4 Model Calibration

4.1 Network Coding

The model network is shown in Figure 2. The model has been coded to a microsimulation standard within this area and the assignment takes place entirely within it.

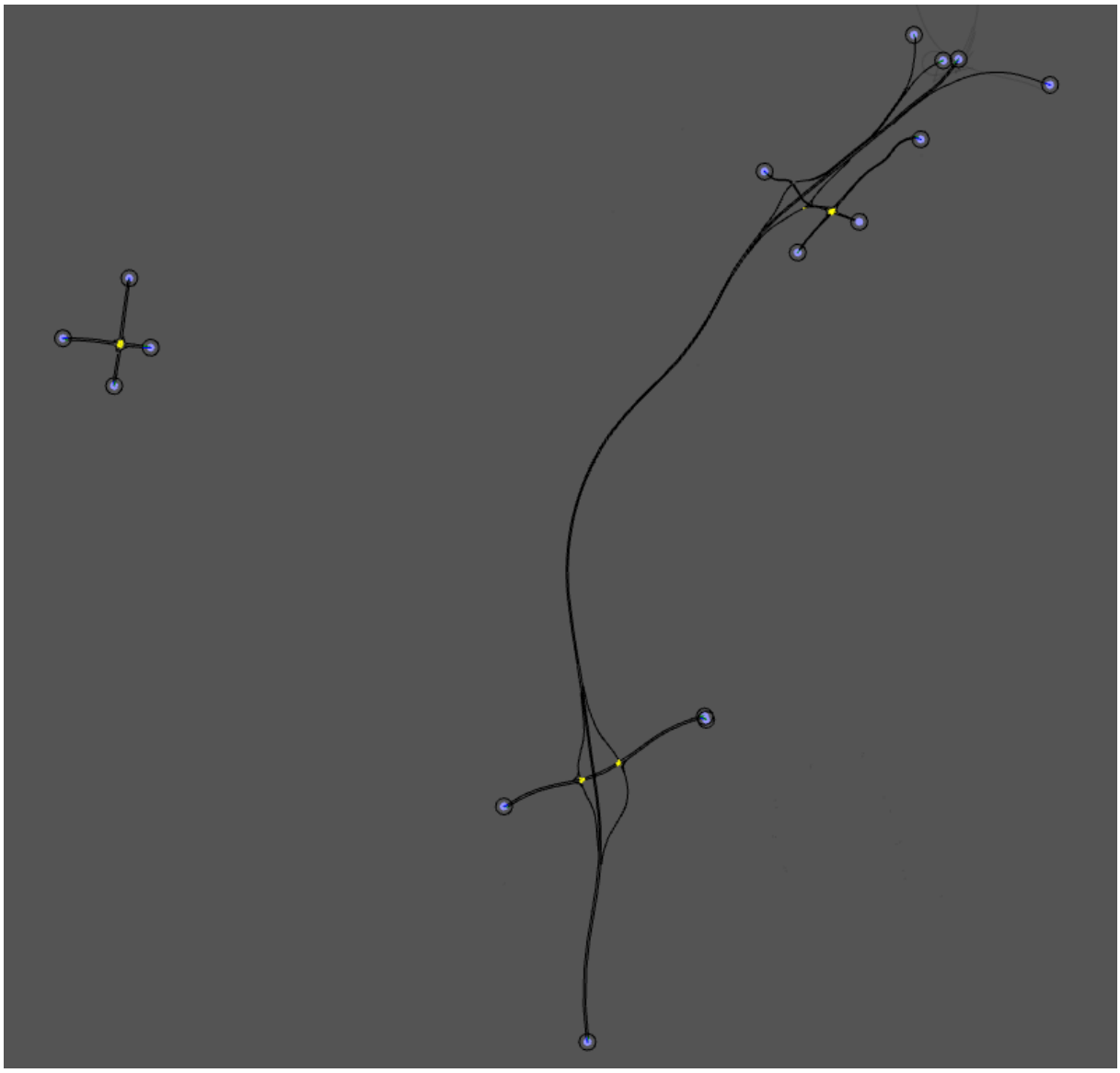


Figure 2: Aimsun Model Area

The model has been coded to micro-simulation standard, with all roads represented. All intersections in the area have been coded. The network was coded using recent aerial imagery from ACTMapi, TCD Grid drawings from TCCS and OSM data imported from Aimsun.

All speed within the study area have been coded according to the road speed limits as listed below:

- 100 km/h
  - Sections of Tuggeranong Parkway
- 90 km/h
  - Sections of Tuggeranong Parkway
- 80 km/h
  - Cotter Road

- 70 km/h
  - Lady Denman Drive
  - John Gorton Drive
- 60 km/h
  - Holborow Avenue

TCCS provided traffic signal data to inform the configuration of the traffic signals within the model. The following data were supplied for each intersection:

- Phase sequence
- Right turn operation
- Cycle length
- Phase timings
- Intergreen details
- Site linkage
- Pedestrian timing
- Detector location
- Intersection layout (schematic)
- Available phases

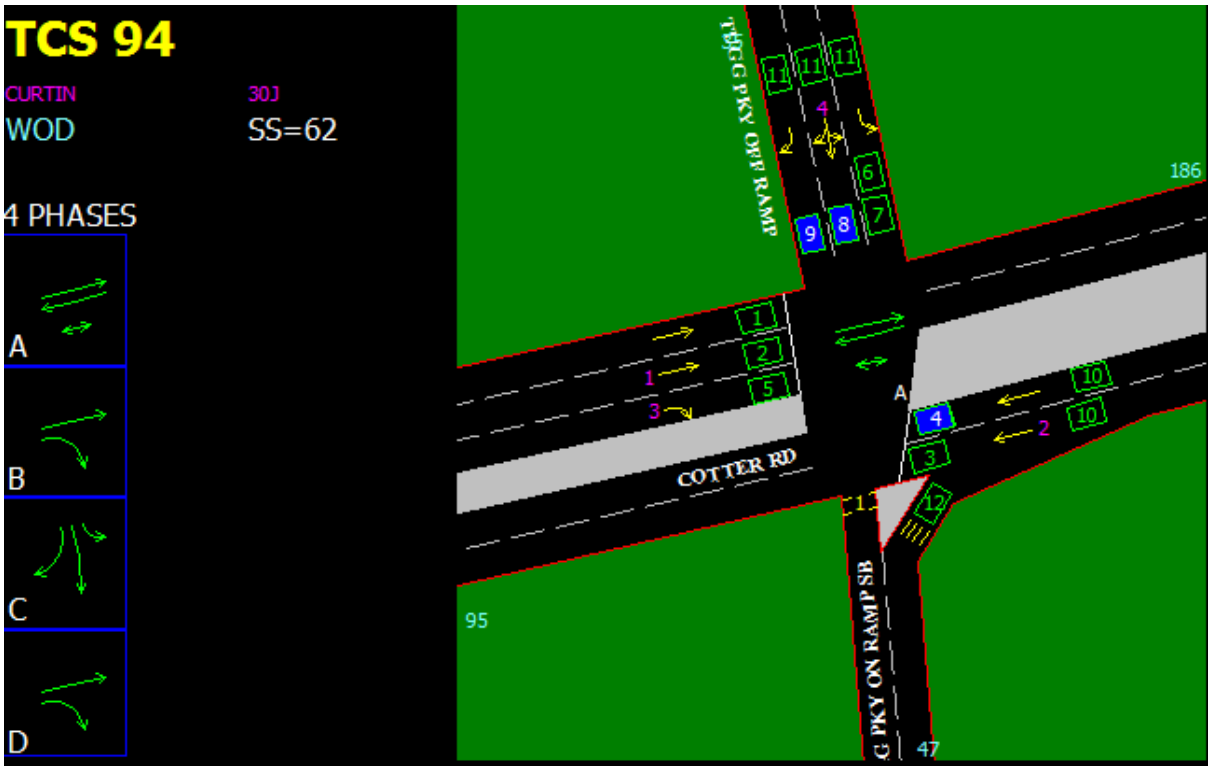
4.1.1 Cycle Time and Phase Splits

All the signal phase operations and phase times in the model have been manually configured based on the SCATS data. This data indicates which signal phases ran during the peak periods and the average duration for which each phase ran. This information was then used as the basis for creating the signal plans in the base model. The average phase times supplied by TCCS are presented in the following sections. The actual modelled phase times differ if the average is less than the sum of minimum green time and inter-green time (typically 12 seconds).

4.1.2 Signal Configurations

Signal configurations were provided by TCCS and are presented below.

4.1.2.1 Set 94 – Cotter Road / Tuggeranong Parkway SB Ramps



Site details

- Phase sequence: A-B-C at all times.

Right turn operation

- Right turns on all approaches are fully controlled (i.e. no filters).

Phase time and cycle length details

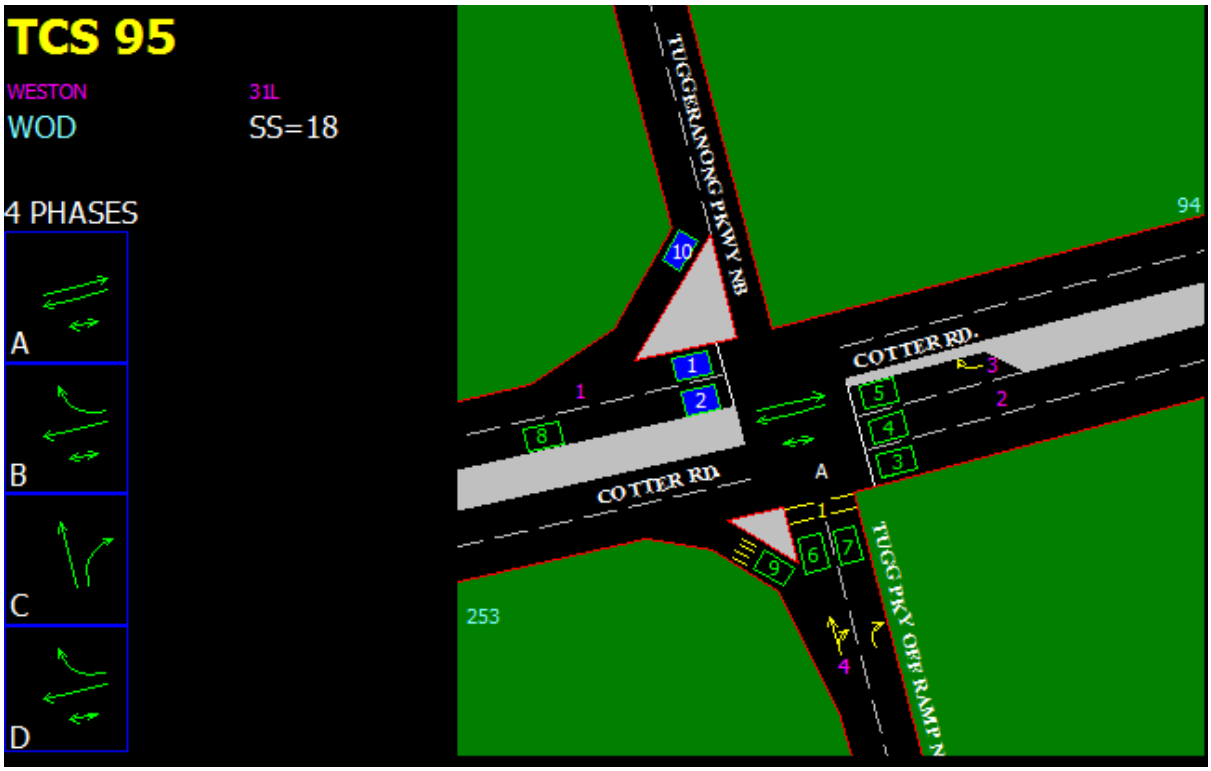
- Maximum cycle time is 120 sec
- Average phase time (sec) and cycle length (sec) details on 11-12 September 2019:

PEAK	TIME PERIOD	AVG CL	A	B	C
AM	0800-0900	120	65	17	38
PM	1700-1800	120	58	16	42
Late Start			0	0	8
Minimum Green time (sec)			8	8	5
Yellow Time (sec)			4	4	2
Red Time (sec)			2	2	7
Intergreen time (Yellow + Red)			6	6	65

Linking

- None

4.1.2.2 Set 95 – Cotter Road / Tuggeranong Parkway NB Ramps



Site details

- Phase sequence: A-B-C at all times.

