The following ramps are considered to have inadequate length or have sight distance restraints:

- Eastbound entry ramp from Cotter Road to Adelaide Avenue – stopping sight distance is near the minimum Austroads standards in peak periods when there is queueing on the entry ramp
- The entry and exit ramps to/from Novar Street, Kent Street and Hopetoun Circuit – Austroads (2007) indicates that the desirable minimum spacing between a freeway entry (eg., eastbound from Novar Street) and exit (eg., eastbound to Hopetoun Circuit) is 900m, but the actual spacing is about 200m
- The east-facing entry ramp from Hopetoun Circuit – this is located too close to the at-grade intersections of Adelaide Avenue with Empire Circuit (about 100m, rather than 900m or more)
- The northbound entry-ramp from Cotter Road to Tuggeranong Parkway – has inadequate length of lane parallel to traffic lanes to enable safe and efficient merging
- The Lakeside interchange ramps – the southbound on-ramp is about 300m long but should be at least 500m according to Austroads standards; there is inadequate sight distance for traffic turning right towards Gungahlin and Belconnen from the Lady Denman Drive link
- The entry and exit ramps to/from Commonwealth Avenue, Edinburgh Avenue and Lawson Crescent – the weaving lengths in this section of road are less than 150m, whereas Austroads indicates they should be at least 900m
- The proposed entry/exit ramps on Morshead Drive at the future Kings Avenue interchange and the Morshead Drive/Russell Drive roundabout – the east-facing entry/exit ramps from Kings Avenue will be too close to the Morshead Drive/Russell Drive roundabout (about 250m, but should be more than 1km, especially given the significant queueing that currently occurs there[6])

The following ramp termini have inadequate spacing for Safe Intersection Sight Distance (ie., less than 500m apart)[7]:

- Cotter Road intersections with Tuggeranong Parkway (240m spacing)
- Lady Denman Drive link under Tuggeranong Parkway (140m spacing)
- Clunies Ross Street under Parkes Way (120m spacing)
- Edinburgh Avenue over Parkes Way (50m spacing)
- Novar Street over Adelaide Avenue (120m spacing)
- Hopetoun Circuit over Adelaide Avenue (130m spacing)

3.4 Bus Routes

The existing ACTION bus routes using the EW corridor are shown in Figures 25 and 26. There are very limited bus services on the major roads in the corridor - Parkes Way, Tuggeranong Parkway, Cotter Road, Morshead Drive or Pialligo Avenue. Roads close to the corridor or crossing the major roads in the corridor are important bus routes, such as, Adelaide Avenue, Constitution Avenue, Commonwealth Avenue and Kings Avenue.

3.5 Trunk Cycling and Walking Paths

The existing trunk cycling and walking paths in the EW corridor are shown in Figure 27. It shows on-road cycle paths in blue and shared paths in red. There are significant gaps in the on-road cycle path network on Cotter Road, Tuggeranong Parkway, Parkes Way, Morshead Drive and Pialligo Avenue. These gaps are gradually being filled as new road works occur.

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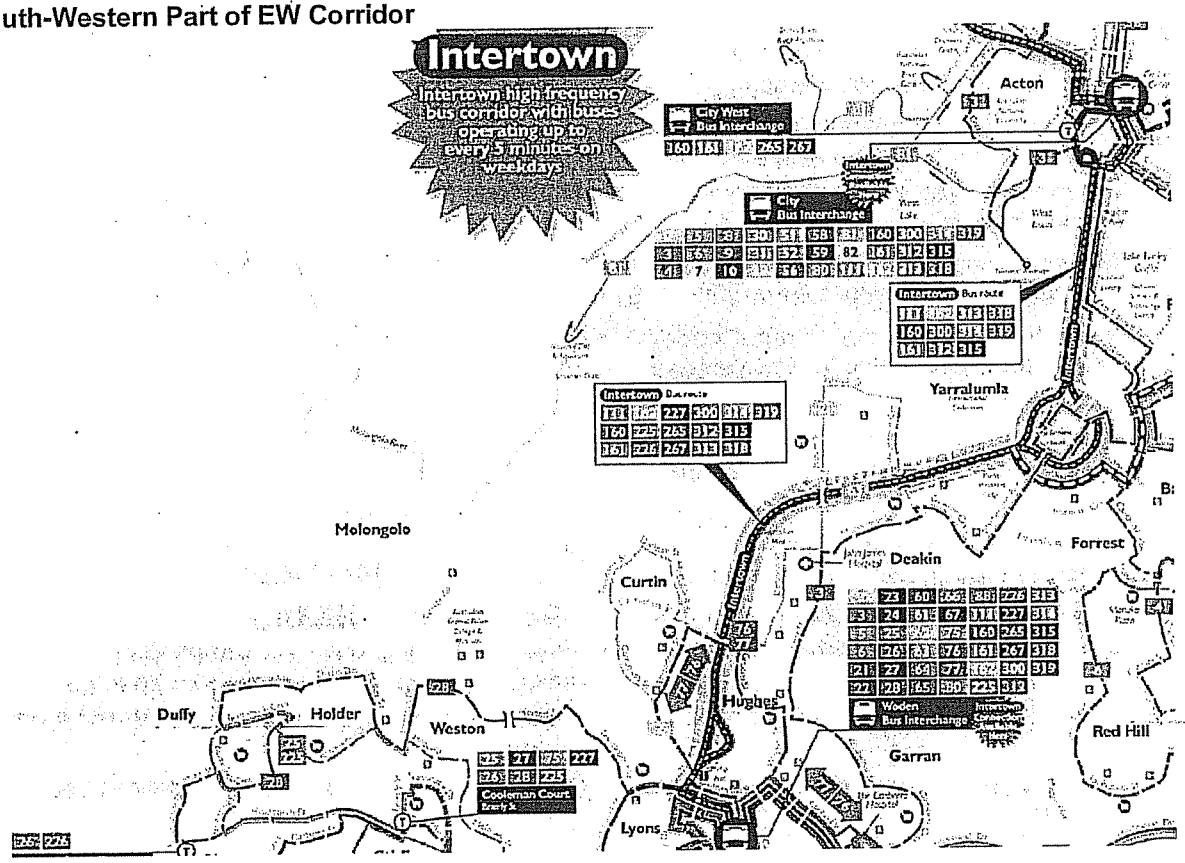
[6] In the AM peak, eastbound queues occasionally block back through the Kings Avenue roundabout causing a ripple effect right along Parkes Way

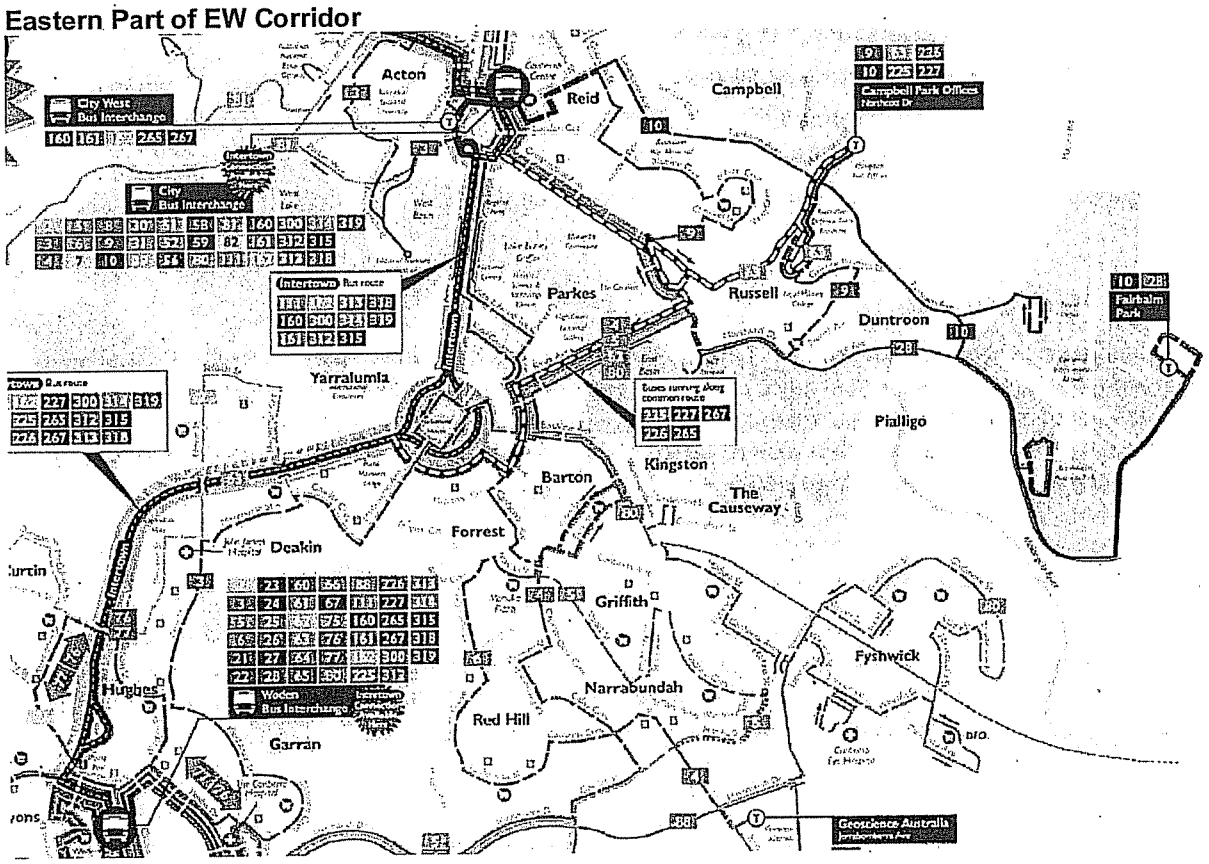
[7] Guide to Traffic Management Part 6 (Austroads 2007)

Figure 25: Existing Bus Routes

South-Western Part of EW Corridor

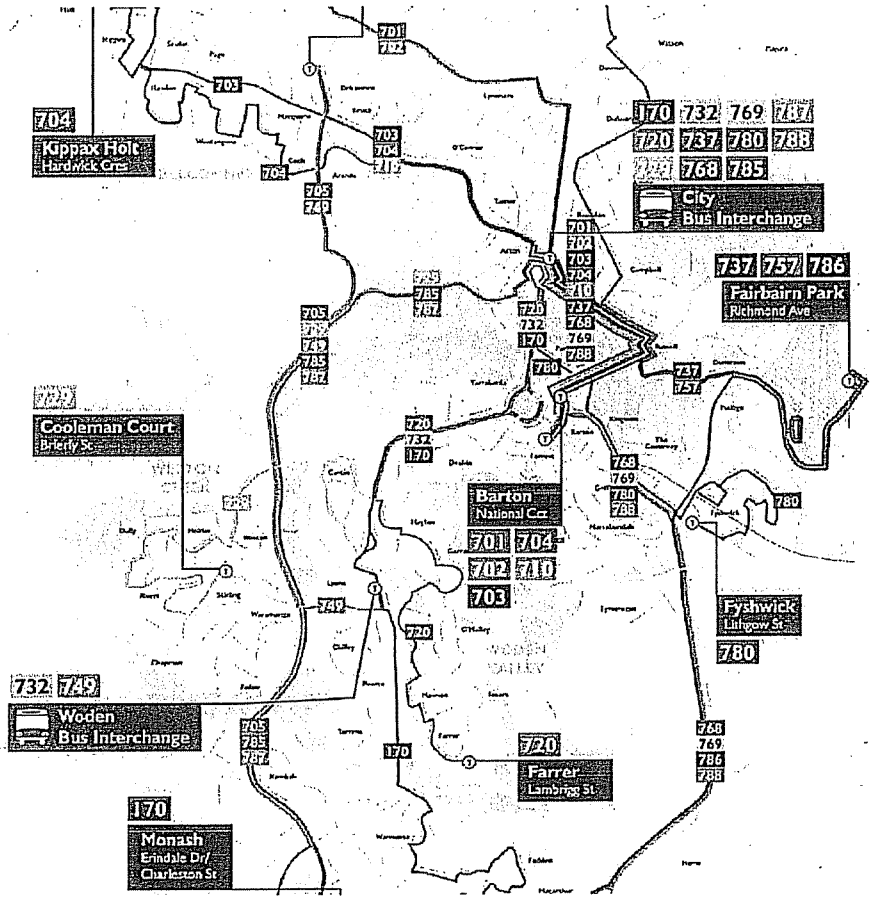


Eastern Part of EW Corridor



Source: ACTION (2009)

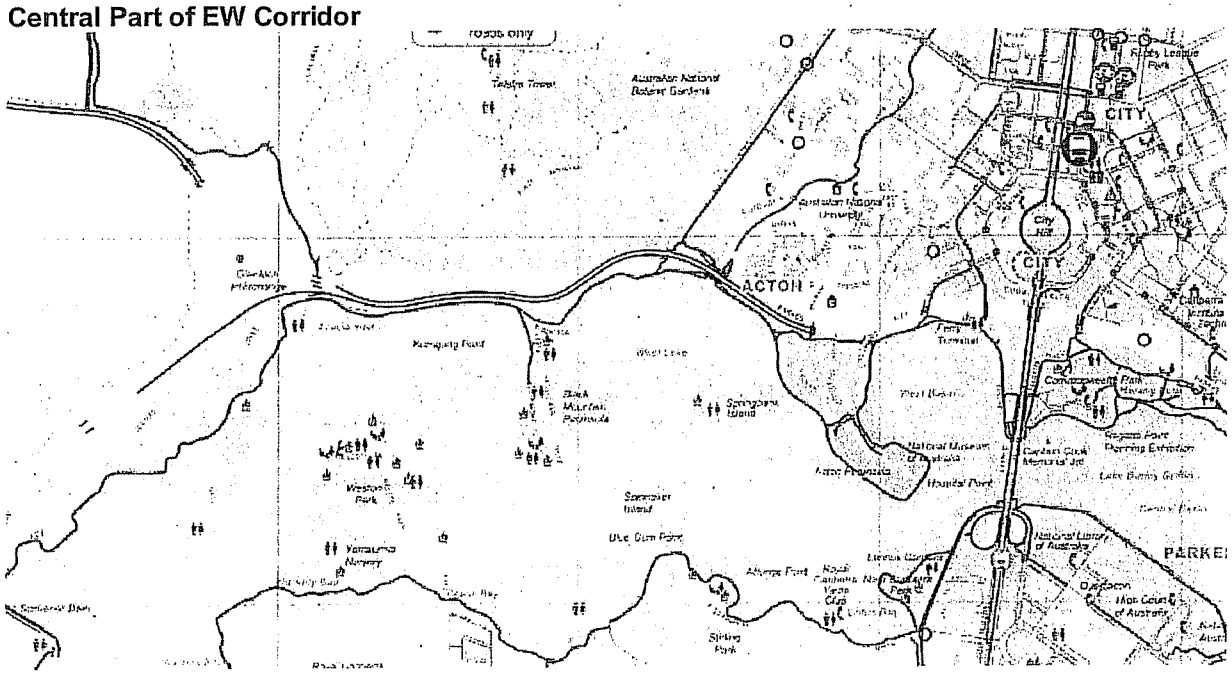
Figure 26: Existing Expresso Bus Routes



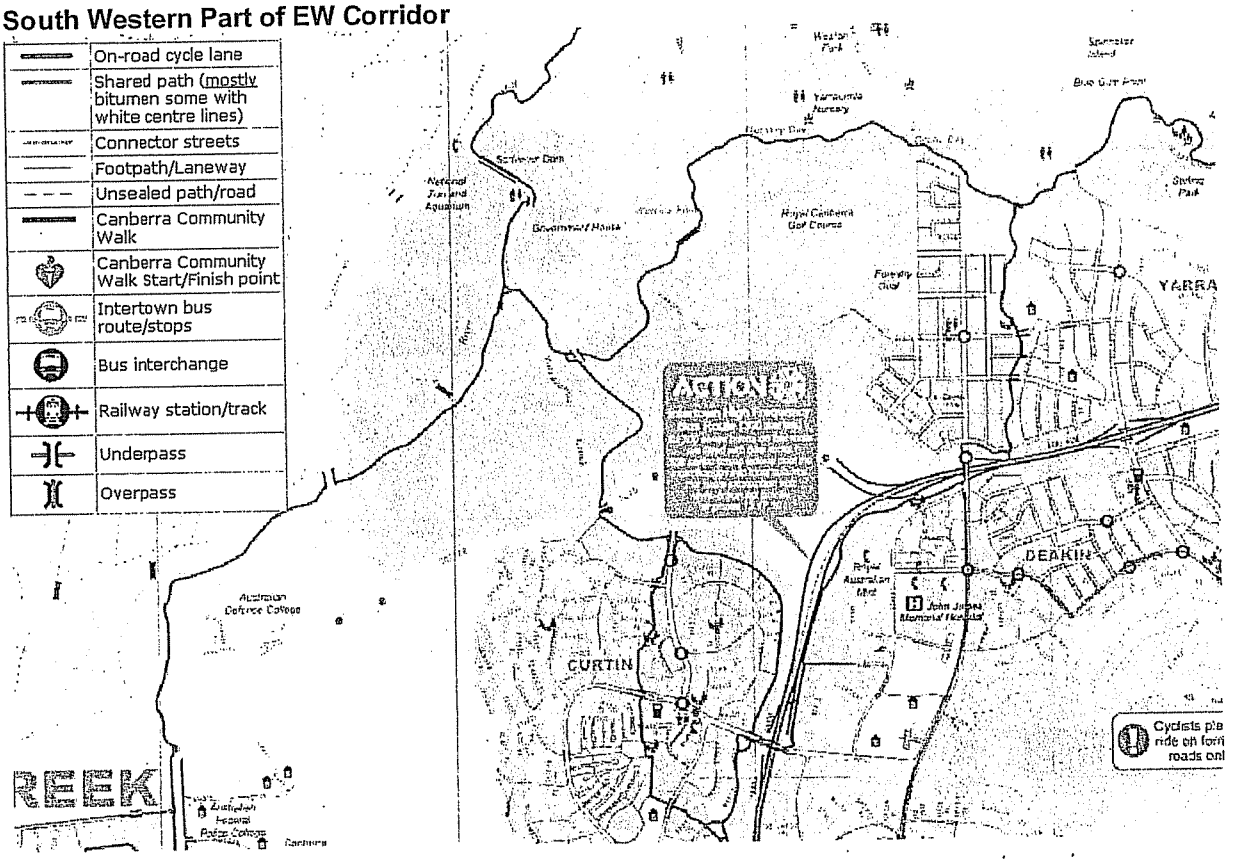
Source: ACTION (2009)

