



Draft Report

Dickson Precinct Traffic and Parking Study

18 June 2012

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SMEC COMPANY DETAILS

SMEC Australia Pty. Ltd.
Level 1, 243 Northbourne Avenue, Lyneham ACT 2602

Tel: (02) 6234 1958

Fax: (02) 6234 1966

Email: [\[REDACTED\]@smec.com](mailto: [REDACTED]@smec.com)

www.smec.com

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Dickson Precinct Traffic and Parking Study – Draft Report

For: ESDD

JUNE 18, 2012

EXECUTIVE SUMMARY

A master plan for the Dickson Group Centre was developed in 2011 by ACT Planning and Land Authority (ACTPLA, now Environment and Sustainable Development Directorate (ESDD)). This master plan defines the structure of development in the Dickson precinct over the next 30 years. SMEC has been engaged to undertake an assessment of the master plan and make recommendations regarding transport, including non-motorised transport, parking and traffic, for the current situation, the short term time frame and the long term implementation of the master plan.

A number of transport studies have been conducted in Dickson recently, especially regarding parking, and these studies have been reviewed and the outcomes used where appropriate for this study.

ES.1 Existing Conditions

The following investigations into the current conditions in Dickson were undertaken:

- Examination of pedestrian and cycle network connectivity and condition
- Survey of pedestrian and cycle volumes
- Survey of parking supply and utilisation
- Survey of traffic volumes
- Micro-simulation modelling
- Intersection analysis

All surveys of demand (cyclist, pedestrian, parking and traffic) were carried out for four peak periods, namely:

- Weekday AM peak (7:00AM-10:00AM)
- Weekday PM peak (4:00PM-6:00PM)
- Weekend midday peak (11:00AM-1:00PM)
- Weekend evening peak (6:00PM-8:00PM)

A site visit was conducted to examine the provision of pedestrian and cyclist infrastructure, as well as its condition and possible safety risks. It was found that, while the provision and condition of the infrastructure tend to be good, there are a few areas that require upgrades.

The pedestrian and cyclist volumes at 24 locations across Dickson were surveyed to allow identification of areas of high demand and possible prioritising of recommendations based on volumes.

A parking supply and utilisation survey was carried out for the centre. 23 parking areas were identified and surveyed for the four peak periods. It was found that there is significant spare capacity across the centre, with utilisation peaking at 63%. However, demand during different peaks is focused on certain parking areas and the centre may benefit from better signage and pedestrian connectivity to encourage better use of car parking areas that are slightly further from the land use they are serving.

Traffic turning volume surveys were conducted for 21 intersections across the precinct for the four peak periods. These surveys showed that traffic volumes tend to be higher on external roads, including Northbourne Avenue, Antill Street and Cowper Street, than inside the centre. These roads had significantly higher traffic volumes on weekdays than

weekends. However, the traffic volumes inside the centre tended to be higher during the weekend peaks than the weekday peaks.

The hierarchy of the road network in the study area was assessed, based on the traffic volumes. It was found that most roads carried traffic volumes appropriate to their hierarchy. However, Antill Street, Cowper Street and Challis Street are currently carrying more traffic than is recommended for their respective hierarchies.

Finally, the 21 intersections were analysed for the four surveyed peaks using SIDRA Intersection. The results of this analysis showed that there are a small number of intersections currently experiencing traffic congestion and high levels of delay for vehicles travelling through them.

ES.2 Assessment of Master Plan

The master plan goals were assessed for two future scenarios:

- Short term, including the development of supermarkets on Blocks 19 and 21
- Long term where the entire master plan is assumed to be implemented

In the short term, only the parking requirements during construction of the supermarkets were assessed as the traffic impacts of the completed supermarket developments were assessed in 2011 by Brown Consulting. It was found that there was insufficient spare parking capacity to cater for the lost capacity while construction is underway if both blocks are developed at the same time. In addition, there is unlikely to be sufficient spare capacity in existing car parks to cater for the lost capacity while Block 21 is being developed.

In the long term, a number of recommendations were made to meet the pedestrian connectivity goals. These included new crossing points and upgrades to existing paths. Some of the goals of the master plan regarding pedestrian and cyclist facilities were addressed in the short term recommendations.

The level of detail available regarding future developments in the Dickson master plan is relatively low so a detailed parking assessment was not able to be carried out. However, indicative parking requirements were developed based on potential land use supplied by ESDD. The calculations carried out indicate that the parking demand is likely to increase to approximately 6,000 in 2031 from 2,500 in 2012. All of this parking will need to be provided inside future developments, probably as basement levels.

The potential indicative road hierarchy, based on predicted daily traffic volumes was also investigated. It was found that with the increased development in Dickson, a number of roads would be carrying substantially higher traffic volumes than is recommended for their hierarchy. These roads include:

- Cowper Street
- Challis Street
- Cape Street (including the extension)
- Badham Street
- Dickson Place

The predicted traffic volumes on these streets mean that on-street parking may not be appropriate. In addition, access and egress to and from developments may be impacted by the high volumes.

The final assessment of the long term scenarios was intersection analysis, both with and without the implementation of the master plan. The same 21 intersections that were analysed for the current situation were analysed for the long term scenarios. In addition, the new intersection related to the extension of Cape Street to Northbourne Avenue in the west and Dickson Place in the east were analysed for the master plan scenario.

It was found that there are a number of intersections that are expected to perform at Level of Service F, which indicates an unacceptable level of delay for drivers, in the long term. Many of these intersections showed similar performance in scenarios both with and without master plan implementation. A number of potential upgrades were recommended to address the performance issues.

ES.3 Cost Estimates

Cost estimates for the recommended upgrades and modifications were developed for the current situation and the long term master plan scenario. These costs are shown in the table below.

Time Frame	Estimated Cost
Short term recommendations	
Long term recommendations	
Total	

These costs will address all current issues identified and allow the implementation of the developments proposed in the master plan.

ES.4 Recommendations

The current operation of the transport network in Dickson was assessed and found to be generally good. However, addressing the following improvements should be prioritised in the short term:

- Pedestrian and cyclist infrastructure and safety:
 - Provide a pedestrian crossing on Challis Street near its intersection with Morphett Street
 - Provide a pedestrian crossing on Challis Street near the Telstra Building
 - Provide a pedestrian crossing on Antill Street near its intersection with Pigot Street
 - Provide a Pedestrian crossing on Dickson Place west of its intersection with Cowper Street
 - Provide a pedestrian crossing on Dickson Shops Road close to the intersection with Cowper Street
 - Widen the 1.2m concrete paths around Daramalan College
 - Provide better lighting on the path extension from Badham Street to the shared path to the south of the precinct to improve security
 - Ensure pedestrian ramps along Challis Street have appropriate steepness for wheelchair access.

- Construct a new pedestrian/cyclist path connection from north of Rosevear Place to shared path to the south and swimming pool
- Car parking operations:
 - Implement better signage to inform users about the location of parking areas that are currently underutilised
- Road network and intersections
 - Signalise the intersection of Morphett Street with the southbound carriageway of Northbourne Avenue. The northbound carriageway would remain as it is.

These recommendations are expected to improve the transport operations and safety in Dickson in the short term.

A number of recommendations have been made to allow implementation of the master plan and these should be implemented as required. These recommendations include:

- Pedestrian and cyclist infrastructure and safety:
 - Provide north/south external links into Dickson by signalising the intersection of Antill Street and Badham Street
 - Improve pedestrian safety at the intersection of Morphett Street and Challis Street (preferably by signalisation)
 - Improve pedestrian safety at the intersection of Morphett Street and Cowper Street (preferably by signalisation)
- Car parking operations:
 - Implement an area wide parking strategy to efficiently plan parking for future developments
- Road network and intersections:
 - Signalise the intersection of Antill Street and Challis Street
 - Signalise the intersection of Challis Street and Cape Street
 - Signalise the intersection of Challis Street and Morphett Street
 - Signalise the intersection of Antill Street and Badham Street (also recommended to improve pedestrian access to Dickson from the suburbs to the north)
 - Signalise the intersection of Morphett Street and Cowper Street (also recommended to improve pedestrian safety around Daramalan College)

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1 INTRODUCTION

1.1 Background

Dickson Group Centre is one of the larger and more active group centres in Canberra and a master plan for the centre has been recently developed (May 2011). This master plan redefines building heights and the layout of the group centre in the longer term, which then allows for increased development in the area.

There have been concerns that the increased development and changes to the layout will have a negative impact on transport and parking in the area. The aim of this project is to assess the impacts of the proposed master plan and to develop options to address these impacts. In addition, the current public transport proposals for Dickson and the Northbourne Avenue corridor will be integrated with the future options for Dickson.

1.2 Objectives

The following are the main objectives of this study:

- Integrate transport into the Dickson Master Plan and consider the current public transport planning projects underway in the area
- Develop integrated parking and transport network provisions for the next 30 years (assuming that the Dickson Master Plan is implemented)
- Investigate the effects of the master plan developments on transport in and around the Dickson Group Centre and develop solutions if required
- Determine if and where road improvements will be required to address the increased development in the group centre
- Determine if changes need to be made to the Dickson Master Plan to address potential parking and transport impacts

2 REVIEW OF RELEVANT BACKGROUND REPORTS

SMEC has reviewed previous reports relating to traffic and parking in Dickson. These reports and a brief description of each are listed below:

- Dickson Master Plan, ACTPLA, May 2011
- Dickson Group Centre Temporary Parking Areas, Brown Consulting, May 2011
- Development Traffic Assessment Report for Block 19 and 21, Dickson Shops, Dickson, ACT, Brown Consulting, June 2011
- Dickson Group Centre Parking Utilisation Study, Brown Consulting, August 2011
- Dickson Temporary Car Parks, SMEC, August 2011

The Dickson master plan, developed by ACTPLA (now ESDD) is the primary background document for this study. The master plan examines the current situation and makes long term recommendations for the development of the precinct. The Dickson master plan also defines a number of sub-precincts in Dickson as shown in *Figure 1*. These precinct names will be used in this study to refer to the relevant areas.

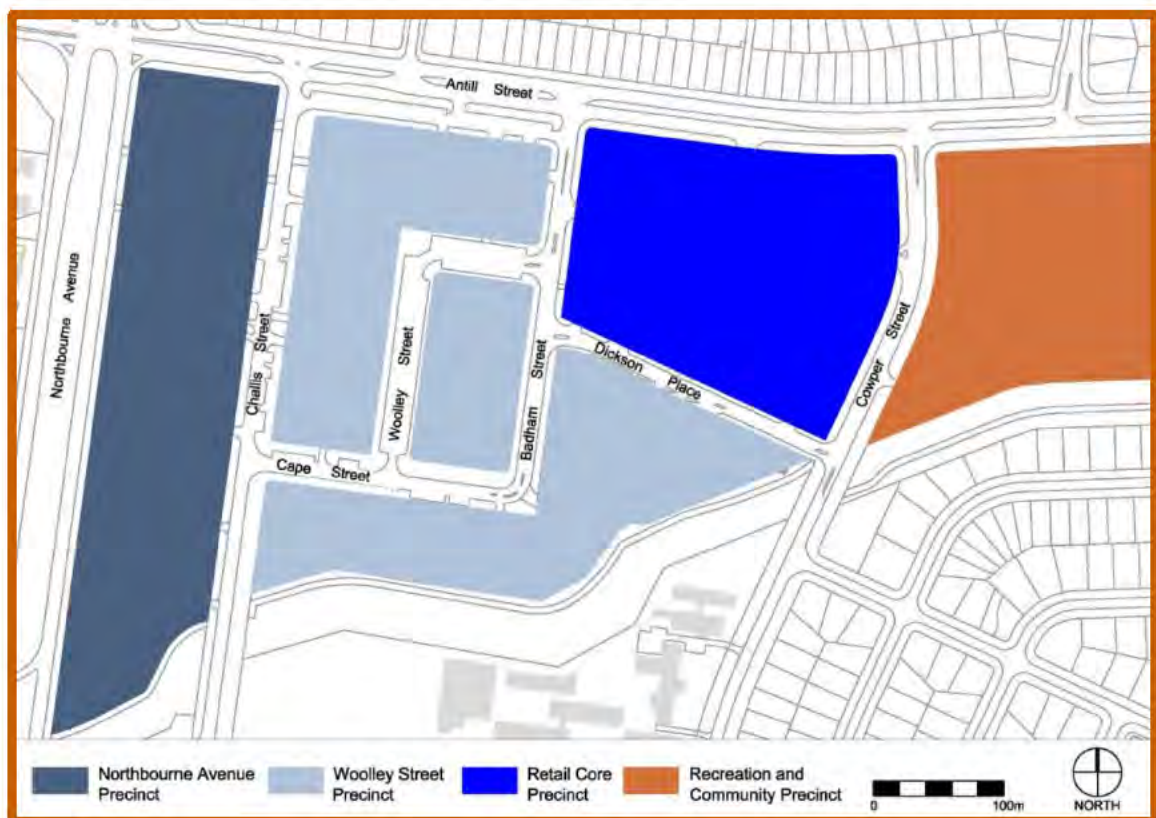


Figure 1: Dickson Precincts (Source: Dickson Master Plan, p19)

In May 2011, Brown Consulting undertook a brief examination of the Dickson area to determine if there were suitable areas able to be used for temporary car parking while redevelopment of existing car parks was underway. They found that there were a number of areas available and recommended further investigations into the following sites:

- Formal on-street parking on Antill Street
- An extension of the existing aquatic centre car park to the east
- A new parking area to the north of the aquatic centre
- Temporary parking on the old ACTAB site

These recommendations were examined in more detail in a later study by SMEC.

Brown Consulting conducted a traffic assessment report for the proposed developments on Block 19 and Block 21, which are currently open air car parks. This assessment found that the current car parks operate at, or slightly over, capacity during the main shopping peak, which is during the middle of the day on a Saturday. The conclusions of the study stated that the development is not expected to have a significant effect on traffic operations in the Dickson Group Centre. In addition, the development will cause a slight shortfall in parking provision, which is expected to lead to overspill of parking demand into adjacent areas.

In August 2011, a parking utilisation study for the Dickson Precinct was undertaken by Brown Consulting. This study found that there was significant spare parking capacity in the Dickson centre at all times, with utilisation rates of 51%-74% on weekdays and 40%-51% on weekends.

Also in August 2011, SMEC undertook concept design of four of the temporary parking areas suggested by Brown Consulting in May 2011. The concept design process included an investigation into existing drainage, vegetation and services. The designs produced included details of car park surface treatments, drainage, access, landscaping, lighting, impacts on vegetation and pedestrian connectivity. In addition, preliminary cost estimates for each of the four car parks were estimated.

3 EXISTING CONDITIONS

A number of investigations on the existing conditions in and around the Dickson Group Centre were conducted, which include the following:

- Examination of pedestrian and cycle network connectivity and condition
- Survey of pedestrian and cycle volumes
- Survey of parking supply and utilisation
- Survey of traffic volumes
- Micro-simulation modelling
- Intersection analysis

Currently, Dickson has a mixture of land use including office, commercial and entertainment. As these land uses have different peak times in terms of traffic generation, the surveys and analyses were conducted over four peak periods to gain a thorough understanding of the existing transport and parking conditions. The four peak periods considered were:

- Weekday AM peak (7:00AM-10:00AM)
- Weekday PM peak (4:00PM-6:00PM)
- Weekend Mid-day peak (11:00AM-1:00PM)
- Weekend Evening peak (6:00PM-8:00PM)

The following sections provide detailed discussions of the investigations outlined above.

3.1 Pedestrian and Cycle Network

The pedestrian and cycle network assessment was based on a site inspection of Dickson Precinct and a desktop assessment of the pedestrian and cycle survey results.

Figure 2 shows the existing cycle and pedestrian path network within Dickson, based on GIS information obtained from TAMSD. A site inspection was carried out on 19 March 2012, which focused on identifying potential infrastructure and safety issues for pedestrians and cyclists.

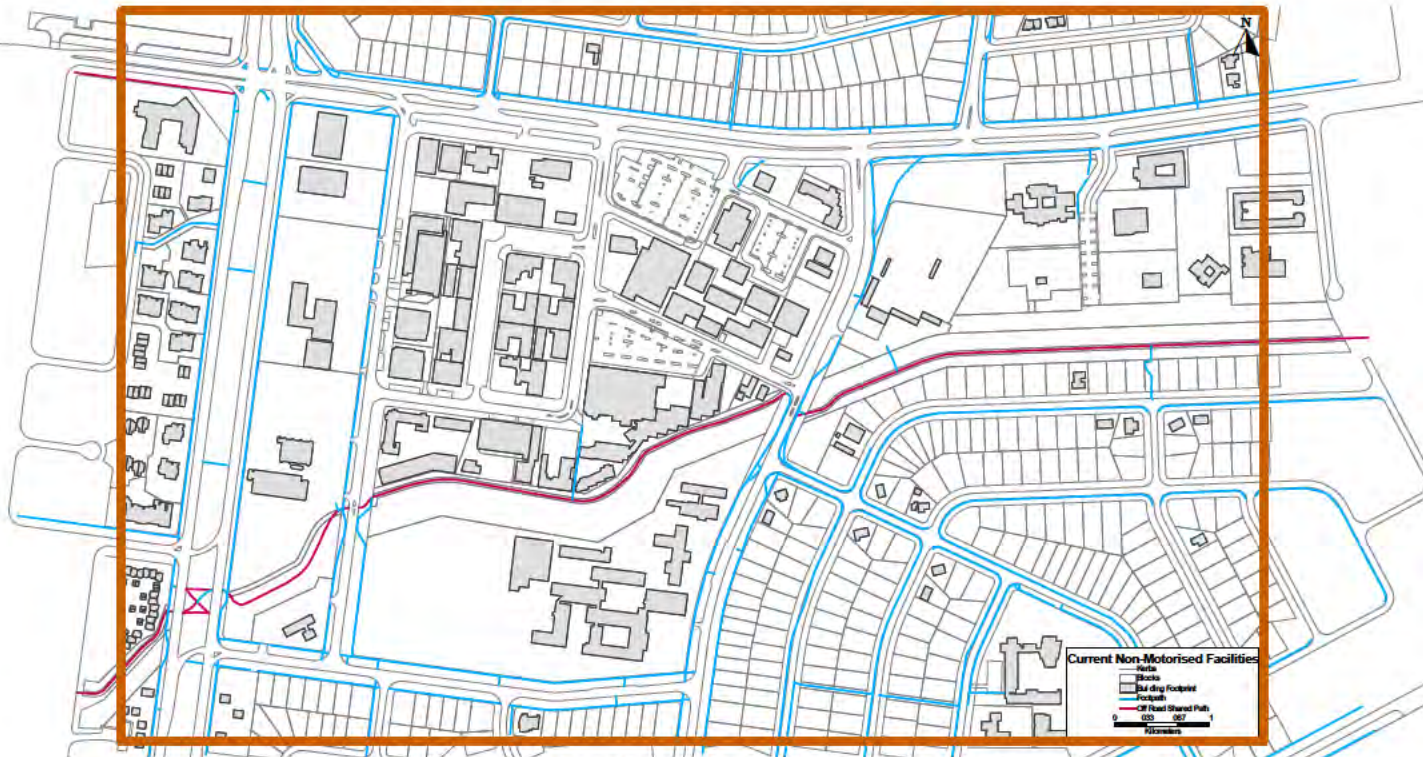


Figure 2: Dickson Precinct Pedestrian and Cyclist Paths

3.1.1 Pedestrian and Cyclist Safety Assessment

Pedestrian Safety

The precinct is generally safe for pedestrians to move around with pedestrian crossings or signalised crossings on most pedestrian desire lines. However, there are some areas where pedestrian safety at road crossings should be considered:

- Access across Challis Street at the intersection with Morphett Street would improve safety for children accessing Daramalan College by walking along Morphett Street
- A second pedestrian crossing of Challis Street near the Telstra Building would benefit office building occupants accessing the Dickson business area (construction of a crossing in this location began after the site inspection was carried out)
- A formal pedestrian crossing on Antill Street near the Pigot Street intersection would provide better access from the subdivision area north of Dickson
- A pedestrian crossing on Dickson Place at the end of the brick paved footway at the south eastern corner of the shopping area may regulate jay walking in the area.

The footpaths around Daramalan College are 1.2m wide concrete paths, wider paths should be considered to allow groups to access them. In addition, they are narrow for a mix of pedestrian and bicycling use.

Off-Road Bicycle Safety

There is a shared path running in a generally east-west direction to the south of Dickson that is used regularly by cyclists and pedestrians. There are three access points into Dickson from this path:

- Along Challis Street footpath
- Along Cowper Street footpath
- Footpath connection to Badham Street

Some paths on Challis Street, Badham Street, Cowper Street, Dickson Place and Antill Street are narrow and not suitable for shared usage by pedestrians and cyclists. The paved areas within the shopping areas have 90-degree blind corners and are not suitable for cycling.

On-Road Bicycling

There are no formal on-road cycle lanes marked within the Dickson Group Centre except for Northbourne Avenue. The internal streets have a lot of turning vehicles accessing intersections and car parking areas as well as reversing out of 90-degree on-street parking bays. The area is not considered to be a safe environment for on-road cycling under the current traffic control scheme.

Bus Services

The Dickson Group Centre has bus stops around the perimeter on Northbourne Avenue, Antill Street and Cowper Street. The maximum walking distance between the bus stops and employment/shops is approximately 600m across the precinct. An internal bus interchange would reduce that distance to less than 400m.

Lighting

All streets have street lighting and most public car parking areas have adequate lighting. The pedestrian areas through the shopping area have pedestrian style lighting. The regional shared path has been provided with lighting recently. The only pedestrian area to rely on ambient light is the path extension from Badham Street to the shared path on the south side of the precinct. This path is constrained by fences either side and has no passive security opportunity and provides a moderate security risk for users late at night.

Infrastructure Quality

The internal paths and crossings are in good condition with evidence of maintenance. Some concrete paths, both inside the precinct and on the perimeter are narrow for two way pedestrian/cycle use. Future path widening of these paths will improve the amenity.

3.1.2 Pedestrian and Cyclist Infrastructure Assessment

Path Widths

Concrete path widths outside the central retail area are generally 1.2m wide. Pedestrian traffic in some areas, particularly around Daramalan College would benefit from wider paths to allow simultaneous bicycle and pedestrian access.

Morphett Street - Challis Street Intersection

Students cross Challis Street at the intersection when walking along the Morphett Street northern path. There is risk of conflict between turning vehicles and pedestrians. A controlled crossing should be considered.

Challis Street

During the AM peak, traffic generally formed platoons allowing adult pedestrians breaks in traffic to cross safely without traffic control.

Students accessing Daramalan College were observed to use the pedestrian crossing adjacent to the storm drain and access the college through a side gate.

Pedestrian movements appear to be low in the morning.

Movements may increase between the office blocks and food outlets during lunch break. A pedestrian crossing near the Telstra Building may be warranted.

Two steep pedestrian ramps were noted north of Dame Pattie Menzies House that were too steep for wheel chair access.

Dickson Place

There is a pedestrian crossing from the shopping plaza area to the car park that requires pedestrians to share the area with circulating vehicles. The footpath adjacent to Dickson Place south has trees blocking access.

There is a paved walkway at the south-eastern end of the shopping plaza (approximately 40 metres west of the intersection with Cowper Street) that would provide a safer crossing if a pedestrian crossing was provided. There is pedestrian access at the Dickson Place/Cowper Street signalised intersection.

Rosevear Place

There is no direct access from the area south of the storm drain, including the shared path, to the businesses in Rosevear Place.

There is a pedestrian path at the northern end of Rosevear Place. Pedestrians share the road with vehicles accessing car parks at the southern half of the road.

There is no formal path between the southern end of Rosevear Place and the swimming pool complex.

Cowper Street

There are four formal crossing points provided along Cowper Street, three signalised and one pedestrian crossing.

Dickson Shops Road has no pedestrian crossing close to the intersection with Cowper Street.

Antill Street

There are signalised pedestrian crossings at Cowper Street and another near the Dickson Library providing access to the north-east. The next signalised intersection is at Northbourne Avenue.

Pedestrian access across Antill Street from Pigot Street and to Challis Street is uncontrolled

Northbourne Avenue

There are pedestrian crossings at the Antill Street signalised intersection and a signalised pedestrian crossing at the shared path crossing near Morphett Street.

There are two uncontrolled mid-block crossing points with concrete paths in the median.

General Observations

Pedestrian access between Woolley Street, Badham Street and the car parks and plaza area are good with formal pedestrian crossings on desire lines. The condition of paths is generally good in this area.

3.1.3 Pedestrian and Cyclist Volumes

Figure 3 shows the locations where pedestrian and cyclist count surveys were conducted. Note that the locations are mostly the same as the intersection count survey locations discussed later in this report, except for some pedestrian crossings.



Figure 3: Pedestrian and Cyclist Survey Locations

Figure 4 to Figure 7 show summaries of the pedestrian and cyclist survey for each peak period. The blue bars represent the total pedestrian movements through a location while the green bars represent the total cyclist movements through the location.

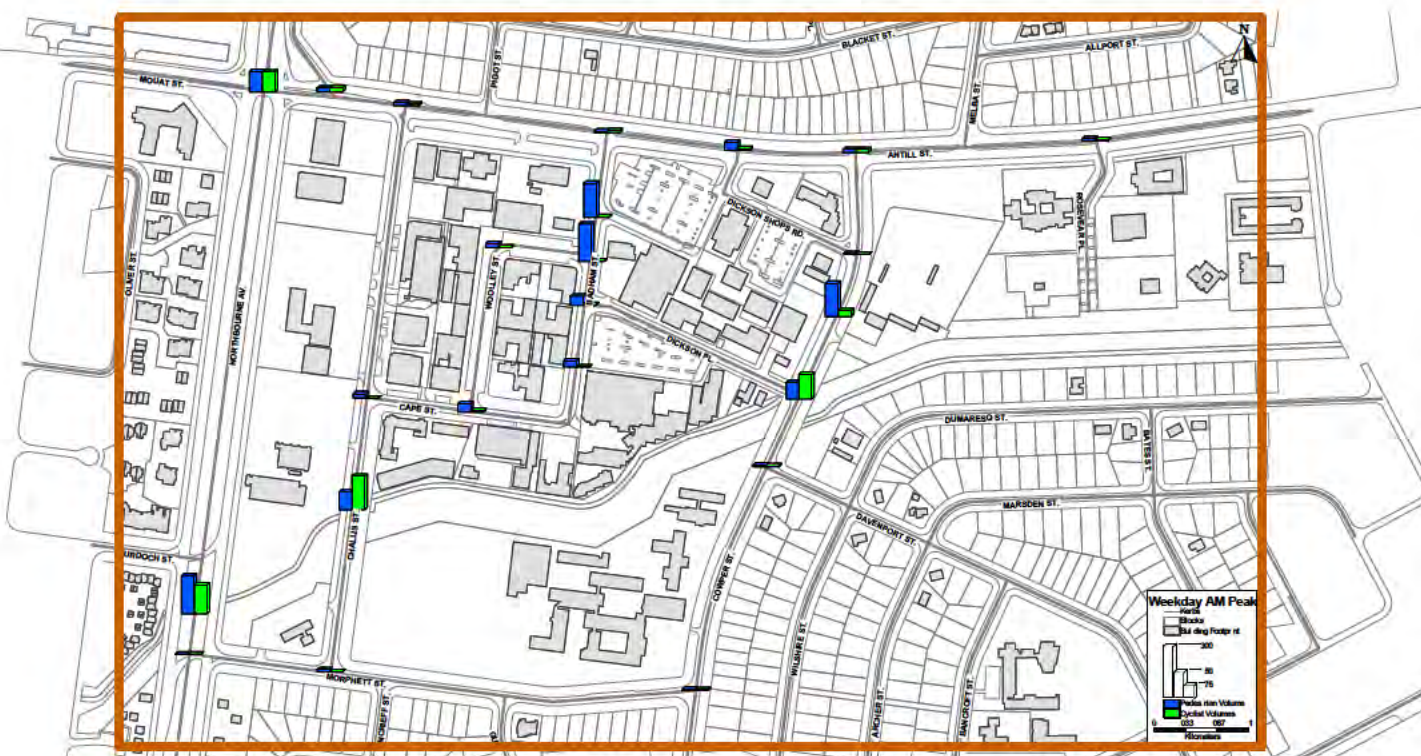


Figure 4: Pedestrian and Cyclist Survey Summary (Weekday AM Peak)

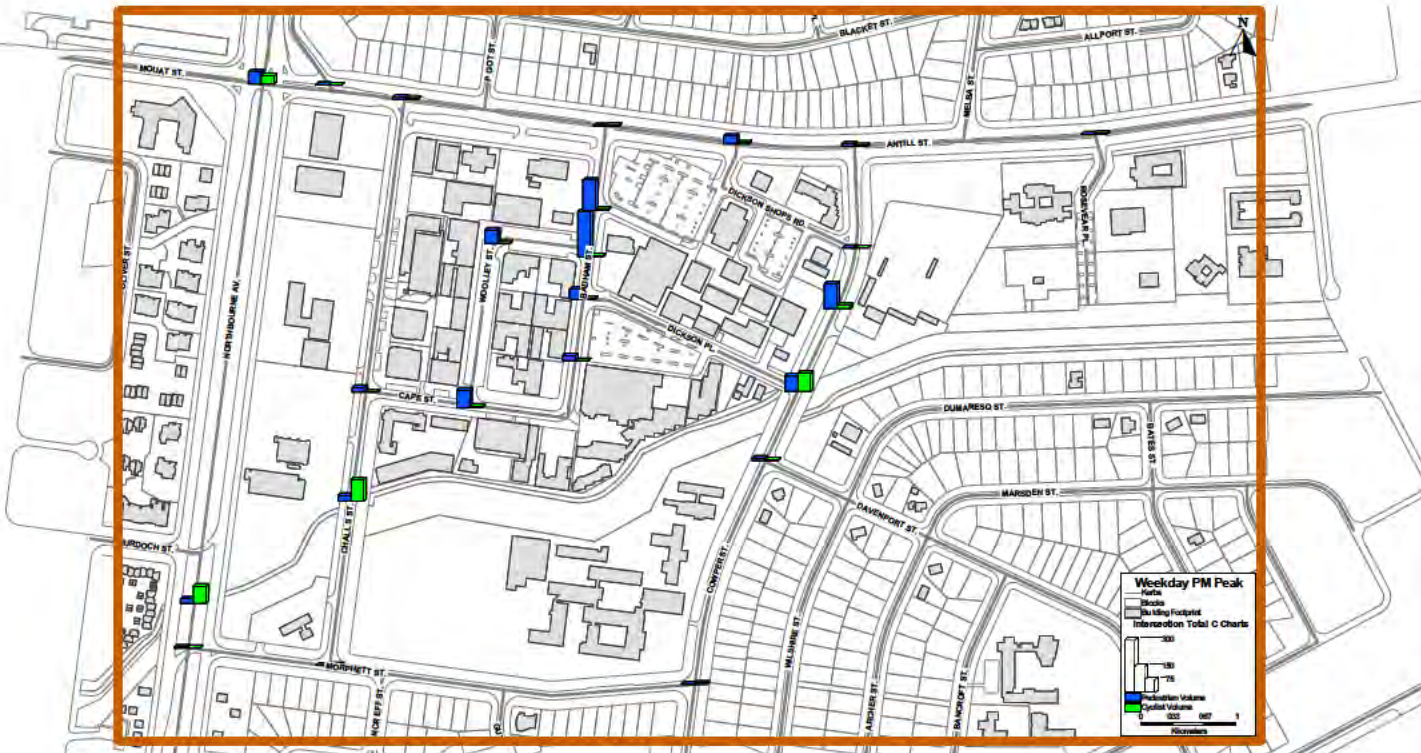


Figure 5: Pedestrian and Cyclist Survey Summary (Weekday PM Peak)

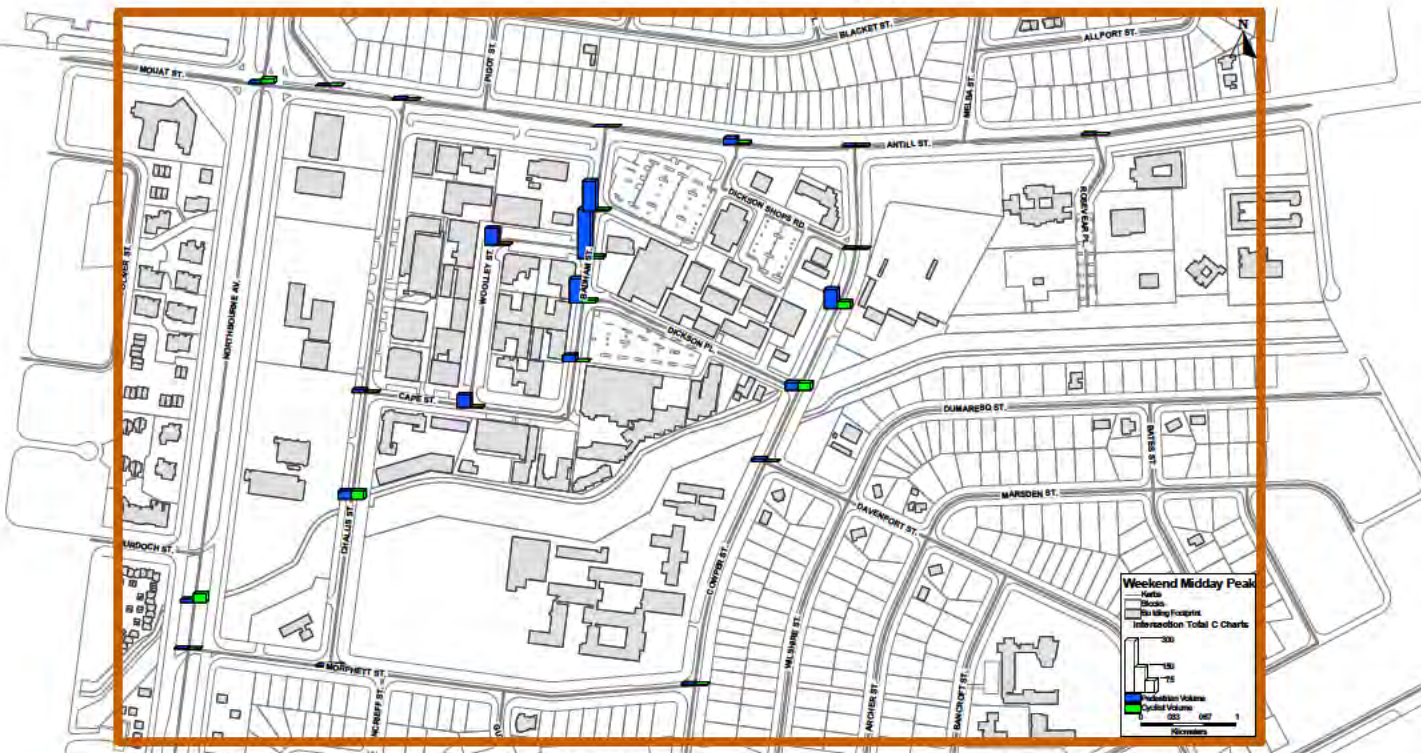


Figure 6: Pedestrian and Cyclist Survey Summary (Weekend Mid-day Peak)

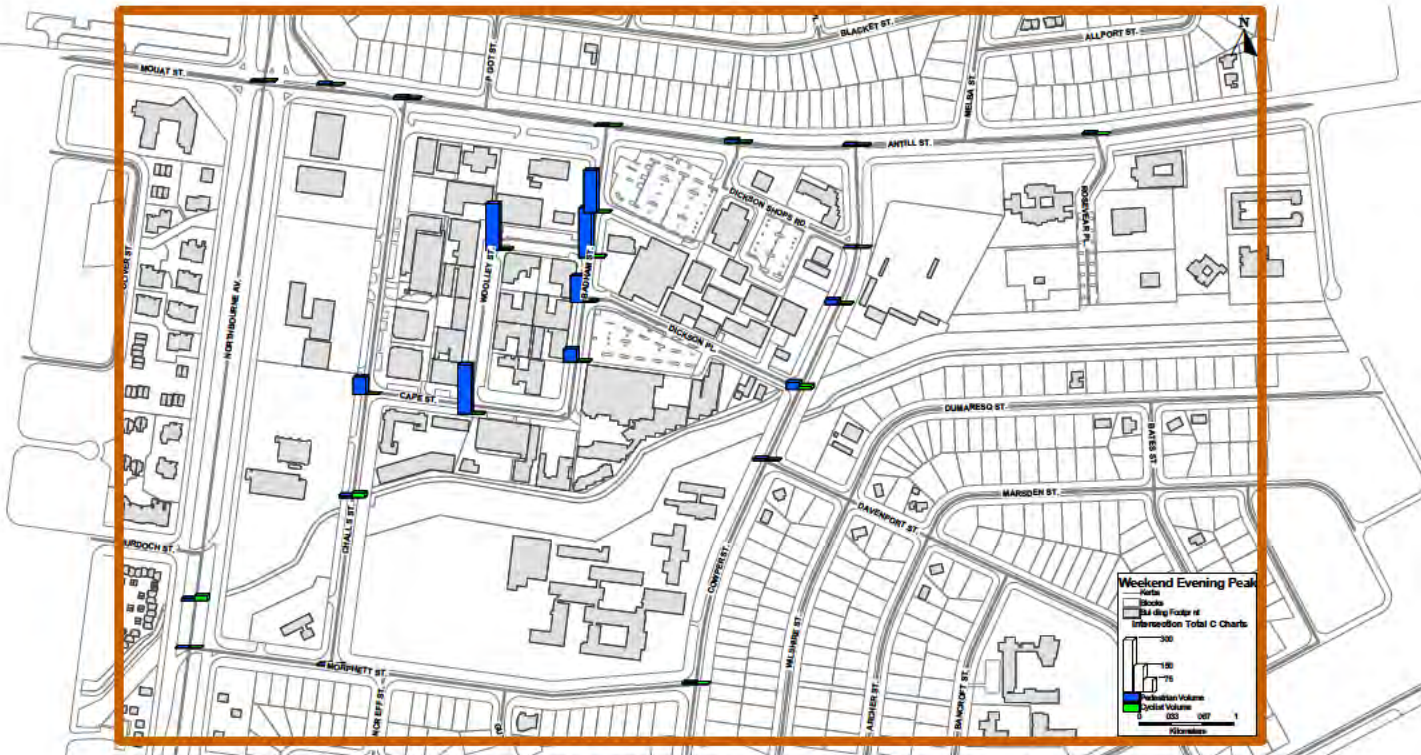


Figure 7: Pedestrian and Cyclist Survey Summary (Weekend Evening Peak)

Table 1 shows a summary of the volumes presented in the preceding figures.

