Eastwood Town Centre
Transport Management and Access Plan

Final Report

Prepared for

City of Ryde

October 2008

Cardno Eppell Olsen Pty Ltd
ABN 82 095 614 154
www.eo.com.au

Sydney Office
Level 3, 910 Pacific Highway
Gordon NSW 2072
T (02) 9496 7700
F (02) 9499 3902

Brisbane Office
Level 1, 9 Gardner Close
Milton QLD 4064
T (07) 3310 2401
F (07) 3369 9722

Wollongong Office
278 Keira Street
Wollongong NSW 2500
T 1300 369 093

Gold Coast Office
Suite 2/20 Nerang Street
Nerang Q 4211
T (07) 5502 1585
F (07) 5502 1586

Document Control

Eastwood TMAP Final Report

Version	Date	Author		Reviewer	
		Name	Initials	Name	Initials
Preliminary Draft	30 November 2007	Jason Scoufis / Clement Lim/Benny Chen	JS/CL/BC	Anissa Levy	AL
Final Draft	17 April 2008	Jason Scoufis / Clement Lim/Benny Chen	JS/CL/BC	Anissa Levy	AL
Final Draft April 08	29th April 2008	Jason Scoufis / Clement Lim/Benny Chen	JS/CL/BC	Anissa Levy	AL
Final Draft May 08	19th May 2008	Jason Scoufis / Lynsey McGarvey	JS/LM	Anissa Levy	AL
Final Report October 08	7th October 2008	Jason Scoufis / Clement Lim/Benny Chen	JS/CL/BC	Anissa Levy	AL

Council Review (at Committee of the Whole)

Version	Date
Final Draft	06 May 2008
Final Report	14 October 2008

TABLE OF CONTENTS

Contents Page Number

Appendices

List of Tables

List of Figures


EXECUTIVE
SUMMARY

EXECUTIVE SUMMARY

Introduction

Cardno Eppell Olsen was commissioned by the City of Ryde in May 2007 to undertake a Transport Management and Access Plan (TMAP) for Eastwood Town Centre.

The scope of work for this study requires the preparation of the following for the Eastwood Town Centre area:

- Preparation of a Traffic Management Plan to identify how best to support development and growth over the next 20 years taking into consideration key developments in the area;
- Preparation of a Parking Management Plan;
- Preparation of an Access Plan that takes into consideration existing pedestrian linkages and gives advice of new linkages (if required) to enhance pedestrian movements and reduce potential pedestrian clustering in the Town Centre;
- Ensure that new infrastructure (if required) adequately supports potential growth;
- Promote economically, environmentally and socially sustainable growth;
- Encourage alternative forms of transport (walking, cycling, public transport); and
- Link with the Ryde Integrated Transport and Land Use Strategy.

Existing Traffic Conditions

Analysis using SIDRA Intersection Analysis software showed that the intersections within the Town Centre are operating at a satisfactory Level of Service under existing control and traffic with the exception of the intersection of Rutledge Street/West Parade Ramp which has excessive delays for left turning vehicles leaving the town centre from the ramp turning into Rutledge Street heading eastbound and vehicles heading southbound on Blaxland Road at Balaclava Road making left turns and straight through which are exhibiting excessive delays in both the AM and PM peaks.

Existing Parking Conditions

A parking inventory was carried in July 2007 of on-street and off-street parking spaces within the Eastwood Town Centre in the area bounded by Rutledge Street, Shaftsbury Road, Wingate Avenue, Balaclava Road and Blaxland Road. The inventory detailed the location, time restriction and capacity of on and off-street parking areas available for public parking (both public and private parking).

A total of 957 off-street parking spaces are provided, with a further 902 on-street spaces in the CBD. In total, 1859 spaces were detailed. A parking occupancy survey was undertaken with the results as detailed below:

- High occupancy rate during peak hours at the off-street car parks at Woolworths (87%), Glen Street (86%), Rowe Street (94%) and Railway Parade (south) (100%) car parks with limited opportunities to find parking in these locations;
- All off-street parking areas have occupancy rates of greater than 50%.
- Most on-street surveyed locations have high parking occupancy during peak hours;
- Due to unrestricted parking limits, the road sections along Wingate Avenue (100%) First Avenue (100%) and Clive Road (97%) exhibit full occupancy; and
- High occupancy rates in the on-street road sections of Ethel Street (94%), Hillview Lane 94%), and Lakeside Road (86%).

Existing Pedestrian and Cycling Conditions

The major constraint to walking and cycling within Eastwood town centre is the rail line which travels through the area. The rail line separates east from west and provides limited crossing opportunities. Existing crossing opportunities (i.e. underpasses) are unattractive and poor in terms of safety and security. Some overlooking surveillance is provided on the northern underpass on the eastern side of the rail line. This surveillance is provided from the train station platforms and a small café outdoor eating area overlooking the underpass.

On the western side of the rail line, there is a much stronger focus on traffic movements rather than pedestrians and cyclists. The location of major roads carrying through traffic on this side of town creates this traffic dominance.

Other constraints identified for pedestrians and cyclists in Eastwood Town Centre are described below:

- Currently, both sides of the town centre present less active frontages to the train station. Key activity areas are located away from the train station;
- There are steep grades on some streets on the eastern side of the town centre which can be a barrier to some pedestrians and cyclists;
- There are high traffic volumes in key pedestrian activity areas on the western side of the town centre, which creates some conflict;
- The eastern side of the town centre is characterised by long blocks. This creates a less accessible and convenient walking environment;
- There is currently no clear visual connection between the eastern and western town centre precincts;
- Streets on the eastern side of the town centre are typically wide, making it difficult for pedestrians to safely and conveniently cross; and
- Traffic domination on streets surrounding the town centre does not encourage pedestrian and cycle access from surrounding residential areas.

Existing Public Transport Conditions

Eastwood is located within Contract Region 7, which extends from Chatswood west to Parramatta. State Transit operates the vast majority of bus services within this region, and all routes that serve Eastwood. Currently, ten routes operate either to or through Eastwood Town Centre.

Eastwood Railway Station is located on the Northern Line, 21km from Sydney Terminal. It is currently served by both suburban and interurban services. Suburban service frequency is generally half-hourly throughout the day, with additional services in both directions during peak periods. Generally every second interurban service stops at Eastwood, with the other interurban services stopping at Epping.

Eastwood is a major interchange between bus and rail services, particularly for Macquarie University students.

Assessment of Future Transport Conditions

In order to assess future substantial land use changes and road network options the Eastwood Transport Model (ETM) has been created using the SATURN modelling program.

A total of six road network changes have been assessed to determine whether they provide an improvement to the overall performance of the road network and also what local impact they have on intersection performance. The year 2027 has been assessed with the following options and land use assumptions as provided by Council:

- **OPTION 1:** Bus Priority Measures along both sides of Eastwood Station taking into consideration existing and future bus routes planned for the area including:
    - converting the West Parade southbound ramp between West Parade and Rutledge Street to bus only;
    - introducing an eastbound bus lane in Ball Avenue at Blaxland Road intersection; and
    - installing a southbound bus lane in Railway Parade at First Avenue and introducing a b-phase at the intersection;

- A modified bus priority road network was modelled (**OPTION 1a**) which included a bus only section of the West Parade ramp between the Eastwood Shopping Centre access and Rutledge Street, thus allowing all movements into and out of the Shopping centre access with the exception of the right turn out of the centre into west Parade;

- **OPTION 2:** Closure of The Avenue from Rowe Street to Progress Avenue and The Avenue to Trelawney Street to facilitate the extension of the Pedestrian Mall;

- **OPTION 3:** Extend Trelawney Street to Hillview Lane and Council's Glen Street Car Park;

- **OPTION 4:** Widen Hillview Lane to allow two-way traffic flow between Shaftsbury Road and West Parade;

- **OPTION 5:** Provision of Right Turn Lane at the intersection of Trelawney Street and Rutledge Street for northbound vehicles wishing to head eastbound; and

- **OPTION 6:** Provision of Left Turn from Rutledge Street onto off-ramp to West Parade for southbound vehicles along Rutledge Street.

The State Plan, A New Direction for NSW is about shaping the State's future. The Plan sets out clear targets for improved outcomes and service.

Every day in NSW almost two million passenger trips are taken on public transport. The people who use public transport expect a reliable, high quality and safe service. By providing a quality service and increased capacity, public transport will be able to attract an increasing share of journeys.

The target as set out in The State Plan is to increase the share of commuter trips made by public transport to and from the Sydney CBD during peak hours from 72% to 75% by 2016 and to increase the proportion of total journeys to work by public transport in the Sydney metropolitan region from 20%-22% to 25%. Given these targets we have assessed each of the above options under two public transport scenarios detailed below:

- **Scenario 1** assumes a 20% discount on anticipated traffic volumes due to public transport; and
- **Scenario 2** assumes a 0% discount on anticipated traffic volumes due to public transport.

Periodic (five yearly) reviews of public transport mode splits will be undertaken to track progress against the existing mode split, provided by State Transit Authority (STA) and Railcorp trip counters. Should these reviews identify under-achievement of public transport mode split (i.e. a reduction as compared to previously measured levels), a “Contingency Plan” will be put into a place which includes the following actions:

- Lobby STA to review bus priority measures to and from Eastwood and to introduce new / additional improvements; and
- Lobby Railcorp to review the capacity of the rail service with the intention of increasing service capacity in peak periods.