Figure 27: Existing Trunk Cycling and Walking Paths

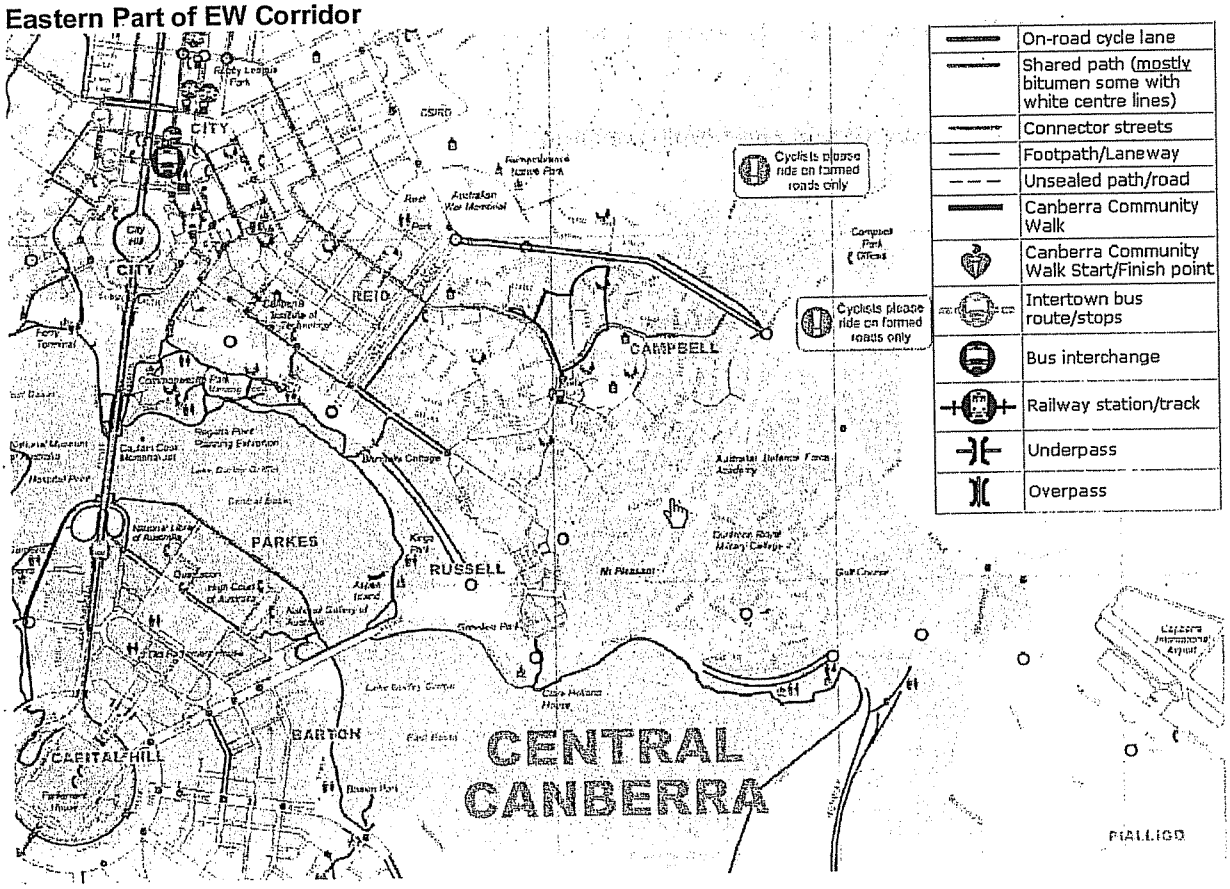
Central Part of EW Corridor



South Western Part of EW Corridor



Eastern Part of EW Corridor



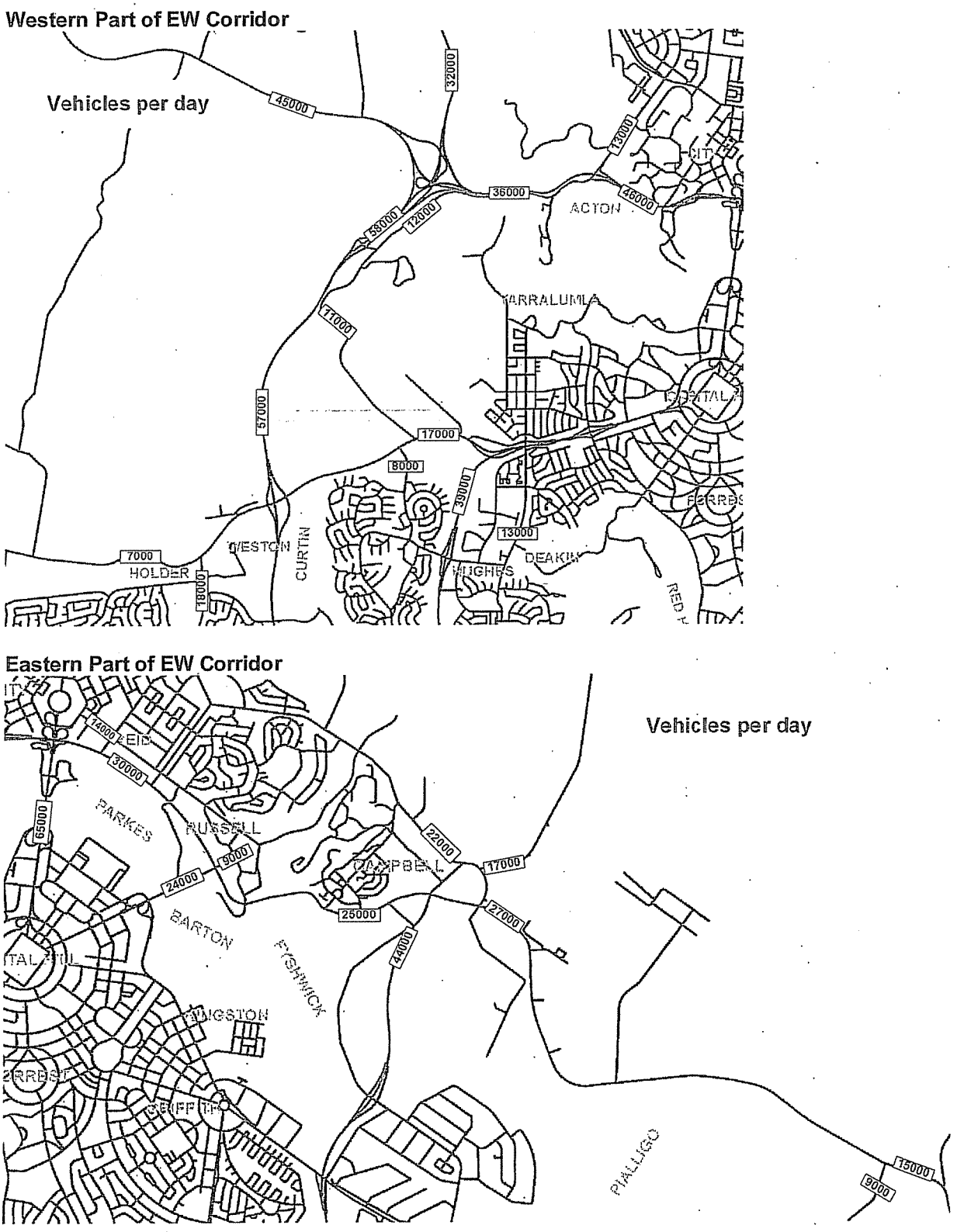
Source: TAMS (2009)

3.6 Traffic Flows

3.6.1 Daily Traffic Volumes

Current average weekday traffic flows on key roads in the EW corridor are summarised in Figure 28. These are some of the busiest roads in Canberra.

Figure 28: Existing Daily Traffic Flows



Source: TAMS (2008)

The high volumes through Glenloch Interchange are most notable. The proposed GDE Stage 2 works will improve traffic flows through here.

Traffic volumes are also high where Parkes Way intersects with Commonwealth Avenue. This also coincides to a location with major design deficiencies and capacity problems. No immediate works are proposed here, but it needs urgent attention.

The other location with high volumes is Pialligo Avenue, Morshead Drive and Monaro Highway. The Stage 1 works are progressing here and funding for the proposed Stage 2 works has been approved. These works together with the improved access arrangements at the airport will greatly improve traffic movements in this area.

3.6.2 Heavy Vehicle Volumes

There is a lack of data on heavy vehicle movements in Canberra. Available data on existing heavy vehicle volumes in the EW corridor is summarised in Table 5.

Table 5: Heavy Vehicle Volumes

Road	Location	Heavy Vehicles per Average Weekday	% Heavy Vehicles
Blamey Cres	Vasey-Watt	110	2.8
Caswell Drive	Glenloch-Aranda bridge	1180	4.2
Constitution Avenue	Blamey-Reg Saunders	100	3.6
Cotter Road	Mount Stromlo-RFS	60	5.3
Cotter Road	Streeton-Forest	210	5.3
Dudley Street	Cotter-Novar	200	2.6
Fairbairn Avenue	Addison-Morshead	1000	6.0
Hopetoun Circuit	Gawler-Macgregor	240	3.6
Kelliher Drive	Russell-Sellheim	60	2.5
Majura Road	Avonley-Mustang	1270	9.3
Railway Street	Oaks Estate-Hill	140	4.1
Streeton Drive	Heysen-Hilder	780	6.4
Tuggeranong Parkway	Cotter-Molonglo	1100	3.5
Tuggeranong Parkway	Hindmarsh-Cotter	690	3.0
Uriarra Road	Coppins Crossing-Cotter	170	3.7

Source: ACT Speed Surveys 2007-2008

This shows that there are relatively large volumes of heavy vehicles at both end of the corridor – on Tuggeranong Parkway to the west and Majura Road to the east. Unfortunately there is no data for Parkes Way or Morshead Drive. However, these roads are also likely to carry similar volumes of heavy vehicles, given the relatively high heavy vehicle volumes on Fairbairn Avenue, Caswell Drive and Streeton Drive.

3.7 Crashes

Historic crash statistics for the worst accident locations in the EW corridor are shown in Figure 29. These locations are ranked in the worst 100 locations in ACT based on seven years of crash data from 2001 to 2007 (TAMS 2008). The score is calculated from the number of different types of crashes, with a higher score given to casualty (4) and fatality crashes (16) compared with property damage only crashes (1). Hence, the higher the score the worse the safety problem.

Four types of crash locations are identified, as combinations of:

- Midblock or intersection crash locations
- Black spot or other crash locations

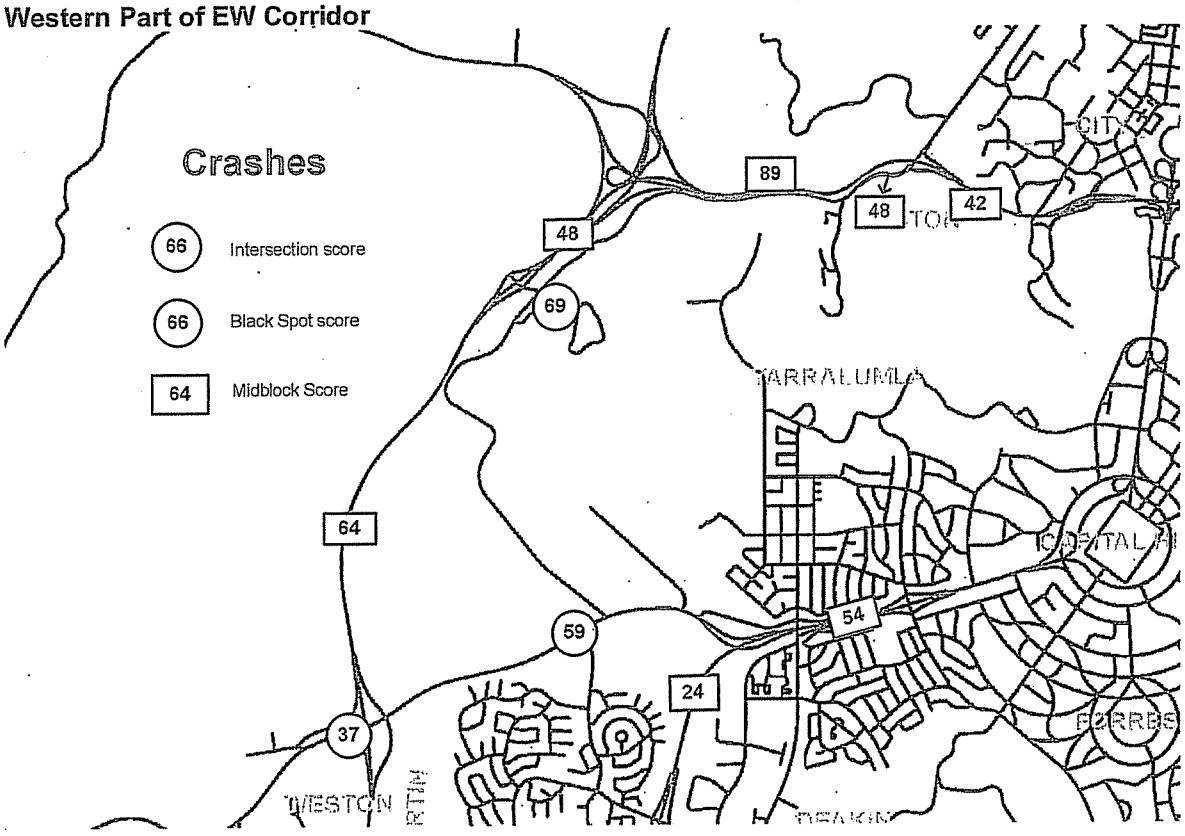
The black spot locations have a proven history of casualty crashes and these attract funding for road safety improvements from the Australian Government. The minimum eligibility criteria for black spot funding are:

- At least 3 casualty crashes in the most recent five-year period
- A benefit cost ratio of at least 2 for proposed improvements at candidate black spot sites

Note that the crash scores in Figure 29 are all based on the TAMS scoring system described above. The locations that meet the Australian Government's black spot criteria are highlighted in a black colour, whilst those that don't are highlighted in red.

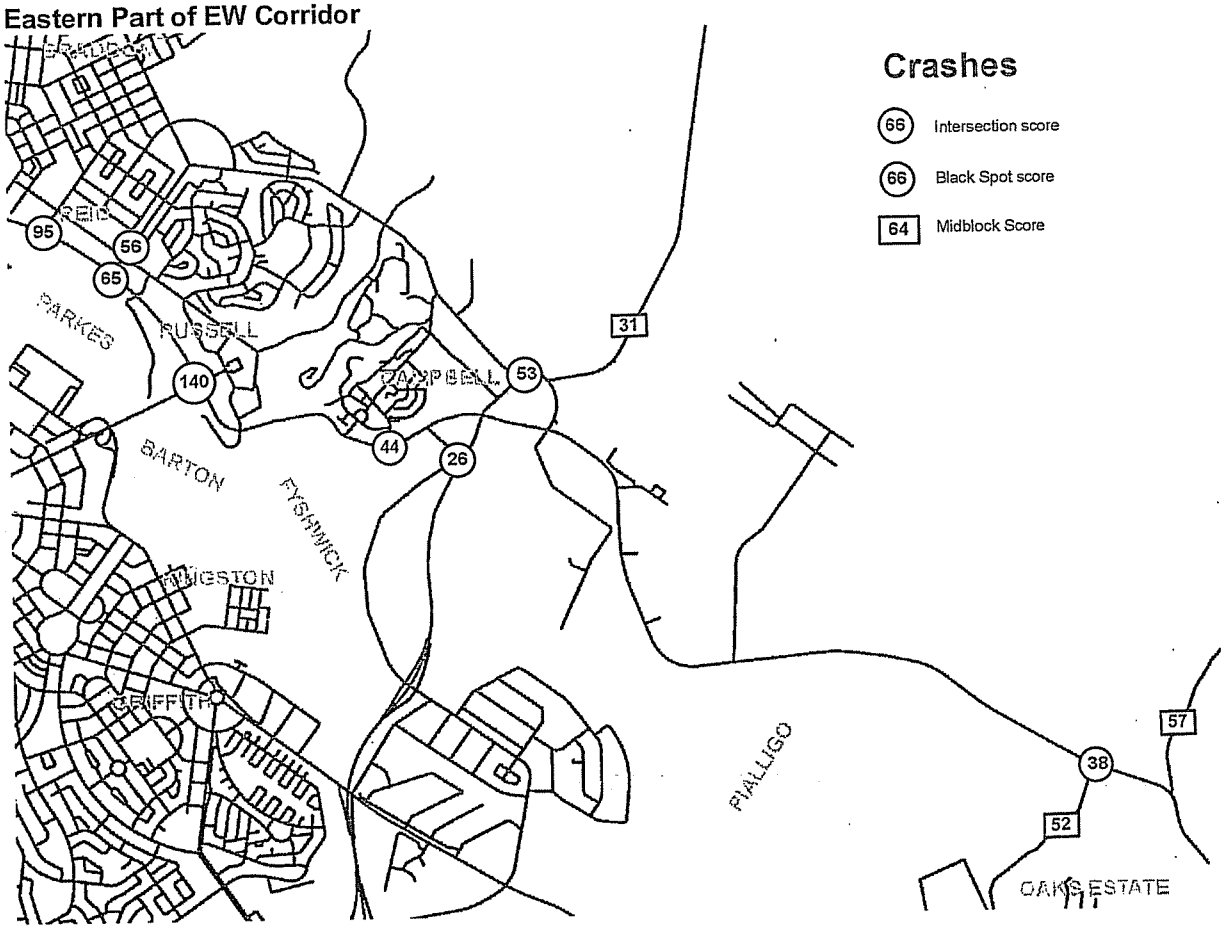
Figure 29: Historic Crash Scores

Western Part of EW Corridor



Source: TAMS (2008)

Eastern Part of EW Corridor



Source: TAMS (2008)

4.0 Traffic Modelling

4.1 Key Processes

The key processes in the traffic modelling work are depicted in Figure 30. The primary elements of this process are:

- The latest population and land-use forecasts for ACT and region (TAMS 2009)
- ACT Government's EMME model of Canberra and Queanbeyan
- Capacity analyses using spreadsheet and SIDRA packages

The outputs from the traffic modelling helped to identify candidate improvement works and also fed into the economic analyses of alternative works packages. In a latter phase of the project a Paramics micro-simulation model of the corridor was created using data from EMME, as outlined in Appendix A.