Table 1: Summary of Pedestrian and Cyclist Survey (2 Hour Peak Period)

Location (Intersection)	Weekday AM		Weekday PM		Weekend AM		Weekend PM	
	Peds	Cycles	Peds	Cycles	Peds	Cycles	Peds	Cycles
1	117	113	70	48	7	27	2	3
2	21	22	4	2	1	4	10	0
3	17	8	13	2	7	0	12	2
4	9	11	4	6	1	0	3	2
5	46	10	46	8	37	13	17	3
6	17	17	13	4	8	6	8	4
7	13	7	3	7	6	4	8	1
8	193	3	171	6	171	8	240	2
9	3	0	4	2	2	0	5	0
10	213	3	259	8	295	13	334	7
11	52	3	58	3	139	15	149	5
12	93	141	91	104	45	43	42	19
13	25	0	26	0	15	0	96	0
14	49	10	102	10	72	2	305	1
15	11	6	16	7	16	0	13	3
16	0	0	6	4	5	0	2	0
17	11	1	0	3	5	6	5	0

Location (Intersection)	Weekday AM		Weekday PM		Weekend AM		Weekend PM	
	Peds	Cycles	Peds	Cycles	Peds	Cycles	Peds	Cycles
18	9	5	4	7	7	5	8	4
19	215	164	25	99	18	50	13	27
20	101	191	33	121	46	46	14	25
21	35	0	29	0	35	3	74	4
22	23	2	76	2	93	2	265	3
23	190	34	143	21	110	38	28	6
Total	1,463	751	1,196	474	1,141	285	1,653	121

These figures and table show that Badham Street and the northern section of Cowper Street are utilised heavily by pedestrians during all four peak periods of the survey, except for Cowper Street in the weekend evening peak. Cape Street and Woolley Street are also heavily used by pedestrians during all peaks with the exception of the weekday AM peak period.

The shared path north of Daramalan College carries a significant number of cyclists and pedestrians at the crossings with Cowper Street, Challis Street, and Northbourne Avenue, mainly during the weekday peaks. The shared path tends to have more cyclists than pedestrians during both weekday peak periods and is likely to be used primarily by commuters. During the weekend peak periods, this path is utilised considerably less than during the weekday peak periods.

3.2 Parking Assessment

The parking assessment was based on a parking utilisation survey which was conducted during the same four peak periods specified for the pedestrian and cyclists count surveys. *Figure 8* shows the location of the parking areas that were surveyed.

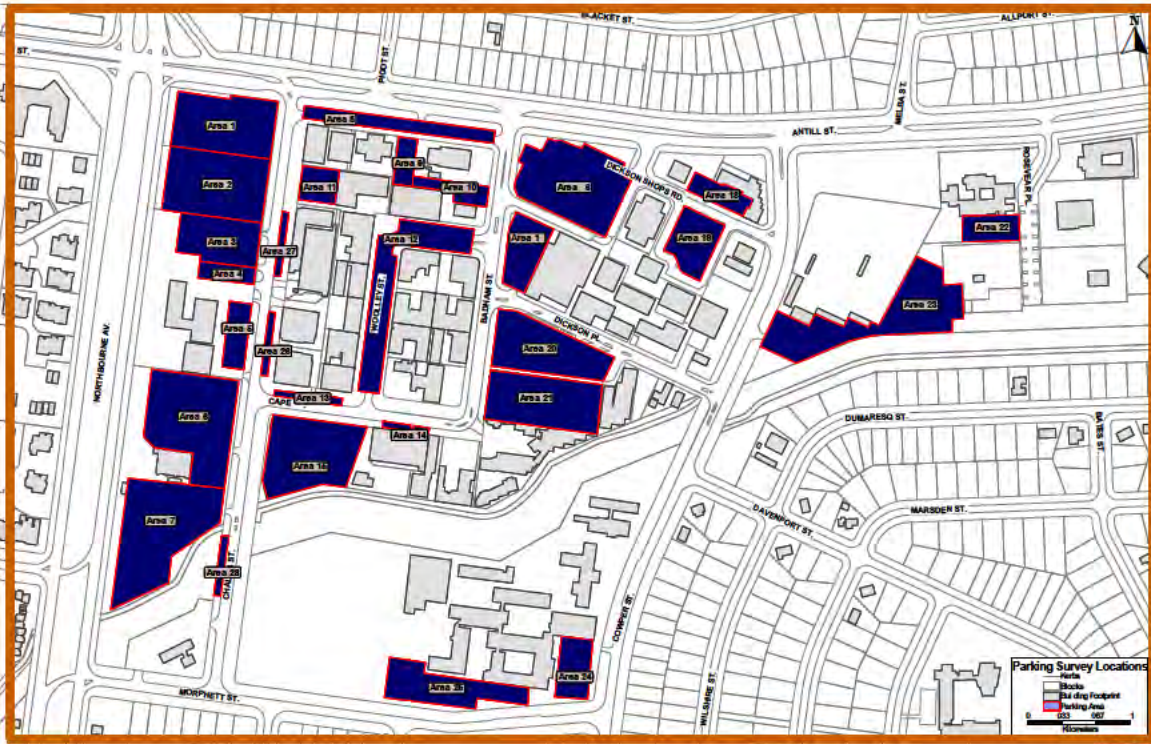


Figure 8: Parking Survey Areas

Figure 9 shows the proportion of parking allocations and parking restrictions in each area. It can be seen that Dickson Precinct has a significant number of long term parking spaces, mainly associated with the Northbourne Avenue Precinct, followed by short term parking. Parking spaces are well distributed throughout the precinct, with the majority of the short term parking located closer to the commercial areas.

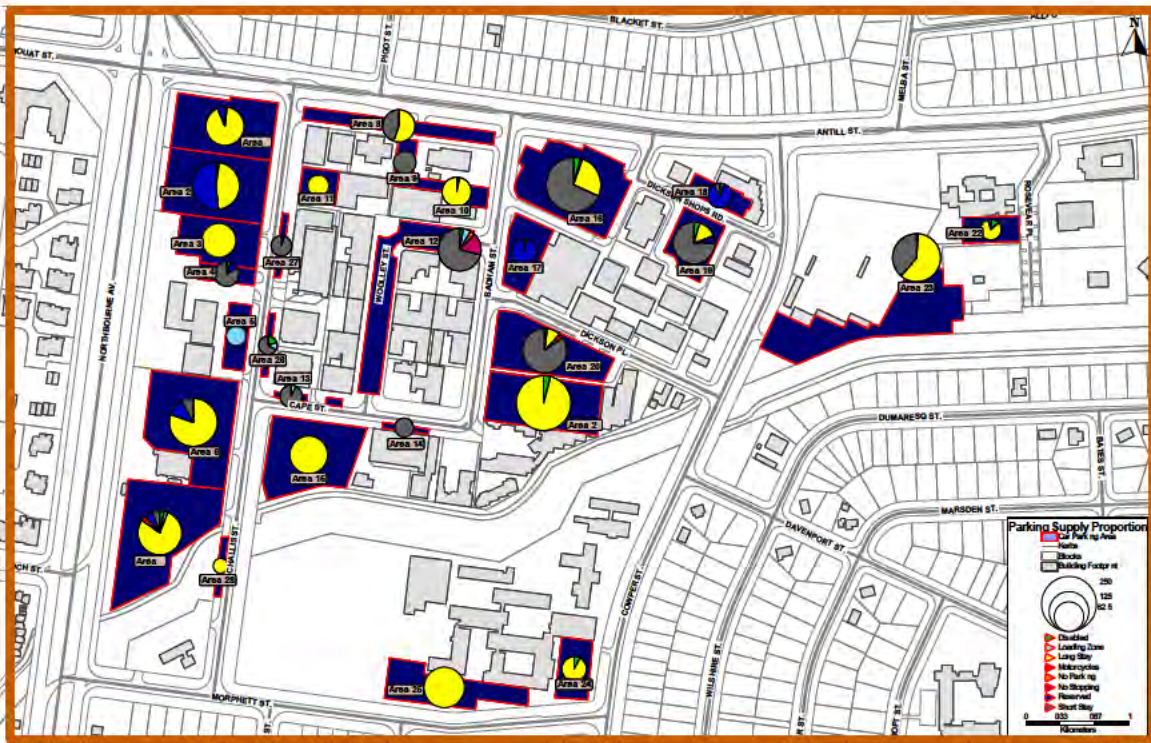


Figure 9: Current Parking Supply at each Location Based on Restrictions

Figure 10 to Figure 13 provide a summary of the parking utilisation survey.



Figure 10: Parking Utilisation Summary (Weekday AM Peak)



Figure 11: Parking Utilisation Summary (Weekday PM Peak)



Figure 12: Parking Utilisation Summary (Weekend Midday Peak)



Figure 13: Parking Utilisation Summary (Weekend Evening Peak)

The figures shown above indicate areas where there is expected to be high demand for parking and which time period that demand occurs in. Table 2 shows the actual supply and demand for each of the parking areas in each of the time periods surveyed.

Table 2: Summary of Parking Utilisation Survey for the Dickson Precinct

Location (Parking Area)	Supply	Thursday, 16 February 2012						Weekend, 18 February 2012					
		7:00	8:00	9:00	16:00	17:00	18:00	11:00	12:00	13:00	18:00	19:00	20:00
1	111	15	47	69	107	100	43	2	1	1	0	0	1
2	176	11	15	95	129	107	53	6	6	3	6	4	6
3	87	6	37	49	27	37	27	4	3	3	1	0	10
4	35	0	0	11	16	11	0	0	0	0	1	2	10
5	20	0	10	12	14	12	8	0	0	0	5	12	7
6	183	20	55	114	116	94	48	12	5	3	8	9	30
7	151	12	79	95	63	48	33	13	9	4	3	4	9
8	74	21	46	64	49	30	15	14	18	19	12	33	57
9	30	0	2	3	14	7	9	12	18	13	24	29	29
10	58	0	3	6	8	11	15	14	21	20	36	40	41
11	25	7	21	24	24	22	20	18	21	23	20	24	25
12	141	13	11	25	63	78	110	103	109	115	117	121	121
13	27	1	2	0	12	14	17	14	19	21	26	27	26
14	18	3	2	8	16	17	17	17	17	17	17	17	17
15	110	7	23	72	65	65	72	54	42	47	29	32	44
16	242	23	102	116	182	180	191	195	233	228	159	193	177
17	38	21	25	28	32	27	23	19	22	24	17	15	31
18	36	0	13	23	32	24	2	20	11	5	5	1	1
19	135	21	36	72	112	69	44	113	123	124	26	32	27
20	154	35	52	74	107	91	114	147	141	147	80	141	149
21	244	46	57	93	127	115	117	91	74	66	79	82	117
22	22	2	6	10	12	8	15	19	17	18	22	0	0
23	183	27	31	58	129	55	46	130	134	124	31	7	2
24	37	1	11	32	20	16	19	11	15	9	11	10	4
25	129	9	17	120	64	41	39	3	5	2	2	2	3
26	15	0	2	8	11	4	11	3	3	10	9	12	13
27	21	3	15	21	19	17	13	17	21	19	19	21	21
28	7	3	7	7	4	1	0	0	0	0	0	0	0
Total	2,509	307	727	1,309	1,574	1,301	1,121	1,051	1,088	1,065	765	870	978
		12%	29%	52%	63%	52%	45%	42%	43%	42%	30%	35%	39%

Table 2 shows that the total utilisation of parking in Dickson is relatively low, peaking at 63% at 4:00 PM on a weekday. However, the parking demand is not evenly distributed and there are a number of parking areas operating close to capacity, which are indicated in red in the table. A number of these parking areas are small (Areas 9, 11, 13, 14, 22, 27 and 28) and excess demand for these areas is likely to be met in adjacent sites. However, large areas such as Areas 1, 16, 19, and 20 that are operating close to capacity

indicates that there are likely to be large numbers of vehicles circulating and searching for space.

From *Table 2* and the earlier figures, two disparate groups with demand for parking were identified, namely:

- Commuters and students
- Shoppers and diners

These two groups are discussed in more detail in the following sections.

3.2.1 Commuter and Student Parking

The parking survey shows that the parking areas in the Northbourne Avenue precinct, between Challis Street and Northbourne Avenue, (Areas 1-7 with exception of Area 5) and Daramalan College (Areas 24 and 25) appear to be mainly used by commuters and students. These parking areas share a similar pattern of parking utilisation for each peak period of the parking survey.

During the AM peak period these parking areas have their highest utilisation, increasing between 7:00 AM and 9:00 AM. During the PM peak period they are progressively emptied as commuters and students go home. During both weekend peak periods these parking areas have near zero utilisation.

It is noted that most of the parking areas west of Challis Street are gated, and are currently underutilised. The parking survey shows that the untimed parking spaces in Areas 1 to 7 are only 62% utilised by 9:00 AM on weekdays. This is the highest utilisation rate recorded for these parking areas during any of the four peak periods.

The non-gated untimed parking spaces near Challis Street (Areas 8, 11 and 28) have near 100% utilisation by 9:00 AM on weekdays. Moreover, these parking areas empty during the PM peak period in the same pattern as the gated parking areas west of Challis Street, and it is assumed that these parking areas are primarily used by commuters that do not have access to the gated parking areas.

It is also noted that the paid parking Area 15 had only 65% utilisation by 9:00 AM on a weekday. Thus, it appears that there is no immediate need for additional parking for commuters along the western side of Dickson. However, the relatively low utilisation of the gated parking areas and the high utilisation of the non-gated car parks suggest that better management of the parking in this area may be of some benefit.

The parking survey conducted did not allow for the identification of which land use drivers from each car park were accessing. If it is the case that workers in buildings with gated car parks are using non-gated car parks, they should be encouraged to use the gated parking areas. This will ease utilisation of the untimed parking areas along Challis Street where time restrictions could then be applied to provide more opportunities for customer access to the adjacent commercial centre.

3.2.2 Shopping and Dining Parking

The parking areas in the Woolley Street Precinct and Retail Core Precinct tend to be heavily utilised during the PM peak, and are also heavily used during both weekend peak periods.

Demand is distributed across these two precincts fairly evenly during the weekend midday peak period with some spare capacity in Areas 8, 15 and 21. There is also some spare capacity in Area 23.

During the weekend evening peak period, demand is centred more on Woolley Street itself. There is now some spare capacity in Areas 19 and 23. Area 15 remains underutilised in this time period as well.

3.3 Traffic Assessment

3.3.1 Traffic Count Surveys

Figure 14 shows the locations of the surveyed intersections as part of this study. A total of 18 intersections were surveyed, three of which (Intersections 1, 6 and 12) are signalised, while the rest are priority controlled. Vehicles were classified as either 'Light' or 'Heavy'.



Figure 14: Intersection Count Survey Locations

Figure 15 to Figure 18 show summaries of the traffic survey. The volumes shown at each location are the total volumes passing through that site for the relevant two-hour peak period.

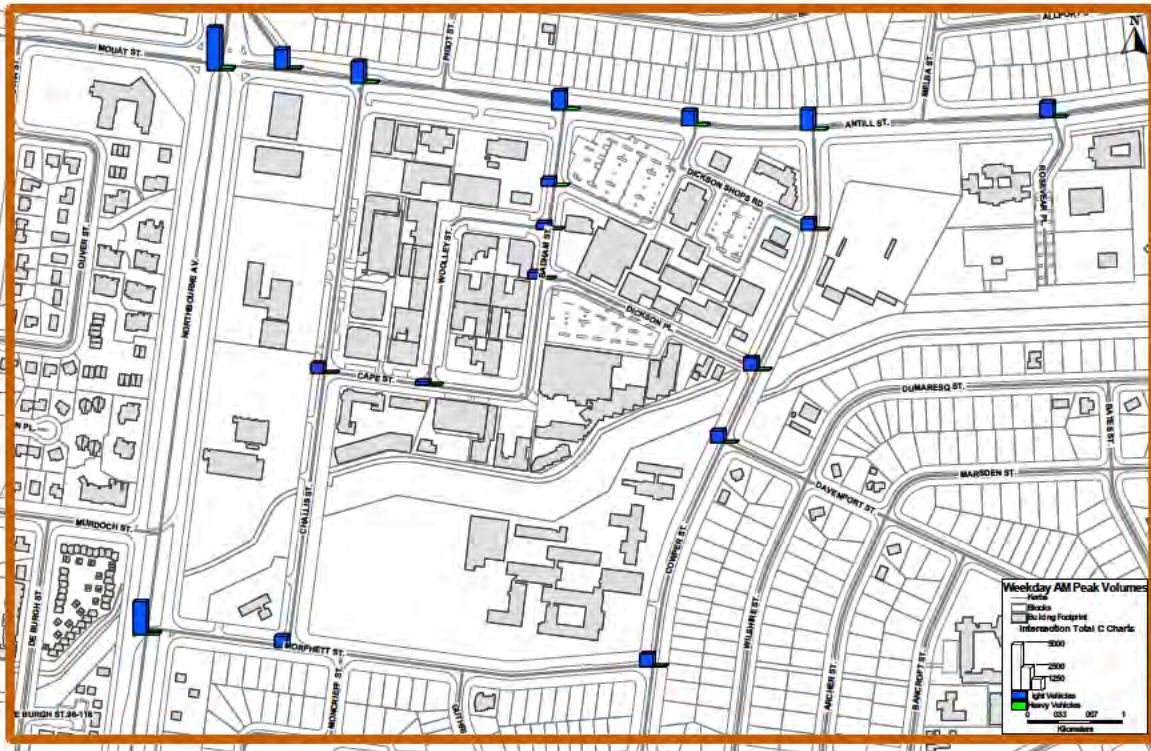


Figure 15: Intersection Survey Summary (Weekday AM Peak)

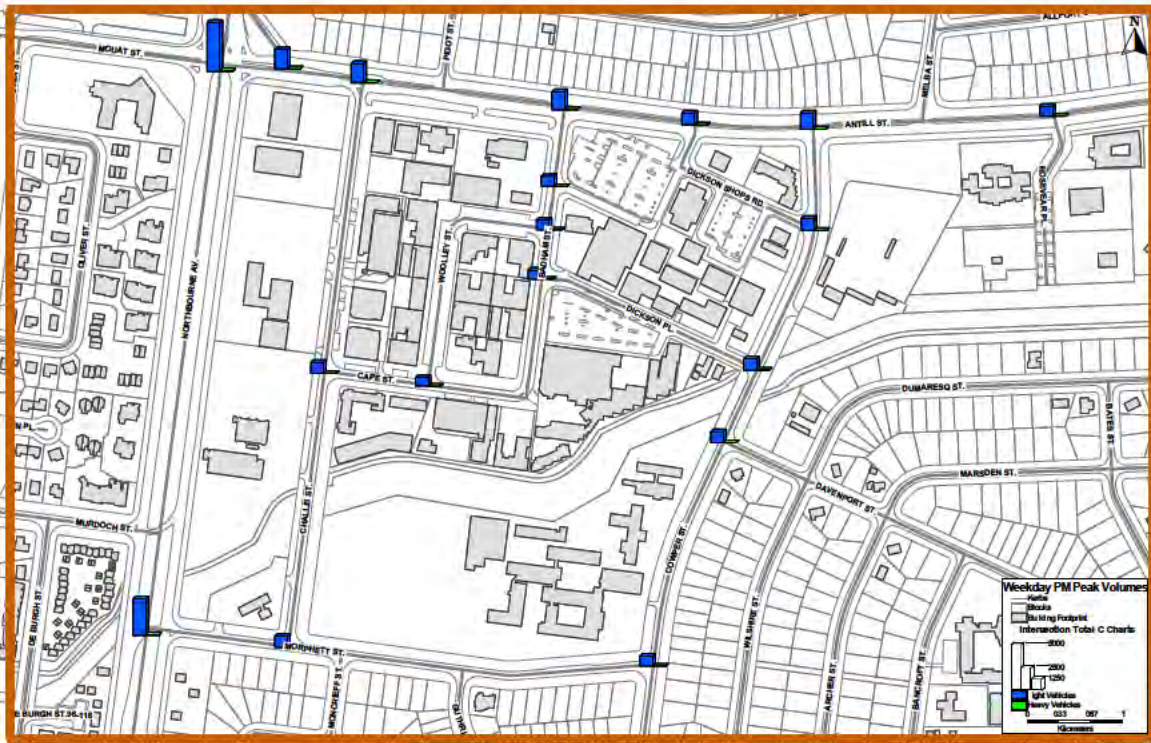


Figure 16: Intersection Survey Summary (Weekday PM Peak)

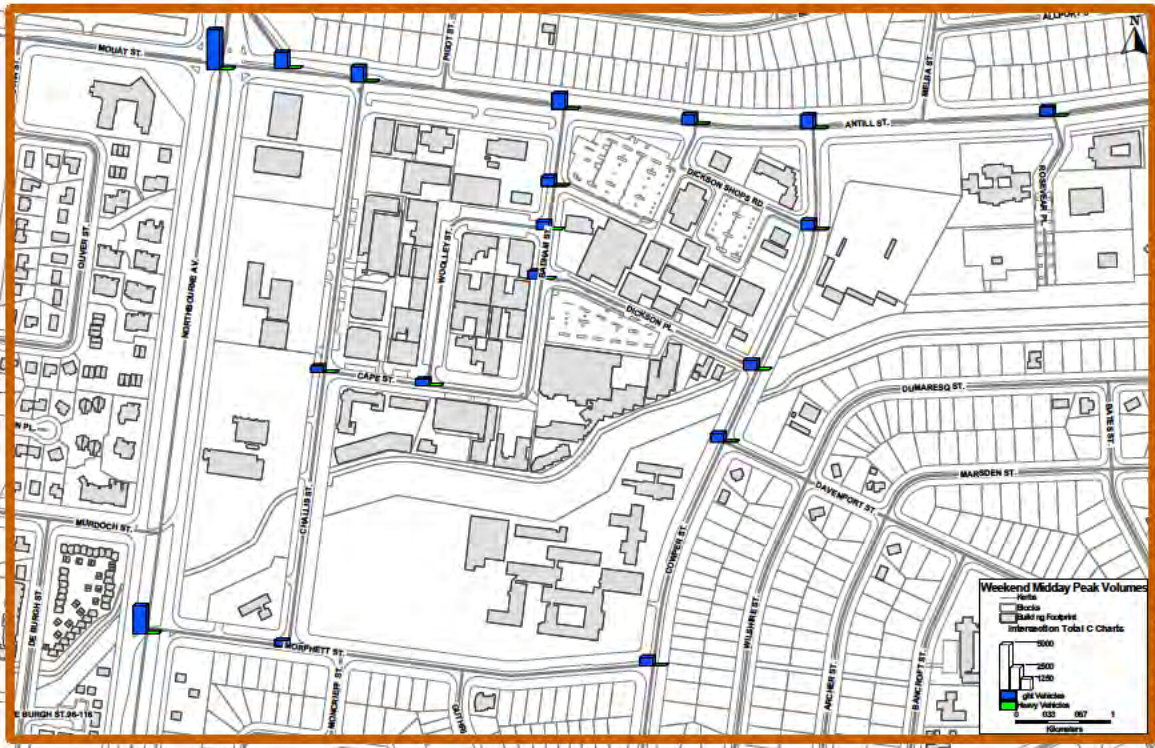


Figure 17: Intersection Survey Summary (Weekend Mid-day Peak)

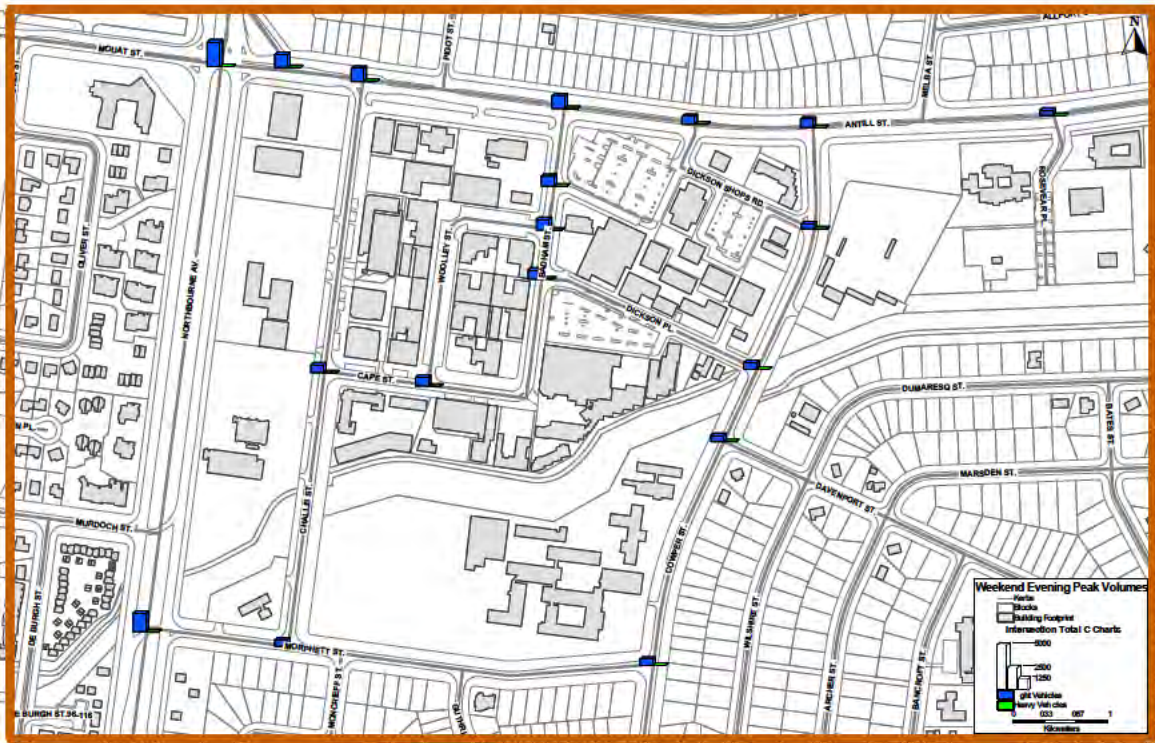


Figure 18: Intersection Survey Summary (Weekend Evening Peak)

Table 3 shows a summary of the results presented in the previous figures.

Table 3: Summary of Light and Heavy Vehicle Survey (2 Hour Peak Period)

Location (Intersection)	Weekday AM		Weekday PM		Weekend AM		Weekend PM	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
1	4,690	244	5,402	138	4,351	85	2,708	26

Location (Intersection)	Weekday AM		Weekday PM		Weekend AM		Weekend PM	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
2	2,161	61	2,125	36	1,695	13	1,428	9
3	2,332	75	2,135	38	1,716	15	1,440	9
4	2,035	63	1,983	37	1,677	12	1,385	8
5	1,639	54	1,347	36	1,110	11	836	4
6	2,252	66	1,811	43	1,458	15	916	7
7	1,646	35	1,135	14	944	6	595	2
8	786	19	1,113	7	1,013	3	1,081	5
9	1,181	36	1,338	25	1,066	12	553	7
10	728	19	1,052	7	868	3	1,168	6
11	748	23	1,006	6	809	3	1,001	4
12	1,334	43	1,262	26	1,068	13	706	6
13	1,027	18	1,237	3	672	4	881	1
14	423	11	922	1	658	3	963	2
15	1,338	39	1,198	17	983	10	675	3
16	3,603	188	4,022	107	3,042	59	2,034	20
17	1,248	28	1,218	4	670	5	695	1
18	1,388	47	1,112	25	931	7	655	3
Total	30,559	1,069	31,418	570	24,731	279	19,720	123

These figures and table show high traffic volumes on Northbourne Avenue and Mouat Street/Antill Street in all peak periods. These roads, together with the roads surrounding the core of the Dickson precinct (i.e. Cowper Street and Morphett Street), carry the largest amount of traffic during weekday peak periods. The western and northern boundaries of the Dickson precinct experience their highest volumes during the PM peak, whilst the southern and eastern boundaries of the Dickson precinct experience their highest volumes during the AM peak, possible due to the location of Daramalan College.

During the weekend peaks, the internal roads of Dickson Precinct (e.g. Badham Street and Dickson Place) carry more traffic during the evening peak than the midday peak period, as shown in *Figure 17* and *Figure 18*. The opposite trend is seen on the external roads during the two weekend peaks.

Northbourne Avenue carries most of the heavy vehicles with more than 150 heavy vehicles during the AM peak period but this is only a small proportion of the total traffic volume.

3.3.2 Micro-simulation Modelling Calibration Results

Micro-simulation models for the four peak periods were developed for the assessment of the Do Nothing and master plan scenarios. Below is a summary of the process and the calibration results.

Origin – Destination (OD) matrix estimation was performed using Paramics Estimator V6, with input from intersection turn counts conducted as part of this study. Estimator generates an OD matrix by iteratively adjusting a previous OD matrix to provide a trip pattern that more closely matches the supplied count data.

The accuracy of OD matrix estimation is gauged by the GEH statistic, which compares the modelled (M) volumes to the counted (C) volumes. It has the effect that as C increases, the allowable difference as a proportion of C decreases. The GEH statistic is given by the equation:

$$GEH = \sqrt{\frac{2(M - C)^2}{M + C}}$$

Where:

- M* : traffic volume estimated by the model
- C* : actual (real-world) traffic volume

Where possible, the GEH for 85% of the estimated volumes should be less than 5, and ideally no estimated volumes should have a GEH greater than 10. The resulting GEH statistics from the calibration of the base network model for each peak period are shown in *Table 4*. In the micro-simulation modelling tasks done for this study, the estimated matrices were optimised in terms of its GEH as far as practical. Whilst there are a few GEH values above 10, they have been assessed individually and are considered acceptable.

Table 4: Summary of Paramics Estimation Results

Peak Period	Average GEH	GEH<5	5<=GEH<10	10<=GEH
Weekday AM Peak	1.81	182 (93%)	11 (6%)	2 (1%)
Weekday PM Peak	2.04	177 (91%)	17 (9%)	1 (1%)
Weekend MD Peak	2.11	177 (91%)	14 (7%)	4 (2%)
Weekend EV Peak	2.29	174 (89%)	16 (8%)	5 (3%)

The seed values that determine the release pattern of vehicles in the model were selected for each peak period based on the lowest GEH value for turning movements.

Table 5: Seed Values Selected for Each Peak Period

Peak Period	Seed Value
Weekday AM Peak	7771
Weekday PM Peak	2849
Weekend MD Peak	5321
Weekend EV Peak	28

3.3.3 Road Network Hierarchy Assessment

The road network in the study area, along with the hierarchy, is shown in *Figure 19*.



Figure 19: Study Area Road Network and Hierarchy (Source: TAMSD)

One of the criteria used by the ACT Residential Subdivision Code to define the road hierarchy is the average daily traffic in vehicles per day (vpd). This classification has been reproduced in *Table 6*.

Table 6 Classification of Roads in Hierarchy

Road Classification	Indicative Traffic Volume (vpd)
Local Access	0-1000
Local Access C	1001-2000
Minor Collector	1000-3000
Major collector	3000-6000

Source: ACT Residential Subdivision Code

Figure 20 provides an indication of directional daily weekday traffic volumes in 2012. These volumes were calculated by using the AM and PM peak volumes and assuming a peak factor of 10% to determine the daily flow. Note that the volume thresholds shown in *Table 6* are for the total volume in both directions while the volumes shown in *Figure 20* are for a single direction, so the threshold levels have been halved.



Figure 20: Daily Weekday Vehicles per Day per Direction – 2012

Figure 20 shows that, in 2012, the volumes on most roads are appropriate for the classified road hierarchy. However, Antill Street, Cowper Street and Challis Street appear to have volumes that are not appropriate for their classification.

3.3.4 Intersection Analysis

Intersection analysis was conducted using SIDRA Intersection. Intersection performance measures such as Level of Service (from delay and degree of saturation) and queue length at the specified key intersections within the study area provided a quantitative basis on the performance of these major junctions in the four peak periods analysed. The Highway Capacity Manual (HCM) criteria for the evaluation of intersection Level of Service (LoS) are given in Table 7.

