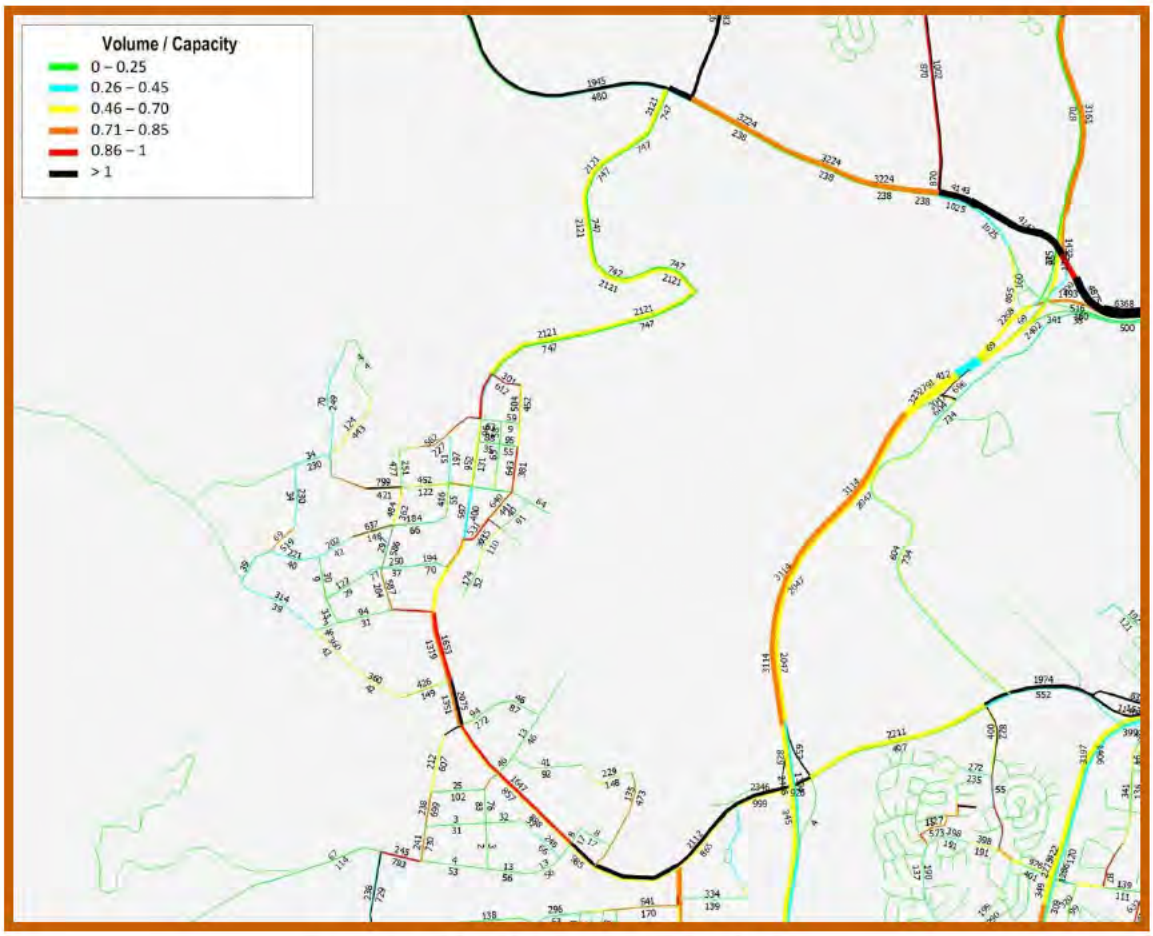

Figure 55: JGD to Coulter Drive 2021 AM Volumes

6.1.2.2 JGD to Bindubi Street

The 2021 AM peak hour volumes for this scenario are shown in Figure.

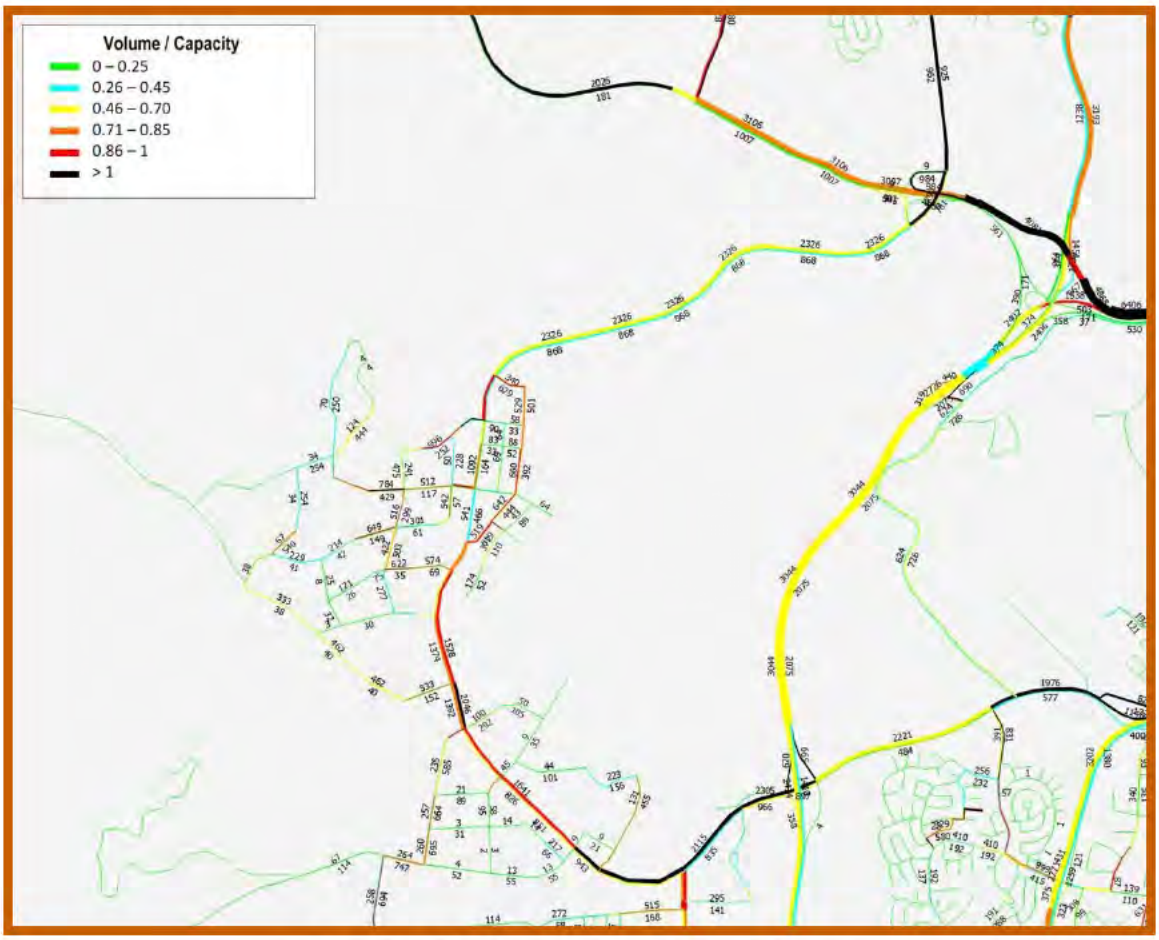

Figure 56: JGD to Bindubi Street 2021 AM Volumes

6.1.2.3 Coppins Crossing Road Only

The 2021 AM peak hour volumes for this scenario are shown in Figure 57.

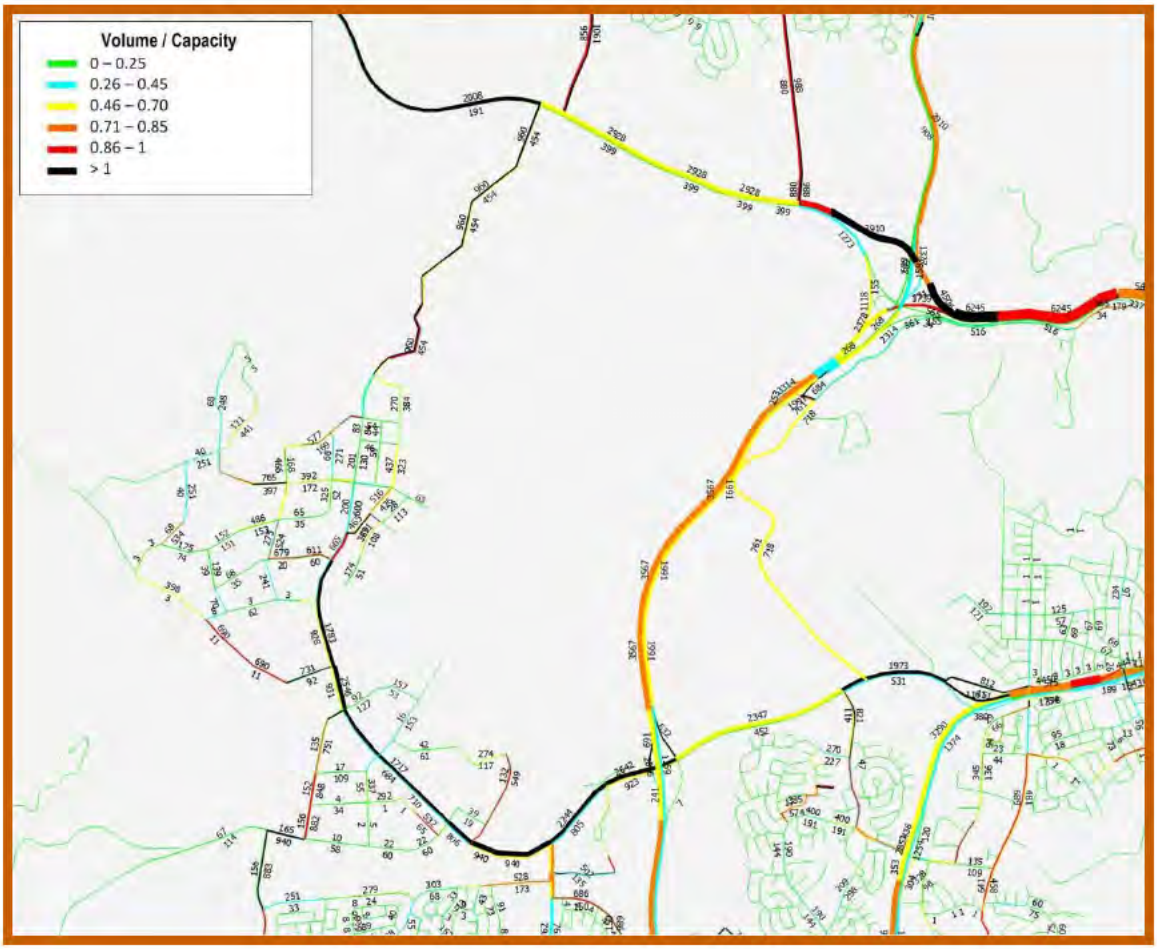

Figure 57: Coppins Crossing Road Only 2021 AM Volumes

6.1.2.4 2021 Modelling Scenario Comparison

Table 8 shows the modelled volumes for each scenario and the difference between them. Red shading indicates that the Bindubi Street option has higher volumes while green shading indicates that the Coulter Drive option has higher volumes.

Table 8: 2021 AM One-hour Peak Midblock Volumes

Road	Dir	Coppins	Coulter	Bindubi	Difference*
Tuggeranong Parkway north of East-West Arterial Interchange	NB	3,570	3,110	3,040	-70
	SB	1,990	2,050	2,080	30
Tuggeranong Parkway south of East-West Arterial Interchange	NB	3,570	3,110	3,040	-70
	SB	1,990	2,050	2,080	30
Lady Denman Drive north of East-West Arterial Extension	NB	760	600	620	20
	SB	720	730	730	0
Lady Denman Drive south of East-West Arterial Extension	NB	760	600	620	20
	SB	720	730	730	0
Coppins Crossing Road	NB	960	-	-	-
	SB	450	-	-	-
Coulter Drive Extension	NB	-	2,120	-	-2,120
	SB	-	750	-	-750
John Gorton Drive	NB	-	-	2,330	2,330
	SB	-	-	870	870
Cotter Road east of East-West Arterial Extension	EB	2,350	2,210	2,220	10
	WB	450	500	480	-20
Cotter Road west of East-West Arterial Extension	EB	2,640	2,350	2,310	-40
	WB	920	1,000	970	-30
Adelaide Avenue	NB	5,030	4,930	4,940	10
	SB	2,130	2,180	2,160	-20
Yarra Glen	NB	3,290	3,200	3,200	0
	SB	1,370	1,410	1,380	-30
McCulloch Street	NB	410	400	390	-10
	SB	820	820	830	10

Road	Dir	Coppins	Coulter	Bindubi	Difference*
William Hovell Drive west of Coulter Drive	EB	2,010	1,950	2,030	80
	WB	190	480	180	-300
William Hovell Drive east of Coulter Drive	EB	2,930	3,220	3,110	-110
	WB	400	240	1,010	770
William Hovell Drive east of Bindubi Street	EB	3,910	4,140	4,080	-60
	WB	1,270	1,030	560	-470
Caswell Drive/GDE north of Glenloch Interchange	NB	910	870	1,240	370
	SB	2,910	3,160	3,190	30
Parkes Way east of Glenloch Interchange	EB	6,250	6,370	6,410	40
	WB	520	500	530	30
Coulter Drive north of William Hovell Drive	NB	860	940	830	-110
	SB	1,060	1,080	1,080	0
Bindubi Street north of William Hovell Drive	NB	880	870	960	90
	SB	990	1,000	930	-70

* The stated difference is between the Coulter Drive and Bindubi Street connection options.

Table 8 shows that, for the most part, there are only small differences in traffic volumes between the options. Larger differences occur on William Hovell Drive, Gungahlin Drive Extension (Caswell Drive), Coulter Drive (north of William Hovell Drive) and Bindubi Street (north of William Hovell Drive). More details of the impacts and performance of each of these options are discussed in Section 6.2.

Of the three scenarios presented in Table 8 for the year 2021, it would probably be more beneficial initially to complete the JGD to William Hovell Drive connection at Bindubi Street, providing a more direct link to the City from Molonglo. This would also facilitate the provision of a high quality transport link as soon as possible. This suggested staging scenario is further discussed in Chapter 11.

6.1.3 2031 AM Modelling Results

Seven road network scenarios were modelled for the 2031 horizon year:

- **Scenario 1 (Section 6.1.3.1)**
  Scenario 1 (Base) includes the full length of the East-West Arterial from John Gorton Drive to Tuggeranong Parkway, connecting to the latter via a full interchange. William Hovell Drive connects to Bindubi Street/John Gorton Drive via a folded diamond interchange and to Coulter Drive/Coppins Crossing Road via an at-grade "quadrant" style junction, which uses comprises three intersections each carrying a subset of the total junction movements. This scenario is shown in Figure 58.
- **Scenario 2 (South Facing Ramps) (Section 6.1.3.2)**
  As for Scenario 1 but with the inclusion of a half diamond interchange between East-West Arterial and Tuggeranong Parkway, with ramps to and from the south only. Shown in Figure 59.
- **Scenario 3 (North Facing Ramps) (Section 6.1.3.3)**
  As for Scenario 1 but with the inclusion of a half diamond interchange between East-West Arterial and Tuggeranong Parkway, with ramps to and from the north only. Shown in Figure 60.
- **Scenario 4 (Lady Denman Drive Connection) (Section 6.1.3.4)**
  East-West Arterial is extended to connect to Lady Denman Drive. No interchange is provided with Tuggeranong Parkway. Shown in Figure 61.
- Scenario 5 (Lady Denman Drive Connection w/o East-West Arterial) (Section 6.1.3.5)
  As for Scenario 4 but without the complete East-West Arterial connection between John Gorton Drive and Tuggeranong Parkway. Shown in Figure 62.
- **Scenario 6 (Cotter Road Connection) (Section 6.1.3.6)**
  The East-West Arterial is extended to Cotter Road, connecting between Tuggeranong Parkway and McCulloch Street, and does not have an interchange with Tuggeranong Parkway. Shown in Figure 63.
- **Scenario 7 (Cotter Road Connection with North Facing Ramps) (Section 6.1.3.7)**
  As for Scenario 6 but with a half diamond interchange between East-West Arterial and Tuggeranong Parkway, with ramps to and from the north only. Shown in Figure 64.

6.1.3.1 Scenario 1 (Base)

Scenario 1 shows strong demand on the eastbound carriageway of East-West Arterial, which, when combined with the demand from feeder roads approaching the interchange with Tuggeranong Parkway, results in the interchange being over capacity.

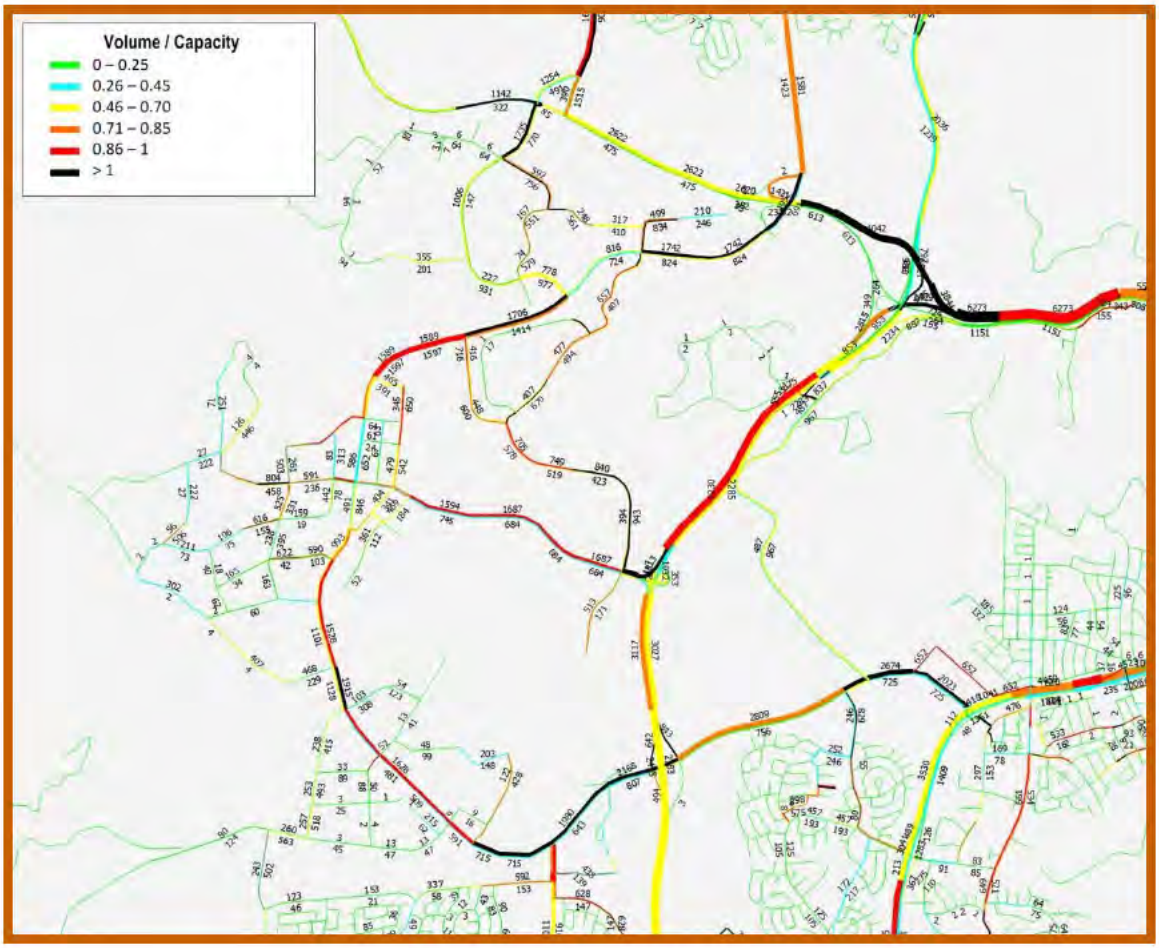

Figure 58: Scenario 1 – 2031 AM Volumes

6.1.3.2 Scenario 2 (South Facing Ramps)

The omission of the north facing ramps results in a reduction of traffic on the East-West Arterial. The ramp configuration results in increased traffic on Tuggeranong Parkway south of the East-West Arterial interchange, and decreased traffic to the north. Compared to Scenario 3 there isn't a pronounced increase in traffic on Cotter Road, with most of the local increase occurring on Lady Denman Drive.