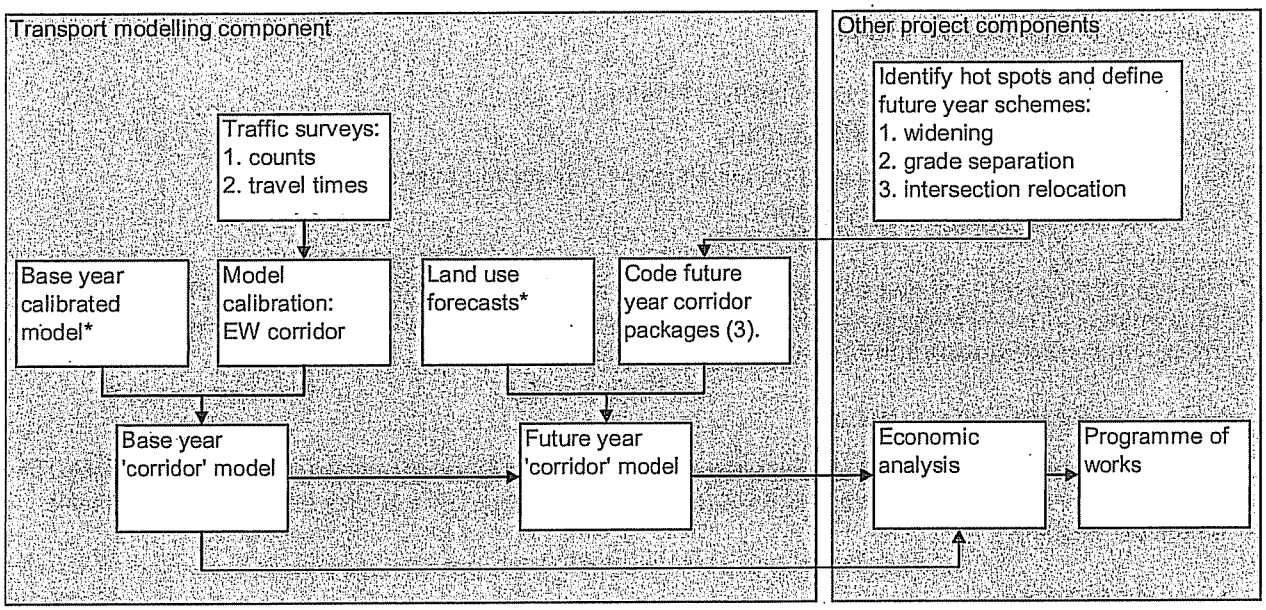


Figure 30: Infrastructure Assessment Framework

4.1.1 The EMME Model

The EMME model is central to the modelling work. AM peak models exist and were used in this project to produce traffic forecasts for four forecast years - 2006, 2011, 2021 and 2031.

The 2006 model was recently created by MRC (2009) as a base year model validation. The results of this validation are summarised in Section 4.2. The mode split for public transport in this model is 9.5% for Canberra as a whole.

The 2011 model was also recently created by MRC (2009). This was reviewed and the network updated to reflect any recent changes in the capital works program. This model had a mode split of 9.5% for public transport usage.

The 2031 model was recently updated by MRC (2008) as part the ACT Public Transport Network Study. This was reviewed and the network updated to reflect any recent changes in planning for Canberra and Queanbeyan's arterial road network. This model had a mode split of 11.1% for public transport usage.

Future year traffic forecasts for road links in the EW corridor were adjusted by any differences found in the 2006 model validation. The full adjustment was applied to 2011 forecasts, but reduced adjustments were applied to 2021 (0.9 times the difference) and 2031 (0.8 times the difference) forecasts. Much less adjustment was applied to road links in the vicinity of major network changes (Majura Parkway, Molonglo arterials), where there was a redistribution of traffic.

In addition, different peak hour factors were applied for each model year, reflecting increased peak spreading in the longer-term. The application of peak hour factors was necessary to convert the modelled two hour flows to peak hour estimates – 0.65 in 2006 and 2011, 0.625 in 2021 and 0.60 in 2031.

4.1.2 Capacity Analyses

The adjusted peak hour traffic volumes were used in subsequent capacity analyses. There were several types of capacity analyses:

- Midblock analyses based on AustRoads criteria
- Ramp analyses based on AustRoads
- Weaving area analyses based on the Highway Capacity Manual
- Intersection analyses using SIDRA

The ramp analyses included an assessment of the ramp proper, the ramp termini and merge/diverge movements. The intersection analyses used existing and EMME model turn volumes, adjusted to match the corrected link traffic forecasts from EMME.

4.2 Model Validation

Statistics comparing the 2006 model forecasts with recent counts were produced, both for Canberra metropolitan screenlines and road links within the EW corridor. The counts came from a number of sources, including:

- SCATS data
- Regular ACT Government counts
- Counts from recent studies in the corridor

Adjustments were made to some counts obtained in years other than 2008 where necessary, to reflect recent growth in the different localities were counts were obtained.

The results of the comparison were summarised in the form of GEH statistics[8]. The resultant comparison for Canberra screenlines is given in Tables 6 and 7 and for links in the EW corridor in Table 8.

[8] The GEH statistic is a form of the Chi-squared statistic comparing observed and modelled flows, which incorporates both relative and absolute errors.

The DMRB (UK Design Manual for Roads and Bridges) recommends that for 85% of individual flows, the GEH statistic should be less than 5; whilst for screen lines all GEH statistics should be less than 4. Australian road authorities often adopt this as their guideline.

Table 6: Model Validation Statistics - Total Screenline Volumes

Screenline	Direction Dir 1	GEH Dir1	GEH Dir2
1 Lake Burley Griffin	Northbound	9.8	10.7
2 East Canberra	Eastbound	14.3	0.8
3 Weston Creek	Outbound	7.8	13.4
4 Civic	Inbound	0.2	4.6
5 Tuggeranong	Outbound	10.1	25.9
6 Macarthur Avenue	Northbound	15.7	2.8
7 Queanbeyan	Outbound	9.5	14.7
8 Gungahlin	Outbound	3.1	6.8
9 Belconnen	Outbound	14.1	8.0

Note: 1. The location of the screenlines is shown in Figure 31
2. Target is for all screenlines to have GEH < 4

Table 7: Model Validation Statistics – Volumes on Screenline Links

GEH Range	No. of Links	% Total	Target
< 5	37	29%	> 85%
5 to 10	39	20%	
> 10	52	41%	< 5%
Total	**128**	**100%**	

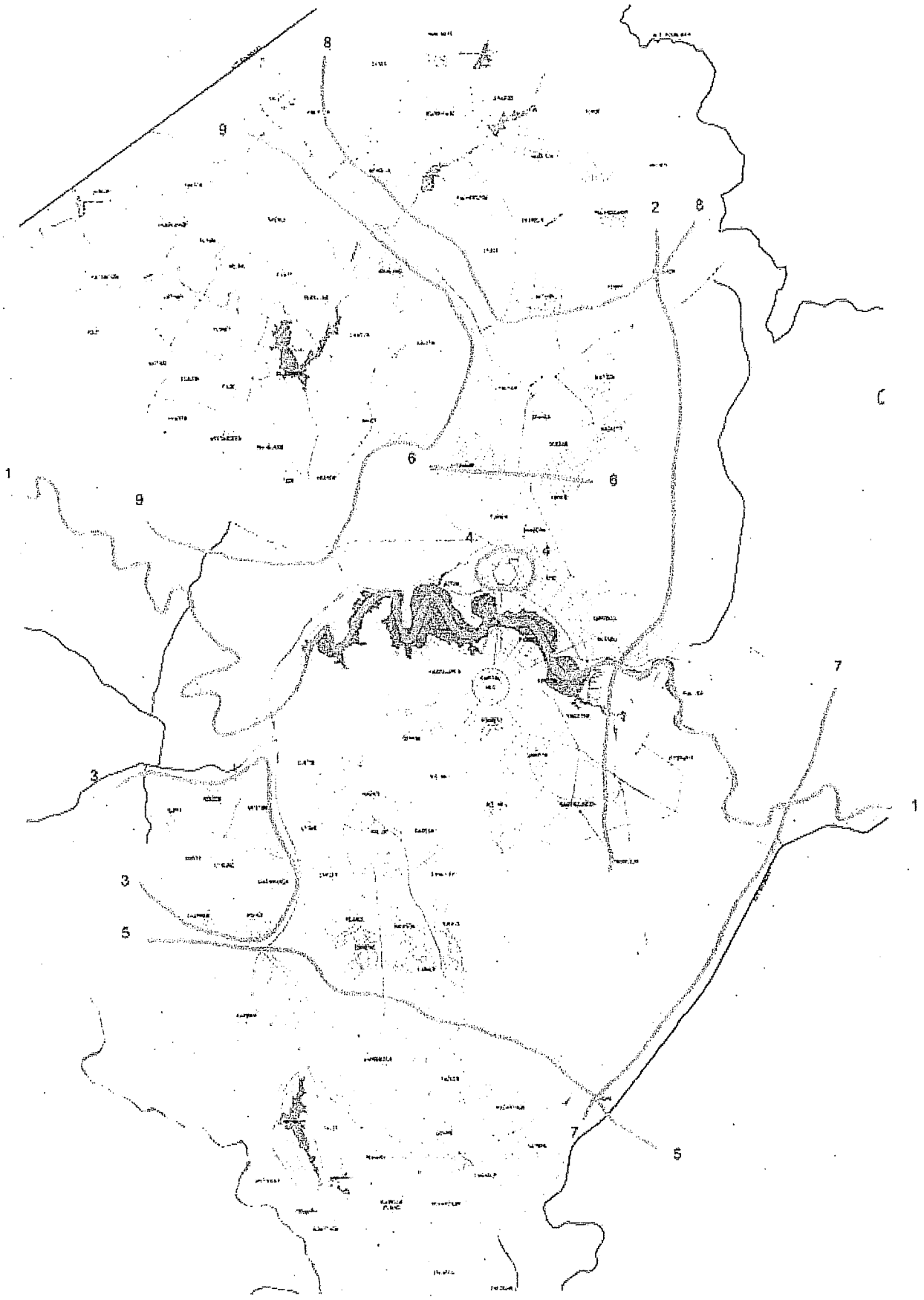
Note: The location of the screenlines is shown in Figure 31

Table 8: EW Corridor Model Validation Statistics

GEH Range	No. of Links	% Total	Target
< 5	45	28%	> 85%
5 to 10	41	26%	
> 10	73	46%	< 5%
Total	**128**	**100%**	

Note: The data for these analyses was obtained from a number of ACT Government databases and recent studies.

Figure 31: Canberra Model Screenlines



These results are relatively poor and the model is still being improved by MRC. However, it is the best we have available now for application to this project and we take account of errors in the model by adjusting the forecast flows, as explained in Section 4.1.1.

4.3 Traffic Forecasts

Daily traffic forecasts and predicted traffic growth rates at key locations in the EW corridor are summarised in Figures 32 to 34, for years 2011, 2021 and 2031 respectively. The average weekday volumes are shown in rectangles and average annual percentage traffic growth rates are shown inside the circles at each location. These forecasts are based on factoring AM traffic forecasts from EMME, using current peak to day factors. This may underestimate growth in daily traffic volumes in sections of roads that are near capacity in the AM peak.

The modelling assumed that the road connections serving Molonglo shown in Figure 8 would be in place by 2021. However, there is some uncertainty about the East West arterial road connection to Tuggeranong Parkway, which is subject to further review. The modelling assumes a number of other known road network improvements, including duplication of GDE by 2011 and construction of Majura Parkway by 2021. The modelling did not extend to scenario testing of alternative road arrangements in the Parliamentary Triangle (eg., the role of Bowen Place and King Edward Terrace, a future Sellheim Drive in Russell).

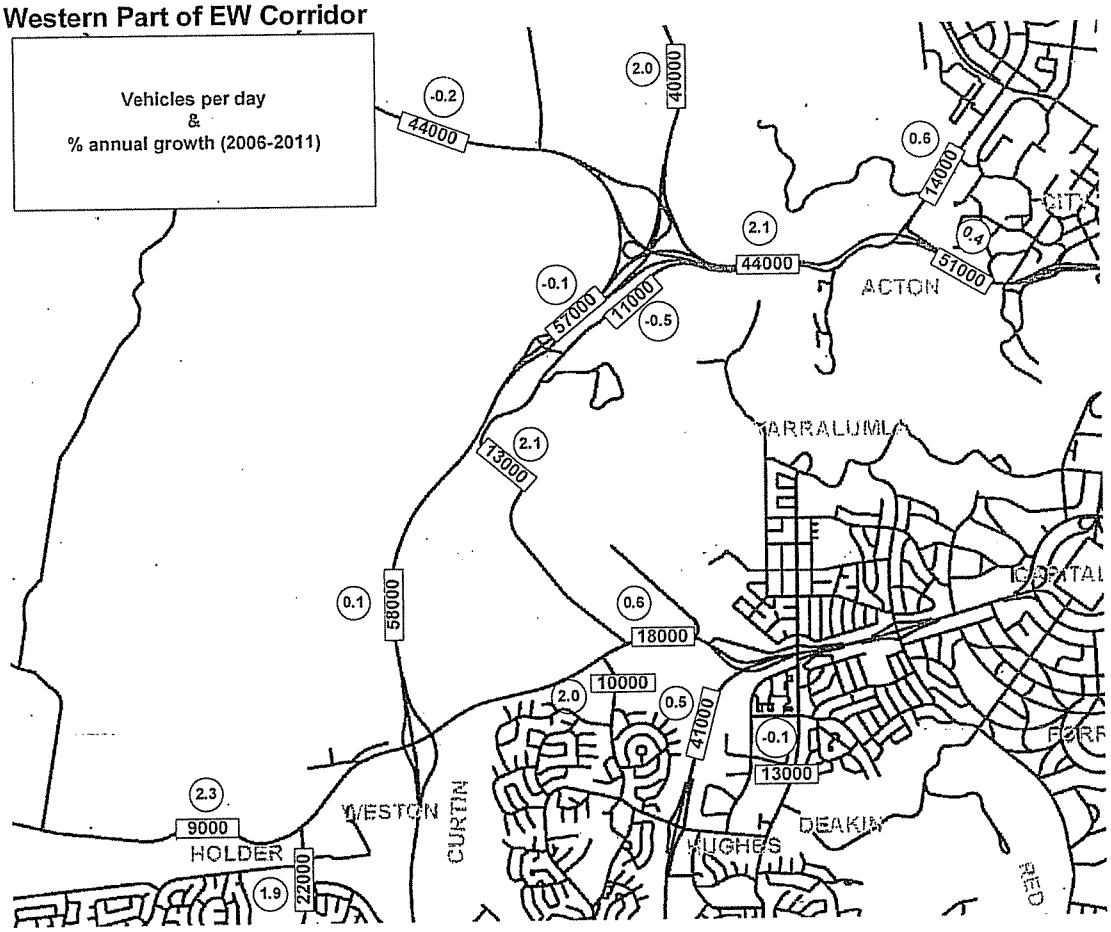
The results of the traffic modelling showed consistent growth in traffic on Parkes Way, Morshead Drive, Pialligo Avenue, Monaro Highway-Majura Road corridor and Cotter Road west of Tuggeranong Parkway. This growth will generally be higher than growth elsewhere in Canberra and is predicted to remain relatively high for the next 10 years, then it is predicted to flatten off.

The highest growth in the next 10 years will be roads near the airport and Molonglo. The new development in Molonglo is predicted to generate about 40,000 vehicle per day in the Cotter Road and Tuggeranong Parkway corridors, via two new arterial roads that will be built to service Molonglo (see Figure 33).

The construction of Majura Parkway and new development in Gungahlin, the Majura Valley and in Queanbeyan will generate significant additional traffic on Monaro Highway, Morshead Drive and Pialligo Avenue. There would also be some growth on Fairbairn Avenue, although this is restricted by its limited capacity.

Figure 32: 2011 Daily Traffic Forecasts and Annual Growth Rates

Western Part of EW Corridor



Eastern Part of EW Corridor

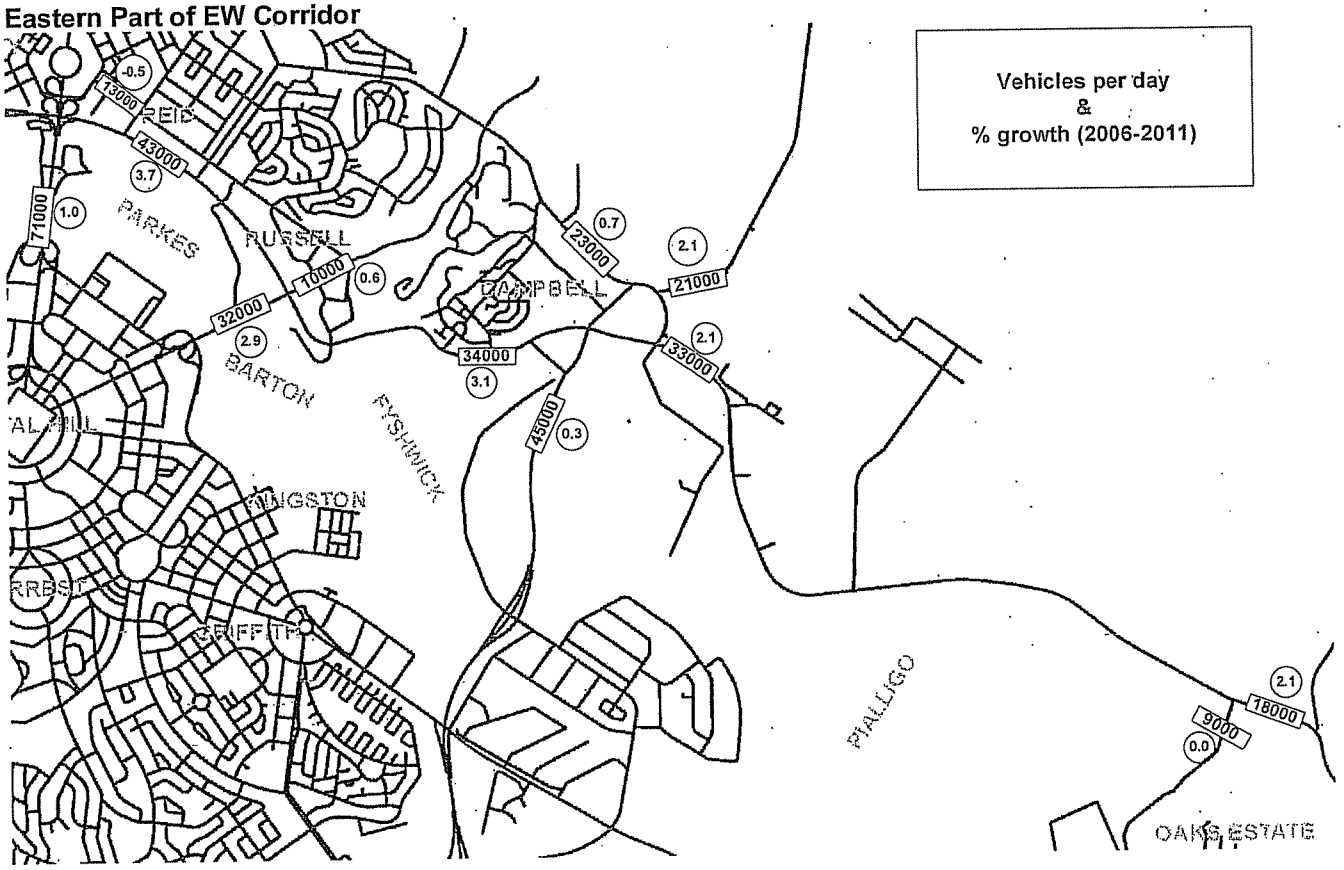
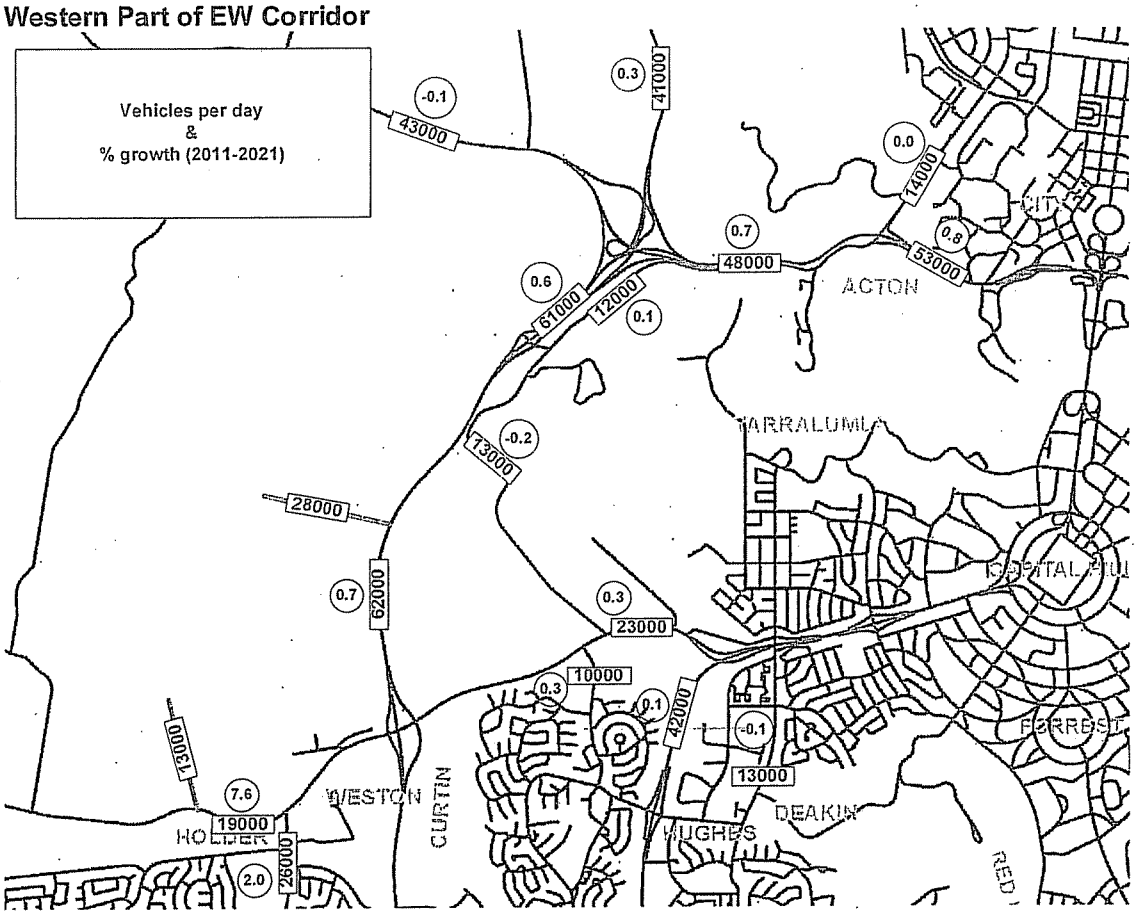