Right turn operation

- Right turns on all approaches are fully controlled (i.e. no filters).

Phase time and cycle length details

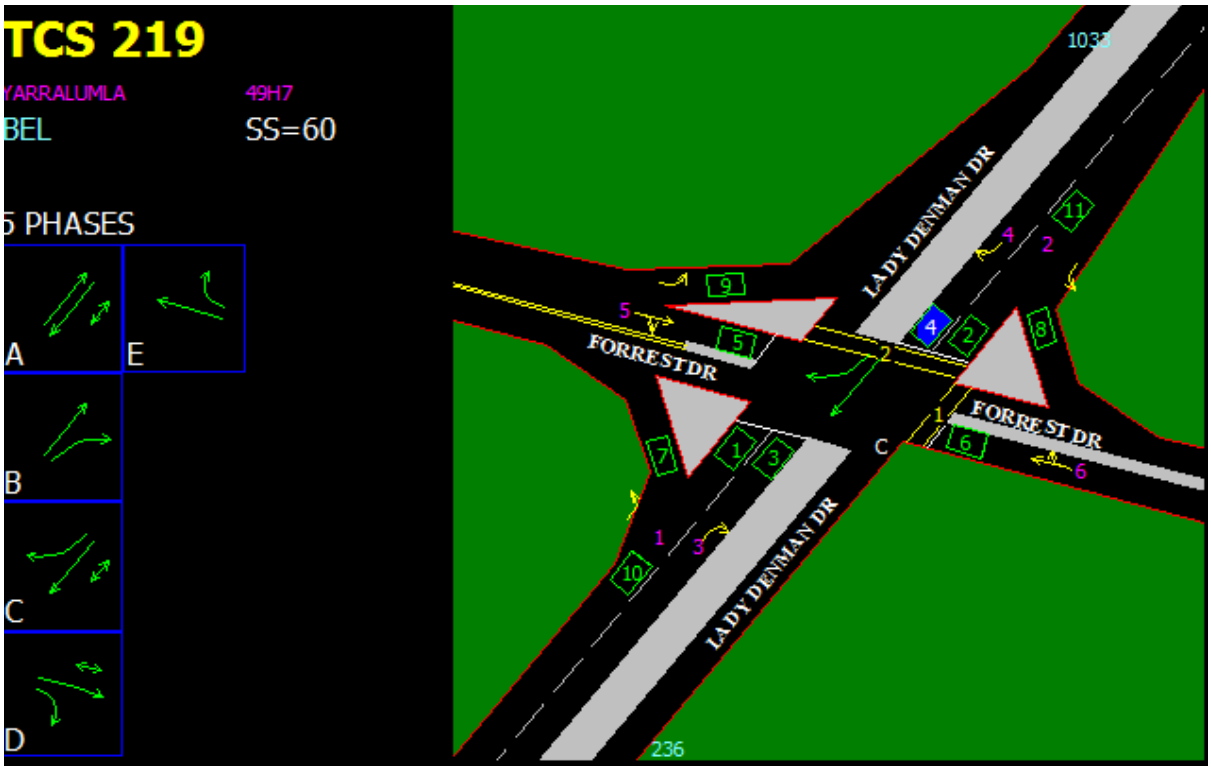
- Maximum cycle time is 120 sec
- Average phase time (sec) and cycle length (sec) details on 11-12 September 2019:

PEAK	TIME PERIOD	AVG CL	A	B	C
AM	0800-0900	120	68	25	27
PM	1700-1800	120	48	56	16
Minimum Green time (sec)			8	8	8
Yellow Time (sec)			4	4	5
Red Time (sec)			2	2	2
Intergreen time (Yellow + Red)			6	6	7

Linking

- Site is permanently linked to Cotter Rd/ Tuggeranong SB ramp intersection (Set 094)

4.1.2.3 Set 219 – Lady Denman Drive / Forest Drive



Site details

- Phase sequence: A-B-D-E-C.

Right turn operation

- Right turns on Lady Denman Dr are fully controlled (i.e. no filters).

Phase time and cycle length details

- Maximum cycle time is 120 sec.
- Average phase time (sec) and cycle length (sec) details on 11-12 September 2019:

PEAK	TIME PERIOD	AVG CL	A	B*	D	E	F
AM	0800-0900	80	17	15	33	15	18
PM	1700-1800	100	18	16	42	15	29
Minimum Green time (sec)			8	8	8	8	16
Yellow Time (sec)			4	4	5	5	5
Red Time (sec)			2	2	2	2	2
Intergreen time (Yellow + Red)			6	6	7	7	7

* B phase was demanded only once in AM and 6 times in PM.

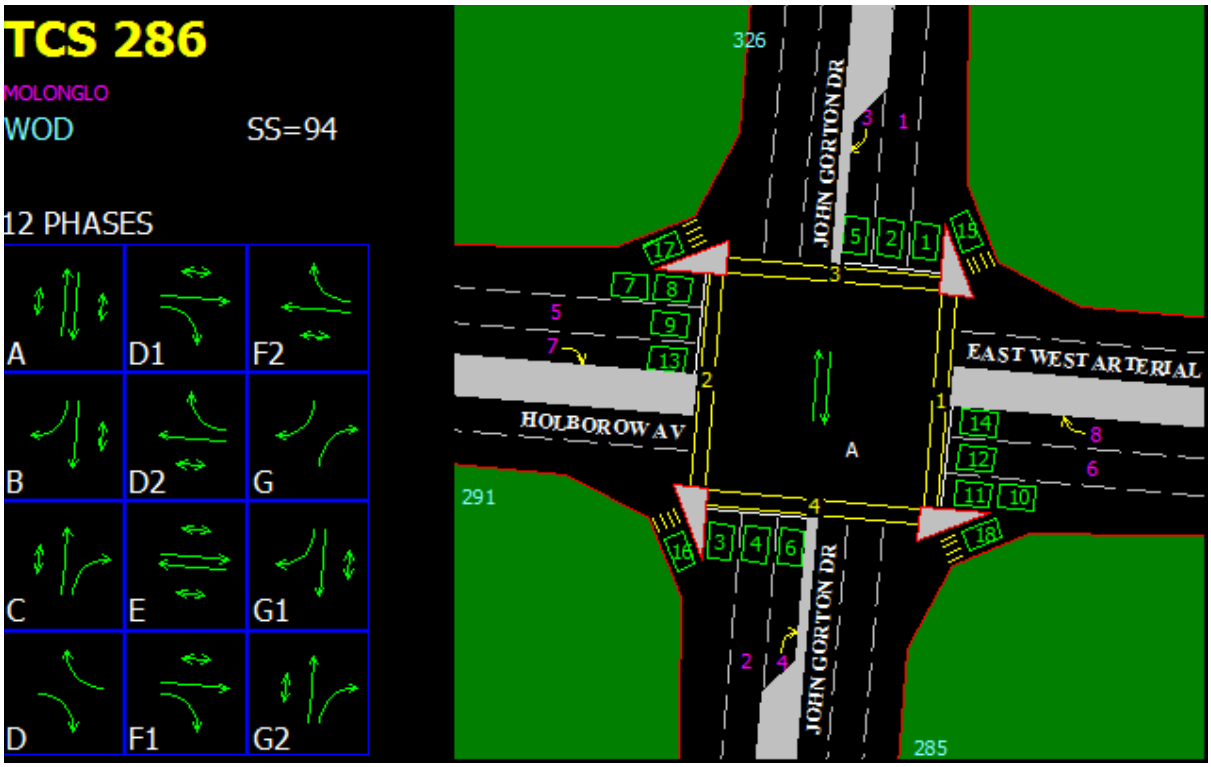
*** C was demanded 26 times in PM peak.

** E phase demanded 8 times in AM and 19 times in PM.

Linking

- None (Master site)

4.1.2.4 Set 286 – John Gorton Drive / Holborow Avenue



Site details

- Phase sequence: A-D-E-G2 at all times.
- As East-West arterial is not in operation, the site always runs G2 (instead of G). Also for the same reason, there are no demands recorded for E phase.
- Double diamond operation.

Right turn operation

- Right turns on all approaches are fully controlled (i.e. no filters).

Phase time and cycle length details

- Maximum cycle time is 120 sec
- Average phase time (sec) and cycle length (sec) details on 11-12 September 2019:

PEAK	TIME PERIOD	AVG CL	A	D	E	G2
AM	0800-0900	75	62	15	15	15
PM	1700-1800	75	69	15	15	15
Minimum Green time			8	8	8	8
Yellow Time			4	4	5	4
Red Time			2	2	2	2
Intergreen time (Yellow + Red)			6	6	7	6

* D phase was demanded 15 times in peak hours, out of 48 cycles.

** G2 was demanded 20-23 times in peak hours, out of 48 cycles.

*** E phase wasn't demanded in either of peak periods.

Linking

- In morning peak, site is linked to Edinburgh Ave/ Parkes Way ramps (Set079)
- Rest of the day, site is linked to Edinburgh Ave/ Marcus Clarke St (Set031).

Signals Coordination

- None (Master site).

4.2 Demand Estimation

The data used to develop existing base case demand matrices are from two key sources:

- Demand matrices from the CSTM
- Traffic counts:
  - Signalised intersection inductive loop counts
  - Manual intersection turning movement counts

Initial trip matrices were extracted from the CSTM. These matrices represent the number of vehicles travelling into, out of and through the model sub-area cordon modelled in the CSTM. The base model matrices represent the morning and evening peak periods for a typical weekday in 2016, which is considered appropriate for a seed matrix for 2019.

The traffic demand for the road network was estimated as a zone to zone trip matrix for each of the peak periods. The development of these matrices is described in the following subsections.

For each of the peak periods, a sub-area pattern matrix was generated using the static traversal tool in Aimsun as a basis for generating each final 2019 traffic demand matrix. The pattern matrices were then modified using Aimsun's static adjustment tool to match the observed traffic counts. The process was as follows:

- Identified, for each count location, the origin-destination pairs whose traffic would pass through the count location
- Expressed an estimate of the count as the sum of the volumes in the identified origin-destination pairs
- Compared the estimated volumes with the counted volumes and average the GEH statistic of the differences
- Adjusted the values of the prior matrices to minimise the average of the GEH statistic of the differences.