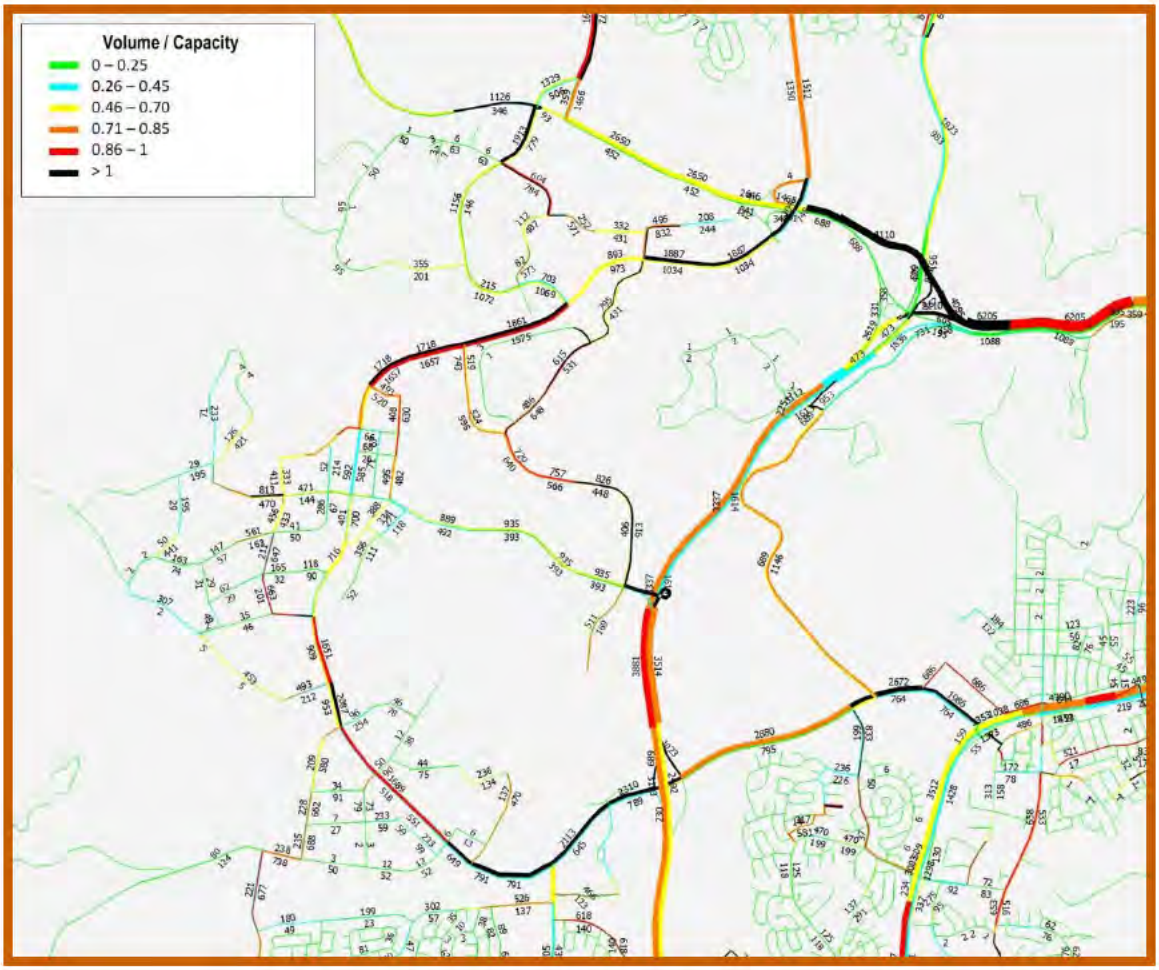

Figure 59: Scenario 2 – 2031 AM Volumes

6.1.3.3 Scenario 3 (North Facing Ramps)

The removal of the south facing ramps results in an increase in traffic on Cotter Road and Lady Denman Drive, since these roads become the best alternatives for traffic between Molonglo and the south or east. Traffic on East-West Arterial is also reduced as a result. The ramp configuration results in increased traffic on Tuggeranong Parkway north of the East-West Arterial interchange, and decreased traffic to the south.

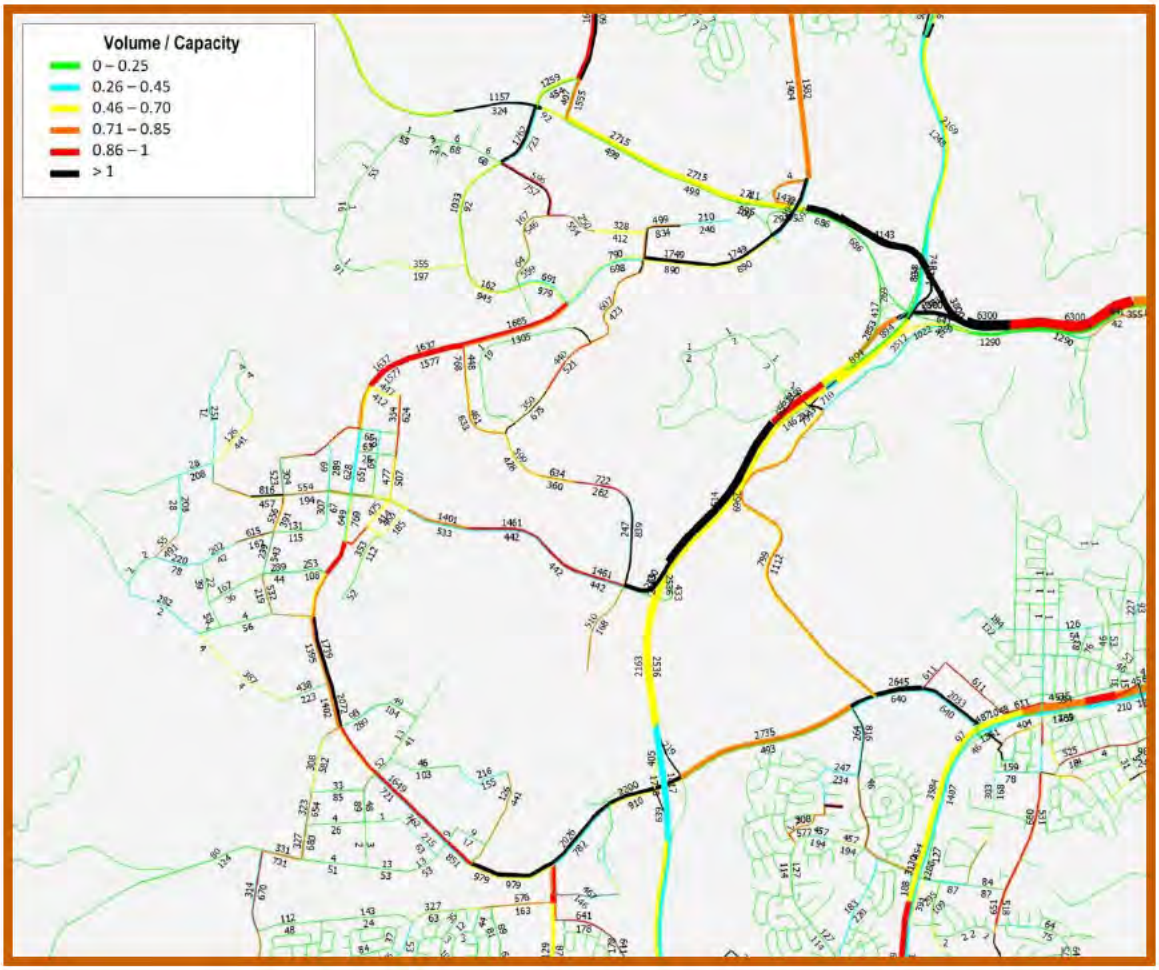

Figure 60: Scenario 3 – 2031 AM Volumes

6.1.3.4 Scenario 4 (Lady Denman Drive Connection)

Without the interchange between East-West Arterial and Tuggeranong Parkway there is less traffic on Tuggeranong Parkway than in Scenario 1, and also a decrease in East-West Arterial traffic. Due to the connection to Lady Denman Drive, this road now operates over capacity north/east-bound between East-West Arterial extension and Forest Drive, and southbound between East-West Arterial extension and Cotter Road. There is a large decrease in the volume on Cotter Road eastbound east of Tuggeranong Parkway however this may be because of the additional congestion caused by the extra traffic coming down Lady Denman Drive.

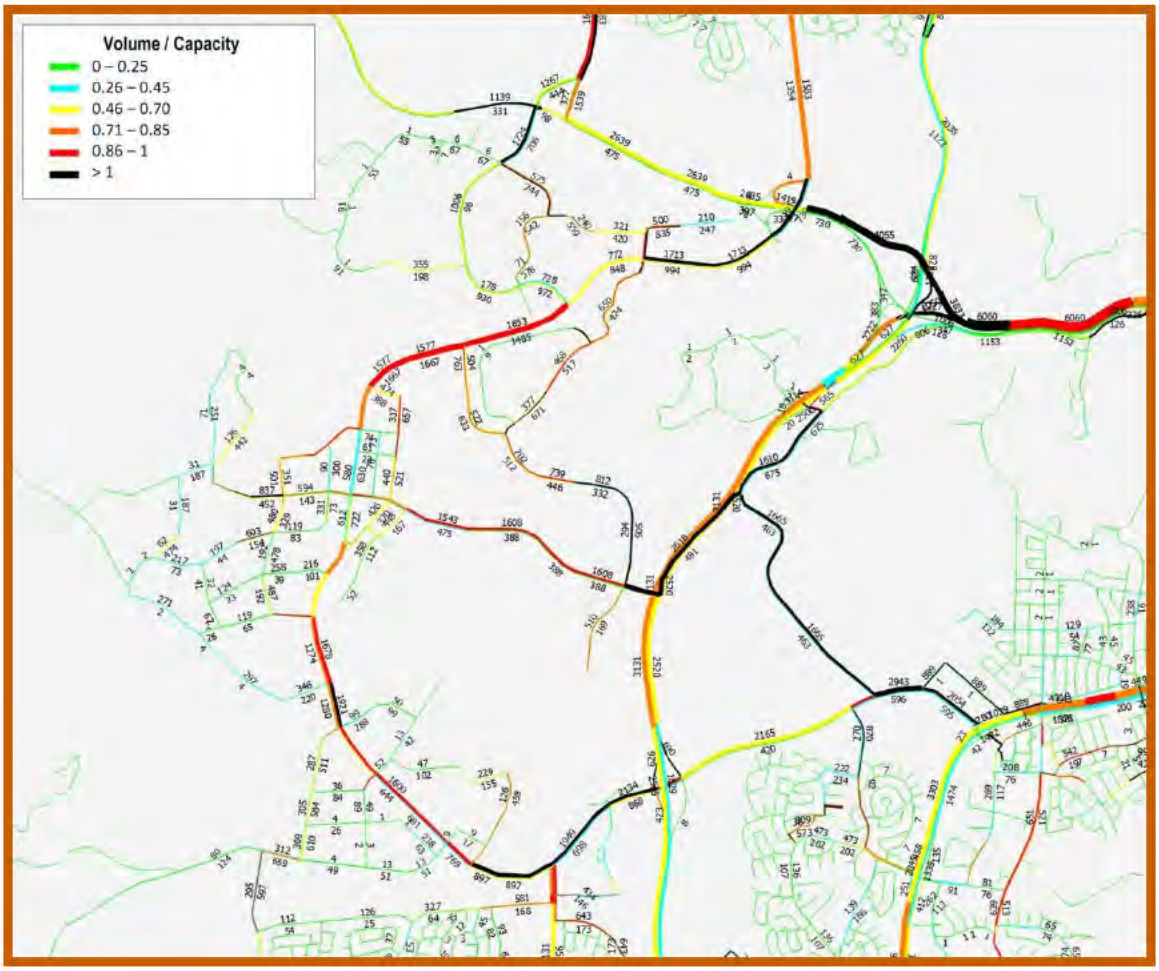

Figure 61: Scenario 4 – 2031 AM Volumes

6.1.3.5 Scenario 5 (Lady Denman Drive Connection without East-West Arterial)

Given the removal of East-West Arterial, other roads within Molonglo now carry the role of delivering traffic to the Lady Denman Drive connection. Due to the reduced connectivity compared to Scenario 4, Lady Denman Drive does not exceed capacity, however it still operates fairly close to its capacity. Compared to Scenario 1, traffic on Cotter Road and Tuggeranong Parkway southbound are reduced, while Tuggeranong Parkway northbound shows an increase.

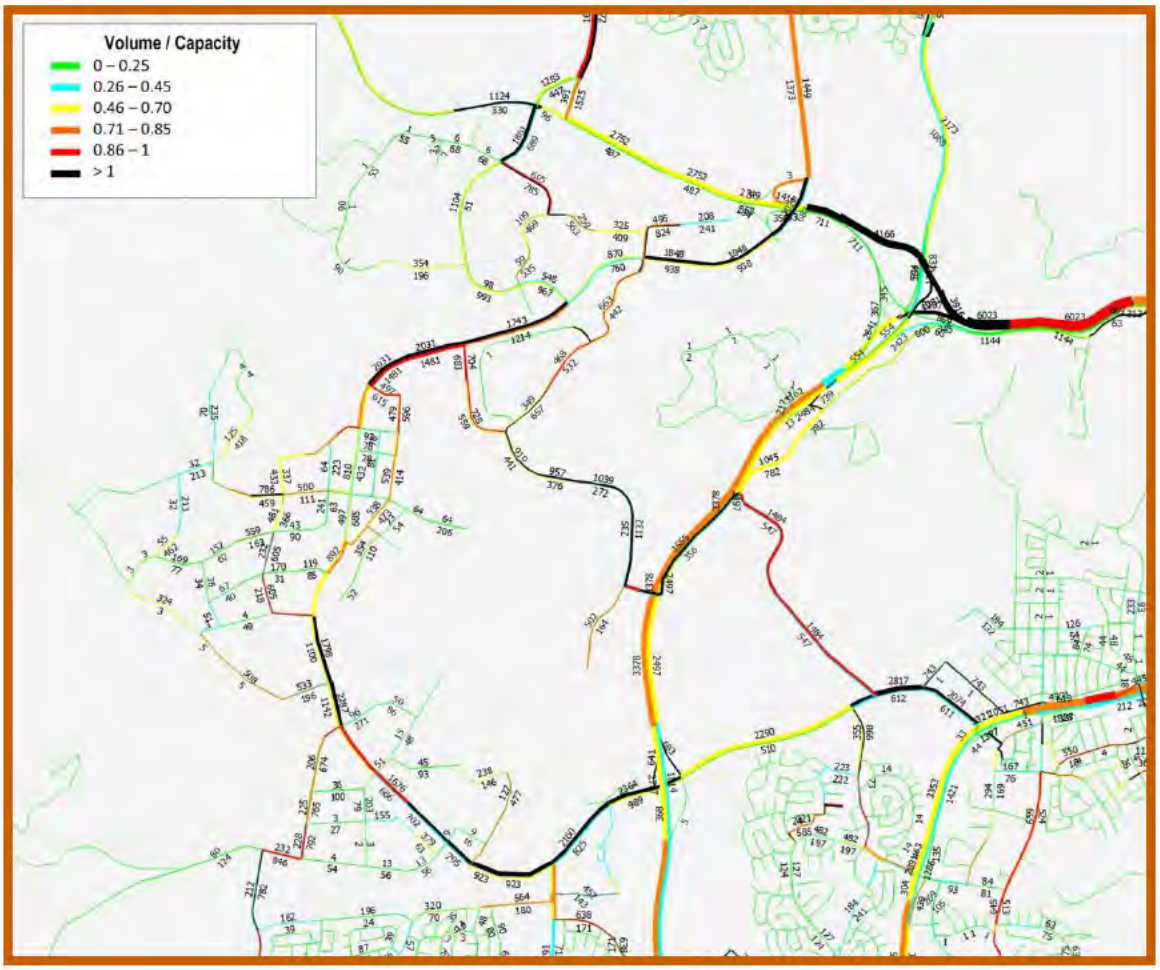

Figure 62: Scenario 5 – 2031 AM Volumes

6.1.3.6 Scenario 6 (Cotter Road Connection)

The East-West Arterial extension to Cotter Road already shows that demand exceeds the capacity of the link, even with two lanes each way. The option relieves traffic slightly on Tuggeranong Parkway and East-West Arterial, increases it slightly on John Gorton Drive, and increases it substantially on Cotter Road east of the East-West Arterial extension.

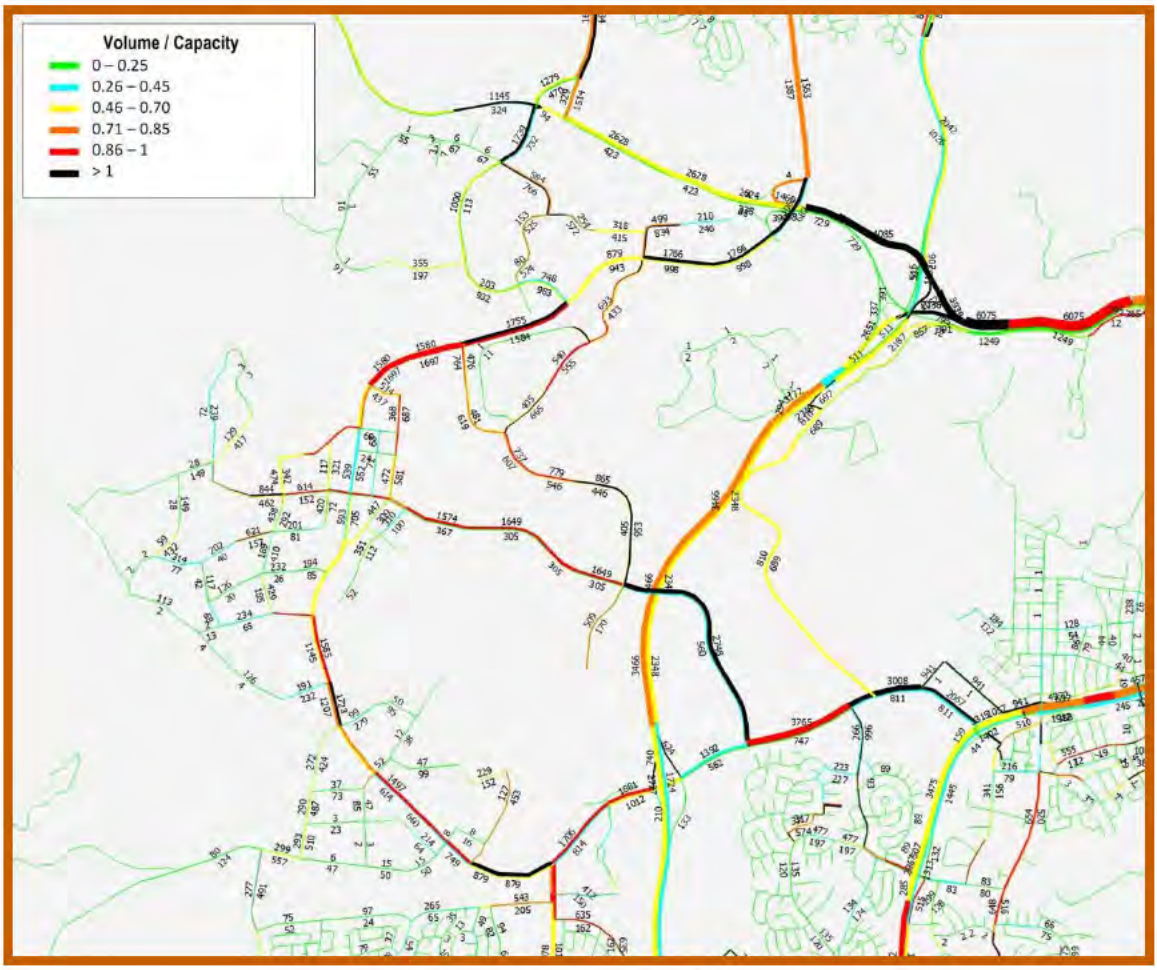

Figure 63: Scenario 6 – 2031 AM Volumes

6.1.3.7 Scenario 7 (Cotter Road Connection with North Facing Ramps)

Compared to Scenario 6, the south/east-bound volume on East-West Arterial extension is substantially lower, albeit still exceeding the capacity of the link. East-West Arterial carries more traffic in this scenario due to the improved connectivity. The half-diamond interchange also noticeably reduces traffic on Lady Denman Drive. Compared to Scenario 1, there is increased southbound traffic on Tuggeranong Parkway north of East-West Arterial and reduced traffic in both directions south of the interchange.