Table 7: HCM Level of Service Criteria (Average Control Delay D in Seconds)

Level of Service	Signalised/Roundabout	Stop/Give Way	Colour
A	$D < 10s$	$D < 10s$	Green
B	$10s \leq D < 20s$	$10s \leq D < 15s$	Light Blue
C	$20s \leq D < 35s$	$15s \leq D < 25s$	Blue
D	$35s \leq D < 55s$	$25s \leq D < 35s$	Pink
E	$55s \leq D < 80s$	$35s \leq D < 50s$	Yellow
F	$D \geq 80s$	$D \geq 50s$	Red

Source: Highway Capacity Manual 2000, Exhibit 16-2 (p.16-2) and 17-2 (p.17-2)

The following 21 intersections were analysed:

- Northbourne Avenue - Antill Street / Mouat Street
- Northbourne Avenue Service Road - Antill Street
- Antill Street - Challis Street
- Antill Street - Badham Street
- Antill Street - Dickson Shops Access Road
- Antill Street - Cowper Street
- Antill Street - Rosevear Place
- Badham Street - Dickson Shop Access Road
- Cowper Street - Dickson Shop Access Road
- Badham Street - Woolley Street
- Badham Street - Dickson Place
- Cowper Street - Dickson Place
- Challis Street - Cape Street
- Cape Street - Woolley Street
- Cowper Street - Davenport Street
- Northbourne Avenue - Morphett Street
- Morphett Street - Challis Street
- Cowper Street - Morphett Street

Consistent with the survey periods, these intersections were modelled for the weekday AM, weekday PM, weekend midday and weekend evening peak periods. *Figure 21* through *Figure 24* show a graphical representation of the modelled performance of each intersection for each peak period in 2012. Detailed intersection analysis results for the current situation are shown in Appendix A.

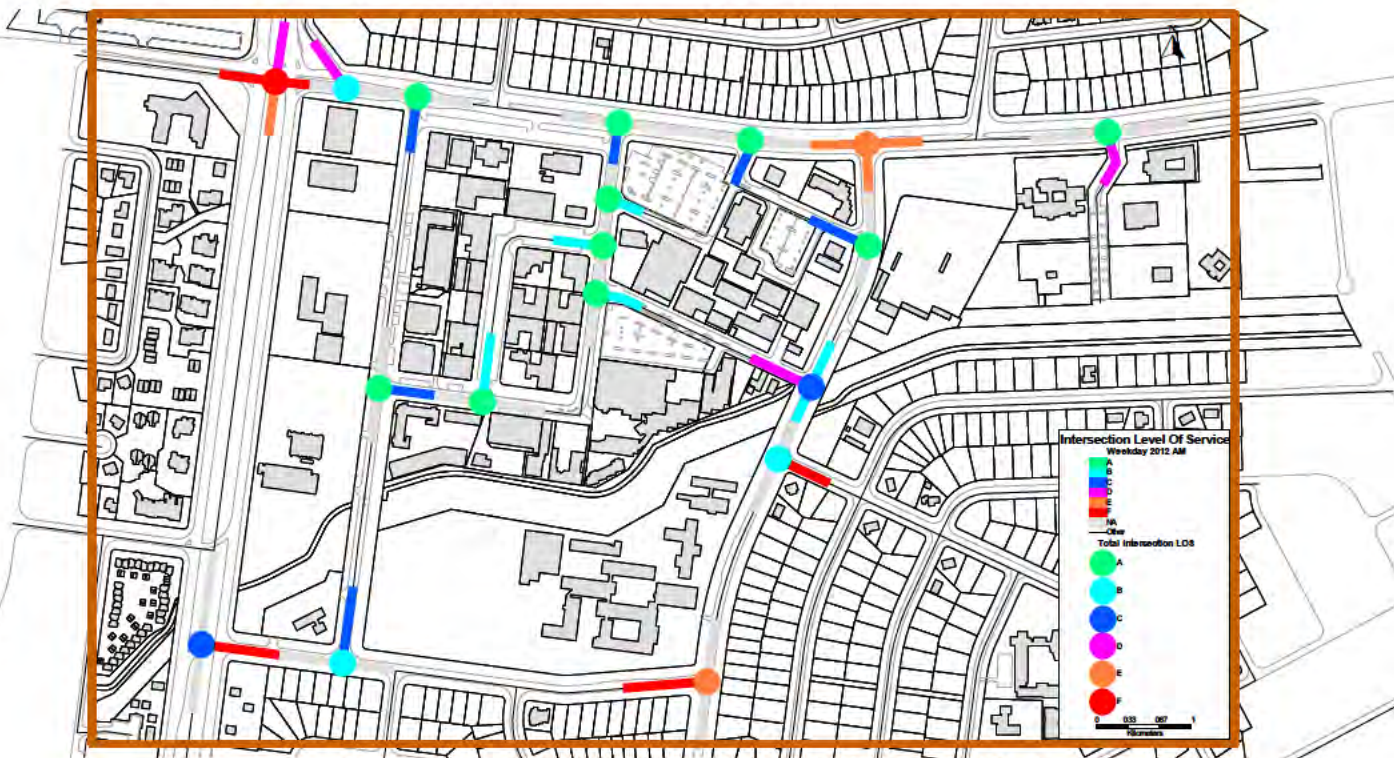


Figure 21: Intersection Level of Service – 2012 Weekday AM Peak

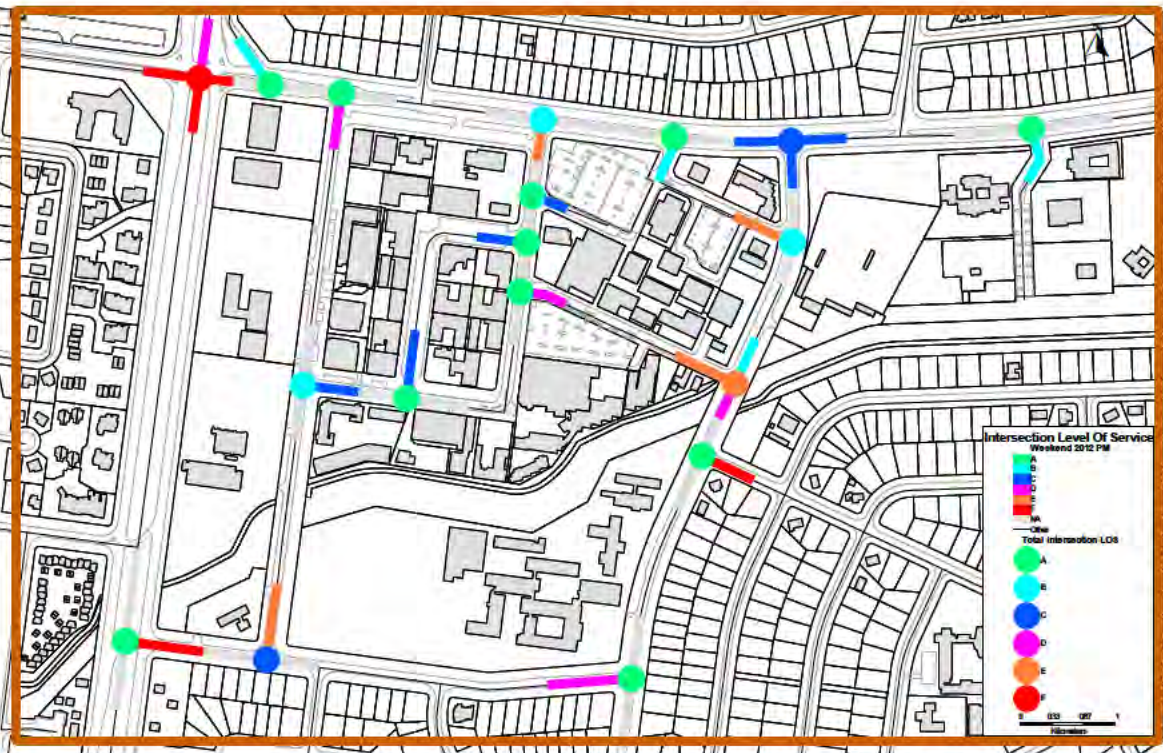


Figure 22: Intersection Level of Service – 2012 Weekday PM Peak

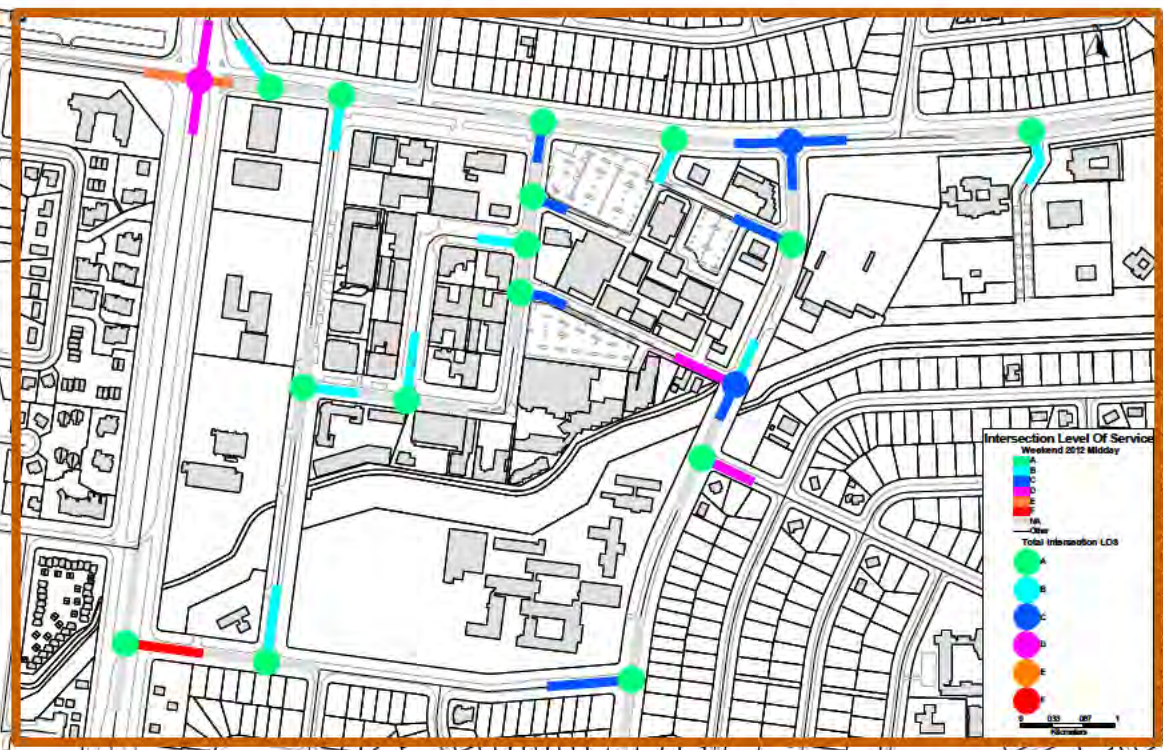


Figure 23: Intersection Level of Service – 2012 Weekend Midday Peak



Figure 24: Intersection Level of Service – 2012 Weekend Evening Peak

The results of the intersection analysis show that there are some areas of concern in the current network, especially in the weekday AM and PM peaks. In the weekday AM peak, the intersection of Northbourne Avenue with Mouat Street and Antill Street is expected to operate at LoS F, with both Mouat Street and Antill Street operating at LoS F. In addition, the following roads are expected to operate at LoS F:

- Morphett Street, at its intersection with Northbourne Avenue
- Morphett Street, at its intersection with Cowper Street
- Davenport Street, at its intersection with Cowper Street

In the weekday PM peak, the following locations are expected to operate at LoS F:

- Intersection of Northbourne Avenue with Mouat Street and Antill Street, on Northbourne Avenue (northbound), Mouat Street and Antill Street approaches
- Morphett Street, at its intersection with Cowper Street
- Davenport Street, at its intersection with Cowper Street

During the weekend midday peak, the only area operating at LoS F is Morphett Street, at its intersection with Northbourne Avenue.

There are no intersections or approaches to intersections operating at LoS F in the weekend evening peak period.

3.4 Summary of Existing Issues and Potential Solutions

Figure 25 shows the recommended changes in the Dickson Precinct to address the identified issues in the current situation.

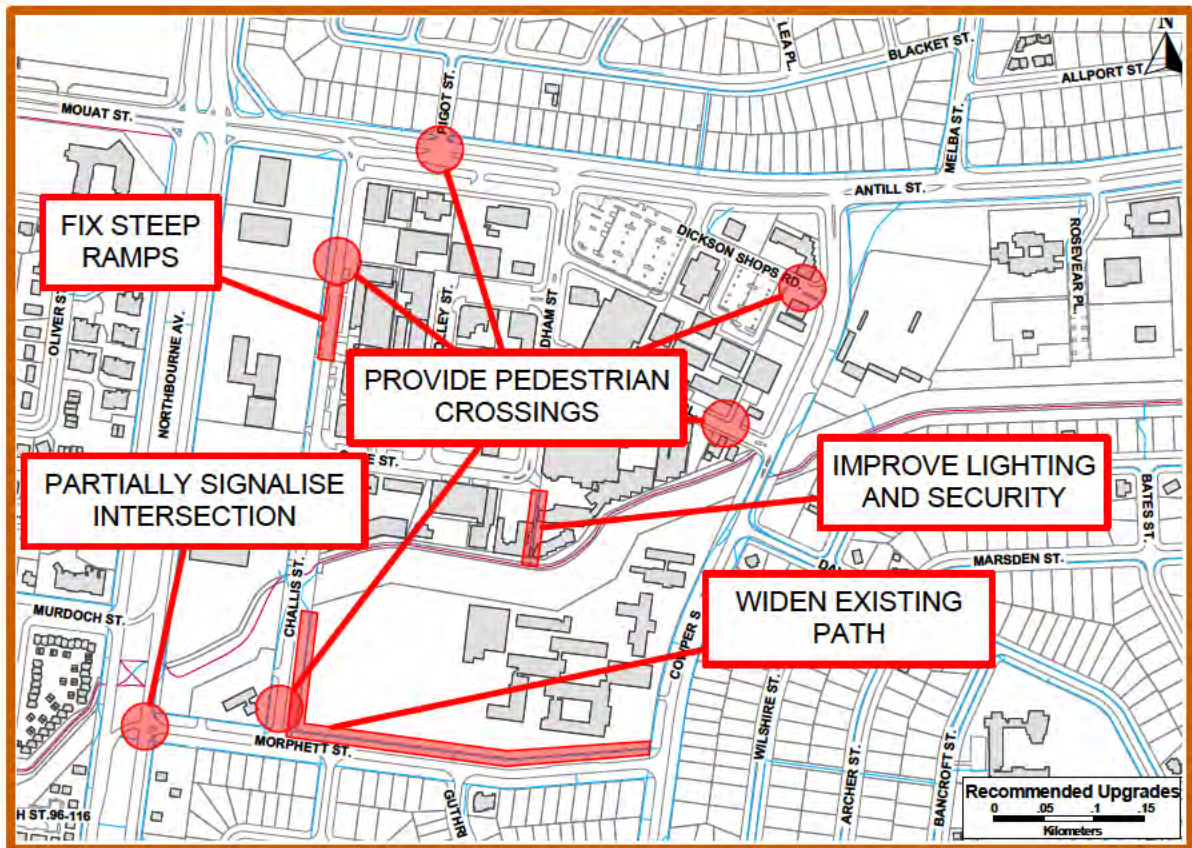


Figure 25: Recommended Upgrades in 2012

These recommendations are discussed in more detail in the following sections.

3.4.1 Pedestrian and Cyclist Facilities

The following changes to the existing pedestrian and cyclist facilities, based on the site inspection, are recommended:

- Provide a pedestrian crossing on Challis Street near its intersection with Morphet Street
- Provide a pedestrian crossing on Challis Street near the Telstra Building
- Provide a pedestrian crossing on Antill Street near its intersection with Pigot Street
- Provide a Pedestrian crossing on Dickson Place west of its intersection with Cowper Street
- Provide a pedestrian crossing on Dickson Shops Road close to the intersection with Cowper Street
- Widen the 1.2m concrete paths around Daramalan College
- Provide better lighting on the path extension from Badham Street to the shared path to the south of the precinct to improve security
- Ensure pedestrian ramps along Challis Street have appropriate steepness for wheelchair access.
- Construct a new pedestrian/cyclist path connection from north of Rosevear Place to shared path to the south and swimming pool

3.4.2 Car Parking

The analysis of the car parking supply and utilisation has shown that there appears to be sufficient car parking capacity in Dickson for current operations. However, the car parking is not evenly utilised across the centre. It is recommended that appropriate signage be implemented to direct drivers to car parks that are shown to be underutilised in this study. Better signage, along with the upgrades to the pedestrian facilities presented above, should allow more efficient usage of current parking facilities.

3.4.3 Road Network and Intersections

The following changes to the existing road network and intersections are recommended to address current performance issues:

- Partial signalisation of the intersection of Northbourne Avenue and Morphett Street

This signalisation would only affect the eastern (southbound) carriageway of Northbourne Avenue. The signals would need to be linked to the existing signalised pedestrian crossing immediately to the north to ensure efficient operation.

These signals would also allow safe crossing of Morphett Street for pedestrians and off-road cyclists travelling north or south along the eastern side of Northbourne Avenue.

While the intersection analysis results indicate that the intersection of Northbourne Avenue with Antill Street and Mouat Street is currently operating at Level of Service F in both the AM and PM peak periods, it is recommended that the *Gungahlin to City Transitway Feasibility Study* (currently in progress) investigate options to improve the performance at this location. That study is expected to recommend significant changes to Northbourne Avenue to address transit operations and is better placed to make recommendations about this intersection.

4 ASSESSMENT OF MASTER PLAN

The proposed master plan developments have been discussed here in two stages. The first is the short term plan to develop Blocks 19 and 21 into two new supermarkets with supporting specialty retail shops. The predicted traffic impact of this development has already been assessed by Brown Consulting in 2011 and the outcomes of that assessment are reviewed here. An in depth analysis, which would essentially duplicate work already undertaken, has not been carried out.

The second stage of the assessment is the long term master plan options, assumed to be implemented by 2031. A more detailed analysis of the long term has been carried out, including traffic modelling and an indicative forecast of future parking requirements.

4.1 Analysis of Short Term Plan

Brown Consulting has already conducted an in depth analysis of the impact of the proposed supermarket developments, which found that the developments were not expected to have a significant impact on traffic operations in the area. In addition, although the new developments do not provide the quantity of parking recommended in the ACT guidelines, the study found that the excess demand was likely to be met by car parks near the new development.

The following section discusses a brief review of the parking analysis based on more recent parking utilisation surveys carried out for this project.

4.1.1 Short Term Parking Requirements

The Dickson master plan indicates that parking Areas 16 and 19 are expected to be redeveloped with supermarkets and supporting specialty shops. These parking areas are located in Block 21 and Block 19, respectively.

Table 8 shows the existing utilisation of the parking Areas 16 and 19 (Blocks 21 and 19). It should be noted that parking areas in the Retail Core Precinct are currently near capacity during the weekday PM peak and weekend midday peak periods. Car parking areas operating at very high utilisation levels typically have a large number of cars circulating repeatedly searching for spaces, which could potentially lead to traffic congestion issues.

Table 8 Summary of Parking Utilisation Survey for Parking Areas 16 and 19

Location	Supply	Thursday, 16 February 2012						Weekend, 18 February 2012					
		7:00	8:00	9:00	16:00	17:00	18:00	11:00	12:00	13:00	18:00	19:00	20:00
Area 16 (Block 21)	242	23	102	116	182	180	191	195	233	228	159	193	177
Area 19 (Block 19)	135	21	36	72	112	69	44	113	123	124	26	32	27
Total	377	44	138	188	294	249	235	308	356	352	185	225	204
		12%	37%	50%	78%	66%	62%	82%	94%	93%	49%	60%	54%

Table 8 shows that Block 21 has a total of 242 parking spaces and block 19 has a total of 135 parking spaces (including taxi zone and motorcycle parking areas). This table also shows that the peak parking demand of Areas 16 and 19 occurs at 12:00 PM on weekends, which is the same as the adjacent parking areas in the Retail Core Precinct.

Temporary removal of either of these parking areas will put significant parking pressure on adjacent parking areas and the surrounding road network as consumers search for parking spaces, so this demand should be met through the use of adjacent parking areas and temporary car parks.

It is expected that some of the parking demand from Areas 16 and 19 will be absorbed by the adjacent parking areas. The *ACT Parking and Vehicular Access General Code* states that Commercial C – Group Centres should have short term parking within 200 metres, while long stay parking should be within 400 metres. However, the *General Code* also states that land uses in the Dickson Group Centre (excluding Section 32, Block 2) require short stay parking to be provided within 100 metres. Therefore, the most likely existing parking areas to be utilised are Areas 8, 9, 10, 12, 17, 18 and 23. While Area 12 is in a location that makes it possible to be utilised, its on-street nature is likely to make it less attractive to supermarket shoppers who often use trolleys to transport goods to their cars. Table 9 shows the number of unused parking spaces in nearby parking areas. It is also noted that demand for parking in Area 23 is likely to be seasonal. The parking surveys were conducted in February and the area is approximately 65% utilised during the weekend midday peak. During winter, when the Aquatic Centre is closed, there is likely to be less demand in this area.

Table 9: Available Parking Space in Areas near Blocks 19 and 21

Parking Area	Thursday, 16 February 2012						Weekend, 18 February 2012					
	7:00	8:00	9:00	16:00	17:00	18:00	11:00	12:00	13:00	18:00	19:00	20:00
Area 8	53	28	10	25	44	59	60	56	55	62	41	17
Area 9	30	28	27	16	23	21	18	12	17	6	1	1
Area 10	58	55	52	50	47	43	44	37	38	22	18	17
Area 12	128	130	116	78	63	31	38	32	26	24	20	20
Area 17	17	13	10	6	11	15	19	16	14	21	23	7
Area 18	36	23	13	4	12	34	16	25	31	31	35	35
Area 23	156	152	125	54	128	137	53	49	59	152	176	181
Total Available Spaces	478	429	353	233	328	340	248	227	240	318	314	278

Based on the available parking spaces around Blocks 19 and 21, it appears that Block 19 (which contains 135 parking spaces) can be redeveloped without the need to provide additional parking. However, appropriate signage must be used to redirect users to the parking areas they should use while construction is underway.

If the development of Block 21 (which contains 242 parking spaces) can be staged, additional temporary parking spaces may not be required. If staging is not possible for Block 21, it is recommended to provide temporary parking spaces within 100 metres of Area 16.

It is noted that there will be an increase in circulating traffic caused by drivers looking for free spaces in highly utilised parking areas. To reduce this impact it is recommended to install temporary signs directing drivers to alternative parking areas (particularly for Area 23). It is expected that this work will be conducted as part of the temporary traffic management plan.

The *ACT Parking and Vehicular Access General Code* states that the proposed supermarkets at Blocks 19 and 21 should provide an additional 326 parking spaces as shown in *Development Traffic Assessment Report for Block 19 and 21, Dickson Shops, Dickson, ACT* (Brown Consulting, June 2011). However, the proposed development will only provide an additional 76 parking spaces. The report argues that the ACT guidelines result in an oversupply and refers to the *RTA Guide to Traffic Generating Development* provision rates, which indicate that 240 parking spaces are required in the development, which are provided. That report assumed that the additional parking demand will utilise the adjacent parking areas.

Relying on adjacent parking areas is expected to result in more circulating traffic which may lead to further issues in the road network. Therefore, it is recommended that additional parking be provided in the developments planned for Blocks 19 and 21.

4.2 Analysis of Long Term Master Plan

The impacts of the master plan developments on transport operations in Dickson were assessed, regarding:

- Pedestrian and cycle network
- Car parking requirements
- Road hierarchy
- Intersection level of service

These investigations are discussed further in the following sections.

4.2.1 Pedestrian and Cycle Network

Figure 4 to *Figure 7* show that Dickson appears to have significant east-west pedestrian and cyclist movements. However, the main north-south movements occur on Northbourne Avenue only. This is likely to be due to lack of appropriate pedestrian crossings on Antill Street and Morphett Street. It is noted that the one signalised crossing at the intersection of Antill Street and Dickson Shops Road carries relatively less pedestrian and cyclists compared to the other crossing facilities surrounding Dickson. For the long term scenario it is recommended to increase the north-south permeability of the precinct by improving the crossing facilities that provide access to the centre of Dickson. This can be achieved by signalling the Antill Street – Badham Street intersection, and improving access from Badham and Cape Streets to the shared path north of Daramalan College. In addition, pedestrian access from the south can be improved by signalling the intersection of Morphett Street and Challis Street and continuing the paved path on the western end of Daramalan College.

The master plan proposes several external connections to the surrounding area as shown in *Figure 26*. These external connections are consistent with the recommendations made above. Similarly, the master plan proposes new internal links and improvements to the

existing links as shown in *Figure 27*. The new east-west internal links will allow better access to Challis Street, which will be very important if the planned major bus station is located along this street.

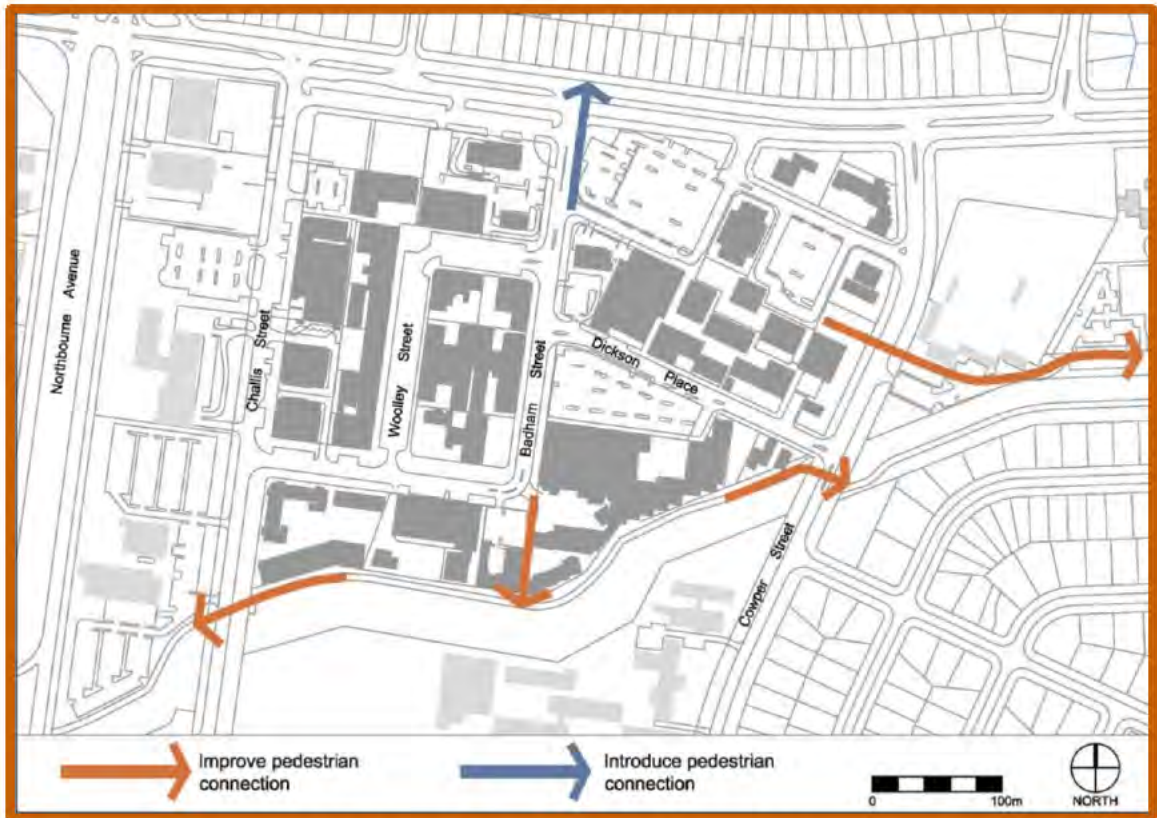


Figure 26: External Pedestrian Access (Source: Dickson master plan)

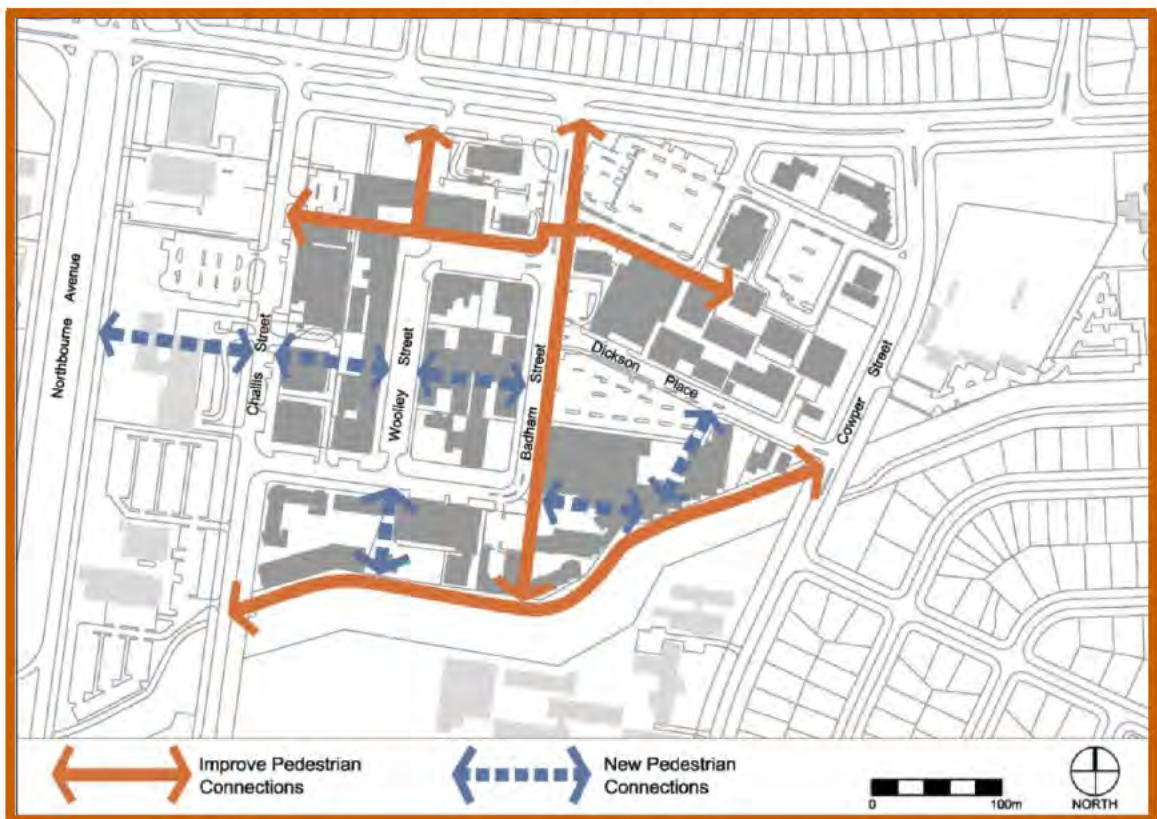


Figure 27: Internal Pedestrian Access (Source: Dickson master plan)

4.2.2 Long Term Parking Requirements

The master plan does not include enough details regarding the proposed land use to conduct a detailed assessment of the number of parking spaces required in the future. However, a basic assessment has been carried out based on the indicative changes in land use shown in *Table 10*.

Table 10: Indicative Future Land Use in Dickson

Land Use	2016	2021	2031
Population	101	830	1,890
Employment	2,880	3,460	4,590
Retail Space (m ²)	31,945	38,645	40,800

Using current parking provision rates, the Dickson Group Centre is expected to require approximately the number of parking spaces shown in *Table 11*.

Table 11: Indicative Future Parking Requirements in Dickson

Land Use	2012	2016	2021	2031
Population	-	90	730	1,670
Employment	-	1,440	1,730	2,300
Retail Space (m ²)	-	1,600	1,930	2,040
Total	2,509	3,130	4,390	6,010

Based on rates from the ACT Parking and Vehicular Access Guidelines and assumptions about unit occupancy and employment rates.

This is an increase to nearly 2.5 times the current supply. This large increase in vehicles entering and exiting the Dickson Precinct to use this parking may have a significant impact on the performance of the road network and intersections in and around Dickson.

4.2.3 Road Network Hierarchy Assessment

Figure 28 and *Figure 29* show that the road hierarchies based on traffic volumes in 2031, both with and without master plan scenarios, are very similar.



Figure 28: Predicted Vehicles per Day per Direction – 2031 Without Master Plan



Figure 29: Predicted Vehicles per Day per Direction – 2031 With Master Plan

Cape Street Extension, east of Badham Street, is expected to carry approximately 5,500 vehicles per day. West of Challis Street, Cape Street Extension is expected to carry 7,800 vehicles per day, which places it in the arterial category. It is noted that *Table 6* states that major collector roads should have a maximum of 6,000 vehicles per day. However, the daily traffic volumes shown here are indicative and the code allows for these volumes to be exceeded if appropriate justification is provided.

While access arrangements appear to be appropriate for the existing hierarchy, as more traffic travels on Dickson Place, Badham Street and Cape Street, the access

arrangements to developments on these streets may need to be reconsidered. Of particular note are the:

- Access driveway to McDonalds on Badham Street south of Woolley Street
- McDonalds loading dock at the western end of Dickson Place
- 90 degree parking on Cape Street

These facilities may not be appropriate for the relatively high volumes of traffic expected on these roads.

4.2.4 Intersection Analysis

In addition to the 21 intersection that were analysed in Section 3.3.4, the following three intersections, related to the extension of Cape Street at both the eastern and western ends, were analysed for the master plan scenario:

- Northbourne Avenue - Cape Street
- Cape Street - Badham Street
- Dickson Place - Cape Street

Again, these intersections were modelled for the weekday AM, PM and Weekend mid-day and evening peak periods using volumes taken from the micro-simulation modelling.

Figure 30 through *Figure 33* show a graphical representation of the expected performance of each intersection for each of the four peak periods in 2031, assuming that the master plan developments do not go ahead. Detailed intersection analysis results for the future scenarios are shown in Appendix A.