Figure 33: 2021 Daily Traffic Forecasts and Annual Growth Rates

Western Part of EW Corridor



Eastern Part of EW Corridor

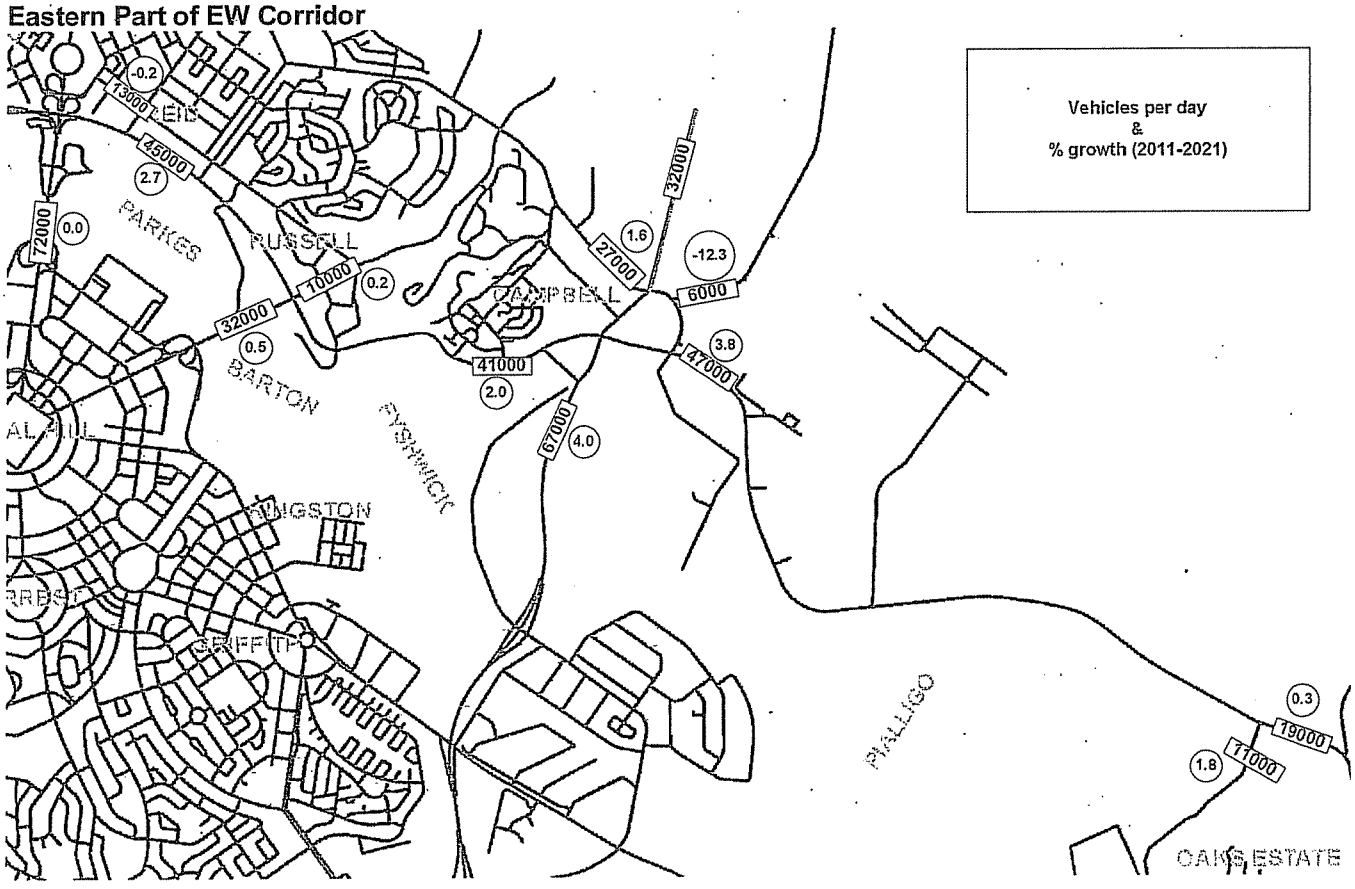
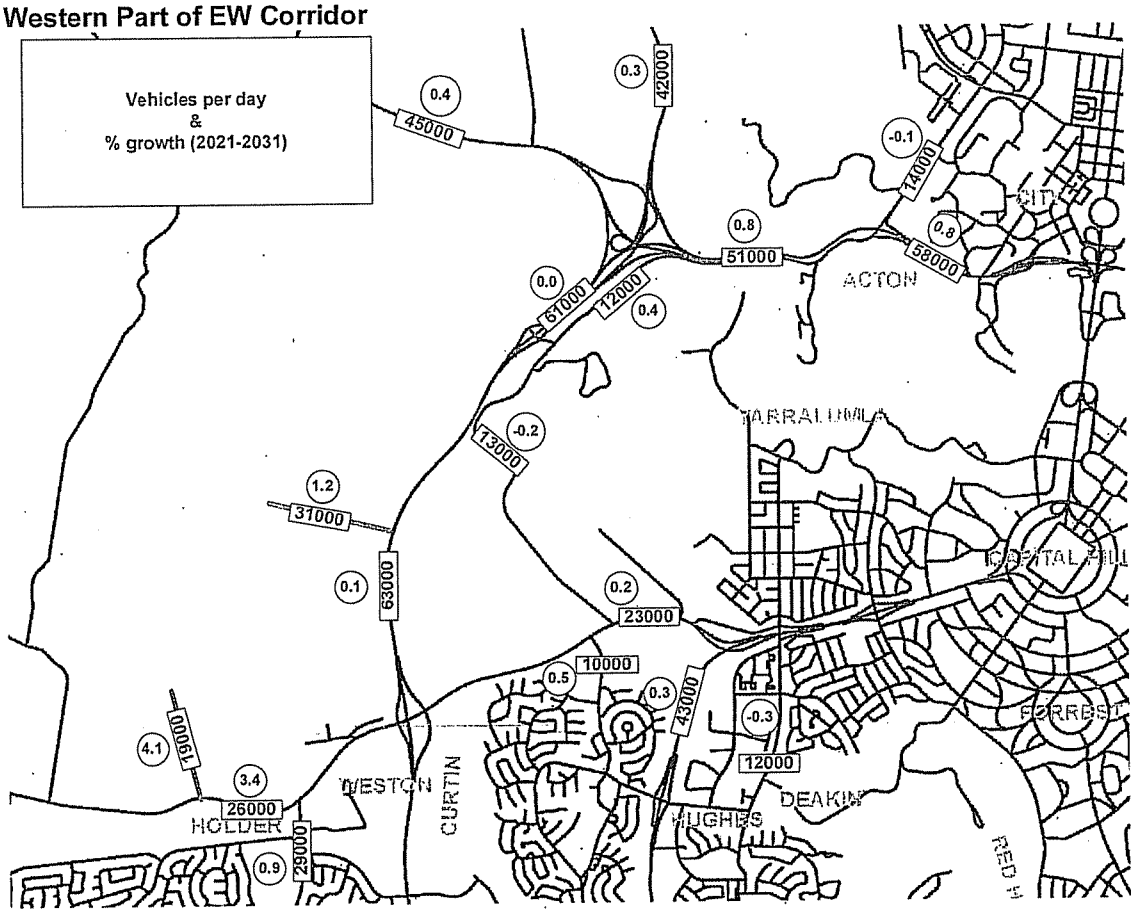
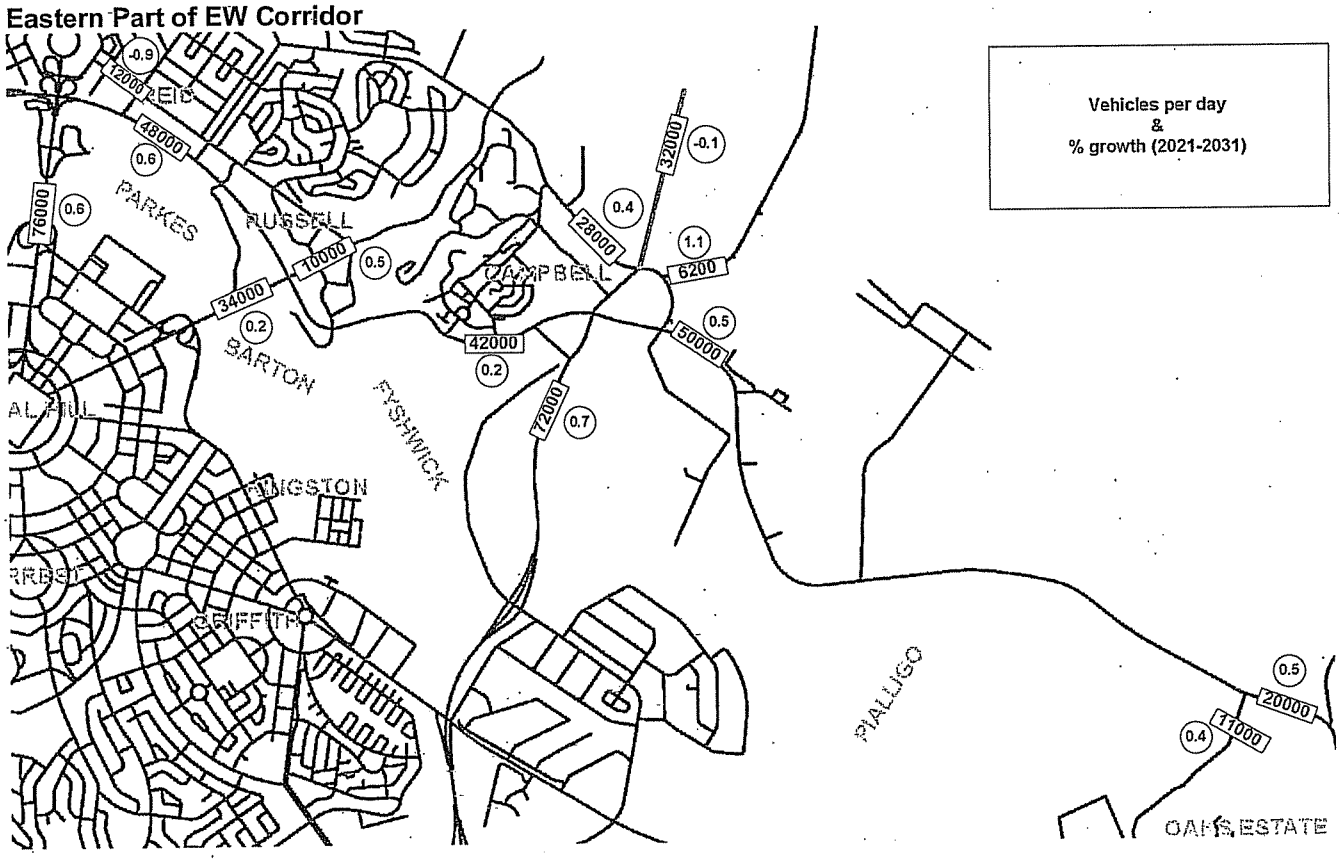


Figure 34: 2031 Daily Traffic Forecasts and Annual Growth Rates

Western Part of EW Corridor



Eastern Part of EW Corridor



5.0 Road Capacity Analyses

5.1 Mid-block

Figures 35 to 37 summarise the results of the AM peak hour midblock level of service analyses for roads in the EW corridor, for the years 2011, 2021 and 2031 respectively. This indicates that most of the roads in the corridor are already and will continue to be congested in the peak hour.

Estimates of volume capacity ratios are annotated on links that have level of service F, as a means of indicating what will be the most congested links. Key observations from these results are:

- New arterial roads accessing Molonglo from Cotter Road and Tuggeranong Parkway are likely to ultimately require a 4-lane divided cross-section
- Cotter Road should desirably be widened to a 4-lane divided cross-section in future, between the proposed new access to Molonglo and Yarra Glen interchange
- Tuggeranong Parkway should desirably be widened between Cotter Road and Glenloch Interchange
- Pialligo Avenue should desirably be widened to a 4-lane divided cross-section in future, between the airport access and the NSW border
- Fairbairn Avenue will need to be upgraded east of Northcott Drive and desirably duplicated through to Treloar Crescent
- The capacity of Parkes Way and Morshead Drive need to be increased, by improving intersection/interchange operation and possibly by widening these roads
- The roads around Russell will require additional capacity

The capacity of the road system is largely controlled by the capacity of intersections and interchanges and improvements to these can defer the need for road duplication or widening. The results of an analysis of interchanges and intersections follow.

5.2 Interchanges

An analysis of the capacity of freeway ramps and weaving areas for roads in the EW corridor was undertaken using procedures in AustRoads guidelines and the Highway Capacity Manual. The capacity of the ramps is determined from the worst level of service provided by either:

- The ramp proper
- The merge/diverge area to/from the ramp
- The section of freeway adjacent to the ramp

The results of the AM peak hour analyses of freeway ramps is summarised in Figures 38 to 40, for the years 2011, 2021 and 2031 respectively. This analysis identified numerous problems with ramps serving the peak direction of travel in the AM peak. It is anticipated that similar problems exist in the reverse direction in the PM peak. The results of the AM peak hour ramp analyses indicated that the following ramps are in most need of attention in future:

- Southbound merge from GDE to Parkes Way
- Northbound from Tuggeranong Parkway to Parkes Way
- Eastbound from Clunies Ross Street to Parkes Way
- Northbound from Cotter Road to Tuggeranong Parkway
- Eastbound from Cotter Road to Adelaide Avenue
- Eastbound from Novar Street to Adelaide Avenue
- Southbound from Parkes Way/London Circuit to Commonwealth Avenue

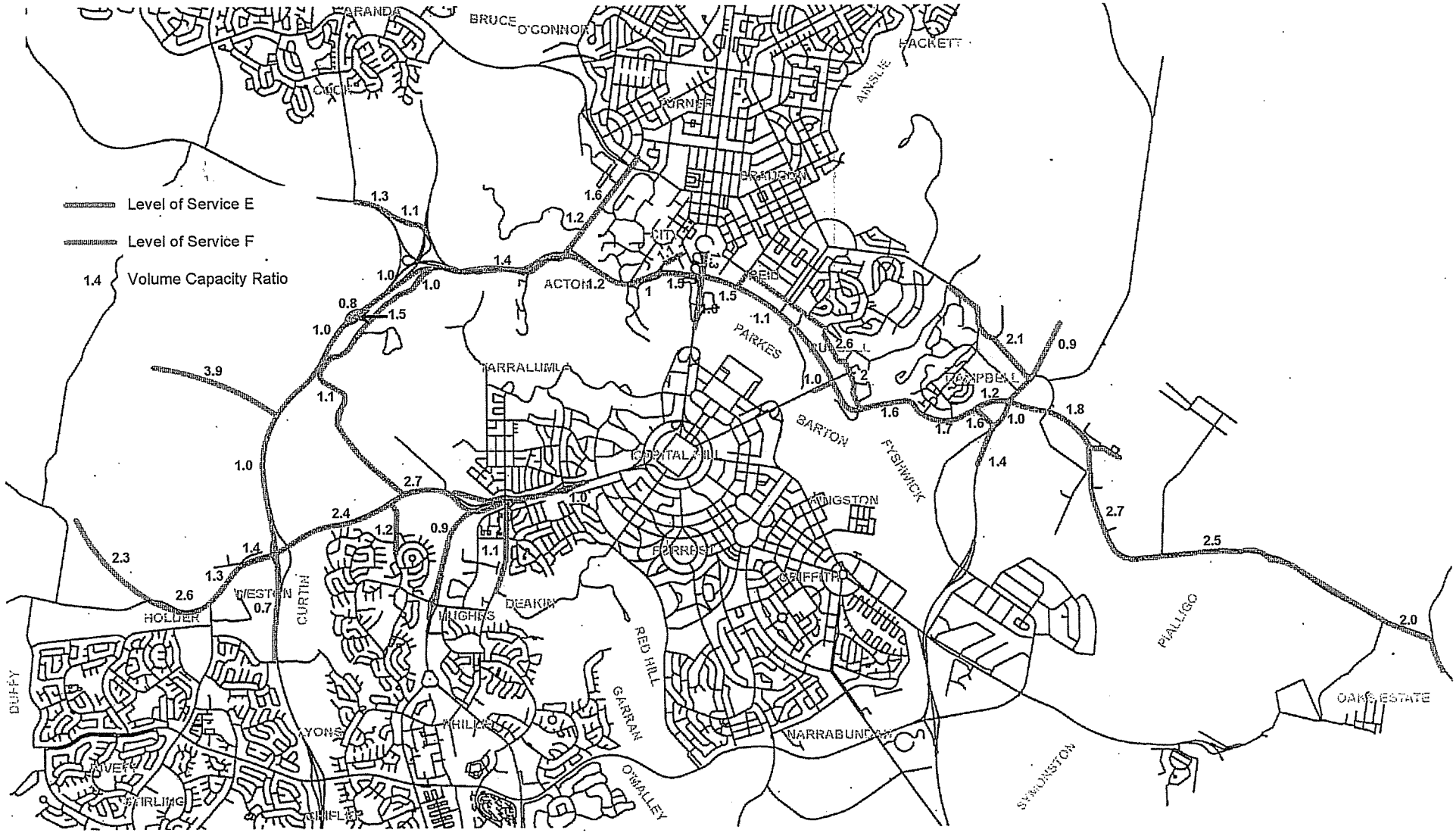
Figure 35: 2011 Midblock Level of Service