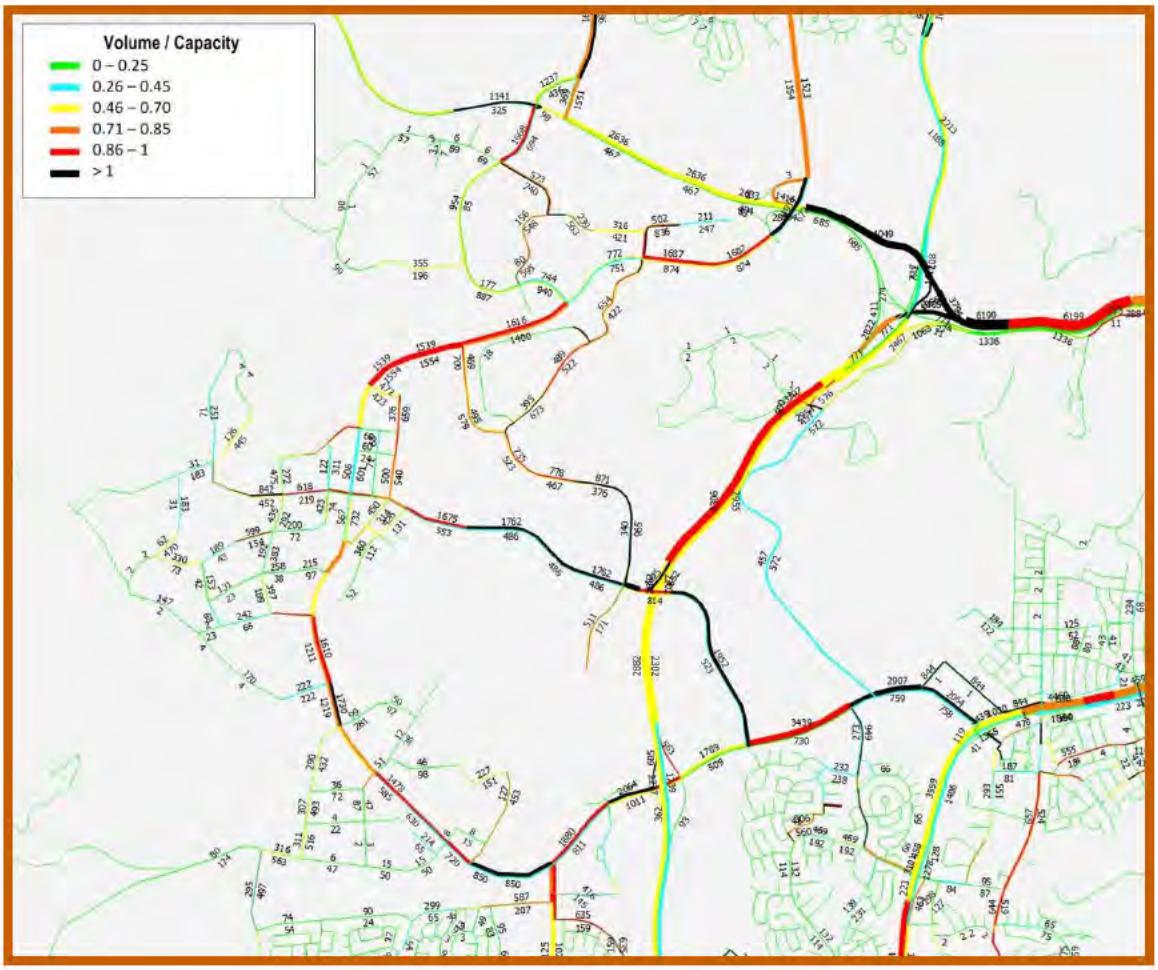

Figure 64: Scenario 7 – 2031 AM Volumes

6.1.3.8 Comparison of 2031 Modelling Scenarios

One-hour peak midblock volumes for selected roads in and around Molonglo are given for each of the scenarios in Table 9. The table is colour-coded such that the largest volume in each row is highlighted red, the lowest green and the 50th percentile yellow.

Table 9: 2031 AM One-hour Peak Midblock Volumes

Road	Dir	S1	S2	S3	S4	S5	S6	S7
Tuggeranong Parkway north of East-West Arterial Interchange	NB	4,230	3,340	4,510	3,130	3,380	4,240	3,470
	SB	2,290	1,610	2,970	2,520	2,500	2,290	2,350
Tuggeranong Parkway south of East-West Arterial Interchange	NB	3,120	3,880	2,160	3,130	3,380	3,140	3,470
	SB	3,030	3,510	2,540	2,520	2,500	3,050	2,350
Lady Denman Drive north of East-West Arterial Extension	NB	490	690	800	1,610	1,050	460	810
	SB	970	1,150	1,110	680	780	980	690
Lady Denman Drive south of East-West Arterial Extension	NB	490	690	800	460	550	460	810
	SB	970	1,150	1,110	1,670	1,480	980	690
Coulter Drive Extension	NB	1,740	1,910	1,760	1,720	1,860	1,720	1,740
	SB	770	780	720	710	690	760	730
John Gorton Drive	NB	1,740	1,890	1,750	1,710	1,850	1,720	1,770
	SB	820	1,030	890	990	940	860	1,000
Cotter Road east of East-West Arterial Extension	EB	2,810	2,880	2,740	2,170	2,290	2,810	1,390
	WB	760	800	490	420	510	770	560
Cotter Road west of East-West Arterial Extension	EB	2,170	2,310	2,200	2,130	2,360	2,160	1,880
	WB	810	790	910	870	990	810	1,010
East-West Arterial east of Tuggeranong Parkway	EB	2,910	1,900	2,350	2,620	1,560	2,920	2,750
	WB	1,050	540	430	480	360	1,050	560
East-West Arterial west of Tuggeranong Parkway	EB	1,690	940	1,460	1,610		1,690	1,650
	WB	680	390	440	390		680	310
Adelaide Avenue	NB	5,080	5,030	5,130	4,960	4,990	5,100	5,010
	SB	2,240	2,270	2,170	2,260	2,220	2,240	2,300
Yarra Glen	NB	3,530	3,510	3,580	3,300	3,350	3,530	3,480
	SB	1,410	1,430	1,410	1,470	1,420	1,400	1,450

Road	Dir	S1	S2	S3	S4	S5	S6	S7
McCulloch Street	NB	250	200	260	270	360	240	270
	SB	830	830	820	870	870	820	970
William Hovell Drive west of Coulter Drive	EB	1,140	1,130	1,160	1,140	1,120	1,140	1,150
	WB	320	350	320	330	330	320	320
William Hovell Drive east of Coulter Drive	EB	2,620	2,650	2,720	2,640	2,750	2,630	2,630
	WB	480	450	500	480	490	470	420
William Hovell Drive east of Bindubi Street	EB	4,040	4,110	4,140	4,060	4,170	4,050	4,090
	WB	610	690	690	730	710	650	730
Caswell Drive/GDE north of Glenloch Interchange	NB	1,240	980	1,250	1,120	1,090	1,220	1,030
	SB	2,040	1,820	2,170	2,040	2,170	2,020	2,040
Parkes Way east of Glenloch Interchange	EB	6,270	6,210	6,300	6,060	6,020	6,320	6,080
	WB	1,150	1,090	1,290	1,150	1,140	1,220	1,250
Coulter Drive north of William Hovell Drive	NB	1,640	1,690	1,670	1,640	1,670	1,610	1,610
	SB	2,010	1,970	2,010	1,980	1,970	1,980	1,980
Bindubi Street north of William Hovell Drive	NB	1,420	1,350	1,400	1,350	1,370	1,380	1,390
	SB	1,580	1,510	1,580	1,580	1,450	1,550	1,560

From Table 9, a decision should be made to select an arterial road network option that minimises impact on the external network. However, close examination of the results shows that most of the options exhibit negligible or minimal differences in traffic volumes on the external road network compared to Scenario 1. One notable exception is Scenario 7, which decreases traffic volumes around the interchange of Cotter Road and the Tuggeranong Parkway. However, this option leads to increase traffic volumes on Cotter Road east of McCulloch Street, and Adelaide Avenue.

This analysis was conducted to determine whether any other scenarios had significant benefits compared to the base case (Scenario 1). As there is no scenario that is clearly better than Scenario 1 in terms of traffic impacts on external roads, the detailed traffic analysis has been conducted using Scenario 1.

6.2 Traffic Operational Analysis

6.2.1 Scenario Summary

The following sections describe the layouts, expected traffic volumes and the results of each area assessed. The layouts presented are the minimum requirements for acceptable performance at each intersection.

The intersection analysis was undertaken for both the AM and PM weekday one-hour peak periods in each model year using direct outputs from the EMME3 strategic models discussed in Section 6.1. As this model is calibrated to produce only one-hour AM peak volumes, one-hour PM peak volumes were obtained by transposing the AM auto vehicle trip matrix and reducing its magnitude by 10%, as the ACT PM peak period generally produces 90% of the peak flow of the AM peak period. This synthetic PM auto vehicle trip matrix was assigned to the network by the model, and PM peak turning volumes were also extracted directly.

6.2.1.1 2016 Traffic Analysis

Molonglo Stages 1 and 2 are expected to be completed by 2016. As most of this development is on the southern side of Molonglo, it is expected that the existing Coppins Crossing Road will have sufficient capacity in this short term.

The current layout of the William Hovell Drive – Coppins Crossing Road intersection was assessed for 2016 traffic demand, and the results show that substantial delays (up to Level of Service F) and long queues are expected at this intersection during both the AM and PM peak periods. The main issue was that sufficient gaps could not be found by the traffic from Coppins Crossing Road entering William Hovell Drive. Thus, the signalisation of this intersection has been assessed as an interim intersection upgrade, for which results are presented in Table 10.

6.2.1.2 2021 Traffic Analysis

It is expected that Molonglo Stage 3 will not be developed by 2021, thus two north-south connections to William Hovell Drive may be an over-investment in road connections. This section includes the intersection assessment for the following three scenarios, for which results are presented in Table 11:

- **John Gorton Drive to Coulter Drive**
  John Gorton Drive connects to Coulter Drive Extension at the group centre
- **John Gorton Drive to Bindubi Street**
  John Gorton Drive connects to William Hovell Drive at the Bindubi Street intersection
- **Coppins Crossing Road**
  Coppins Crossing Road remains the only direct connection from Molonglo to William Hovell Drive. It is assumed that the William Hovell Drive – Coppins Crossing Road intersection upgrades that were required for 2016 will be developed further and that Coppins Crossing Road remains one lane in each direction.

These same scenarios have also been assessed using the strategic transport model with discussions presented earlier in Section 6.1.

6.2.1.3 2031 Traffic Analysis

The intersection of William Hovell Drive and Coulter Drive/Coulter Drive Extension has been assessed using traffic volumes obtained from the 2031 Scenario 1 (Base). The following three intersection options were assessed, for which results are presented in Table 12:

- Quadrant
- Staggered T Intersection
- Four Way Intersection

The intersection of William Hovell Drive and John Gorton Drive/Bindubi Street has been assessed using traffic volumes obtained from the 2031 Scenario 1 (Base) strategic transport modelling. The following interchange options were assessed, for which results are presented in Table 13:

- Folded Diamond Interchange
- Diamond Interchange

The intersections associated with the connection of the East-West Arterial with Tuggeranong Parkway and Cotter Road were assessed for the following three scenarios, for which results are presented in Table 14:

- Scenario 1 (Base)
- Scenario 6 (Cotter Road Connection)
- Scenario 7 (Cotter Road Connection with North Facing Ramps)

6.2.2 2016 Coppins Crossing Road Scenario

The intersection of William Hovell Drive and Coppins Crossing Road is only 150 metres west of the signalised intersection of William Hovell Drive and Coulter Drive. Both intersections were assessed as closely spaced intersections according to guidelines provided by SIDRA Solutions. The location of the two intersections is shown in Figure 65.

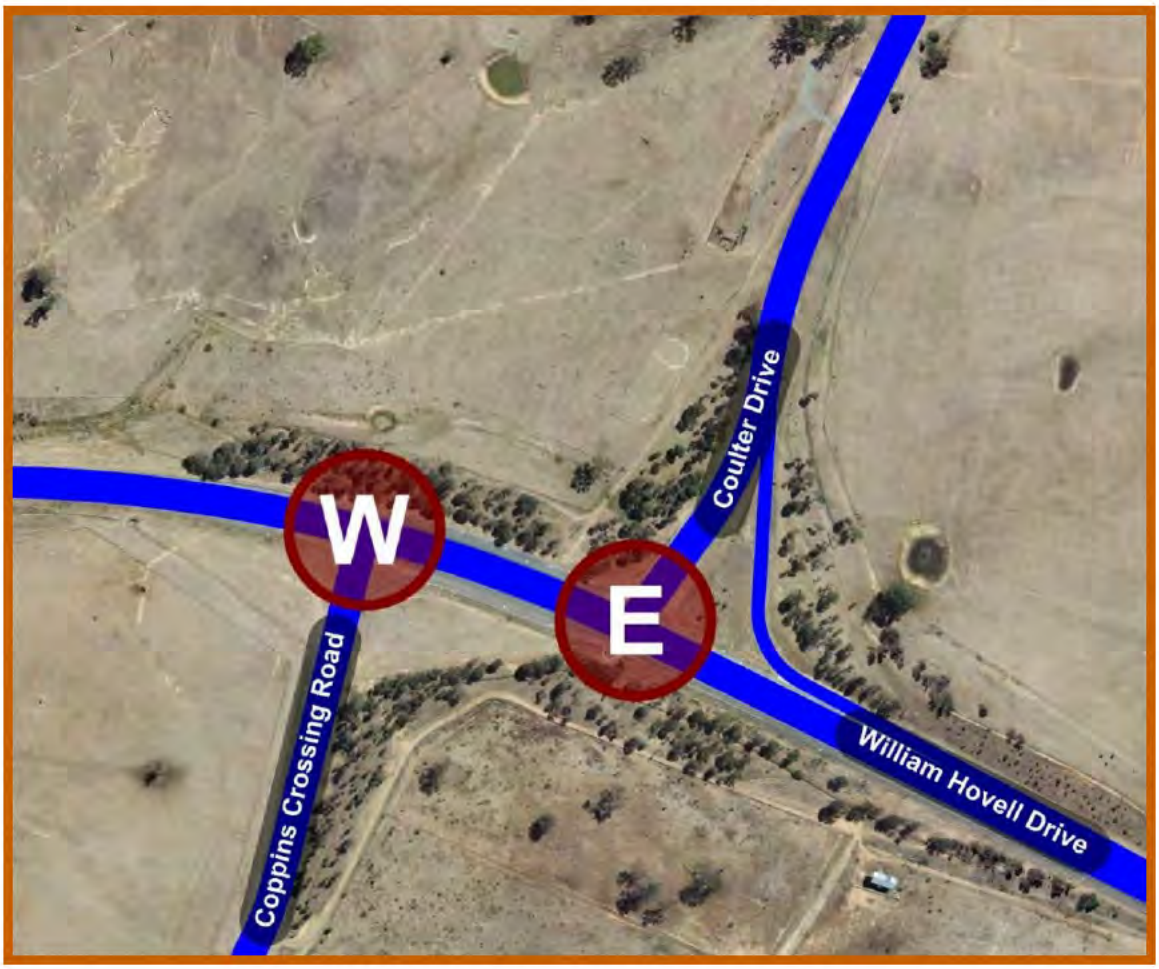

Figure 65: Intersection Locations for Staggered T Option

6.2.2.1 William Hovell Drive – Coppins Crossing Road (West)

The intersection requires substantial upgrades to achieve acceptable performance. The required layout of the intersection is shown in Figure 66. This intersection is expected to operate at LOS D during the AM peak and LOS B during the PM peak. However, it should be noted that the volume on William Hovell Drive west of this intersection is expected to exceed 2,000 vehicles/hour. HCM 2010 describes the basic capacity at a free flow speed of 90 km/hr as 2,250 PC/hour/lane (Passenger Car equivalents).