This methodology is carried out by Aimsun during the OD matrix adjustment process. It undertakes the process iteratively, progressively refining the outcome. The output is a matrix that, when assigned to the network, much more closely matches the observed counts than the input matrix.

4.3 Vehicle Behaviour

The traffic assignment is a dynamic, microscopic simulation with Stochastic Route Choice (SRC). The SRC method begins by calculating the initial shortest path for each OD pair using the defined initial costs. In the case of this model, there is no realistic route choice so a prior path assignment is not used as an input. After the 30 minute warm-up period, the travel times are calculated. The route choice cycle is 15 minutes and 100% of vehicles are allowed to adjust their routes.

4.4 Specific Calibration Adjustments

A number of specific network adjustments were incorporate to achieve queuing behaviour resembling real-world conditions. These were validated qualitatively based on local knowledge of site conditions and queue observations provided by Roads ACT.

4.4.1 Cotter Road Interchange

To control the length of queues forming on the southbound off-ramp from Tuggeranong Parkway to Cotter Road, the turning speed for both left and right turning movements into Cotter Road was reduced. The automatic curve speed for the left and right turning movements is 26.3 km/h and 46.7 km/h respectively. These were reduced to 20 km/h and

30 km/h respectively. The effect of this is to sustain a rolling queue that generally extends to the two-lane section of the ramp.

To better balance the observed volume and the queuing behaviour on the northbound on-ramp, the micro-simulation lane changing cooperation on the link downstream of the merge point was increased slightly to 83%.

4.4.2 Forest Drive Interchange

To control the length of queues forming on Tuggeranong Parkway southbound approaching the off-ramp to Forest Drive, a combination of measures was required:

- In consultation with Roads ACT, a fourth kerbside lane was added to simulate the behaviour of exiting traffic queuing in the shoulder during the weekday AM peak period. This specific adjustment was not required in the PM peak period.
- On the turn from Tuggeranong Parkway southbound to the off-ramp, the lookahead distances and wait time before losing turn have been greatly increased to encourage vehicles to get in the correct lane sooner.
- To simulate the give-way behaviour at the left turn from the off-ramp into Forest Drive eastbound and the subsequent left turn from Forest Drive to Lady Denman Drive northbound and to induce queues that extend out of the ramp on to Tuggeranong Parkway, the speed of the approach links has been reduced to 20 km/h in both cases.

5 Model Validation

The ACT Traffic Microsimulation Modelling Guidelines (February 2019) was used as a main guideline for base year model development and calibration process.

The guidelines specify statistical criteria that can be used to assess whether a microsimulation model is adequately representing existing:

- Traffic volumes
- Signal timings

The traffic surveys conducted during November 2019 form the basis of the traffic volume validation.

The signal set up and input data have been discussed in detail in Section 4.1.2.

The traffic volumes are calibrated on a network wide basis using the GEH statistic as per validation criteria given in the ACT guidelines. The GEH statistic is calculated for each surveyed intersection turning movement, or link volume where turning movements cannot be separated, to compare the model and observed traffic volumes.

To achieve calibration, the guideline stipulates that, for the entire network, the following calibration targets should be achieved:

- 85 per cent of count sites with a GEH statistic less than five
- Sites with GEH statistic greater than 10 are undesirable and require explanation if they exist
- Coefficient of determination (R^2) should be greater than 0.9

In addition, the slope of the relationship between counted and modelled sites should be within 0.05 of unity.

5.1 Calibration and Validation Results

The modelled traffic volumes, taken as the average of five different seed runs, have been compared to the observed volumes at the locations described in Section 2.1 during the estimation process. The GEH statistic has been calculated for each intersection turning movement count or midblock volume where individual turning movements could not be separated in the SCATS data.

Table 4: Model Calibration

NETWORK WIDE CALIBRATION CRITERIA	AM PEAK	PM PEAK
85% of observations must have GEH < 5	100%	100%
All observations with GEH > 10 must be explained	N/A	N/A
R^2 must be > 95%	99.9%	99.9%
Slope = 1 ± 0.05	0.99	0.98

The estimation shows good correlation in both peak periods, with correlation above 95% in both the AM and PM peaks. There are no movements in either peak period with a GEH value above 5. The slope is within range in both peak periods. Therefore, the AM and PM peak models are considered to be appropriately calibrated to the observed traffic volumes. Based on this result, it is very likely that the future year models would provide a good representation of traffic operations where similar levels of model coding and accuracy are applied.

5.2 Queue Behaviour Diagrams

Some example diagrams from the models are included below to demonstrate the calibrated model behaviour.

5.2.1 Forest Drive Queue Behaviour

An example of the AM peak queuing at Forest Drive is given in Figure 3. This queue occasionally extends further to the north. There is not a significant queuing issue here in the PM peak period.

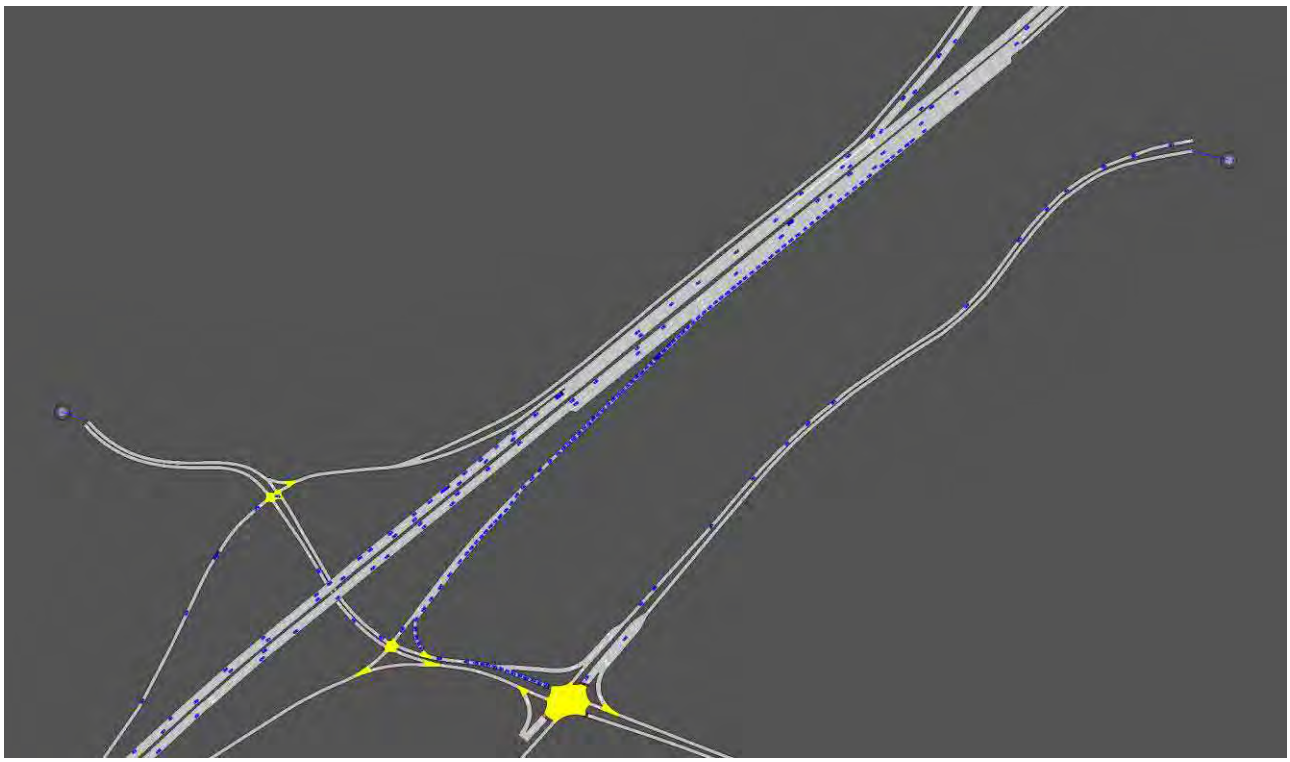


Figure 3: Forest Drive Queuing (AM Peak Period)

5.2.2 Cotter Road Queue Behaviour

Queue development on the Cotter Road northbound on-ramp and Cotter Road eastbound during the AM peak period is shown in Figure 4. An example of the PM peak period queue development on the southbound off-ramp is shown in Figure 5.

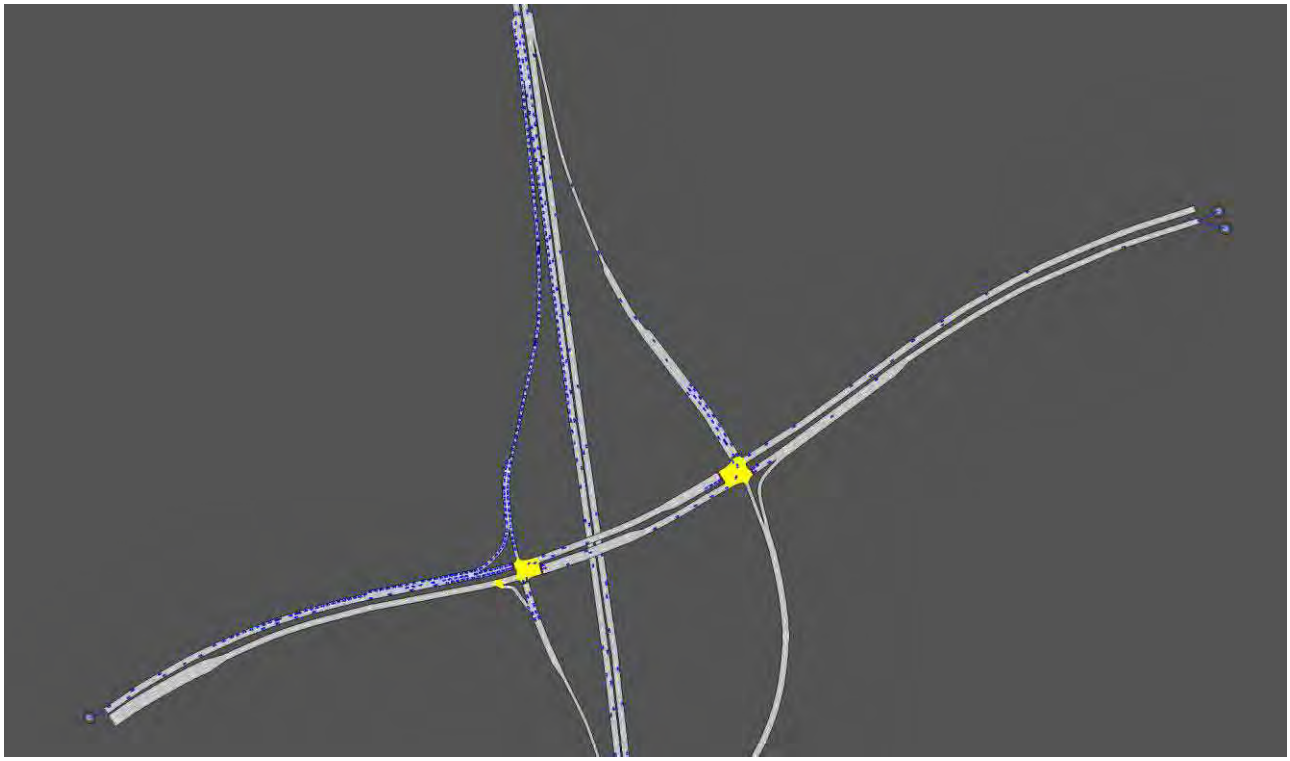


Figure 4: Cotter Road Queuing (AM Peak Period)