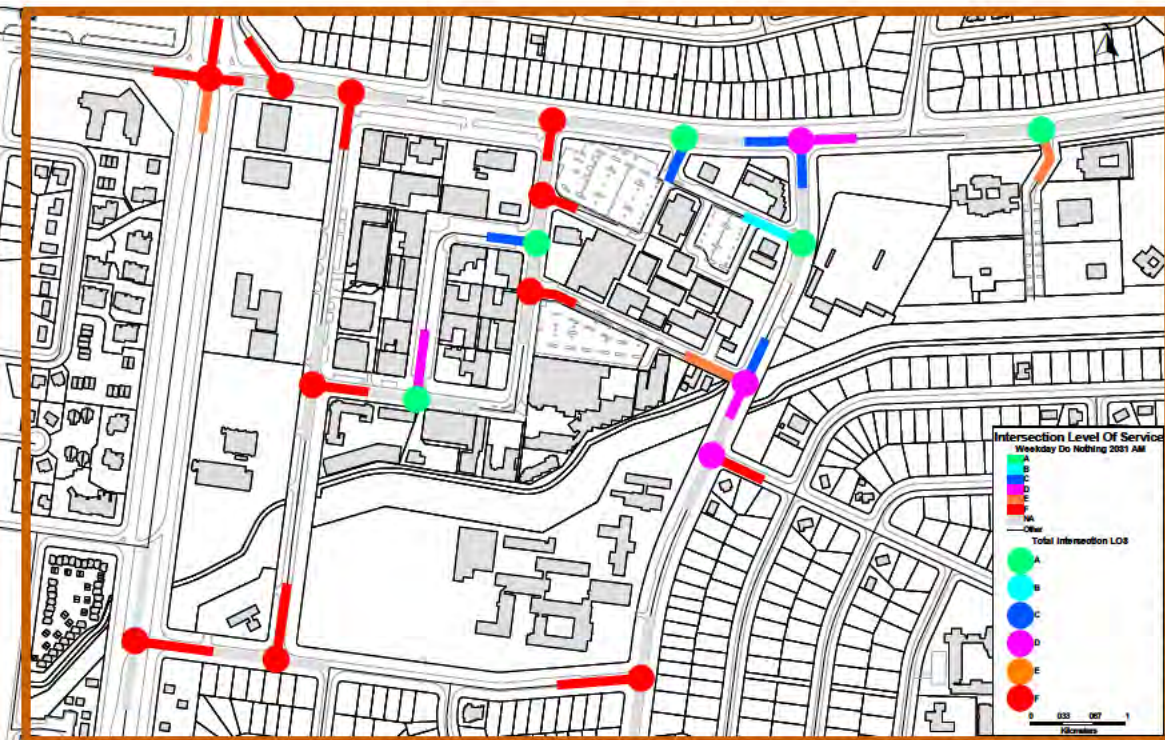


Figure 30: Intersection Level of Service – 2031 Do Nothing Weekday AM Peak Period

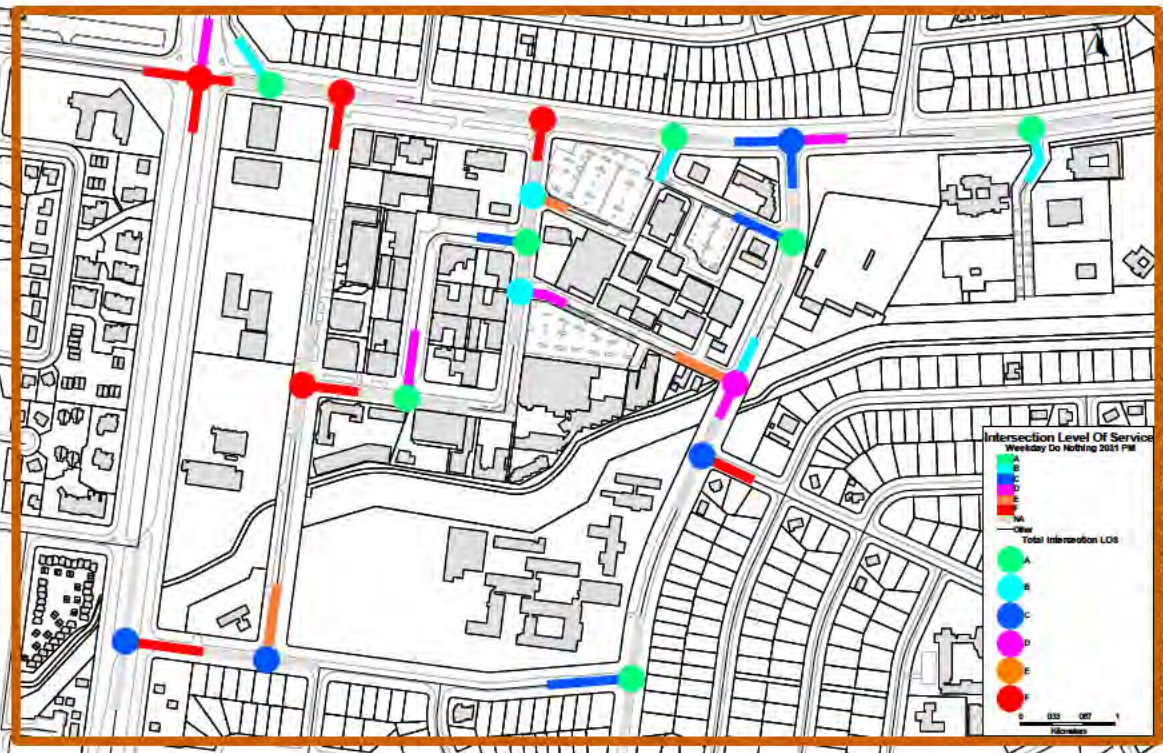


Figure 31: Intersection Level of Service – 2031 Do Nothing Weekday PM Peak Period

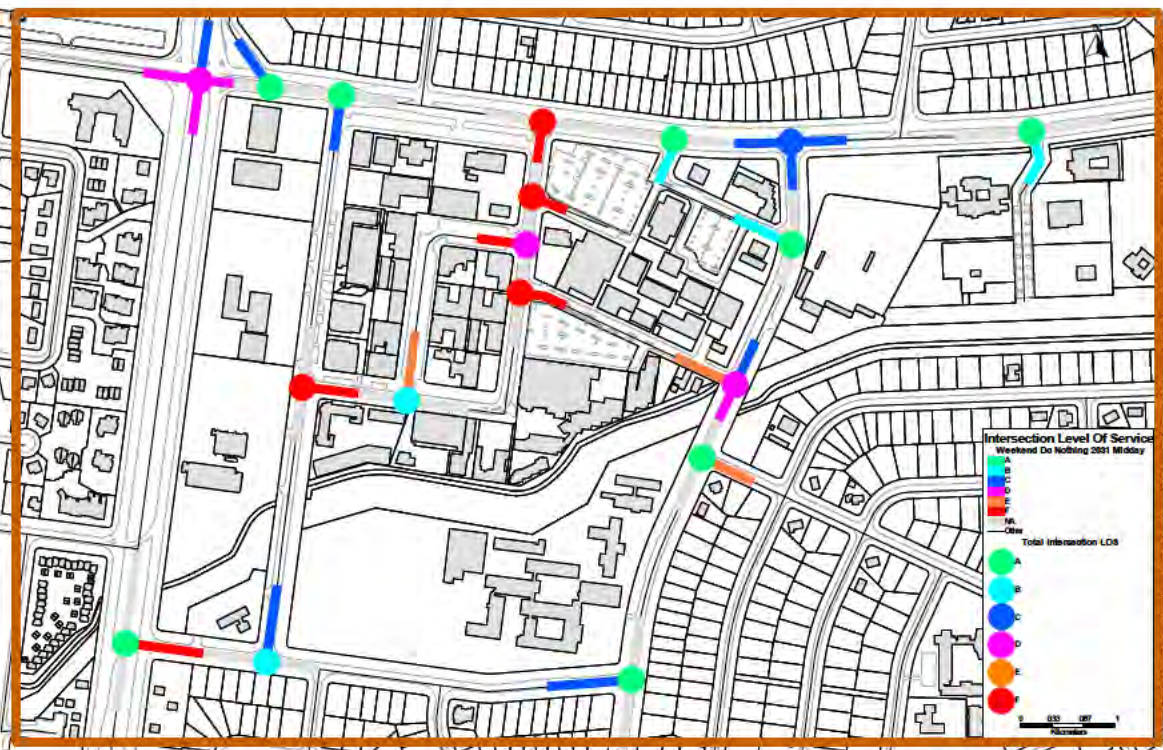


Figure 32: Intersection Level of Service – 2031 Do Nothing Weekend Midday Peak

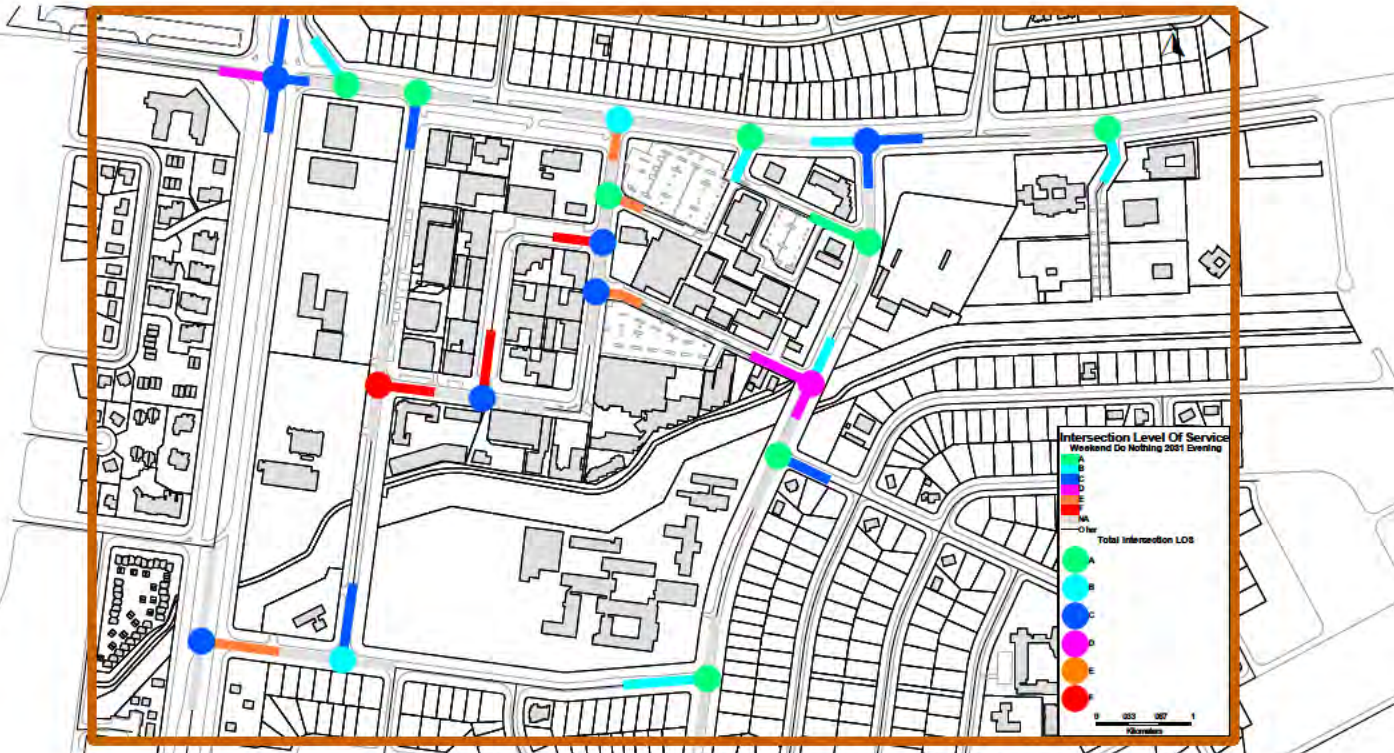


Figure 33: Intersection Level of Service – 2031 Do Nothing Weekend Evening Peak

From the preceding figures, it can be seen that there are a number of intersections and links that are expected to operate at Level of Service F without the master plan developments. The intersections include:

- Northbourne Avenue – Antill Street / Mouat Street (AM and PM peaks)
- Northbourne Avenue – Morphett Street (AM peak)
- Antill Street – Northbourne Avenue Service Road (AM peak)
- Antill Street – Challis Street (AM and PM peaks)
- Challis Street – Cape Street (AM, PM, weekend midday and weekend evening peaks)
- Challis Street – Morphett Street (AM peak)
- Antill Street – Badham Street (AM, PM and weekend midday peaks)
- Badham Street – Dickson Shops Road (AM and weekend midday peaks)
- Badham Street – Dickson Place (AM and weekend midday peaks)
- Cowper Street – Morphett Street (AM peak)

In addition to these intersections, the following roads are expected to operate at Level of Service F:

- Davenport Street, at its intersection with Cowper Street (AM and PM peaks)
- Morphett Street, at its intersection with Northbourne Avenue (PM and weekend midday peaks)
- Woolley Street, at its intersection with Badham Street (weekend midday and weekend evening peaks)
- Woolley Street, at its intersection with Cape Street (weekend evening peak)

Figure 34 through Figure 37 show a graphical representation of the expected performance of each intersection for each of the four peak periods in 2031, assuming that the master plan

developments go ahead. Detailed intersection analysis results for the future scenarios are shown in Appendix A.

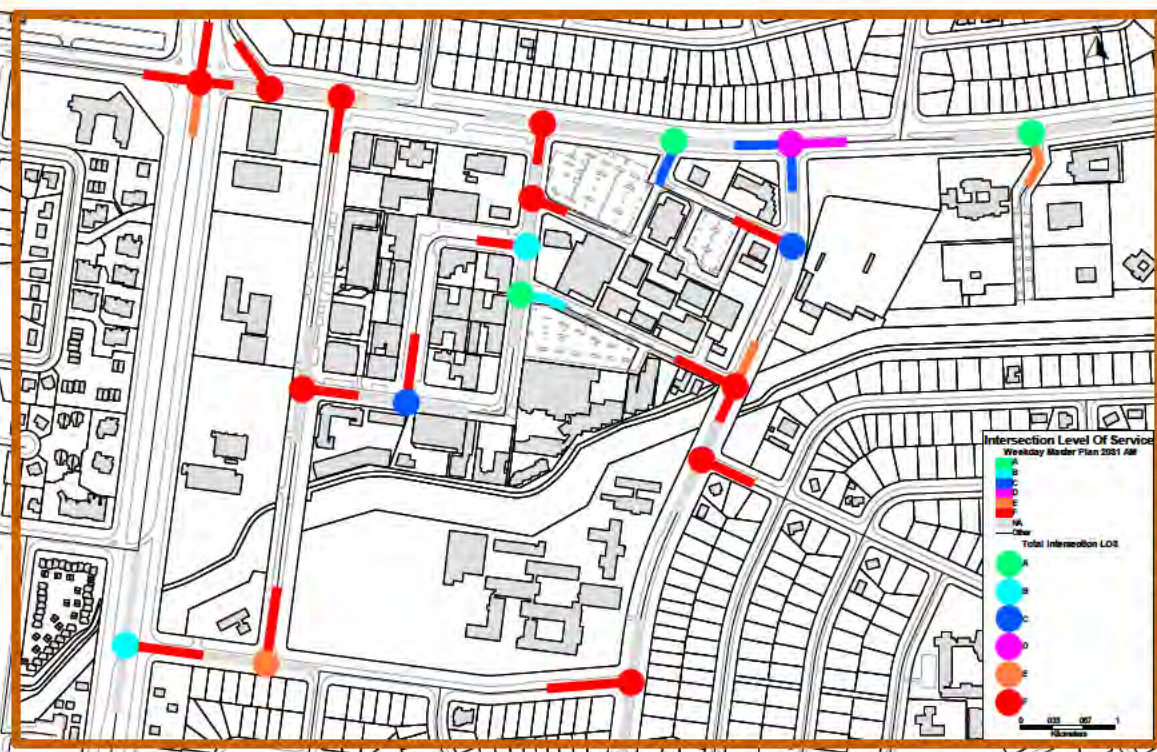


Figure 34: Intersection Level of Service – 2031 Master Plan Weekday AM Peak Period

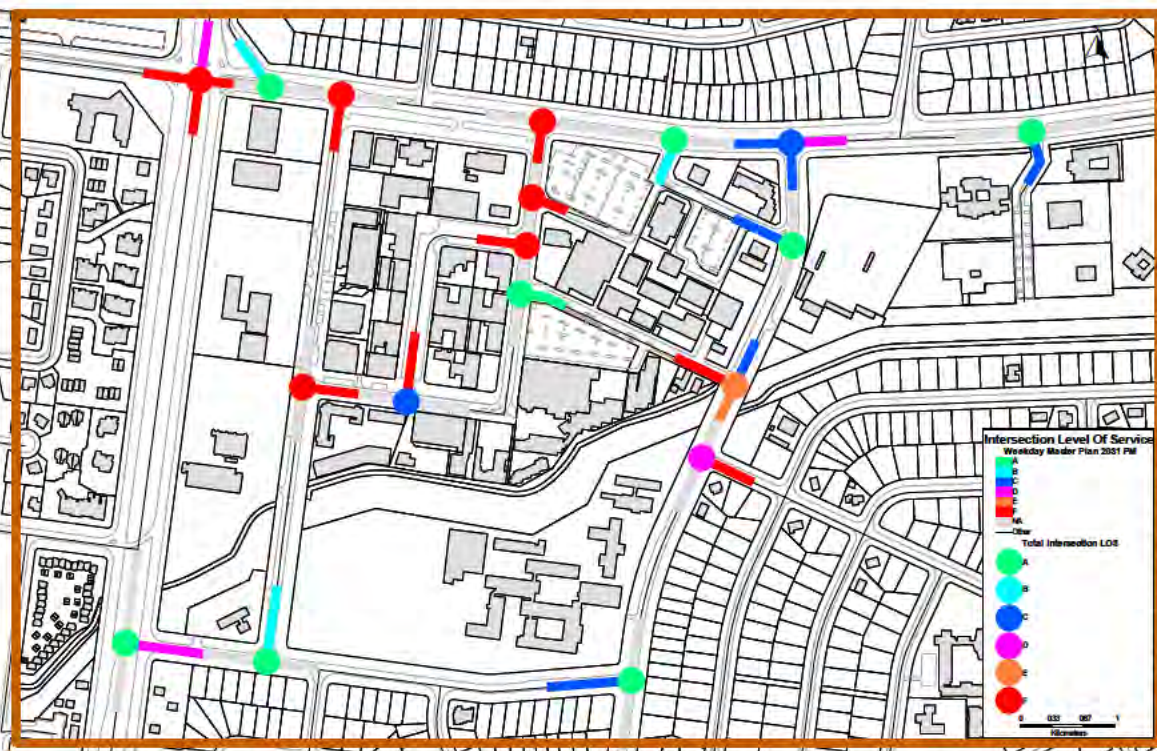


Figure 35: Intersection Level of Service – 2031 Master Plan Weekday PM Peak Period

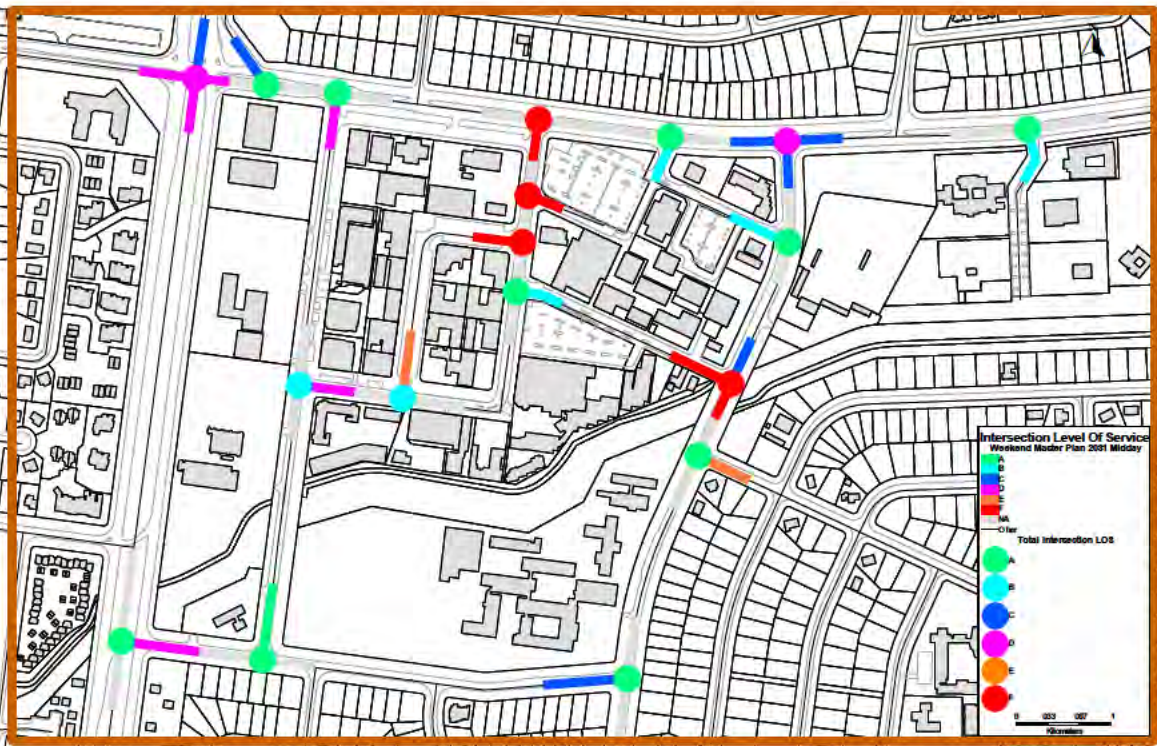


Figure 36: Intersection Level of Service – 2031 Master Plan Weekend Midday Peak Period

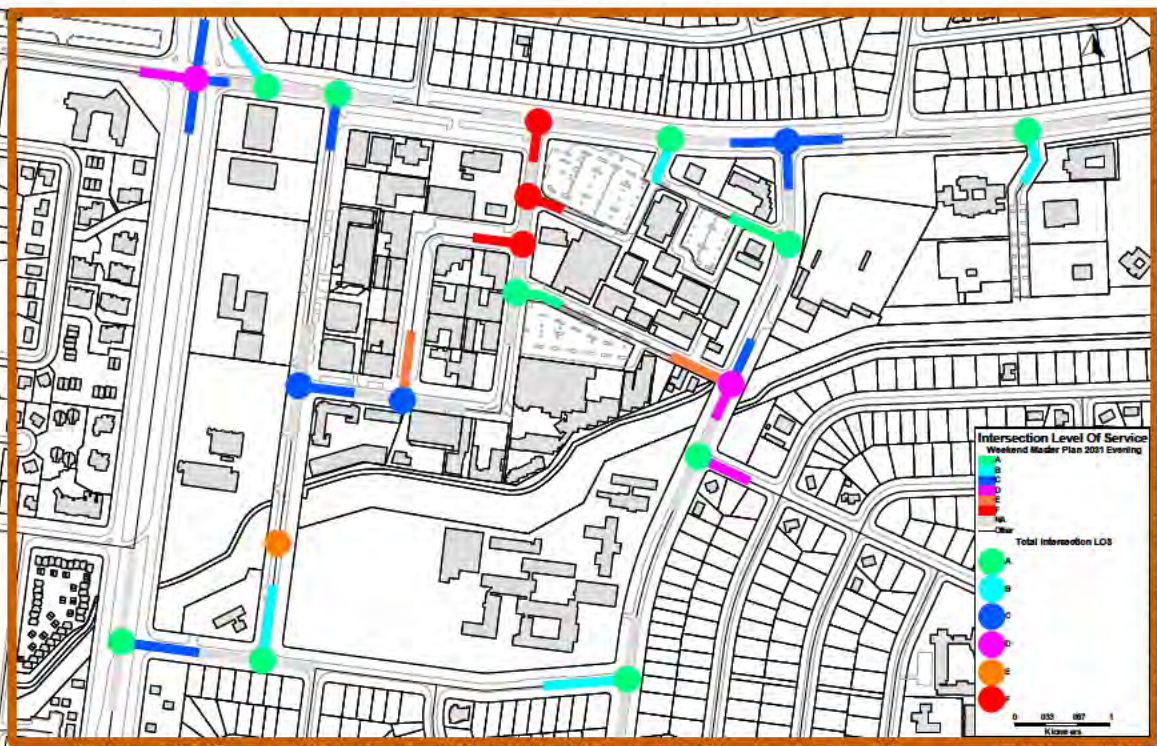


Figure 37: Intersection Level of Service – 2031 Master Plan Weekend Evening Peak Period

From the preceding figures, it can be seen that there are a number of intersections and links that are expected to operate at Level of Service F if the master plan developments are implemented. The intersections include:

- Northbourne Avenue – Antill Street / Mouat Street (AM and PM peaks)
- Antill Street – Northbourne Avenue Service Road (AM peak)
- Antill Street – Challis Street (AM and PM peaks)
- Challis Street – Cape Street (AM, PM and weekend evening peaks)

- Antill Street – Badham Street (AM, PM, weekend midday and weekend evening peaks)
- Badham Street – Dickson Shops Road (AM, weekend midday and weekend evening peaks)
- Badham Street – Woolley Street (PM, weekend midday and weekend evening peaks)
- Cowper Street – Dickson Place (AM and weekend midday peaks)
- Cowper Street – Davenport Street (AM peak)
- Cowper Street – Morphett Street (AM peak)

In addition to these intersections, the following roads are expected to operate at Level of Service F in 2031 if the master plan is implemented:

- Morphett Street, at its intersection with Northbourne Avenue (AM and weekend midday peaks)
- Challis Street, at its intersection with Morphett Street (AM peak)
- Woolley Street, at its intersection with Badham Street (weekend midday peak)
- Woolley Street, at its intersection with Cape Street (AM and PM peaks)
- Dickson Place, at its intersection with Cowper Street (PM peak)
- Dickson Shops Road, at its intersection with Cowper Street (AM peak)
- Davenport Street, at its intersection with Cowper Street (PM peak)

Recommendations to address these performance issues are presented in the following sections.

4.3 Summary of Issues Found and Potential Solutions

A number of recommendations have been made to allow the implementation of the master plan. These relate to:

- Pedestrian and cyclist facilities
- Car parking
- Road network and intersections

These recommendations are shown in *Figure 38* and discussed in the following sections.

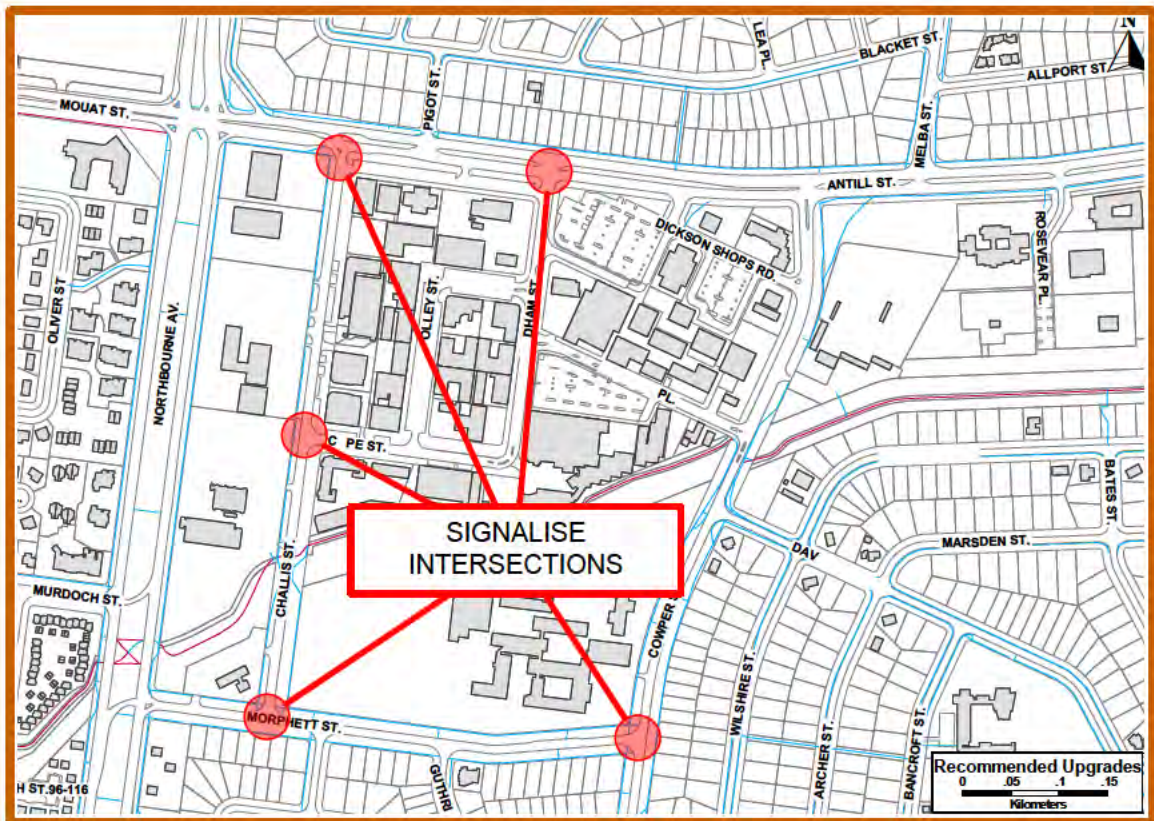


Figure 38: Recommended Upgrades for the 2031 Master Plan Scenario

4.3.1 Pedestrian And Cyclist Facility Improvements

The following improvements to the pedestrian and cyclist facilities are recommended:

- Providing north/south external links into Dickson by signalising the intersection of Antill Street and Badham Street
- Improving pedestrian safety at the intersection of Morphet Street and Challis Street (preferably by signalisation)
- Improving pedestrian safety at the intersection of Morphet Street and Cowper Street (preferably by signalisation)

Provide new pedestrian connections inside Dickson Precinct as shown in the master plan (Figure 27). It is assumed that these internal links will be developed as the surrounding buildings are further developed.

4.3.2 Car Parking Options

It is recommended to develop the proposed supermarkets and associated retail facilities on Blocks 19 and 21 in stages. If possible, Block 21 should also be developed in stages. By leaving some of the parking area undisturbed it is possible to for the adjacent parking areas to provide the additional parking spaces needed during the construction phase.

The master plan does not include enough details regarding the proposed land use to accurately predict the number of parking spaces required in the future. However, a brief assessment indicates that the requirement for parking is likely to rise from approximately 2,500 in 2012 to approximately 6,000 in 2031. All proposed developments should meet the parking requirements set out in the *ACT Parking and Vehicular Access General Code* or whichever code is relevant at the time of development.

In the future, it may be possible to reduce the parking requirements by considering dual use or shared parking. Dual use parking, referred to in Brown Consulting (2011), is where a number of land uses share a parking area. Users are able to visit more than one land use without requiring a second car parking space. This type of system would require an area wide parking management plan that considers the total parking supply of the Dickson centre, not just the parking requirements of individual developments. It is also necessary to determine which land uses may be compatible for dual use and the appropriate level of parking supply offset.

It may also be possible to consider sharing parking spaces between land uses that have fundamentally different demand peaks. For example, a parking area serving a residential development would typically have high demand over night when people are at home, but would sit empty during the day. An employment area would have high demand during the day while people are at work, but would sit empty at night. If these land uses shared a parking area, the utilisation of that parking area could be expected to be high at all times of the day and night. Again, an area wide management plan would be necessary. There would also need to be management of individual parking areas to ensure satisfactory operation.

4.3.3 Road Network And Intersection Options

The analysis of the road network and intersection performance has identified a number of locations where the level of service is expected to be poor or unacceptable. These locations are on arterial roads around the Dickson precinct and also on local streets inside the precinct. At this stage in the process, it is considered appropriate to make recommendations to improve the level of service on the arterials roads while the local streets can tolerate a higher delay. In addition, the operation of some of the local streets is highly dependent on the location of access to future parking areas, which is not yet known.

It is recommended that the following changes to intersections are made to address identified performance issues:

- Signalisation of the following intersections:
 - Antill Street and Challis Street
 - Challis Street and Cape Street
 - Challis Street and Morphett Street
 - Antill Street and Badham Street (also recommended to improve pedestrian access to Dickson from the suburbs to the north)
 - Morphett Street and Cowper Street (also recommended to improve pedestrian safety around Daramalan College)

5 COST ESTIMATES

The analysis of the current situation and the long term master plan has revealed a number of transport related issues that need to be addressed to enable the proposed developments to proceed. The indicative cost estimates have been calculated for each of the changes recommended in Sections 3.4 and 4.3 and these estimates are presented in the following sections.

5.1 Cost of Recommendation for Current Issues

The costs of the recommendations to address current identified issues have been estimated and are presented in *Table 12*.

Table 12: Estimated Cost of Recommended Upgrades – Current

Recommendation	Estimated Cost
Pedestrian crossing on Challis Street near Morphett Street	
Pedestrian crossing on Challis Street near the Telstra Building	
Pedestrian crossing on Antill Street near Pigot Street	
Pedestrian crossing on Dickson Place west of Cowper Street	
Pedestrian crossing on Dickson Shops Road close to Cowper Street	
Widen the concrete paths around Daramalan College	
Provide better lighting on the path extension from Badham Street to the shared path to the south	
Ensure pedestrian ramps along Challis Street have appropriate steepness for wheelchair access	
Construct a new pedestrian/cyclist path connection from Rosevear Place to the shared path to the south	
Signalise the intersection of Morphett Street with the southbound carriageway of Northbourne Avenue	
Total	

5.2 Cost of Long Term Recommendations

The costs of the recommendations to address issues in the long term have been estimated and are presented in *Table 13*.

Table 13: Estimated Cost of Recommended Upgrades – Long Term

Recommendation	Estimated Cost
Signalise the intersection of Antill Street and Badham Street	
Signalise the intersection of Antill Street and Challis Street	
Signalise the intersection of Challis Street and Cape Street	
Signalise the intersection of Challis Street and Morphett Street	
Signalise the intersection of Antill Street and Badham Street (also recommended to improve pedestrian access to Dickson)	
Signalise the intersection of Morphett Street and Cowper Street (also recommended to improve pedestrian safety around Daramalan College)	
Total	

6 CONCLUSIONS

The current and future transport operations in Dickson have been assessed and it was found that a small number of upgrades to existing facilities are required, both now and in the future to allow the full development of the master plan.

6.1 Immediate/Short Term Recommendations

The current operation of the transport network in Dickson was assessed and found to be generally good. However, addressing the following improvements should be prioritised in the short term:

- Pedestrian and cyclist infrastructure and safety:
 - Provide a pedestrian crossing on Challis Street near its intersection with Morphett Street
 - Provide a pedestrian crossing on Challis Street near the Telstra Building
 - Provide a pedestrian crossing on Antill Street near its intersection with Pigot Street
 - Provide a Pedestrian crossing on Dickson Place west of its intersection with Cowper Street
 - Provide a pedestrian crossing on Dickson Shops Road close to the intersection with Cowper Street
 - Widen the 1.2m concrete paths around Daramalan College
 - Provide better lighting on the path extension from Badham Street to the shared path to the south of the precinct to improve security
 - Ensure pedestrian ramps along Challis Street have appropriate steepness for wheelchair access.
 - Construct a new pedestrian/cyclist path connection from north of Rosevear Place to shared path to the south and swimming pool
- Car parking operations:
 - Implement better signage to inform users about the location of parking areas that are currently underutilised
- Road network and intersections
 - Signalise the intersection of Morphett Street with the southbound carriageway of Northbourne Avenue. The northbound carriageway would remain as it is.

These recommendations are expected to improve the transport operations and safety in Dickson in the short term.

6.2 Long Term Recommendations

In the long term, the transport demands in Dickson are expected to increase significantly, both with and without the implementation of the master plan. A number of recommendations have been made to allow implementation of the master plan and these should be implemented as required. These recommendations include:

- Pedestrian and cyclist infrastructure and safety:
 - Provide north/south external links into Dickson by signalising the intersection of Antill Street and Badham Street

- Improve pedestrian safety at the intersection of Morphett Street and Challis Street (preferably by signalisation)
- Improve pedestrian safety at the intersection of Morphett Street and Cowper Street (preferably by signalisation)
- Car parking operations:
 - Implement an area wide parking strategy to efficiently plan parking for future developments
- Road network and intersections:
 - Signalise the intersection of Antill Street and Challis Street
 - Signalise the intersection of Challis Street and Cape Street
 - Signalise the intersection of Challis Street and Morphett Street
 - Signalise the intersection of Antill Street and Badham Street (also recommended to improve pedestrian access to Dickson from the suburbs to the north)
 - Signalise the intersection of Morphett Street and Cowper Street (also recommended to improve pedestrian safety around Daramalan College)

APPENDIX A 2012 (EXISTING) SIDRA RESULTS

APPENDIX B 2031 DO NOTHING SIDRA RESULTS

APPENDIX C 2031 MASTERPLAN SIDRA RESULTS

APPENDIX D 2031 MASTERPLAN (RECOMMENDED) SIDRA RESULTS

APPENDIX E COST ESTIMATES



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Final Report

Dickson Precinct Traffic and Parking Study

11 July 2012

Ref. 3002303

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Report for:	ESDD

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SMEC COMPANY DETAILS

SMEC Australia Pty. Ltd.
Level 1, 243 Northbourne Avenue, Lyneham ACT 2602

Tel: (02) 6234 1958

Fax: (02) 6234 1966

Email: [REDACTED] [@smec.com](mailto:[REDACTED]@smec.com)

www.smec.com

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Dickson Precinct Traffic and Parking Study – Final Report

For: ESDD

JULY 11, 2012

EXECUTIVE SUMMARY

A master plan for the Dickson Group Centre was developed in 2011 by ACT Planning and Land Authority (ACTPLA, now Environment and Sustainable Development Directorate (ESDD)). This master plan defines the structure of development in the Dickson precinct over the next 30 years. SMEC has been engaged to undertake an assessment of the master plan and make recommendations regarding transport, including non-motorised transport, parking and traffic, for the current situation, the short term time frame and the long term implementation of the master plan.