ENGINEERING ACTION PLAN

An Engineering Action Plan has been developed to detail devices and engineering improvements for upgrading vehicular traffic, pedestrian access, cycling and road safety, in order to cater for the existing, 5 year, 10 year and 20 year horizon. The Engineering Action Plan is split into traffic management, pedestrian access, parking and public transport. The proposed works are listed below and detailed in the TMAP report:

Recommended Traffic Management Plan

1. Installation of Roundabout at Hillview Road/West Parade/Bus Interchange (T1) to assist vehicle movements when the Rail/Bus Interchange at Eastwood is upgraded, with measures identified in the Eastwood Interchange Scoping Study;
2. Direction Signposting to West Parade (T2);
3. Conversion of Hillview Lane to two way traffic over time as development occurs (requires planning control changes) (T3);
4. Dedicated Left Turn Lane along Rutledge Street for (a) Eastbound and (b) westbound traffic (at Trelawney Street) (T4); and
5. Roundabout at the intersection of Glen Street and Shaftsbury Road (T5).

Recommended Pedestrian Access and Mobility Plan

1. Implementation of a 40 km/hr speed limit in Core CBD area (P1);
2. Raised Marked Foot-crossings at six (6) locations including The Avenue, Lakeside Road West Parade and railway Parade (P2);
3. Pedestrian/Cycle Overpass across rail corridor (P3);
4. Shared Zones at Hillview Lane and Coolgun Lane (P4);
5. Way-finding Signposting Strategy (P5); and
6. Road widening of Laneways (Hillview Lane and Coolgun Lane) (P6).

Recommended Public Transport Plan

1. Bus Lane in West Parade (PT1);
2. Bus Lane in Ball Avenue (PT2);
3. Bus Lane in East Parade (PT3);
4. Bus Shelters at eight locations (8) locations along Rutledge Street, First Avenue, Railway Parade and Ball Avenue (PT4); and
5. Bicycle Priority Measures (PT5)

Recommended Parking Management Plan

1. Additional carparking with redevelopment of sites (PK1);
2. Glen Street Car Park Time Limits (PK2);
3. East Parade Time Limits (PK3);
4. Directional signposting to Glen Street Car Park (PK4);
5. Directional signposting to other major public and private car parks in Eastwood (PK5);
6. Line Marking of on-street parking spaces within Eastwood Town Centre (PK6); and
7. Motorcycle/Scooter Parking (PK7).

SECTION 1

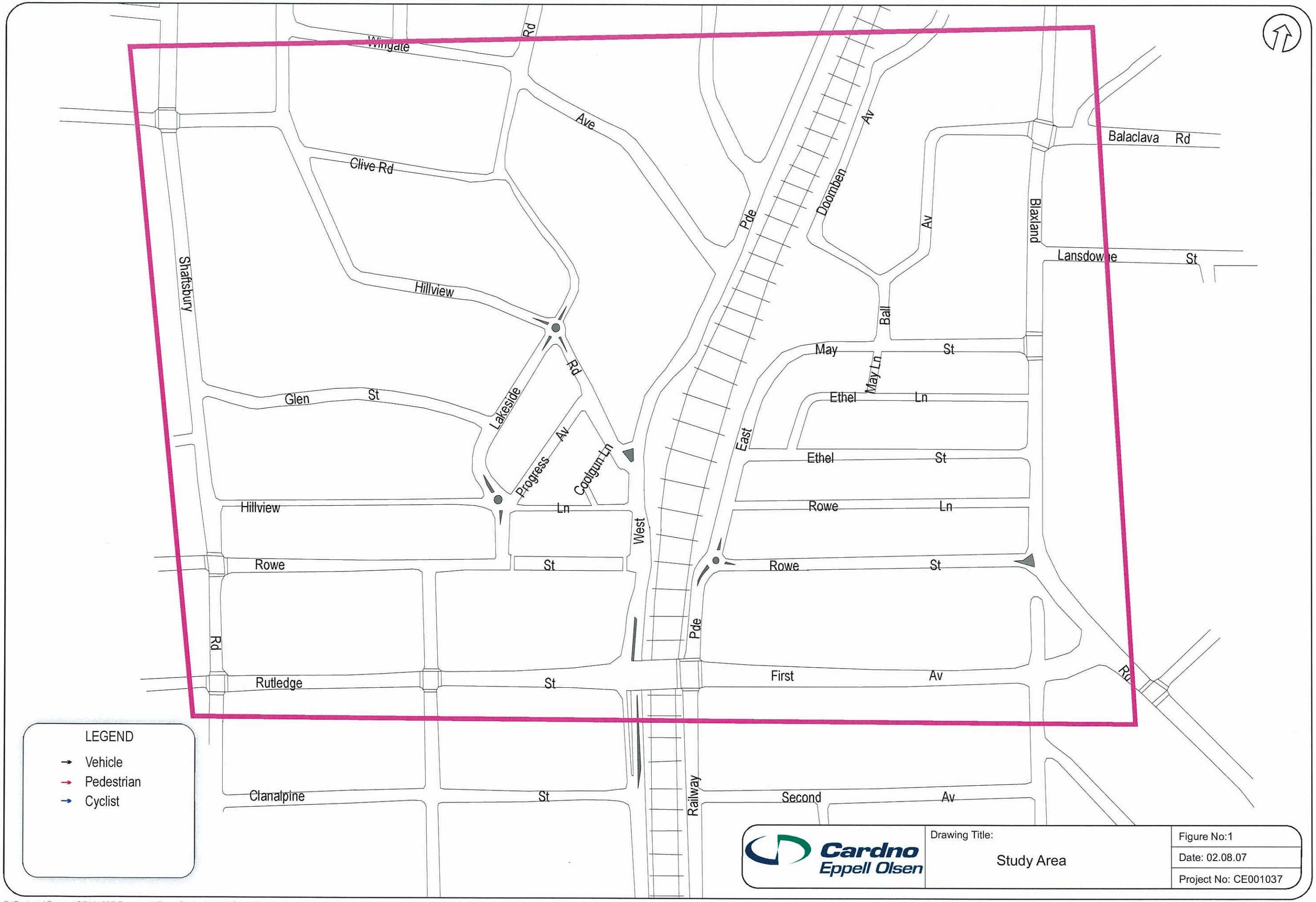
INTRODUCTION & BACKGROUND

1.0 INTRODUCTION

Cardno Eppell Olsen was commissioned by City of Ryde in May 2007 to undertake a Transport Management and Access Plan (TMAP) for Eastwood Town Centre.

The scope of work for this study requires the preparation of the following for the Eastwood Town Centre area as illustrated in **Figure 1** as follows:

- Preparation of a Traffic Management Plan to identify how best to support development and growth over the next 20 years taking into consideration key developments in the area;
- Preparation of a Parking Management Plan;
- Preparation of an Access Plan that takes into consideration existing pedestrian linkages and gives advice of new linkages (if required) to enhance pedestrian movements and reduce potential pedestrian clustering in the Town Centre;
- Ensure that new infrastructure (if required) adequately supports potential growth;
- Promote economically, environmentally and socially sustainable growth;
- Encourage alternative forms of transport (walking, cycling, public transport); and
- Link with the Draft Ryde Integrated Transport and Land Use Strategy.



Cardno Eppell Olsen

Drawing Title: Study Area

Figure No:1

Date: 02.08.07

Project No: CE001037

R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\.cdr

2.0 REVIEW OF BACKGROUND REPORTS

There are a large number of studies that have been undertaken in recent years which are relevant to this study. The following are of particular relevance, and these have been reviewed to understand strategic context and background to future plans:

- NSW Department of Planning, City of Cities : Metropolitan Strategy 2006;
- Draft Ryde Integrated Transport and Land Use Strategy (March 2007);
- Draft 2006 Eastwood Master Plan Review;
- DCP 2006;
- Ryde Bicycle Strategy and Master Plan 2007;
- LEP 110 – Eastwood Urban Village;
- Letter from Railcorp regarding the possibility of a pedestrian overbridge across Eastwood Station; and
- Blaxland Road-Lane Cove Road, Ryde to Bridge Street, Epping - Route Development Study –TTPA May 1994

The main findings of these reports are detailed below.

2.1 Draft Ryde Integrated Transport and Land Use Strategy (March 2007)

Ref. No.	Year/month	Author	Report
1	March 2007	PBAI	Centre Report for Eastwood

The report details the following constraints and opportunities;

Constraints

- The introduction of express trains may soon be limited with introduction of the new rail line /timetable;
- Flooding limits potential for redevelopment of Town Centre and closes train station due to flooding of pedestrian subway and ticketing area;
- Current road network is disjointed and there is local traffic congestion; and
- High demand for limited car parking spaces for both commuter and commercial parking.

Opportunities

- Development of a new pedestrian and cycle overpass over the railway line;
- Improve pedestrian amenity and connectivity and improve walkability of the Town Centre and links between station and parks;
- Potential for development of dormitory area for Macquarie Park with new rail line;
- Potential for improved pedestrian linkages with Brickpit and Mobbs Lane developments in Parramatta Council Local Government Area;
- Encourage the growth of the centre to cater for new residents;
- Improved public transport information and facilities; and
- Improved vehicular access and management.

The report provided recommended actions for Eastwood relating to;

- Public transport, Community transport, Personal transport and Taxis Action;
- Walking and Cycling;
- Road Management; and
- Integrated Land Use Planning/Car Parking Actions.

2.2 Draft Eastwood Master Plan Review

Ref. No.	Year/month	Author	Report
2	February 2007	Ryde Council	Draft 2006 Master Plan review

In 2001 Ryde Council adopted the Eastwood Commercial Centre Planning Study and Master Plan. The Plan was then reviewed in 2006 to ensure synchronisation between the Plan, the Development Control Plan, Local Environmental Plan 110, the Metropolitan Strategy, and State Environmental Planning Policy No. 65.

The report delivered to Council at a meeting on 20 February 2007 resulted in the following resolutions related to traffic, access and mobility:

- Further discussion of the Action Plan for the Master Plan Review be deferred to a proposed workshop;
- That the General Manager write to State Rail advising of the community support for a pedestrian footbridge over the rail line at Eastwood;
- That the preparation of a Traffic Management Plan (this report) be endorsed; and
- That Glen Street Carpark be redeveloped and the subject of a design competition.