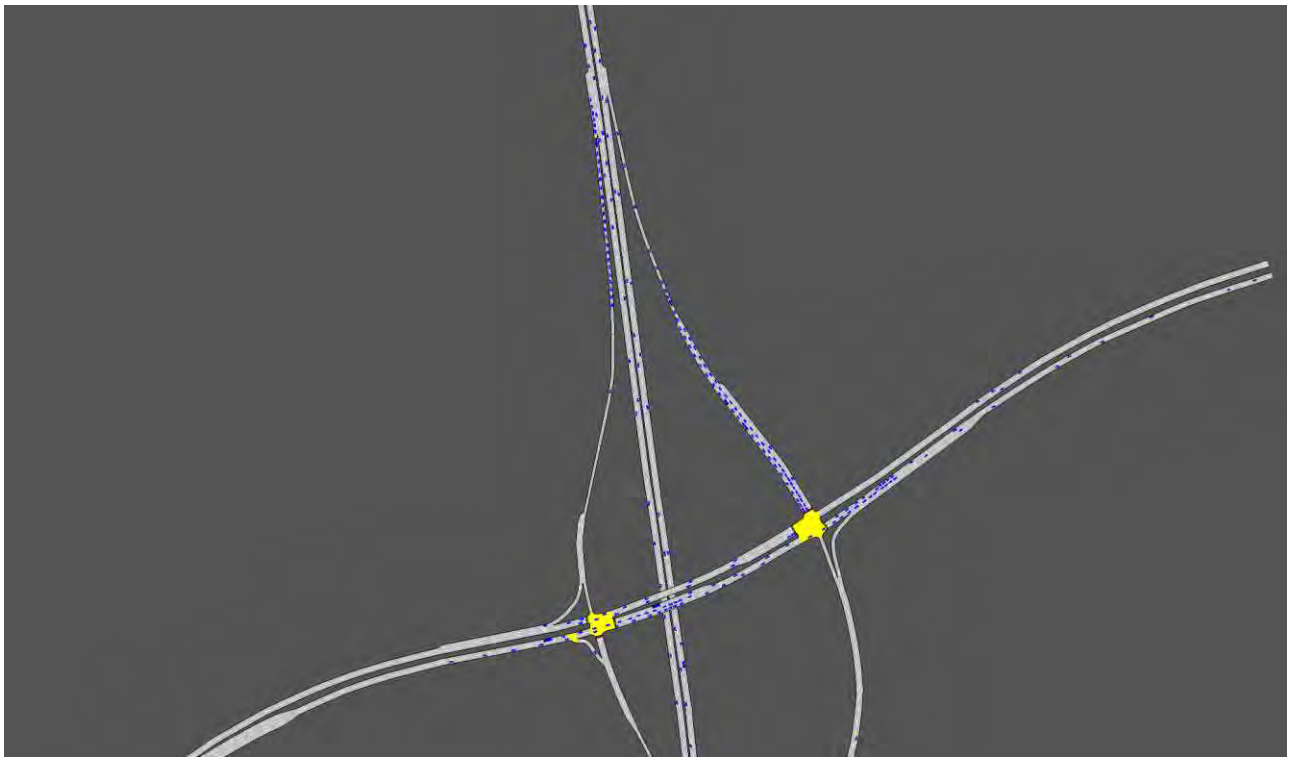


Figure 5: Cotter Road Queuing (PM Peak Period)

6 Model Stability

6.1 Results Comparison Across Five Seed Runs

The model stability has been assessed by comparing the following three model outputs across five seed runs:

- Number of vehicles in the network.
- Total network travel time.
- Average network speed.

These outputs are shown graphically in Figure 6, Figure 7 and Figure 8, respectively. Some variability is visible in the AM model, which is a reflection of the unpredictably of the queue behaviour on the Cotter Road northbound on-ramp and the Forest Drive southbound off-ramp.

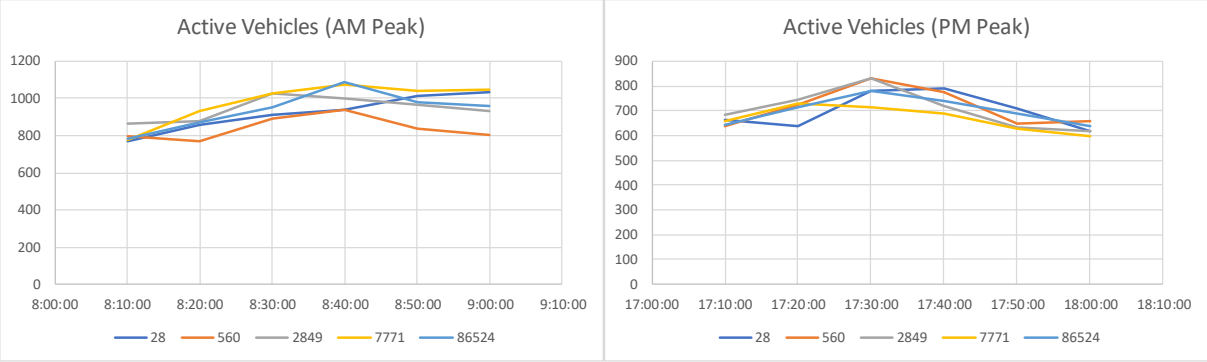


Figure 6: Number of Vehicles in the network

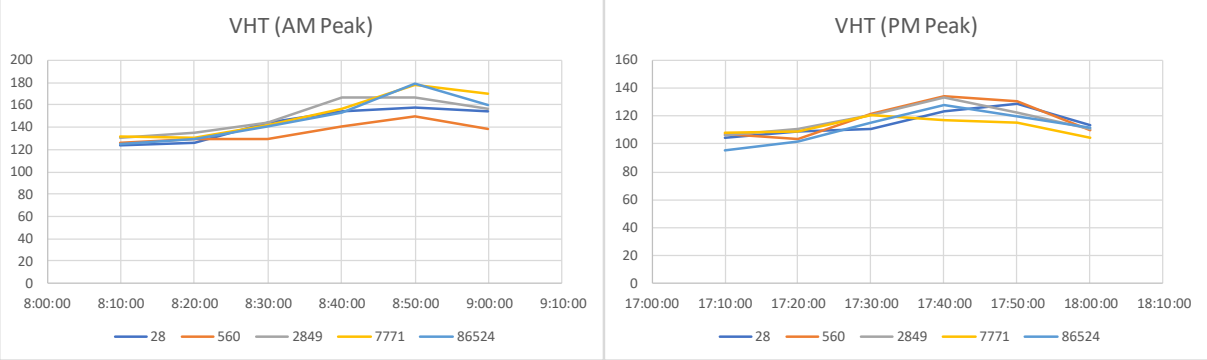


Figure 7: Network Travel Time

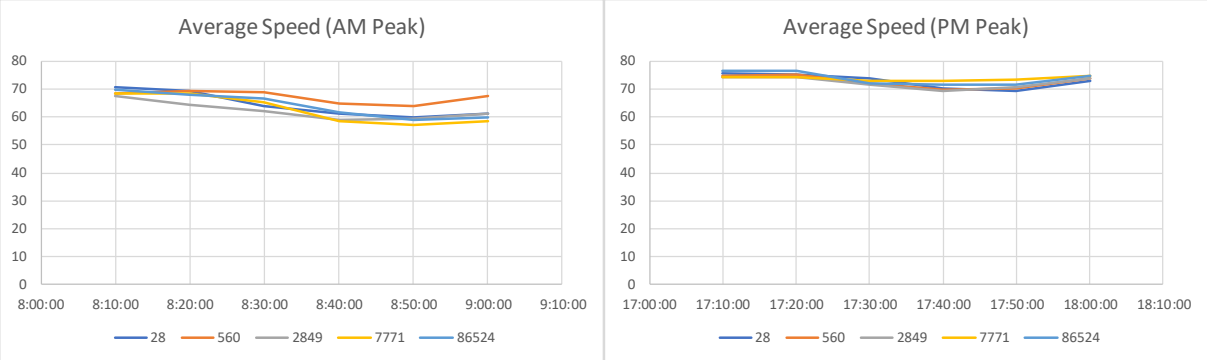


Figure 8: Average Network Speed

7 Model Limitations

The primary limitation of the model is a relative shortage of existing data. For this project, it was not possible to collect current travel data due to the changed travel patterns arising from the travel restrictions in place for the COVID-19 crisis. However, it is felt that the model can still be calibrated to a sufficient level for this project, where the outputs will not be used for the detailed design of a road.

Some effort has been put into ensuring that the model reflects real-world queuing behaviour at the Cotter Road and Forest Drive interchanges, on a qualitative basis. Other queues occur in the area, notably through Glenloch Interchange from Tuggeranong Parkway to Caswell Drive, as a result of the northbound on-ramp merging with Caswell Drive. This occurs outside the model and so the effect of this (significant) queue is not reflected in the model.

8 Conclusions

This report summarises the development and calibration process for the base models of the EWA road network.

8.1 Summary

A microsimulation model using stochastic route choice assignment functionality of Aimsun 8.4 has been developed for the area around the Molonglo EWA.

Observed traffic counts from May 2017, November 2019 and outputs from the recently calibrated CSTM were used to generate AM and PM base OD matrices for the 2019 model year.

Calibration of the model was conducted to match existing road network and intersection behaviour, using recent aerial imagery and signal control plans provided by TCCS.

Validation of the model was conducted against the observed traffic count data. The outcomes of the traffic count validation, with model volumes taken as the average of five different seed runs, are shown in Table 5. 100% of movements in both peak periods have a GEH statistic less than 5. The estimation shows good correlation in both peak periods, with better than 95% correlation. The slope in both peak periods is also within the required range of 0.95-1.05.

Table 5: Model Calibration Results

NETWORK WIDE CALIBRATION CRITERIA	AM PEAK	PM PEAK
85% of observations must have GEH < 5	100%	100%
All observations with GEH > 10 must be explained	0	0
R^2 must be > 95%	99.9%	99.9%
Slope = 1 ± 0.05	0.99	0.98

Therefore, the AM and PM peak models are considered appropriately calibrated to the observed traffic volumes. Based on this result, it is very likely that the future year models would provide a good representation of traffic operations where similar levels of model coding and accuracy are applied.

8.2 Conclusion

The baseline Aimsun traffic model has been adequately calibrated and validated to the prescribed modelling guidelines.

