

Local Area Traffic Management Plan for the Suburb of Paradise

1 April 2011

Campbelltown City Council



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A+ GRI Rating: Sustainability Report 2009*

Revision	Details	Date	Amended By
00	Original	23 July 2010	YM Chang
01	Revised Draft including A4 figures	16 December 2010	YM Chang
02	Final	1 April 2011	YM Chang

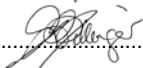
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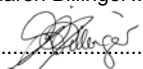
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Date: 1 April 2011

Distribution:

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1. Introduction

1.1 Background

Parsons Brinckerhoff (PB) was commissioned by Campbelltown City Council ('Council') to prepare a Local Area Traffic Management (LATM) plan for the suburb of Paradise. The plan is one of an intended number of plans to be prepared for suburbs within Campbelltown which will address traffic related issues identified in Council's Transport Plan 2006–16.

Under the umbrella of council's Strategic Plan 2005–10, the Transport Plan (the 'Plan') guides decisions of Council with respect to transport. The Plan identifies traffic congestion on the arterial road network (resulting in additional traffic using local streets) and safety in local streets as key issues for the area.

The Plan also defines a desired functional road hierarchy with target maximum thresholds for traffic volumes and speeds for each road class. Activity 2.2.2 in the Plan specifies the need to develop traffic management schemes for local streets to ensure that actual traffic volumes and speeds on any given local road are compliant with the target thresholds.

This LATM plan addresses specific traffic issues within the suburb of Paradise with the aim of contributing to the achievement of the intentions of the Transport Plan.

1.2 Study scope

The scope of this study was to prepare an LATM plan which considers all Council owned roads and infrastructure within the suburb of Paradise. Junctions and intersections of local roads with arterial roads owned and operated by Department of Transport, Energy and Infrastructure (DTEI) were also considered as part of the study scope. From discussion with Council it was also determined that the LATM plan would be aimed primarily at moderating vehicle speeds, improving safety where required and avoid displacing traffic onto adjacent local streets.

The LATM plan was developed without consultation with stakeholders (including DTEI) or the community, at Council's request. This commission therefore delivers a draft conceptual Traffic Management Plan on which Council will subsequently consult with residents and other stakeholders to gain its acceptance for implementation. Prioritisation of individual treatments within the plan will guide Council in developing a staged implementation schedule consistent with its budgetary allocations.

The following documents have been reviewed and considered in the preparation of this plan:

- Council's Strategic Consultation Plan 2010
- 30 year Plan for Greater Adelaide
- Campbelltown (City) Development Plan
- Campbelltown City Council Transport Plan 2006-2016
- Findings of the LATM process presented in this report are consistent with:
 - ▶ Council's Strategic Bicycle Plan
 - ▶ Austroads Guide to Traffic Management Series, and
 - ▶ Australian Standard AS1742.13.

The study was based on information made available by Council, site observations and additional traffic count information obtained by PB at selected locations where approved by Council.

1.3 Methodology

The following process was used to develop the Local Area Traffic Management Plan for Paradise:

1. Collect and analyse relevant data (including traffic volumes and speeds and crash statistics).
2. Review relevant documentation.
3. Meet Council to discuss the above information and canvas relevant issues (including resident complaints).
4. Assess current road and traffic conditions and determine locations where further traffic information would assist in gaining a thorough understanding of relevant issues.
5. Site inspection/s to assess current conditions and observe traffic behaviour.
6. Determine locations where traffic management treatments may assist in reducing traffic speeds and volumes.
7. Identify and assess options for traffic management treatments and select preferred treatments.
8. Present preliminary issues and Draft Local Area Traffic Management Plan to Council staff for discussion and preliminary feedback.
9. Refine LATM Plan and prepare and submit Draft Report for formal review and comment by Council.
10. Finalise the LATM Plan and overall report taking into account comments by Council.

2. The study area

Paradise is located within the Campbelltown City Council, approximately 9 kilometres north east of the Adelaide CBD. The suburb is bound by the River Torrens, River Drive, Schulze Road, Gorge Road and Church Road (refer Figure 2.1 Locality Plan).

The suburb is predominantly residential but incorporates a number of significant traffic generators including:

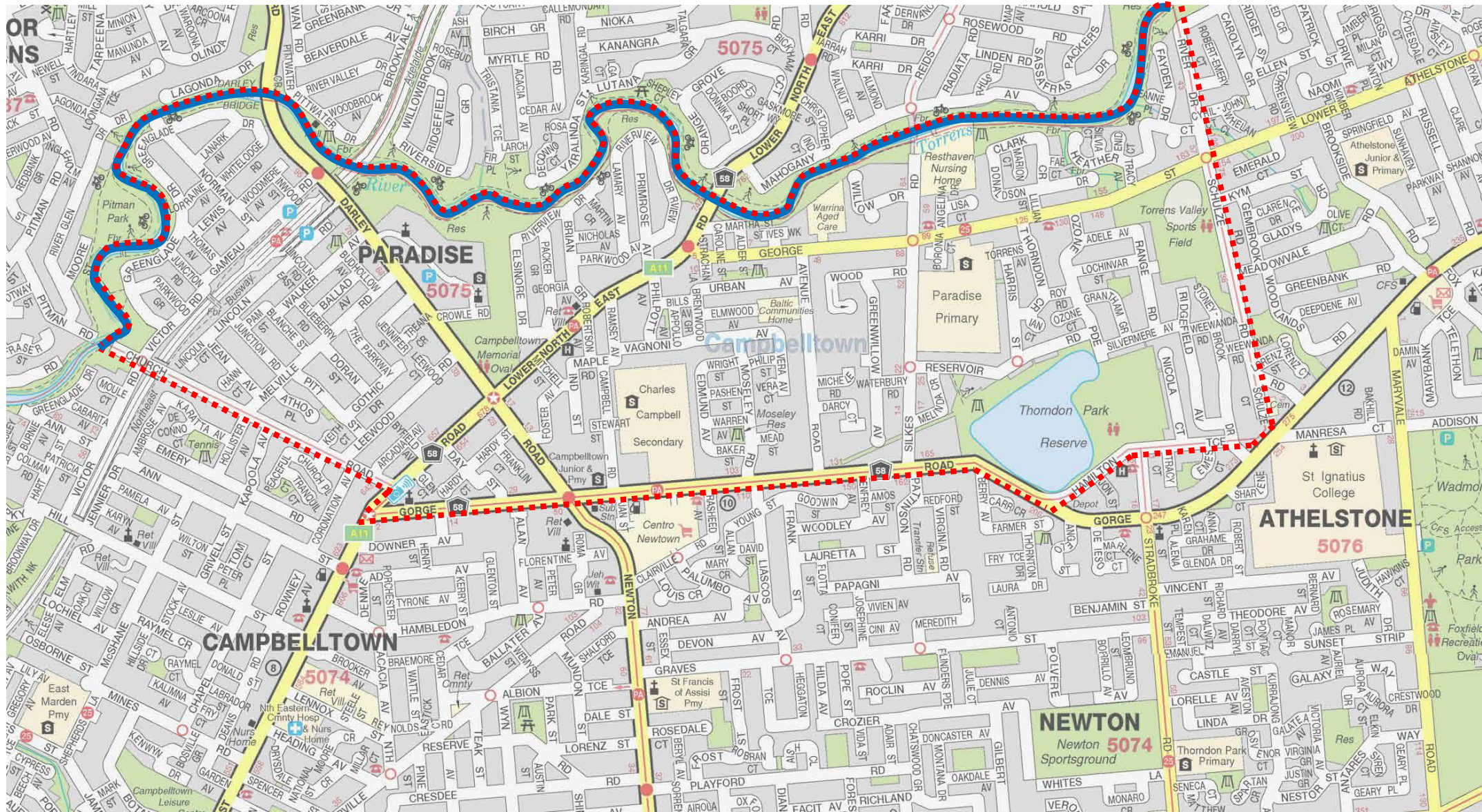
- Paradise public transport interchange, located on the western side of the suburb
- Paradise Community Church, located on Darley Road on the western side of the suburb
- Charles Campbell Secondary School on Campbell Road, and
- Paradise Primary School on Silkes Road.

Other significant traffic generators near the suburb boundary include:

- St Ignatius College is located just south of Gorge Road (in Athelstone), and
- Centro Newton Shopping Centre (in Newton) located south of Gorge Road.

Figure 2.1 also shows the location of the above traffic generators.





Source: UBD Street Directory



Key
 ■ Locality Boundary
 ■ River Torrens

Paradise Local Area Traffic Management Plan
Figure 2.1: Locality Map

3. Review of existing documentation

There are a number of previous reports and studies undertaken by various State and Local Government agencies that have direct relevance to the preparation of this LATM Plan; these documents are described in turn below.

3.1 Council's Strategic Plan 2010 and Campbelltown (City) Development Plan

Council's Strategic Plan prepared in 2010 and the Campbelltown (City) Development Plan (which was last updated in January 2010) did not suggest any major changes in travelling patterns for the suburb of Paradise in the near future.

3.2 30 Year Plan for Greater Adelaide

The 30-Year Plan for Greater Adelaide was first released in February 2010. This report states the plan to enhance network of recreation trails and open space connected to Hill face Zone and River Torrens.

3.3 Campbelltown City Transport Plan 2006-2016

The Campbelltown City Transport Plan 2006-2016 (the 'Plan') was adopted by Council in February 2007. The Plan has been prepared to guide the decisions of Council with respect to transport and is aimed to provide guidance and direction for Council and other bodies about the direction of transport planning in the City.

Functional road hierarchies within the Campbelltown City Council are outlined in the Campbelltown City Council Transport Plan 2006–2016, as follows:

Table 3.1 Functional road hierarchies

Functions	Traffic volumes	Speed limit	Maximum 85 th percentile speed	Maximum mean speed	Primary function
Arterial road (DTEI roads)	Controlled by Department for Transport, Energy and Infrastructure				
Arterial road (Council)	<10,000 vpd	60 km/h	<65 km/h	<60 km/h	Traffic movement with controlled property access
Secondary arterial road	<10,000 vpd	50 km/h	<55 km/h	<50 km/h	Traffic movement with property access
Major collector road	<6,000 vpd	50 km/h	<55 km/h	<50 km/h	Property access with through movement

Functions	Traffic volumes	Speed limit	Maximum 85 th percentile speed	Maximum mean speed	Primary function
Minor collector road	<2,000 vpd	50 km/h	<50 km/h	<45 km/h	Property access with minor through movement
Local road	<750 vpd	50 km/h	<40 km/h	<40 km/h	Property access only