2.3 Ryde Local Environmental Plan No. 110 – Eastwood Urban Village

Ref. No.	Year/month	Author	Report
6	July 2003	Ryde Council	Ryde Local Environmental Plan No. 110 – Eastwood Urban Village

The Ryde Local Environmental Plan No. 110 was gazetted on 18 July 2003 and covers the Eastwood and West Ryde Urban Villages.

The Plan aims to promote the accessibility of each urban village through:

- The enhancement of pedestrian safety and amenity;
- Improved pedestrian links within the village;
- The management of traffic speed and flow through the village; and
- The encouragement of public transport and alternatives to private vehicles.

The Plan also requires that:

- Development is to promote the reduction of motor vehicle dependency and actively encourage the use of public transport, walking and cycling;
- An accessible environment for people with disabilities and mobility difficulties is to be created to ensure access equality;
- The intensity of development is to be in accordance with the capacity of existing and proposed public transport and road systems;
- Parking provision is to acknowledge accessibility by foot, bicycle and public transport.

2.4 Letter from Railcorp

Ref. No.	Year/month	Author	Report
7	April 2007	RailCorp	Draft 2006 Master Plan review –cycle and pedestrian bridge over railway line

The letter details that there are two reasons Council is seeking the new bridge;

- To provide an alternate means of access to the station during periods of flooding around the existing access station subway; and
- To improve local connectivity within the Eastwood Town Centre.

Railcorp advise that Easy Access is currently being constructed at Eastwood Station. The project includes 3 new lifts, accessible toilet, improved CCTV coverage and lighting and other passenger safety measures. This work includes improvements to drainage.

The letter advises that in light of the above, they do not support an alternative access to the station, but support the construction of a pedestrian and cycle bridge over the railway corridor.

SECTION 2

EXISTING SITUATION

3.0 ACCIDENT DATA

Three years of reported accident data were provided by Council and reviewed for the years 2003 to 2005 (refer to **Appendix A**).

3.1 Number of Crashes

Overall a total of 169 crashes were reported within the study area. ***Table 3.1*** shows the number of crashes each year. The figures show that the number of crashes is consistent each year with the exception of 2003.

Table 3.1: Total number of recorded crashes 2003 to 2005

Year	2003	2004	2005	Total
Crashes within study area	44	62	63	169

3.2 Severity of Crashes

Table 3.2 shows the severity of crashes reported. The main finding is that no fatal crashes have occurred and 34% of all crashes have resulted in injury.

Table 3.2: Severity of Crashes

Severity of Crash	Fatal	Injury Crash	Tow away	Total
Number within Study Area	0	57	112	169

3.3 Crash Locations

Figure 2 shows the locations of all reported crashes within the study area. It is apparent that most accidents (approximately 85%) occur on the State Road network at intersections on Blaxland Road, First Avenue, Rutledge Street and Shaftsbury Road.

Accident clusters occur at the following locations:

- Blaxland Road / Balaclava Road intersection with a total of 33 accidents, predominant by vehicles turning right to Balaclava Road, causing conflicts with southbound through vehicles on Blaxland Road (R.U.M Code: 21);
- First Ave / East Parade intersection with a total of 25 accidents, predominant by right turning vehicles colliding with through vehicles (R.U.M Code: 21) travelling in opposite directions. Most of the crashes involved eastbound and westbound vehicles; and
- Rutledge Street / Shaftsbury Road intersection recorded a total of 12 accidents. Similar to intersections mentioned above, the accidents involved are dominated by right turning vehicles and through vehicles in opposite directions travelling eastbound and westbound. (R.U.M Code: 21).

3.4 Pedestrian Crashes

A total of 10 accidents have occurred involving pedestrians during the three year study period. Each of these accidents has resulted in injury, however none have been fatal. The accidents are summarised in ***Table 3.3***.

Table 3.3: Summary of Pedestrian Accidents

Year	Time	Weather	Accident Location	RUM Code	Severity	Age of Pedestrian	Sex of Pedestrian
2003	9:35am	Fine	First Ave East of East Pde	0	Injury	84	M
2004	7:10pm	Rain	Ball Ave at May St	0	Injury	22	F
2004	7:30pm	Fine	Blaxland Rd North of Ethel St	0	Injury	17	F
2004	4:40pm	Fine	First Ave East of East Pde	0	Injury	8	M
2005	6:47pm	Fine	Ethel St at Railway Pde	2	Injury	30	M
2005	2:30pm	Fine	First Ave at East Pde	0	Injury	-	F
2005	11:59am	Fine	Hillview Ln 250 m East of Shaftsbury Rd	0	Injury	76	F
2005	5:40pm	Overcast	Progress Ave 100m South of Hillview Rd	3	Injury	28	F
2005	6:15pm	Fine	Railway Pde 20m North of Rowe	0	Injury	25	M
2005	1:20pm	Fine	Wingate Ave 50m East of Lakeside	2	Injury	82	F

3.5 Cyclist Crashes

Records have also shown that only 2 accidents involving pedal cyclists occurred during the period 2003 – 2005. The accidents are summarised in ***Table 3.4*** below.

Table 3.4: Summary of Cyclist Accidents

Year	Time	Weather	Accident Location	RUM Code	Severity	Age of Cyclist	Sex of Cyclist
2005	11:20am	Fine	First Ave at East Pde	21	Injury	67	M
2005	6:15pm	Fine	Ball Ave at Doomben Ave	13	Injury	29	F

4.0 SITE INSPECTIONS AND INVENTORIES

4.1 Traffic Management

An inventory of existing traffic management was carried out in July 2007. The main features of the traffic management within the study area are discussed in this section and are summarised in **Figure 3**.

4.1.1 Traffic Signals

There are 6 signalised intersections within the study area and they are listed below:

- Shaftsbury Road / Rowe Street;
- Shaftsbury Road / Rutledge Street;
- Trelawney Street / Rutledge Street;
- Rutledge Street / East Parade / First Avenue;
- Blaxland Road / Balaclava Road;
- Blaxland Road / May Street; and
- Blaxland Road / First Avenue.

4.1.2 Roundabouts

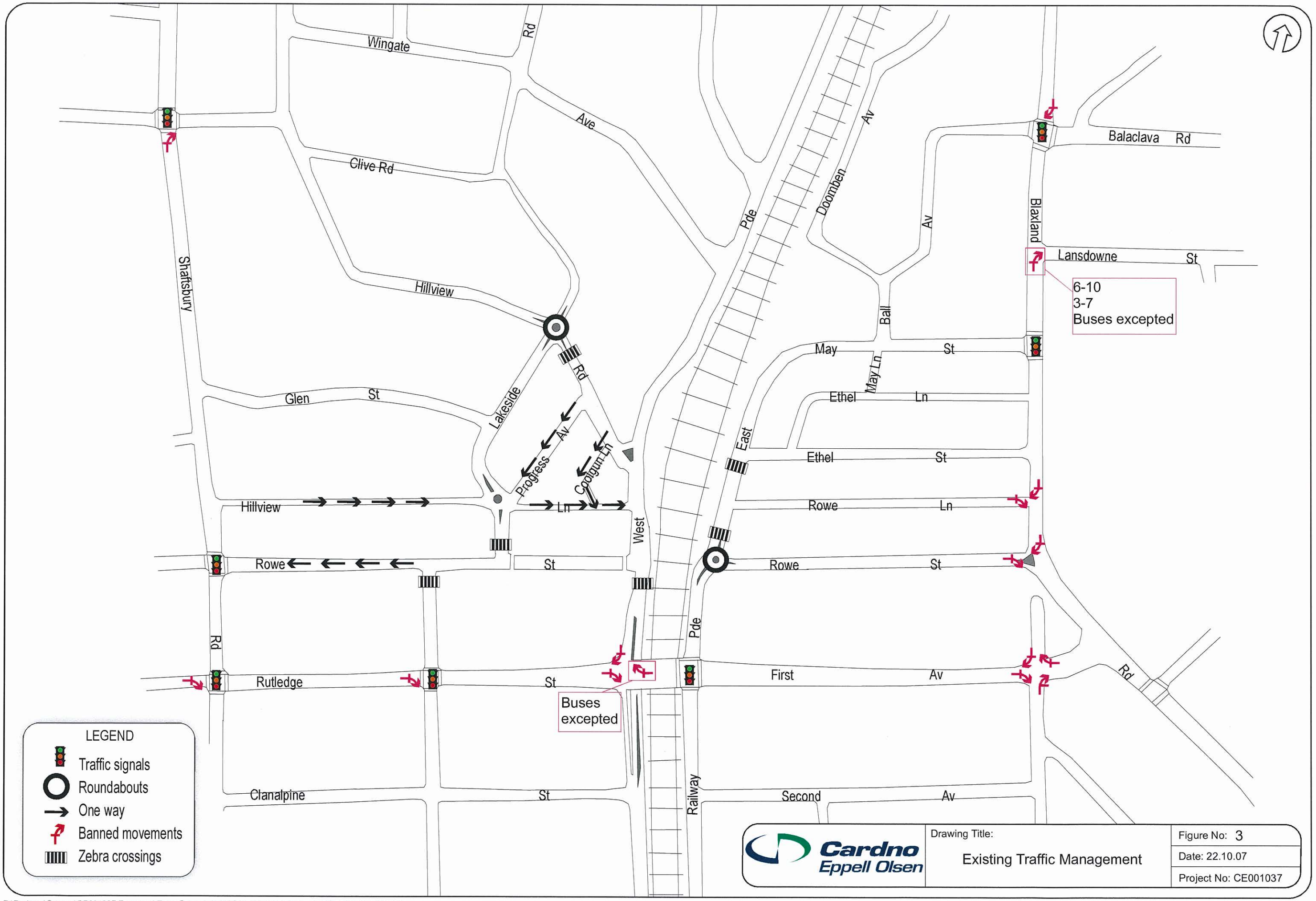
Roundabouts are utilised as traffic controls at the following intersections:

- Hillview Road / Lakeside Road; and
- Railway Parade / Rowe Street.