Appendix A GEH Outputs

2019 AM Validation GEH

INTERSECTION	APPROACH	TURN	OBSERVED	MODELLED	GEH
Cotter Rd Southbound ramp	North	All	1164	1148	0.5
	East	T	552	564	0.5
		L	141	139	0.2
	West	R	126	115	1.0
		T	1791	1781	0.2
Cotter Rd Northbound ramp	East	R	194	197	0.2
		T	846	854	0.3
	South	R	516	522	0.3
		L	135	132	0.2
	West	T	1358	1377	0.5
		L	783	794	0.4
Lady Denman Dr – Forest Dr	North	R	73	70	0.4
		T	82	87	0.5
		L	3	1	1.8
	East	All	7	11	1.2
	South	R	1	1	0.2
		T	75	70	0.6
		L	212	228	1.1
	West	T+R	495	500	0.2
		L	843	833	0.3
John Gorton Dr – Holborrow Ave	North	R	29	28	0.2
		T	357	364	0.4
		L	0	0	0.0
	East	R	0	0	0.0
		T	0	0	0.0
		L	0	0	0.0
	South	R	0	0	0.0
		T	263	261	0.1
		L	45	43	0.3
	West	R	41	37	0.7

INTERSECTION	APPROACH	TURN	OBSERVED	MODELLED	GEH
		T	0	0	0.0
		L	28	23	1.0
Lakeside Interchange North	West	T	64	66	0.2
		L	5	3	0.8
	East	R	243	236	0.4
		T	86	82	0.4
	South	R	868	853	0.5
		L	10	3	2.9
Lakeside Interchange South	West	R	1	8	3.2
		T	951	912	1.3
	North	R	98	71	2.9
		L	441	427	0.7
	East	T	250	243	0.4
		L	64	64	0.0

2019 PM Validation GEH

INTERSECTION	APPROACH	TURN	OBSERVED	MODELLED	GEH
Cotter Rd Southbound ramp	North	All	1010	959	1.6
	East	T	1565	1522	1.1
		L	425	430	0.2
	West	R	111	110	0.1
		T	462	459	0.1
Cotter Rd Northbound ramp	East	R	406	419	0.7
		T	2069	2034	0.8
	South	R	118	114	0.4
		L	121	120	0.1
	West	T	458	454	0.2
		L	558	559	0.1
Lady Denman Dr – Forest Dr	North	R	377	369	0.4
		T	115	108	0.7
		L	4	0	2.8
	East	All	18	39	3.9

INTERSECTION	APPROACH	TURN	OBSERVED	MODELLED	GEH
	South	R	1	0	1.4
		T	52	53	0.1
		L	715	693	0.8
	West	T+R	341	353	0.6
		L	86	93	0.8
John Gorton Dr – Holborrow Ave	North	R	26	26	0.0
		T	250	255	0.3
		L	0	0	0.0
	East	R	0	0	0.0
		T	0	0	0.0
		L	0	0	0.0
	South	R	0	0	0.0
		T	349	336	0.7
		L	47	43	0.6
	West	R	45	46	0.1
		T	1	0	1.4
		L	34	37	0.5
Lakeside Interchange North	West	T	128	136	0.7
		L	98	89	1.0
	East	R	506	504	0.1
		T	71	95	2.6
	South	R	96	110	1.4
		L	1	3	1.3
Lakeside Interchange South	West	R	10	27	4.0
		T	217	220	0.2
	North	R	5	5	0.2
		L	211	225	1.0
	East	T	572	595	0.9
		L	519	504	0.7

local people
global experience

SMEC is recognised for providing technical excellence and consultancy expertise in urban, infrastructure and management advisory. From concept to completion, our core service offering covers the life-cycle of a project and maximises value to our clients and communities. We align global expertise with local knowledge and state-of-the-art processes and systems to deliver innovative solutions to a range of industry sectors.

www.smec.com

Appendix I Cost Estimate

Trade Summary

Project: Default Project
Building: 4520 - Molonglo East-West Arterial Road
Details: 4520 - Molonglo EWA - Indicative Cost Estimate

Code	Description	Quantity	Unit	% of Cost	Rate	Total
	MOLONGLO EAST-WEST ARTERIAL ROAD - INDICATIVE COST ESTIMATE					
3	OPTION 3					
4	OPTION 4					
5	OPTION 5					

INCLUSIONS

All costs are calculated at June 2020 Prices

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 cyclway

Bridge works

Road furniture such as crash barriers and the like

Linemarking and pavement marking

Road signage

Signalised intersection works on Tuggeranong Parkway Intersection as indicated on drawings

Preliminaries

Traffic Management

Design and Management Fees

Procurement and Project Management Fees

Contingency

EXCLUSIONS

GST

Escalation beyond estimate date

In-ground water services

In-ground sewer services

In-ground gas services

In-ground communication services

In-ground electrical services

Diversion / Relocation of existing services

Trade Summary

Project: Default Project
Building: 4520 - Molonglo East-West Arterial Road
Details: 4520 - Molonglo EWA - Indicative Cost Estimate

Code	Description	Quantity	Unit	% of Cost	Rate	Total
	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					

Trade Summary

Project: Default Project **Details:** Option 6

Building: 4520 - Molonglo East-West Arterial Road

Code	Description	Quantity	Unit	% of Cost	Rate	Total
	MOLONGLO EAST-WEST ARTERIAL ROAD - INDICATIVE COST ESTIMATE					
6	OPTION 6			100.00		

INCLUSIONS

All costs are calculated at June 2020 Prices

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 cyclway

Bridge works

Road furniture such as crash barriers and the like

Linemarking and pavement marking

Road signage

Signalised intersection works on Tuggeranong Parkway Intersection as indicated on drawings

Preliminaries

Traffic Management

Design and Management Fees

Procurement and Project Management Fees)

Contingency

EXCLUSIONS

GST

Escalation beyond estimate date

In-ground water services

In-ground sewer services

In-ground gas services

In-ground communication services

In-ground electrical services

Diversion / Relocation of existing services

Demolition of existing services

2 lane cycle highway - Assumed delivered under separate project

Trade Summary

Project: Default Project **Details:** Option 6

Building: 4520 - Molonglo East-West Arterial Road

Code	Description	Quantity	Unit	% of Cost	Rate	Total
	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					

Appendix J MCA Workshop

East West Arterial

Multi-Criteria Analysis (MCA) Workshop

11 June 2020

SMEC

Member of the Surbana Jurong Group

Notes taken from the presentation are recorded in red text throughout the following slides

Workshop Overview

Objectives

- Presentation of Options
- MCA Workshop
- Determine the preferred option

Intro
Project Overview

MCA Process

Team Overview

Work to Date

Options
Review of three route options

Criteria
Discussion of MCA Criteria

MCA Workshop
Assessment of options using Multi-Criteria Analysis

Preferred Option

Project Overview & Context

EPSDD through the Infrastructure Partners Delivery Group (IDPG) has engaged SMEC to undertake a assessment of options for the East West Arterial road.

Securing a Road Corridor

The study will help to select an appropriate road corridor for gazettal in the Territory Plan.

Future Horizon

The EWA is unlikely to be progressed for 10+ years. Securing an appropriate road corridor is essential to ensuring the implementation of the project in the future.

Project Objectives – *Develop a strategic design for a future third arterial road connection to the Molonglo Valley and define a road corridor for future development*

MCA Objectives – *Engage with key stakeholders to assess the relative merits of the three developed options and their elements to identify a preferred option*

Team Overview

Ali Lashkari

Project Manager – Territory (EPSDD)

Patrick Paynter

Project Director – Territory (EPSDD)

Doug Tonge

Project Manager (SMEC)

Work to Date

Environmental + Physical Constraints

- Ecology
- Heritage
- Contamination
- Infrastructure

Planning Considerations

Relevant planning considerations

Traffic & Transport

- Strategic Modelling
- Microsimulation Modelling

Option Development

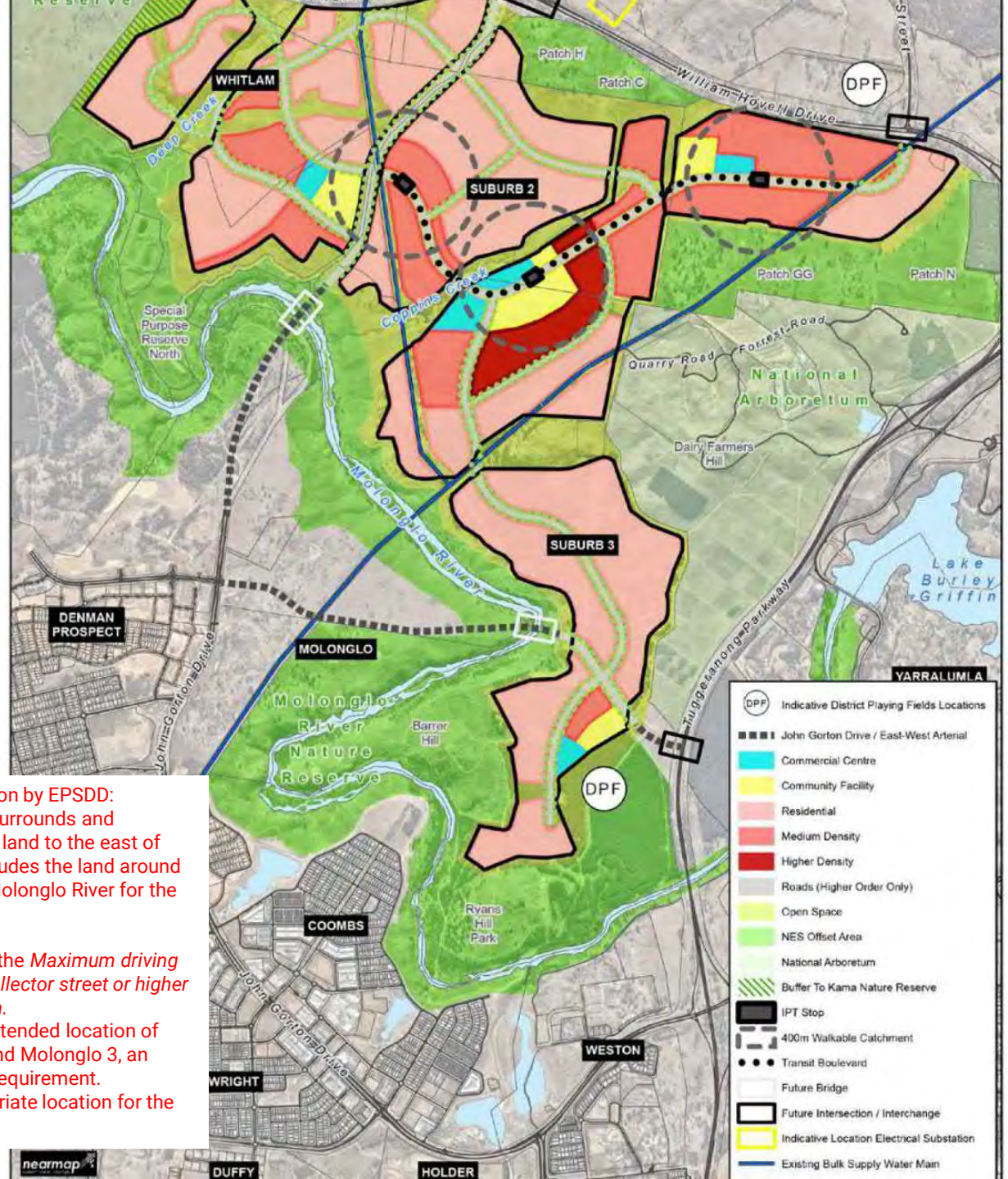
- Trumpet interchange
- Split Diamond interchange
- Compact Footprint

The MCA workshop moves on from the agency workshop into the feasibility assessment to understand the best option to move forward with the alignment. It is intended to use a robust process to secure an alignment so the Project team can proceed to gazettal of a road corridor in the Territory Plan. The team is looking to ensure it has considered relevant constraints and surrounding road networks so that the alignment can be confirmed.