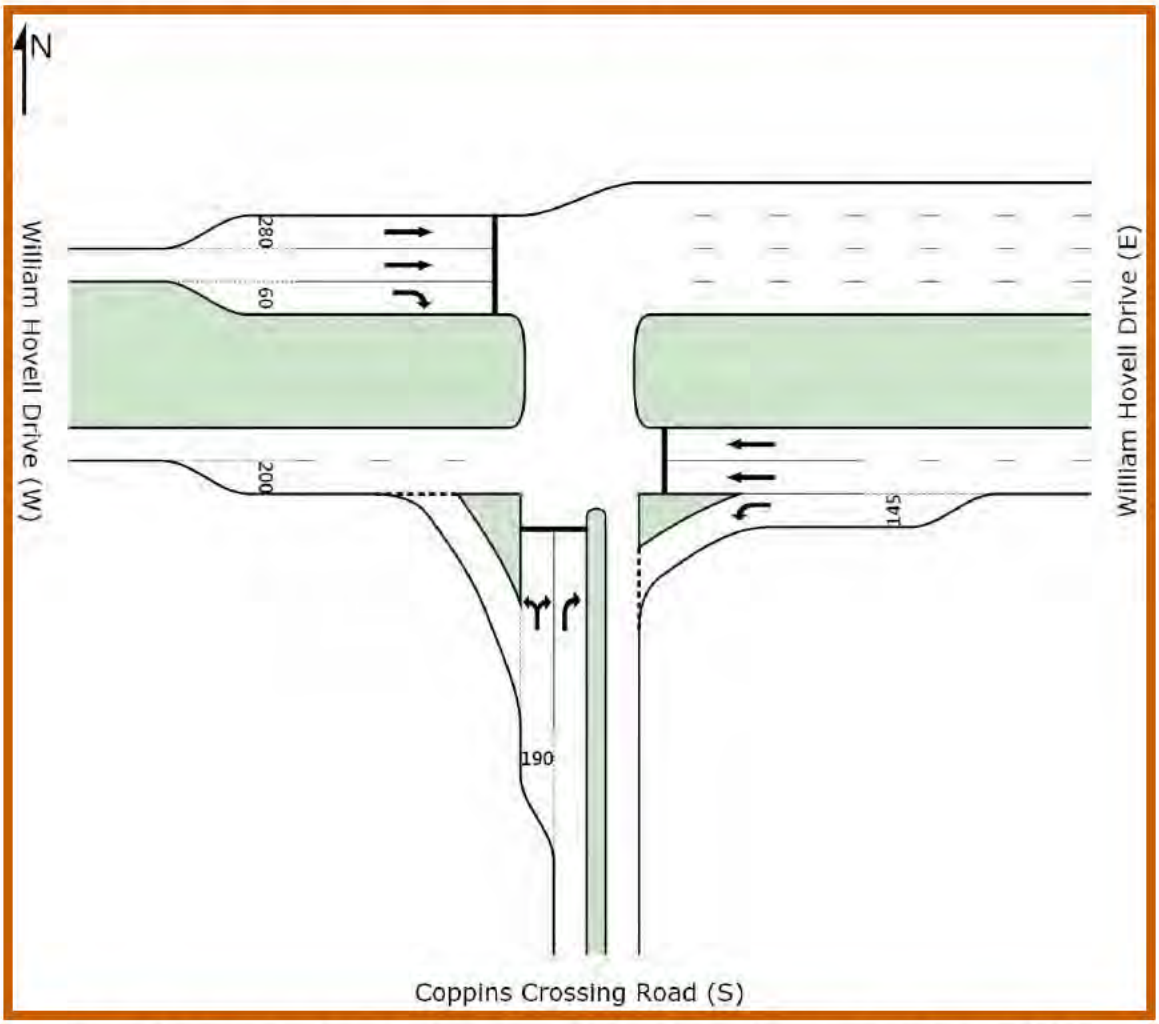

Figure 66: Intersection Layout of William Hovell Drive – Coppins Crossing Road (Upgrade 2016)

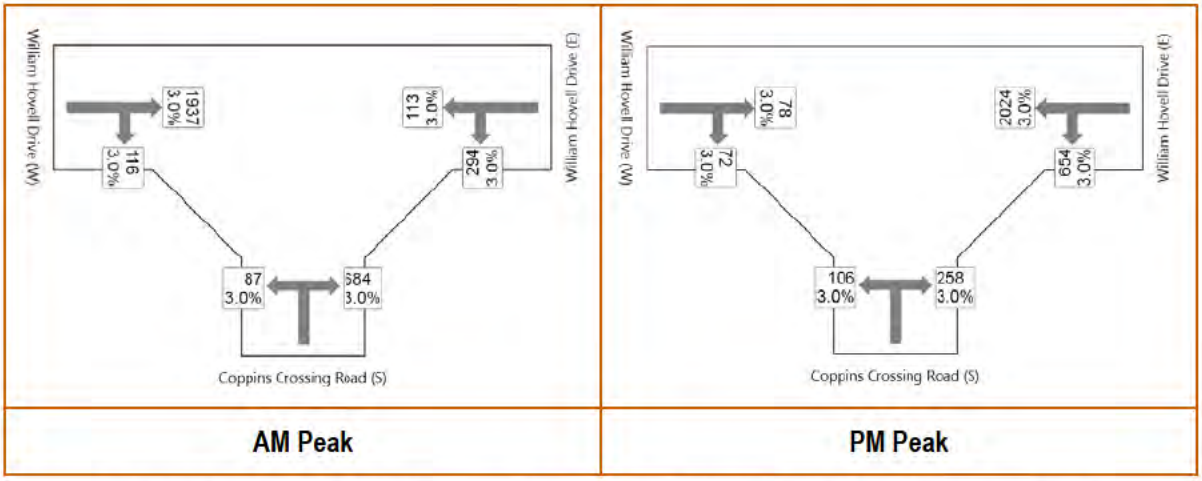

Figure 67: Hourly Volumes at William Hovell Drive – Coppins Crossing Road (Upgrade 2016)

6.2.2.2 William Hovell Drive – Coulter Drive

The upgrade at this intersection is mainly concerned with the two heaviest movements during the AM peak period – through from the west and left from the north – which are in opposition. The required layout of the intersection is shown in Figure 71. This layout is expected to operate at LOS B during the AM peak period and LOS C during PM peak period.

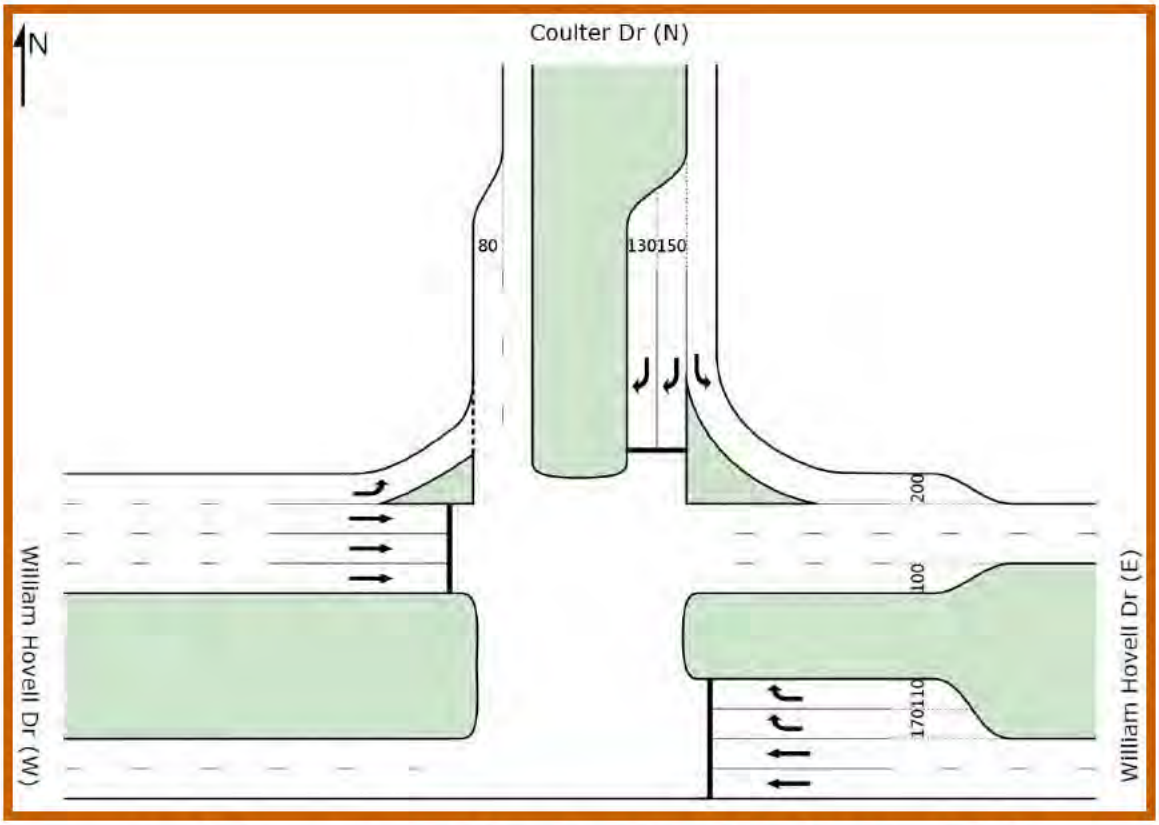

Figure 68: Intersection Layout of William Hovell Drive – Coulter Drive (Upgrade 2016)

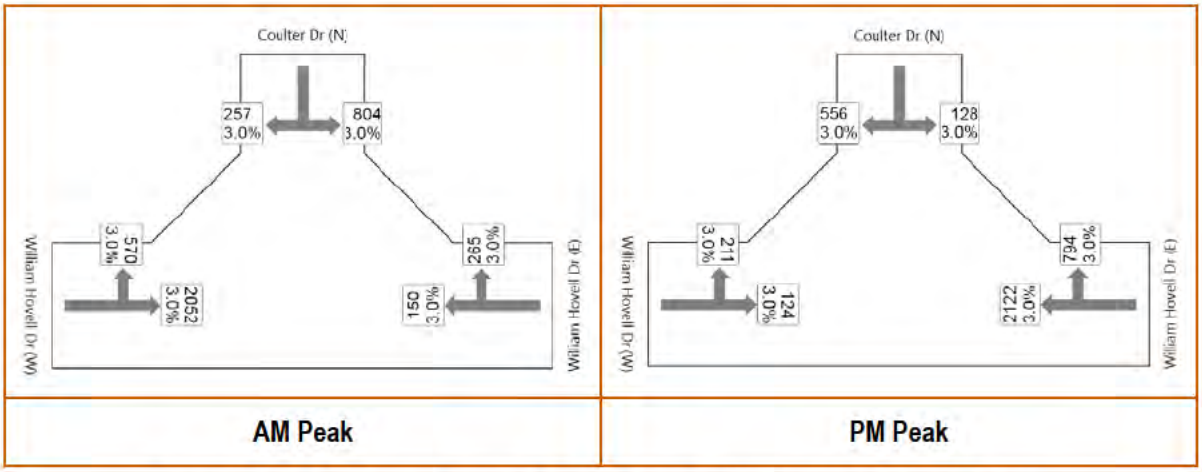

Figure 69: Hourly Volumes at William Hovell Drive – Coulter Drive (Upgrade 2016)

6.2.3 2021 John Gorton Drive to Coulter Drive Scenario

This scenario assumes that Coulter Drive Extension (formerly Coppins Crossing Road) is connected to William Hovell Drive as a T-intersection, as shown in Figure 65. While this scenario assumes no direct connection of Molonglo to the intersection of Bindubi Street and William Hovell Drive, the analysis shows that significant upgrades will still be required.

6.2.3.1 William Hovell Drive – Coulter Drive Extension (West)

The western intersection (shown in Figure 70) is expected to operate at LOS D during the AM peak and LOS B during the PM peak. The limitation at this intersection is the conflict between the right turn from the south and the through movement from the west during the AM peak period.

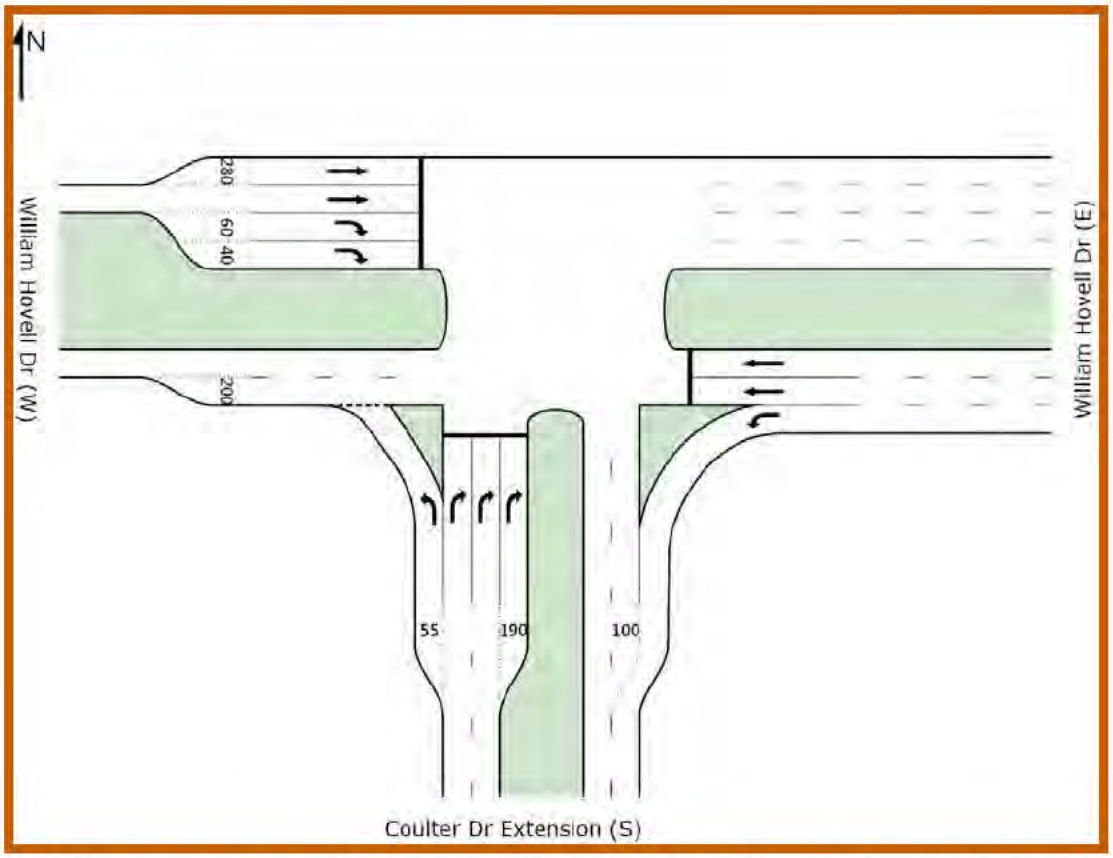

Figure 70: Intersection Layout of William Hovell Drive – Coulter Drive Extension (Staggered T West 2021)

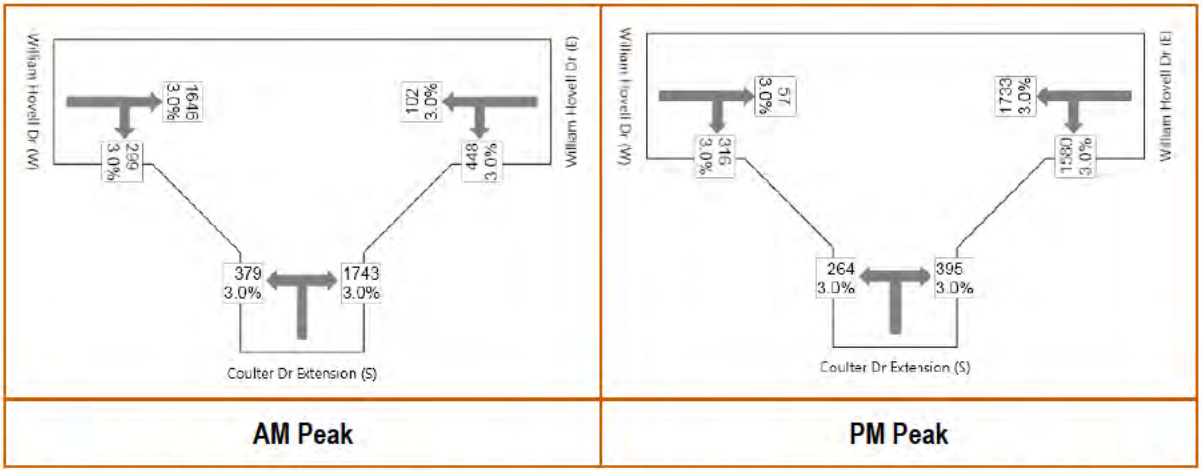

Figure 71: Hourly Volumes at William Hovell Drive – Coulter Drive Extension (Staggered T West 2021)

6.2.3.2 William Hovell Drive – Coulter Drive (East)

The eastern intersection (shown in Figure 72) is expected to operate at LOS B during the AM peak and LOS C during the PM peak. Additional short lanes were required for the through movements on both William Hovell Drive approaches.

The limitations at this intersection are the through movement from the west during the AM peak period and the conflict between the right turns from the east and north during the PM peak period.

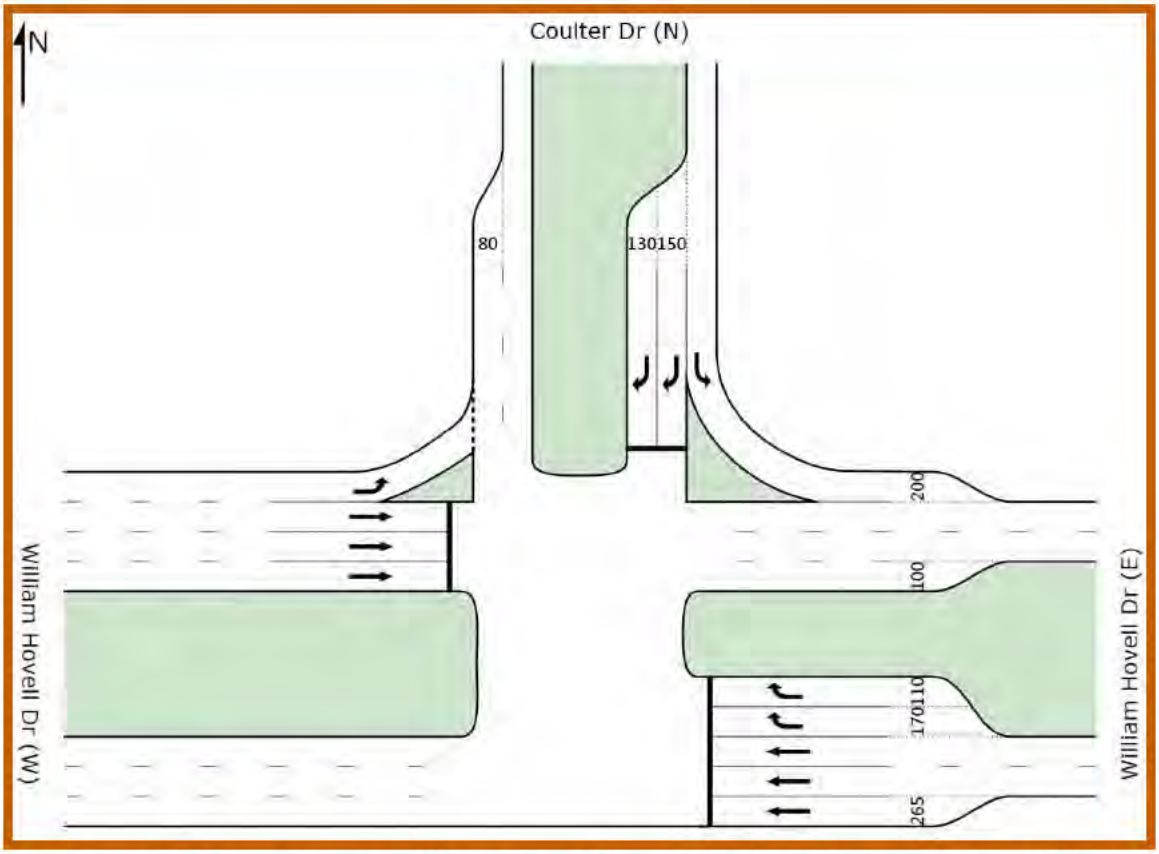

Figure 72: Intersection Layout of William Hovell Drive – Coulter Drive (Staggered T East 2021)

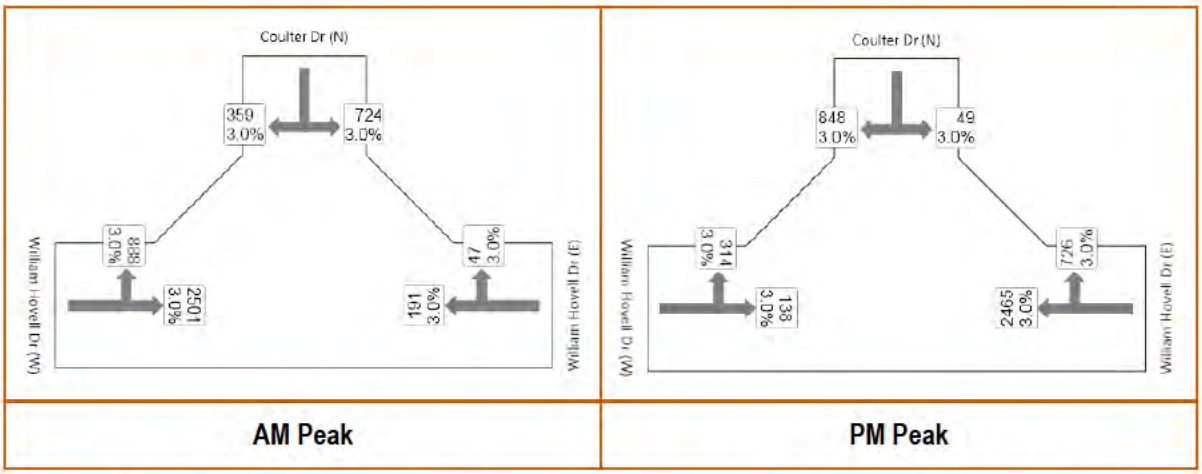

Figure 73: Hourly Volumes at William Hovell Drive – Coulter Drive (Staggered T East 2021)

6.2.3.3 William Hovell Drive – Bindubi Street

This intersection is expected to operate at LOS E during the AM peak and LOS B during the PM peak. This intersection layout shown in Figure 74 is based on the existing intersection, and is an illustration that this intersection will not operate at an acceptable level of performance if it is not upgraded significantly. The limitation is the right turn from the east conflicting with the through movement from the west during the AM peak period. A Select Link Analysis (SLA) for the intersection shows that 18% of the traffic using this intersection in the AM peak period is generated by Molonglo, with the PM figure being 16%.