4.1.3 Priority Control

The other intersections within the study area are priority-controlled and the locations are:

- Shaftsbury Road / Glen Street;
- Trelawney Street / Rowe Street;
- Lakeside Road / Glen Street;
- West Parade / Hillview Road;
- West Parade / Hillview Lane;
- Rutledge Street / West Parade Ramps;
- Clanalpine Street / West Parade;
- Railway Parade / Rowe Lane;
- Blaxland Road / Rowe Lane;
- West Parade / Wingate Avenue;
- Blaxland Road / Rowe Street; and
- May Street / Ball Avenue.



R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\Eastwood Traffic Management.cdr

4.1.4 Other Traffic Control Features

Other salient traffic conditions and features relevant to this study are as follows:

- Pedestrian Mall in Rowe Street between West Parade and The Avenue;
- Rowe Street is one-way westbound between Trelawney Street and Shaftsbury Avenue;
- Hillview Lane is a one-way eastbound between The Avenue and the access to the council car park;
- Only left turning movements are permitted at the ramps at Rutledge Street;
- Right turning movements are banned from Rutledge St (eastern approach) except right turning northbound buses into West Parade; and
- Right turns for eastbound traffic on Rutledge Street are banned at Shaftsbury Road and Trelawney Street Banned movements include southbound traffic movements from Rowe Street and Rowe Lane (western approach) and westbound traffic movements from Blaxland (northern approach).

4.1.5 Pedestrian Facilities

Marked Pedestrian Crossings are provided at the following locations:

- Trelawney Street at the intersection of Rowe Street;
- The Avenue at the intersection of Rowe Street;
- Progress Avenue at the intersection of Lakeside Road;
- Progress Avenue at the intersection of Hillview Road;
- Hillview Road south of Progress Avenue;
- Lakeside Road south of Glen Street;
- Hillview Road south of Lakeside Road;
- Railway Parade south of Ethel Street;
- Railway Parade north of Rowe Street;
- West Parade near Eastwood Plaza (Rowe Street); and
- At Eastwood interchange on West Parade.

4.1.6 Speed Limits

40 km/hr School Zones are provided in Hillview Road between Clive Road and Lakeside Road.

All roads are signposted 50 km/hr with the exception of the following roads which are signposted 60 km/hr:

- Blaxland Road;
- First Avenue; and
- Rutledge Street.

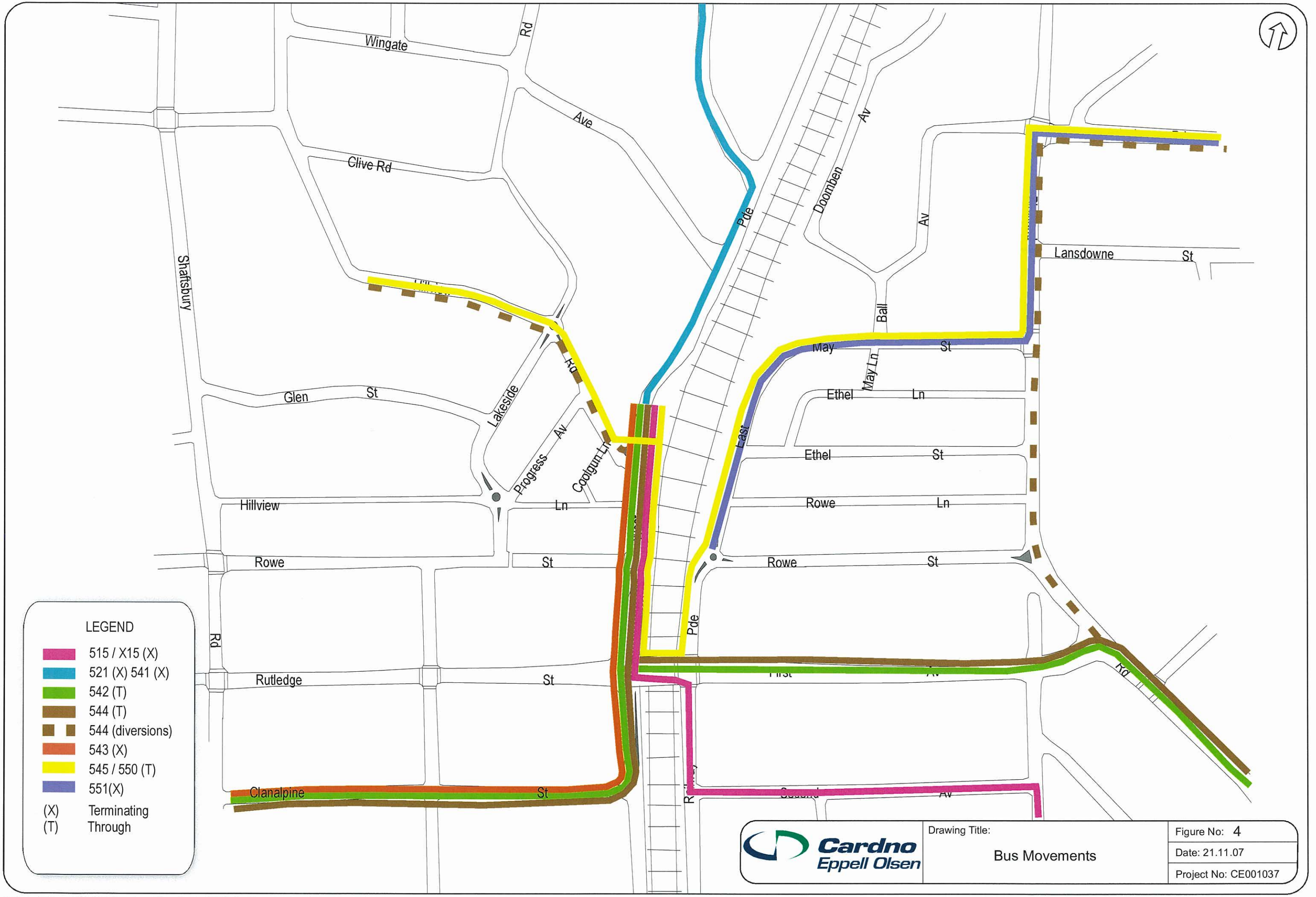
4.2 Public Transport Inventory

4.2.1 Buses

Eastwood is located within Contract Region 7, which extends from Chatswood west to Parramatta. State Transit operates the vast majority of bus services within this region, and all routes that serve Eastwood.

Currently, ten routes operate either to or through Eastwood Town Centre. These are summarised below and their routes through the Town Centre illustrated in **Figure 4**.

- Route 515/X15 – a daily daytime service between Eastwood, Ryde and the City. Service frequency is typically half-hourly, with westbound afternoon peak period services replaced by Route X15, which runs express from the City to Lyons Road, Drummoyne;
- Route 521 – a Monday to Saturday daytime service between Eastwood, Rydalmere and Parramatta. Service frequency is hourly at best;
- Route 541 – a Monday to Saturday daytime service between Eastwood and Epping. Service frequency is hourly, with an increase to 40 minutes during peak periods;
- Route 542 – a Monday to Friday part-time service between Auburn, Ermington, Eastwood and Small Roads. Service frequency is irregular, with three westbound services operating during the morning peak and three eastbound services operating during the afternoon peak;
- Route 543 – a Monday to Friday part-time service between West Ryde, Denistone West and Eastwood. Only one service in each direction is provided during the morning peak;
- Route 544 – a Monday to Saturday daytime service between Auburn and Ermington, with selected trips extending via Eastwood to Macquarie Shopping Centre. Service frequency through Eastwood is hourly, with additional services during peak periods;
- Route 545 – a full time cross regional service between Chatswood, Macquarie Park, Eastwood and Parramatta. Service frequency is a minimum of fifteen minutes throughout the day, with additional services during peak periods. This route is the most heavily patronised route through Eastwood, conveying large numbers of Macquarie University students between the university and railway station;
- Route 550 – a weekday part time service between Chatswood, Macquarie Park, Eastwood and Parramatta. Service frequency is irregular, with five westbound trips operating during the afternoon peak and one eastbound trip during the morning peak; and
- Route 551 – a weekday peak period service between Eastwood and Marsfield. Three services operate to Eastwood in the morning peak period and two services operate to Marsfield during the afternoon period.



R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\Eastwood Bus movements.cdr

The major piece of bus infrastructure in Eastwood is the bus interchange, located on the west side of the railway station adjacent to West Parade. The interchange is the terminal point for all terminating bus services, with the exception of Route 551, and is also served by all through bus services.

Congestion through Eastwood Town Centre during peak periods affects the speed and reliability of bus services. Known congested locations include the intersection of Blaxland Road/Balaclava Road, along West Parade, and exiting the bus interchange. During peak periods there is considerable competition for road space between different buses at the bus interchange, with conflicts between through services, terminating services and buses laying over. Routes 521 and 541 actually leave from the western side of West Parade to assist in easing this congestion. The popularity of route 545 services has often resulted in State Transit running up to four buses on the one service in order to cope with demand. This creates additional pressures on road space within the interchange and on the priority-controlled exit from the interchange.

4.2.2 Trains

Eastwood Railway Station is located on the Northern Line, 21km from Sydney Terminal. It is currently served by both suburban and interurban services. Suburban service frequency is generally half-hourly throughout the day, with additional services in both directions during peak periods. Generally every second interurban service stops at Eastwood, with the other interurban services stopping at Epping.