Source: Campbelltown City Council Transport Plan 2006-2016

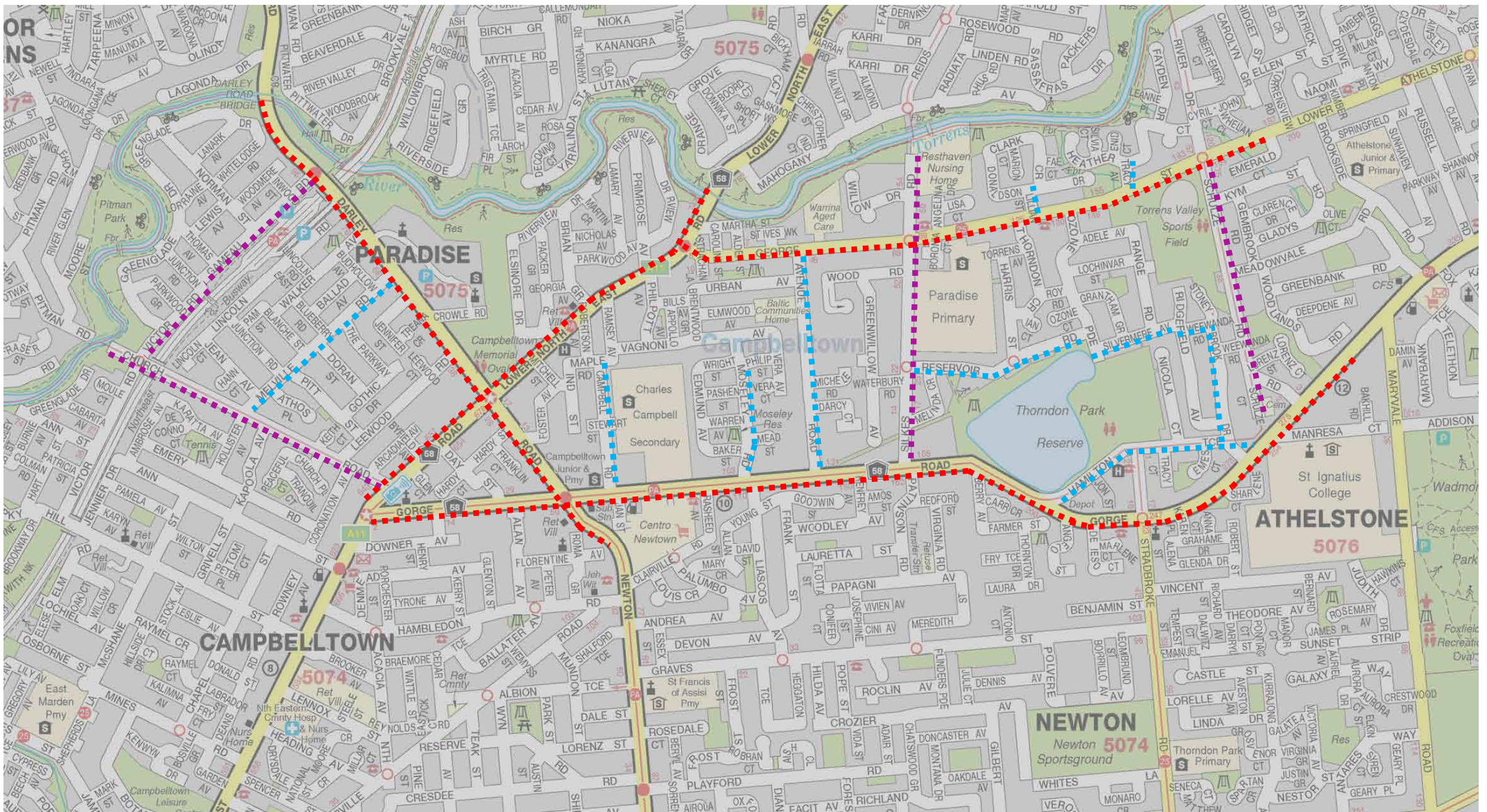
Table 3.2 summarises the road classifications within the suburb of Paradise, as set out in the Transport Plan.

Table 3.2 Road classifications within Paradise

Road Classification	Road
Arterial roads	Lower North East Road
	Gorge Road
	Darley Road
	George Street
Major collector roads	Church Road
	Gameau Road
	Victor Road
	Junction Road (Victor Road to Gameau Road)
	Silkes Road (Gorge Road to George Street)
Minor collector roads	Schulze Road
	Avenue Road
	Campbell Road
	Hamilton Terrace
	Lillian Street
	Melville Road
	Moseley Road
	Ozone Parade
	Reservoir Road
	Silvermere Avenue
	Stoneybrook Drive (Weewanda Avenue to Hamilton Terrace)
	Tracy Avenue
	Weewanda Avenue

Source: Campbelltown City Council Transport Plan 2006-2016

Figure 3.1 illustrates the above road hierarchy within Paradise.



Source: UBD Street Directory



- Key**
- Arterial Road
 - Major Collector
 - Minor Collector

Paradise Local Area Traffic Management Plan
Figure 3.1: Road Hierarchy

3.4 BikeDirect maps and the City of Campbelltown Strategic Bicycle Plan

BikeDirect maps produced by DTEI indicate that there are currently formal bicycle lanes along Lower North East Road and Gorge Road. An off-road sealed bicycle path follows the length of the River Torrens through Paradise and provides links to the Paradise Interchange.

The Strategic Bicycle Plan (2007) recommends bicycle lanes be introduced along Silkes Road and George Street which have not been introduced to date. Figure 3.2 shows the designated bike routes identified in the Plan.

3.5 City of Campbelltown Footpath development and maintenance policy

Council has a “Footpath development and maintenance” policy in place which states that “No footpath be constructed on streets where the traffic volumes are less than 300 veh/day” (clause 5.5.3). This policy would appear to be at odds with the fact that the ageing population is becoming a pressing issue throughout Australia and a footpath on at least one side of each street is desirable especially for elderly who are less mobile.

3.6 Adelaide Metro bus timetables

The Paradise Interchange is a major intermediate interchange along the O-Bahn busway. It is serviced by AdelaideMetro buses. It provides for a significant number of commuters and casual riders car parking spaces for commuters to the Adelaide CBD to utilise.

AdelaideMetro buses that service the Paradise suburb include:

- Gameau Road, Junction Road, Victor Road: route 522
- Darley Road: routes 104, 125, 126, 174, 178, 504, 556, 557, 558, 559, and 560
- Lower North East Road: routes 174, 556, 557, and 558
- Gorge Road: routes 178, 578, and 579
- George Street: route 178
- Silkes Road: route 178.

On-street bus stops are located at numerous locations along the abovementioned routes, with a majority of these not indented.

It is also worth noting here that in addition to the Adelaide Metro services listed above, Campbelltown City Council also provides free door to door community bus services to the following locations every Wednesday to Friday which residents can simply call for a pickup:

- Centro Newton
- Campbelltown Public Library
- Newton Village
- Glynde Corner and
- Firlie Shopping Centre.

3.7 Council submissions

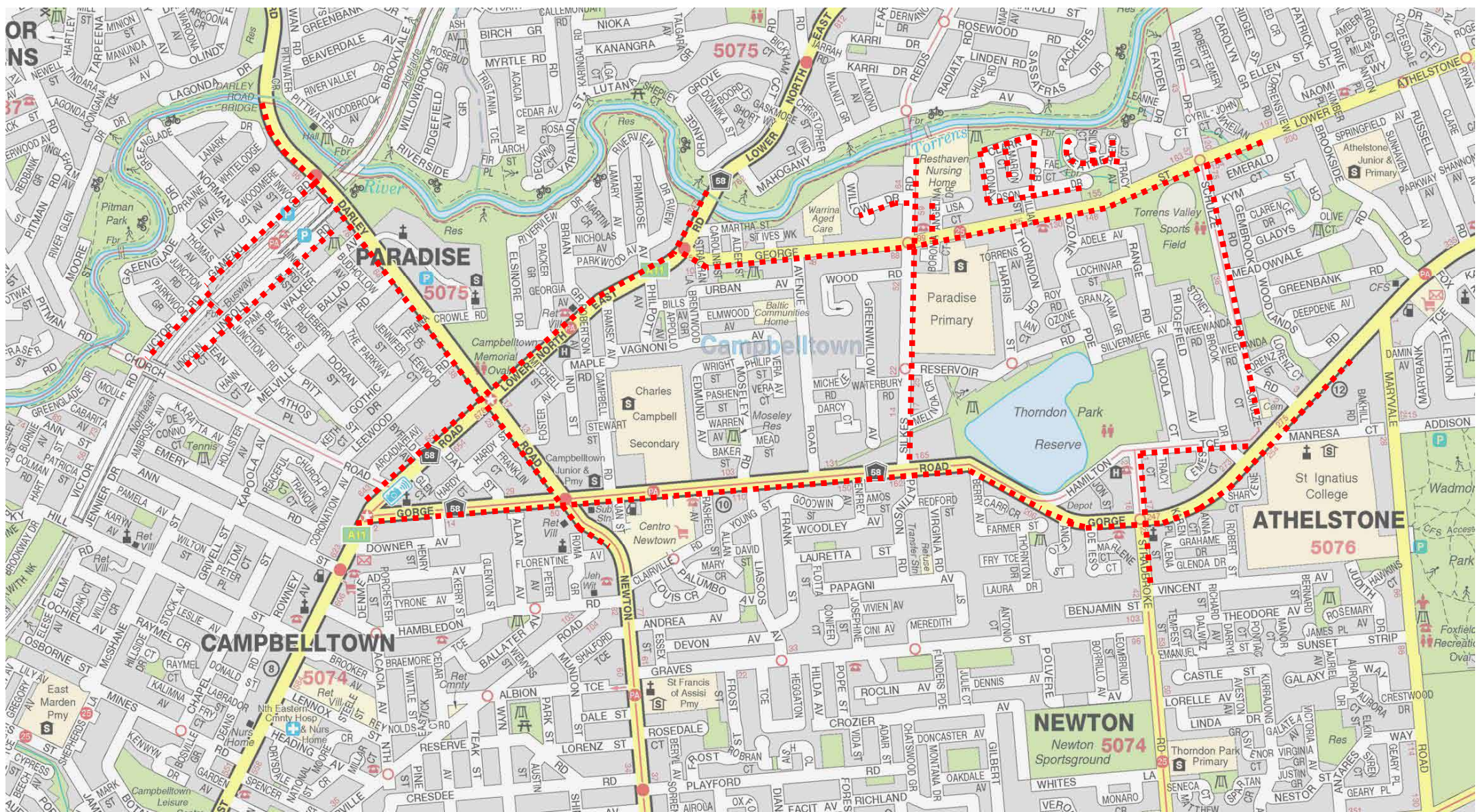
Council had received a number of written submissions from residents, each expressing concerns with current traffic provisions within Paradise; these concerns have been received over the last 2 years, and are summarised in Table 3.3 below.

Table 3.3 Resident concerns

Road	Date	Description
Gameau Road	3/9/2008	Concerns for reckless drivers along Gameau Road without being attentive to the safety of other road users including motorists, cyclists and pedestrians.
Gorge Road/Silkes Road intersection	27/10/2009	Concerns of peak traffic turn movements at Gorge Road/Silkes Road intersection causing congestion, especially right turns into Silkes Road from Gorge Road (east) and right turns from Gorge Road (west) into Pattinson Road, with right turning vehicles queuing past adjacent intersections. Issues raised that drivers waiting to turn right out of Silkes do not have opportunities to turn right, making exits dangerous or risk waiting unreasonable lengths of time.
Gorge Road/Silkes Road intersection	13/1/2009	Issue raised of car parking overflow from "Wacky Warehouse" is occurring on local streets and increasing congestion at the intersection. Also risks to pedestrians.
Heather Court	12/05/2009	Traffic calming
Lincoln Road	11/12/2006	Some traffic appears to be speeding in the street and is a danger to children at the kindergarten. Can council do a count and assess if a traffic calming device is warranted. Resident has reported matter to Police.
Lower North East Road/Robertson Avenue	19/05/2008	Due to an incident at the intersection, resident believes that something needs to be done with the intersection as it is a very wide opening.
Maple Road	08/05/2006	Since median installed in Campbell Road, resident has difficulty turning into driveway.
Melville Road	09/03/2007	A request from a resident for line marked parking bays along Melville Road to prevent people parking in front of his property taking up two spaces.
Melville Road	26/05/2010	Resident requested that parking be prohibited close to the intersection to improve visibility, as a van parked in Melville adjacent to Pitt obstructs view of approaching traffic over the rise.
Philpott Avenue	31/08/2009	Resident is concerned about the volume of traffic using Philpott Avenue to access the Paradise Hotel, Charles Campbell Secondary School, and the Newton Light industrial Area, as well as Paradise Motors using it as a test route for vehicles.
Philpott Avenue	24/11/2006	Resident requested that commercial vehicles use of Philpott Avenue be checked. Resident claims use and speed excessive.
Riverview Drive	19/06/2009	Concerns for vehicle volumes/speeds and safety if Riverside Drive is connected through a proposed subdivision.
Silkes Road	6/05/2009	Suggested review of the school crossing on Silkes Road adjacent Paradise Primary School.