Planning Overview

There are currently two concept plans under preparation by EPSDD:
the Concept Plan for the Molonglo Town Centre and Surrounds and
the Concept Plan for the remainder of Molonglo 3 (i.e. land to the east of JGD and to the north of the Molonglo River, which includes the land around the Bindubi Street extension and the eastern side of Molonglo River for the EWA)

The Estate Development Code (Rule 58) requires that the *Maximum driving distance between any dwelling and a minor or major collector street or higher order road be max 700m and an arterial road be 1200m.*
When considering the current road network, and the intended location of new residential density in the Molonglo town centre and Molonglo 3, an east-west distributor will be necessary to satisfy this requirement.
The purpose of this project is to determine the appropriate location for the EWA to allow a road corridor to be gazetted.

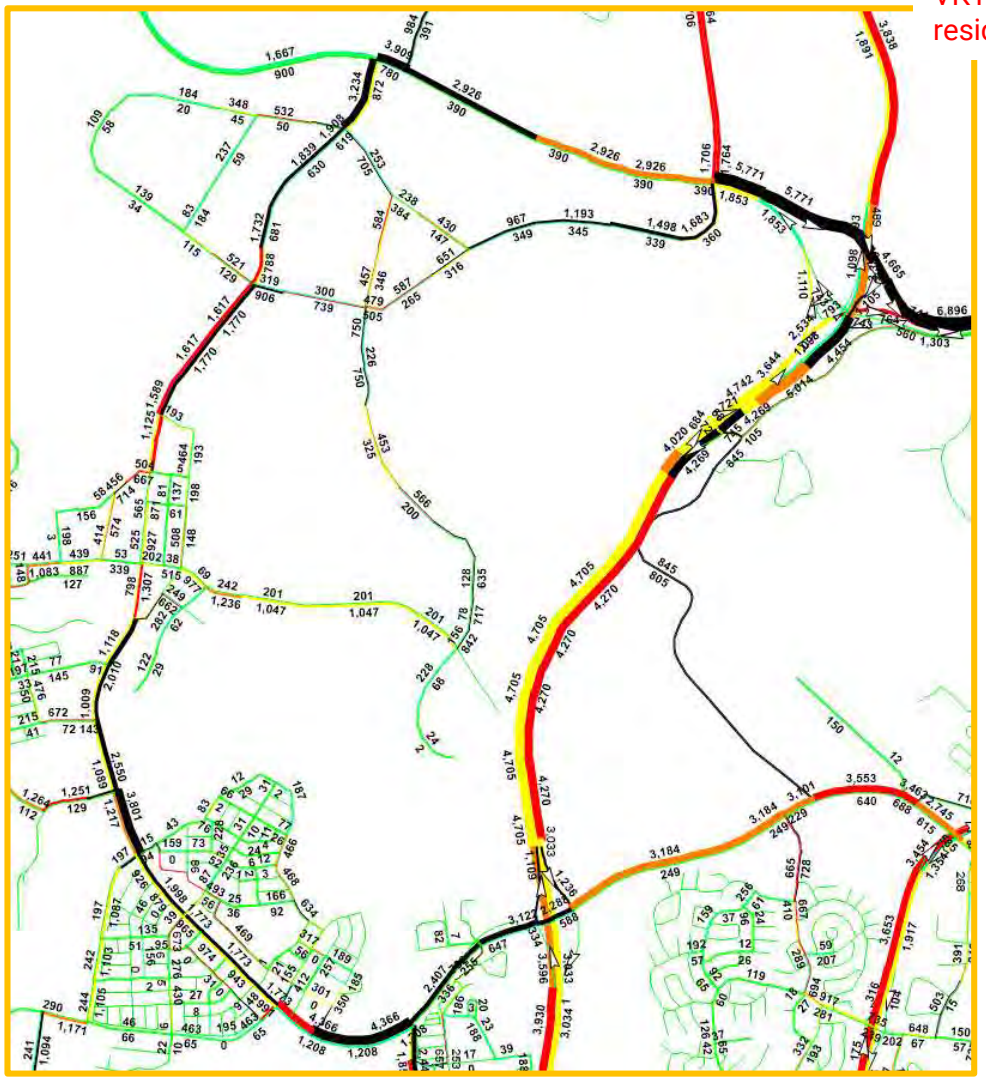


Traffic & Transport

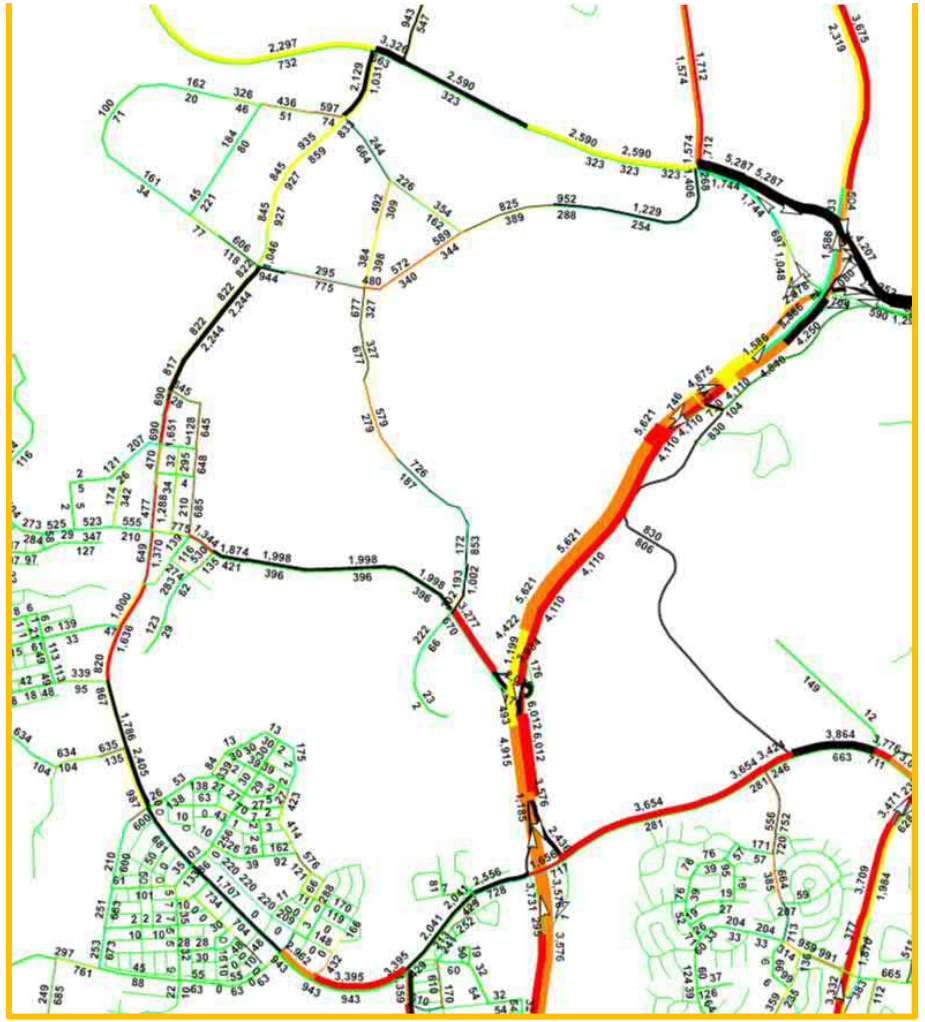
Strategic Modelling

Traffic – strategic modelling – CSTM (trip generation by population) allows to model the impact of a major road project like this along a wider area as it would increase network capacity relatively widely across the area.
Base case – no EWA "black indicates over capacity"
2041 Project Case – less black routes in the network

VKT benefit (km's travelled) – more efficient with EWA, west Belconnen residents using WHD to get to the city without EWA



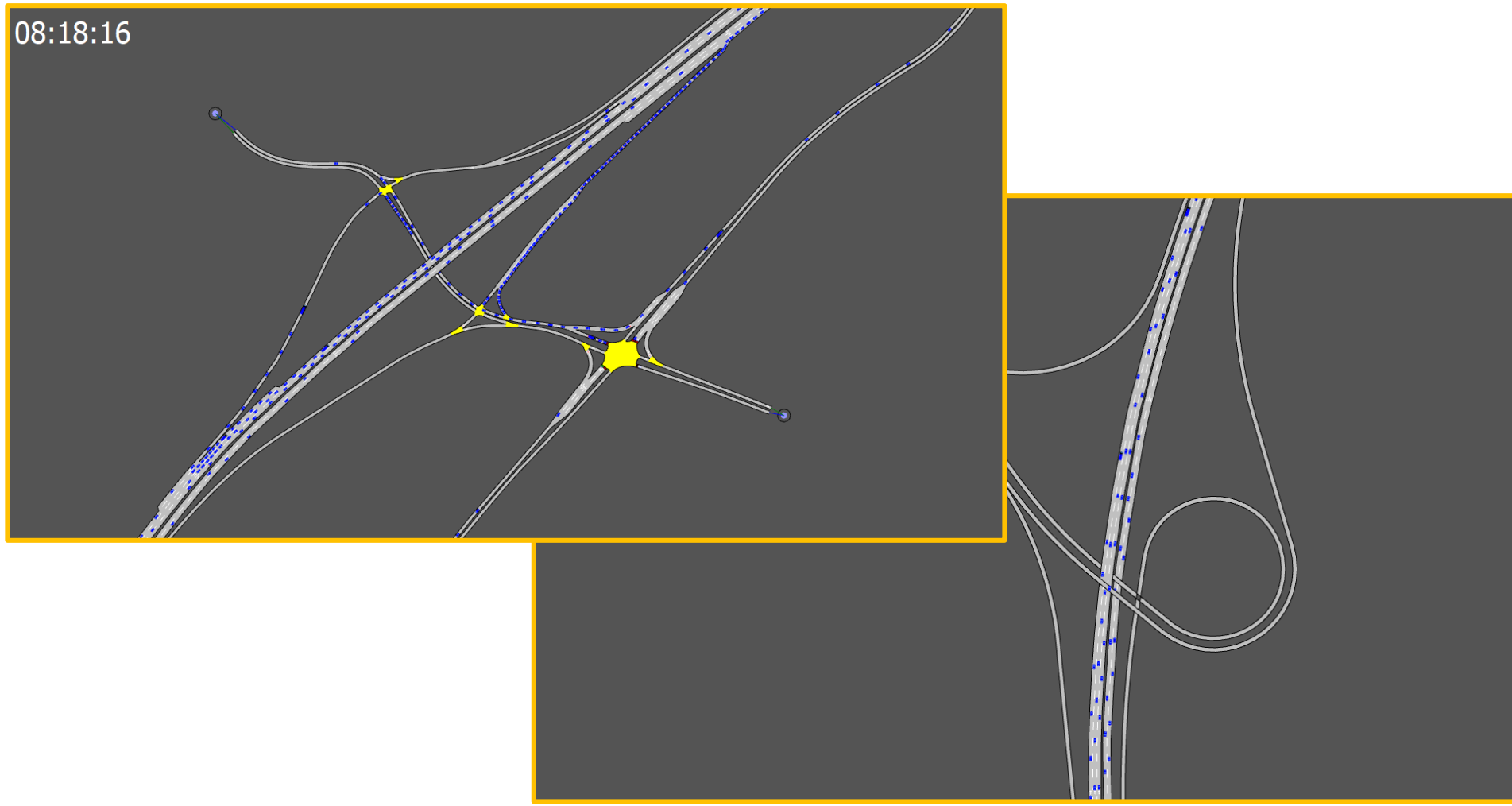
2041 Base Case



2041 Project Case

Traffic & Transport

Microsimulation Modelling



Mini-Q

[redacted] – *south of the zoo / east of the parkway (Pine Forrest)*
What is the intention to use this land? Development in future? Expansion of Zoo?