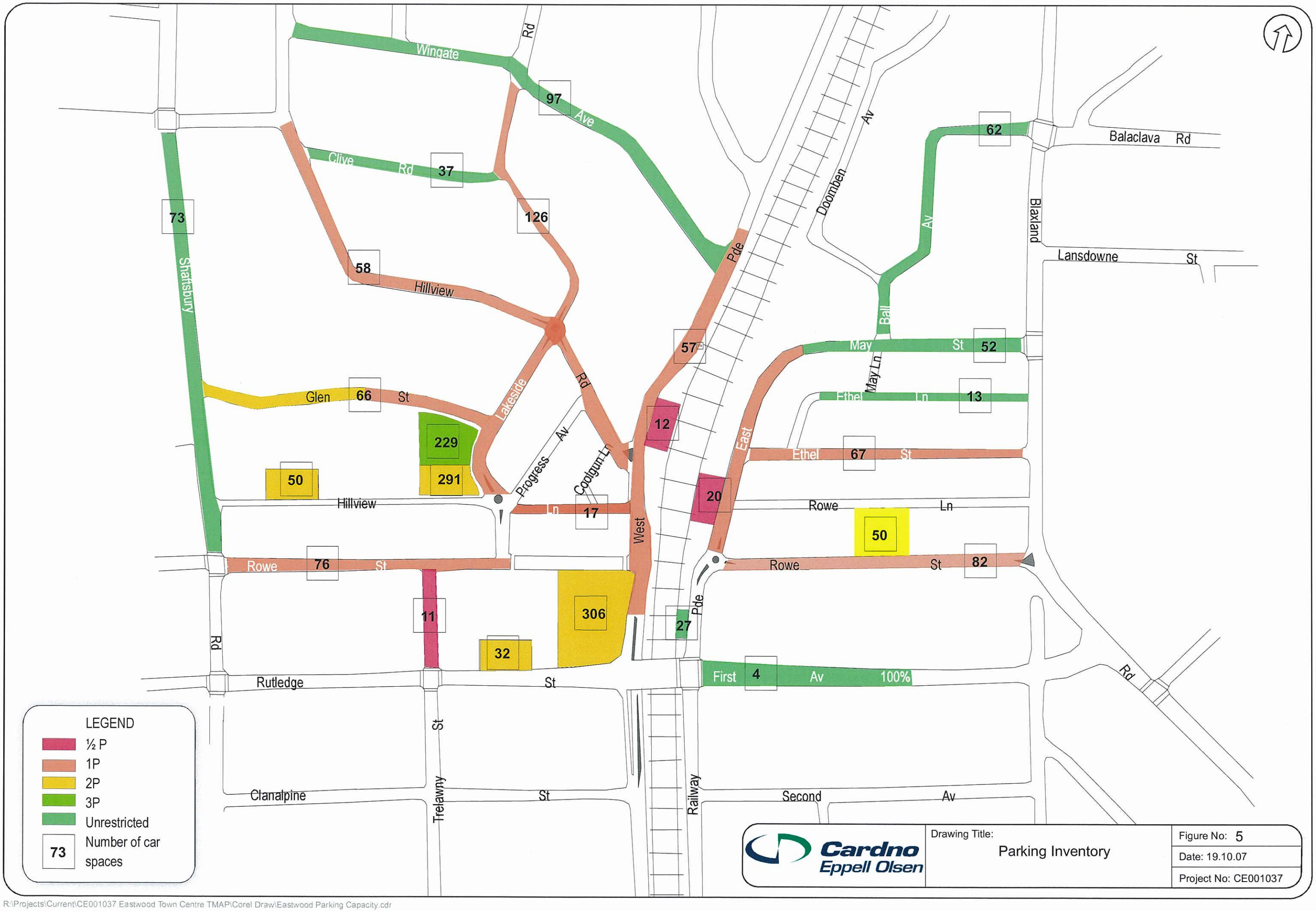
Eastwood is a major interchange between bus and rail services, particularly for Macquarie University students. This role may be reduced with the construction of the Epping to Chatswood railway line, which will provide a faster journey between Macquarie University and the Northern rail line. With the opening of the new line in 2008, it is also likely that interurban services will no longer stop at Eastwood, as has been advised by TIDC.

4.3 Parking Inventory

A parking inventory was carried in July 2007 of on-street and off-street parking spaces within the Eastwood Town Centre in the area bounded by Rutledge Street, Shaftsbury Road, Wingate Avenue, Balaclava Road and Blaxland Road. **Figure 5** details the location, time restriction and capacity of on-street and off-street parking areas available for public parking (both public and private parking).

A total of 957 off-street parking spaces are provided, with a further 902 on-street spaces in the CBD. In total, 1859 spaces were detailed.

Table 4.1 details off-street parking supply whilst ***Table 4.2*** details on-street parking supply. The full summary of parking including short term and long term is illustrated in ***Table 4.3***.



R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\Eastwood Parking Capacity.cdr

Table 4.1: Off-street Parking Supply

Location	Capacity	Parking Limits	Comments
Rowe St	50	Short Term	
Railway Pde (N)	20	Short Term	
Railway Pde (S)	27	Short Term	
Railway Station	12	Short Term	Additional 5 spaces for staffs
Woolworths	306	Long Term	2 illegal parking at ramp at survey time
Rutledge St (Fruit Market)	32	Short Term	
Glen St (nr Retrovision)	520	Short Term	
Hillview Ln (nr Childcare)	50	Short Term	

Table 4.2: On-street Parking Supply

Location	Capacity	Parking Limits	Comments
Ball Ave	62	Short Term	
May St	52	Long Term	
Ethel Ln	13	Long Term	
Ethel St	71	Short Term	
Rowe St (E)	82	Short Term	
First Ave	4	Short Term	
West Pde	57	Short Term	
Trelawney St	11	Short Term	Capacity includes 3 spaces for Loading Zone
Rowe St (W)	76	Short Term	Capacity includes 8 spaces for Loading Zone and 5 spaces for Disabled Parking
Hillview Ln (E)	17	Short Term	
Glen St	66	Short Term	
Hillview Rd	58	Short Term	
Clive Rd	37	Short Term	
Wingate	97	Long Term	
Lakeside	126	Short Term	Capacity includes. 3 spaces for Truck Zone and 3 spaces for Loading Zone
Shaftsbury	73	Short Term	

Table 4.3: Summary of Parking Supply

Type of Parking	Supply
On-street Short Term	740
On-street Long Term	162
On-street Total	902
Off-street Short Term	1,017
Off-street Long Term	0
Off-street Total	957
TOTAL	**1,919**

5.0 TRAFFIC COUNTS

5.1 Intersection Counts

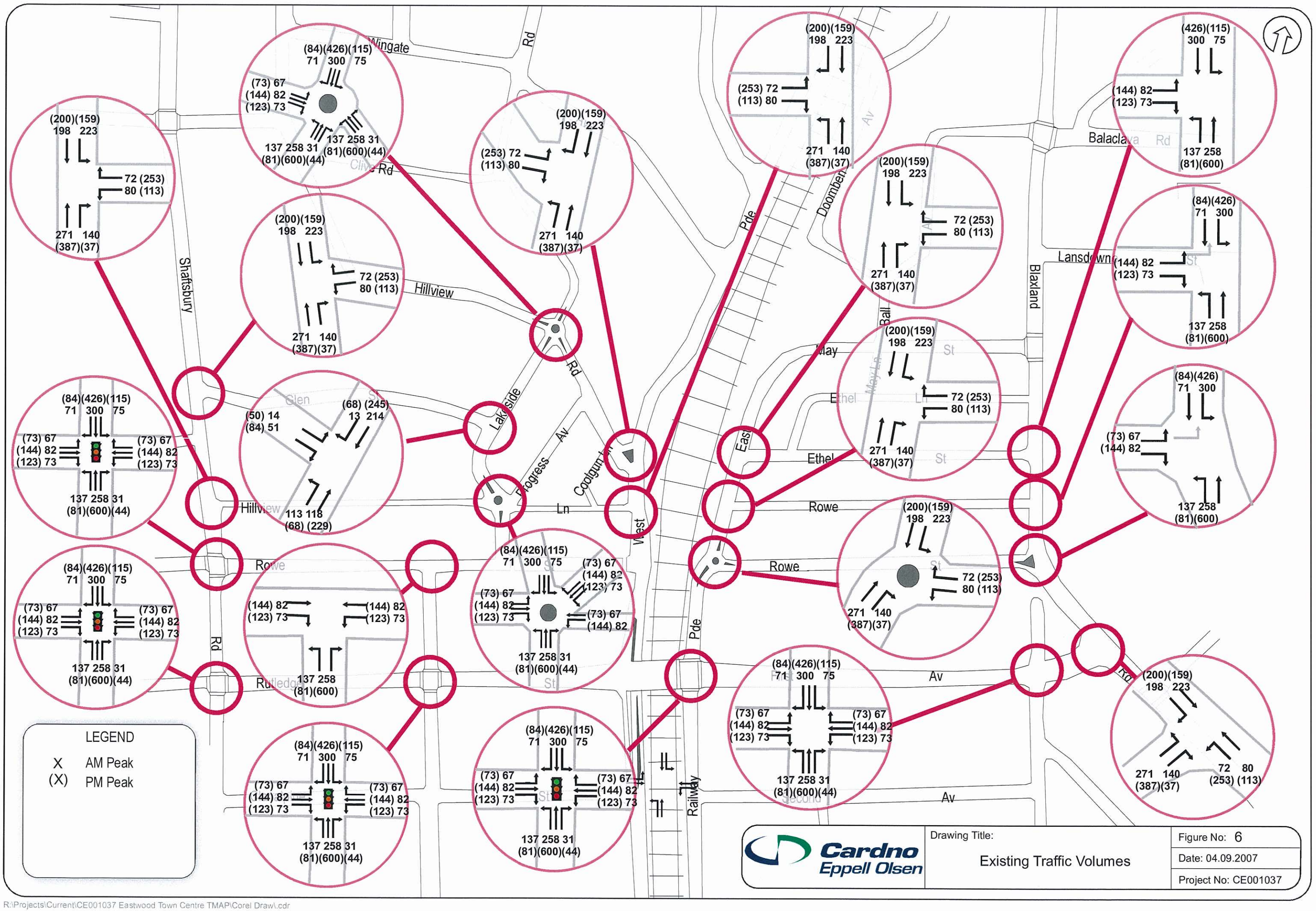
Traffic surveys were carried out at a total of 21 intersections on Thursday 19 July 2007 between 7.30am and 9.30pm and 4.00pm and 6.00pm. The locations are detailed below:

- Shaftsbury Road / Glen Street;
- Shaftsbury Road / Rowe Street;
- Shaftsbury Road / Rutledge Street;
- Trelawney Street / Rowe Street;
- Trelawney Street / Rutledge Street;
- Hillview Road / Lakeside Road;
- Lakeside Road / Glen Street;
- West Parade / Hillview Road;
- West Parade / Hillview Lane;
- Hillview Rd / Coolgun Lane;
- Rutledge Street / West Parade Ramps;
- Clanalpine Street / West Parade;
- Railway Parade / Rowe Lane;
- Blaxland Road / Rowe Lane;
- Rutledge Street / East Parade / First Avenue;
- Blaxland Road / Balaclava Road;
- West Parade / Wingate Avenue;
- Blaxland Road / May Street;
- Lakeside Road / Progress Avenue;
- Lakeside Road / Car Park Access; and
- Glen Street / Car Park Access.

The AM peak hour (7.30am – 8.30am) existing turning volumes and PM peak hour (5.00pm 6.00pm) are shown in **Figure 6**.

These intersection counts were supplemented with traffic counts carried out in December 2005 at the following intersections:

- Blaxland Road / Rowe Street;
- Railway Parade / Rowe Street;
- First Avenue / Blaxland Road; and
- May Street / Ball Avenue.



R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\.cdr

6.0 STAKEHOLDER ISSUES WORKSHOP

A stakeholder workshop was held on Friday 10th August 2007 attended by some 30 stakeholders including representatives from Chamber Of Commerce, State Transit Authority, Railcorp, Developers and Council staff. The meeting included an update on the works undertaken to date and the assessment of the existing situation. A review of possible scenarios for consideration in the traffic model was discussed and further options detailed. All transport modes were discussed at the workshop with considerable discussion on opportunities to improve and encourage public transport.

From the stakeholders workshop and subsequent internal discussions with Council staff, 6 road network scenarios have been determined as requiring detailed modelling analysis. The detailed analysis is provided in the subsequent chapters of this report.

7.0 EXISTING CONDITIONS

7.1 Existing Traffic Conditions

The intersection performance for existing conditions has been evaluated by Level of Service as described in RTA's ***Guide to Traffic Generating Developments*** using the SIDRA software package. This is based on the average delay per vehicle, and Level of Service criteria is based on the movement with the highest delay per vehicle where vehicles are controlled by priority signs (priority controlled junctions and roundabouts).

Table 7.1: Level of Service Criteria for Intersections

Level of Service	Average Delay per vehicle(secs)	Traffic signals, roundabout	Give Way and Stop Signs (priority)
A	0 to 14 secs	Good operation	Good operation
B	15 to 28 secs	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42 secs	Satisfactory	Satisfactory
D	43 to 56 secs	Operating near capacity	Near capacity and accident study required
E	57 to 70 secs	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	More than 70 secs	Unsatisfactory and requires additional capacity	Unsatisfactory and requires other control mode

Note that Level of Service criteria is based on the movement with the highest delay per vehicle where vehicles are controlled by priority signs (priority controlled junctions and roundabouts).

Analysis using SIDRA software showed that most of the intersections are operating at a satisfactory Level of Service under existing control and traffic volumes (see ***Table 7.2***) with the exception of the intersection of Rutledge Street/West Parade Ramp which has excessive delays for left turning vehicles leaving the town centre from the ramp turning into Rutledge Street heading eastbound and vehicles heading southbound on Blaxland Road at Balaclava Road making left turns and straight through which are exhibiting excessive delays in both the AM and PM peaks.

Table 7.2: Existing Intersection Performance

Intersection	Intersection Control	Existing AM Peak				Existing PM Peak			
		Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)
Shaftsbury / Glen	Give Way (N-S)	0.108	16.0	B	13	0.661	30.0	C	39
Shaftsbury / Rowe	Traffic Signals	0.298	21.8	B	64	0.594	30.6	C	103
Shaftsbury / Rutledge	Traffic Signals	0.871	33.3	C	286	0.819	27.3	B	204
Trelawney / Rowe	Give Way (E-W)	0.264	9.9	A	11	0.754	16.3	B	100
Trelawney / Rutledge	Traffic Signals	0.705	13.2	A	140	0.888	28.7	C	196
Hillview Rd / Lakeside	Roundabout	0.207	6.7	A	9	0.203	7.2	A	9
Lakeside / Glen	Give Way (N-S)	0.172	10.6	A	7	0.205	11.8	A	7
West Pde / Hillview Rd	Give Way (N-S)	0.302	2.2	A	22	0.085	3.2	A	5
West Pde / Hillview Ln	Give Way (N-S)	0.068	18.6	B	2	0.315	24.1	B	12
Rutledge / West Pde Ramp	**Give Way (N-S)**	**> 1.0**	**> 120**	**F**	**> 500**	**> 1.0**	**> 120**	**F**	**> 500**
Clanalpine / West Pde	Give Way (N-S)	0.159	10.2	A	6	0.199	11.8	A	7
Railway Pde / Rowe Ln	Give Way (N-S)	0.227	1.7	A	16	0.203	1.7	A	14
Blaxland / Rowe	Give Way (N-S)	0.024	28.4	B	1	0.230	28.3	B	7
Rutledge / East Pde / First Ave	Traffic Signals	0.718	17.2	B	150	0.935	30.1	C	236
Blaxland / Balaclava	**Traffic Signals**	**>1.0**	**65.4**	**E**	**543**	**0.937**	**36.1**	**C**	**271**
West Pde / Wingate	Give Way (N-S)	0.367	19.0	B	16	0.157	15.6	B	5
Blaxland / May	Traffic Signals	0.635	15.3	B	130	0.718	14.7	B	155
Blaxland / Rowe St	Give Way (N-S)	0.266	20.3	C	9	0.578	38.0	C	21
Railway Pde / Rowe St	Roundabout	0.264	5.9	A	15	0.288	5.8	A	17
Blaxland / First	Traffic Signals	1.000	43.3	D	230	1.000	41.5	C	239
May / Ball	Give Way (E-W)	0.255	3.2	A	17	0.206	14.9	13	7

*Results for the approach with the highest delay are presented for give-way intersections.

7.2 Existing Through Traffic

To determine through traffic movements into and out of the area, an origin-destination survey was conducted on Thursday 26th July 2007. The survey was conducted between 7.30 AM and 9.30 AM in the morning and 4.00 PM and 6.00 PM in the afternoon. This survey involved recording the numberplates of a sample of vehicles entering and leaving the study area at the seven cordon locations at:

- Blaxland Road north of Balaclava Road;
- Blaxland Road south of First Avenue;
- Balaclava Road east of Blaxland Road;
- Eastwood Avenue between Wingate Avenue and Railway Parade;
- Shaftsbury Road north of Glen Street;
- Shaftsbury Road south of Rutledge Street; and
- Rutledge Street west of Shaftsbury Road.

Vehicles recorded as being through traffic could stop briefly in the study area to pick up or drop off passengers. In the tables below, vehicles which proceed through the study area are referred to as ***Through Traffic.***

There are also trips which begin or terminate in the study area, where any duration of stay in the study area is extended beyond a few minutes. These trips are referred to as "***To and From Study Area"***. These trips can also be referred to as "***external – internal"*** or ***"internal – external"*** trips. They comprise of all trips not included in the tables below.

7.3 Outcomes

Table 7.3, ***Table 7.4*** and ***Table 7.5*** summarise the results of the Origin-Destination survey.

Table 7.3: Cordon Points

SITE NO.	ROAD	LOCATION	DIRECTION
1	Blaxland Road	North of Balaclava Road	Northbound
2	Blaxland Road	North of Balaclava Road	Southbound
3	Blaxland Road	South of First Avenue	Northbound
4	Blaxland Road	South of First Ave	Southbound
5	Balaclava Road	East of Blaxland Road	Eastbound
6	Balaclava Road	East of Blaxland Road	Westbound
7	Eastwood Avenue	between Wingate Avenue & Railway Parade	Northbound
8	Eastwood Avenue	between Wingate Avenue & Railway Parade	Southbound
9	Shaftsbury Road	North of Glen Street	Northbound
10	Shaftsbury Road	North of Glen Street	Southbound
11	Shaftsbury Road	South of Rutledge Street	Northbound
12	Shaftsbury Road	South of Rutledge Street	Southbound
13	Rutledge Street	West of Shaftsbury Road	Eastbound
14	Rutledge Street	West of Shaftsbury Road	Westbound

Table 7.4: Through Traffic AM Peak

Time	**AM Peak 7:30am - 09:30am**									
Site Number		1	4	5	7	9	12	14	Tot	**Through traffic**
	NP	1228	2665	1839	226	365	479	1389	8191	
2	1672	81	899	215	0	0	20	137	1352	**81%**
3	1780	507	89	214	0	32	53	543	1438	**81%**
6	1365	233	97	90	0	62	26	398	906	**66%**
8	754	20	182	94	108	0	0	69	473	**63%**
10	1135	54	299	154	24	32	349	91	1003	**88%**
11	504	49	54	0	21	116	24	16	280	**56%**
13	2746	205	947	873	0	35	0	99	2159	**79%**
Total	9956	1149	2567	1640	153	277	472	1353	7611	**76%**

Table 7.5: Through Traffic PM Peak

Time	PM Peak 4:00pm-6:00pm									
Site Number		1	4	5	7	9	12	14	Tot	**Through Traffic**
	NP	1228	2501	1839	226	365	479	1389	8027	
2	1672	135	921	176	0	0	20	59	1311	**78%**
3	2079	579	431	98	0	152	20	489	1769	**85%**
6	1365	394	268	107	26	57	36	445	1333	**98%**
8	754	20	96	35	130	0	0	0	281	**37%**
10	1135	33	79	77	24	86	145	32	476	**42%**
11	504	10	49	18	22	111	15	9	234	**46%**
13	2746	109	598	598	38	56	0	79	1478	**54%**
Total	10255	1280	2442	1109	240	462	236	1113	6882	**67%**

It is quite clear from the surveys that most of the traffic using Blaxland Road (more than 80%) in the peak periods is through traffic passing through the study area.