Source: Campbelltown City Council

Most of the issues raised above have either been checked and found that the issues raised were not engineering issues or been resolved by installation of traffic control devices, or will be included in the discussions section 5.



Source: UBD Street Directory



Key
 ■■■ Bike Routes

Paradise Local Area Traffic Management Plan
 Figure 3.2: Planned bike routes

4. Data collection

Data collected for the study area has included traffic speed and volume data and crash statistics. Traffic speed and volume data is a combination of existing information already collected by the Council, supplemented where required by additional count information. Crash data for reported accidents occurring on the road network within the past 5 years has been sourced from DTEI.

4.1 Traffic volumes and speeds

Traffic volumes and speeds throughout the suburb are gathered regularly by Council. These counts are conducted using the pneumatic tube counters usually over one week duration. The following table summarises the latest traffic counts and speed data collected for a number of key streets within Paradise. For the purpose of analysis, traffic data collected prior to 2005 was not considered.

Table 4.1 Traffic volumes and speeds from 2005–2010

Road	Location (adjacent house number)	Year	85 th percentile speed (km/h)	Mean speed (km/h)	Annual Average Daily Traffic (AADT)
Avenue Road	27	2010	46	38	1106
Campbell Road	18	2010	41	33	1723
Foster Ave	13	2005	30	36	376
Gameau Road	11	2010	56	50	1613
George Street	171	2005	62	56	6266
George Street	145	2006	61	55	6321
Greenwillow	14	2006	47	38	152
Hamilton Tce	West	2007	34	29	1045
Harris Street	11	2005	49	39	119
Lincoln Road	23	2007	55	41	300
Lochinvar St.	12	2010	42	31	102
Melinda Cres	10	2008	43	33	109
Melville Road	14	2009	54	46	1237
Melville Road	38	2009	50	43	1270
Mitchell Street	1	2005	42	33	133
Mitchell Street	8	2005	29	24	309
Ozone Parade.	14	2010	51	42	281
Packer Cres	1A	2007	41	33	416
Philpott Ave	10	2007	46	39	751
Range Road	21	2010	52	43	291
Schulze	32	2005	54	46	2311
Schulze	51	2005	58	51	2601
Silkes Road	52	2009	54	47	3852
Silkes Road	14	2010	57	51	5208
Silvermere Ave	12	2010	49	38	267

Road	Location (adjacent house number)	Year	85 th percentile speed (km/h)	Mean speed (km/h)	Annual Average Daily Traffic (AADT)
Urban Ave	20	2009	54	46	405
Vagnoni Ave	13	2005	52	44	822
Vagnoni Ave	23	2005	50	36	141

Source: Campbelltown City Council, ATS

Table 4.2 summarises the streets with either speeding or volume issues.

Table 4.2 Summary of streets with speeding and/or volume issues

Street	Issues	Comments
Gameau Road	85 th percentile speed at 56km/hr	Threshold for major collector: 55km/hr
Schulze Road	85 th percentile speed at 58km/hr	Threshold for major collector: 55km/hr
Silkes Road	85 th percentile speed at 57km/hr	Threshold for major collector: 55km/hr
Philpott Avenue	AADT of 751 veh/day	Threshold for local road: 750 veh/day
Vagnoni Avenue	AADT of 822 veh/day	Threshold for local road: 750 veh/day

These issues are not overly significant in terms of the extent to which speed and volume thresholds are exceeded.

4.1.1 Crash statistics

Crash data for 2005–2010 inclusive was sourced by PB for the suburb of Paradise. A full record of all crashes is contained in Appendix A.

Overall, road crashes on the local road network on the study area are not considered to be a significant issue for concern within the precinct, given their frequency, crash type and level of severity. By contrast, the number of crashes at junctions of local roads with arterial roads is relatively high. These are summarised in Table 4.3, and identify only intersections with more than 10 reported crashes over the past 5 years.

Table 4.3 Summary of crash data 2005-2010

Intersection	Traffic control device	Number of crashes	Predominant crash type and number	Apparent cause	Comments
George Street and Lower North East Road	Traffic signal	30	14 rear end	Inattention	5 rear end when pavement wet
			10 right angle	Disobey traffic signal	
			7 during night time	Inattention	
			24 property damage only		

Intersection	Traffic control device	Number of crashes	Predominant crash type and number	Apparent cause	Comments
Darley Road and Gameau Road	Traffic signal	18	8 rear end	Inattention	Property damage only
			8 right angle	Fail to stand	Usually resulted in some minor injuries
Gorge Road and Silkes Road	Stop sign	11	9 right angle	Disobey stop sign	Vehicles exiting Silkes Road responsible
			8 property damage only		

While the crash data showed that most of the crashes were due to human error, it is possible that the physical road layout may also have contributed in some way and accordingly engineering measures can be taken to improve the location. Refer to Section 8 for suggestions to improve the locations.



5. Existing traffic management provisions

This section describes the existing conditions and traffic management provisions along key roads within the suburb of Paradise.

5.1 Traffic control devices

Figure 5.1 shows the traffic control devices currently in place within the suburb of Paradise. Table 5.1 lists the traffic control devices being installed in the past 5 years.

Table 5.1 Traffic control devices installed in the past 5 years

Road	Traffic control
Avenue Road	Two way slow points to discourage heavy vehicles and divert traffic to Silkes Road (the preferred route).
Campbell Road	One lane driveway link to divide road at school zone.
George Street	Painted median and parking bays to reduce speed. Signed as 60 km/h.
Melville Road	Introduction of parking bay on the southeast side of the road and pedestrian refuge, road narrowing and solid median islands to side roads to reduce speed.
Mitchell Street /Foster Avenue	Solid medians and give way sign to clarify "Y" junction.
Ozone Parade	Pavement bars around the bend to slow traffic down
Vagnoni Avenue/Moseley Road	Solid median and pedestrian refuge on Moseley Road to slow traffic, reduce corner cutting – including school zone
Weewanda Road	Solid medians at intersections of Stoneybrook Drive and Ridgehaven Avenue, to prevent corner cutting

Source: Campbelltown City Council

Selected roads within the study area are further discussed in section 5.3.

5.2 On-street parking provisions

On-street parking along local roads is generally permitted within the study area with the exception of streets around Paradise Interchange; a number of large car parks accommodate the demands of the park and ride commuters on the O-Bahn. Some overflow car parking has been observed along roads surrounding the interchange, including along Darley Road, Lincoln Road, Gameau Road, Victor Road and other local streets nearby. Two hour parking restrictions have been implemented to manage this overflow.

5.3 Traffic management provisions on selected roads

5.3.1 George Street

George Street is approximately 12 m wide and the only arterial road within the study area that is under the care and responsibility of the City of Campbelltown. The road connects

Lower North East Road and Lower Athelstone Road. The intersection of George Street and Lower North East Road is signalised; while the intersections of George Street and Silkes Road as well as Schulze Road are controlled by roundabouts.

The traffic survey conducted in 2005 and 2006 showed that the speed and volume on this street are within the thresholds for an arterial road.

There is a school zone on George Street at the entrance to Campbelltown Primary School, between Boronia Court and Thorndon Crescent. Students on traffic duty with 'STOP' banners are present during peak school traffic hours.

30 crashes were recorded at the intersection of George Street and Lower North East Road over the past 5 years. The intersection is signalised with a filtered right turn for north bound traffic turning into George Street and uncontrolled left turn slip lane for west bound traffic turning left into Lower North East Road.

It is understood that Council installed painted median and parking bays on both sides of George Street to make the travelling lane narrow and hence to reduce speed. This approach is believed to have performed well as observed by council staff at this location although no data is available to support this finding.

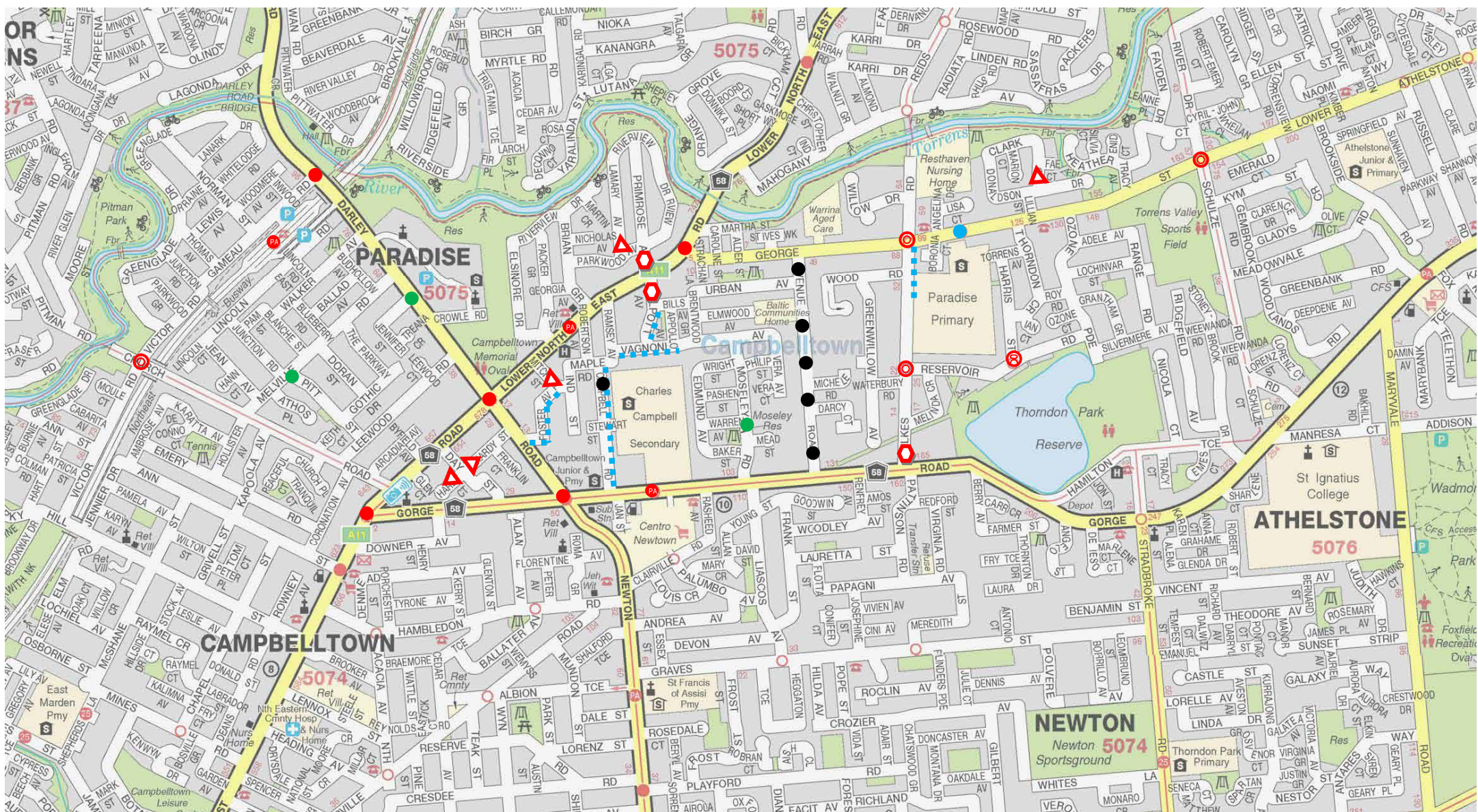
It was observed during site inspections that the 'Keep Left' sign on the western approach of the roundabout at the intersection of Silkes Road was missing.