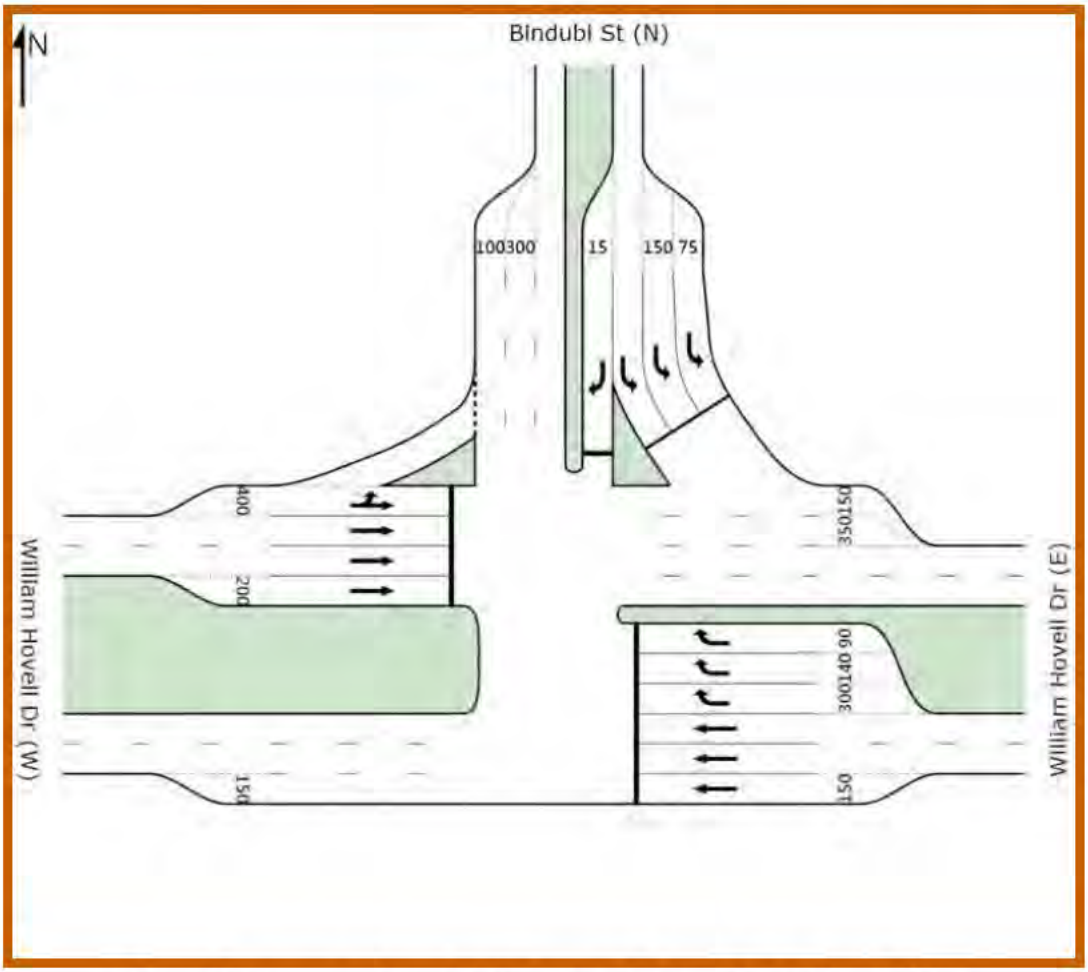

Figure 74: Intersection Layout of William Hovell Drive – Bindubi Street (2021)

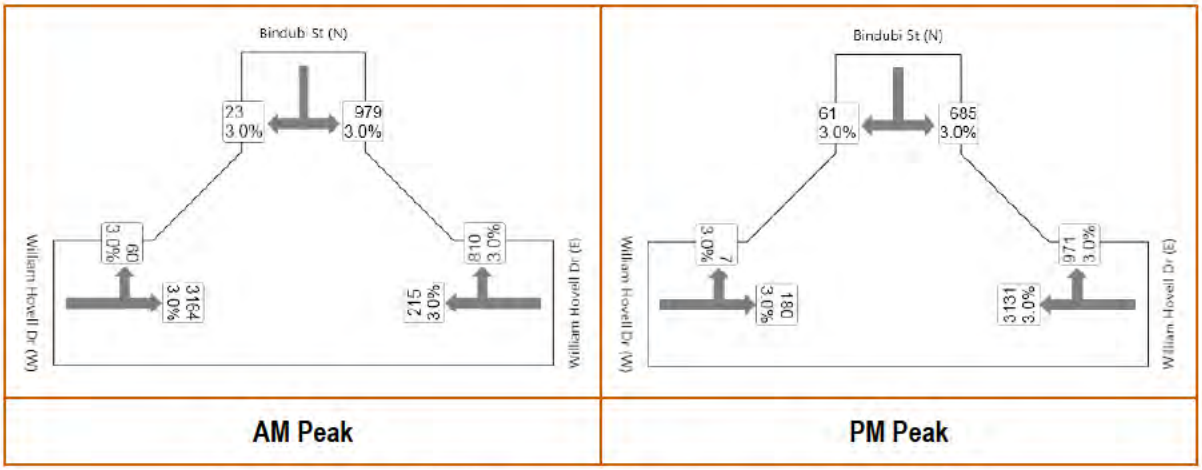

Figure 75: Hourly Volumes at William Hovell Drive – Bindubi Street (2021)

6.2.4 2021 Coppins Crossing Road Scenario

This scenario was also assessed for 2016 in Section 6.2.2. The 2021 analysis shows that the intersection upgrades necessary for 2016 are generally also sufficient for 2021. Coppins Crossing Road does however require an additional short left turn lane for this movement to operate at better than LOS F.

Coppins Crossing Road has one lane in each direction, limiting the amount of traffic that can travel from/to Molonglo during the AM and PM peak period.

6.2.4.1 William Hovell Drive – Coppins Crossing Road (West)

The required layout of the intersection is shown in Figure 76. This intersection is expected to operate at LOS D during the AM peak period and LOS B during the PM peak period.

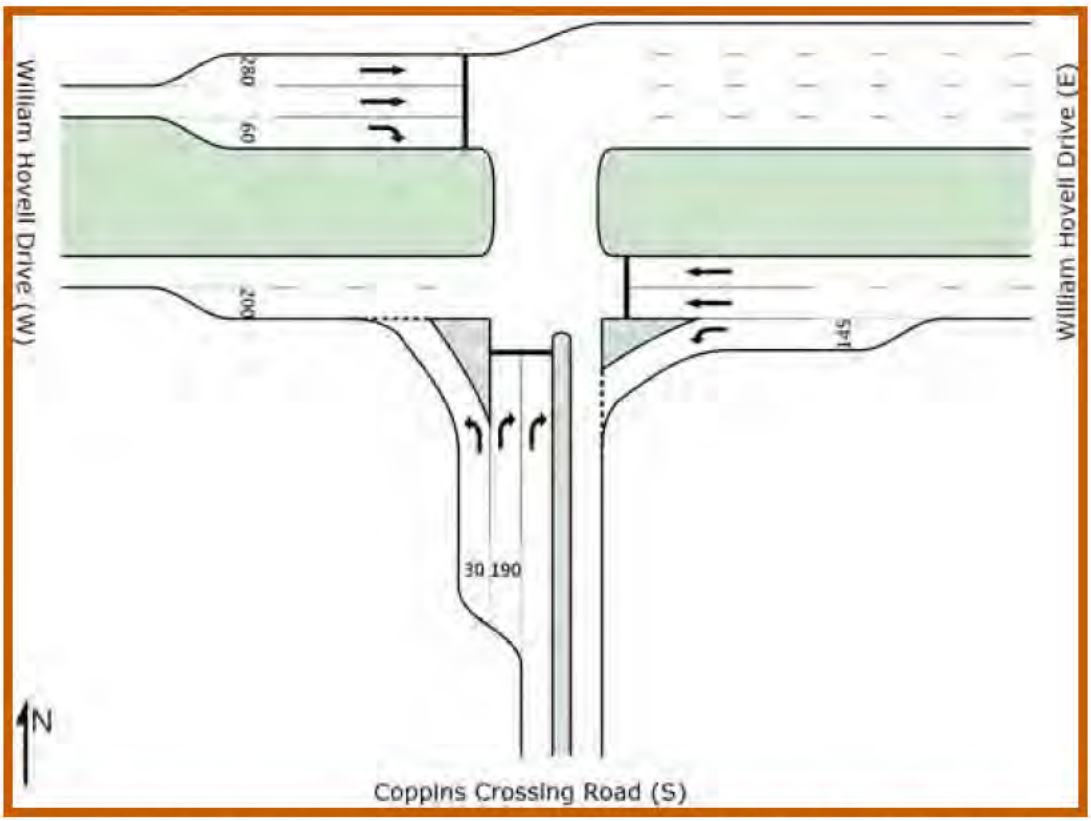

Figure 76: Intersection Layout of William Hovell Drive – Coppins Crossing Road (Upgrade 2021)

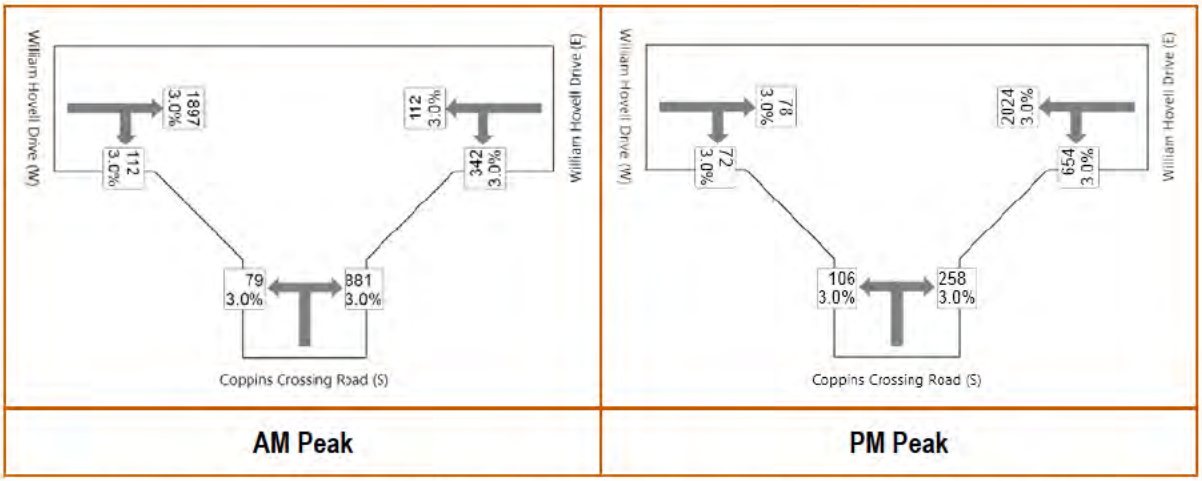

Figure 77: Hourly Volumes at William Hovell Drive – Coppins Crossing Road (Upgrade 2021)

6.2.4.2 William Hovell Drive – Coulter Drive (East)

The required layout is shown in Figure 78. This intersection is expected to operate at LOS B during the AM peak period and LOS C during the PM peak period.

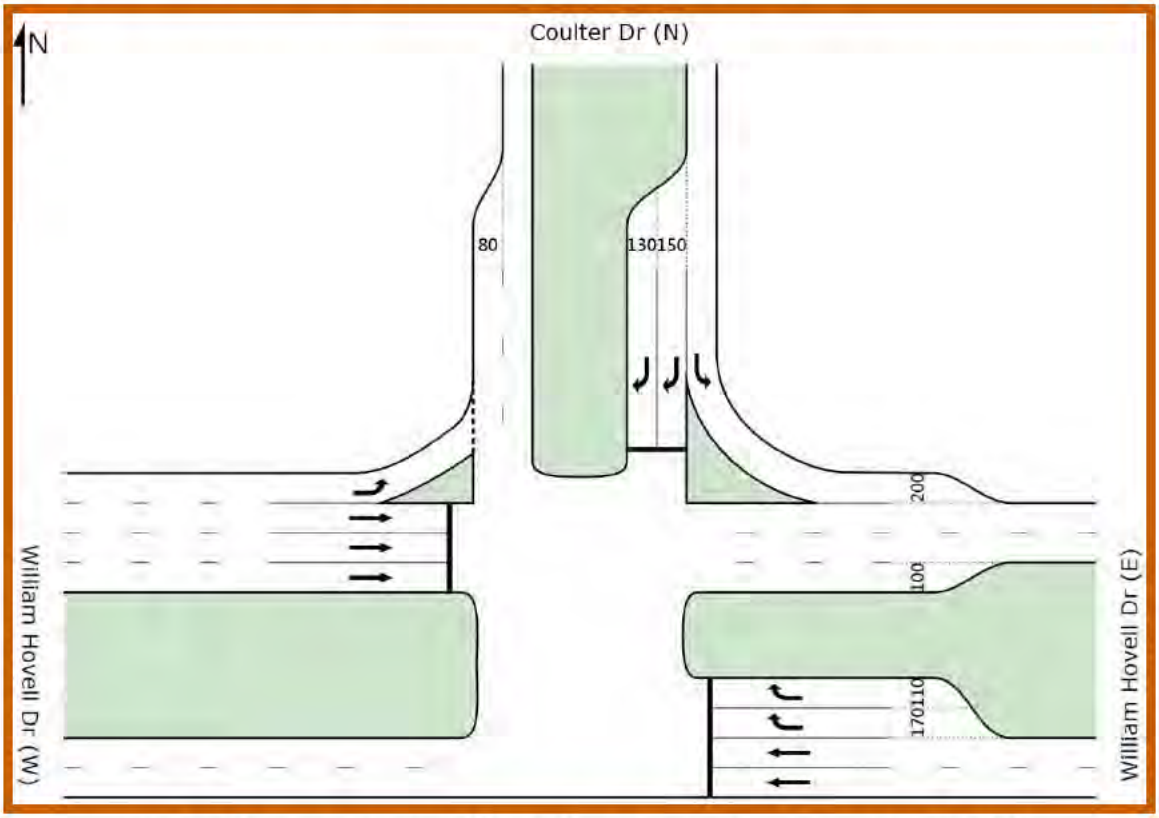

Figure 78: Intersection Layout of William Hovell Drive – Coulter Drive (Upgrade 2021)

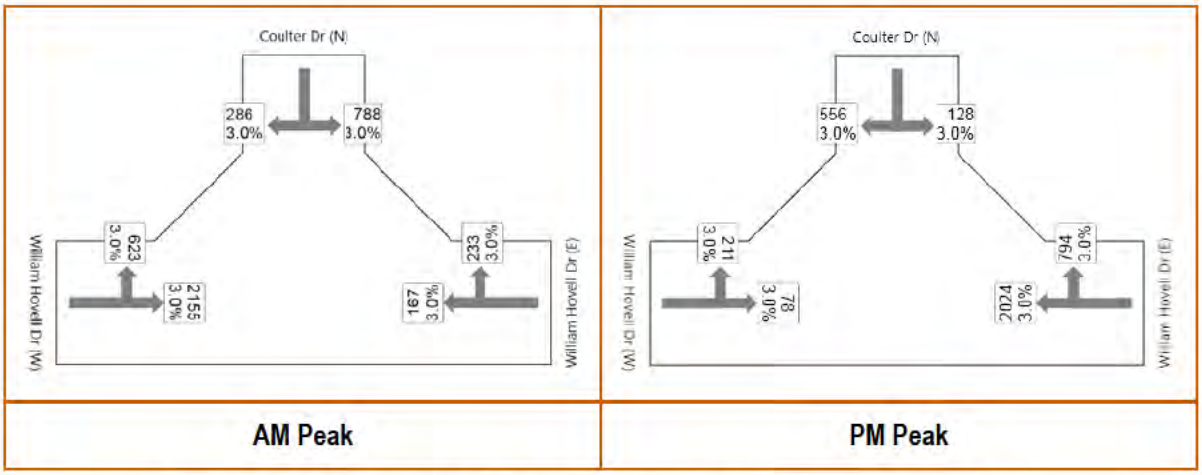

Figure 79: Hourly Volumes at William Hovell Drive – Coulter Drive (Upgrade 2021)

6.2.5 2021 John Gorton Drive to Bindubi Street Scenario

This scenario assumes that the William Hovell Drive – John Gorton Drive/Bindubi Street Folded Diamond Interchange will be constructed by 2021, whilst the Coulter Drive Extension is not constructed. In this scenario the existing intersection at William Hovell Drive and Coulter Drive continues to operate at an acceptable level of service.

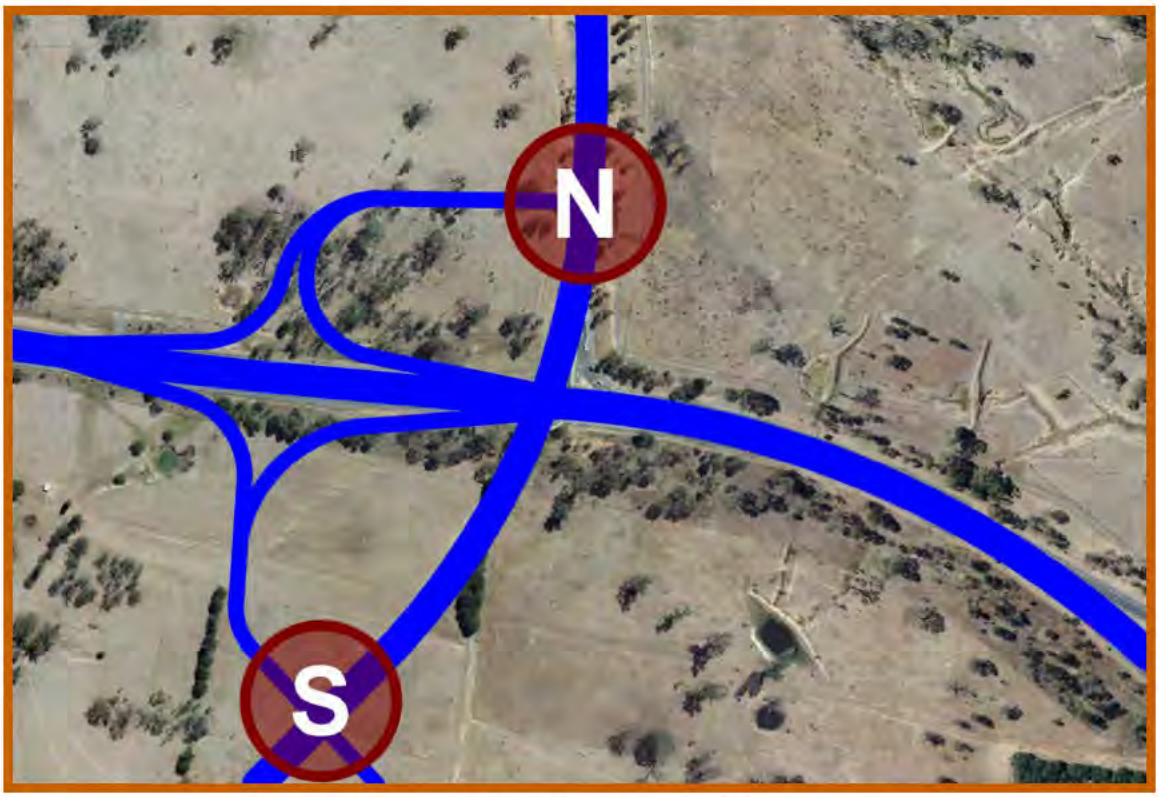

Figure 80: Intersection Locations for Folded Diamond Option

In addition to the configuration shown in Figure 80, the interchange was analysed as an at-grade four-way signalised intersection, shown in Figure 87. This was intended to evaluate the possibility of a simpler interim design before construction of a service interchange such as the folded diamond. It is clear from this analysis that the configuration required for an at-grade signalised intersection to achieve acceptable performance, given the expected 2021 traffic volumes, is impractical.