In summary, the movements are:

- In the AM peak period 76% of all vehicles recorded at the cordon points were through traffic movements;
- In the PM peak period the proportion of through traffic reduces to 67%;
- Typically around 5% of trips recorded at the cordon locations involved the return trips. That is, drivers who returned through the same cordon location (but in the opposite direction) after a short duration stay (typically a pick up or drop off);
- In the AM peak period, of all eastbound vehicles on Rutledge Street west of Shaftsbury Road, 79% of vehicles passed through the study area. In the PM peak the through traffic using this route reduces considerably to 54%; and
- In the AM peak period, of all southbound vehicles on Shaftsbury Road north of Glen Street, 88% of vehicles recorded passed through the study area. This reduces by more than half in the PM peak to 42%.

7.4 Existing Parking Demand

7.4.1 Parking Occupancy Survey

The demand for parking is related to the land uses it serves. In order to establish the parking demand and pattern in Eastwood Town Centre, a parking occupancy survey was carried out for the 1,919 spaces detailed in the parking inventory discussed previously.

Car park occupancies, both on and off-street, were surveyed at weekday lunch time peak from 12.00pm to 1.00pm on Tuesday 24th July 2007.

The results of the occupancy surveys are presented in the **Tables 7.6** and **7.7**.

The following off-street public parking areas were surveyed:

- Rowe Street;
- Railway Parade;
- Railway Station;
- Woolworths;
- Rutledge Street (Fruit Market);
- Glen Street (near Retrovision); and
- Hillview Lane (near Childcare).

On-street parking occupancy was surveyed on the following streets:

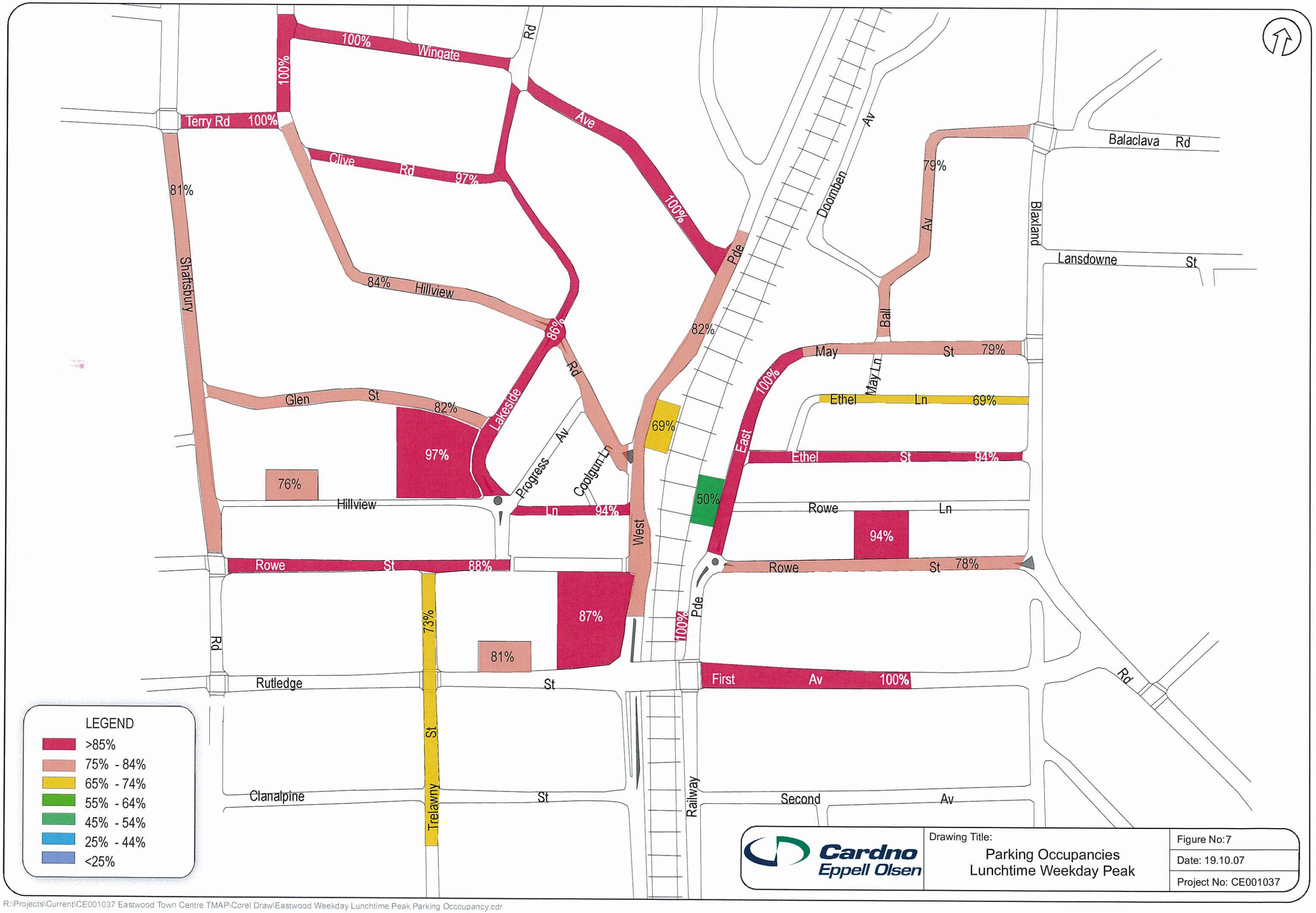
- Ball Avenue;
- May Street;
- Ethel Lane;
- Ethel Street;
- Rowe Street East;
- First Avenue;
- West Parade;
- Trelawney Street;
- Rowe Street West;
- Hillview Lane East;
- Clive Road;
- Wingate Avenue;
- Lakeside Road; and
- Shaftsbury Road.

7.5 Parking Occupancy

7.5.1 Off-street Parking

The parking occupancy findings are shown in **Figure 7**. The analysis shows the variation in car parking demand in each parking area. The key findings are:

- High occupancy rate during peak hours at the off-street car parks at Woolworths (87%), Glen Street (86%), Rowe Street (94%) and Railway Parade - south (100%) car parks with limited opportunities to find parking in these locations; and
- All off-street parking areas have occupancy rates of greater than 50%.



R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\Eastwood Weekday Lunchtime Peak Parking Occcupancy.cdr

7.5.2 On-street Parking

The results of on-street parking occupancy surveys are provided below. The key findings are:

- Most surveyed locations have high parking occupancy during peak hours;
- Due to unrestricted parking limits, the road sections along Wingate Avenue (100%) First Avenue (100%) and Clive Road (97%) exhibit full occupancy; and
- High occupancy rates in the on-street road sections of Ethel Street (94%), Hillview Lane 94%), and Lakeside Road (86%).

7.5.3 Combined Parking

The combined parking occupancy for on-street and off-street is detailed in ***Table 7.6***.

Table 7.6: Parking Occupancy Combined

	Reference	Location	Occupancy	Capacity	% Occupancy
On-street Parking	1	Ball Ave	49	62	79%
	2	May St	41	52	79%
	3	Ethel Ln	9	13	69%
	4	Ethel St	67	71	94%
	5	Rowe St (E)	64	82	78%
	6	First Ave	4	4	100%
	7	West Pde	47	57	82%
	8	Trelawney St	8	11	73%
	9	Rowe St (W)	67	76	88%
	10	Hillview Ln (E)	16	17	94%
	11	Glen St	54	66	82%
	12	Hillview Rd	49	58	84%
	13	Clive Rd	36	37	97%
	14	Wingate	97	97	100%
	15	Lakeside	108	126	86%
	16	Shaftsbury	59	73	81%
Off-street Parking	1	Rowe St	47	50	94%
	2	Railway Pde (N)	10	20	50%
	3	Railway Pde (S)	27	27	100%
	4	Railway Station	8	12	67%
	5	Eastwood Shopping Centre	266	306	87%
	6	Rutledge St (Fruit Market)	26	32	81%
	7	Glen St (nr Retrovision)	447	520	85%
	8	Hillview Ln (nr Childcare)	38	50	76%

The overall parking occupancy during the survey was 86% with 1,644 spaces occupied out of a total of 1,919 spaces. This indicates that there were still some 275 spaces vacant during the weekday lunchtime period.

There is only one section of parking which is being under utilised which is the Railway Parade (north) off-street car park.

7.5.4 Parking Time Limits

Table 7.7 below details the type of parking available. Note that 3 hour parking or less has been considered short term parking whilst more than 3 hours is long term parking.