Photo 5.1 Painted median and parking bays on George Street

5.3.2 Gameau Road/Victor Road

Gameau Road and Victor Road are parallel to the Northeast Busway, connecting Church Road and Darley Road. Both roads are wide with parking restrictions (2 hour parking) currently utilised to control parking on the streets.



Source: UBD Street Directory



- Key**
- PA Pedestrian Actuated Crossing
 - Pedestrian Refuge
 - Roundabout
 - School Zone
 - ▲ Give Way Sign
 - Slow Point
 - Student Crossing
 - Traffic Signal
 - ◻ Stop Sign

Paradise Local Area Traffic Management Plan
Figure 5.1: Existing traffic control devices

More than 1600 veh/day of traffic use Gameau and Victor Roads to access the park and ride car park on the northern side of the Paradise Interchange.

It is likely that Gameau Road and Victor Road may be used as part of a rat run between Darley Road and OG Road. The recorded 85th percentile speed of 56 km/hr is slightly high for major collector road (threshold traffic volume of 6,000 veh/day and 85th percentile speed of 55 km/hr), however it is not considered to be excessive and the volume is well under the threshold.

18 crashes were recorded at the intersection of Gameau Road and Darley Road, 8 of these crashes were right angle crashes resulting in minor injury. Most of the apparent error of these crashes were inattention and fail to stand.

5.3.3 Church Road

Church Road has a wide carriageway, generally undivided but with a narrow raised central island and raised pavement bars at the Church Road/Melville Road intersection and between Leewood Road and Coronation Drive. More than 2000veh/day currently uses Church Road to access the Paradise interchange and also to use other local streets to avoid delays at intersections along North East Road.

The most recent traffic counts conducted along Church Road were recorded in 2001 prior to the reduction in local street speed limits (to 50 km/h). This count was not included in Table 4.1 due to the age of the data. The count showed the 85th percentile speed was 71 km/h and annual average daily traffic volumes up to 2,100 vehicles in the mid section between Melville and Leewood Roads.



Photo 5.2 Church Road

5.3.4 Silkes Road

Silkes Road functions as a major collector road carrying more than 5,200 vehicles per day and is the preferred route for heavy vehicles travelling between George Street and Gorge Road.

Paradise Primary School is located on the eastern side of Silkes Road. A school crossing has been installed approximately 50 m away from the roundabout at the intersection of Silkes Road and George Street. Council has previously received complains about the 25 km/h speed limit being ignored within the school zone. It was observed during site inspections that the number of students using this crossing is relatively low however the orange “Children Crossing” flag was not displayed after school.

Traffic surveys in 2005 and 2010 suggested that while the traffic volume on Silkes Road increased overtime, from 4970 veh/day to 5200 veh/day; speeds has also been reduced slightly, from 59 km/h to 57 km/h, without any traffic control devices being installed. The threshold for a major collector is 6,000 veh/day with the 85th percentile speed of 55 km/hr. While the 85th percentile speed of 57 km/hr is slightly above the threshold, it is not considered excessive for streets of this nature consider the high volume.

11 crashes were recorded at the intersection of Silkes Road and Gorge Road. 9 of these crashes were right angle collision when vehicles from Silkes Road failed to give way to vehicles travelling ahead on Gorge Road. It was observed that right turning buses into Pattinson Road to the bus depot in Newton severely blocked the sight of right turning vehicles from Silkes Road onto Gorge Road.



Photo 5.3 School zone on Silkes Road

5.3.5 Schulze Road

Schulze Road is the secondary route connecting George Street and Gorge Road. The latest traffic count in 2005 showed that the 85th percentile speed of 58 km/h on the northern side of the street was higher than speed threshold of 55 km/hr; however consider the nature and lack of crash history of this road the speed was not considered an issue.

A 'Remember 50' sign was recently installed on the southern end of the road to remind drivers about the speed limit.



Photo 5.4 Intersection of Kym Street and Schulze Road

5.3.6 Melville Road

Melville Road recently had parking bays installed along the length of the road between Darley Road and Church Road and pedestrian refuge on the southern side in between Junction Road and Pitt Street. This had the impact of reducing speeds in the order of 10% (85th percentile speeds reduced to 54 km/h from 59 km/h). Traffic volumes also dropped in the order of 5–10% to approximately 1,250 vehicles per day (annual average daily traffic).

It is understood that several incidents have occurred at the pedestrian refuge, most of them at night and alcohol related. A night inspection was conducted and found that lighting at this location appeared adequate.



Photo 5.5 Melville Road



Photo 5.6 Pedestrian refuge on Melville Road

5.3.7 Campbell Road

There are a number of major traffic generators on both sides of Campbell Road: Charles Campbell Secondary School on the eastern side, Campbelltown Junior and Primary School and a child care centre on the western side. A one lane driveway link was installed to slow traffic down at the school zone and it has worked well therefore no recommendations have been made for this street.



Photo 5.7 One way driveway link on Campbell Road

5.3.8 Avenue Road

Avenue Road provides direct connection between George Street and Gorge Road. Council recently installed 5 slow points along the length of the road mainly to divert heavy vehicles to Silkes Road which is the preferred route. It has been shown that the AADT of Avenue Road decreased to 1,100vpd in 2010 from 2,270 vpd in 1999. No recommendations have therefore been made for this street.

5.3.9 Leewood Road

Leewood Road is a wide straight road with no central line marking. Leewood Road (and other local streets outside Paradise) is believed to be used by traffic avoiding delays at the Lower North East Road intersections with Darley Road and Gorge Road.

The most recent traffic counts conducted along Leewood Road were in the year 2000 prior to the introduction of reduction in local street speed limits (to 50 km/h), this data was not shown in Table 4.1 due to the age of the data. This count showed the 85th percentile as 69 km/h. Annual average daily traffic volume at last count was 400 vehicles, which is relatively low.



Photo 5.8 Leewood Road

5.3.10 Day Street

Day Street provides a short connection between Lower North East Road and Gorge Road. Of approximately 300 metres in length, it exhibits two sharp 90 degree bends in the road. The latest traffic count shows the annual average daily traffic volume to be 625 vehicles, with 85th percentile speeds of 44 km/h.

Whilst the vehicle speeds do not pose an issue, the volume is greater than what might be expected for the number of properties it serves which suggests that for it may be used for rat running in the peak traffic periods; a significant number of vehicles turn right into Day Street from Lower North East Road (southwest) to then turn left onto Gorge Road. This ‘rat-run’ avoids significant delays and long queue lengths that are currently experienced by right turning traffic from Lower North East Road into Gorge Road. This issue has been exacerbated by the ban of the right turn from Lower North East Road into Darley Road (by the Department for Transport, Energy and Infrastructure (DTEI)).

5.3.11 Philpott Avenue

Council had previously received complaints from residents regarding traffic volumes and speeds on Philpott Avenue. Traffic survey indicated that there are no speeding issue on this street however the volume of 751 veh/day marginally exceeds the threshold of 750 veh/day for a local road.

5.3.12 Vagnoni Avenue

Similarly to Philpott Avenue, traffic counts on Vagnoni Avenue indicated that the traffic volume on this street is of 822 veh/day exceeds the threshold for a local road with no speed issues.

5.3.13 Urban Avenue

Traffic counts on Urban Avenue in 2009 showed that the volumes and speeds are under threshold. There is an imbalance between the two directions of travel with 67% of the daily traffic travelling eastbound. This suggests that non local traffic may be using this street for rat running. It is not unusual for streets of this nature as it provides connection from Campbell Road to George Street.

5.3.14 Harris Street

Harris Street is mainly residential with a 2 blocks being occupied as a pickup zone for Paradise Primary School. Council had received several requests for the installation of school zone on this street.

5.3.15 Heather Court and Riverview Drive

Heather Court and Riverview Drive exhibit several bends along its length and streets of this nature often suffer issues of corner cutting. Residents had previously expressed their concerns regarding the safety of their street.



Photo 5.9 Bends on Heather Court

5.3.16 Robertson Avenue

Robertson Avenue provides access in between Lower North East Road and Campbell Road. Residents had previously raised concerns regarding the wide opening at the intersection of Roberson Avenue and Lower North East Road due to an incident that occurred at this location. The width of Robertson Avenue poses a risk to pedestrian crossing this street and also encourage corner cutting.

5.3.17 General observations

It was observed that the streets in the suburb of Paradise are generally wide (above 7 m) and straight. There are very few trees lining the streets which give the perception of a wide corridor conducive to higher travel speeds.

The standard of signage and line marking in the area appear adequate throughout the suburb.

6. Summary of identified traffic issues

Table 6.1 summarises the streets with traffic issues identified above.

Table 6.1 Summary of traffic issues

Street/Intersection	Hierarchical Role of Road	Issue/s	Source of issue identification
Intersection of George Street/ Lower North East Road	Arterial	30 crashes over the past 5 years	Crash statistic
Intersection of George Street/ Silkes Road	Arterial/major collector	Missing 'keep left' sign at roundabout	Observation
Intersection of Gameau Road/Darley Road	Major collector/ arterial	18 crashes	Crash statistic
Church Road	Major collector	Speed: 71 km/hr (2001)	Traffic survey
Silkes Road	Major collector	School Zone being ignored	Resident concern
Intersection of Silkes Road/ Gorge Road	Major collector/ arterial	11 crashes	Crash statistic
Melville Road	Minor collector	Safety at pedestrian refuge	Council
Leewood Road	Local	Speed: 69 km/hr (2000)	Traffic survey
Day Street	Local	Rat running	Observation
Philpott Avenue	Local	Volume: 751 veh/day	Traffic survey/ resident concerns
Vagnoni Avenue	Local	Volume: 822 veh/day	Traffic survey
Harris Street	Local	Traffic and pedestrian conflict	Resident concerns
Heather Court	Local	Request for traffic calming	Resident concerns
Riverview Drive	Local	Request for traffic calming	Resident concerns
Intersection of Robertson Avenue and Lower North East Road	Local/ Arterial	Request for traffic calming	Resident concerns
General		Lack of street trees	Observation



7. Options for improvements

7.1 Options for improvements

This section describes the traffic management strategies which have been developed to address the issues identified as summarised in section 6 of this report.