Note: AM peak hour only

Figure 36: 2021 Midblock Level of Service

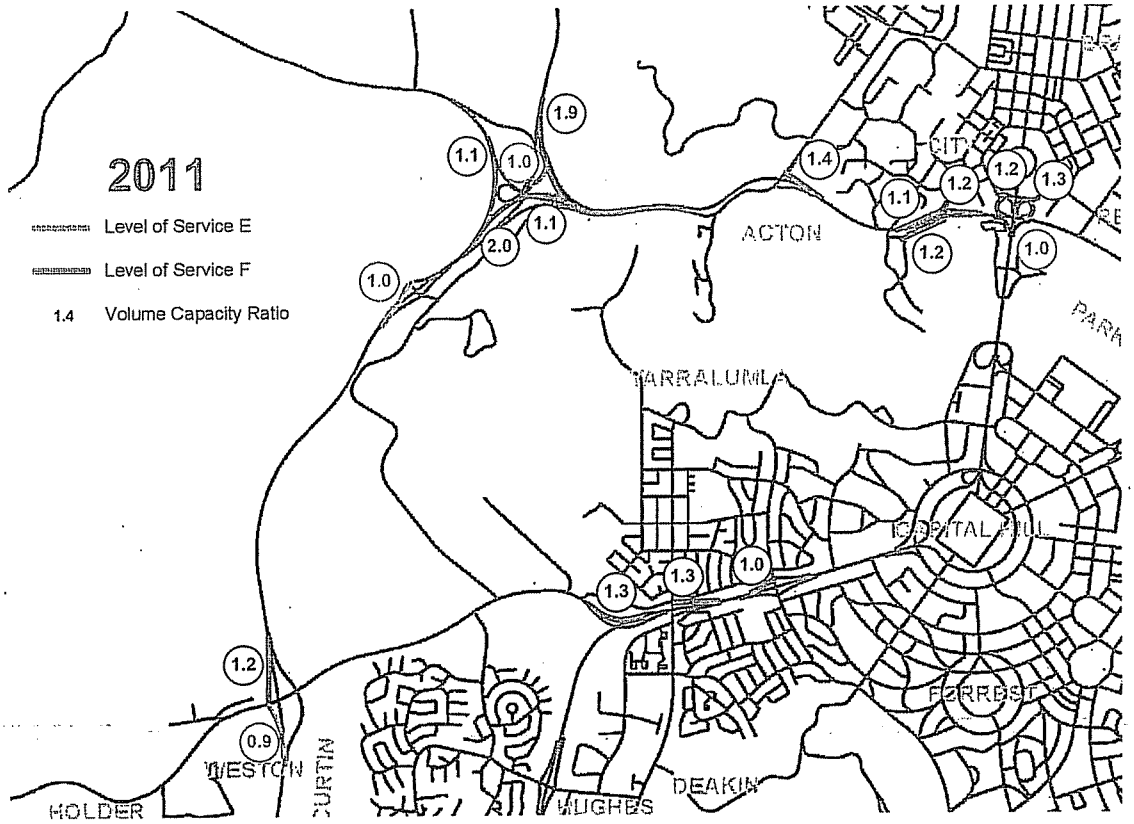
Note: AM peak hour only

Figure 37: 2031 Midblock Level of Service



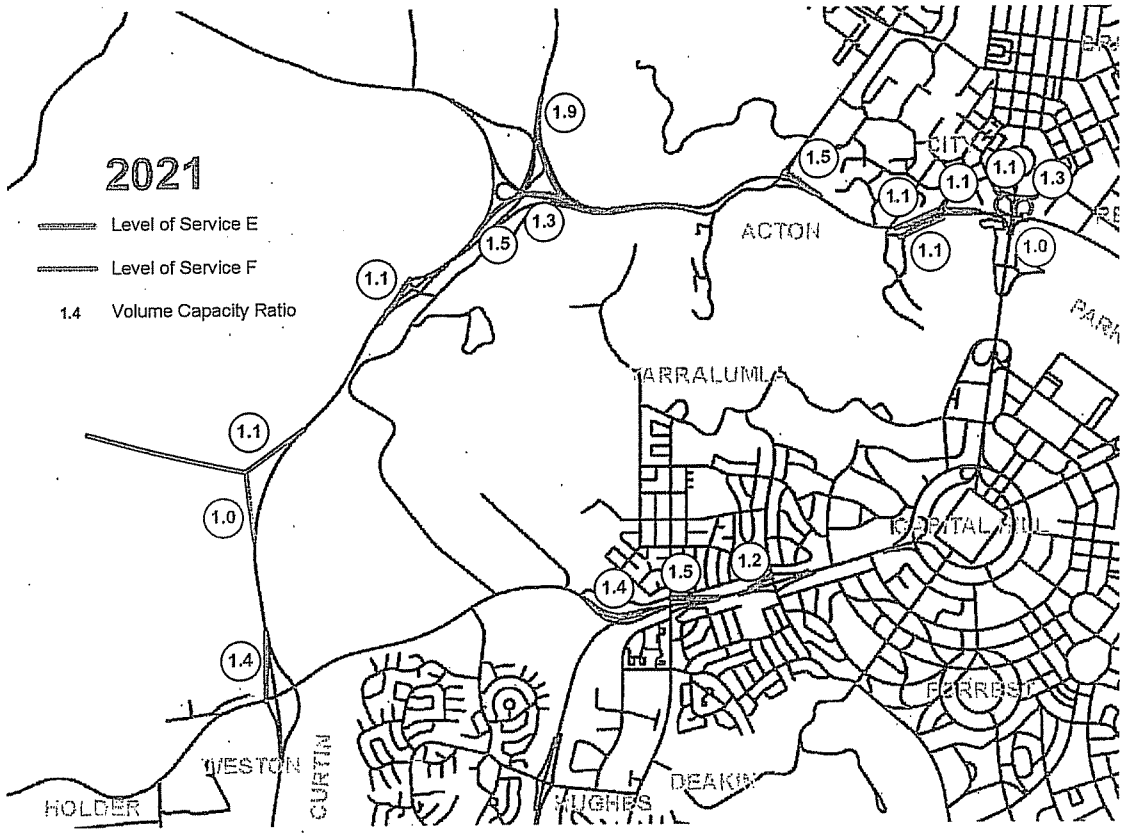
Note: AM peak hour only

Figure 38: 2011 Freeway Ramp Level of Service



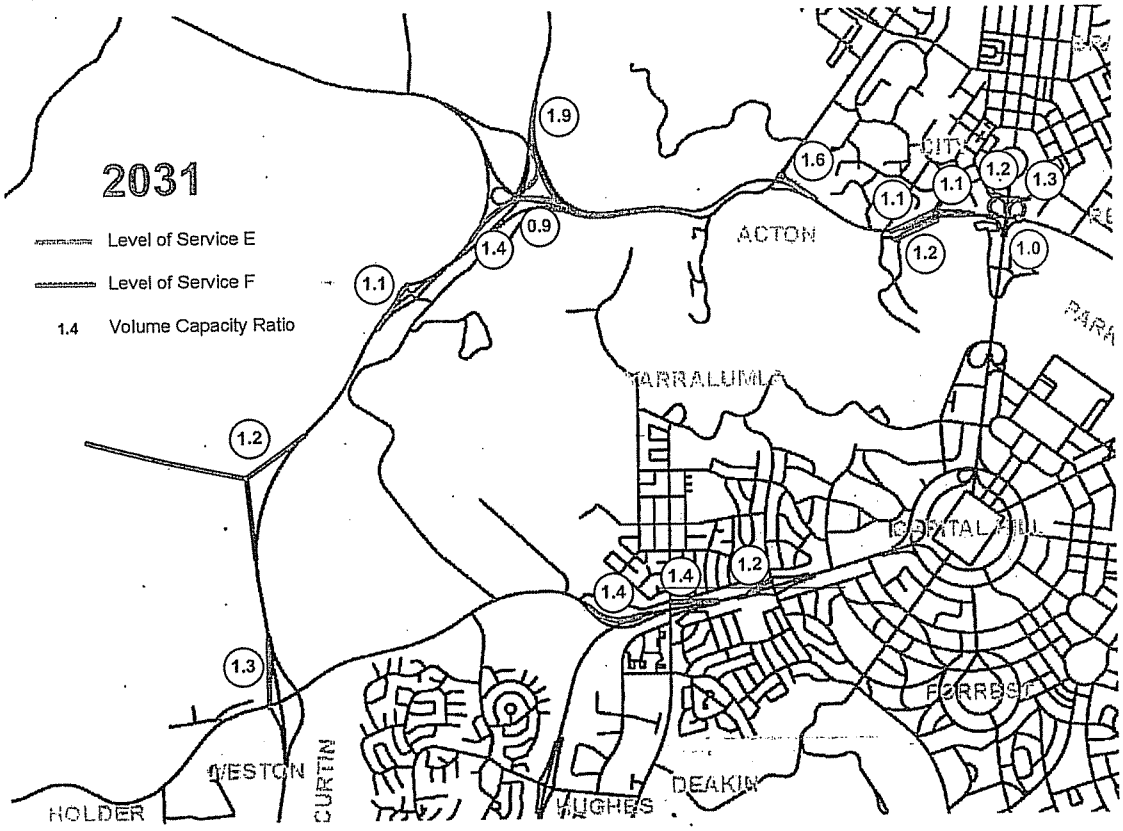
Note: AM peak hour only

Figure 39: 2021 Freeway Ramp Level of Service



Note: AM peak hour only

Figure 40: 2031 Freeway Ramp Level of Service



Note: AM peak hour only

The results of the AM peak hour weaving analyses are given in Table 9. It indicates that weaving movements greatly affect the operation of Parkes Way between Clunies Ross Street and Coranderrk Street. These are a major impediment to flows along Parkes Way during peak periods.

Table 9: Level of Service for Weaving Sections

Location	2011	2021	2031
NB on Tuggeranong Pwy between Lakeside Int and Glenloch Int	B	B	B
EB on Parkes Way near Acton Tunnel	F	F	F
EB on Parkes Way between Edinburgh Ave and Commonwealth Ave	F	F	F
WB on Parkes Way between Commonwealth Ave and Lawson Dr	B	C	C
WB on Parkes Way between Coranderrk St and Commonwealth Ave	D	D	D
SB on Tuggeranong Pwy from GDE and Parkes Way	B	B	B
NB on Tuggeranong Pwy to Parkes Way and William Hovell Dr	C	C	C

Note: 1. AM peak hour only

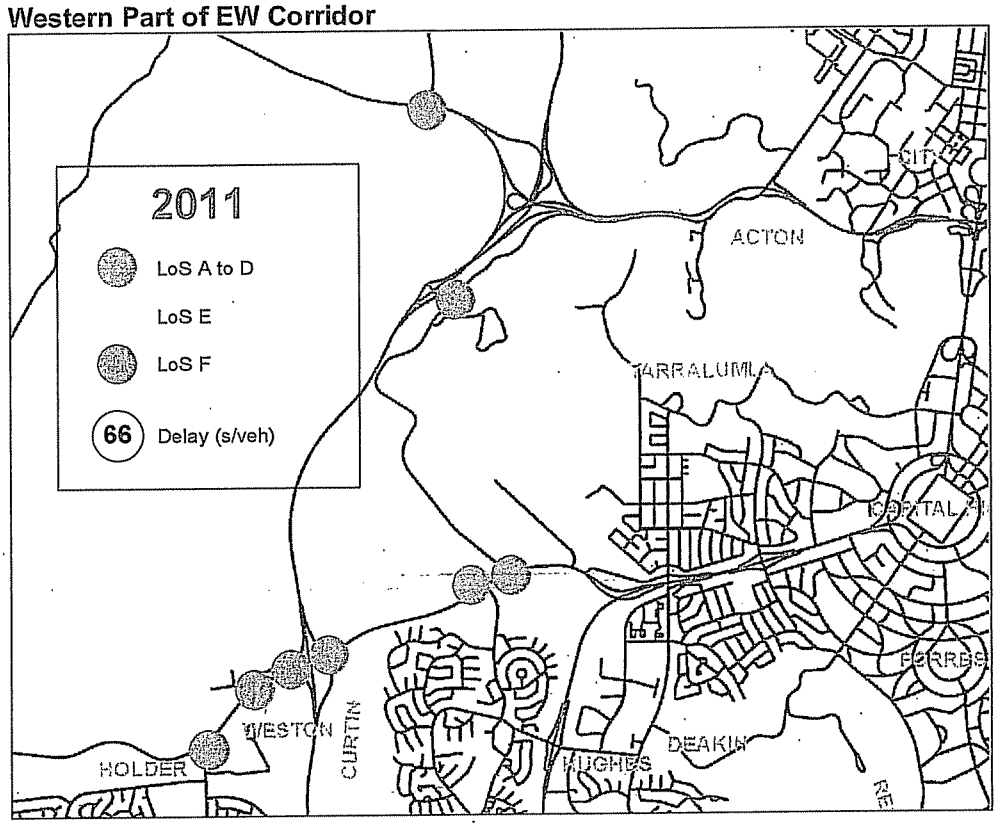
2. The analysis of the section between Lakeside and Glenloch interchanges was based on the proposed design for GDE Stage 2

5.3 Intersections

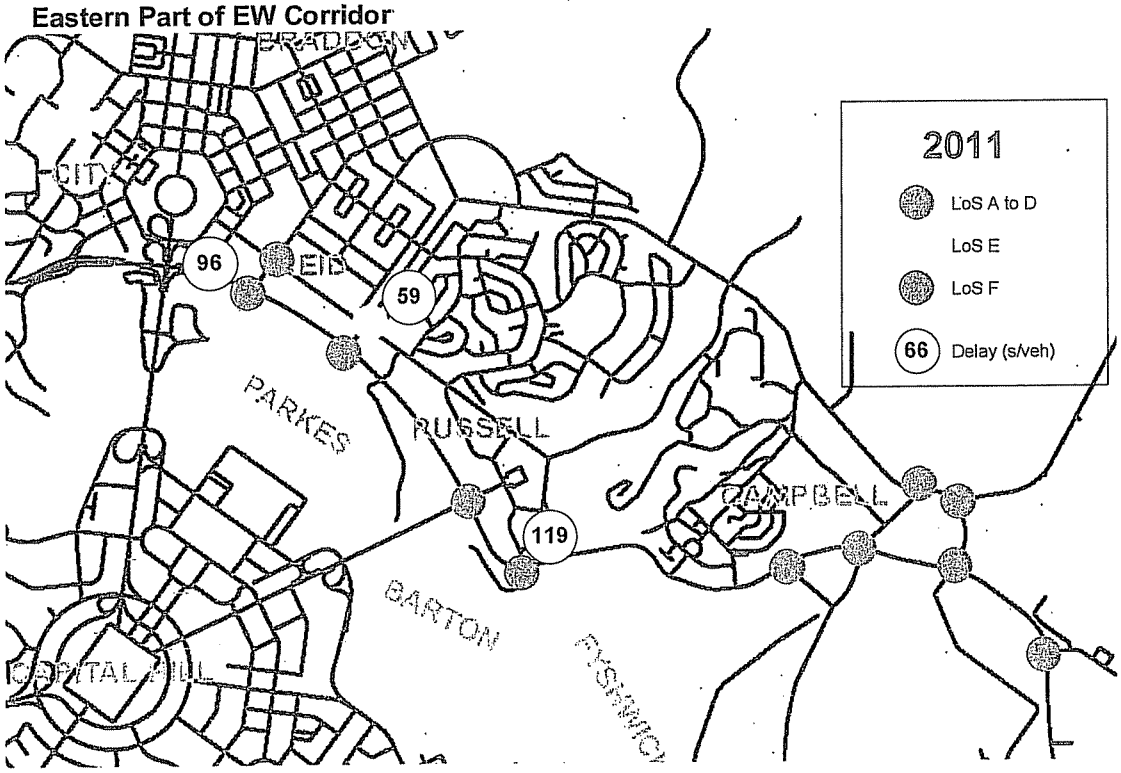
The results of the AM peak hour SIDRA analyses are summarised in Figures 41 to 43 and more details are given in Table 10. Commentary on these analyses follows in Table 11.