6.2.5.1 William Hovell Drive – John Gorton Drive/Bindubi Street (Four-way)

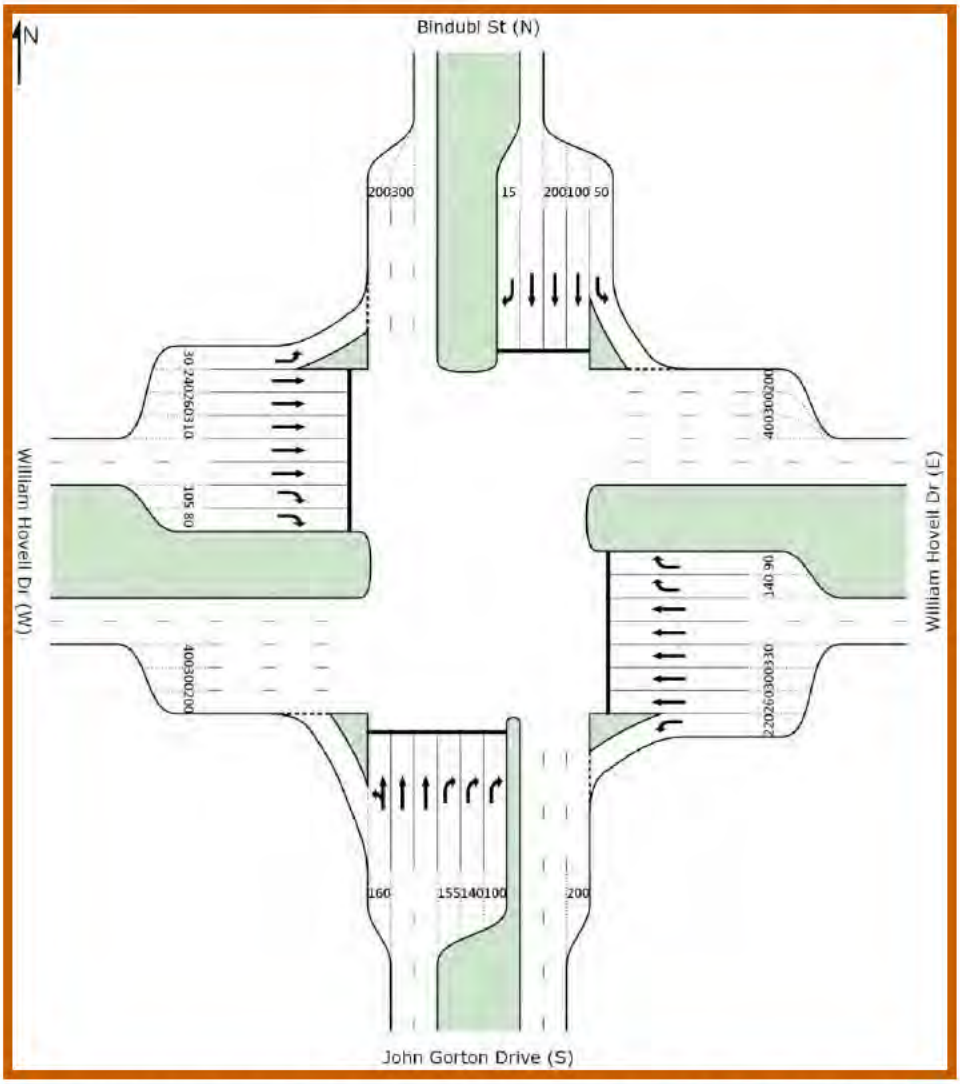

Figure 81: Intersection Layout of William Hovell Drive – John Gorton Drive/Bindubi Street (At-grade Intersection Option)

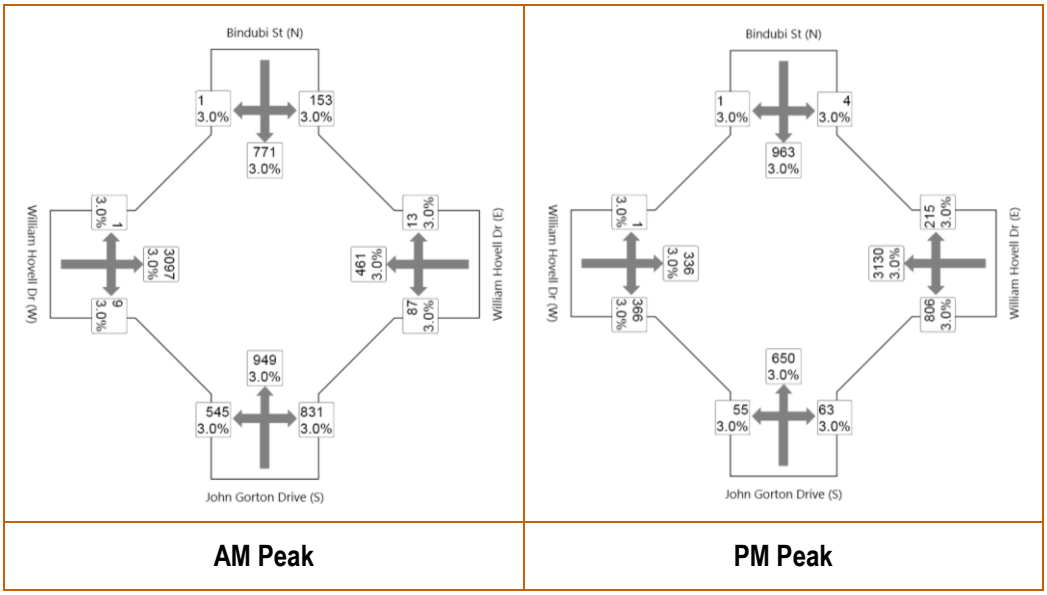

Figure 82: Hourly Volumes at William Hovell Drive – John Gorton Drive/Bindubi Street (At-grade Intersection 2021)

6.2.5.2 William Hovell Drive – Bindubi Street (North)

The northern intersection of the folded diamond interchange (shown in Figure 83) is expected to operate at LOS C during both weekday peak periods. The limitation is the conflict between the right turn from the north and the through movement from the south during the AM peak.

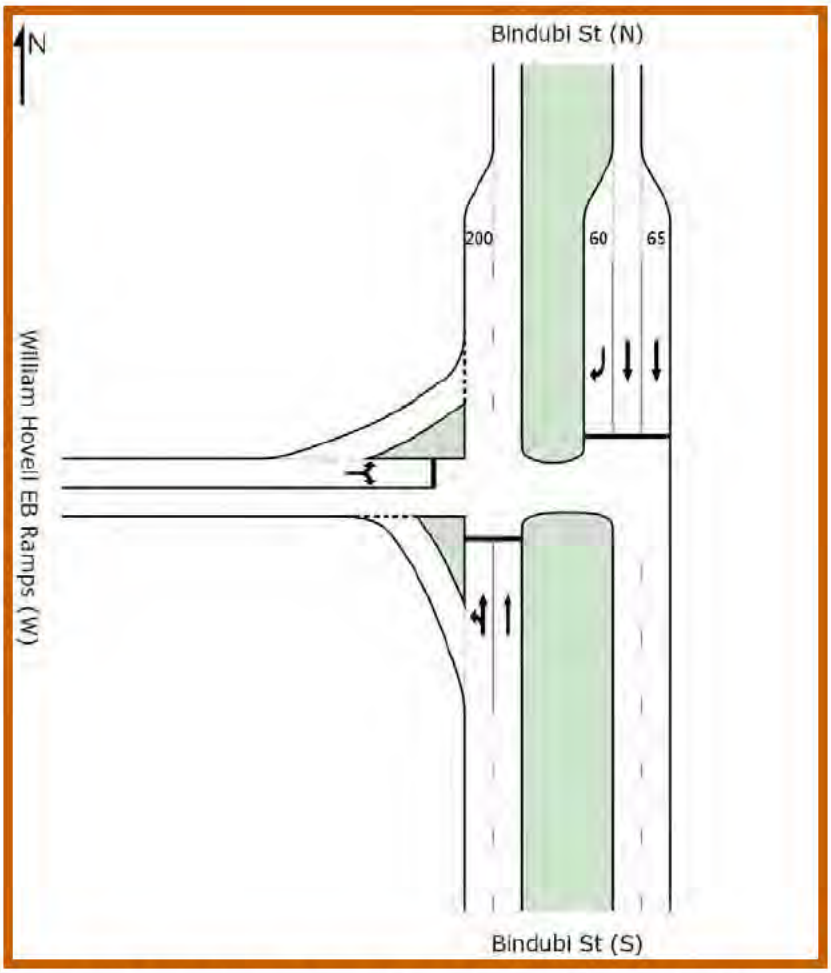

Figure 83: Intersection Layout of William Hovell Drive – Bindubi Street (Folded Diamond North 2021)

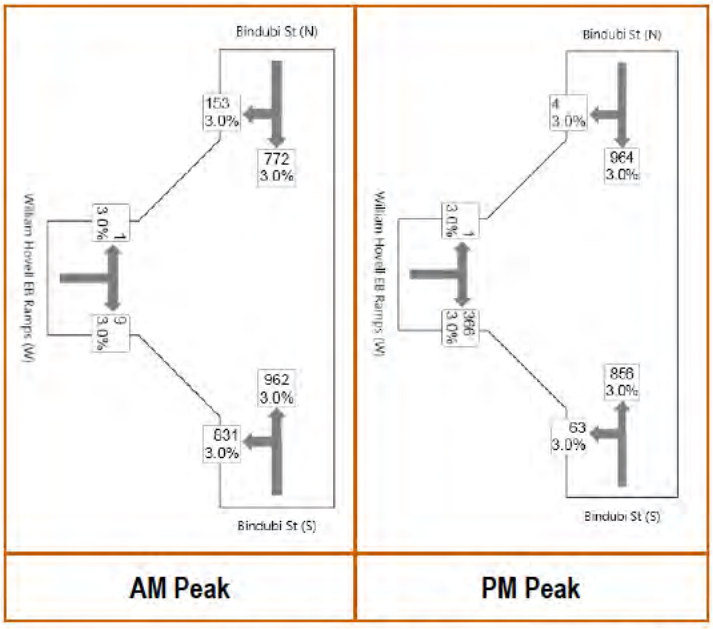

Figure 84: Hourly Volumes at William Hovell Drive – Bindubi Street (Folded Diamond North 2021)

6.2.5.3 William Hovell Drive – John Gorton Drive (South)

The southern intersection (shown in Figure 85) is expected to operate at LOS A during the AM peak and LOS D during the PM peak. Since the local road to the east of this intersection is not expected to be developed by 2021 the intersection operates as a T in

this scenario, converting to a four-way intersection by 2031 as described in Section 6.2.9.2. The major conflict is between the right turn from the west and the through movement from the north during the PM peak.

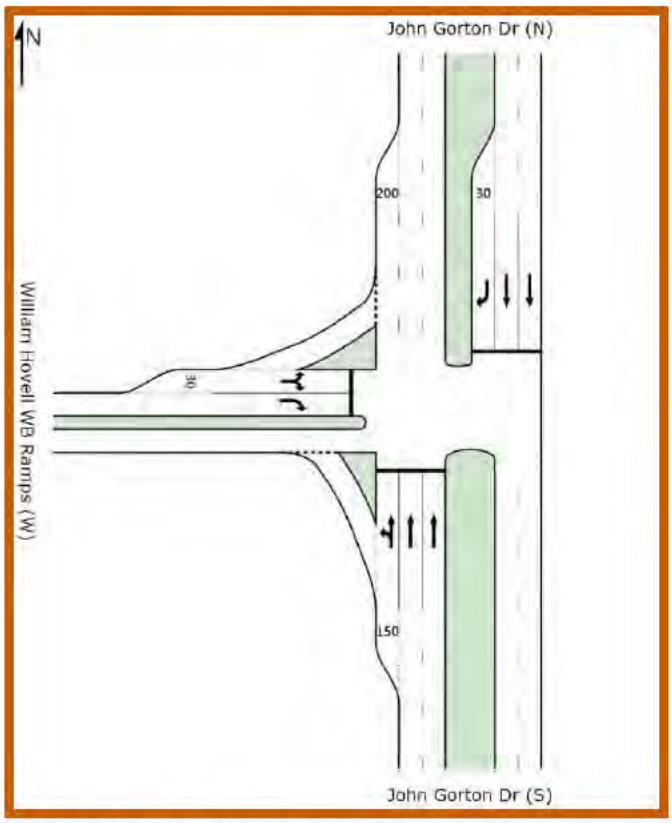

Figure 85: Intersection Layout of William Hovell Drive – John Gorton Drive (Folded Diamond South 2021)

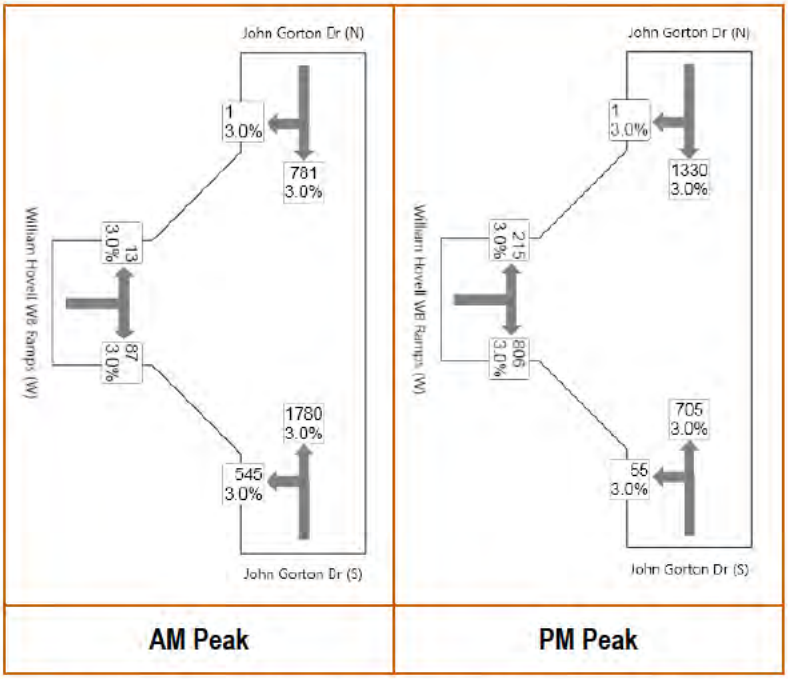

Figure 86: Hourly Volumes at William Hovell Drive – John Gorton Drive (Folded Diamond South 2021)

6.2.5.4 William Hovell Drive – Coulter Drive

Coppins Crossing Road is not connected to William Hovell Drive in this scenario. The intersection upgrade required for 2016 (described in Section 6.2.2) will operate at LOS C during the 2021 AM peak and LOS B during the 2021 PM peak.

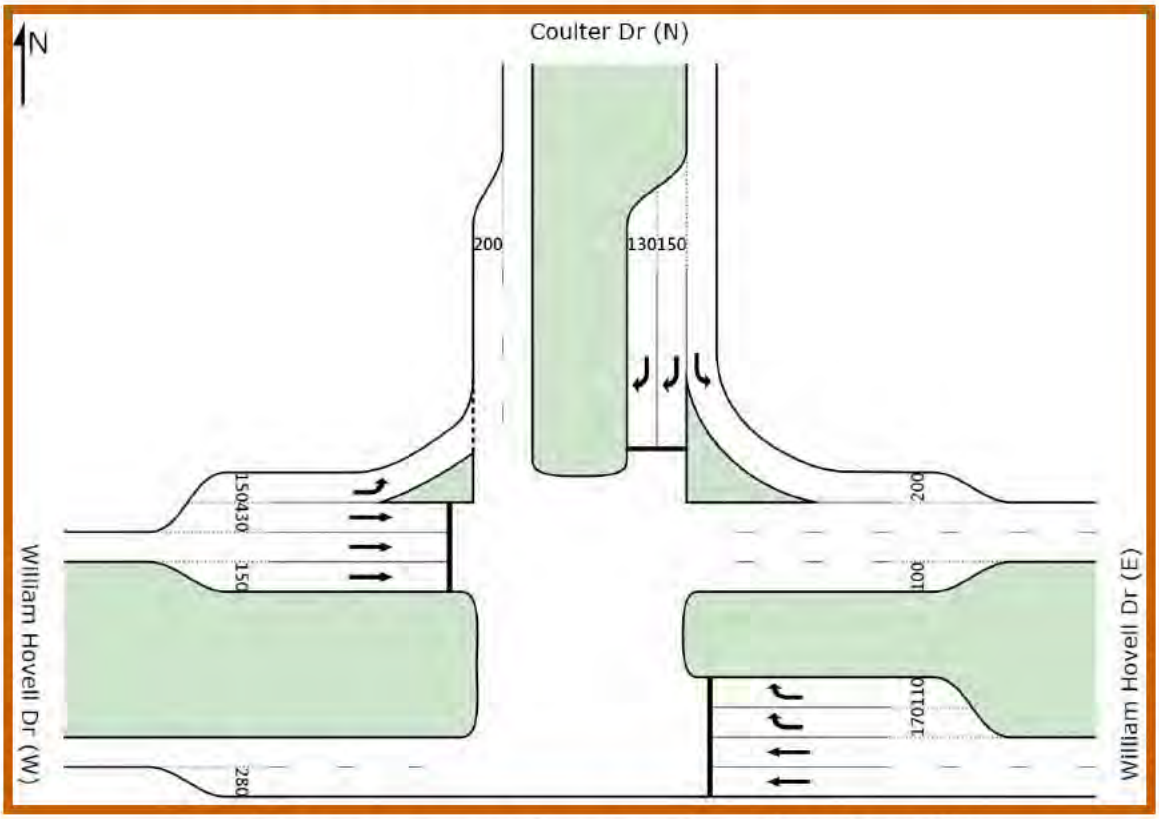

Figure 87: Intersection Layout of William Hovell Drive – Coulter Drive (2021)

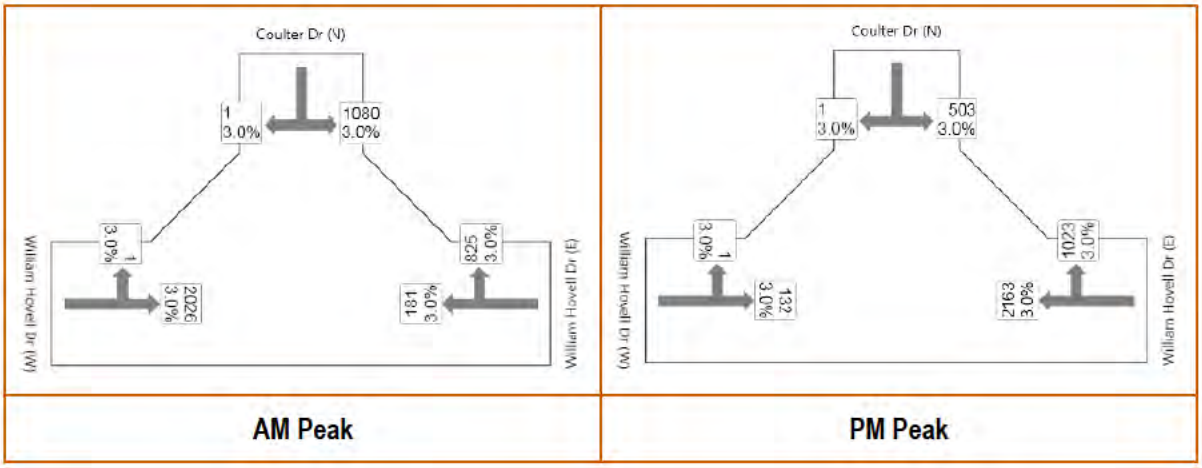

Figure 88: Hourly Volumes at William Hovell Drive – Coulter Drive (2021)

6.2.5.5 William Hovell Drive – Bindubi Street Eastbound Onramp Merge

The assessment shows that the merge is expected to operate within capacity, at LOS E during the AM peak and LOS A during the PM peak.