A number of transport studies have been conducted in Dickson recently, especially regarding parking, and these studies have been reviewed and the outcomes used where appropriate for this study.

ES.1 Existing Conditions

The following investigations into the current conditions in Dickson were undertaken:

- Examination of pedestrian and cycle network connectivity and condition
- Survey of pedestrian and cycle volumes
- Survey of parking supply and utilisation
- Survey of traffic volumes
- Micro-simulation modelling
- Intersection analysis

All surveys of demand (cyclist, pedestrian, parking and traffic) were carried out for four peak periods, namely:

- Weekday AM peak (7:00AM-9:00AM)
- Weekday PM peak (4:00PM-6:00PM)
- Weekend midday peak (11:00AM-1:00PM)
- Weekend evening peak (6:00PM-8:00PM)

A site visit was conducted to examine the provision of pedestrian and cyclist infrastructure, as well as its condition and possible safety risks. It was found that, while the provision and condition of the infrastructure tend to be good, there are a few areas that require upgrades.

The pedestrian and cyclist volumes at 24 locations across Dickson were surveyed to allow identification of areas of high demand and possible prioritising of recommendations based on volumes.

A parking supply and utilisation survey was carried out for the centre. 23 parking areas were identified and surveyed for the four peak periods. It was found that there is significant spare capacity across the centre, with utilisation peaking at 63%. However, demand during different peaks is focused on certain parking areas and the centre may benefit from better signage and pedestrian connectivity to encourage better use of car parking areas that are slightly further from the land use they are serving. Gated and publicly accessible car parks were analysed separately and it was found that 65% of the parking is publicly accessible. The publicly accessible parking had a maximum utilisation of 64%, which occurred in the weekday PM and weekend midday peak periods.

Traffic turning volume surveys were conducted for 21 intersections across the precinct for the four peak periods. These surveys showed that traffic volumes tend to be higher on

external roads, including Northbourne Avenue, Antill Street and Cowper Street, than inside the centre. These roads had significantly higher traffic volumes on weekdays than weekends. However, the traffic volumes inside the centre tended to be higher during the weekend peaks than the weekday peaks.

The hierarchy of the road network in the study area was assessed, based on the traffic volumes. It was found that most roads carried traffic volumes appropriate to their hierarchy. However, Antill Street, Cowper Street and Challis Street are currently carrying more traffic than is recommended for their respective hierarchies.

Finally, the 21 intersections were analysed for the four surveyed peaks using SIDRA Intersection. The results of this analysis showed that there are a small number of intersections currently experiencing traffic congestion and high levels of delay for vehicles travelling through them.

ES.2 Assessment of Master Plan

The master plan goals were assessed for two future scenarios:

- Short term, including the development of supermarkets on Blocks 19 and 21
- Long term where the entire master plan is assumed to be implemented

In the short term, only the parking requirements during construction of the supermarkets were assessed as the traffic impacts of the completed supermarket developments were assessed in 2011 by Brown Consulting. It was found that there was insufficient spare parking capacity to cater for the lost capacity while construction is underway if both blocks are developed at the same time. In addition, there is unlikely to be sufficient spare capacity in existing car parks to cater for the lost capacity while Block 21 is being developed. It was also found that the planned developments for Block 19 and 21 do not include the number of parking spaces required by the *ACT Parking and Vehicular Access Guidelines*. These plans should be revised to ensure that they comply with the guidelines.

In the long term, a number of recommendations were made to meet the pedestrian connectivity goals. These included new crossing points and upgrades to existing paths. Some of the goals of the master plan regarding pedestrian and cyclist facilities were addressed in the short term recommendations.

The level of detail available regarding future developments in the Dickson master plan is relatively low so a detailed parking assessment was not able to be carried out. However, indicative parking requirements were developed based on potential land use supplied by ESDD. The calculations carried out indicate that the parking demand is likely to increase to approximately 6,000 in 2031 from 2,500 in 2012. All of this parking will need to be provided inside future developments, probably as basement levels.

The potential indicative road hierarchy, based on predicted daily traffic volumes was also investigated. It was found that with the increased development in Dickson, a number of roads would be carrying substantially higher traffic volumes than is recommended for their hierarchy. These roads include:

- Cowper Street
- Challis Street
- Cape Street (including the extension)
- Badham Street
- Dickson Place

The predicted traffic volumes on these streets mean that on-street parking may not be appropriate. In addition, access and egress to and from developments may be impacted by the high volumes.

The final assessment of the long term scenarios was intersection analysis, both with and without the implementation of the master plan. The same 21 intersections that were analysed for the current situation were analysed for the long term scenarios. In addition, the new intersection related to the extension of Cape Street to Northbourne Avenue in the west and Dickson Place in the east were analysed for the master plan scenario.

It was found that there are a number of intersections that are expected to perform at Level of Service F, which indicates an unacceptable level of delay for drivers, in the long term. Many of these intersections showed similar performance in scenarios both with and without master plan implementation. A number of potential upgrades were recommended to address the performance issues.

ES.3 Cost Estimates

Cost estimates for the recommended upgrades and modifications were developed for the current situation and the long term master plan scenario. These costs are shown in the table below and include 40% contingency and GST.

Time Frame	Estimated Cost (inc GST)
Short term recommendations	\$650,850
Long term recommendations	\$1,113,600
Total	\$1,764,450

These recommended actions will address all current issues identified and allow the implementation of the developments proposed in the master plan.

ES.4 Recommendations

The current operation of the transport network in Dickson was assessed and found to be generally good. However, addressing the following improvements should be prioritised in the short term:

- Pedestrian and cyclist infrastructure and safety:
 - Provide a pedestrian crossing on Challis Street near its intersection with Morphett Street
 - Provide a pedestrian crossing on Challis Street near the Telstra Building
 - Provide a pedestrian crossing on Antill Street near its intersection with Pigot Street (short term only)
 - Provide a pedestrian crossing on Dickson Shops Road close to the intersection with Cowper Street
 - Monitor the safety of the pedestrian crossing on Challis Street north of Daramalan College and intervene with a raised pedestrian crossing if required
 - Widen the 1.2m concrete paths around Daramalan College to 2.0 metres wide

- Provide better lighting on the path extension from Badham Street to the shared path to the south of the precinct to improve security
- Ensure pedestrian ramps along Challis Street have appropriate steepness for wheelchair access.
- Construct a new pedestrian/cyclist path connection from north of Rosevear Place to shared path to the south and swimming pool
- Car parking operations:
 - Implement better signage to inform users about the location of parking areas that are currently underutilised, especially the pool car park, the surface car park south of Dickson Place and the car park underneath the Dickson Tradies Club
- Road network and intersections
 - Signalise the intersection of Morphett Street with the southbound carriageway of Northbourne Avenue. The northbound carriageway would remain as it is.

These recommendations are expected to improve the transport operations and safety in Dickson in the short term.

A number of recommendations have been made to allow implementation of the master plan and these should be implemented as required. These recommendations include:

- Pedestrian and cyclist infrastructure and safety:
 - Provide north/south external links into Dickson by signalising the intersection of Antill Street and Badham Street
 - Improve pedestrian safety at the intersection of Morphett Street and Challis Street (preferably by signalisation)
 - Improve pedestrian safety at the intersection of Morphett Street and Cowper Street (preferably by signalisation)
- Car parking operations:
 - Implement an area wide parking strategy to efficiently plan parking for future developments
- Road network and intersections:
 - Signalise the intersection of Antill Street and Challis Street
 - Signalise the intersection of Challis Street and Cape Street
 - Signalise the intersection of Challis Street and Morphett Street
 - Signalise the intersection of Antill Street and Badham Street (also recommended to improve pedestrian access to Dickson from the suburbs to the north)
 - Signalise the intersection of Morphett Street and Cowper Street (also recommended to improve pedestrian safety around Daramalan College)

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1 INTRODUCTION

1.1 Background

Dickson Group Centre is one of the larger and more active group centres in Canberra and a master plan for the centre has been recently developed (May 2011). This master plan redefines building heights and the layout of the group centre in the longer term, which then allows for increased development in the area.

There have been concerns that the increased development and changes to the layout will have a negative impact on transport and parking in the area. The aim of this project is to assess the impacts of the proposed master plan and to develop options to address these impacts. In addition, the current public transport proposals for Dickson and the Northbourne Avenue corridor will be integrated with the future options for Dickson.

1.2 Objectives

The following are the main objectives of this study:

- Integrate transport into the Dickson Master Plan and consider the current public transport planning projects underway in the area
- Develop integrated parking and transport network provisions for the next 30 years (assuming that the Dickson Master Plan is implemented)
- Investigate the effects of the master plan developments on transport in and around the Dickson Group Centre and develop solutions if required
- Determine if and where road improvements will be required to address the increased development in the group centre
- Determine if changes need to be made to the Dickson Master Plan to address potential parking and transport impacts

1.3 Study Area

The study area for this project is shown in *Figure 1*. The study area includes the group centre and is bounded by Antill Street, Northbourne Avenue, Morphett Street, Cowper Street and Rosevear Place.

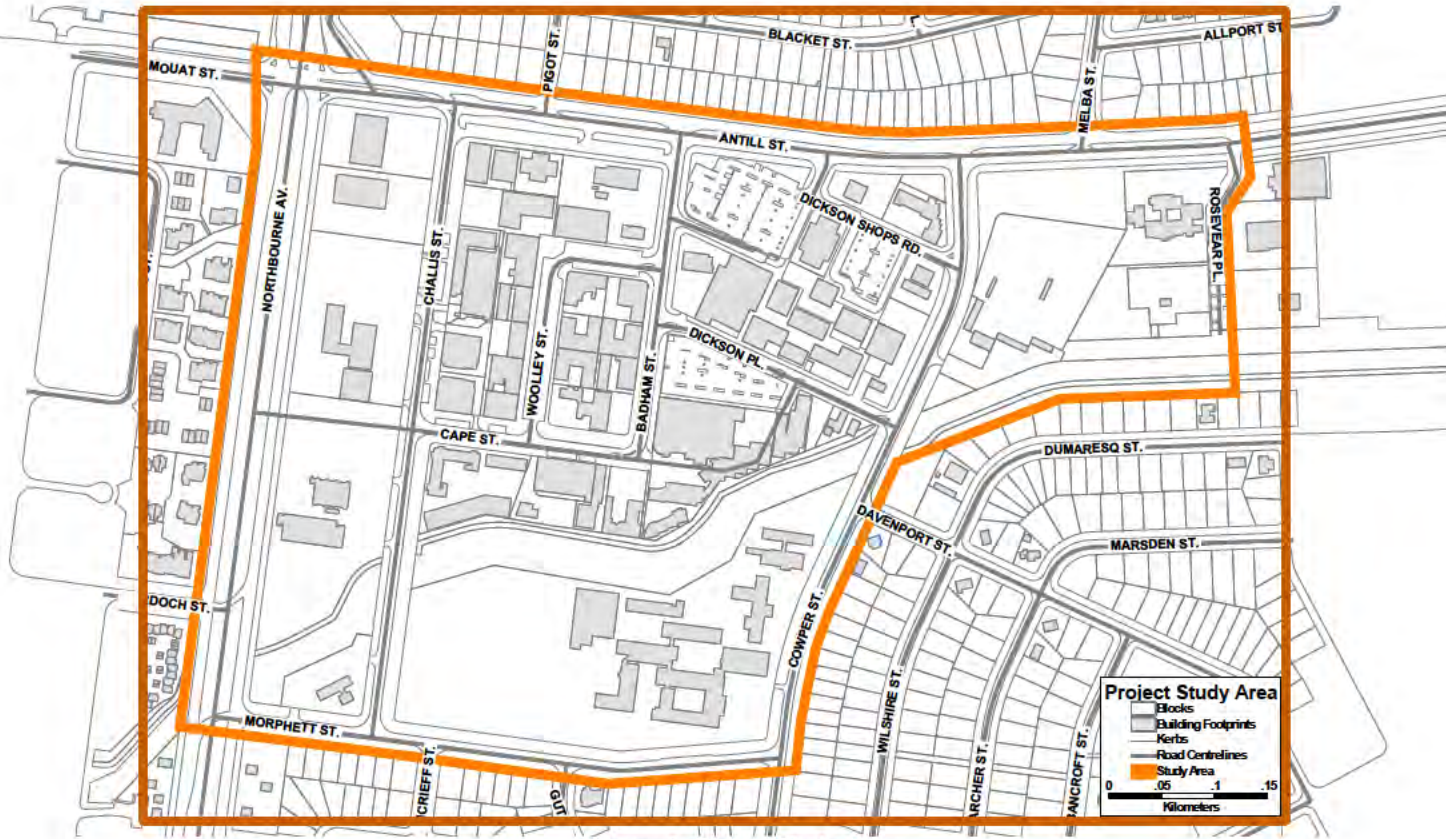


Figure 1: Project Study Area

2 REVIEW OF RELEVANT BACKGROUND REPORTS

SMEC has reviewed previous reports relating to traffic and parking in Dickson. These reports and a brief description of each are listed below:

- Dickson Master Plan, ACTPLA, May 2011
- Dickson Group Centre Temporary Parking Areas, Brown Consulting, May 2011
- Development Traffic Assessment Report for Block 19 and 21, Dickson Shops, Dickson, ACT, Brown Consulting, June 2011
- Dickson Group Centre Parking Utilisation Study, Brown Consulting, August 2011
- Dickson Temporary Car Parks, SMEC, August 2011

The Dickson master plan, developed by ACTPLA (now ESDD) is the primary background document for this study. The master plan examines the current situation and makes long term recommendations for the development of the precinct. The Dickson master plan also defines a number of sub-precincts in Dickson as shown in *Figure 2*. These precinct names will be used in this study to refer to the relevant areas.

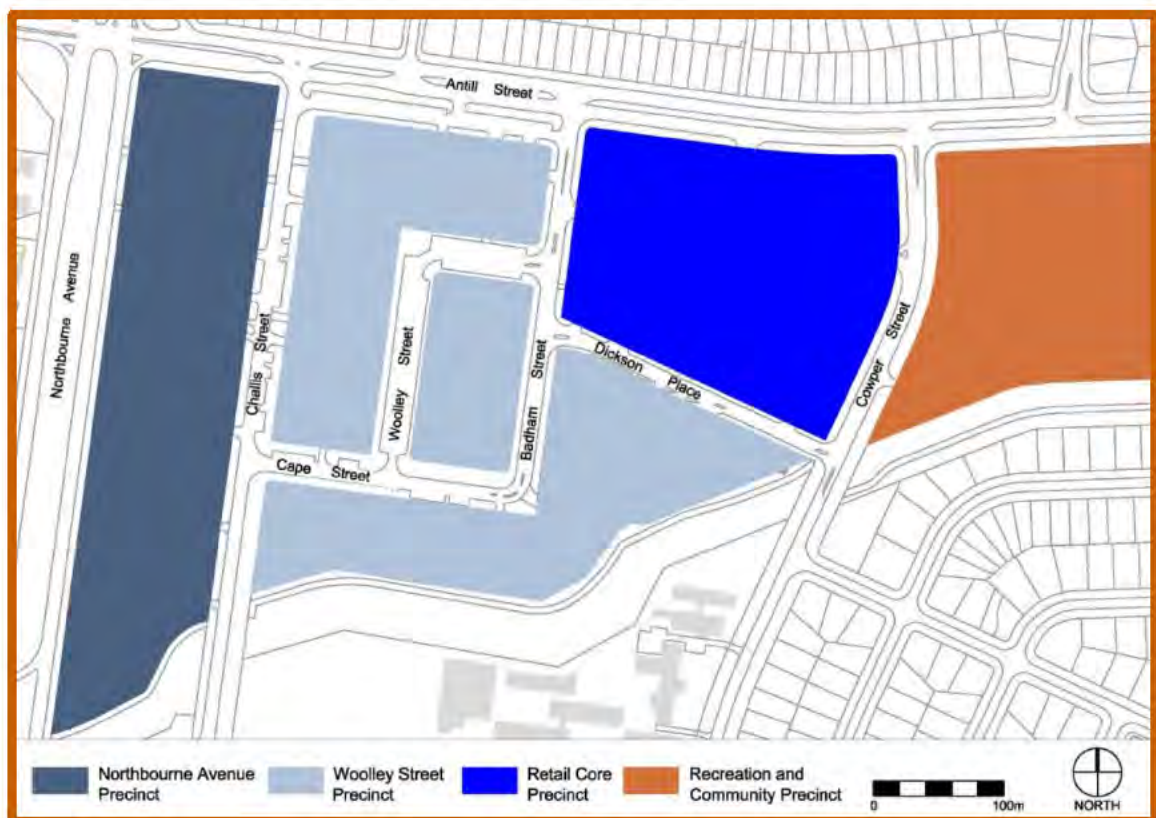


Figure 2: Dickson Precincts (Source: Dickson Master Plan, p19)

In May 2011, Brown Consulting undertook a brief examination of the Dickson area to determine if there were suitable areas able to be used for temporary car parking while redevelopment of existing car parks was underway. They found that there were a number of areas available and recommended further investigations into the following sites:

- Formal on-street parking on Antill Street
- An extension of the existing aquatic centre car park to the east
- A new parking area to the north of the aquatic centre
- Temporary parking on the old ACTAB site

These recommendations were examined in more detail in a later study by SMEC.

Brown Consulting conducted a traffic assessment report for the proposed developments on Block 19 and Block 21, which are currently open air car parks. This assessment found that the current car parks operate at, or slightly over, capacity during the main shopping peak, which is during the middle of the day on a Saturday. The conclusions of the study stated that the development is not expected to have a significant effect on traffic operations in the Dickson Group Centre. In addition, the development will cause a slight shortfall in parking provision, which is expected to lead to overspill of parking demand into adjacent areas.

In August 2011, a parking utilisation study for the Dickson Precinct was undertaken by Brown Consulting. This study found that there was significant spare parking capacity in the Dickson centre at all times, with utilisation rates of 51%-74% on weekdays and 40%-51% on weekends.

Also in August 2011, SMEC undertook concept design of four of the temporary parking areas suggested by Brown Consulting in May 2011. The concept design process included an investigation into existing drainage, vegetation and services. The designs produced included details of car park surface treatments, drainage, access, landscaping, lighting, impacts on vegetation and pedestrian connectivity. In addition, preliminary cost estimates for each of the four car parks were estimated.

3 EXISTING CONDITIONS

A number of investigations on the existing conditions in and around the Dickson Group Centre were conducted, which include the following:

- Examination of pedestrian and cycle network connectivity and condition
- Survey of pedestrian and cycle volumes
- Survey of parking supply and utilisation
- Survey of traffic volumes
- Micro-simulation modelling
- Intersection analysis

Currently, Dickson has a mixture of land use including office, commercial and entertainment. As these land uses have different peak times in terms of traffic generation, the surveys and analyses were conducted over four peak periods to gain a thorough understanding of the existing transport and parking conditions. The four peak periods specified by the client were:

- Weekday AM peak (7:00AM-10:00AM)
- Weekday PM peak (4:00PM-6:00PM)
- Weekend Mid-day peak (11:00AM-1:00PM)
- Weekend Evening peak (6:00PM-8:00PM)

The following sections provide detailed discussions of the investigations outlined above.

3.1 Pedestrian and Cycle Network

The pedestrian and cycle network assessment was based on a site inspection of Dickson Precinct and a desktop assessment of the pedestrian and cycle survey results.

Figure 3 shows the existing cycle and pedestrian path network within Dickson, based on GIS information obtained from TAMSD. A site inspection was carried out on 19 March 2012, which focused on identifying potential infrastructure and safety issues for pedestrians and cyclists.

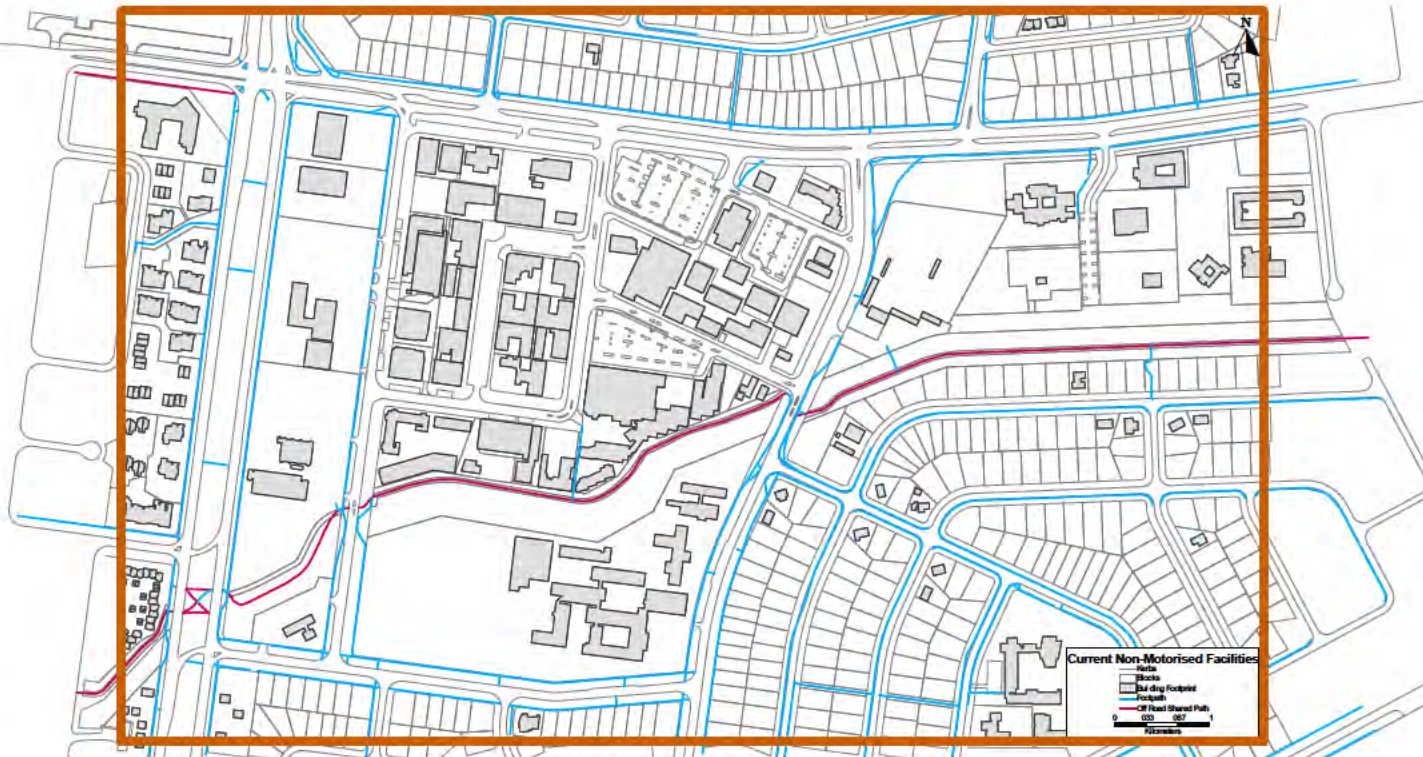


Figure 3: Dickson Precinct Pedestrian and Cyclist Paths

3.1.1 Pedestrian and Cyclist Safety Assessment

Pedestrian Safety

The precinct is generally safe for pedestrians to move around with pedestrian crossings or signalised crossings on most pedestrian desire lines. However, there are some areas where pedestrian safety at road crossings should be considered:

- Safer access across Challis Street at the intersection with Morphett Street would improve safety for students accessing Daramalan College by walking along Morphett Street
- A second pedestrian crossing of Challis Street near the Telstra Building would benefit office building occupants accessing the Dickson business area (construction of a crossing in this location began after the site inspection was carried out)
- A formal pedestrian crossing on Antill Street near the Pigot Street intersection would provide better access from the subdivision area north of Dickson (in the short term only as signals will be provided at Challis Street in the long term)
- A pedestrian crossing on Dickson Place at the end of the brick paved footway at the south eastern corner of the shopping area may regulate jay walking in the area.

The footpaths around Daramalan College are 1.2m wide concrete paths, 2.0m wide paths should be considered to allow groups to access them. In addition, they are narrow for a mix of pedestrian and bicycling use.

There is anecdotal evidence that the pedestrian crossing on Challis Street, just north of Daramalan College, is a regular accident site. No specific issues at this location were noted during the site visit. If there are persistent safety issues at this crossing, it is recommended that a raised pedestrian crossing be installed. This will increase the visibility of the crossing point and also force drivers to slow down as they approach.

Off-Road Bicycle Safety

There is a shared path running in a generally east-west direction to the south of Dickson that is used regularly by cyclists and pedestrians. There are three access points into Dickson from this path:

- Along Challis Street footpath
- Along Cowper Street footpath
- Footpath connection to Badham Street

Some paths on Challis Street, Badham Street, Cowper Street, Dickson Place and Antill Street are narrow and not suitable for shared usage by pedestrians and cyclists. The paved areas within the shopping areas have 90-degree blind corners and are not suitable for cycling.

On-Road Bicycling

There are no formal on-road cycle lanes marked within the Dickson Group Centre except for Northbourne Avenue. The internal streets have a lot of turning vehicles accessing intersections and car parking areas as well as reversing out of 90-degree on-street parking bays. The area is not considered to be a safe environment for on-road cycling under the current traffic control scheme.

Bus Services

The Dickson Group Centre has bus stops around the perimeter on Northbourne Avenue, Antill Street and Cowper Street. The maximum walking distance between the bus stops and employment/shops is approximately 600m across the precinct. An internal bus interchange would reduce that distance to less than 400m.

Lighting

All streets have street lighting and most public car parking areas have adequate lighting. The pedestrian areas through the shopping area have pedestrian style lighting. The regional shared path has been provided with lighting recently. The only pedestrian area to rely on ambient light is the path extension from Badham Street to the shared path on the south side of the precinct. This path is constrained by fences either side and has no passive security opportunity and provides a moderate security risk for users late at night.

Infrastructure Quality

The internal paths and crossings are in good condition with evidence of maintenance. Some concrete paths, both inside the precinct and on the perimeter are narrow for two way pedestrian/cycle use. Future path widening of these paths will improve the amenity.

3.1.2 Pedestrian and Cyclist Infrastructure Assessment

Path Widths

Concrete path widths outside the central retail area are generally 1.2m wide. Pedestrian traffic in some areas, particularly around Daramalan College would benefit from 2.0m wide paths to allow simultaneous bicycle and pedestrian access.

Morphett Street - Challis Street Intersection

Students cross Challis Street at the intersection when walking along the Morphett Street northern path. There is risk of conflict between turning vehicles and pedestrians. A controlled crossing should be considered.

Challis Street

During the AM peak, traffic generally formed platoons allowing adult pedestrians breaks in traffic to cross safely without traffic control.

Students accessing Daramalan College were observed to use the pedestrian crossing adjacent to the storm drain and access the college through a side gate.

Pedestrian movements appear to be low in the morning.

Movements may increase between the office blocks and food outlets during lunch break. A pedestrian crossing near the Telstra Building may be warranted.

Two steep pedestrian ramps were noted north of Dame Pattie Menzies House that are too steep for wheel chair access. These ramps are located at each end of the row of shops between Dame Pattie Menzies House and Antill Street. There is a footpath that runs adjacent to the ramps but this is often blocked by cars parking with their wheels against the kerb and their noses over the footpath.

Dickson Place

There is a pedestrian crossing from the shopping plaza area to the car park that requires pedestrians to share the area with circulating vehicles. The footpath adjacent to Dickson Place south has trees blocking access.

There is a paved walkway at the south-eastern end of the shopping plaza (approximately 40 metres west of the intersection with Cowper Street) that would provide a safer crossing if a pedestrian crossing was provided. There is pedestrian access at the Dickson Place/Cowper Street signalised intersection.

Rosevear Place

There is no direct access from the area south of the storm drain, including the shared path, to the businesses in Rosevear Place.

There is a pedestrian path at the northern end of Rosevear Place. Pedestrians share the road with vehicles accessing car parks at the southern half of the road.

There is no formal path between the southern end of Rosevear Place and the swimming pool complex.

Cowper Street

There are four formal crossing points provided along Cowper Street, two are signalised and two are pedestrian crossings.

Dickson Shops Road has no pedestrian crossing close to the intersection with Cowper Street.

Antill Street

There are signalised pedestrian crossings at Cowper Street and another near the Dickson Library providing access to the north-east. The next signalised intersection is at Northbourne Avenue.

Pedestrian access across Antill Street from Pigot Street and to Challis Street is uncontrolled

Northbourne Avenue

There are pedestrian crossings at the Antill Street signalised intersection and a signalised pedestrian crossing at the shared path crossing near Morphett Street.

There are two uncontrolled mid-block crossing points with concrete paths in the median.

General Observations

Pedestrian access between Woolley Street, Badham Street and the car parks and plaza area are good with formal pedestrian crossings on desire lines. The condition of paths is generally good in this area.

3.1.3 Pedestrian and Cyclist Volumes

Figure 4 shows the locations where pedestrian and cyclist count surveys were conducted. Note that the locations are mostly the same as the intersection count survey locations discussed later in this report, except for some pedestrian crossings. As discussed earlier, four peaks were identified by the client and the surveys were conducted for those peaks.



Figure 4: Pedestrian and Cyclist Survey Locations

Figure 5 to Figure 8 show summaries of the pedestrian and cyclist survey for each peak period. The blue bars represent the total pedestrian movements through a location while the green bars represent the total cyclist movements through the location.

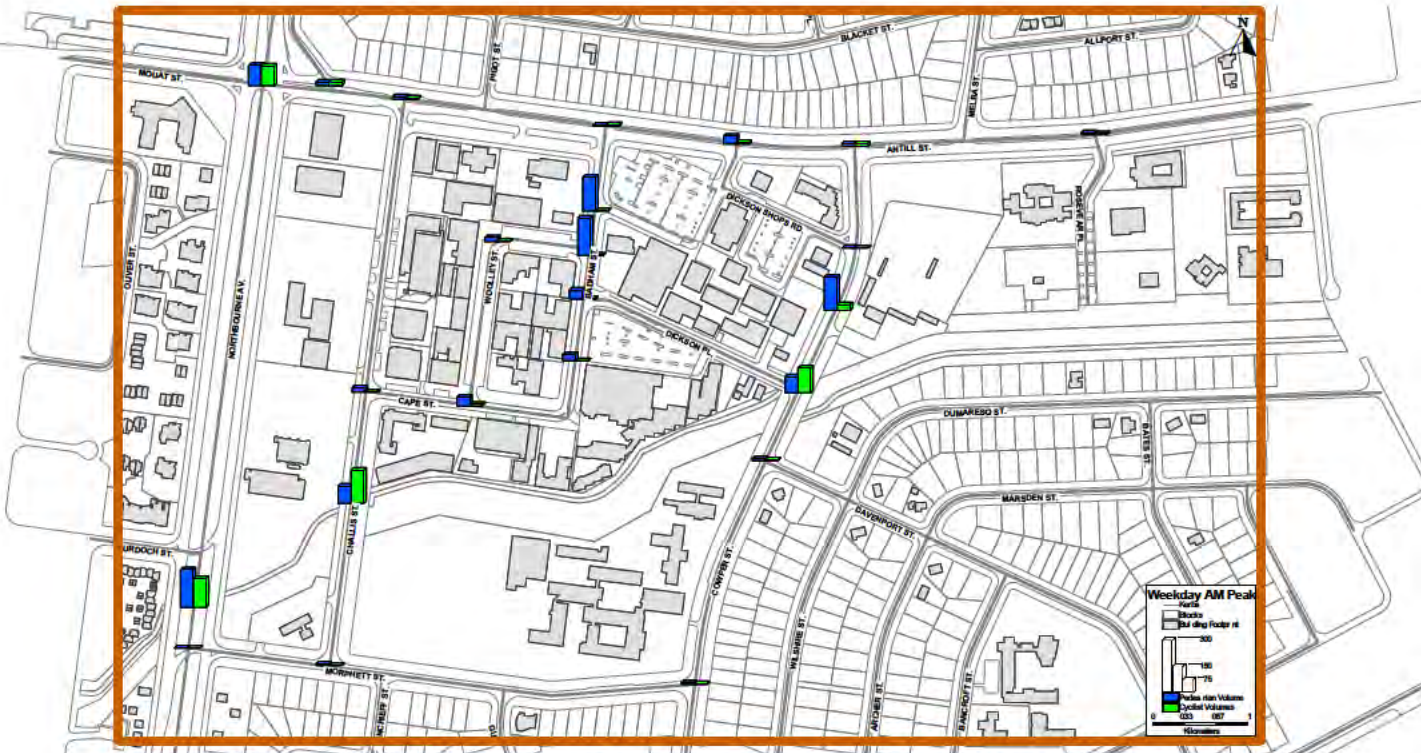


Figure 5: Pedestrian and Cyclist Survey Summary (Weekday AM Peak)

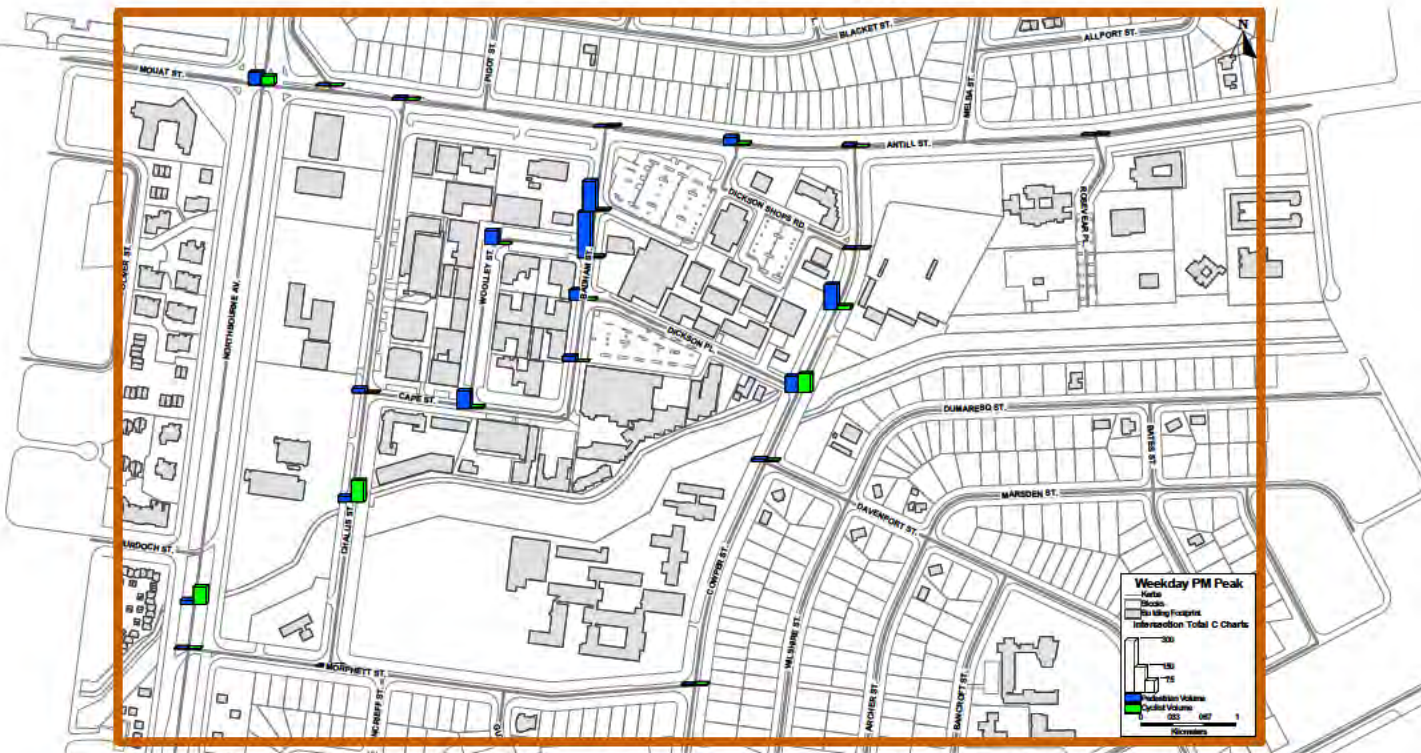


Figure 6: Pedestrian and Cyclist Survey Summary (Weekday PM Peak)



Figure 7: Pedestrian and Cyclist Survey Summary (Weekend Mid-day Peak)

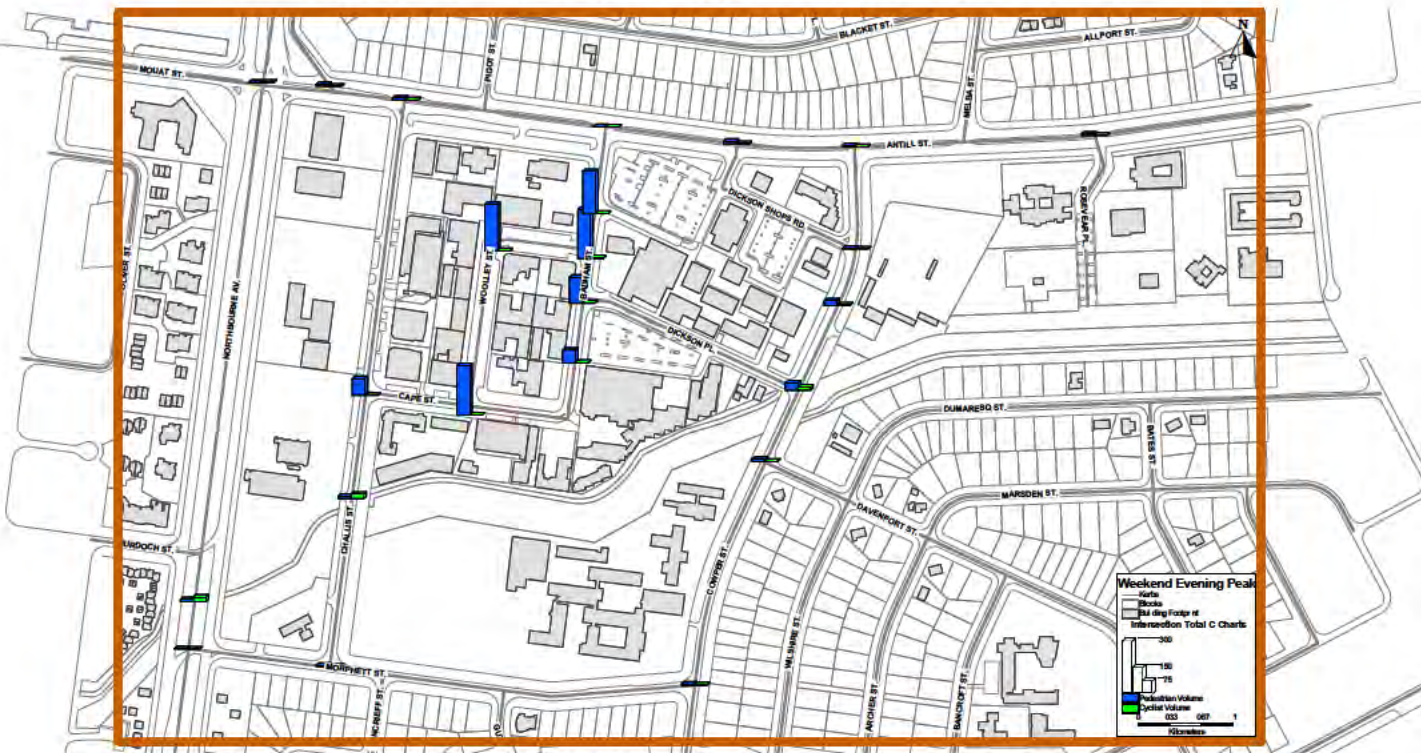


Figure 8: Pedestrian and Cyclist Survey Summary (Weekend Evening Peak)

Table 1 shows a summary of the volumes presented in the preceding figures.