Figure 41: 2011 Intersection Level of Service

Western Part of EW Corridor



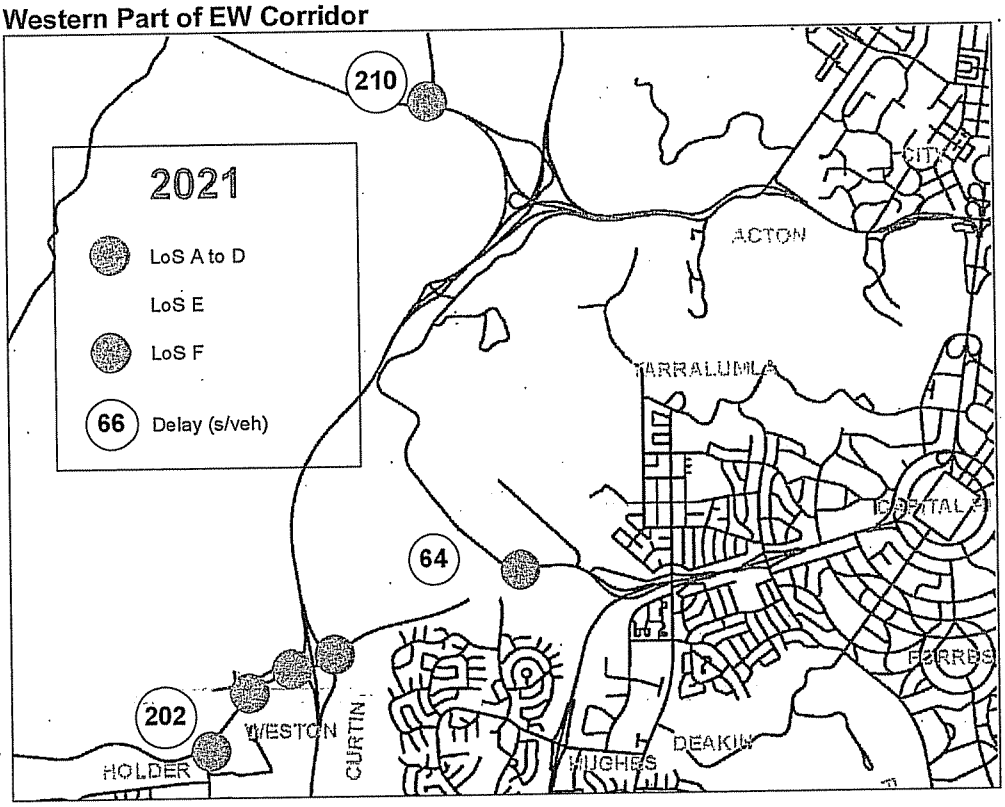
Eastern Part of EW Corridor



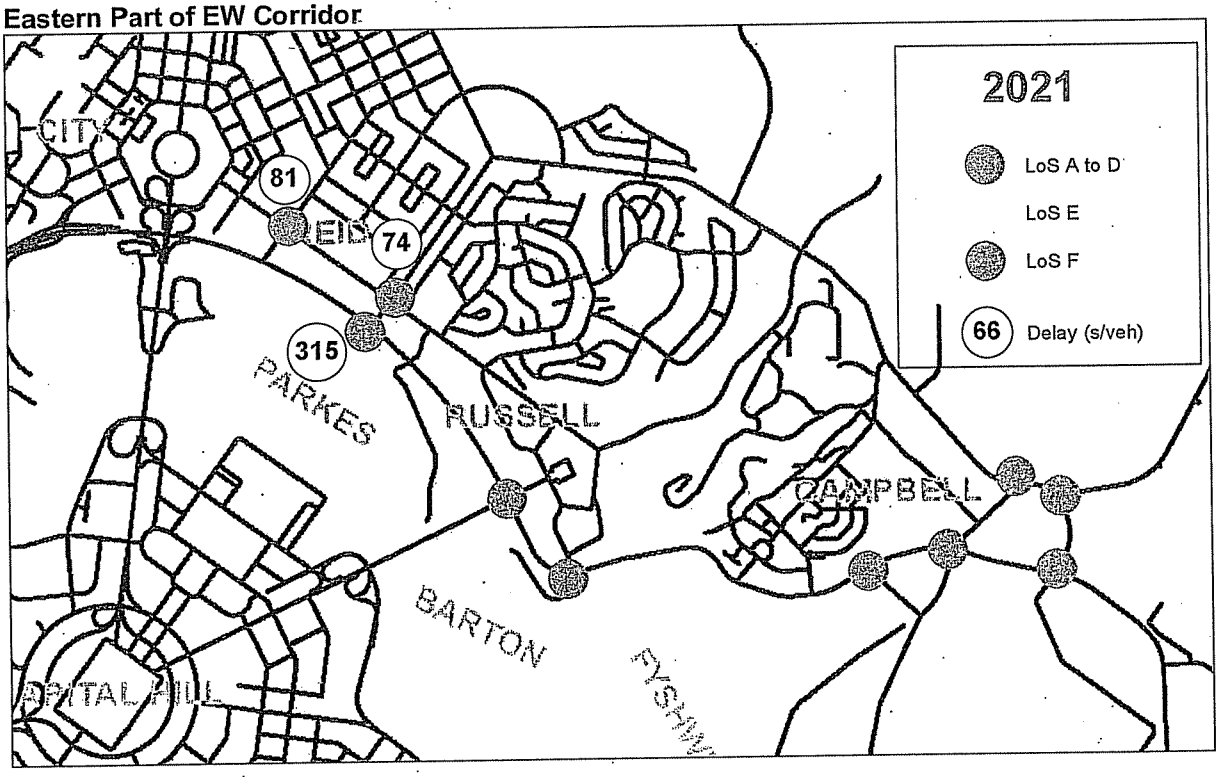
Note: AM peak hour only

Figure 42: 2021 Intersection Level of Service

Western Part of EW Corridor



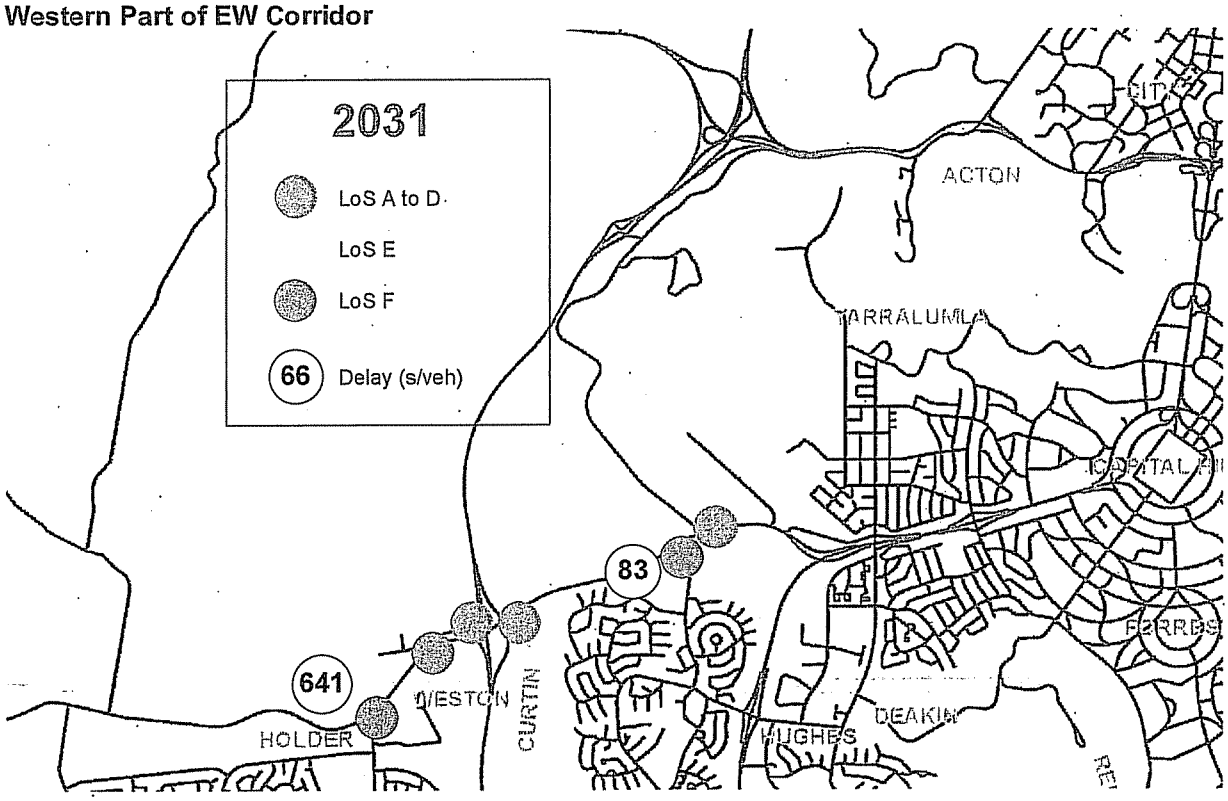
Eastern Part of EW Corridor



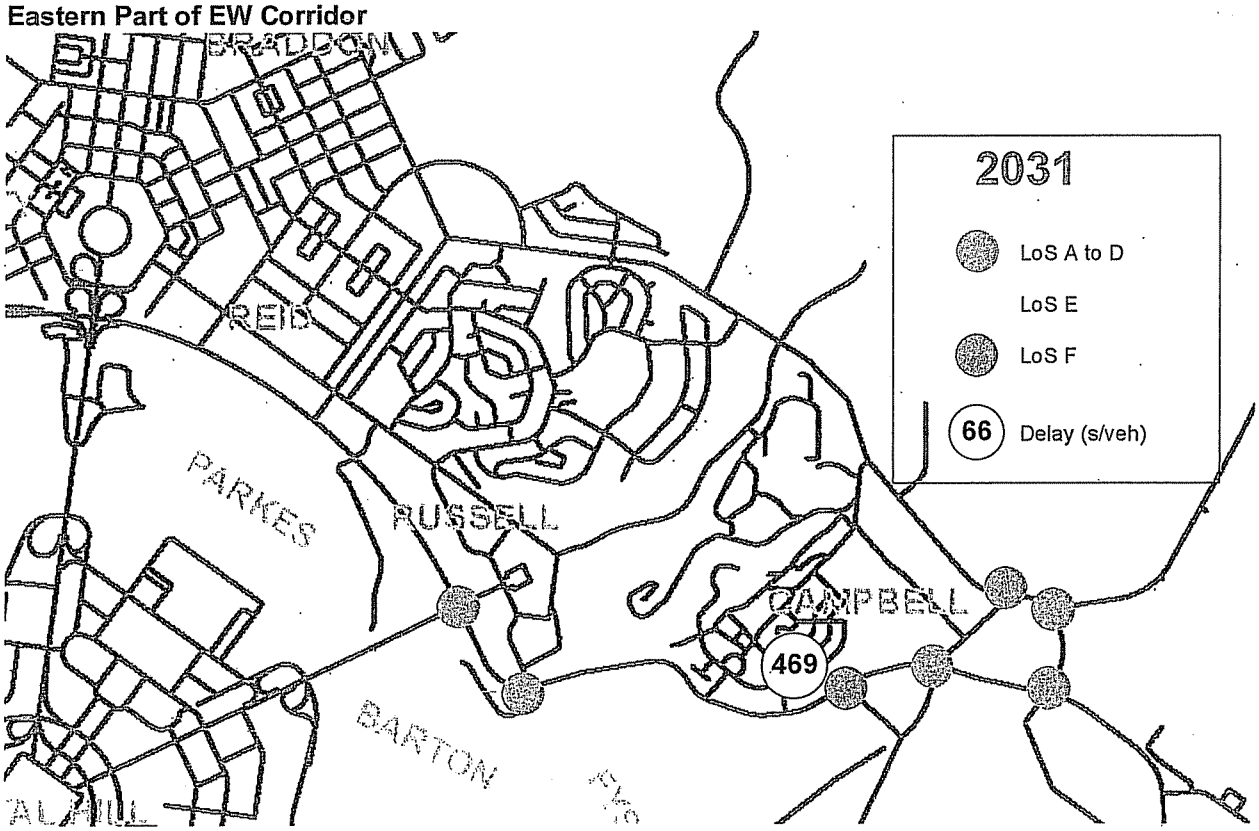
Note: AM peak hour only

Figure 43: 2031 Intersection Level of Service

Western Part of EW Corridor



Eastern Part of EW Corridor



Note: AM peak hour only

Table 10: SIDRA Intersection Analysis Results

Intersection	2011		2021		2031	
	Ave. Delay (sec)	LOS	Ave. Delay (sec)	LOS	Ave. Delay (sec)	LOS
Kings Ave / Parkes Way (Grade Separated)	-	-	20.7	B	21.8	B
Morshead Dr / Russell Dr Roundabout (with Hospice)	118.5	F	60.6	E	368.3	F
Morshead Dr / Russell Dr (signals) (with existing Hospice access)	44.4	D	31.3	C	52.6	D
Morshead Dr / Russell Dr (signals) (with left-in-left-out Hospice access)	25.1	B	20.0	B	38.6	C
Parkes Way / Anzac Parade Roundabout	36.1	C	314.9	F	563.0	F
Anzac Parade and Constitution Ave (existing)	58.5	E	-	-	-	-
Anzac Parade / Constitution Ave Modified Box arrangement	33.3	C	73.8	F	961.8	F
Morshead Dr / Dairy Flat Rd Road	16.5	B	16.1	B	468.4	F
Morshead Dr / Pialligo / Monaro Hwy SIGNALS	30.4	C	12.3	A	14.0	A
Parkes Way / Coranderrk St Roundabout	96.1	F	-	-	-	-
Parkes Way / Coranderrk signals	32.1	C	36.0	C	37.8	C
Constitution Ave / Coranderrk St (existing)	49.9	D	80.8	F	77.0	F
Constitution Ave / Coranderrk St (revised layout)	-	-	38.3	C	42.5	C
Fairbairn Ave/Morshead Dr signals	17.1	B	14.3	A	14.7	B
Fairbairn Ave / Majura Road	18.9	B	13.1	A	13.4	A
Fairbairn Ave/Beltana/Pialligo Ave SIGNALS	32.9	C	35.2	C	29.6	C
Cotter Road/Streeton Drive (existing layout)	32.5	C	201.7	F	631.2	F
Cotter Road /Streeton Dr (Modified 3 int layout)	-	-	20.8[9]	B	22.8[10]	B
Cotter Road/McCulloch St (Existing)	49.7	D	63.8	E	82.6	F
Cotter Road/McCulloch St (Revised)	30.1	C	20.5	B	33.6	C
Bindubi St / William Hovell Dr (signals)	66.1	E	210.1	F		
Cotter Road / Lady Denman Drive (Roundabout)	40.9	C	42.7	D	22.5	B

[9] Layout includes 2 lanes on Cotter Road
[10] Layout requires 3 lanes on Cotter Road

Intersection	2011		2021		2031	
	Av. Delay (sec)	LoS	Av. Delay (sec)	LoS	Av. Delay (sec)	LoS
Cotter Road/Lady Denman Drive(Signals)	28.1	B	21.7	B	21.7	B
Cotter Road / Tuggeranong Parkway Ramp (WEST)	14.6	B	9.9	A	11.8	A
Cotter Road / Tuggeranong Parkway Ramp (EAST)	44.6	D	20.0	B	16.5	B
Cotter Road / Kirkpatrick Street (existing roundabout)	15.1	B	33.9	C	168.5	F
Cotter Road / Kirkpatrick Street SIGNALS	16.3	B	13.8	A	12.3	A

Note: AM peak hour analysis only

Table 11: Commentary on Results of Intersection Analyses

Intersection	Comments
Kings Ave / Parkes Way	• Grade separation assumed to be operational after 2011 (currently being designed). • Expected to operate at satisfactory LoS ('B') up to 2031
Morshead Dr / Russell Dr	• Existing roundabout is at capacity now. Significant queuing and delays occur on the Morshead Dr west approach due to the high demand of right turning vehicles into Russell Drive in the AM peak. • A capacity upgrade is required at this intersection in the form of signals. A possible layout is shown in Figure 44. • Full access to the hospice road (upon signalisation) will impose additional delays on the intersection due to the need for additional phases. • Restricted (left-in-left-out) access into hospice road would improve future performance of the signals. This configuration would however result in a redistribution of traffic, albeit only minor volumes.
Parkes Way / Anzac Parade	• Existing roundabout configuration will operate satisfactorily in 2011, but will require an upgrade by 2021. • NCA's Griffin Legacy work has identified a potential grade separation of this intersection. The roundabout would need to remain, with Parkes Way tunnelled underneath.
Anzac Parade / Constitution Ave	• The existing configuration is nearing capacity today and will be operating at an unacceptable LoS ('E') by 2011. The existing queuing and delays stem from the 'box' right turn arrangement which requires right turning vehicles to store in the Anzac Parade median. This results in queues extending back to Parkes Way and interfering with the performance of this major arterial road – an undesirable situation.

Intersection	Comments
	• Anzac Parade is on the 'Heritage List'; therefore the potential upgrade options for this intersection are limited. Previous discussions with NCA and Department of Heritage have identified a wish to maintain the existing inner kerb lines. The outer kerb line is constrained by the existing road lighting scheme along Anzac Parade. • An interim solution, involving revised linemarking and signal controls can provide some short term performance improvements without impacting on the Anzac Parade median (see Figure 45). However, by 2021 this revised configuration is likely to fail. • The 'heritage' constraints limit the options for capacity improvements and further investigations are being undertaken by NCA.
Morshead Dr / Dairy Flat Rd Road	• The existing configuration (roundabout) will operate well until 2021, but will require a capacity upgrade prior to 2031. • The recent provision of a 'bypass' lane for the eastbound through movement on Morshead Drive has provided increased capacity here and reduced queuing and delays.
Morshead Dr / Pialligo / Monaro Hwy	• This intersection has recently been upgraded to signalised control, as part of the Pialligo Avenue duplication. This configuration is expected to perform well beyond 2011. • The future Monaro Hwy / Majura Parkway flyover has been assumed to occur prior by 2021, resulting in a revised Morshead Dr / Pialligo Ave configuration (removal of the 'through' movement from the south). This future configuration is expected to operate satisfactorily to 2031.
Parkes Way / Coranderrk St	• The existing roundabout configuration currently experiences significant queuing on the Parkes Way west approach in the AM peak. The overall performance of this intersection is expected to worsen by 2011, but still acceptable at an overall LoS 'D'. • By 2021 this intersection will require a capacity upgrade to be able to accommodate the high demand for movements into and out of Coranderrk Street. Careful consideration will need to be given to any future layout to ensure minimal interference with the nearby Constitution Avenue signals. • In the absence of a fully grade separated intersection, a large signalised configuration will provide adequate capacity up to 2031. • A set of signals that maintains the 'continuous' westbound movement along Parkes Way (signalised seagull) appears to be the most efficient configuration, but would continue to create safety risks due to the weaving movement from Coranderrk Street to the Commonwealth Avenue exit ramp. Hence, an option with all movements controlled was analysed and found to work (see Figure 46).

Intersection	Comments
Constitution Ave / Coranderrk St	• The existing configuration is expected to be nearing capacity by 2011, with queuing on the southern approach extending back to Parkes Way and affecting the operation of the roundabout[11] – this is undesirable. • This intersection would be upgraded as part of the possible future duplication of Constitution Avenue. The ultimate configuration would likely include designated right turn lanes within the Constitution Avenue median (Figure 47). • An upgrade to this intersection is required very soon to allow for adequate future road capacity.
Fairbairn Ave / Morshead Dr	• This intersection has recently been upgraded (additional lanes), as part of the Pialligo Avenue duplication. Analysis shows that this configuration is expected to have adequate spare capacity up to 2031. • Notably, the traffic volumes at this intersection are expected to decrease as a result of the future Monaro Hwy / Majura Parkway flyover.
Fairbairn Ave / Majura Road	• The soon to be completed duplication of Fairbairn Avenue will include an upgrade of this intersection. The upgrade will provide adequate capacity to provide for satisfactory levels of performance up to 2031, assuming the Majura Parkway is built before 2021.
Fairbairn Ave / Beltana / Pialligo Ave	• Currently this intersection is a roundabout configuration, however the soon to be completed duplication of Pialligo Avenue will include an upgrade of this intersection to signalised control. The upgrade will provide adequate capacity to provide for satisfactory performance up to 2031.
Cotter Road / Streeton Drive	• This intersection is expected to be running with spare capacity until 2011 with the existing configuration. • By 2021 this intersection will require a major upgrade to accommodate heavy traffic on Cotter Road due to the development of Molonglo. A revised (3 intersection) configuration[12] at this intersection is expected to perform with adequate spare capacity. • By 2031 this configuration will need to be upgraded to include 3 through lanes on Cotter Road (see Figure 48).
Cotter Road / McCulloch St	• The existing configuration is expected to be nearing capacity by 2011, with more than 600m queuing on Cotter Road (undesirable). • Analysis shows that after upgrading the existing configuration (extending the through lane on Cotter Rd by about 200m as shown in Figure 49), this intersection will perform satisfactorily up to 2031.