As discussed with Council, the traffic management plan is aimed primarily at moderating vehicle speeds and improve safety where required and avoid transferring traffic onto adjacent local streets. Council has also indicated its preference for treatments which do not include vertical deflection devices. The ranges of available LATM devices to treat the issues are included in Appendix B (source: AS1742.13: Manual of uniform traffic control devices Part 13: Local area traffic management). Devices available to reduce speed without diverting traffic are:

- Lane narrowing/kerb extensions.
- Midblock median treatments (e.g. pedestrian refuge). Other midblock treatments such as blister islands and driveway links are not considered appropriate given the potential of traffic diversion of these devices.
- Speed limit signs.
- Tactile surface treatments; e.g. paved threshold treatments. Tactile surface treatments are not considered appropriate devices for the LATM within Paradise, given their relative level of noise pollution that would potentially be generated.

7.2 Discussions of issues vs treatments

The following subsections consider various treatments available to address the issues as summarised in Table 6.1.

7.2.1 Intersection of George Street and Lower North East Road

30 crashes were recorded at this signalised intersection over the past 5 years; while 80% of the crashes result in property damage only, it is recommended that Council approach DTEI to assess the adequacy of filter right turn at this intersection to improve the safety at this intersection.

7.2.2 Intersection of George Street and Silkes Road

It was observed during site inspections that the 'Keep Left' sign on the western approach of the roundabout was missing; while this does not pose a major safety issue to the intersection it is recommended that the 'Keep Left' sign be replaced.

7.2.3 Intersection of Gameau Road and Darley Road

18 accidents have been recorded at this junction over the past 5 years. 45% of these were rear end crashes and a further 45% were right angle incidents, which is a common characteristic of traffic signal operation. The reported right angle crashes however involved a number of different movements into and out of Gameau Road. It is recommended that Council discuss with SAPOL regarding the possibility of the installation of a red light camera which is known to have the effect of increasing the awareness at a signalised intersection.

7.2.4 Church Road

An 85th percentile speed of 71 km/hr was recorded in 2001. It is recommended that a traffic survey be conducted for this street to verify if issue still present. If the street still has speed issues, some treatment to reduce speed without diverting traffic will be required, hence midblock slow points and roundabout which is known to have the effect of diverting traffic will not be recommended.

AS1742.13 recommended that LATM devices be placed with a spacing of 80–120 m. Consider the width (9.5 m) and length (900 m from Lower North East Road to Victor Road) of the street, 7–11 midblock median treatments will be required which is considered excessive for this street. It is therefore recommended that parking bays be installed to achieve lane narrowing on this street.

7.2.5 Silkes Road

Residents had raised their concerns over the school crossing on Silkes Road, it was observed during the site inspection that the orange 'Children Crossing' flag was not displayed. It is recommended that school display the orange flag before and after school in increase awareness of the school zone at this location and monitor drivers behaviour. Consider that the small number of students using this crossing, the installation of flashing yellow signal is considered to be excessive. If the display of orange flag was not sufficient to change the behaviour of driver, it is recommended that SAPOL be contacted to assist with the policing of this location.

7.2.6 Intersection of Silkes Road and Gorge Road

11 crashes were recorded at this intersection and it was observed that right turning buses into Pattinson Road to the bus depot in Newton severely blocked the sight of right turning vehicles from Silkes Road onto Gorge Road.

Turning count at this intersection proved that the traffic volume at this intersection met the warrant of *'For each of four one-hour periods of an average day, the major road flow exceeds 900 veh/day in both directions, and the highest volume approach on the minor road exceeds 100 veh/day, and the speed of traffic on the major road or limited sight distance from the minor road causes undue delay or hazard to the minor road vehicles, and there is no other nearby installation easily accessible to the minor road traffic'* as listed in Austroads Guide to Traffic Engineering Practice Series: Traffic Signals.

It is understood that Council staff have previously discussed with DTEI the need for installation of traffic signals at this intersection; without success. It is therefore recommended that DTEI be approached again for the signalisation of this intersection not only for the safety

of vehicles exiting Silkes Road and also for students and pedestrian crossing this section of Gorge Road to get to the bus stop on the eastern side of Pattinson Road.

7.2.7 Melville Road

Council staff advised that several incidents had happened at the pedestrian refuge most of them were alcohol or inattention related at night. A night inspection was undertaken and it was found that the lighting at this location was adequate, however it is recommended that a 'Pedestrians' warning sign together with a 'Refuge Island' sign be installed in advance of the refuge island to highlight the presence of the refuge.

7.2.8 Leewood Road

The traffic survey conducted in recorded an 85th percentile speed of 69 km/hr. It is recommended that a traffic survey be conducted for this street to update the age of the data and verify if the issue still relevant. For similar reasons as mentioned above for Church Road, it is recommended that parking bays be installed to achieve lane narrowing on this street. Alternatively, a pedestrian refuge can be considered in between house number 16 and 18 to which will have the effect of providing safety for pedestrian crossing the road possibly to the playground on Pitt Street and also reduce speeds.

7.2.9 Day Street

The recorded traffic volume of 625 veh/day on Day Street was observed to be too high for what might be expected for the number of properties it serves. This suggests that it may be used for rat running in the peak traffic periods. While the rat running may not pose any safety concern for this street, it is believed that reducing delays and queue lengths at the intersection of Lower North East Road and Gorge Road may ultimately reduce the numbers of vehicles rat running through Days Road. It is therefore recommended that DTEI be approached to evaluate the capacity of the signalised intersection of Lower North East Road and Gorge Road, particularly for right turn traffic travelling in a north bound direction.

7.2.10 Philpott Avenue

Resident concern has been raised regarding the traffic volume on this street, which has been classified as a local road. Traffic surveys have recorded an average weekday traffic volume of 751 veh/day for this street; marginally exceeding the threshold for a local road (refer Table 3.1). Considering the physical characteristics and location of the street in terms of its length and connectivity to other streets, and that there are no speeding issues on this street, no traffic control device is suggested.

7.2.11 Vagnoni Avenue

The recorded traffic volume of 822 veh/day exceeded the threshold of a local road of 750 veh/day however there were no speeding issues on this street. It is, however, desirable to reduce the traffic volume on this street to preserve the characteristic of a local road. Following the success experienced with the installation of slow points on Avenue Road, it is recommended that installation of slow points on Vagnoni Avenue be considered.

7.2.12 Harris Street

School and parents have previously requested a school zone be installed on Harris Street. Installation of school zone will increase driver awareness of the presence of students and hence their safety. It is recommended that a School Zone be installed.

7.2.13 Heather Court and Riverview Drive

The nature of these two streets are very similar, they are both windy and provide opportunities for corner cutting. Considering that the width of these local roads which are not being used as bus route, it is recommended that pavement bars be installed in the middle of the road at the bends to reduce corner cutting which is also known to have the effect of reducing speed.

7.2.14 Intersection of Robertson Avenue and Lower North East Road

Residents had previously raised the wide opening on Robertson Avenue at this intersection which pose risk to both traffic and pedestrian crossing this intersection; it is recommended that a traffic island and line marking be installed on Robertson Avenue to divide the road. The traffic island will also provide refuge to pedestrians crossing the road.

7.2.15 General

It was observed that most streets in Paradise are lacking street trees which are known to have the effect of making the streets appear narrower and hence reducing speeds. It is recommended that Council implement a tree planting program as a long term strategy for traffic calming for the suburb.

8. Recommendations and prioritisations

Table 8.1 and Figure 8.1 summarises the issues and recommendations as discussed in Section 7.2. The following factors were considered in prioritising the recommendations:

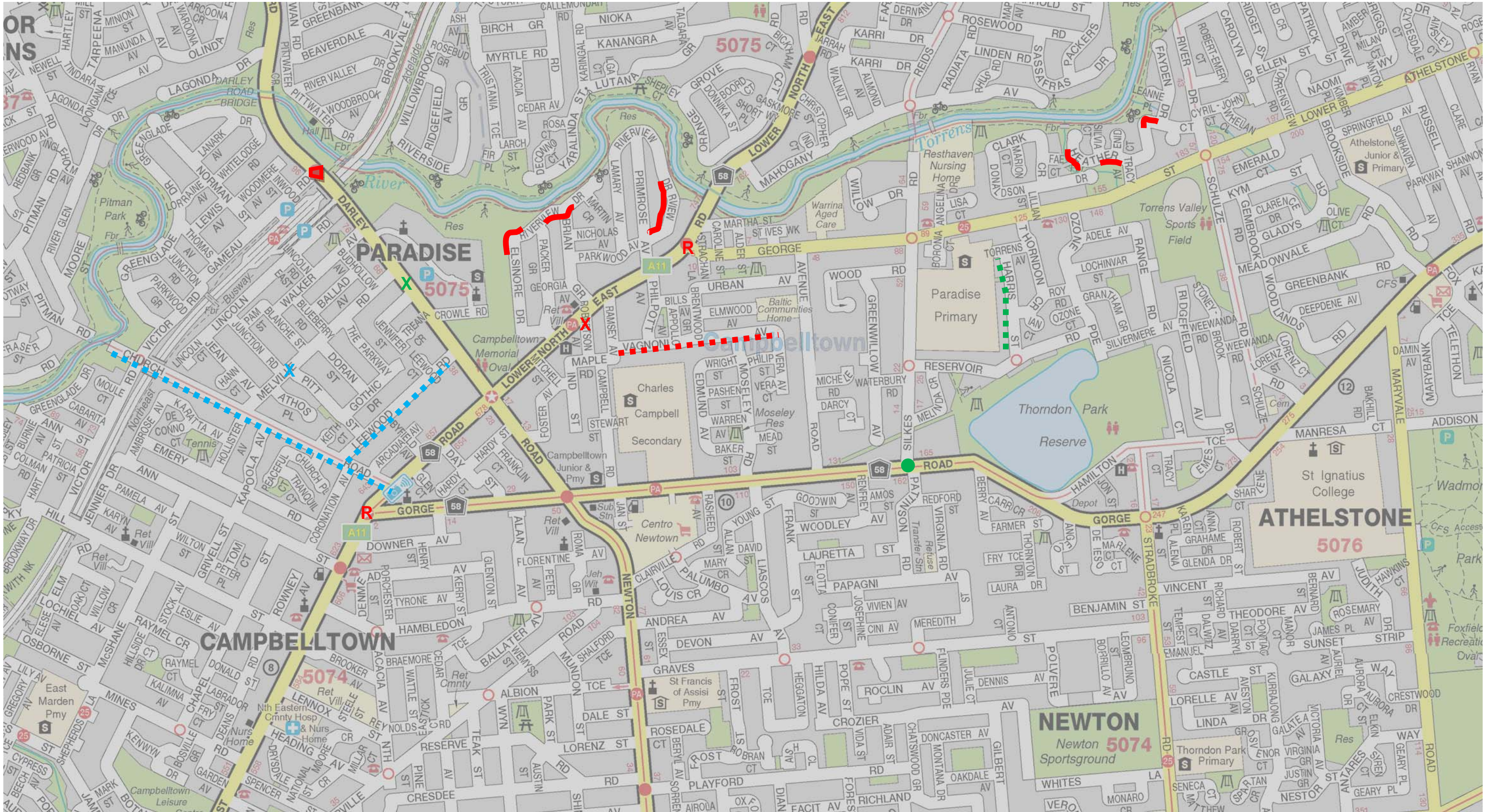
- impact on safety
- difficulty in implementations, and
- cost.