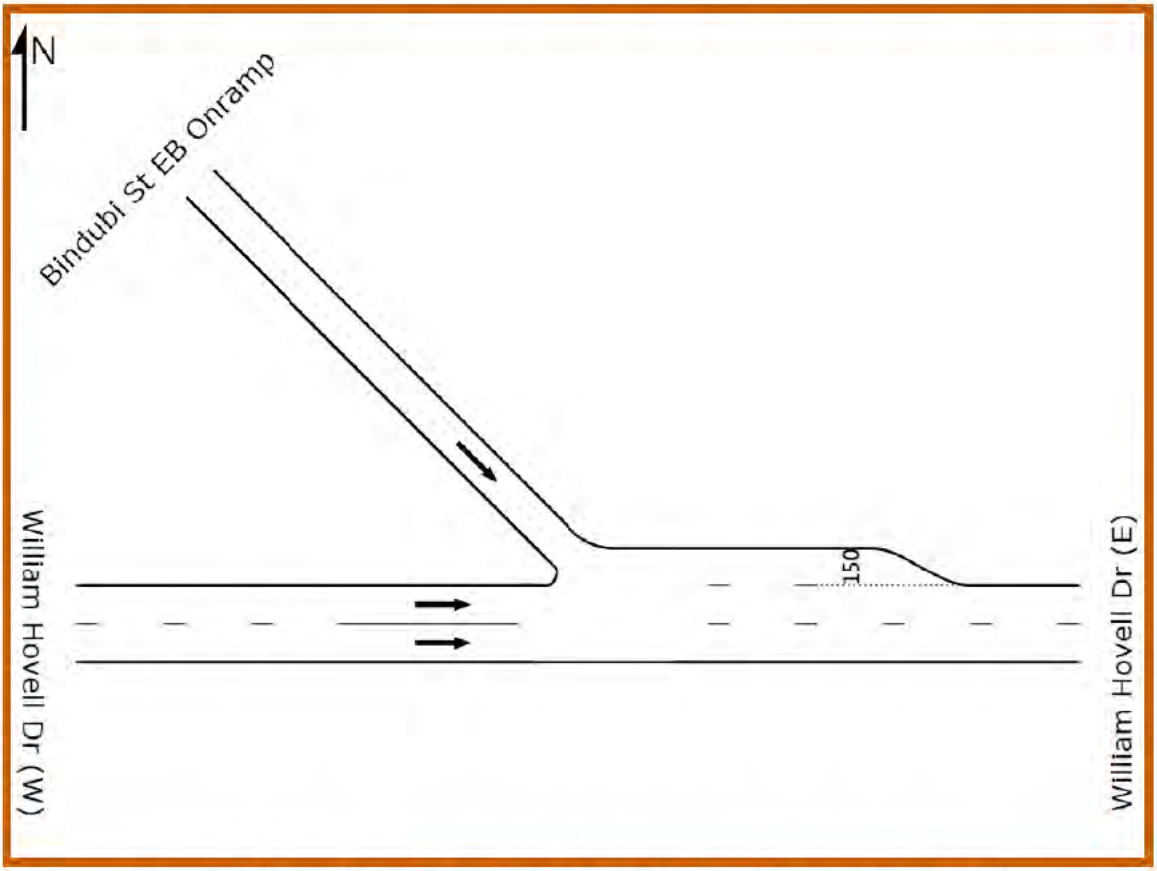

Figure 89: William Hovell Drive – Bindubi Street Eastbound Onramp Merge (2021)

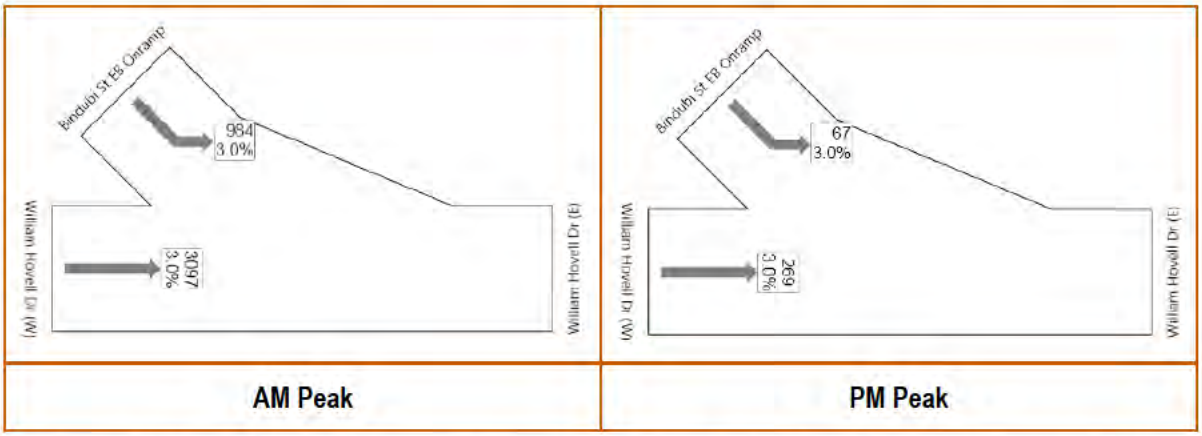

Figure 90: Hourly Merging Volumes at William Hovell Drive – Bindubi Street Eastbound Onramp (2021)

6.2.5.6 William Hovell Drive – John Gorton Drive Westbound Onramp Merge

This merge is expected to operate within capacity, at LOS B during the AM peak and LOS D during the PM peak.

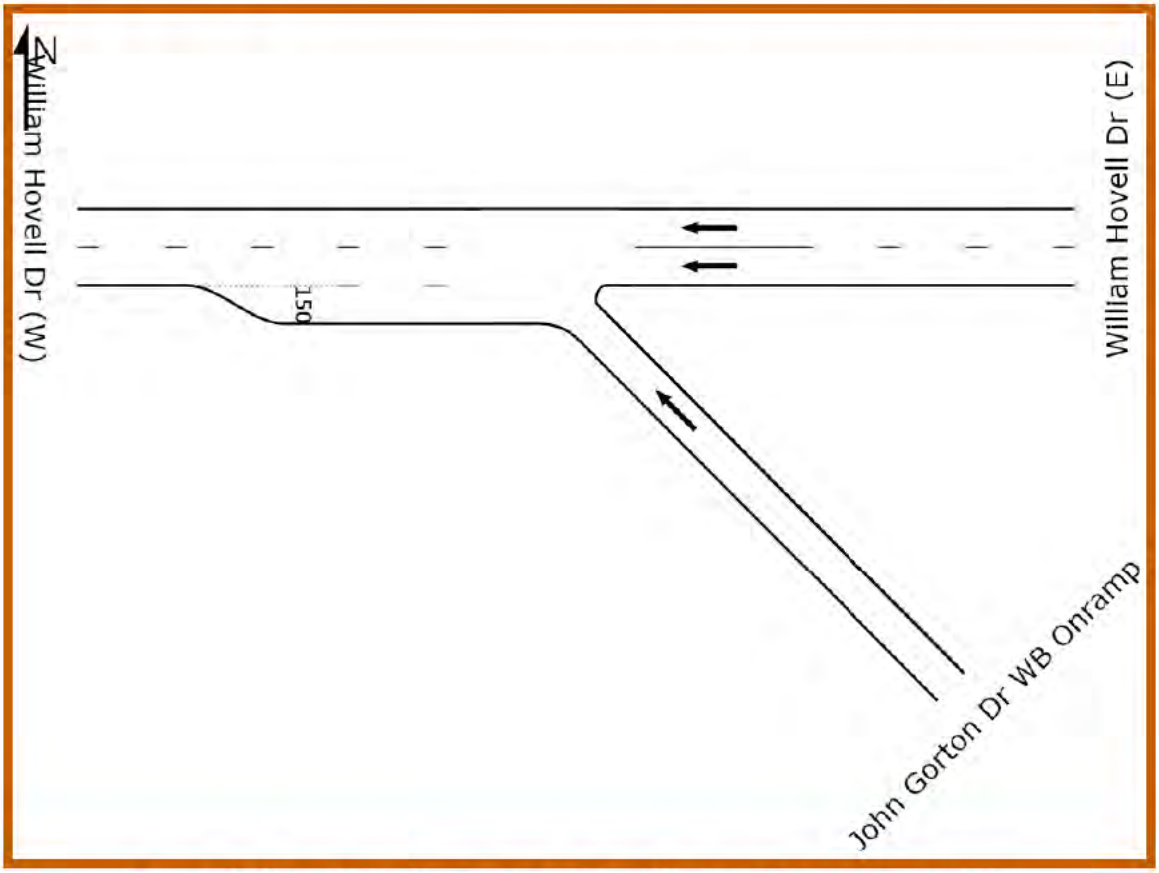

Figure 91: William Hovell Drive – Bindubi Street Westbound Onramp Merge (2021)

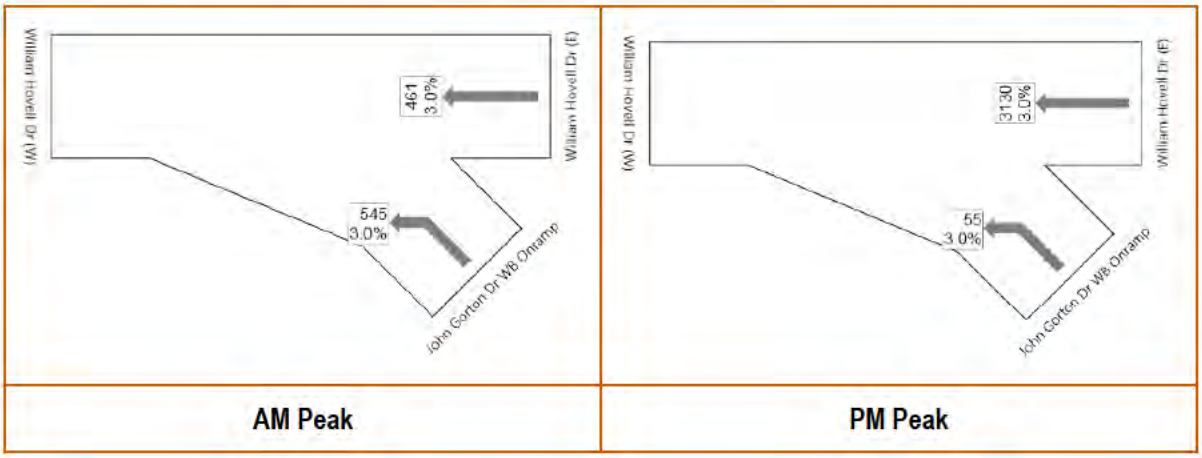

Figure 92: Hourly Merging Volumes at William Hovell Drive – Bindubi Street Westbound Onramp (2021)

6.2.5.7 William Hovell Drive Eastbound Weaving from Tuggeranong Parkway to John Gorton Drive

The weaving analysis shows that three lanes are required to provide sufficient capacity within the weaving area. This can be achieved by bringing the ramp from Tuggeranong Parkway on as an added lane, in contrast to the existing merge configuration. In addition, the weaving operation improves significantly by lane balancing the exit as shown in Figure 93. The analysis shows that with a weaving distance of 200 metres, performance is expected to be LOS A during the AM peak and LOS E during the PM peak.

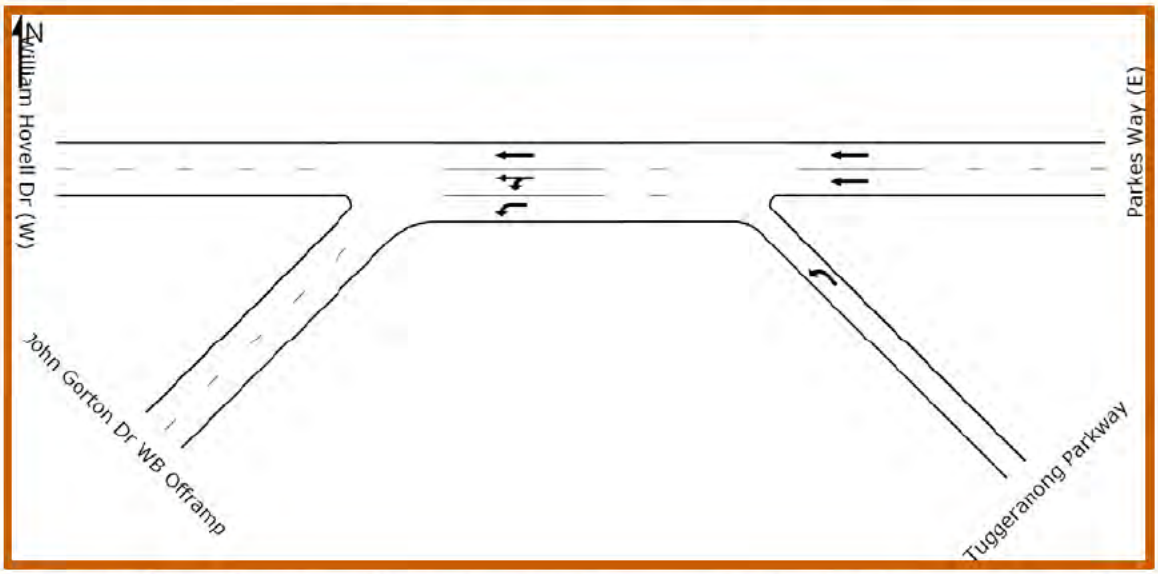

Figure 93: William Hovell Drive Weaving Area from Tuggeranong Parkway to John Gorton Drive (2021)

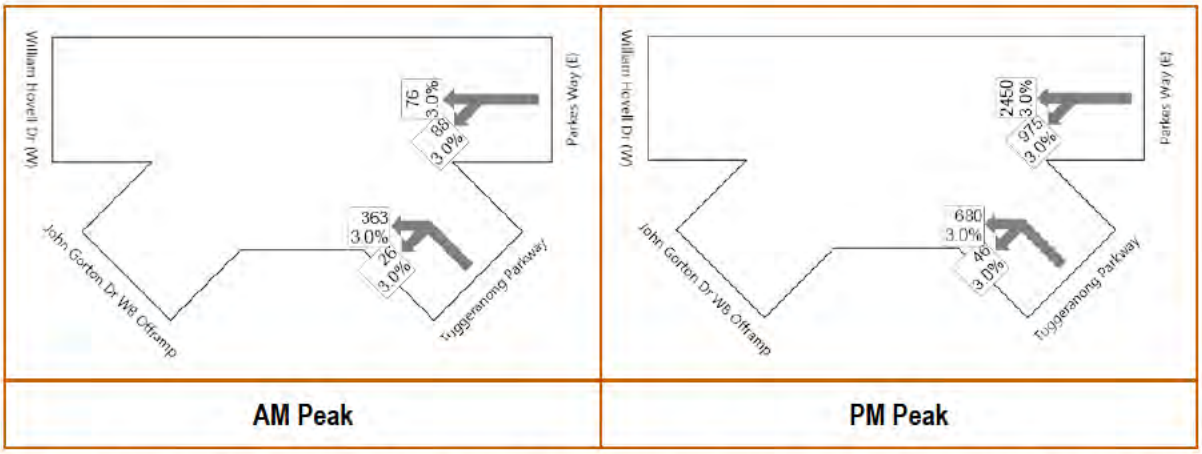

Figure 94: Hourly William Hovell Drive Weaving Volumes from Tuggeranong Parkway to John Gorton Drive (2021)

6.2.6 2031 William Hovell Drive – Coulter Drive Quadrant Option

The quadrant option maintains the location of the existing intersection of William Hovell Drive – Coulter Drive. The intersection of William Hovell Drive – Coppins Crossing Road is converted to a four-way, with the new northern leg connecting to Coulter Drive approximately 200 metres further north.

The layout employed here is used when there is a high volume in one quadrant (two adjacent approaches) of a road junction, and is described in *A Policy on Geometric Design of Highways and Streets* (AASHTO 2004, pp.571-572). In this case the largest volumes are the left turn from Coulter Drive to William Hovell Drive in the AM peak and the right turn from William Hovell Drive to Coulter Drive in the PM peak. The configuration improves performance by removing these heavy volumes from the four-way intersection of William Hovell Drive – Coulter Drive Extension.

Figure 95: Intersection Locations for Quadrant Option

6.2.6.1 Coulter Drive – Coulter Drive Extension (North)

The northern intersection (shown in Figure 96) is expected to operate at LOS B during the AM peak and LOS C during the PM peak. The limitation at this intersection is the conflict between the right turn from the north and the through movement from the south during the PM peak period.