[11] Queueing back to the Coranderrk Street/Parkes Way roundabout already occurs during the AM peak, partly due to lane inbalances in queues on Coranderrk Street back from Constitution Avenue

[12] Layout recommended by SMEC in Molonglo Roads Feasibility Study: Traffic Analysis and Economic Appraisal of Cotter/Streeton/Kirkpatrick Road Network

Intersection	Comments
Bindubi St / William Hovell Dr	• This intersection is expected to reach capacity by 2011. Grade separation of this intersection should be implemented when the Molonglo distributor road connection is built here.
Cotter Road / Lady Denman Drive	• The existing roundabout configuration is expected to reach capacity by 2011 and will need to be upgraded to signals. A possible layout is shown in Figure 50. • Analyses of a traffic signal arrangement here shows that it will perform satisfactorily with adequate spare capacity up to 2031. • This signalised intersection could be easily co-ordinated with the nearby Cotter Road / McCulloch St intersection
Cotter Road / Tuggeranong Parkway Ramp (WEST)	• The existing configuration (signals) will operate well within capacity up to 2031.
Cotter Road / Tuggeranong Parkway Ramp (EAST)	• The existing configuration (signals) will operate well within capacity up to 2031.
Cotter Road / Kirkpatrick Street	• Existing roundabout configuration will operate satisfactorily in 2011, but is expected to reach capacity by 2021 and will need to be upgraded to signals. A possible layout is shown in Figure 51.

Figure 44: Possible Layout for Morshead Drive/ Russell Drive Intersection

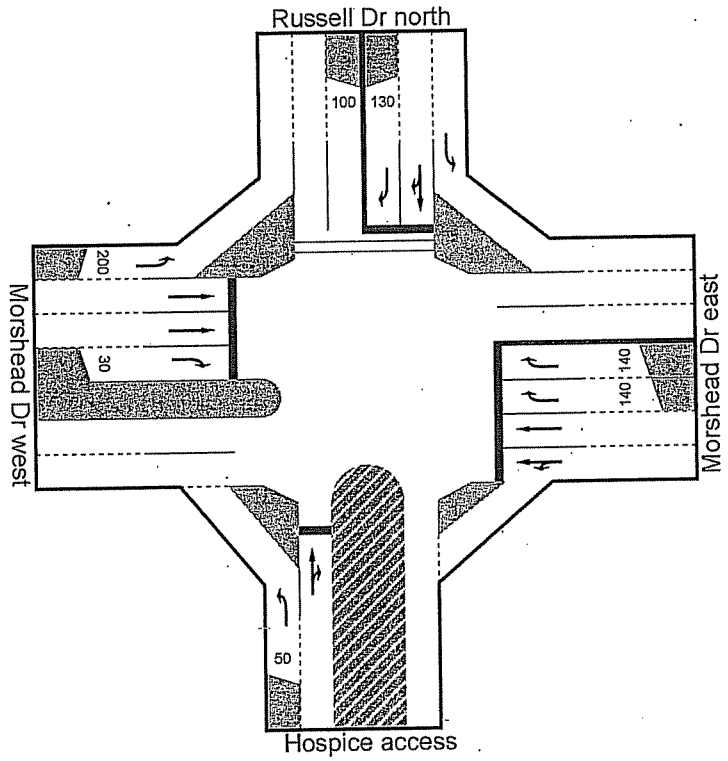


Figure 45: Modified Box Turn Arrangement for Anzac Pde/Constitution Ave Signals

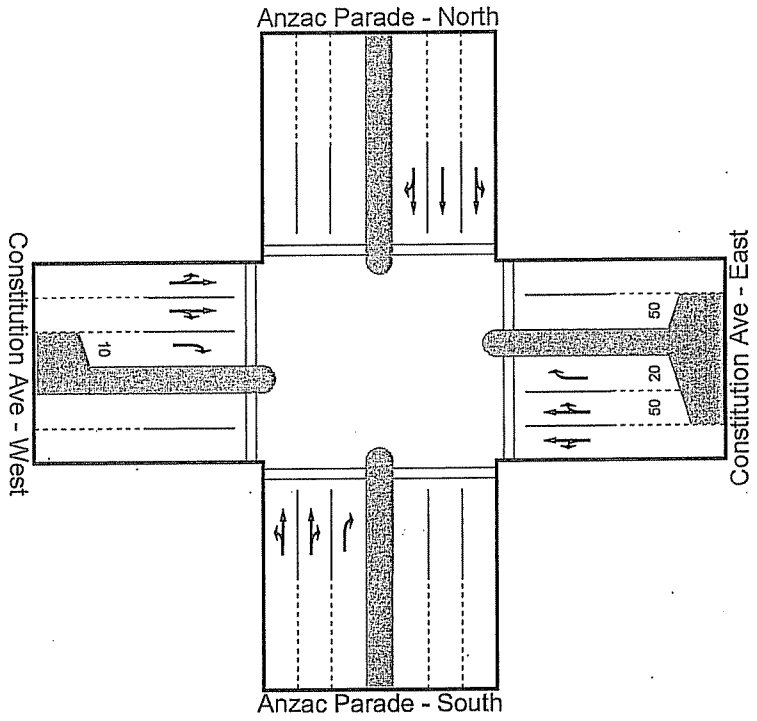


Figure 46: Possible Layout for Parkes Way/Coranderrk Street Intersection

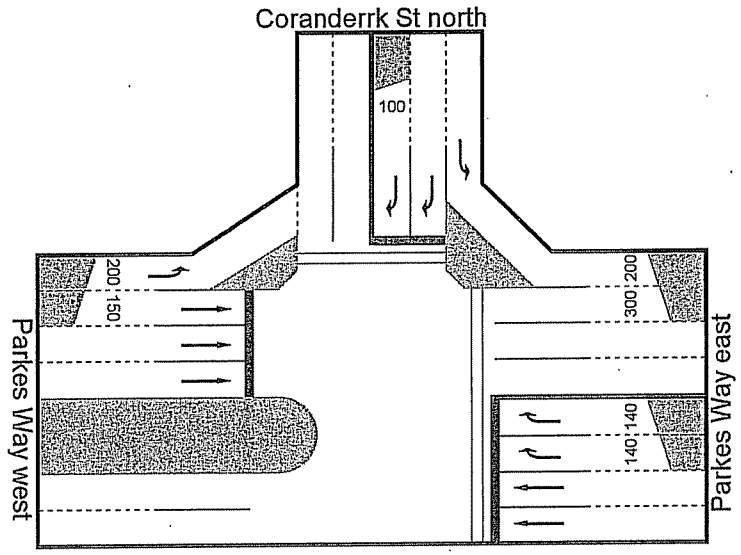


Figure 47: Revised Layout for Constitution Ave/Coranderrk St Intersection

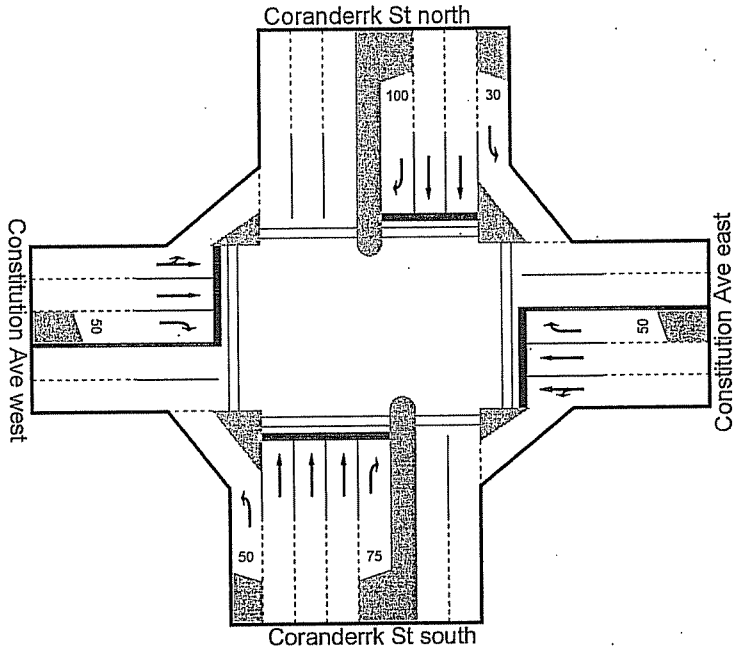


Figure 48: Possible Layout for Streeton Drive/Cotter Road Intersection

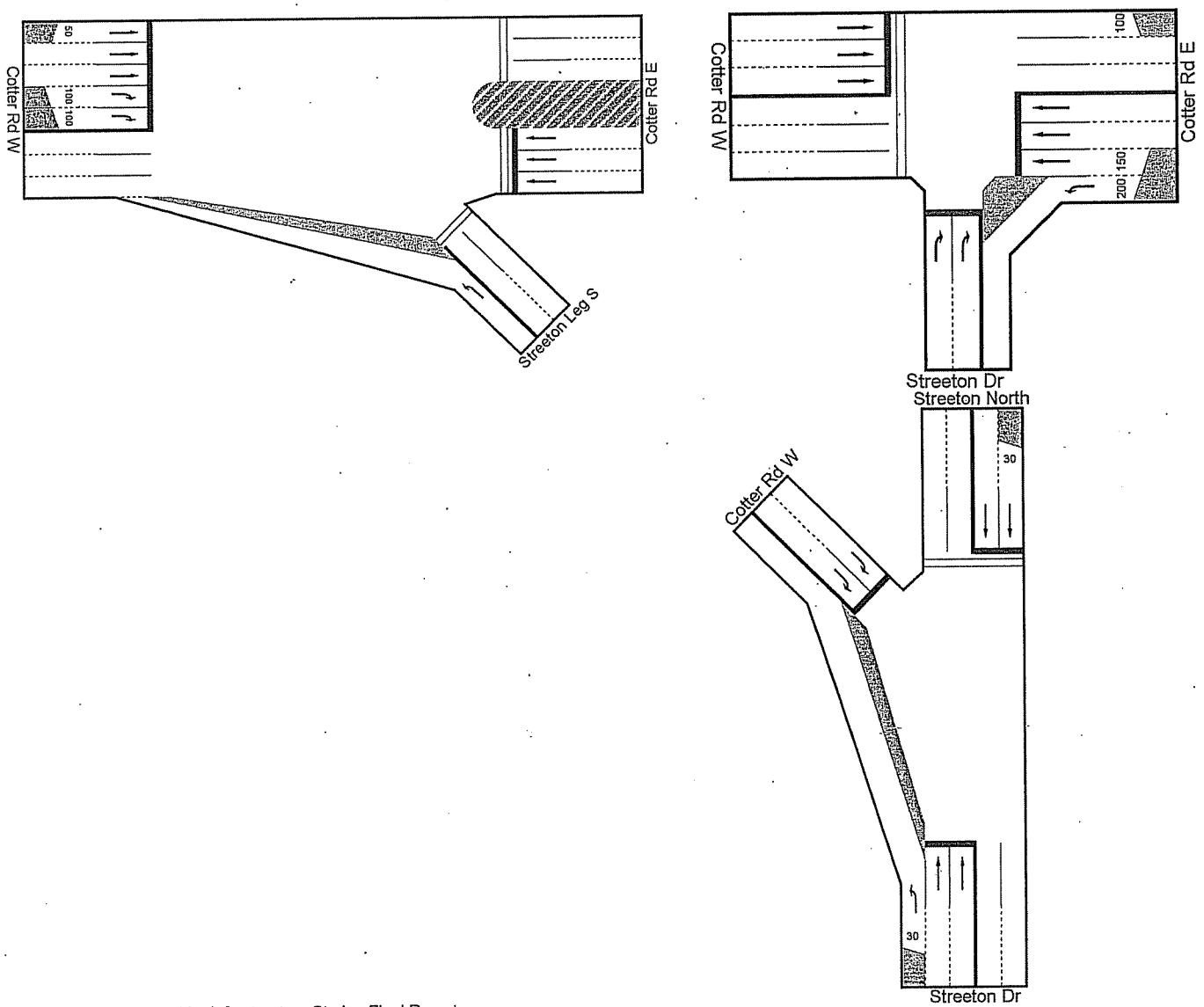


Figure 49: Revised Layout for Cotter Rd/McCulloch St Intersection

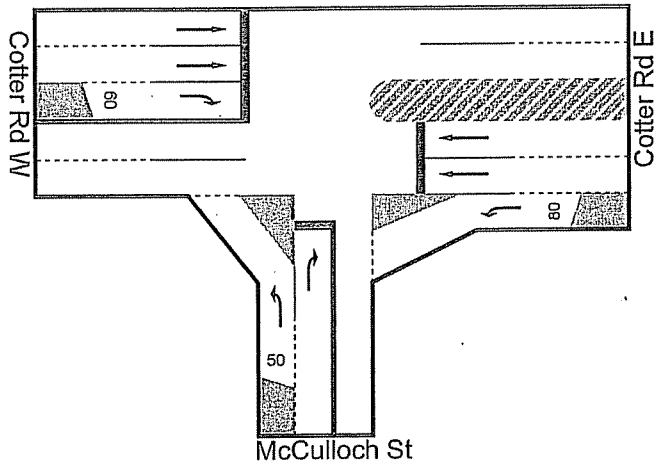


Figure 50: Possible Layout for Lady Denman Drive/Cotter Road Intersection

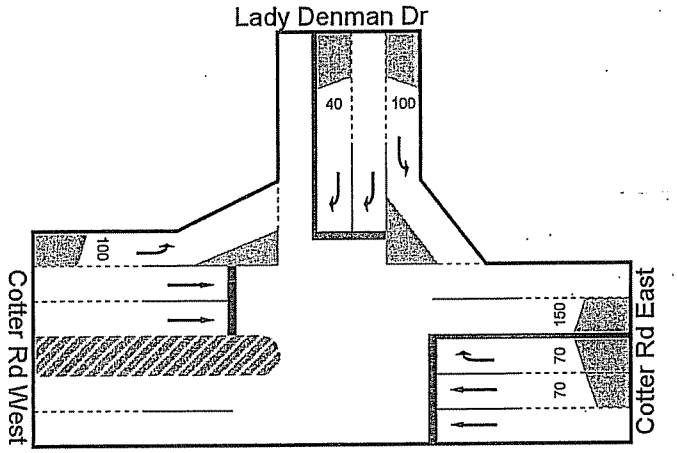
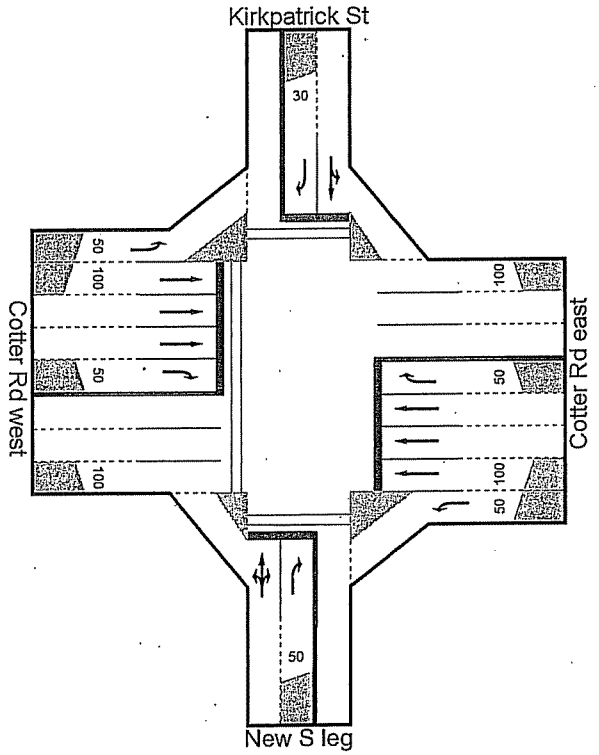


Figure 51: Possible Layout for Kirkpatrick Street/Cotter Road Intersection



6.0 Infrastructure Works Packages

6.1 Key Network Deficiencies

The previous analyses and discussions raised numerous deficiencies and concerns for roads in the EW corridor. Figure 52 highlights these concerns and possible priorities are given in Figure 53.