Table 8.1 summarise the relatively straight forward treatments for identified issues can be implemented, these are dealt with directly in the recommendations table, and where further consideration is required these are discussed in detail in Section 7.2.

Table 8.1 Summary of recommendations and prioritisations

Street/ intersection	Identified Issues	Recommendations	Priority
Intersection of George Street/ Lower North East Road	30 crashes over 5 years	Approach DTEI to review the filter right turn	High
Intersection of George Street/ Silkes Road	Missing 'keep left' sign at the roundabout	Replace 'keep left' sign	High
Intersection of Gameau Road/ Darley Road	18 crashes over 5 years	Approach SAPOL to install red light camera at this location	Medium
Church Road	85 th percentile speed of 71 km/hr (2001)	Installation of parking bays and painted median subject to updated traffic survey	High
Silkes Road	School zone being ignored	Display 'Children Crossing' flag	High
Intersection of Silkes Road/ Gorge Road	11 crashes over 5 years	Approach DTEI for the installation of traffic signal	Medium
Melville Road	Safety at pedestrian refuge	Install 'pedestrians' warning sign and 'refuge island' sign	High
Leewood Road	85 th percentile speed of 69 km/hr (2000)	Installation of parking bays and painted median or pedestrian refuge subject to updated traffic survey	High
Day Street	Rat running	Approach DTEI to review the signalised intersection of Lower North East Road and Gorge Road in view of reducing bypassing traffic	Medium
Vagnoni Avenue	Traffic volume of above threshold for local roads	Installation of slow points	Medium
Harris Street	Traffic and pedestrian conflict	Install school zone	High
Heather Court	Request for traffic calming	Install pavement bars at bends	Medium
Riverview Drive	Request for traffic calming	Install pavement bars at bends	Medium
Intersection of Robertson Avenue and Lower North East Road	Wide opening poses risk to traffic and pedestrian	Install traffic island	High
General	Lack of street trees	Implement street trees planting program	Medium

Recommendations with 'High' priority are recommended to be action immediately; 'Medium' priority should be included in Council's strategy plan within 1–2 years.



Source: UBD Street Directory



- Key**

 - Install parking bays and painted median
 - Install pavement bars
 - Install pedestrian crossing sign
 - Install school zone
 - Install red light camera
- Review signal phasing
 - Install slow points
 - Install traffic signal
 - Install traffic island

Paradise Local Area Traffic Management Plan
Figure 8.1: Summary of recommendations

Appendix A

Crash data

Date	Time	Crash Type	Location	Weather	Lighting	Apparent Error	Severity
Schulze Road							
29/03/2007	7:40	Hit fixed object	Midblock between uncoded roads	Dry	Daylight	Inattention	1 minor injury
Gorge Road							
13/03/2009	4:50	Hit fixed object	Intersection of Avenue Road	Dry	Night	Inattention	1 minor injury
6/04/2006	17:00	Right angle	Intersection of Avenue Road	Dry	Daylight	Fail to stand	1 minor injury
25/08/2006	17:45	Right angle	Intersection of Avenue Road	Dry	Night	Fail to stand	PDO
13/10/2006	18:05	Right angle	Intersection of Avenue Road	Dry	Daylight	Fail to give way	1 minor injury
16/01/2008	20:25	Right angle	Intersection of Avenue Road	Dry	Daylight	Fail to give way	PDO
24/07/2008	17:30	Right angle	Intersection of Avenue Road	Dry	Night	Fail to give way	PDO
13/02/2007	9:20	Side swipe	Intersection of Avenue Road	Dry	Daylight	Overtake without due care	PDO
24/02/2006	15:50	Right angle	Intersection of Campbell Road	Dry	Daylight	Fail to give way	PDO
9/09/2006	14:54	Rear end	Intersection of Campbell Road	Dry	Daylight	Reverse without due care	PDO
24/12/2007	12:40	Right angle	Intersection of Campbell Road	Dry	Daylight	Fail to stand	2 minor injury
23/03/2009	20:26	Rear end	Intersection of Moseley Road	Dry	Night	Inattention	PDO
30/05/2009	10:30	Rear end	Intersection of Moseley Road	Dry	Daylight	Reverse without due care	PDO
6/06/2009	21:15	Right angle	Intersection of Moseley Road	Wet	Night	Fail to give way	PDO
8/08/2009	17:00	Right angle	Intersection of Moseley Road	Dry	Daylight	Fail to give way	PDO
9/05/2005	8:30	Rear end	Intersection of Silkes Road	Dry	Daylight	Follow too closely	PDO
14/02/2008	9:30	Rear end	Intersection of Silkes Road	Dry	Daylight	Inattention	PDO
20/06/2006	16:15	Right angle	Intersection of Silkes Road	Dry	Daylight	Disobey Stop Sign	PDO
16/04/2007	16:45	Right angle	Intersection of Silkes Road	Dry	Daylight	Disobey Stop Sign	PDO
3/05/2007	17:45	Right angle	Intersection of Silkes Road	Wet	Night	Disobey Stop Sign	PDO
9/05/2007	16:15	Right angle	Intersection of Silkes Road	Dry	Daylight	Disobey Stop Sign	PDO
18/12/2007	11:15	Right angle	Intersection of Silkes Road	Dry	Daylight	Disobey Stop Sign	1 minor injury
30/03/2008	13:50	Right angle	Intersection of Silkes Road	Dry	Daylight	Disobey Stop Sign	4 minor injury
26/06/2008	11:25	Right angle	Intersection of Silkes Road	Dry	Daylight	Disobey Stop Sign	PDO
30/03/2009	8:50	Right angle	Intersection of Silkes Road	Dry	Daylight	Disobey Stop Sign	PDO
12/03/2010	17:02	Right angle	Intersection of Silkes Road	Dry	Daylight	Disobey Stop Sign	PDO
Gothic Drive							
15/07/2007	20:25	Hit fixed object	Between The Parkway and Doran Street	Dry	Night	Inattention	PDO
18/04/2008	9:50	Hit pedestrian	Between The Parkway and Reserve	Dry	Day	Reverse without due care	1 minor injury
Gameau Road							
28/07/2005	14:00	Rear end	Between Inwood Street and Norman Street	Dry	Day	Reverse without due care	PDO
18/03/2008	7:10	Right angle	Between Inwood Street and Norman Street	Dry	Day	Fail to give way	1 minor injury

Date	Time	Crash Type	Location	Weather	Lighting	Apparent Error	Severity
20/06/2006	16:45	Right angle	Between Inwood Street and Norman Street	Dry	Day	Fail to give way	1 minor injury
Silkes Road							
30/08/2009	12:15	Right angle	Between Wood Road and Reservoir Road	Dry	Daylight	Reverse without due care	PDO
4/09/2008	17:00	Hit parked vehicle	Between Waterbury Road and Melinda Cresce	Dry	Daylight	Inattention	PDO
Avenue Road							
15/04/2007	16:00	Hit fixed object	Between Gorge Road and Darcy Court	Dry	Daylight	Inattention	PDO
28/12/2008	1:00	Hit parked vehicle	Between Michele Road and Urban Avenue	Dry	Night	Inattention	PDO
19/04/2005	16:30	Left road- out of control	between uncoded roads	Dry	Daylight	Vehicle Fault	1 minor injury
Reservoir Road							
17/07/2007	9:30	Hit fixed object	Intersection of Harris Street	Wet	Daylight	Inattention	1 minor injury
23/01/2010	6:05	Hit fixed object	Between Silkes Road and Melinda Crescent	Dry	Night	Inattention	PDO
Melville Road							
6/12/2008	3:11	Hit parked vehicle	Between uncoded roads	Dry	Night	Driving under influence	PDO
3/05/2008	8:00	Hit fixed object	Between uncoded roads	Dry	Day	Inattention	PDO
31/07/2009	9:30	Hit fixed object	Between uncoded roads	Wet	Day	Inattention	1 minor injury
4/08/2006	12:00	Right angle	Intersection of Blanche Street	Dry	Day	Fail to give way	PDO
23/09/2009	16:30	Side swipe	Between Pitt Street and Blanche Street	Dry	Day	Overtake without due care	PDO
George Street							
26/12/2008	7:00	Hit parked vehicle	Between Boronia Court and Silkes Road	Dry	Day	Inattention	PDO
23/10/2009	11:00	Hit parked vehicle	Between Lillian Street and Thorndon Crescent	Dry	Day	Inattention	PDO
4/07/2006	8:45	Rear end	Between Silkes Road and Avenue Road	Dry	Day	Inattention	PDO
4/08/2006	19:45	Side swipe	Between Silkes Road and Avenue Road	Dry	Night	Overtake wihtout due care	1 minor injury
2/05/2007	14:02	Hit fixed object	Between St Ives Walk and Alder Street	Dry	Day	Inattention	1 minor injury
3/08/2006	17:25	Hit parked vehicle	Between St Ives Walk and Avenue Road	Dry	Day	Inattention	PDO
28/08/2006	21:30	Hit fixed object	Between Strachan Lane and Caroline Street	Dry	Night	Inattention	PDO
24/11/2009	21:10	Hit fixed object	Between Thorndon crescent and Angelina Driv	Dry	Night	Inattention	PDO
1/11/2006	9:15	Hit fixed object	Between Tracy Avenue and Schulze Road	Dry	Day	Inattention	1 minor injury
12/12/2007	18:20	Side swipe	Between Tracy Avenue and Schulze Road	Dry	Day	Fail to give way	1 minor injury
26/01/2009	20:18	Hit parked vehicle	Between uncoded roads	Dry	Day	DUI	PDO
14/06/2008	10:50	Rear end	Between uncoded roads	Dry	Day	Inattention	PDO
19/09/2009	13:10	Rear end	Between uncoded roads	Dry	Day	Follow too closely	PDO
27/01/2009	16:35	Hit pedestrian	Intersection Alder Street	Dry	Daylight	Inattention	1 minor injury
5/08/2009	8:30	Right angle	Intersection Alder Street	Dry	Daylight	Fail to give way	PDO
13/12/2009	16:30	Rear end	Intersection of Avenue Road	Dry	Daylight	Inattention	PDO