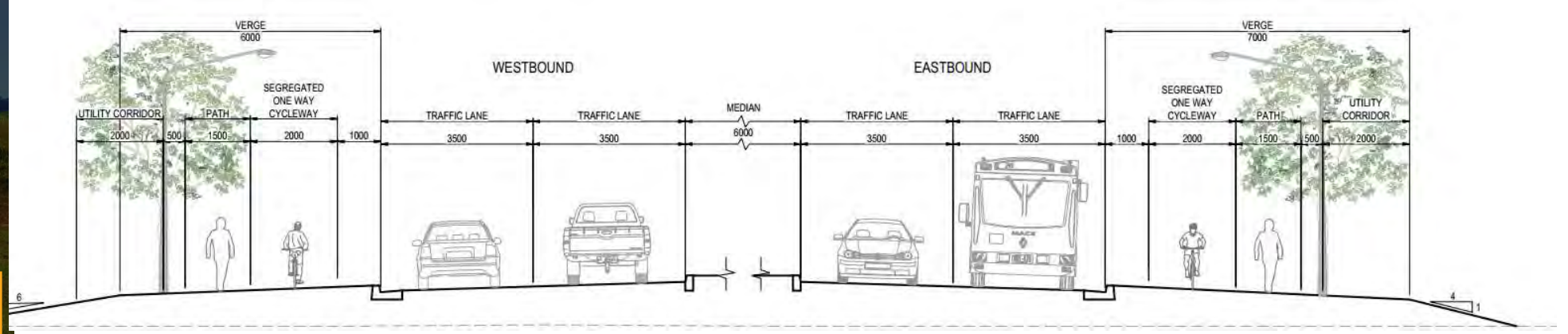
[redacted] – *where the arboretum is at the moment, that's it – no further expansion*

SMEC
Member of the Surbana Jurong Group

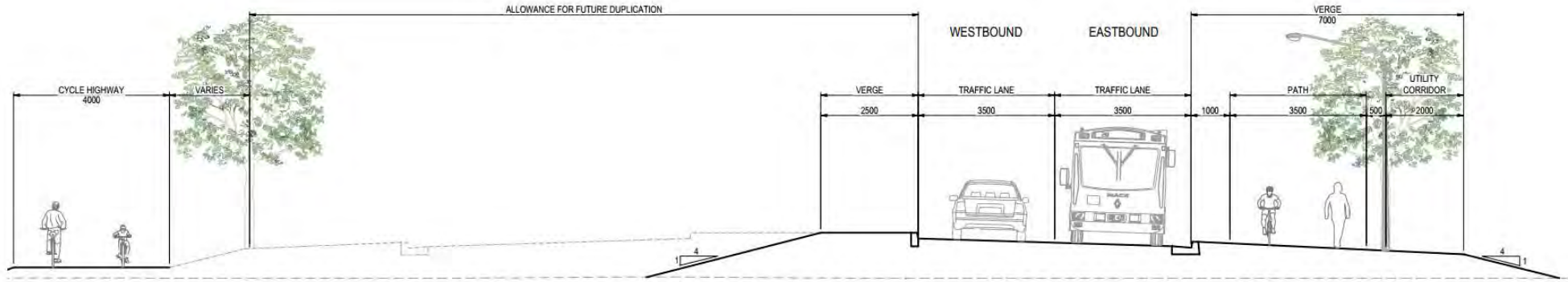

Options
Review

Proposed Cross Sections

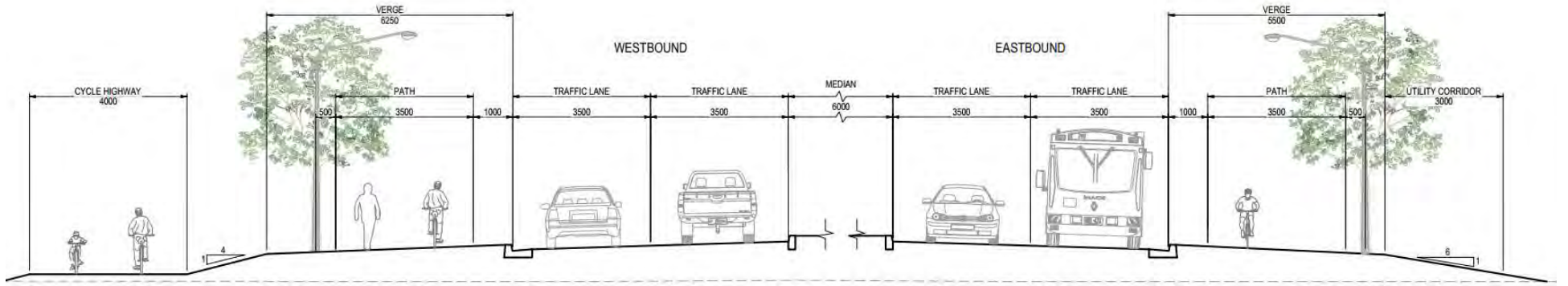
Cross sections – common across all options.
Bridge design philosophy to adopt similar to JGD bridge.
More info to be provided as we develop the strategic design.



Molonglo Town Centre

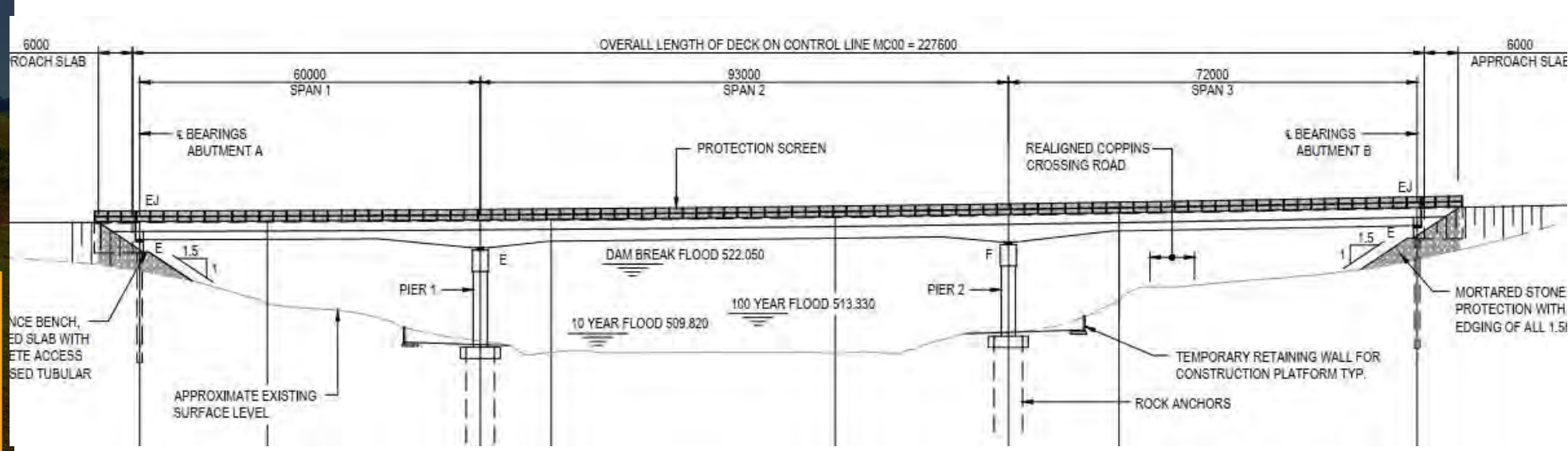


East of Molonglo Town Centre to Molonglo East Connector Road



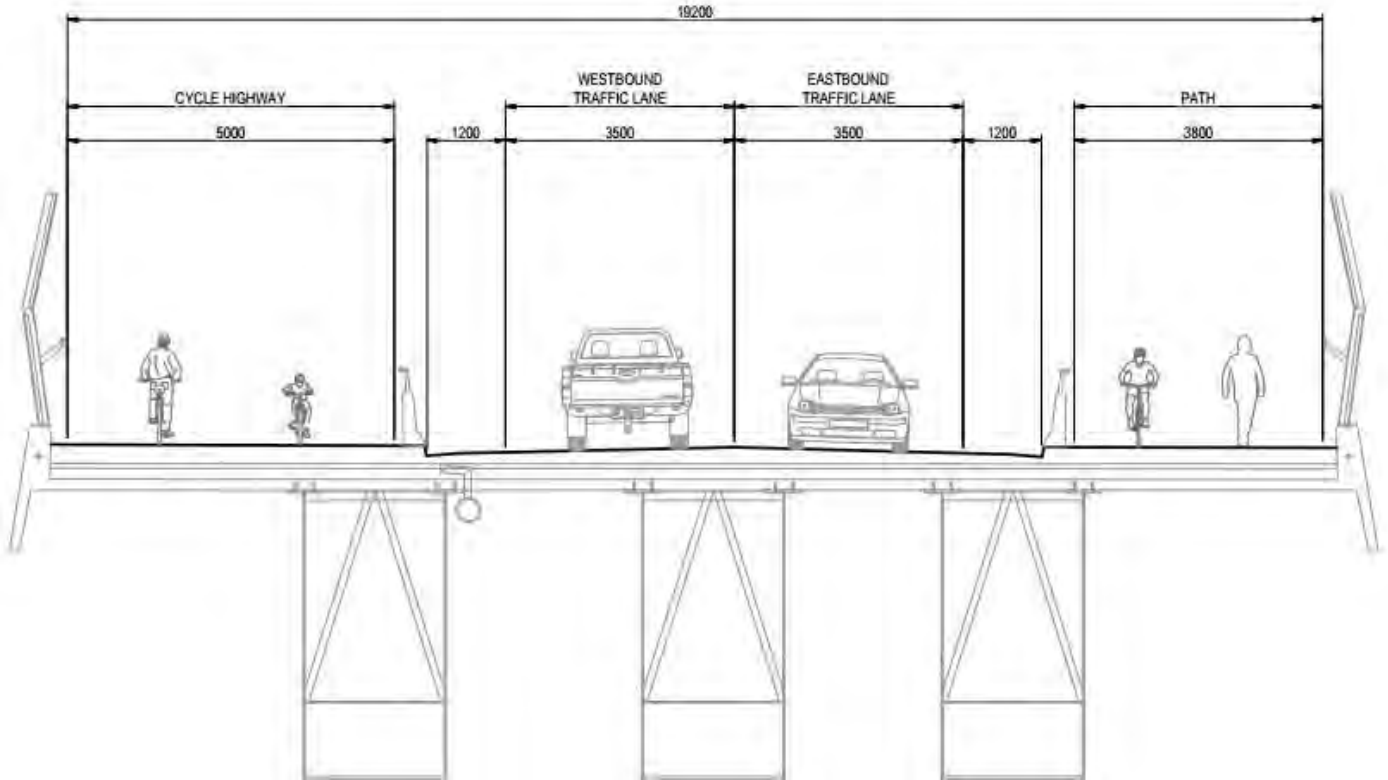
Molonglo East Connector Road to Tuggeranong Parkway interchange

Molonglo River Bridge



Current PSP design of downstream bridge on John Gorton Drive

The bridge over Molonglo River is the most significant architectural feature of the EWA proposal and follows the 'Family of Bridges' concept that the ACT Government Architect previously asked for in Molonglo.