Table 1: Summary of Pedestrian and Cyclist Survey (2 Hour Peak Period)

Location (Intersection)	Weekday AM		Weekday PM		Weekend AM		Weekend PM	
	Peds	Cycles	Peds	Cycles	Peds	Cycles	Peds	Cycles
1	117	113	70	48	7	27	2	3

Location (Intersection)	Weekday AM		Weekday PM		Weekend AM		Weekend PM	
	Peds	Cycles	Peds	Cycles	Peds	Cycles	Peds	Cycles
2	21	22	4	2	1	4	10	0
3	17	8	13	2	7	0	12	2
4	9	11	4	6	1	0	3	2
5	46	10	46	8	37	13	17	3
6	17	17	13	4	8	6	8	4
7	13	7	3	7	6	4	8	1
8	193	3	171	6	171	8	240	2
9	3	0	4	2	2	0	5	0
10	213	3	259	8	295	13	334	7
11	52	3	58	3	139	15	149	5
12	93	141	91	104	45	43	42	19
13	25	0	26	0	15	0	96	0
14	49	10	102	10	72	2	305	1
15	11	6	16	7	16	0	13	3
16	0	0	6	4	5	0	2	0
17	11	1	0	3	5	6	5	0
18	9	5	4	7	7	5	8	4
19	215	164	25	99	18	50	13	27
20	101	191	33	121	46	46	14	25
21	35	0	29	0	35	3	74	4
22	23	2	76	2	93	2	265	3
23	190	34	143	21	110	38	28	6
Total	1,463	751	1,196	474	1,141	285	1,653	121

These figures and table show that Badham Street and the northern section of Cowper Street are utilised heavily by pedestrians during all four peak periods of the survey, except for Cowper Street in the weekend evening peak. Cape Street and Woolley Street are also heavily used by pedestrians during all peaks with the exception of the weekday AM peak period.

The shared path north of Daramalan College carries a significant number of cyclists and pedestrians at the crossings with Cowper Street, Challis Street, and Northbourne Avenue, mainly during the weekday peaks. The shared path tends to have more cyclists than pedestrians during both weekday peak periods and is likely to be used primarily by commuters. During the weekend peak periods, this path is utilised considerably less than during the weekday peak periods.

3.2 Parking Assessment

The parking assessment was based on a parking utilisation survey which was conducted during the same four peak periods specified for the pedestrian and cyclists count surveys. *Figure 9* shows the location of the parking areas that were surveyed. It is noted that the surveys do not include the structured car park to the north of Dame Pattie Menzies House (on Challis Street) or the on-street parking areas on Antill Street. Previous studies in Dickson indicate that the capacity of the on-street parking area on Antill Street could hold up to 62 cars if it was properly marked. In its current unmarked state, it has a capacity of 44 cars. Utilisation of this area peaks at 64% during the week and 27% on weekends. The structured car park on Challis Street has a capacity of 329 vehicles (including 4 disabled spaces). No previous data is available for this car park.

The weather during the survey periods was mainly fine and there was no rainfall recorded on the weekday surveyed. There was heavy rain recorded after 7:00pm on the weekend day surveyed. This may have had some impact on the evening parking utilisation survey.

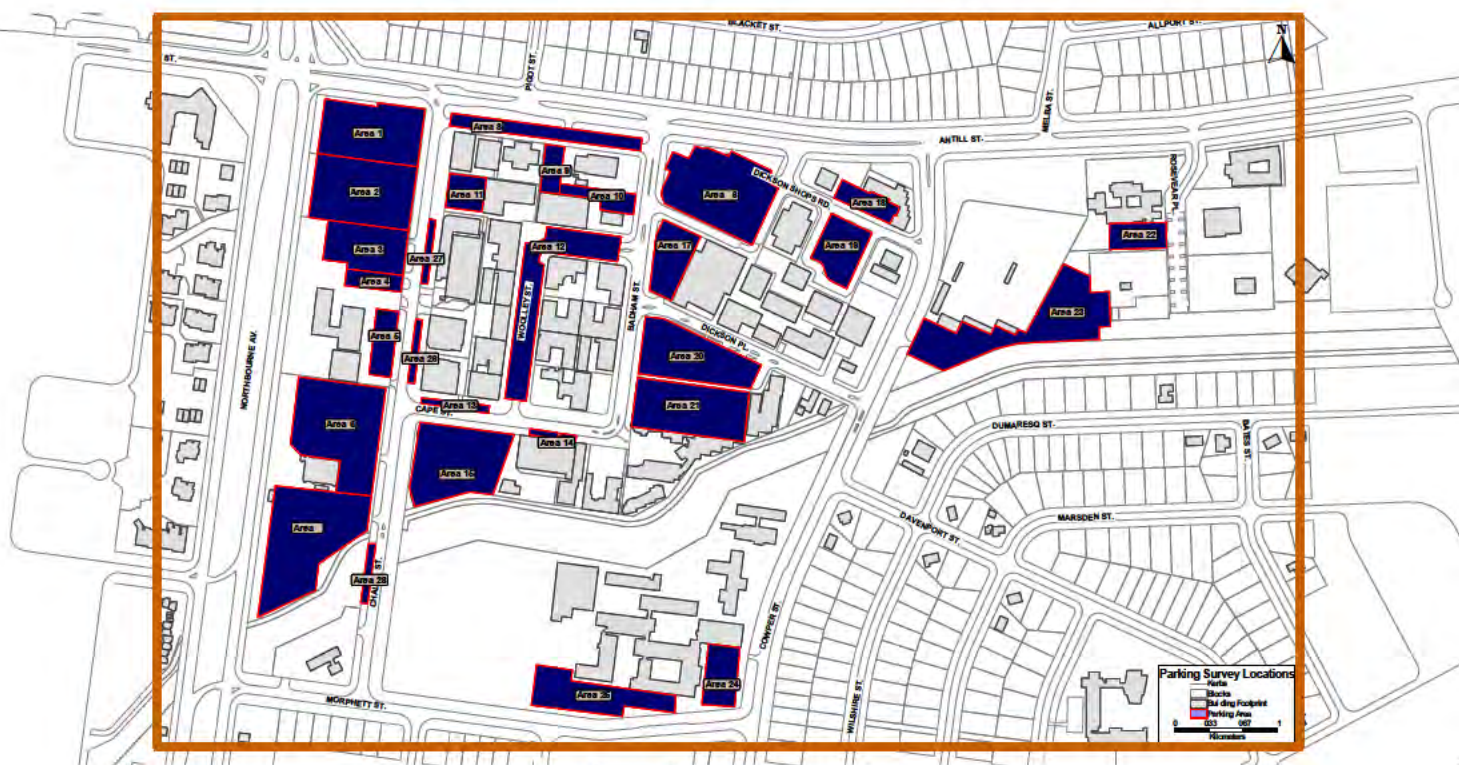


Figure 9: Parking Survey Areas

Figure 10 shows the proportion of parking allocations and parking restrictions in each area. It can be seen that Dickson Precinct has a significant number of long term parking spaces, mainly associated with the Northbourne Avenue Precinct, followed by short term parking. Parking spaces are well distributed throughout the precinct, with the majority of the short term parking located closer to the commercial areas.

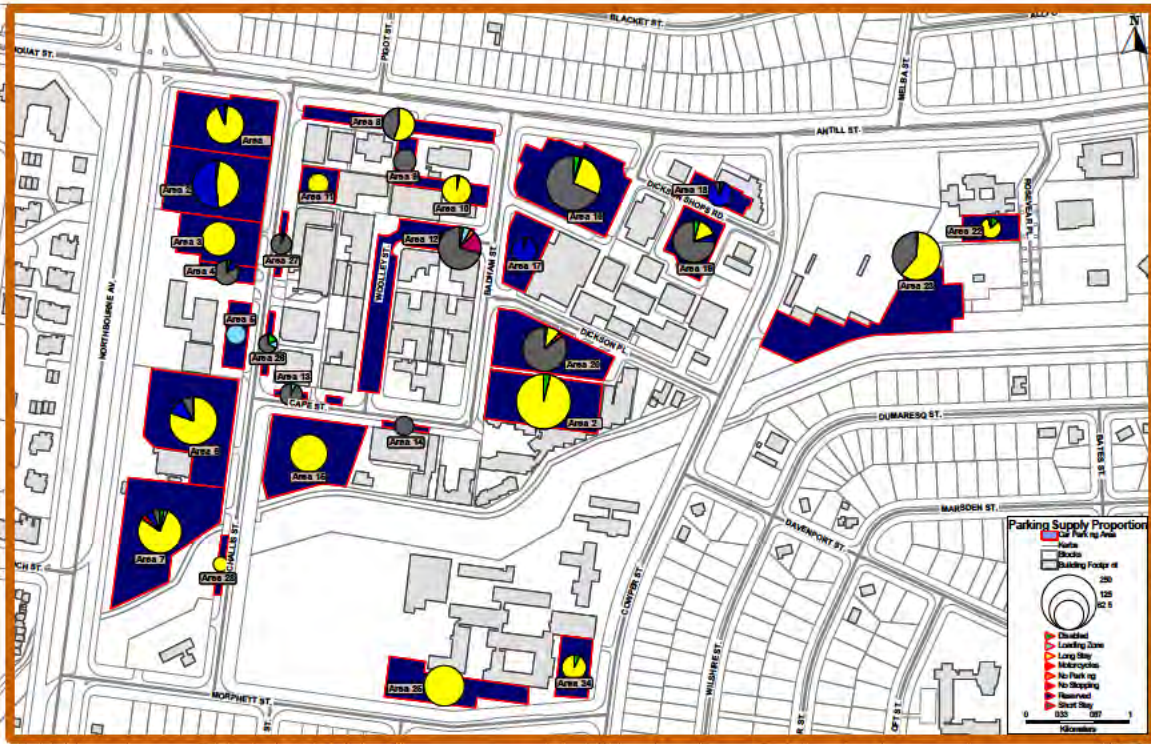


Figure 10: Current Parking Supply at each Location Based on Restrictions

Figure 11 to Figure 14 provide a summary of the parking utilisation survey.



Figure 11: Parking Utilisation Summary (Weekday AM Peak)



Figure 12: Parking Utilisation Summary (Weekday PM Peak)



Figure 13: Parking Utilisation Summary (Weekend Midday Peak)



Figure 14: Parking Utilisation Summary (Weekend Evening Peak)

The figures shown above indicate areas where there is expected to be high demand for parking and which time period that demand occurs in. Table 2 shows the actual supply and demand for each of the parking areas in each of the time periods surveyed.

Table 2: Summary of Parking Utilisation Survey for the Dickson Precinct

Location (Parking Area)	Supply	Thursday, 16 February 2012						Weekend, 18 February 2012					
		7:00	8:00	9:00	16:00	17:00	18:00	11:00	12:00	13:00	16:00	19:00	20:00
1	111	15	47	69	107	100	43	2	1	1	0	0	1
2	176	11	15	95	129	107	53	6	6	3	6	4	6
3	87	6	37	49	27	37	27	4	3	3	1	0	10
4	35	0	0	11	16	11	0	0	0	0	1	2	10
5	20	0	10	12	14	12	8	0	0	0	5	12	7
6	183	20	55	114	116	94	48	12	5	3	8	9	30
7	151	12	79	95	63	48	33	13	9	4	3	4	9
8	74	21	46	64	49	30	15	14	18	19	12	33	57
9	30	0	2	3	14	7	9	12	18	13	24	29	29
10	58	0	3	6	8	11	15	14	21	20	36	40	41
11	25	7	21	24	24	22	20	18	21	23	20	24	25
12	141	13	11	25	63	78	110	103	109	115	117	121	121
13	27	1	2	0	12	14	17	14	19	21	26	27	26
14	18	3	2	8	16	17	17	17	17	17	17	17	17
15	110	7	23	72	65	65	72	54	42	47	29	32	44
16	242	23	102	116	182	180	191	195	233	228	159	193	177
17	38	21	25	28	32	27	23	19	22	24	17	15	31

Location (Parking Area)	Supply	Thursday, 16 February 2012						Weekend, 18 February 2012					
		7:00	8:00	9:00	16:00	17:00	18:00	11:00	12:00	13:00	18:00	19:00	20:00
18	36	0	13	23	32	24	2	20	11	5	5	1	1
19	135	21	36	72	112	69	44	113	123	124	26	32	27
20	154	35	52	74	107	91	114	147	141	147	80	141	149
21	244	46	57	93	127	115	117	91	74	66	79	82	117
22	22	2	6	10	12	8	15	19	17	18	22	0	0
23	183	27	31	58	129	55	46	130	134	124	31	7	2
24	37	1	11	32	20	16	19	11	15	9	11	10	4
25	129	9	17	120	64	41	39	3	5	2	2	2	3
26	15	0	2	8	11	4	11	3	3	10	9	12	13
27	21	3	15	21	19	17	13	17	21	19	19	21	21
28	7	3	7	7	4	1	0	0	0	0	0	0	0
Total	2,509	307	727	1,309	1,574	1,301	1,121	1,051	1,088	1,065	765	870	978
		12%	29%	52%	63%	52%	45%	42%	43%	42%	30%	35%	39%

Table 2 shows that the total utilisation of parking in Dickson is relatively low, peaking at 63% at 4:00 PM on a weekday. However, the parking demand is not evenly distributed and there are a number of parking areas operating close to capacity, which are indicated in red in the table. A number of these parking areas are small (Areas 9, 11, 13, 14, 22, 27 and 28) and excess demand for these areas is likely to be met in adjacent sites. However, large areas such as Areas 1, 16, 19, and 20 that are operating close to capacity indicates that there are likely to be large numbers of vehicles circulating and searching for space.

A number of car parks in Dickson are access controlled and are not accessible to the public. These controlled car parks include Areas 1, 2, 3, 6, 7, 24 and 25. While 24 and 25 are not controlled, they are used by Daramalan College and are too far from the Dickson Centre to be used by people travelling to Dickson. Area 3 has its boom gates removed on weekends and becomes publicly accessible. However, it is not heavily utilised in the weekend peaks.

Table 3 shows a summary of the supply and utilisation for private and publicly accessible parking areas in Dickson.

Table 3: Summary of Public and Private Parking for the Dickson Precinct

Type	Supply	Thursday, 16 February 2012						Weekend, 18 February 2012					
		7:00	8:00	9:00	16:00	17:00	18:00	11:00	12:00	13:00	18:00	19:00	20:00
Private	874	74	261	574	526	443	262	51	44	25	31	29	63
Utilisation		8%	30%	66%	60%	51%	30%	6%	5%	3%	4%	3%	7%
Public	1,635	233	466	735	1,048	858	859	1,000	1,044	1,040	734	841	915
Utilisation		14%	29%	45%	64%	52%	53%	61%	64%	64%	45%	51%	56%

This table shows that the private parking demand peaks at 66% at 9:00am on a weekday. This peak may change if the utilisation of the offices in the Northbourne Precinct changes. The current utilisation is not known.

On the weekend, the private parking is almost completely empty as these car parks serve offices and Daramalan College, which are not typically used on the weekend. The publicly accessible parking demand peaks at 64%. This demand is reached during both the weekday PM and the weekend midday peak periods.

From *Table 2* and the earlier figures, two disparate groups with demand for parking were identified, namely:

- Commuters and students
- Shoppers and diners

These two groups are discussed in more detail in the following sections.

3.2.1 Commuter and Student Parking

The parking survey shows that the parking areas in the Northbourne Avenue precinct, between Challis Street and Northbourne Avenue, (Areas 1-7 with exception of Area 5) and Daramalan College (Areas 24 and 25) appear to be mainly used by commuters and students. These parking areas share a similar pattern of parking utilisation for each peak period of the parking survey.

During the AM peak period these parking areas have their highest utilisation, increasing between 7:00 AM and 9:00 AM. During the PM peak period they are progressively emptied as commuters and students go home. During both weekend peak periods these parking areas have near zero utilisation.

It is noted that most of the parking areas west of Challis Street are gated, and are currently underutilised. The parking survey shows that the untimed parking spaces in Areas 1 to 7 are only 62% utilised by 9:00 AM on weekdays. This is the highest utilisation rate recorded for these parking areas during any of the four peak periods.

The non-gated untimed parking spaces near Challis Street (Areas 8, 11 and 28) have near 100% utilisation by 9:00 AM on weekdays. Moreover, these parking areas empty during the PM peak period in the same pattern as the gated parking areas west of Challis Street, and it is assumed that these parking areas are primarily used by commuters that do not have access to the gated parking areas.

It is also noted that the paid parking Area 15 had only 65% utilisation by 9:00 AM on a weekday, which was its highest utilisation in any surveyed peak. Thus, it appears that there is no immediate need for additional parking for commuters along the western side of Dickson. However, the relatively low utilisation of the gated parking areas and the high utilisation of the non-gated car parks suggest that better management of the parking in this area may be of some benefit.

The parking survey conducted did not allow for the identification of which land use drivers from each car park were accessing. If it is the case that workers in buildings with gated car parks are using non-gated car parks, they should be encouraged to use the gated parking areas. This will ease utilisation of the untimed parking areas along Challis Street where time restrictions could then be applied to provide more opportunities for customer access to the adjacent commercial centre.

3.2.2 Shopping and Dining Parking

The parking areas in the Woolley Street Precinct and Retail Core Precinct tend to be heavily utilised during the PM peak, and are also heavily used during both weekend peak periods.

Demand is distributed across these two precincts fairly evenly during the weekend midday peak period with some spare capacity in Areas 8, 15 and 21. There is also some spare capacity in Area 23.

During the weekend evening peak period, demand is centred more on Woolley Street itself. There is now some spare capacity in Areas 19 and 23. Area 15 remains underutilised in this time period as well.

3.3 Traffic Assessment

3.3.1 Traffic Count Surveys

Figure 15 shows the locations of the surveyed intersections as part of this study. A total of 18 intersections were surveyed, three of which (Intersections 1, 6 and 12) are signalised, while the rest are priority controlled. Vehicles were classified as either 'Light' or 'Heavy'.



Figure 15: Intersection Count Survey Locations

Figure 16 to Figure 19 show summaries of the traffic survey. The volumes shown at each location are the total volumes passing through that site for the relevant two-hour peak period.

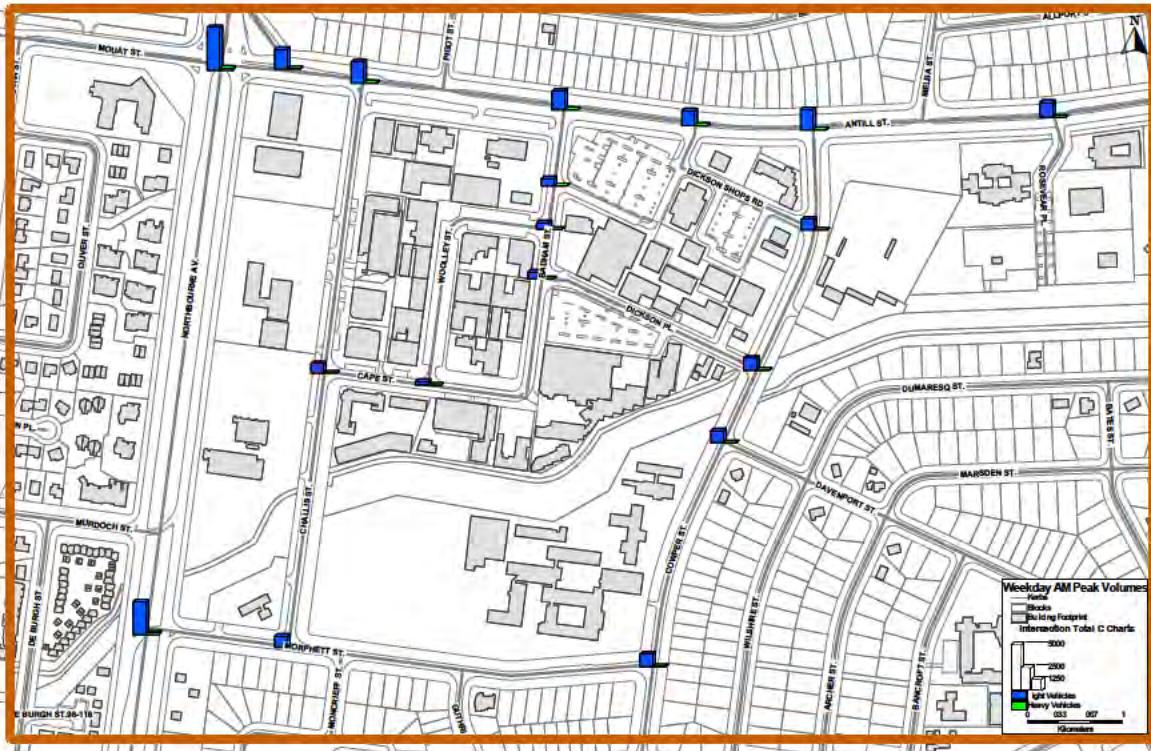


Figure 16: Intersection Survey Summary (Weekday AM Peak)

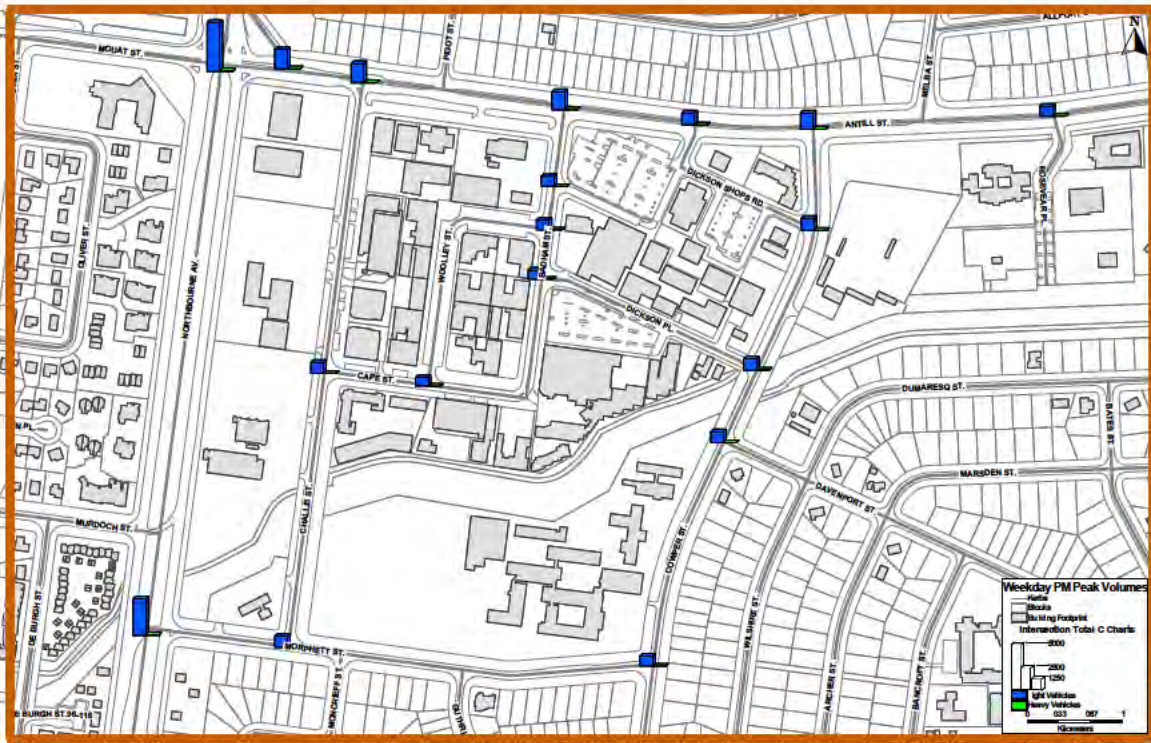


Figure 17: Intersection Survey Summary (Weekday PM Peak)

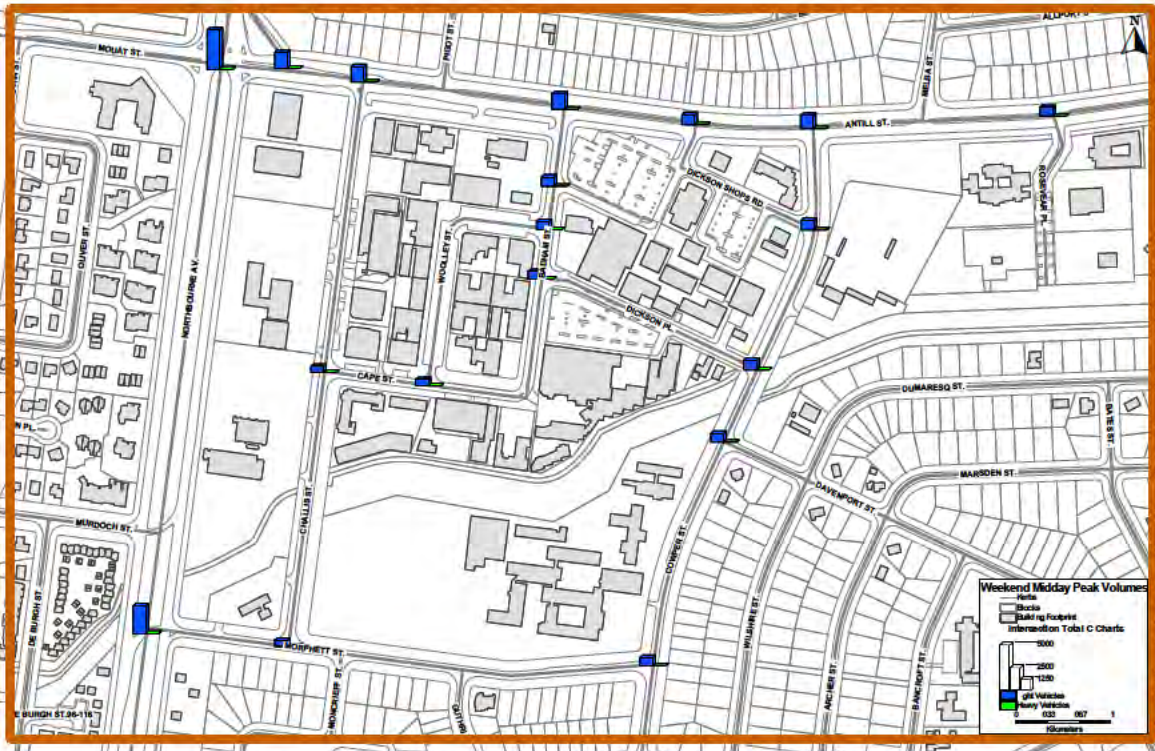


Figure 18: Intersection Survey Summary (Weekend Mid-day Peak)

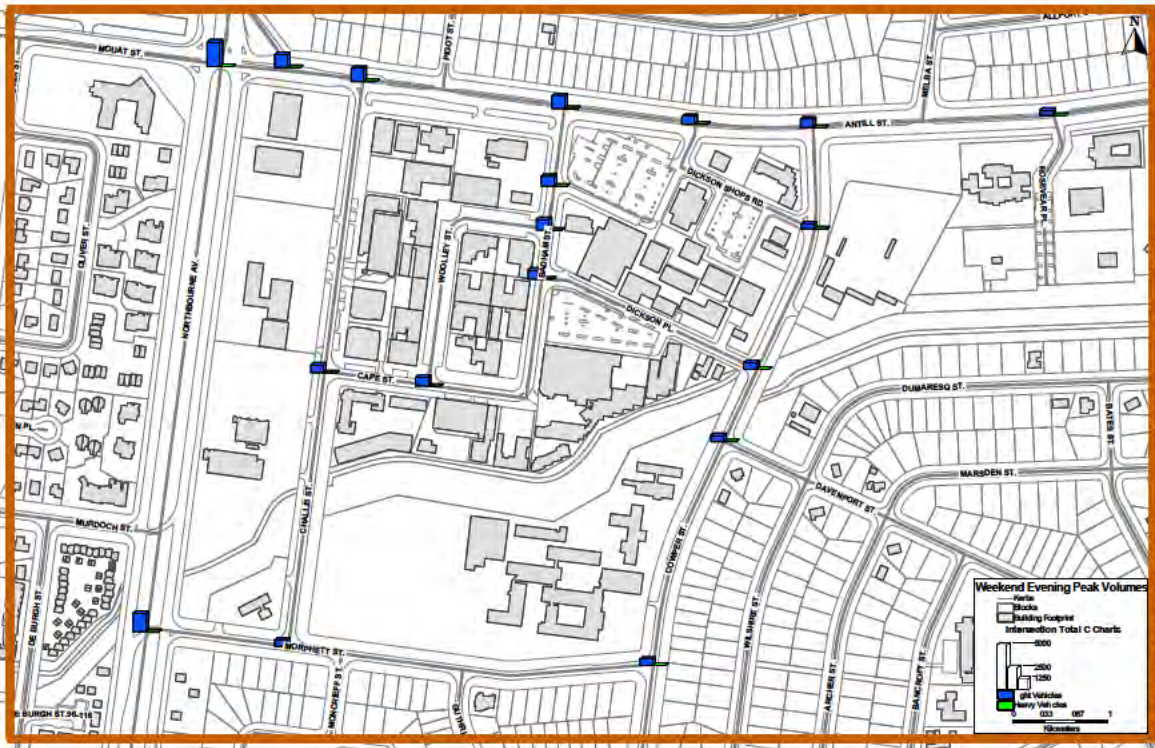


Figure 19: Intersection Survey Summary (Weekend Evening Peak)

Table 4 shows a summary of the results presented in the previous figures.

Table 4: Summary of Light and Heavy Vehicle Survey (2 Hour Peak Period)

Location (Intersection)	Weekday AM		Weekday PM		Weekend AM		Weekend PM	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
1	4,690	244	5,402	138	4,351	85	2,708	26

Location (Intersection)	Weekday AM		Weekday PM		Weekend AM		Weekend PM	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
2	2,161	61	2,125	36	1,695	13	1,428	9
3	2,332	75	2,135	38	1,716	15	1,440	9
4	2,035	63	1,983	37	1,677	12	1,385	8
5	1,639	54	1,347	36	1,110	11	836	4
6	2,252	66	1,811	43	1,458	15	916	7
7	1,646	35	1,135	14	944	6	595	2
8	786	19	1,113	7	1,013	3	1,081	5
9	1,181	36	1,338	25	1,066	12	553	7
10	728	19	1,052	7	868	3	1,168	6
11	748	23	1,006	6	809	3	1,001	4
12	1,334	43	1,262	26	1,068	13	706	6
13	1,027	18	1,237	3	672	4	881	1
14	423	11	922	1	658	3	963	2
15	1,338	39	1,198	17	983	10	675	3
16	3,603	188	4,022	107	3,042	59	2,034	20
17	1,248	28	1,218	4	670	5	695	1
18	1,388	47	1,112	25	931	7	655	3
Total	30,559	1,069	31,418	570	24,731	279	19,720	123

These figures and table show high traffic volumes on Northbourne Avenue and Mouat Street/Antill Street in all peak periods. These roads, together with the roads surrounding the core of the Dickson precinct (i.e. Cowper Street and Morphett Street), carry the largest amount of traffic during weekday peak periods. The western and northern boundaries of the Dickson precinct experience their highest volumes during the PM peak, whilst the southern and eastern boundaries of the Dickson precinct experience their highest volumes during the AM peak, possible due to the location of Daramalan College.

During the weekend peaks, the internal roads of Dickson Precinct (e.g. Badham Street and Dickson Place) carry more traffic during the evening peak than the midday peak period, as shown in *Figure 18* and *Figure 19*. The opposite trend is seen on the external roads during the two weekend peaks.