Date	Time	Crash Type	Location	Weather	Lighting	Apparent Error	Severity
1/09/2008	13:00	Right angle	Intersection of Avenue Road	Dry	Daylight	Fail to give way	PDO
11/03/2007	19:55	Right angle	Intersection of Avenue Road	Dry	Daylight	Fail to give way	PDO
25/09/2005	2:00	Hit fixed object	Intersection of Lower North East Road	Dry	Night	DUI	PDO
27/03/2008	8:25	Right angle	Intersection of St Ives Walk	Dry	Day	Fail to give way	PDO
10/06/2006	11:50	Hit fixed object	Intersection of Lower North East Road	Dry	Daylight	Inattention	1 minor injury
24/08/2009	15:35	Hit fixed object	Intersection of Lower North East Road	Dry	Daylight	Inattention	3 minor injury
13/06/2005	14:50	Rear end	Intersection of Lower North East Road	Dry	Daylight	Reverse without due care	PDO
16/02/2006	15:28	Rear end	Intersection of Lower North East Road	Dry	Daylight	Inattention	PDO
21/02/2006	17:20	Rear end	Intersection of Lower North East Road	Dry	Daylight	Inattention	PDO
19/05/2006	10:45	Rear end	Intersection of Lower North East Road	Dry	Daylight	Inattention	PDO
24/08/2006	8:50	Rear end	Intersection of Lower North East Road	Wet	Daylight	Follow too closely	2 minor injury
23/02/2007	10:15	Rear end	Intersection of Lower North East Road	Dry	Daylight	Inattention	2 minor injury
8/06/2008	16:15	Rear end	Intersection of Lower North East Road	Wet	Daylight	Inattention	PDO
9/10/2008	9:30	Rear end	Intersection of Lower North East Road	Dry	Daylight	Inattention	PDO
17/11/2008	9:15	Rear end	Intersection of Lower North East Road	Dry	Daylight	Inattention	PDO
24/04/2009	10:00	Rear end	Intersection of Lower North East Road	Wet	Daylight	Inattention	PDO
31/07/2009	10:00	Rear end	Intersection of Lower North East Road	Wet	Daylight	Inattention	PDO
1/10/2009	17:15	Rear end	Intersection of Lower North East Road	Dry	Daylight	Inattention	PDO
21/02/2005	15:25	Right angle	Intersection of Lower North East Road	Dry	Daylight	Disobey- Traffic lights	PDO
19/06/2005	14:30	Right angle	Intersection of Lower North East Road	Dry	Daylight	Fail to stand	PDO
8/10/2006	13:10	Right angle	Intersection of Lower North East Road	Dry	Daylight	Fail to stand	PDO
19/02/2008	15:30	Right angle	Intersection of Lower North East Road	Dry	Daylight	Disobey- Traffic lights	PDO
21/02/2008	17:10	Right angle	Intersection of Lower North East Road	Dry	Daylight	Disobey- Traffic lights	PDO
12/01/2010	16:00	Right angle	Intersection of Lower North East Road	Dry	Daylight	Disobey- Traffic lights	PDO
16/03/2009	6:45	Roll over	Intersection of Lower North East Road	Wet	Daylight	Inattention	1 minor injury
10/02/2005	18:00	Side swipe	Intersection of Lower North East Road	Dry	Daylight	Incorrect turn	PDO
30/05/2005	11:45	Side swipe	Intersection of Lower North East Road	Dry	Daylight	change lanes to endanger	PDO
28/04/2008	7:50	Rear end	Intersection of Silkes Road	Dry	Daylight	Follow too Closely	PDO
7/08/2009	17:00	Rear end	Intersection of Silkes Road	Dry	Daylight	Follow too Closely	PDO
23/05/2007	15:15	Rear end	Intersection of Silkes Road	Dry	Daylight	Inattention	PDO
16/01/2008	17:10	Rear end	Intersection of Silkes Road	Dry	Daylight	Inattention	PDO
27/09/2006	18:10	Rear end	Intersection of Silkes Road	Dry	Daylight	Inattention	1 minor injury
19/05/2007	9:00	Right angle	Intersection of Silkes Road	Wet	Daylight	Fail to give way	PDO
30/01/2009	9:40	Right angle	Intersection of Silkes Road	Dry	Daylight	Fail to give way	1 minor injury

Date	Time	Crash Type	Location	Weather	Lighting	Apparent Error	Severity
30/03/2006	15:30	Right angle	Intersection of Silkes Road	Dry	Daylight	Fail to give way	PDO
16/06/2006	17:45	Rear end	Intersection of Lower North East Road	Dry	Night	Inattention	PDO
20/06/2008	17:30	Rear end	Intersection of Lower North East Road	Wet	Night	Inattention	PDO
16/04/2005	23:20	Right angle	Intersection of Lower North East Road	Dry	Night	Fail to stand	PDO
4/08/2008	19:10	Right angle	Intersection of Lower North East Road	Dry	Night	Disobey- Traffic lights	PDO
13/06/2009	00:10	Right angle	Intersection of Lower North East Road	Wet	Night	Fail to give way	PDO
7/01/2010	20:45	Right angle	Intersection of Lower North East Road	Dry	Night	Fail to stand	1 minor injury
18/05/2007	3:30	Hit fixed object	Intersection of Silkes Road	Wet	Night	Inattention	1 minor injury
26/07/2008	18:15	Rear end	Intersection of Tracy Avenue	Dry	Night	Inattention	PDO
Church Road							
25/11/2008	19:00	Right angle	Intersection of Lower North East Road	Dry	Daylight	Fail to give way	1 minor injury
9/05/2009	10:40	Head on	Intersection of Lower North East Road	Dry	Daylight	Fail to keep left	PDO
23/05/2007	23:10	Right angle	Intersection of Lower North East Road	Dry	Night	Fail to give way	PDO
21/12/2007	15:30	Rear end	Intersection of Lower North East Road	Dry	Daylight	Follow too closely	PDO
1/04/2008	18:10	Right angle	Intersection of Lower North East Road	Dry	Daylight	Fail to give way	PDO
Leewood Road							
24/03/2007	10:50	Rear end	Intersection of Darley Road	Dry	Daylight	Inattention	PDO
5/12/2007	17:20	Right turn	Intersection of Darley Road	Dry	Daylight	Fail to stand	PDO
12/07/2008	15:43	Rear end	Intersection of Darley Road	Dry	Daylight	Inattention	PDO
8/12/2009	17:30	Right turn	Intersection of Darley Road	Dry	Daylight	Fail to stand	2 minor injury
Lower North East Road							
16/06/2009	7:30	Rear end	Intersection Glen Court Paradise	Dry	Daylight	Inattention	PDO
18/02/2008	13:10	Rear end	Intersection Martha Street	Dry	Daylight	Inattention	PDO
24/12/2010	16:30	Rear end	Intersection Martha Street	Dry	Daylight	Inattention	1 minor injury
18/06/2009	7:45	Right angle	Intersection Martha Street	Dry	Daylight	Fail to stand	PDO
30/12/2007	11:45	Rear end	Intersection Martha Street	Dry	Daylight	Inattention	PDO
9/07/2009	8:35	Rear end	Intersection Mitchell Stret	Dry	Daylight	Inattention	PDO
6/01/2009	13:00	Right angle	Intersection Primrose Avenue	Dry	Daylight	Disobey stop sign	PDO
27/10/2009	16:30	Right angle	Intersection Primrose Avenue	Dry	Daylight	Disobey stop sign	1 minor injury
20/02/2010	10:40	Right angle	Intersection Primrose Avenue	Dry	Daylight	Fail to stand	1 minor injury
24/06/2007	14:00	Right angle	Intersection Primrose Avenue	Dry	Daylight	Disobey stop sign	1 minor injury
2/09/2008	17:15	Rear end	Intersection Primrose Avenue	Dry	Daylight	Inattention	PDO
10/10/2005	11:10	Right angle	Intersection Primrose Avenue	Dry	Daylight	Fail to stand	PDO
9/12/2009	16:00	Rear end	Intersection Robertson Avenue	Dry	Daylight	Inattention	PDO

Date	Time	Crash Type	Location	Weather	Lighting	Apparent Error	Severity
19/05/2008	9:19	Right angle	Intersection Robertson Avenue	Dry	Daylight	Fail to give way	2 minor injury
12/06/2008	7:30	Rear end	Intersection Robertson Avenue	Dry	Daylight	Follow too closely	1 minor injury
14/03/2006	10:05	Right angle	Intersection Robertson Avenue	Dry	Daylight	Fail to give way	PDO
Darley Road							
8/11/2007	16:20	Hit fixed object	Intersection Crowle Road	Dry	Daylight		PDO
2/06/2006	18:50	Rear end	Intersection Crowle Road	Dry	Night	Inattention	PDO
30/06/2006	13:30	Rear end	Intersection Crowle Road	Wet	Daylight	Inattention	PDO
22/05/2009	15:30	Rear end	Intersection Crowle Road	Dry	Daylight	Fail to give way	PDO
20/06/2006	16:25	Right angle	Intersection Crowle Road	Dry	Daylight	Fail to stand	PDO
31/08/2008	8:30	Right angle	Intersection Crowle Road	Dry	Daylight	Fail to stand	1 minor injury
9/10/2009	17:35	Right angle	Intersection Crowle Road	Dry	Daylight	Fail to stand	PDO
18/08/2007	16:00	Rear end	Intersection Foster Avenue	Dry	Daylight	Inattention	1 minor injury
15/07/2005	11:15	Rear end	Intersection Gameau Road	Dry	Daylight	Inattention	1 minor injury
26/07/2007	00:45	Hit fixed object	Intersection Gameau Road	Dry	Night	Inattention	PDO
28/03/2006	17:05	Hit pedestrian	Intersection Gameau Road	Dry	Daylight	Disobey traffic light	1 minor injury
2/11/2005	14:20	Rear end	Intersection Gameau Road	Dry	Daylight	Inattention	PDO
19/12/2005	8:40	Rear end	Intersection Gameau Road	Dry	Daylight	Inattention	PDO
17/05/2006	15:45	Rear end	Intersection Gameau Road	Dry	Daylight	Inattention	1 minor injury
25/12/2006	11:45	Rear end	Intersection Gameau Road	Dry	Daylight	Inattention	PDO
10/07/2007	19:30	Rear end	Intersection Gameau Road	Dry	Night	Follow too closely	PDO
6/01/2008	16:00	Rear end	Intersection Gameau Road	Dry	Daylight	Inattention	PDO
22/09/2009	11:10	Rear end	Intersection Gameau Road	Dry	Daylight	Inattention	PDO
24/03/2006	18:45	Right angle	Intersection Gameau Road	Dry	Daylight	Fail to stand	PDO
27/09/2006	9:05	Right angle	Intersection Gameau Road	Dry	Daylight	Disobey traffic light	PDO
2/02/2007	8:25	Right angle	Intersection Gameau Road	Dry	Daylight	Fail to stand	1 minor injury
18/08/2008	6:45	Right angle	Intersection Gameau Road	Dry	Daylight	Fail to give way	1 minor injury
11/11/2008	8:15	Right angle	Intersection Gameau Road	Dry	Daylight	Fail to stand	PDO
17/05/2009	6:20	Right angle	Intersection Gameau Road	Dry	Daylight	Fail to stand	1 minor injury
24/07/2009	18:58	Right angle	Intersection Gameau Road	Dry	Night	Disobey traffic light	1 minor injury
10/11/2009	17:30	Right angle	Intersection Gameau Road	Dry	Daylight	Fail to stand	1 minor injury
Campbell Road							
18/11/2005	18:10	Hit pedestrian	Between Gorge Road and Stewart Street	Dry	Daylight	Inattention	1 serious injury