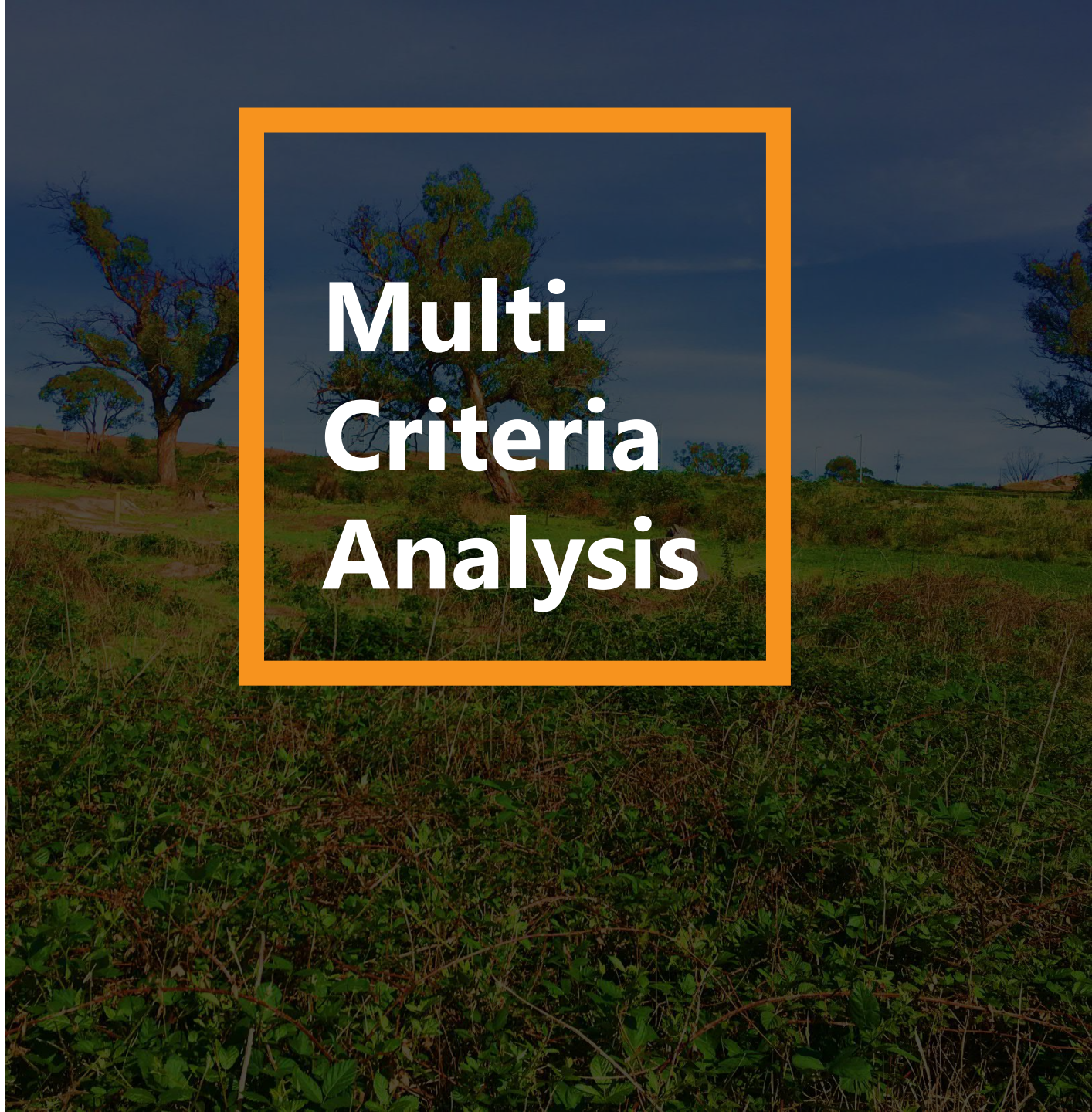


Proposed Cross Section on Molonglo River Bridge

Key Steps

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

Based on: *TfNSW Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives, June 2018*



Multi-Criteria Analysis

1 Define Objectives & Options

Project Objectives – *Develop a strategic design for a future third arterial road connection to the Molonglo Valley and define a road corridor for future development*

MCA Objectives – *Engage with key stakeholders to assess the relative merits of the three developed options and their elements to identify a preferred option*

2 Define Criteria – TBL Framework

Environmental

- Ecology
- Heritage
- Visual impact

Social

- Road user safety
- Arboretum plantings
- Active travel

Economic

- Traffic (VHT+ VKT)
- Construction & whole of life costs
- Traffic impacts during construction
- Development potential

Other criteria considered*

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

** There was not considered to be substantive differences for these criteria across the three options*

3 Weight Criteria

Pairwise Analysis

- Pairwise – scaling – how we formed our view. Todays intent not to go through the weightings. The scaling will enable +-20% to check sensitivity of the weightings.
- Criteria weighting, TCCS feedback – we will use as part of the sensitivity test which will show the robustness of the MCA process

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

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

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	2Ec.1	1.Ec2	2.Ec4	-

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

The range of values that have been used are 3 = major importance; 2 = medium importance; and 1 = minor importance.

3 Weight Criteria

Pairwise Analysis Results

Ecology	Heritage	Visual Impacts	Road User Safety	Arboretum Plantings	Active Travel	Network Operation	Construction and Whole of Life Costs	Traffic Impacts during Construction	Development Potential
13%	9%	3%	8%	4%	3%	28%	19%	3%	10%
TCCS suggested weightings:									
10%	*7%*	*3%*	*15%*	*2%*	*8%*	*25%*	*15%*	*5%*	*10%*

4 Option Scoring

Option Performs:

1 - **3** - **5**

Very Poorly

Moderate
(target a score of 3 as the median score for each criteria)

Very Well

Mini-Q

SMEC

Member of the Surbana Jurong Group

4 Option Scoring

Due to the final MCA scores being very close between Option 3 & 5, Option 6 was considered (a hybrid of Option 3 & 5). 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 Options 3 & 5.

Ecology

Key considerations:

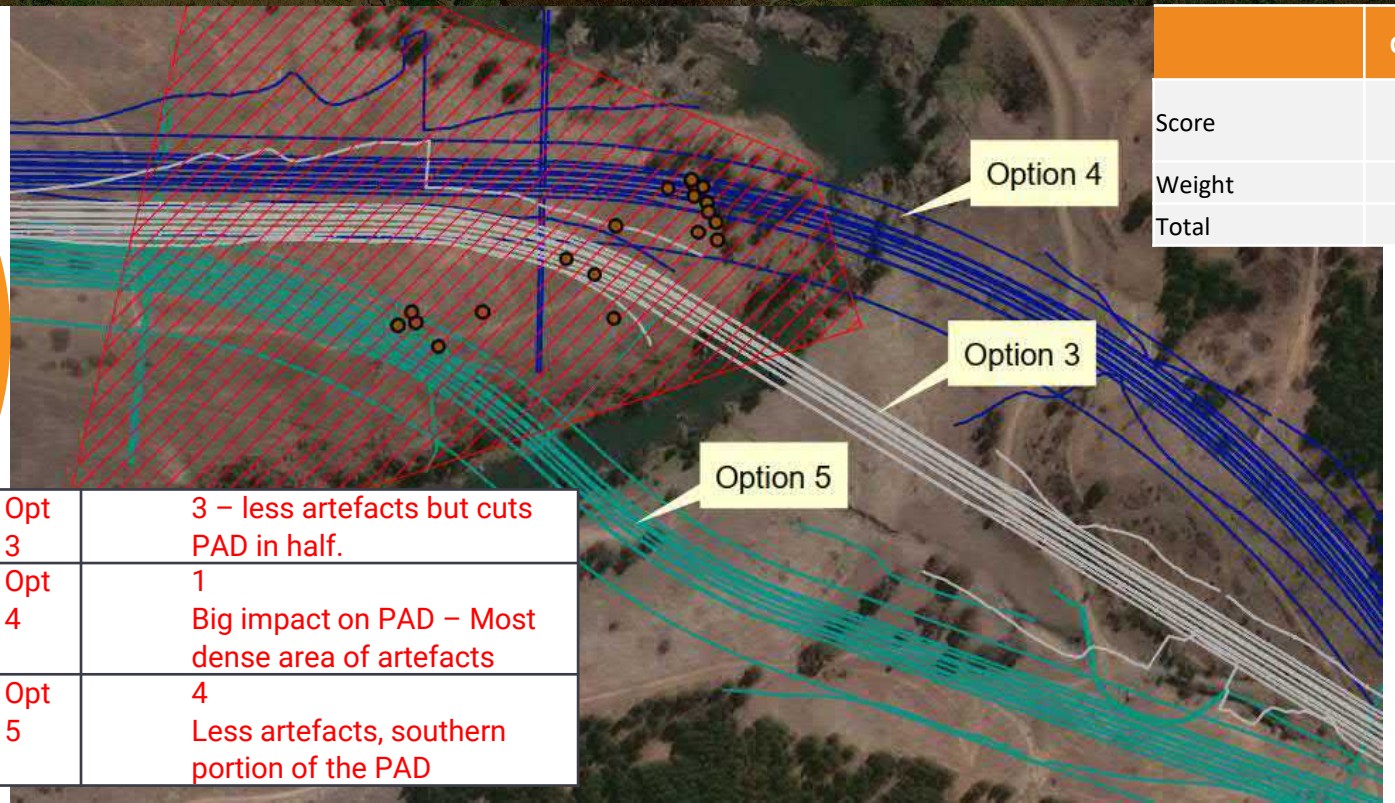
- Impact on habitats

Opt 3	2 BGW larger area disturbed due to batters PTWL batter – through larger habitat patch 20m buffer around habitat – creates a barrier to movt, construction footprint wider
Opt 4	1 Threshold issue – PCS couldn't support
Opt 5	5 Isolated habitat Smaller footprint

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

4 Option Scoring

Heritage



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

Opt 3	3 – less artefacts but cuts PAD in half.
Opt 4	1 Big impact on PAD – Most dense area of artefacts
Opt 5	4 Less artefacts, southern portion of the PAD

Whilst not in the meeting, these scores were subsequently confirmed by ACT Heritage unit

Key considerations:

- Impacts on PAD and know finds

4 Option Scoring

Visual Impacts

Key considerations:

- Visual impact of roads/embankments
- Visual impact of structural elements

Opt 3	3 Bridge height and more fill
Opt 4	2 Lower in the valley, less fill but significant cut required
Opt 5	4 Batter east of the river, bridge quite high in the valley

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