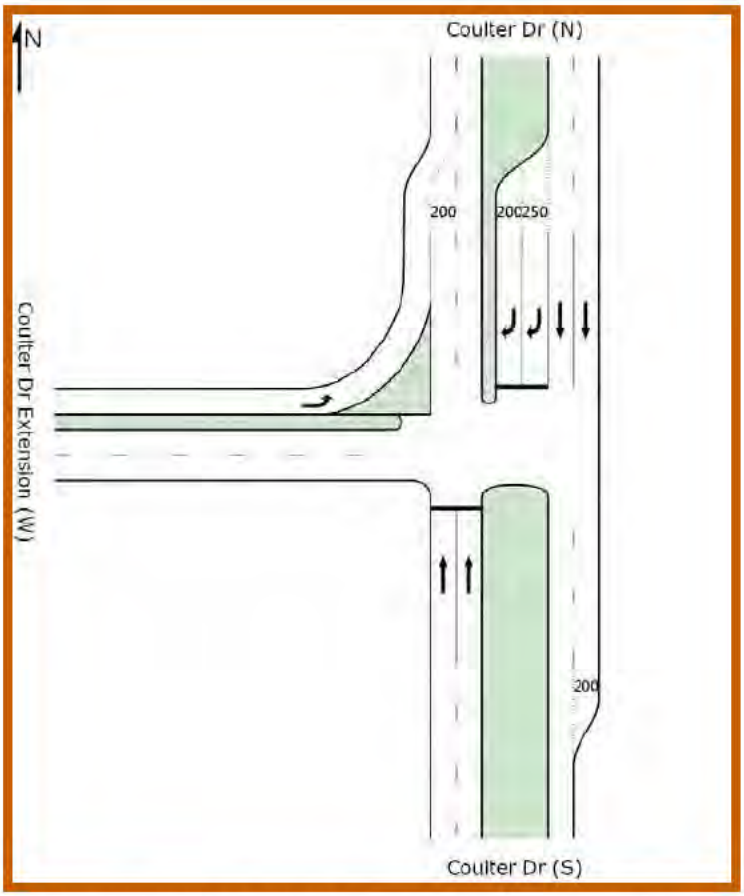

Figure 96: Intersection Layout of Coulter Drive – Coulter Drive Extension (Quadrant 2031)

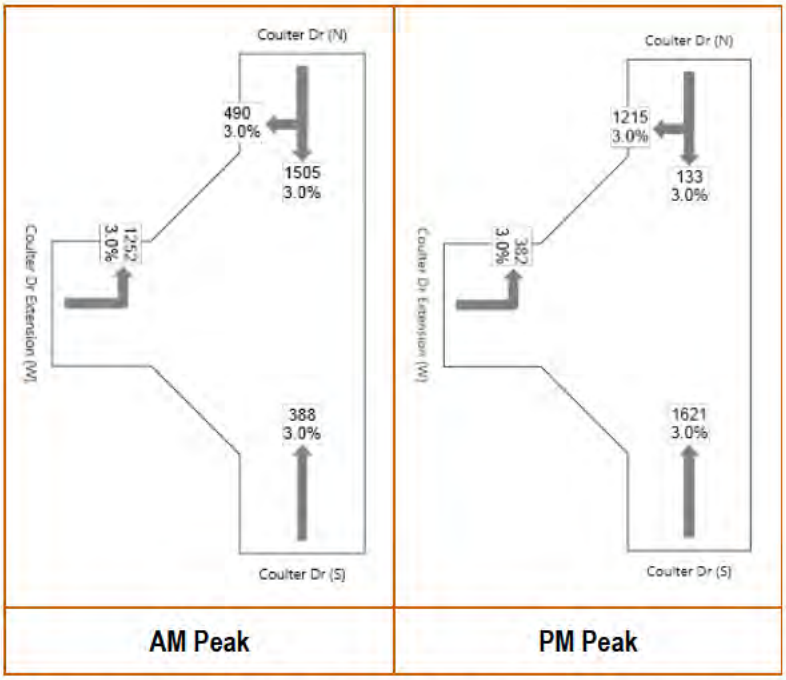

Figure 97: Hourly Volumes at Coulter Drive – Coulter Drive Extension (Quadrant 2031)

6.2.6.2 William Hovell Drive – Coulter Drive (East)

The eastern intersection (shown in Figure 98) is expected to operate at LOS C during the AM peak and LOS B during the PM peak. The major conflict occurs between the right turn from the east and the through movement from the west during the AM peak. During the PM peak the right turn from the east is also expected to be heavy.

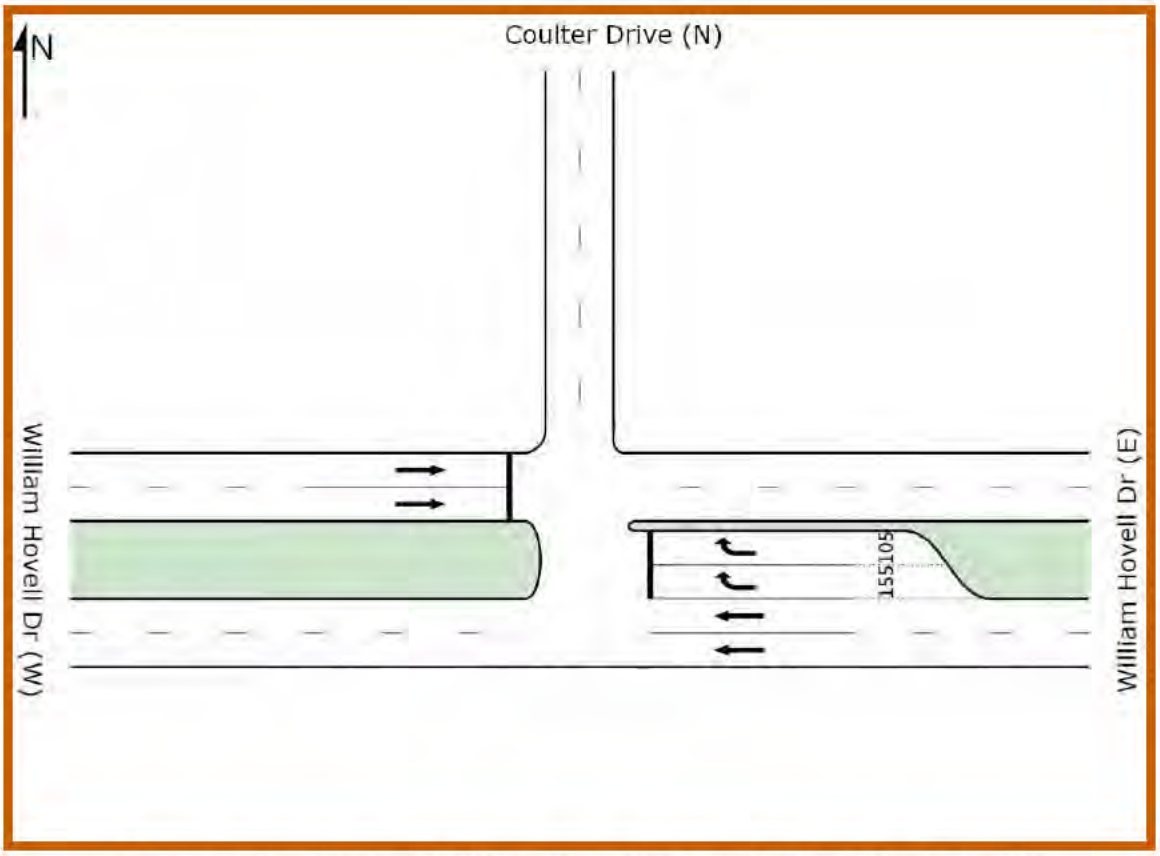

Figure 98: Intersection Layout of William Hovell Drive – Coulter Drive (Quadrant 2031)

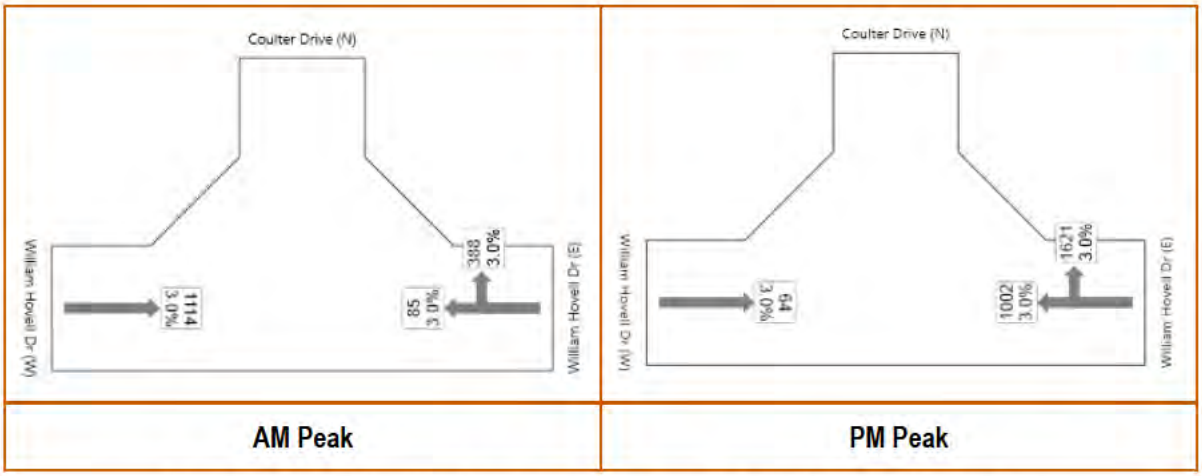

Figure 99: Hourly Volumes at William Hovell Drive – Coulter Drive (Quadrant 2031)

6.2.6.3 William Hovell Drive – Coulter Drive Extension (West)

The western intersection (shown in Figure 100) is expected to operate at LOS E during both weekday peak periods. The right turn movements at this intersection are relatively light and the intersection can operate acceptably with fewer lanes than the staggered T and four-way intersection options.

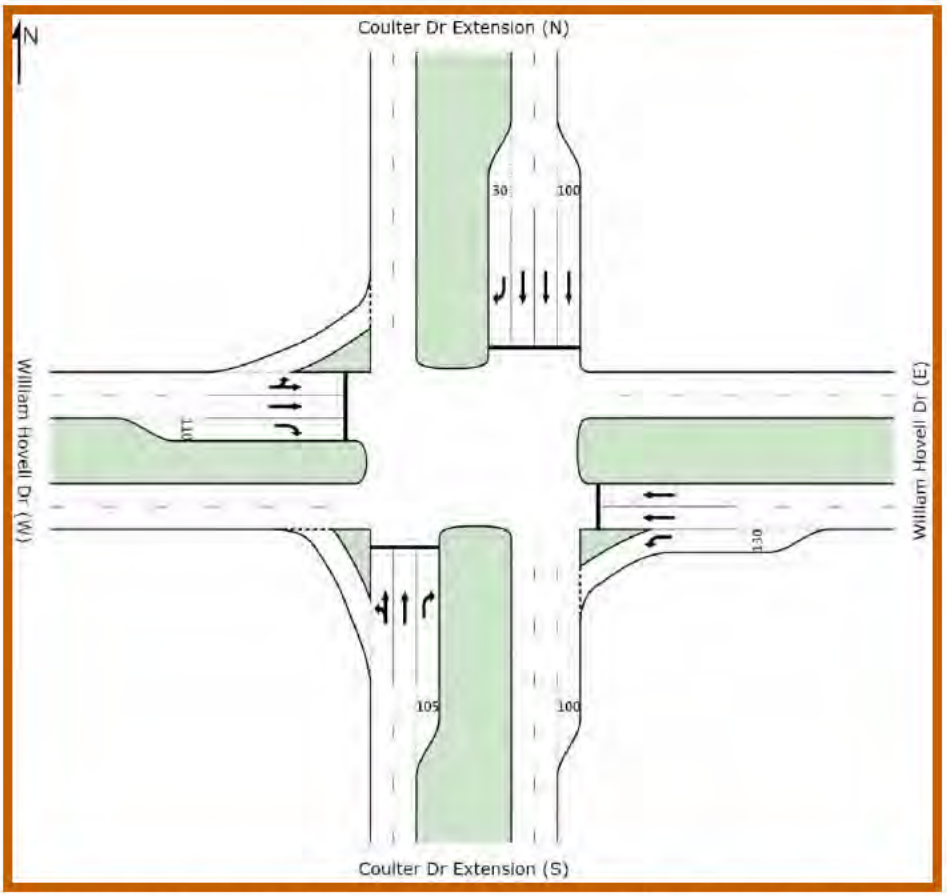

Figure 100: Intersection Layout of William Hovell Drive – Coulter Drive Extension (Quadrant 2031)

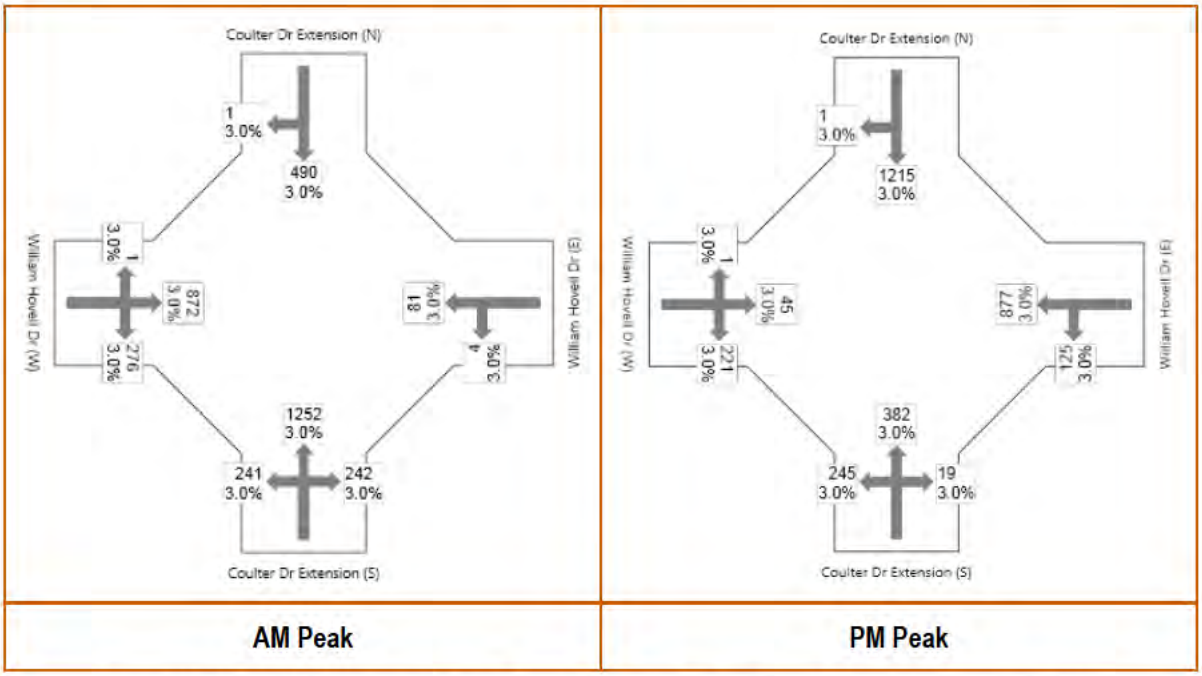

Figure 101: Hourly Volumes at William Hovell Drive – Coulter Drive Extension (Quadrant 2031)

6.2.6.4 William Hovell Drive – Coulter Drive Eastbound Onramp Merge

The Quadrant configuration maintains the existing left turn from Coulter Drive southbound to William Hovell Drive eastbound, with widening to accommodate the additional demand. This merge operates within its capacity and is expected to be LOS C during the AM peak and LOS A during the PM peak.

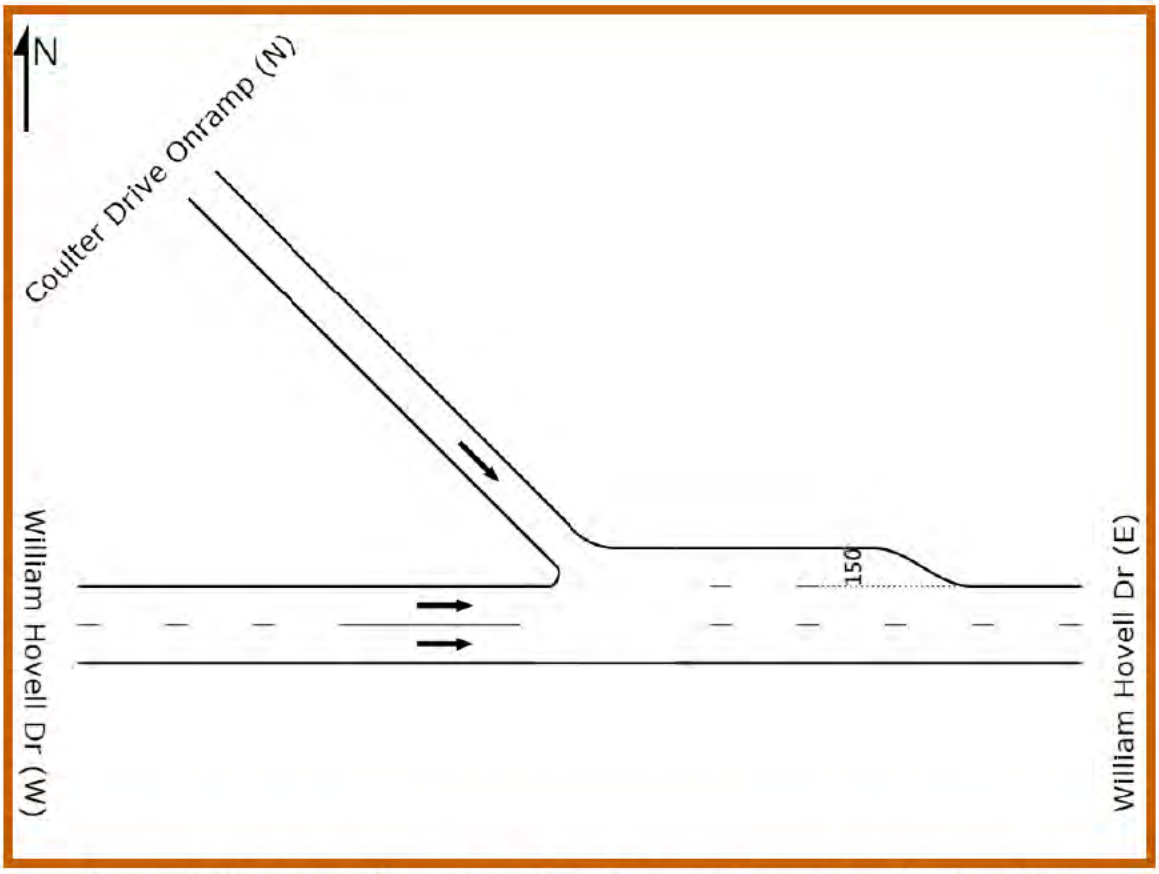

Figure 102: William Hovell Drive – Coulter Drive Eastbound Onramp Merge (Quadrant 2031)

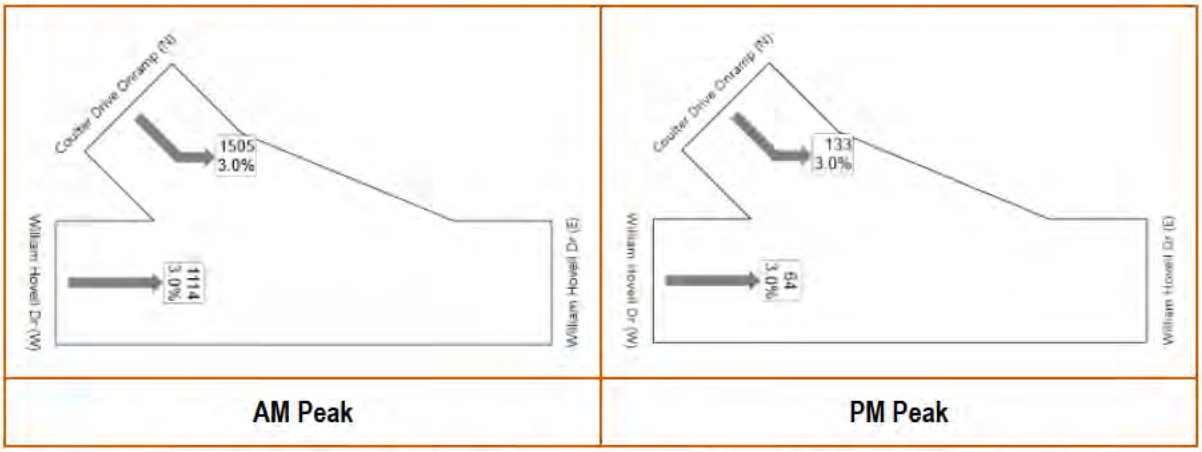

Figure 103: Hourly Merging Volumes at William Hovell Drive – Coulter Drive Eastbound Onramp (Quadrant 2031)