Date	Time	Crash Type	Location	Weather	Lighting	Apparent Error	Severity
Crowle Road							
22/05/2009	18:50	Rear end	Between Darley Road and Reserve	Dry	Night	Inattention	2 minor injury
Edmund Avenue							
19/04/2008	15:00	Hit fixed object	Interseciton Baker Street	Dry	Daylight	Reverse without due care	PDO
Foster Avenue							
10/11/2005	18:20	Rear end	Between Mitchell Street and uncoded road	Wet	Daylight	Follow too closely	PDO
Gothic Drive							
15/07/2007	20:25	Hit fixed object	Between The Parkway and Doran Street	Dry	Night	Inattention	PDO
18/04/2008	9:50	Hit pedestrian	Between The Parkway and Reserve	Dry	Daylight	Reverse without due care	1 minor injury
Greenglade Drive							
1/11/2008	3:00	Hit fixed object	Between uncoded roads	Dry	Night	Inattention	PDO
Leewood Road							
25/02/2007	12:30	Hit parked vehicle	Between Pitt Street and Leewood Court	Dry	Daylight	Inattention	PDO
Melville Road							
6/12/2008	3:11	Hit parked vehicle	Between uncoded roads	Dry	Night	DUI	PDO
3/05/2008	8:00	Hit fixed object	Between uncoded roads	Dry	Daylight	Inattention	PDO
31/07/2009	9:30	Hit fixed object	Between uncoded roads	Wet	Daylight	Inattention	1 minor injury
Mitchell Street							
9/05/2005	8:25	Hit fixed object	Intersection Ind Street	Dry	Daylight	Inattention	PDO
Norman Street							
26/02/2005	1:45	Hit fixed object	Intersection Lanark Avenue and Greenglade Dr	Dry	Night	Inattention	1 serious injury
Parkwood Avenue							
29/06/2007	20:55	Hit fixed object	Intersection of Brian Grove and Reserve	Dry	Night	Inattention	PDO
Primrose Avenue							
10/09/2006	9:45	Hit fixed object	Between Riverview Drive and Parkwood Avenue	Dry	Daylight	Reverse without due care	PDO
Reservoir Road							
17/07/2007	9:30	Hit fixed object	Intersection Harris Street	Wet	Daylight	Inattention	1 minor injury
23/01/2010	6:05	Hit fixed object	Between Silkes Road and Melinda Crescent	Dry	Night	Inattention	PDO
Silvermere Avenue							
1/04/2008	8:40	Hit parked vehicle	Between uncoded roads	Dry	Daylight	Inattention	PDO
Stoneybrook Drive							
17/07/2008	10:30	Right angle	Intersection Hamilton Terrace	Dry	Daylight	Fail to give way	1 minor injury

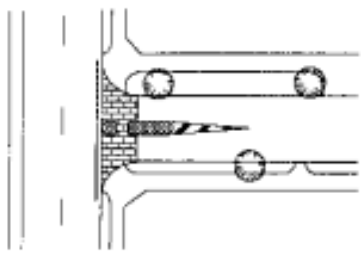
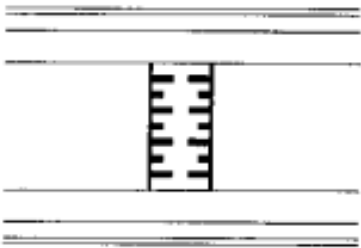
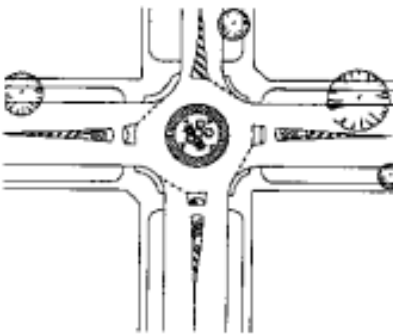
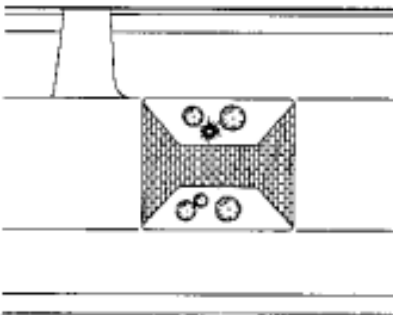
Date	Time	Crash Type	Location	Weather	Lighting	Apparent Error	Severity
Thorndon Crescent							
6/02/2005	21:15	Hit parked vehicle	Between Torrens Avenue and uncoded road	Dry	Night	Inattention	1 serious injury
Torrens Avenue							
11/04/2009	0:00	Hit parked vehicle	Between Thorndon Crescent and Harris Street	Dry	Night	Inattention	PDO
Vera Street							
17/11/2008	18:00	Right angle	Between Philip Street and Vera Court	Dry	Night	Reverse without due care	PDO
Victor Road							
16/07/2006	2:00	Hit fixed object	Between Greenglade Drive and Church Road	Wet	Night	Inattention	PDO
Robertson Avenue							
17/11/2006	8:15	Right angle	Intersection Maple Road	Dry	Daylight	Fail to give way	1 minor injury

Appendix B

LATM devices – Advantages and Disadvantages

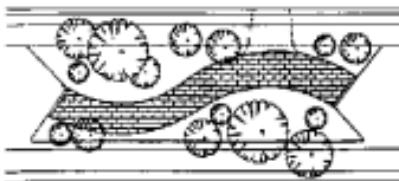
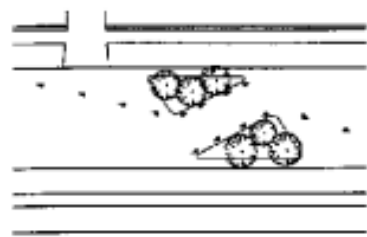
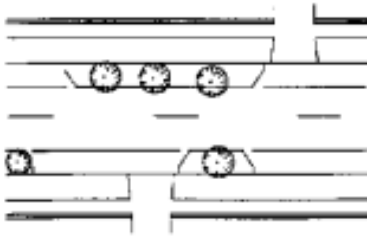
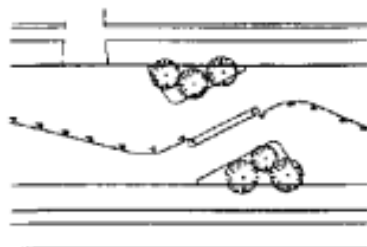
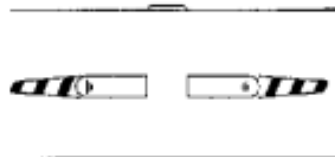
(source: Australian Standard 1742.13, Manual of uniform traffic control devices, Part 13: Local area traffic management)

TABLE 2.1
LATM DEVICES—ADVANTAGES AND DISADVANTAGES

LATM device	Advantages	Disadvantages
 <p>1 Perimeter (threshold) treatment</p>	<p>Provides a positive indication that a driver is leaving the arterial road system and entering a local area. Reduces entry speeds. Can provide a useful staging for pedestrians. Provides a landscaping opportunity.</p>	<p>Low speed turns from the arterial road may affect traffic flow on the arterial road</p>
 <p>2 Road hump</p>	<p>When correctly positioned, it reduces vehicle speeds in the vicinity of the hump. When used in a series, it reduces speeds over the entire length of the street. Through traffic is often discouraged from using the street. It is a relatively low cost device to install and maintain.</p>	<p>May increase noise due to braking, acceleration and vertical displacement of vehicles. Reduces the 85th percentile speeds but may leave unaffected the small percentage of high speed vehicles.</p>
 <p>3 Roundabout</p>	<p>Reduces the number of conflict points in an intersection. Reduces vehicle speeds through the intersection. Provides orderly and continuous flow of traffic. Clarifies priority and simplifies decision making. Increases conspicuity of the intersection.</p>	<p>May be restrictive for some larger service and emergency vehicles unless the roundabout is mountable. May involve considerable construction costs, especially if land acquisition is required. May increase noise because of extra gear changing. May require special lighting at an added cost.</p>
 <p>4 Single-lane slow point</p>	<p>Reduces speed near the device. When used in series it reduces overall speed. Discourages through traffic. Imposes minimal inconvenience to local residents. Increases pedestrian safety. Provides a landscaping opportunity.</p>	<p>Landscaping needs to be maintained to ensure that visibility is not blocked. It is contrary to driver expectations if used in isolation. There is possibility of increased noise. Can be hazardous for vehicular traffic and cyclists if not designed and maintained correctly. Confrontation between opposing drivers arriving simultaneously could create problems.</p>

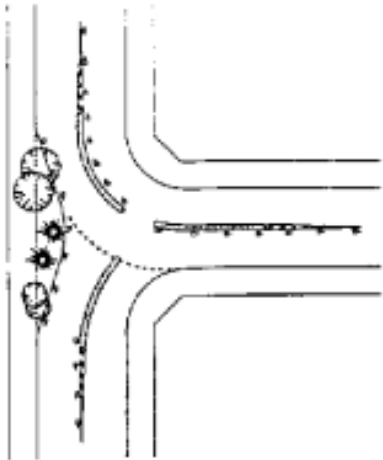
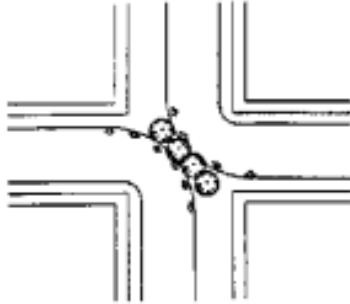
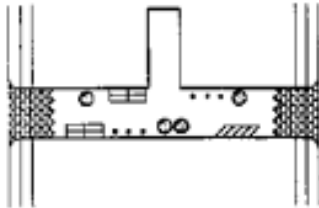
(continued)

TABLE 2.1 (continued)

LATM device	Advantages	Disadvantages
	<p>As for (4) Provides greater visual obstruction than (4). Can provide opportunity for substantial landscaping.</p>	<p>May restrict emergency vehicles. May increase the area to be maintained by residents. Cost can be considerable because of its length. (Best installed when the street is due for reconstruction.)</p>
<p>5 Driveway link</p> 	<p>As for (4)</p>	<p>As for (4). May restrict emergency vehicles.</p>
	<p>Causes only minor inconvenience to local users. Regulates parking and serves to protect parked vehicles. Can be used at intervals to produce landscaping scheme.</p>	<p>Not very effective in reducing speeds. Not very effective as a visual obstruction.</p>
<p>7 Two-lane slow point</p> 	<p>As for (4), except that the increase in pedestrian safety may be smaller.</p>	<p>As for (4) It is usually less effective in controlling speeds than other devices. May restrict emergency vehicles. Is not effective as a visual obstruction.</p>
<p>8 Two-lane angled slow point</p> 	<p>Provides a refuge for pedestrians and cyclists crossing the street. Visually enhances the residential streetscape when landscaped.</p>	<p>Will not reduce speeds by as much as a vertical displacement device, or other horizontal displacement devices.</p>
<p>9 Mid block island</p>		

(continued)

TABLE 2.1 (continued)

LATM device	Advantages	Disadvantages
 <p>10 Modified intersection</p>	<p>Reduces vehicle speeds in the vicinity of the device. Can lower vehicle speeds along the length of the street when placed in series. May discourage through traffic along the top of the 'T'. May be used to reinforce changes in priority resulting from alterations to the positioning of STOP signs or GIVE WAY signs.</p>	<p>Can be hazardous for vehicular traffic and may cause confusion regarding intersection priority if not correctly designed. Must be designed to accord with State regulations.</p>
 <p>11 Road closures (a diagonal closure is illustrated)</p>	<p>Eliminates through traffic. Provides landscaping opportunities. Reduces conflict points if used at an intersection. Increases pedestrian safety.</p>	<p>May inconvenience residents in gaining access to their properties. Can shift traffic volumes to adjacent streets. May inhibit access by emergency vehicles.</p>
 <p>12 Shared zone</p>	<p>Provides a low speed environment which is safer for pedestrians and cyclists. Can improve amenity without affecting access. Provides for flexibility of parking layouts.</p>	<p>High cost.</p>