Northbourne Avenue carries most of the heavy vehicles with more than 150 heavy vehicles during the AM peak period but this is only a small proportion of the total traffic volume.

3.3.2 Micro-simulation Modelling Calibration Results

Micro-simulation models for the four peak periods were developed for the assessment of the Do Nothing and master plan scenarios. Below is a summary of the process and the calibration results.

Origin – Destination (OD) matrix estimation was performed using Paramics Estimator V6, with input from intersection turn counts conducted as part of this study. Estimator generates an OD matrix by iteratively adjusting a previous OD matrix to provide a trip pattern that more closely matches the supplied count data.

The accuracy of OD matrix estimation is gauged by the GEH statistic, which compares the modelled (M) volumes to the counted (C) volumes. It has the effect that as C increases, the allowable difference as a proportion of C decreases. The GEH statistic is given by the equation:

$$GEH = \sqrt{\frac{2(M - C)^2}{M + C}}$$

Where:

- M* : traffic volume estimated by the model
- C* : actual (real-world) traffic volume

Where possible, the GEH for 85% of the estimated volumes should be less than 5, and ideally no estimated volumes should have a GEH greater than 10. The resulting GEH statistics from the calibration of the base network model for each peak period are shown in *Table 5*. In the micro-simulation modelling tasks done for this study, the estimated matrices were optimised in terms of its GEH as far as practical. Whilst there are a few GEH values above 10, they have been assessed individually and are considered acceptable.

Table 5: Summary of Paramics Estimation Results

Peak Period	Average GEH	GEH<5	5<=GEH<10	10<=GEH
Weekday AM Peak	1.81	182 (93%)	11 (6%)	2 (1%)
Weekday PM Peak	2.04	177 (91%)	17 (9%)	1 (1%)
Weekend MD Peak	2.11	177 (91%)	14 (7%)	4 (2%)
Weekend EV Peak	2.29	174 (89%)	16 (8%)	5 (3%)

The seed values that determine the release pattern of vehicles in the model were selected for each peak period based on the lowest GEH value for turning movements.

Table 6: Seed Values Selected for Each Peak Period

Peak Period	Seed Value
Weekday AM Peak	7771
Weekday PM Peak	2849
Weekend MD Peak	5321
Weekend EV Peak	28

3.3.3 Road Network Hierarchy Assessment

The road network in the study area, along with the hierarchy, is shown in *Figure 20*.

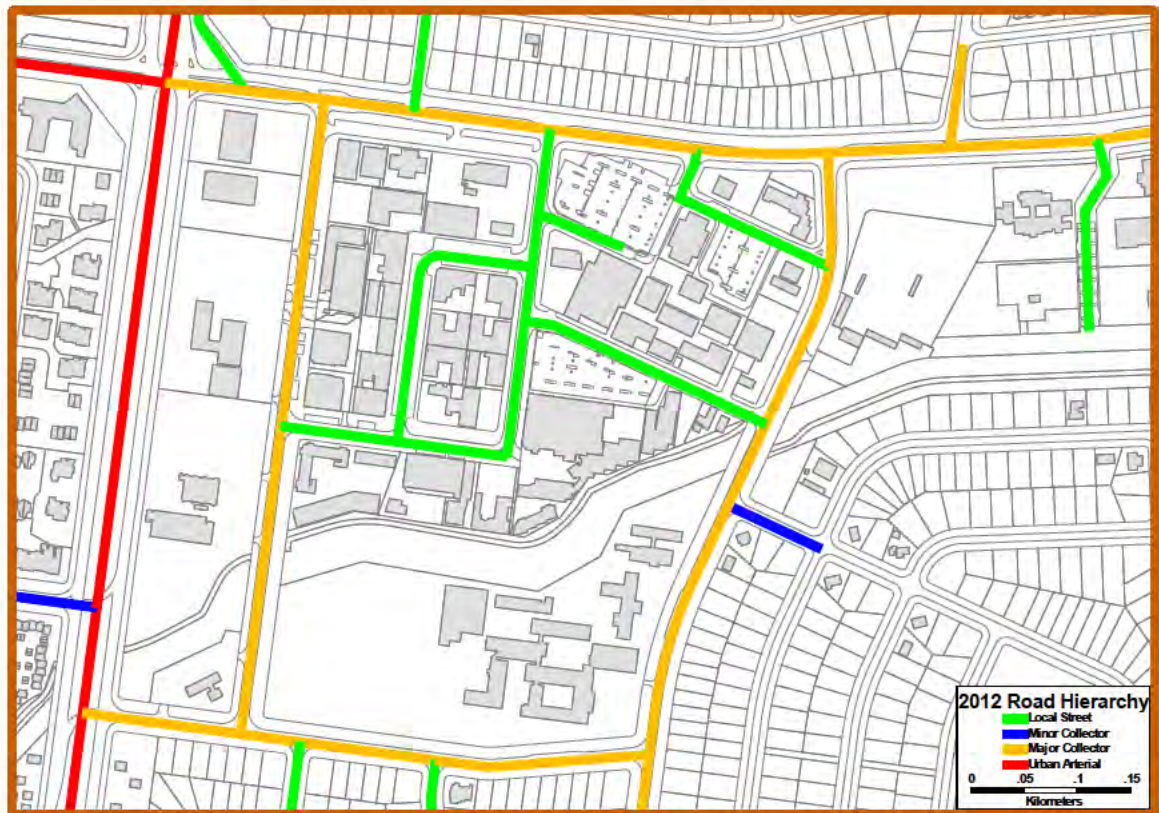


Figure 20: Study Area Road Network and Hierarchy (Source: TAMSD)

One of the criteria used by the ACT Residential Subdivision Code to define the road hierarchy is the average daily traffic in vehicles per day (vpd). This classification has been reproduced in *Table 7*.

Table 7 Classification of Roads in Hierarchy

Road Classification	Indicative Traffic Volume (vpd)
Local Access	0-1000
Local Access C	1001-2000
Minor Collector	1000-3000
Major collector	3000-6000

Source: ACT Residential Subdivision Code

Figure 21 provides an indication of daily weekday traffic volumes in 2012. These volumes were calculated by taking the AM and PM peak volumes from the micro-simulation modelling outputs and assuming a peak factor of 10% to determine the daily flow.

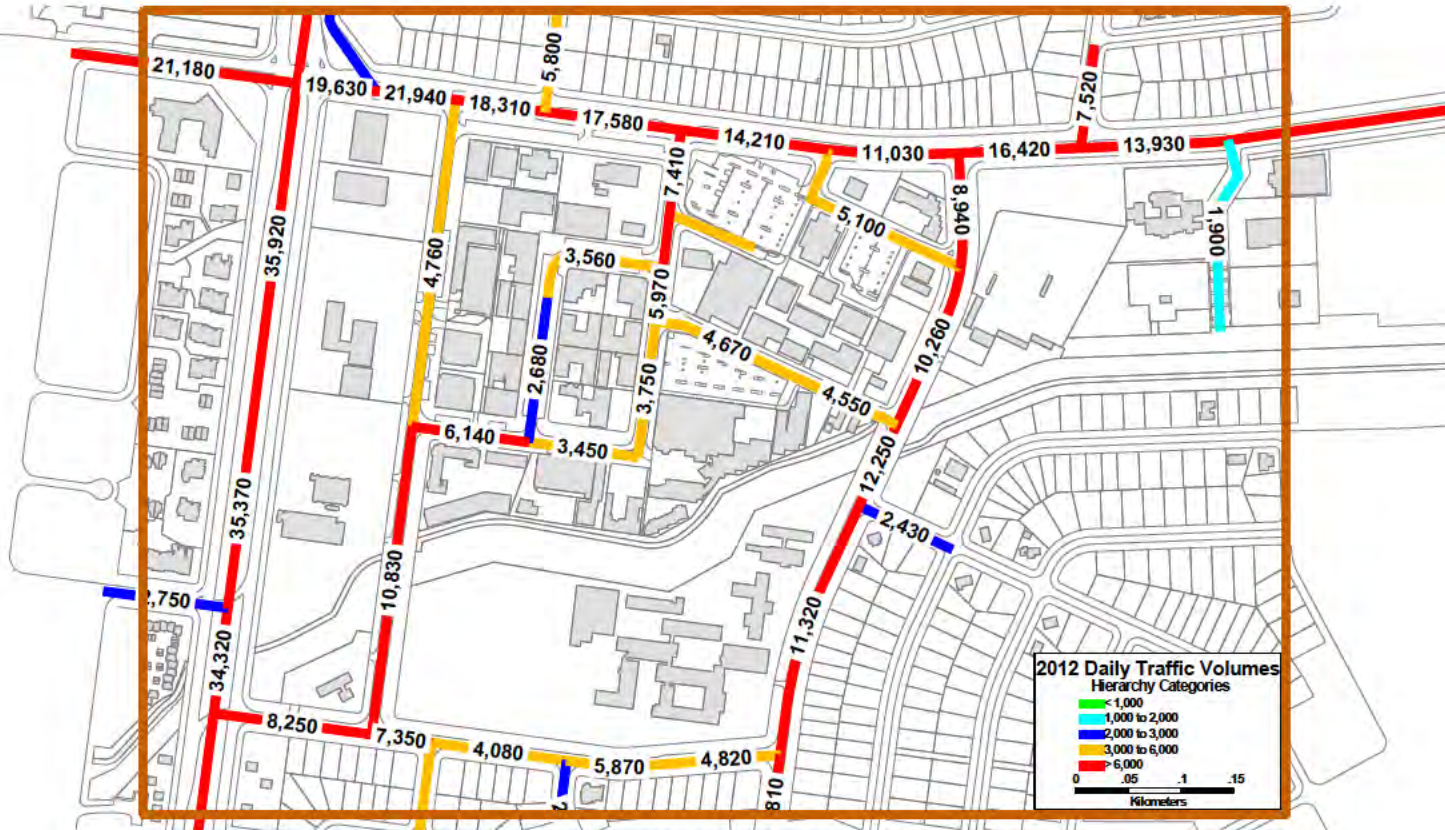


Figure 21: Daily Weekday Vehicles per Day – 2012

Figure 21 shows that, in 2012, the volumes on most roads are not appropriate for the classified road hierarchy. In particular, Antill Street, Cowper Street and Challis Street appear to have volumes that are not appropriate for their classification.

3.3.4 Intersection Analysis

Intersection analysis was conducted using SIDRA Intersection. Intersection performance measures such as Level of Service (from delay and degree of saturation) and queue length at the specified key intersections within the study area provided a quantitative basis on the performance of these major junctions in the four peak periods analysed. The Highway Capacity Manual (HCM) criteria for the evaluation of intersection Level of Service (LoS) are given in Table 8.

Table 8: HCM Level of Service Criteria (Average Control Delay D in Seconds)

Level of Service	Signalised/Roundabout	Stop/Give Way	Colour
A	$D < 10s$	$D < 10s$	Green
B	$10s \leq D < 20s$	$10s \leq D < 15s$	Cyan
C	$20s \leq D < 35s$	$15s \leq D < 25s$	Blue
D	$35s \leq D < 55s$	$25s \leq D < 35s$	Magenta
E	$55s \leq D < 80s$	$35s \leq D < 50s$	Yellow
F	$D \geq 80s$	$D \geq 50s$	Red

Source: Highway Capacity Manual 2000, Exhibit 16-2 (p.16-2) and 17-2 (p.17-2)

The following 21 intersections were analysed:

- Northbourne Avenue - Antill Street / Mouat Street
- Northbourne Avenue Service Road - Antill Street
- Antill Street - Challis Street
- Antill Street - Badham Street
- Antill Street - Dickson Shops Access Road
- Antill Street - Cowper Street
- Antill Street - Rosevear Place
- Badham Street - Dickson Shop Access Road
- Cowper Street - Dickson Shop Access Road
- Badham Street - Woolley Street
- Badham Street - Dickson Place
- Cowper Street - Dickson Place
- Challis Street - Cape Street
- Cape Street - Woolley Street
- Cowper Street - Davenport Street
- Northbourne Avenue - Morphett Street
- Morphett Street - Challis Street
- Cowper Street - Morphett Street

Consistent with the survey periods, these intersections were modelled for the weekday AM, weekday PM, weekend midday and weekend evening peak periods. *Figure 22* through *Figure 25* show a graphical representation of the modelled performance of each intersection for each peak period in 2012. Detailed intersection analysis results for the current situation are shown in Appendix A.

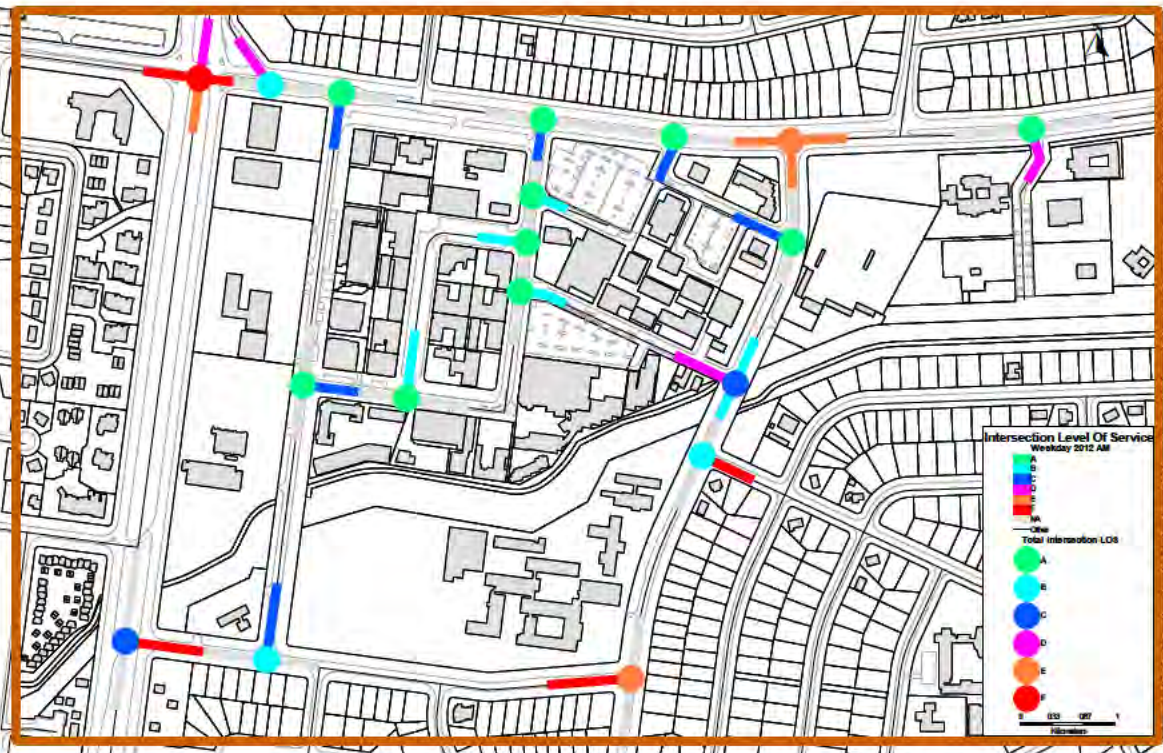


Figure 22: Intersection Level of Service – 2012 Weekday AM Peak

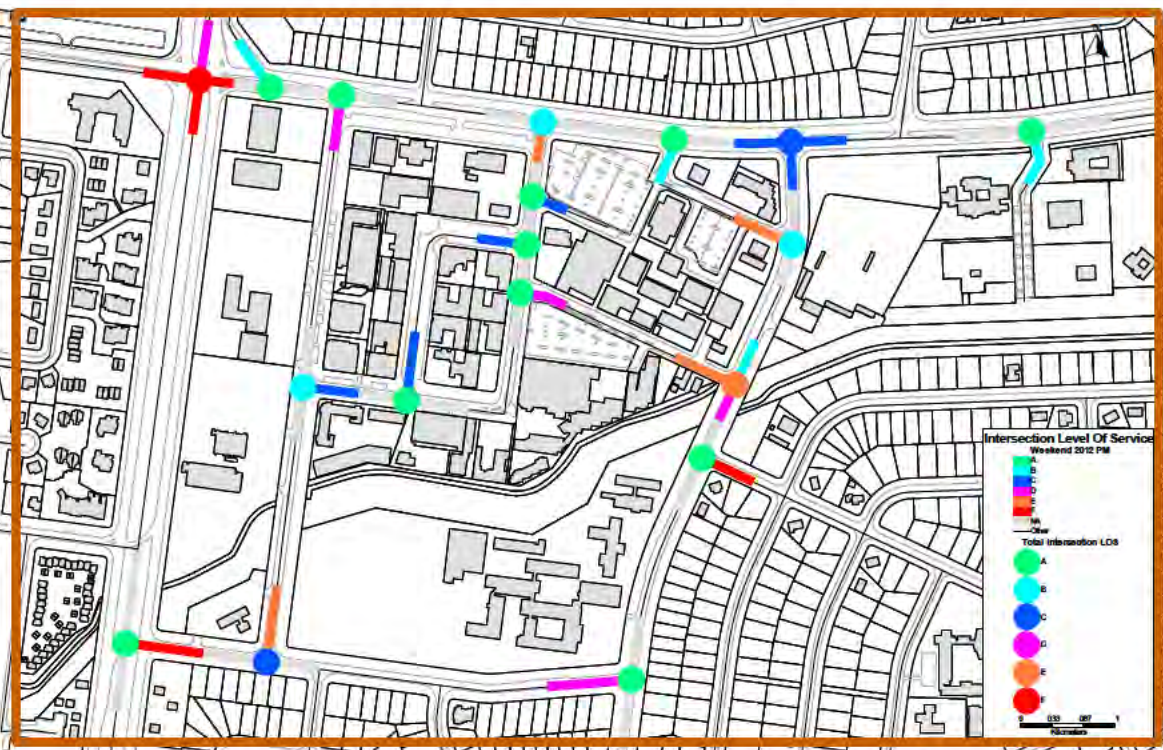


Figure 23: Intersection Level of Service – 2012 Weekday PM Peak

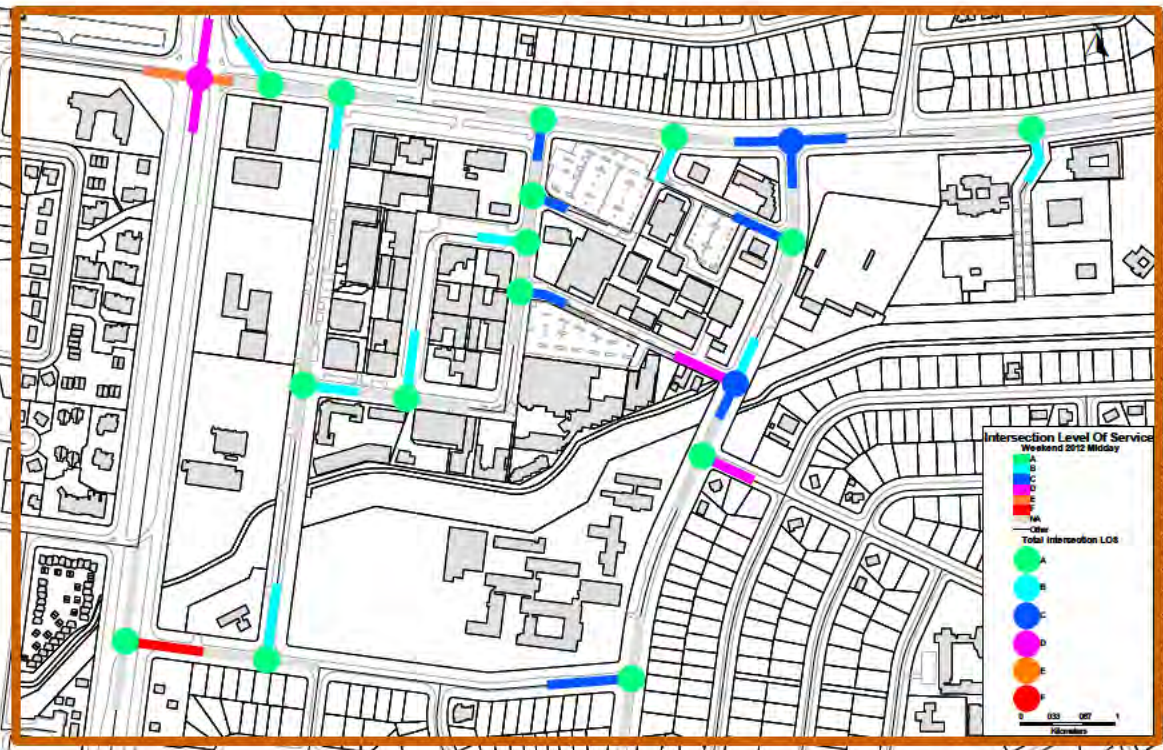


Figure 24: Intersection Level of Service – 2012 Weekend Midday Peak

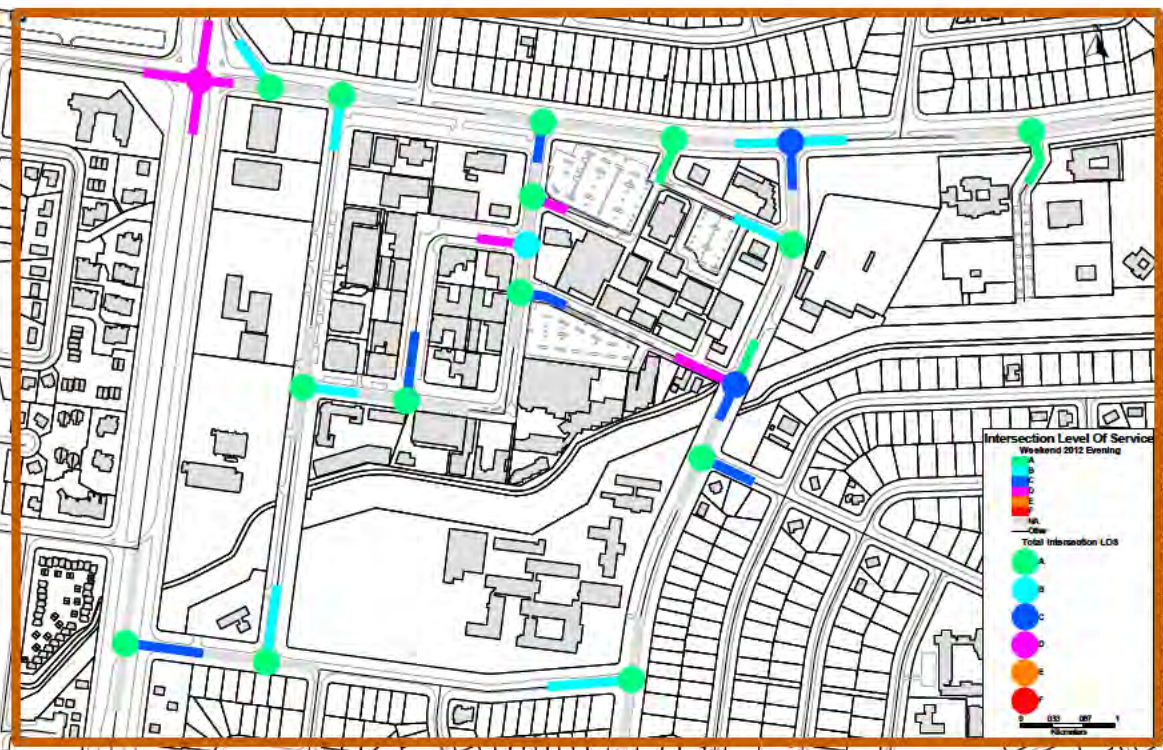


Figure 25: Intersection Level of Service – 2012 Weekend Evening Peak

The results of the intersection analysis show that there are some areas of concern in the current network, especially in the weekday AM and PM peaks. In the weekday AM peak, the intersection of Northbourne Avenue with Mouat Street and Antill Street is expected to operate at LoS F, with both Mouat Street and Antill Street operating at LoS F. In addition, the following roads are expected to operate at LoS F:

- Morphett Street, at its intersection with Northbourne Avenue

- Morphett Street, at its intersection with Cowper Street
- Davenport Street, at its intersection with Cowper Street

In the weekday PM peak, the following locations are expected to operate at LoS F:

- Intersection of Northbourne Avenue with Mouat Street and Antill Street, on Northbourne Avenue (northbound), Mouat Street and Antill Street approaches
- Morphett Street, at its intersection with Cowper Street
- Davenport Street, at its intersection with Cowper Street

During the weekend midday peak, the only area operating at LoS F is Morphett Street, at its intersection with Northbourne Avenue.

There are no intersections or approaches to intersections operating at LoS F in the weekend evening peak period.

3.4 Summary of Existing Issues and Potential Solutions

Figure 26 shows the recommended changes in the Dickson Precinct to address the identified issues in the current situation.

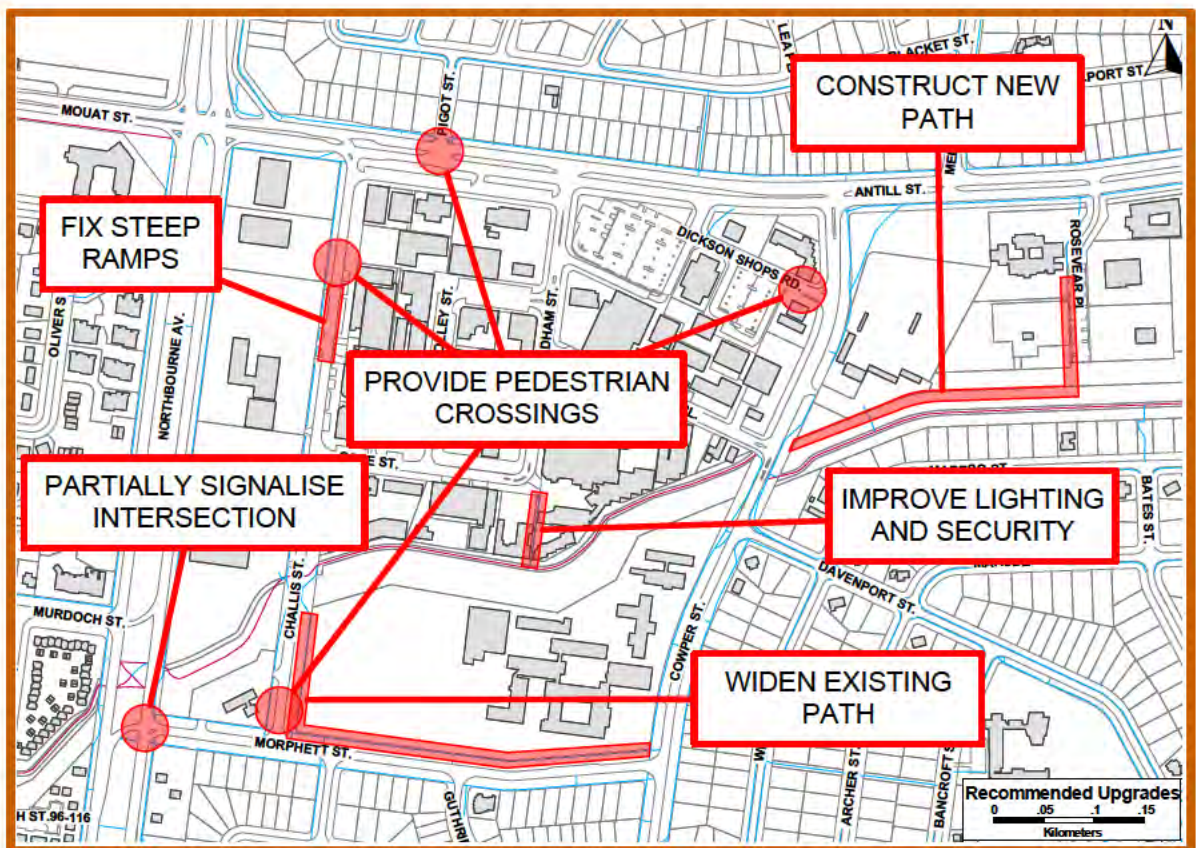


Figure 26: Recommended Upgrades in 2012

These recommendations are discussed in more detail in the following sections.

3.4.1 Pedestrian and Cyclist Facilities

The following changes to the existing pedestrian and cyclist facilities, based on the site inspection, are recommended:

- Provide a pedestrian crossing on Challis Street near its intersection with Morphett Street

- Provide a pedestrian crossing on Challis Street near the Telstra Building
- Provide a pedestrian crossing on Antill Street near its intersection with Pigot Street in the short term
- Provide a pedestrian crossing on Dickson Shops Road close to the intersection with Cowper Street
- Widen the 1.2m concrete paths around Daramalan College to 2.0m wide
- Provide better lighting on the path extension from Badham Street to the shared path to the south of the precinct to improve security
- Ensure pedestrian ramps along Challis Street have appropriate steepness for wheelchair access.
- Construct a new pedestrian/cyclist path connection from north of Rosevear Place to shared path to the south and swimming pool

3.4.2 Car Parking

The analysis of the car parking supply and utilisation has shown that there appears to be sufficient car parking capacity in Dickson for current operations. However, the car parking is not evenly utilised across the centre. It is recommended that appropriate signage be implemented to direct drivers to car parks that are shown to be underutilised in this study. The large car parks that are currently underutilised are:

- Dickson pool car park (this is likely to be variable with weather and season)
- Surface car park on the southern side of Dickson Place
- Underground car park underneath Dickson Tradies Club

Better signage, along with the upgrades to the pedestrian facilities presented above, should allow more efficient usage of current parking facilities.

3.4.3 Road Network and Intersections

The following changes to the existing road network and intersections are recommended to address current performance issues:

- Partial signalisation of the intersection of Northbourne Avenue and Morphett Street

This signalisation would only affect the eastern (southbound) carriageway of Northbourne Avenue. The signals would need to be linked to the existing signalised pedestrian crossing immediately to the north to ensure efficient operation.

These signals would also allow safe crossing of Morphett Street for pedestrians and off-road cyclists travelling north or south along the eastern side of Northbourne Avenue.

While the intersection analysis results indicate that the intersection of Northbourne Avenue with Antill Street and Mouat Street is currently operating at Level of Service F in both the AM and PM peak periods, it is recommended that the *Gungahlin to City Transitway Feasibility Study* (currently in progress) investigate options to improve the performance at this location. That study is expected to recommend significant changes to Northbourne Avenue to address transit operations and is better placed to make recommendations about this intersection.

4 ASSESSMENT OF MASTER PLAN

The proposed master plan developments have been discussed here in two stages. The first is the short term plan to develop Blocks 19 and 21 into two new supermarkets with supporting specialty retail shops. The predicted traffic impact of this development has already been assessed by Brown Consulting in 2011 and the outcomes of that assessment are reviewed here. An in depth analysis, which would essentially duplicate work already undertaken, has not been carried out.

The second stage of the assessment is the long term master plan options, assumed to be implemented by 2031. A more detailed analysis of the long term has been carried out, including traffic modelling and an indicative forecast of future parking requirements.

4.1 Analysis of Short Term Plan

Brown Consulting has already conducted an in depth analysis of the impact of the proposed supermarket developments, which found that the developments were not expected to have a significant impact on traffic operations in the area. In addition, although the new developments do not provide the quantity of parking recommended in the ACT guidelines, the study found that the excess demand was likely to be met by car parks near the new development.

The following section discusses a brief review of the parking analysis based on more recent parking utilisation surveys carried out for this project.

4.1.1 Short Term Parking Requirements

The Dickson master plan indicates that parking Areas 16 and 19 are expected to be redeveloped with supermarkets and supporting specialty shops. These parking areas are located in Block 21 and Block 19, respectively.

Table 9 shows the existing utilisation of the parking Areas 16 and 19 (Blocks 21 and 19). It should be noted that parking areas in the Retail Core Precinct are currently near capacity during the weekday PM peak and weekend midday peak periods. Car parking areas operating at very high utilisation levels typically have a large number of cars circulating repeatedly searching for spaces, which could potentially lead to traffic congestion issues.

Table 9 Summary of Parking Utilisation Survey for Parking Areas 16 and 19

Location	Supply	Thursday, 16 February 2012						Weekend, 18 February 2012					
		7:00	8:00	9:00	16:00	17:00	18:00	11:00	12:00	13:00	18:00	19:00	20:00
Area 16 (Block 21)	242	23	102	116	182	180	191	195	233	228	159	193	177
Area 19 (Block 19)	135	21	36	72	112	69	44	113	123	124	26	32	27
Total	377	44	138	188	294	249	235	308	356	352	185	225	204
		12%	37%	50%	78%	66%	62%	82%	94%	93%	49%	60%	54%

Table 9 shows that Block 21 has a total of 242 parking spaces and block 19 has a total of 135 parking spaces (including taxi zone and motorcycle parking areas). This table also shows that the peak parking demand of Areas 16 and 19 is 356 vehicles and occurs at 12:00 PM on weekends, which is the same as the adjacent parking areas in the Retail Core Precinct.

Temporary removal of either of these parking areas will put significant parking pressure on adjacent parking areas and the surrounding road network as consumers search for parking spaces, so this demand should be met through the use of adjacent parking areas and temporary car parks.

It is expected that some of the parking demand from Areas 16 and 19 will be absorbed by the adjacent parking areas. The *ACT Parking and Vehicular Access General Code* states that Commercial C – Group Centres should have short term parking within 200 metres, while long stay parking should be within 400 metres. However, the *General Code* also states that land uses in the Dickson Group Centre (excluding Section 32, Block 2) require short stay parking to be provided within 100 metres. Therefore, the most likely existing parking areas to be utilised are Areas 8, 9, 10, 12, 17 (McDonalds 30 minute parking), 18, 20 and 23. While Area 12 is in a location that makes it possible to be utilised, its on-street nature is likely to make it less attractive to supermarket shoppers who often use trolleys to transport goods to their cars. Table 10 shows the number of unused parking spaces in nearby parking areas. It is also noted that demand for parking in Area 23 is likely to be seasonal. The parking surveys were conducted in February and the area is approximately 65% utilised during the weekend midday peak. During winter, when the Aquatic Centre is closed, there is likely to be less demand in this area.

Table 10: Available Parking Space in Areas near Blocks 19 and 21

Parking Area	Thursday, 16 February 2012						Weekend, 18 February 2012					
	7:00	8:00	9:00	16:00	17:00	18:00	11:00	12:00	13:00	18:00	19:00	20:00
Area 8	53	28	10	25	44	59	60	56	55	62	41	17
Area 9	30	28	27	16	23	21	18	12	17	6	1	1
Area 10	58	55	52	50	47	43	44	37	38	22	18	17
Area 12	128	130	116	78	63	31	38	32	26	24	20	20
Area 17	17	13	10	6	11	15	19	16	14	21	23	7
Area 18	36	23	13	4	12	34	16	25	31	31	35	35
Area 20	119	102	80	47	63	40	7	13	7	74	13	5
Area 23	156	152	125	54	128	137	53	49	59	152	176	181
Total Available Spaces	597	531	433	280	391	380	255	240	247	392	327	283

Based on the available parking spaces around Blocks 19 and 21, it appears that Block 19 (which contains 135 parking spaces) can be redeveloped without the need to provide

additional parking during construction. However, appropriate signage must be used to redirect users to the parking areas they should use while construction is underway.

If the development of Block 21 (which contains 242 parking spaces) can be staged, additional temporary parking spaces may not be required. If staging is not possible for Block 21, it is recommended to provide temporary parking spaces as close to Area 16 as is feasible.

It is noted that there will be an increase in circulating traffic caused by drivers looking for free spaces in highly utilised parking areas. To reduce this impact it is recommended to install temporary signs directing drivers to alternative parking areas (particularly for Area 23). It is expected that this work will be conducted as part of the temporary traffic management plan.