Figure 52: Key Road Network Deficiencies and Priorities

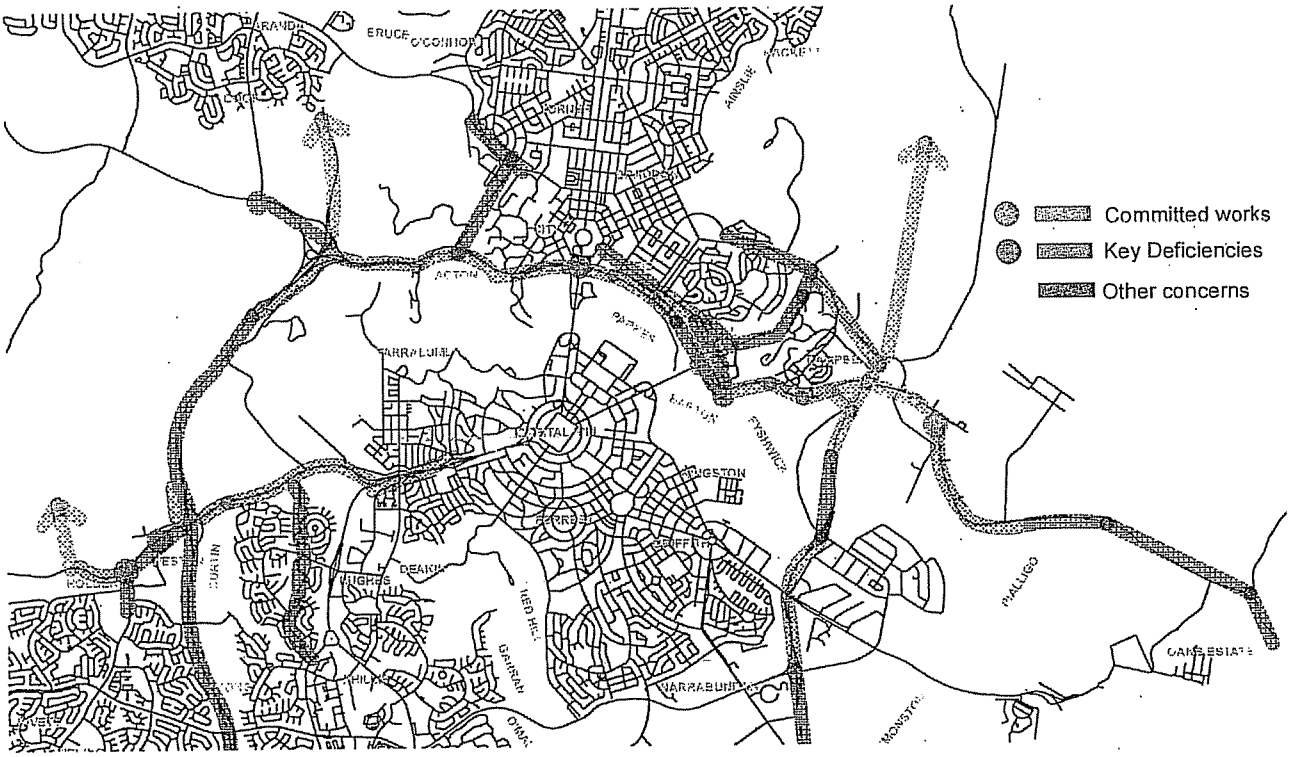
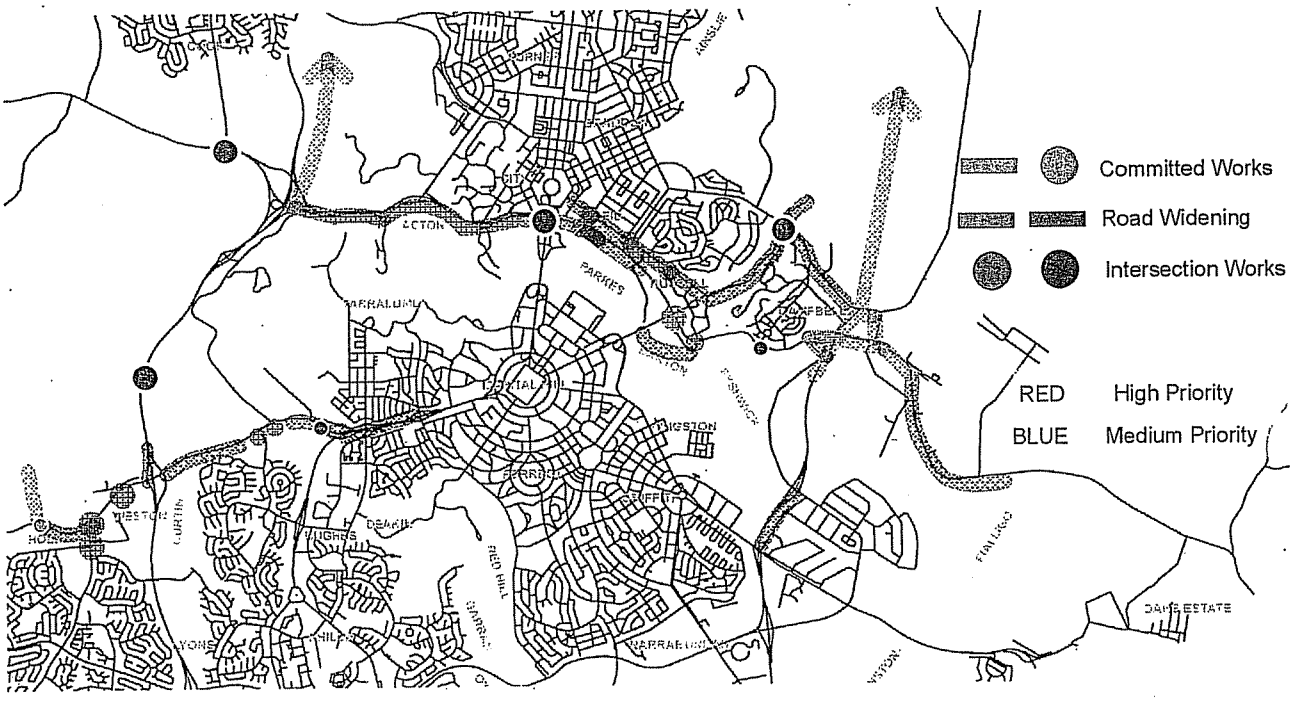


Figure 53: Key Road Network Improvement Priorities



The relative priorities for the various potential road upgrades are indicative. Actual priorities will depend on relative costs and benefits of individual projects.

6.2 Description of Packages

This project examines a number of broad packages of works. More detailed investigations of specific projects within these packages should follow as part of subsequent feasibility studies.

The three packages created for assessment in this project are described in Tables 8 to 10 and illustrated in Figures 50 to 52. They are based on a geographic spread of projects, with either a focus on Parkes Way (Package 1), Cotter Road (Package 2) or Fairbairn Avenue (Package 3).

Table 12: Description of Works Package No. 1 (Parkes Way West Widening)

No.	Item	Description	Source
1	Streeton Dr/ Cotter Rd intersection	Major capacity upgrade	GHD PSP drawings, modified to reflect AECOM's latest analyses – see Figure 48
2	Cotter Rd/McCulloch St intersection	Capacity upgrade	AECOM SIDRA layout
3	Cotter Rd/Lady Denman Dr intersection	Capacity upgrade	AECOM SIDRA layout – see Figure 50
4	Parkes Way widening	Extra lane in the median	AECOM sketch
5	Parkes Way widening	Bridge widening over Clunies Ross	AECOM sketch – see Figure 57
6	Parkes Way widening	Bridge widening over Sullivans Creek	AECOM sketch – see Figure 57
7	Parkes Way widening	Reconstruct Clunies Ross WB ramp	AECOM sketch – see Figure 57
8	Constitution Ave duplication	London Cct - Coranderrk St & Anzac Pde West - Blamey Cres	NCA drawings & AECOM SIDRA
9	Morshead Dr/Russell Dr intersection	Reconstruct as signalised intersection	AECOM SIDRA – see Figure 44

In addition to these works there are a number of committed works common to all works packages. These are:

- The NS Arterial access to Molonglo and its intersection with Cotter Road.
- The reconstruction of the Kirkpatrick Street/Cotter Road roundabout as a signalised 4-leg junction to enable access for the new development of North Weston, as shown in Figure 51.
- The duplication of GDE and associated improvements to the Glenloch Interchange (AECOM 2009)
- The reconstruction of the Kings Avenue/Parkes Way intersection as a grade-separated single point interchange (see Figure 58).
- Majura Parkway Stage 2 – a draft EIS has recently been released for public comment for this (see http://www.actpla.act.gov.au/topics/your_say/comment/draft_eis/majura_parkway)

Figure 54: Package One

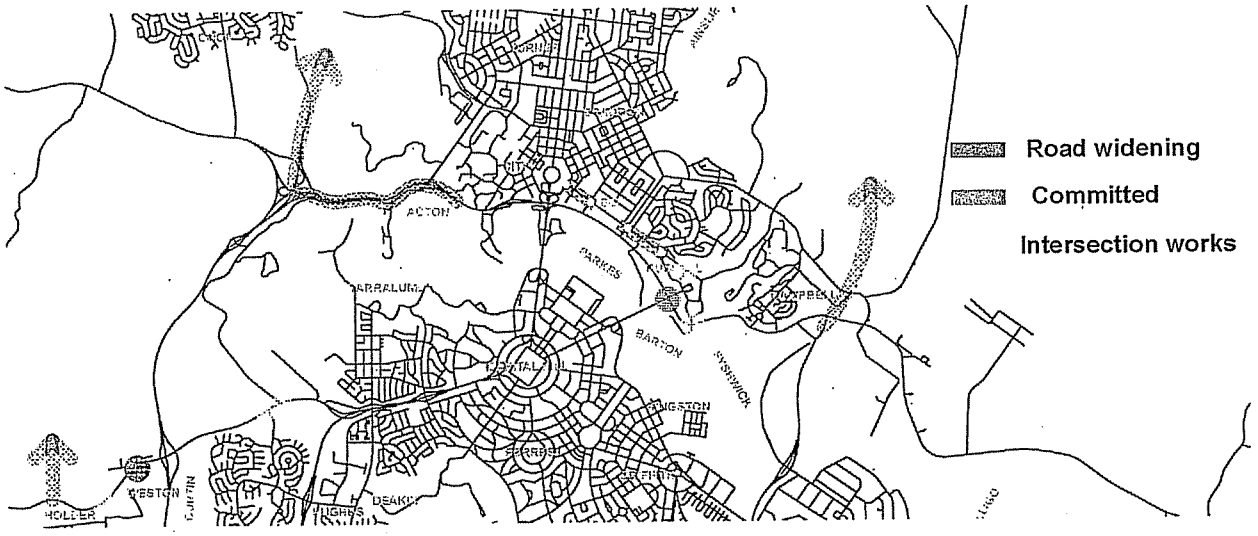


Figure 55: Package Two

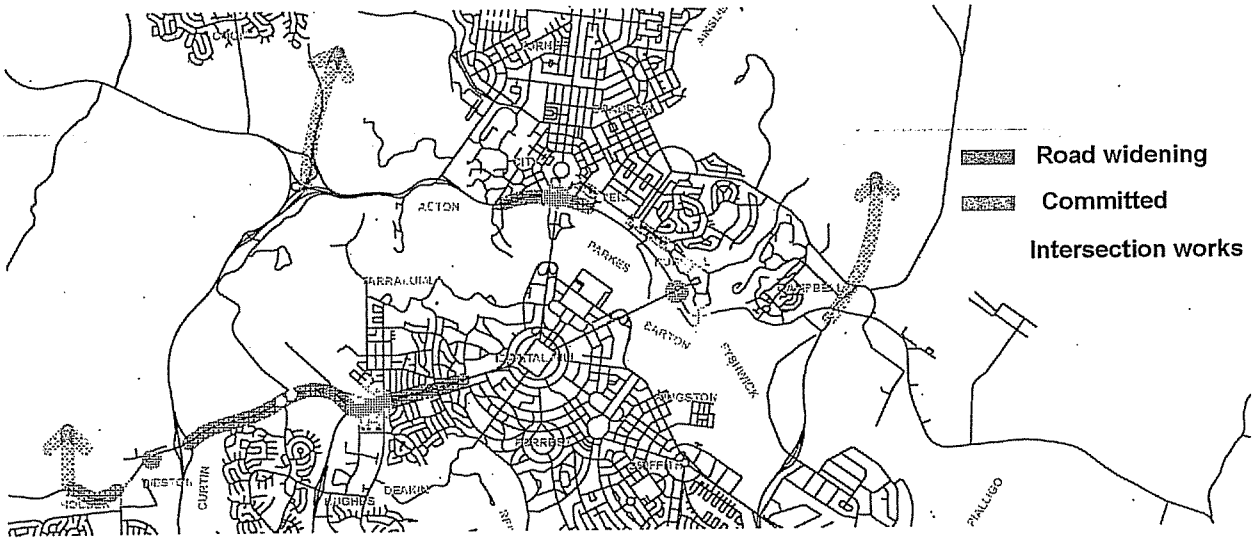


Figure 56: Package Three

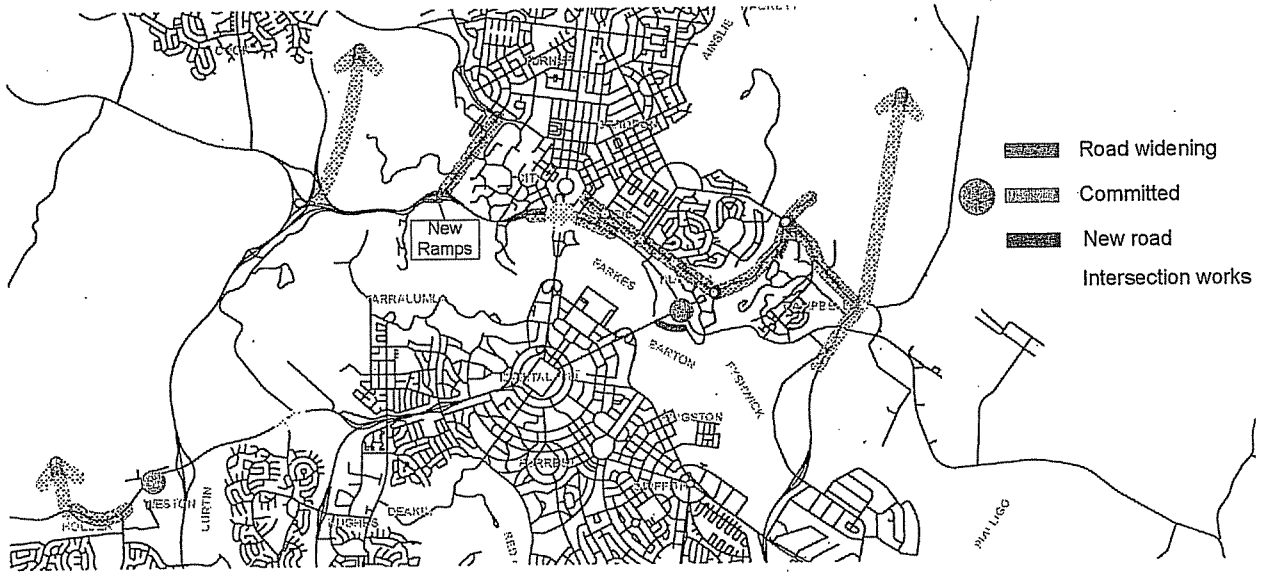


Figure 57: Parkes Way Widening Over Existing Bridges

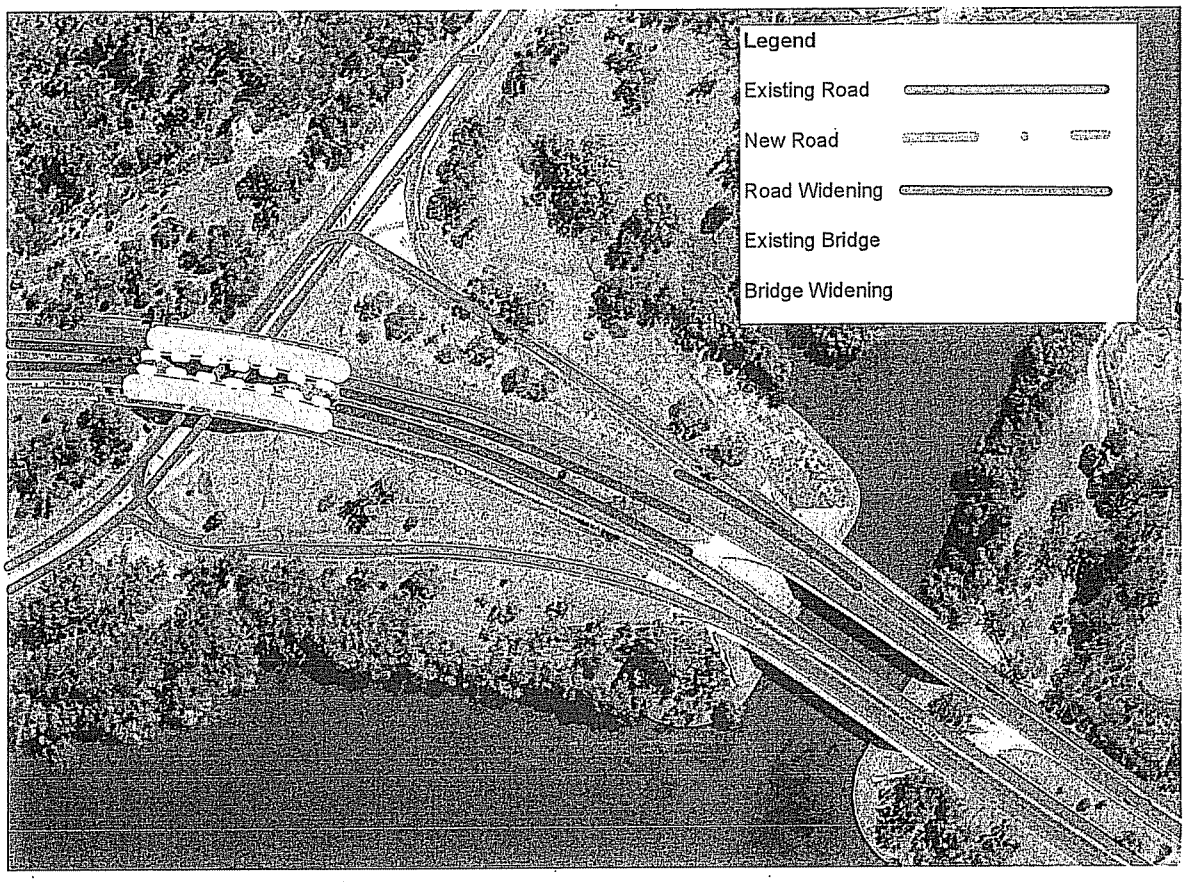
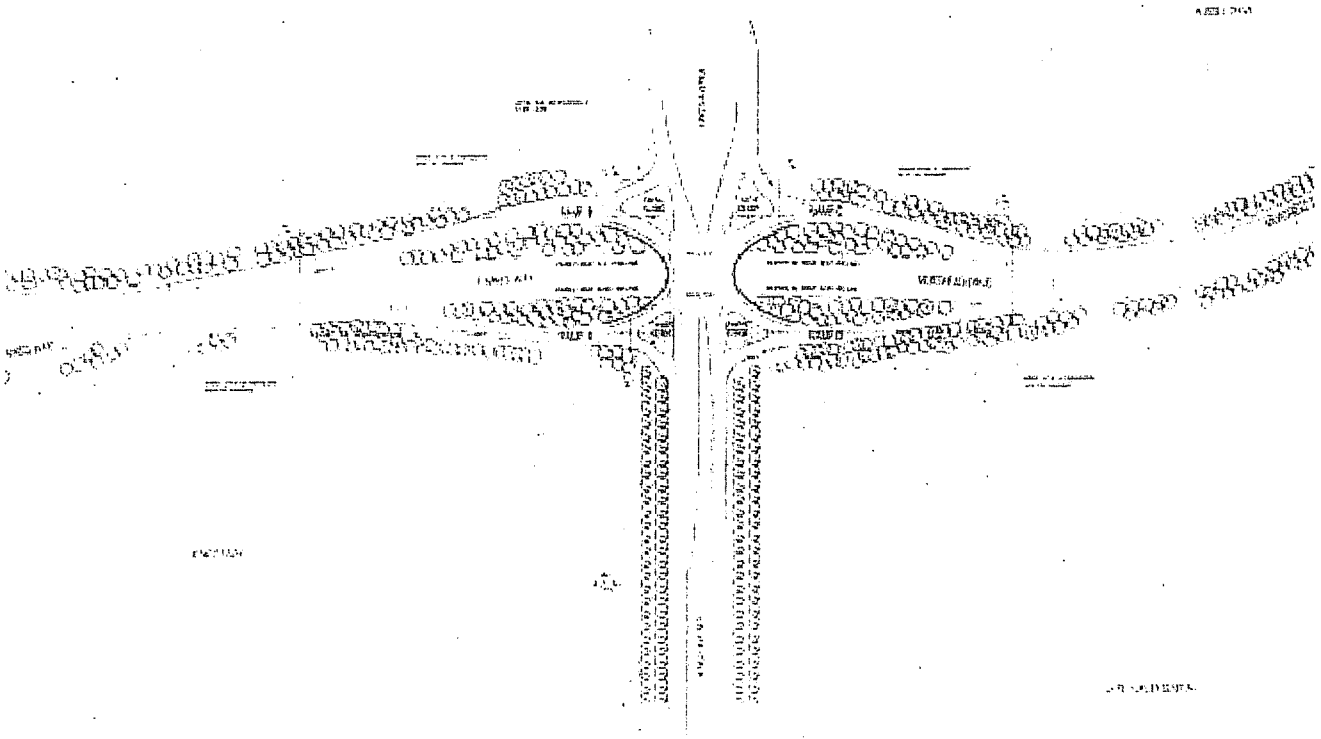


Figure 58: Proposed Parkes Way/Kings Avenue Interchange



Source: NCA (2009)