The *ACT Parking and Vehicular Access General Code* states that the proposed supermarkets at Blocks 19 and 21 should provide an additional 326 parking spaces as shown in *Development Traffic Assessment Report for Block 19 and 21, Dickson Shops, Dickson, ACT* (Brown Consulting, June 2011). However, the proposed development will only provide an additional 76 parking spaces. The report argues that the ACT guidelines result in an oversupply and refers to the *RTA Guide to Traffic Generating Development* provision rates, which indicate that 240 parking spaces are required in the development, which are provided. That report assumed that the additional parking demand will utilise the adjacent parking areas.

Relying on adjacent parking areas is expected to result in more circulating traffic which may lead to further issues in the road network. Therefore, it is recommended that the 326 additional car parking spaces required by the ACT guidelines be provided in the developments planned for Blocks 19 and 21.

4.2 Analysis of Long Term Master Plan

The impacts of the master plan developments on transport operations in Dickson were assessed, regarding:

- Pedestrian and cycle network
- Car parking requirements
- Road hierarchy
- Intersection level of service

These investigations are discussed further in the following sections.

4.2.1 Pedestrian and Cycle Network

Figure 5 to *Figure 8* show that Dickson appears to have significant east-west pedestrian and cyclist movements. However, the main north-south movements occur on Northbourne Avenue only. This is likely to be due to lack of appropriate pedestrian crossings on Antill Street and Morphett Street. It is noted that the one signalised crossing at the intersection of Antill Street and Dickson Shops Road carries relatively less pedestrian and cyclists compared to the other crossing facilities surrounding Dickson. For the long term scenario it is recommended to increase the north-south permeability of the precinct by improving the crossing facilities that provide access to the centre of Dickson. This can be achieved by signalising the Antill Street – Badham Street intersection, and improving access from Badham and Cape Streets to the shared path north of Daramalan College. In addition, pedestrian access from the south can be improved by signalising the intersection of Morphett Street and Challis Street and continuing the paved path on the western end of Daramalan College.

The master plan proposes several external connections to the surrounding area as shown in *Figure 27*. These external connections are consistent with the recommendations made above. Similarly, the master plan proposes new internal links and improvements to the existing links as shown in *Figure 28*. The new east-west internal links will allow better access to Challis Street, which will be very important if the planned major bus station is located along this street.

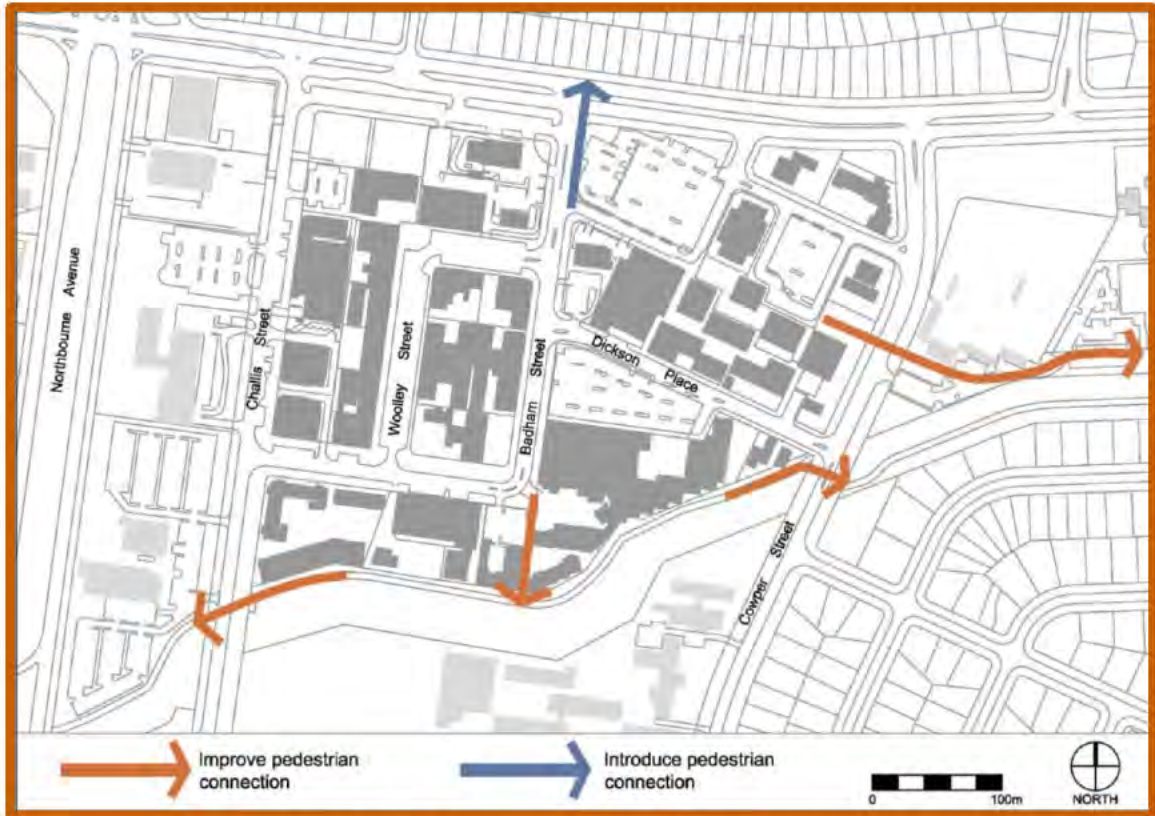


Figure 27: External Pedestrian Access (Source: Dickson master plan)

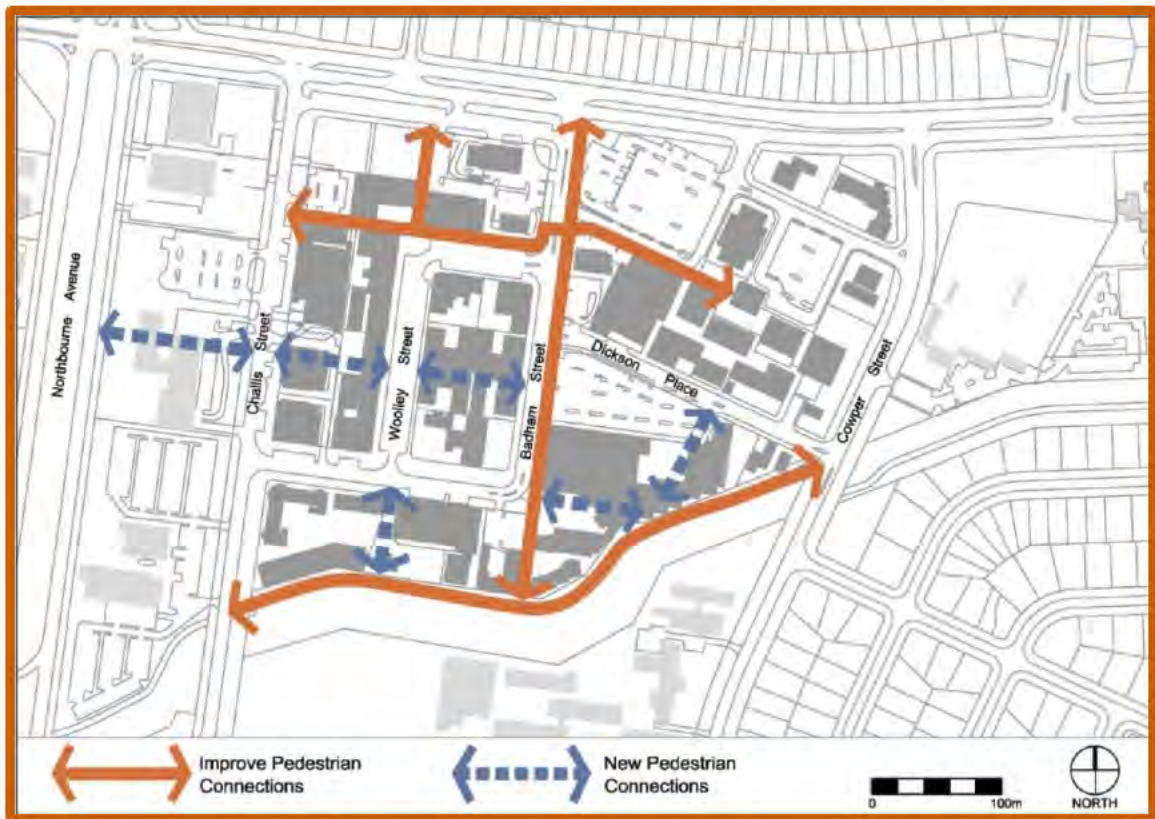


Figure 28: Internal Pedestrian Access (Source: Dickson master plan)

4.2.2 Long Term Parking Requirements

The master plan does not include enough details regarding the proposed land use to conduct an accurate assessment of the number of parking spaces required in the future. However, a basic assessment has been carried out based on the indicative changes in land use shown in Table 11.

Table 11: Indicative Future Land Use in Dickson

Land Use	2016	2021	2031 (Without Master Plan)	2031 (With Master Plan)
Population	101	250	280	1,890
Employment	2,880	3,306	3,329	4,590
Retail Space (m ²)	31,945	34,130	36,000	40,800

Using current parking provision rates and making assumptions about residential unit occupancy and employment rates per square metre of commercial development, the Dickson Group Centre is expected to require approximately the number of parking spaces shown in Table 12.

Table 12: Indicative Future Parking Requirements in Dickson

Land Use	2012	2016	2021	2031 (Without Master Plan)	2031 (With Master Plan)
Population	-	90	220	250	1,670

Land Use	2012	2016	2021	2031 (Without Master Plan)	2031 (With Master Plan)
Employment	-	1,440	1,650	1,660	2,300
Retail Space (m ²)	-	1,600	1,710	1,800	2,040
Total	2,509	3,130	3,580	3,710	6,010

Based on rates from the ACT Parking and Vehicular Access Guidelines and assumptions about residential unit occupancy and employment rates.

This is an increase to nearly 2.5 times the current supply if the master plan is implemented. It is assumed that the parking associated with population (residential) and employment will be contained within individual developments and will not be publicly accessible. The parking associated with retail development should be accessible to the general public.

The large increase in vehicles entering and exiting the Dickson Precinct to use this parking may have a significant impact on the performance of the road network and intersections in and around Dickson.

It is also noted that the 2031 scenario without the master plan (i.e. the do nothing scenario) includes some development and population, employment and retail space are all expected to increase. The master plan allows for higher levels of development, especially in residential and employment numbers.

4.2.3 Road Network Hierarchy Assessment

Figure 29 and Figure 30 show that the indicative road hierarchies (based only on traffic volumes) in 2031, both with and without master plan scenarios, are very similar.

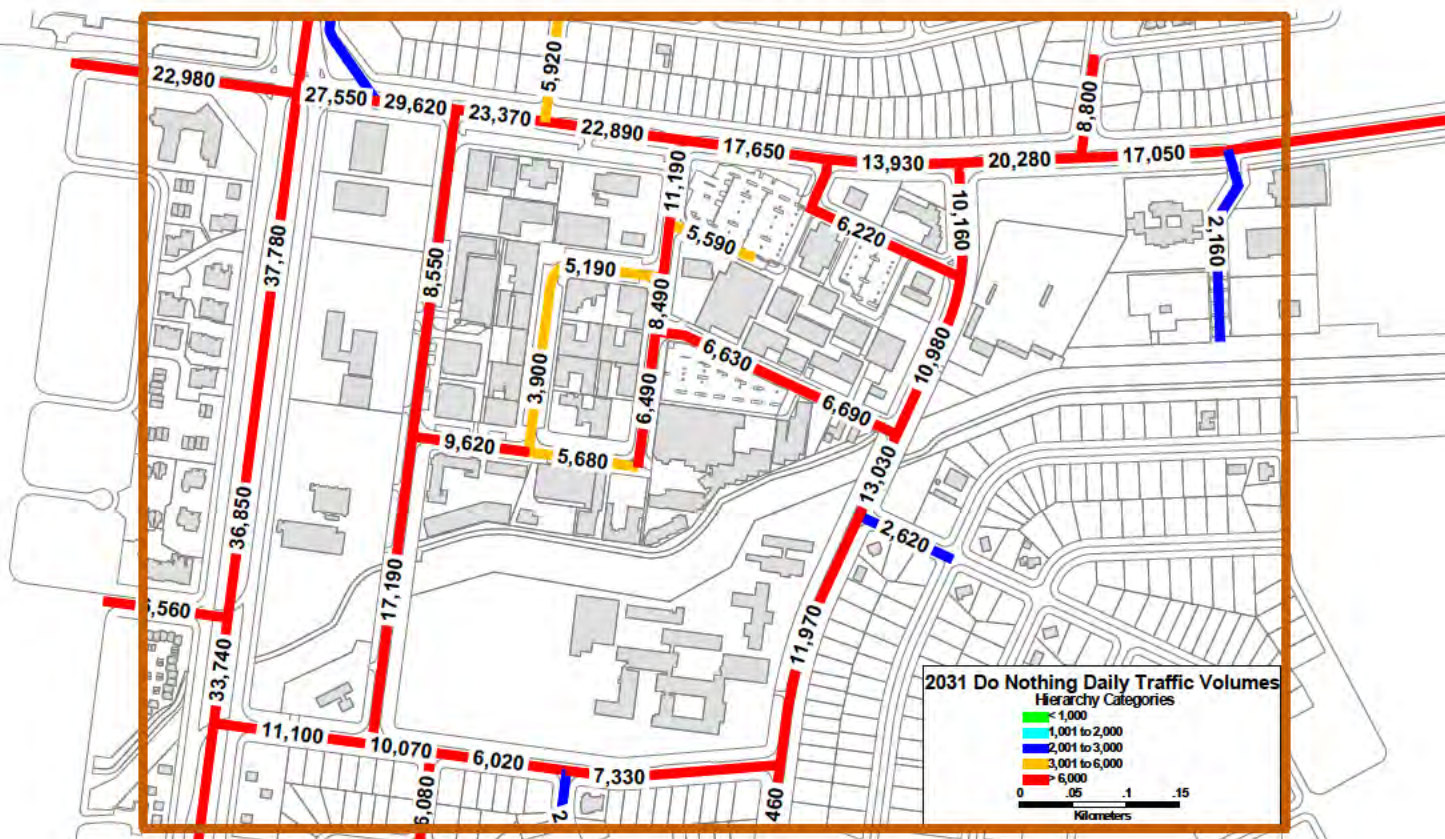


Figure 29: Predicted Vehicles per Day – 2031 Without Master Plan

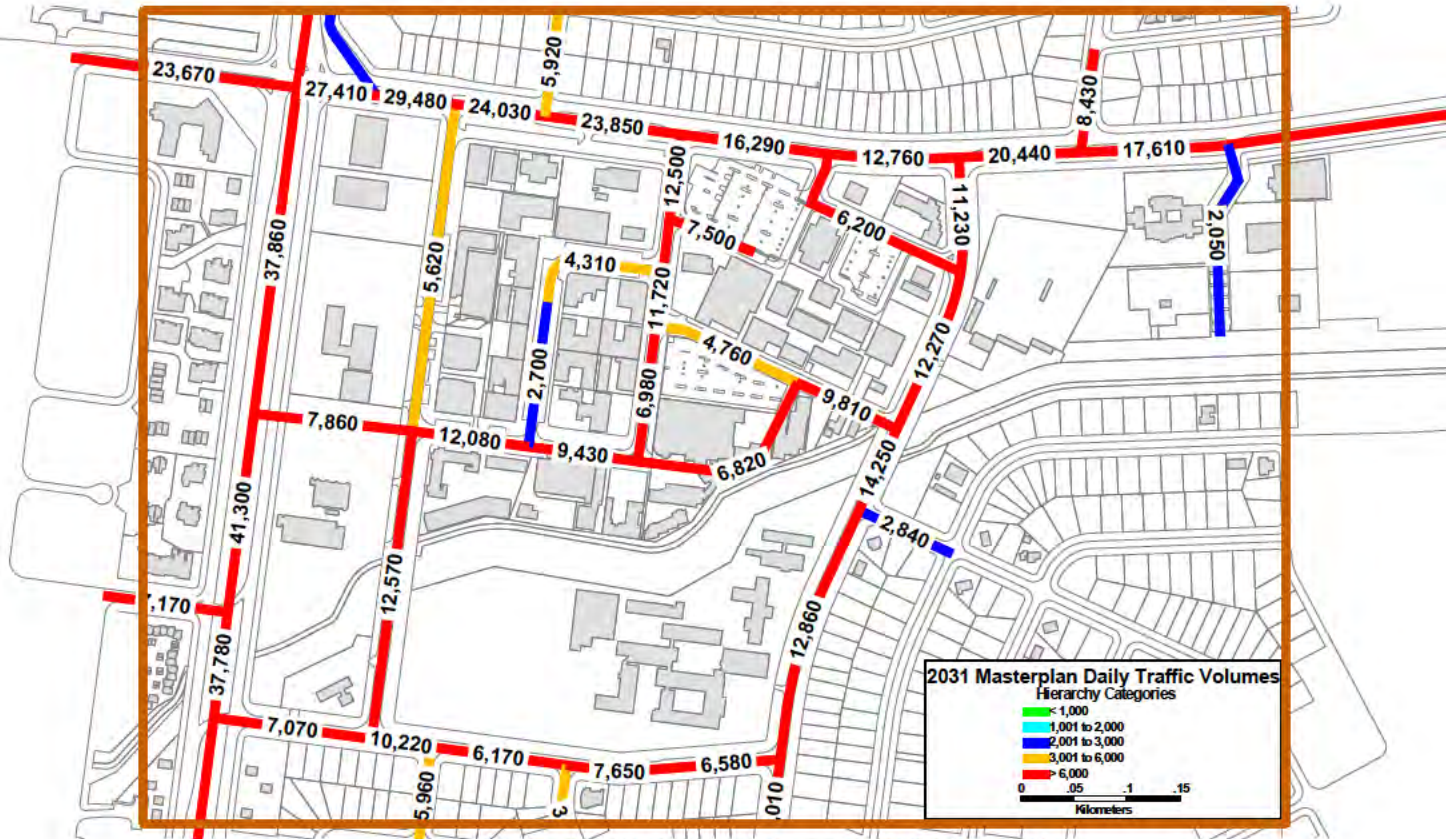


Figure 30: Predicted Vehicles per Day – 2031 With Master Plan

Figure 29 shows that even in the do nothing scenario, there is expected to be an increase in development and thus, an increase in traffic.

Cape Street Extension, east of Badham Street, is expected to carry approximately 6,800 vehicles per day. West of Challis Street, Cape Street Extension is expected to carry 7,800 vehicles per day, which places it in the arterial category, based on traffic volumes. However, the daily traffic volumes shown here are indicative and the code allows for some flexibility in road hierarchy planning. It is recommended that Cowper Street and Antill Street be upgraded to arterial roads while Cape Street and Badham Street should become major collectors. Challis Street and Morphett Street are likely to remain as major collectors.

Figure 31 shows the expected differences in daily traffic volumes in 2031 if the master plan is implemented.

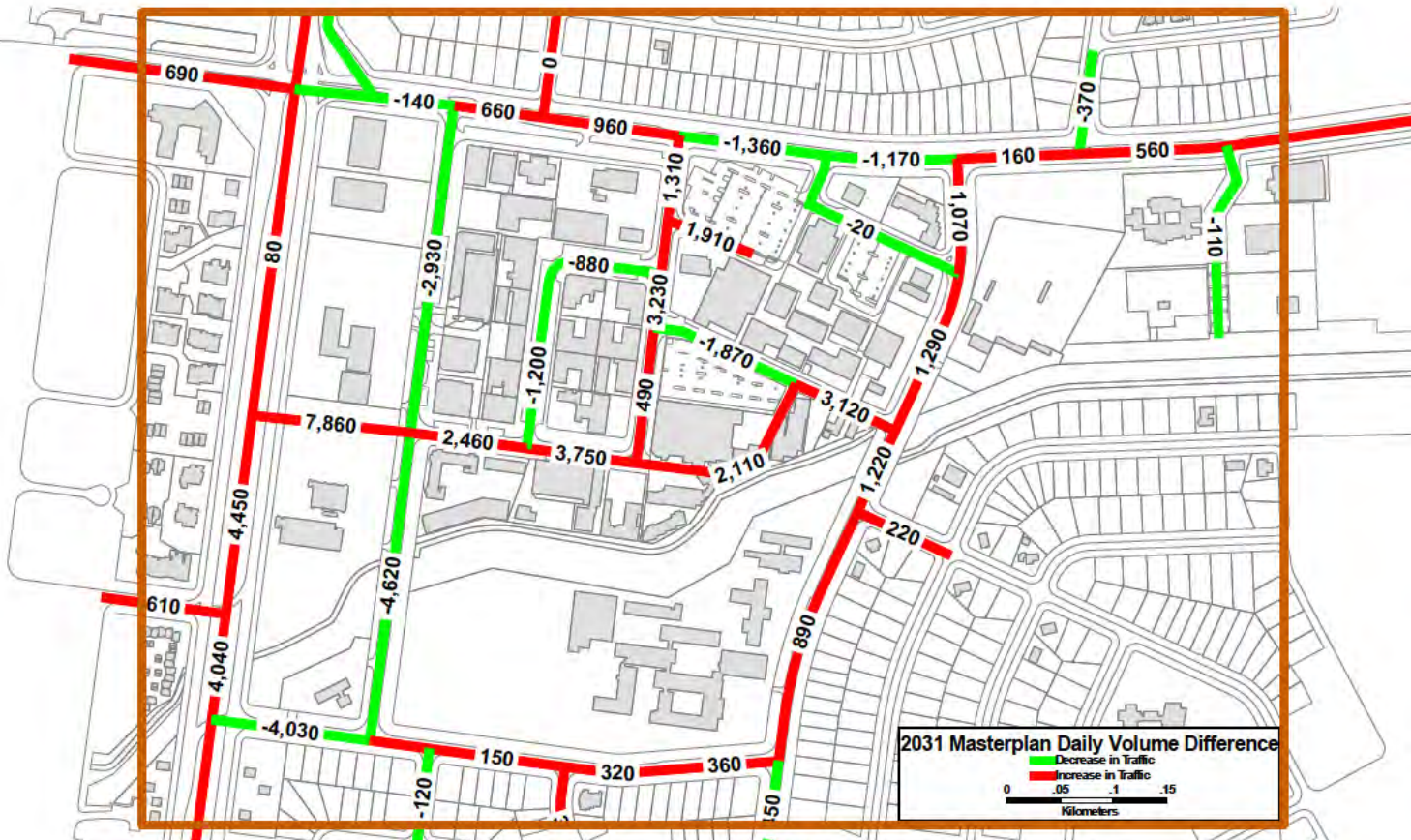


Figure 31: Daily Traffic Differences in 2031 after Master Plan Implementation

The major reductions in traffic are on Challis Street and Morphett Street. This is mainly due to the Cape Street extension to Northbourne Avenue. Similarly, there is a reduction on Antill Street between Cowper Street and Badham Street which appears to be due to the extension of the eastern end of Cape Street to Dickson Place. Small increases in traffic are noted on Mouat Street, Antill Street (east of Cowper Street) and Murdoch Street.

While access arrangements appear to be appropriate for the proposed hierarchy, as more traffic travels on Dickson Place, Badham Street and Cape Street, the access arrangements to developments on these streets may need to be reconsidered. Of particular note are the:

- Woolworths loading dock at the western end of Dickson Place
- 90 degree parking on Cape Street

These facilities may not be appropriate for the relatively high volumes of traffic expected on these roads.

4.2.4 Intersection Analysis

In addition to the 21 intersection that were analysed in Section 3.3.4, the following three intersections, related to the extension of Cape Street at both the eastern and western ends, were analysed for the master plan scenario:

- Northbourne Avenue - Cape Street
- Cape Street - Badham Street
- Dickson Place - Cape Street

Again, these intersections were modelled for the weekday AM, PM and Weekend mid-day and evening peak periods using volumes taken from the micro-simulation modelling.

Figure 32 through Figure 35 show a graphical representation of the expected performance of each intersection for each of the four peak periods in 2031, assuming that the master plan developments do not go ahead. Detailed intersection analysis results for the future scenarios are shown in Appendix A.

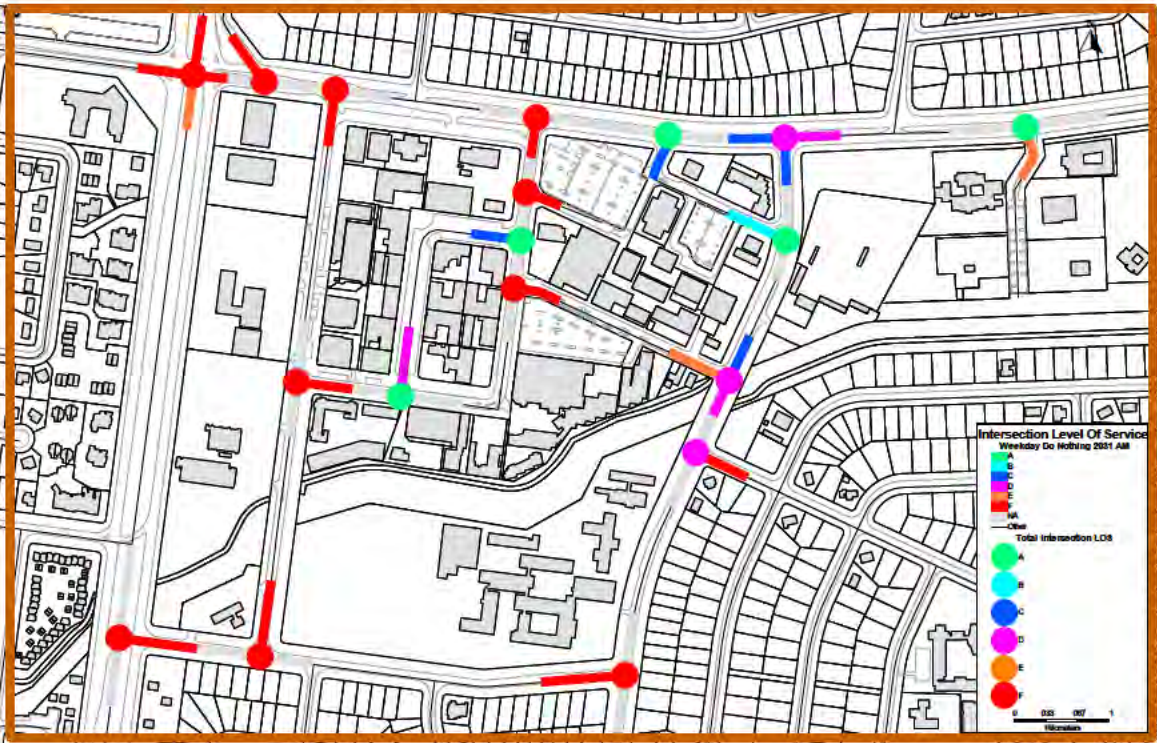


Figure 32: Intersection Level of Service – 2031 Do Nothing Weekday AM Peak Period

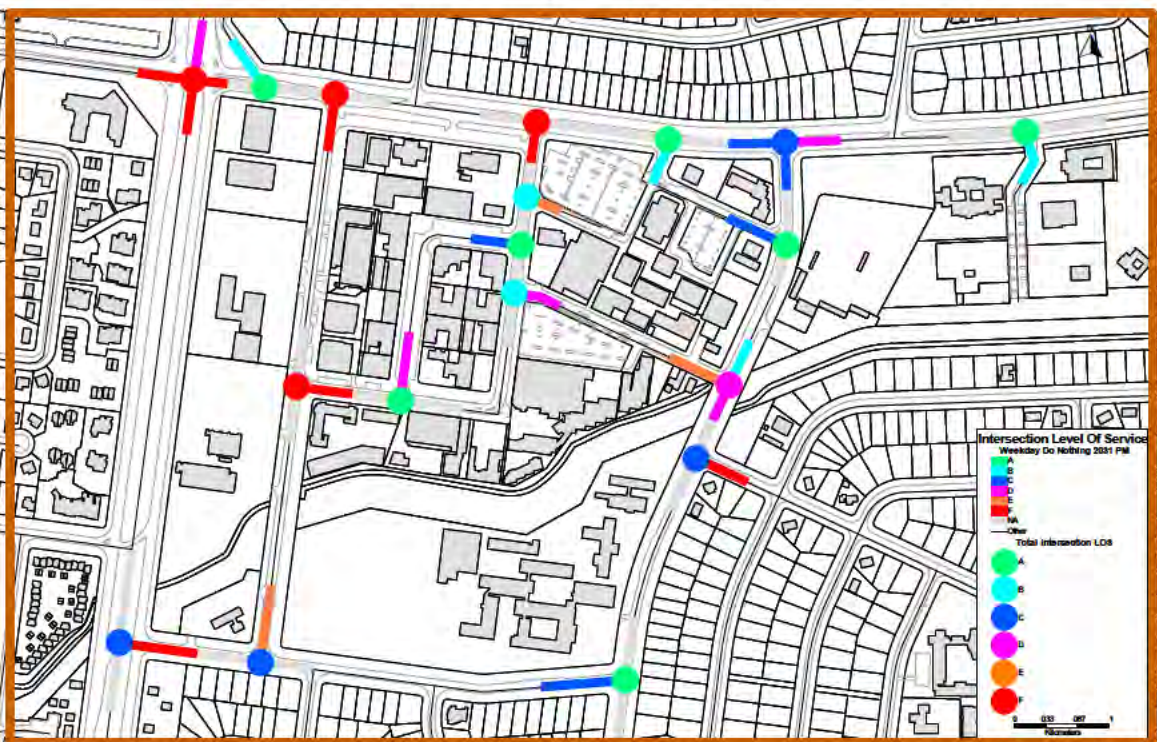


Figure 33: Intersection Level of Service – 2031 Do Nothing Weekday PM Peak Period

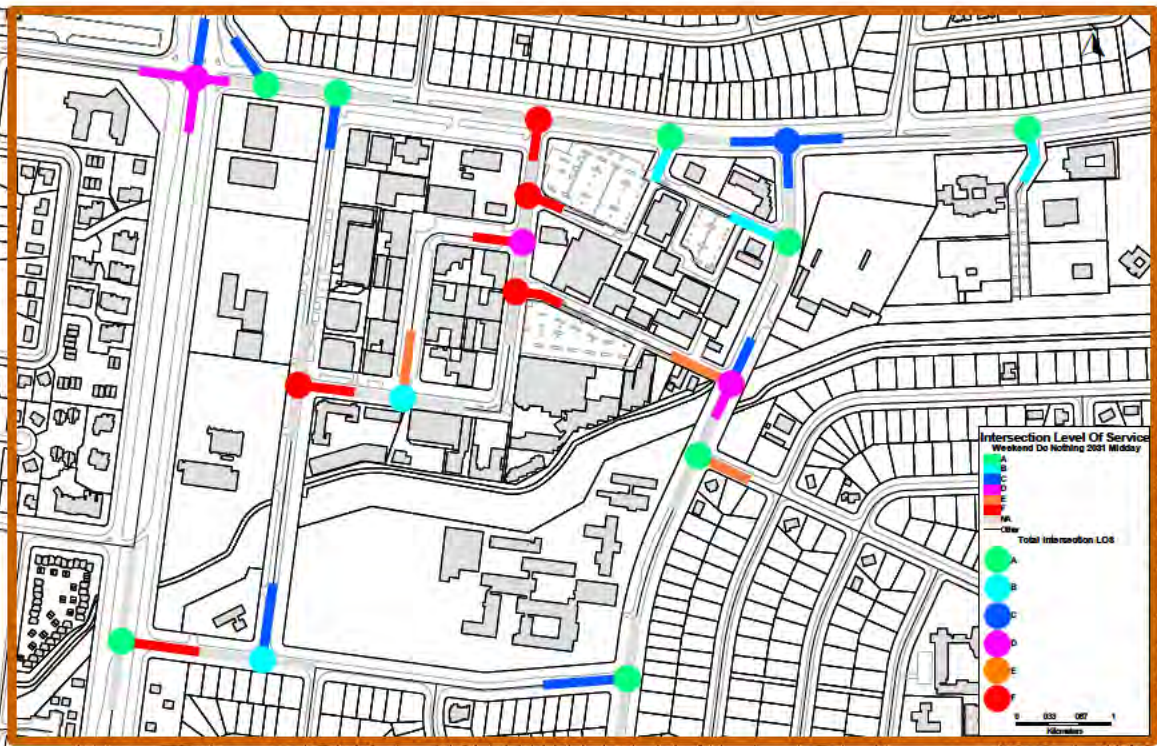


Figure 34: Intersection Level of Service – 2031 Do Nothing Weekend Midday Peak

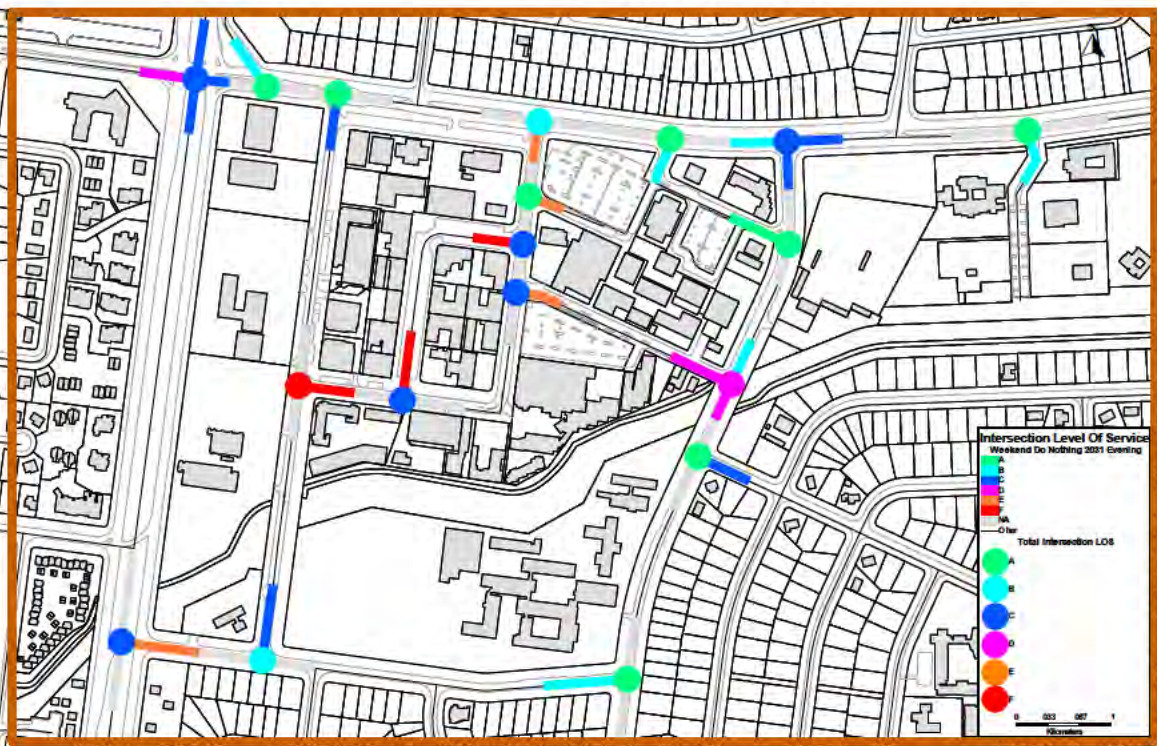


Figure 35: Intersection Level of Service – 2031 Do Nothing Weekend Evening Peak

From the preceding figures, it can be seen that there are a number of intersections and links that are expected to operate at Level of Service F without the master plan developments. The intersections include:

- Northbourne Avenue – Antill Street / Mouat Street (AM and PM peaks)
- Northbourne Avenue – Morphett Street (AM peak)
- Antill Street – Northbourne Avenue Service Road (AM peak)
- Antill Street – Challis Street (AM and PM peaks)