Table 7.7: Available Parking

Type of Parking	**Supply**
On-street Short Term	740
On-street Long Term	162
On-street Total	902
Off-street Short Term	1017
Off-street Long Term	0
Off-street Total	1017
TOTAL	1919

SECTION 3

TRANSPORT MODELLING

8.0 TRANSPORT MODEL DEVELOPMENT

The Eastwood Transport Model (ETM) is based upon the SATURN 10.7 suite of transport modelling programs. This is a sophisticated traffic assignment and simulation package developed at the University of Leeds, England. The program allows for the modelling of delays on links and at junctions and can be used to model traffic conditions in both urban and local road environments.

For SATURN to operate, the traffic model must comprise of three elements:

- a road network containing all of the main routes for traffic within the project study area. The area is split into simulation and buffer areas, where the impact of traffic on junction delay is estimated in the simulation area;
- a zone system of geographic areas that generate and attract trips; and
- a trip matrix that provides details of the demand for travel movements between the various zones.

In the case of the ETM the full model is in simulation except for the external zones (which by definition are part of the buffer network). Some network sections, such as parts of the residential area south of Rutledge Street, could be equally modelled in buffer or simulation without affecting traffic volumes to the remainder of the town centre and the external roads. For consistency the ETM is a full simulation with mid-block capacity constraint in the form of speed flow curves to represent the limits of traffic flows between intersections. The capacity restraint is generally applied to residential and town centre roads.

SATURN employs an iterative traffic assignment and simulation structure. The trip matrix is assigned onto the road network via the assignment procedure and traffic chooses the minimum cost route between its origin and destination, based upon user specified generalised cost parameters for time and distance.

Following the assignment stage, the simulation process determines the arrival and departure profiles of traffic through all junctions in the network that are being specifically simulated. This information is then used to calculate queues and delays at these junctions, with this information then returned to the assignment procedure, where a new set of routes through the network is determined.

The simulation and assignment processes are combined in the SATURN module SATALL, which will continue until the change in flow between successive assignment/simulation loops is sufficiently small as to be considered of no importance. The model is then considered to have reached equilibrium, or to have converged and is therefore deemed to be suitable for interrogation and analysis.

8.1 Modelled Time Periods

The model was developed for the following weekday two time periods for a base year of 2007:

- AM Peak Period (8:00am – 9:00am); and
- PM Peak Period (5:00pm – 6:00pm).

These two periods were chosen as analysis of available traffic data had shown them to be the periods when traffic flows were at their highest levels in and around the Eastwood Town Centre. Hence, the impact of any proposed development would be most pronounced at these times.

The modelling procedure adopted will allow for the comparison of peak hour modelled flows against observed data, as well as providing information on link speeds, location of queues, delays and capacity problems across the network within the town centre and the external roads that lead to the town centre and surround it.

8.2 Network Building

Traffic models developed for use by SATURN comprise a two tier definition of the highway network:

- The simulation network; and
- The buffer network.

All links and junctions that are considered to be important to the routing of traffic accurately through the model study area should be included in one of these tiers of coding. **Figure 8a** shows the study area for the ETM. As discussed previously the capacity restraint which is generally part of the buffer network have been applied selectively applied in the simulation network as well for the following reasons:

- To refect the site visits showing minimal rat-running in the residential streets in the north east section of the study area;
- Some of the roads in the main part of the town centre are “busy and crowded” and pedestrian movements have a higher priority than vehicle ones in contrast to roads such as First Avenue. Moreover frequent parking manoeuvres and car space searches slows down the average speed and hence discourages through traffic volumes.

The ETM was developed from anew and is not reliant on other strategic models. In that sense the knowledge of the town centre and the traffic patterns in the area are important in the development of a local area transport model.

SATURN

WS Atkins

& Leeds ITS

EASS10.UFN

Scale 1765

Figure 8a
2007 Base Year Network

28-11- 7

SCOTT WILSON

The ETM highway network was developed from 3 primary data sources:

- Aerial photographs showing the road network;
- Traffic counts; and
- On site network inventory.

The network inventory survey recorded details for all links and junctions included in the highway networks for parameters such as junction type, location, number of lanes on links and at junction stop lines, gradients, banned turns, visibility and turning radii. This data was used to allocate speed flow curves to the highway model links and to calculate turning movement saturation flows at junctions.

The Eastwood Transport Model incorporates the following roads defined by the study area:

- Arterial Roads such as Blaxland Road;
- Sub-arterial roads such as First Avenue and Rutledge Street;
- Collector roads such as East and West Parade; and
- Local roads such as Ethel Street and Glen Street.

In addition to the road network is the link from zone to the road network. The following Figure shows the road network as represented by the Saturn software with some centroid connectors. Overall the road network represented in the Eastwood Transport Model reflects the roads in the study area well.

In addition to the road networks are the intersection controls such as roundabouts, priority (stop and give way signs) and traffic signals. In total there are three roundabouts, eight signalised junctions and fifty-seven priority junctions. The signalised junctions are located on Blaxland Road, First Avenue, Rutledge Street and Shaftsbury Road.

8.3 The Simulation Network

The simulation network provides the more detailed element of the overall model coding and is both link and junction based. It allows for the specific input of turn saturation flows at junctions, calculated from geometric data such as lane widths, turn radii, visibility and gradient. These provide limits to the volume of traffic that can make a specific turning movement at a junction within the modelled time period. Where turn lanes have limited storage length the capacity used takes into this circumstance. This allows the SATURN program to calculate the queues and delays that build up at junctions and it is the level of these that influences traffics route choice through the network in subsequent iterations.

Simulation junctions are joined together by links, to which a speed flow curve can be allocated, which allows link delay to be calculated. The speed-flow curve type is dependent upon the characteristics of the link, such as speed limit, location, number of lanes and carriageway standard. To maintain consistency, where speed flow curves were allocated to simulation links, the curve types reflected a road hierarchy.

All saturation flows were calculated in Passenger Car Units (PCU's).

8.4 The Buffer Network

Coding for the buffer network is simpler than that for the simulation network, with details coded on a link rather than a junction basis. Hence, no turning movements or delays are modelled in the buffer area. All buffer links were allocated a speed flow curve, again consistent with those which allow SATURN to calculate link delays. These delays determine the route choice of traffic through the buffer network.

8.5 Zoning System

The zone system adopted for the ETM comprised of four distinct levels as detailed below representing:

- External zones representing roads entering and exiting the study area;
- Internal zones:
    - Residential;
    - On-street parking spaces;
    - Off-street parking spaces for the public carparks;
    - Retail and commercial.

In general the internal zones represent areas within a block (and less) in the town centre and hence the zones have natural boundaries. In the case of the retail and commercial zones the floorspace and the private car spaces provided have been sought from Council. In total there are 85 zones in the ETM. The Eastwood Town Centre has five different types of zones used:

- External zones representing road links into and out of the study area (23 zones);
- Public off-street carparks (4 zones);
- Commercial and retail landuses (within a street block, and13 zones);
- On-street parking zones within a block side face (22 zones);
- Residential areas (23 zones).

In total there are 85 zones making up the Eastwood Transport Simulation Model and the zoning system reflects the multi-use nature of the Eastwood Town.

A listing of zones is presented in **Appendix B**.

8.6 Construction of the AM and PM peak Hour Prior Matrix

The matrices were developed from three data sources:

- Number plate survey undertaken on the following external road cordon points:
  - Shaftsbury Road north of Glen Street;
  - Rutledge Street west of Shaftsbury Street;
  - Shaftsbury Street south of Rutledge Street;
  - Blaxland Road south of First Avenue;
  - Balaclava Road east of Blaxland Road;
  - Blaxland Road north of Balaclava Road;
  - Railway Avenue north of Wingate Avenue.
- Traffic counts at various intersections in the study area; and
- Land use information provided by council.

The number plate survey was undertaken for the AM (730:am-9:30am) and PM peak periods (4:00pm-6:00pm).

The number plate survey is a spot count and essentially provides information on the following traffic movements:

- External to external;
- Internal to external; and
- External to internal.

Of the three traffic movements the external to external has the highest confidence interval since the major routes into and out of the study area are surveyed. For the remaining two movements only one part of the trip is recorded. For example, an internal to external trip will only record at which point the vehicle leaves the study area and not the origin of the trip. However the number plate survey does provide information of each of the matrix elements.

An internal-internal matrix was derived from the land use information.

Each of the hourly matrices from the number plate survey making up the peak period was factored according to the number of trips the matrix contributes to the peak period, and then added together to obtain the peak hour matrix. This peak hour matrix was then weighted again according to the traffic count undertaken at the umber plate survey site.

This section summarises the process used in the construction of the prior matrix for the weekday AM and PM peak hour models. From the traffic count data it was found that the AM and PM peak hours respectively was 7:30am-8:30am and 5pm-6pm respectively. In the AM peak hour the time of the peak hour is largely determined by the through traffic on arterial and sub-arterial roads that bisect the town centre.

In establishing the prior matrices for the calibration two data sources were used:

- A number plate matching survey of some of the main routes into and out of the Eastwood Town Centre was undertaken; and
- Traffic counts were undertaken at approximately 20 intersections in the study area.

The traffic counts are used in two ways:

- Some of the intersection arms are external zones in the Eastwood Transport Model and hence the observed traffic volumes are used as the trip end values as origin or destinations; and
- In calibrating the Eastwood Transport model the observed traffic volumes are compared to the modelled traffic volumes and adjustments either to the matrices and/or network are made.

The number plate matching survey is a recording of number plates at set locations in the road network and the numbers are matched to obtain information of travel patterns. The locations are listed in ***Table 8.1*** below:

Table 8.1: Number Plate Matching Survey

SITE NO.	ROAD	LOCATION	DIRECTION
1	Blaxland Rd	Nth of Balaclava Rd	NB
2	Blaxland Rd	Nth of Balaclava Rd	SB
3	Blaxland Rd	Sth of First Ave	NB
4	Blaxland Rd	Sth of First Ave	SB
5	Balaclava Rd	East of Blaxland Rd	EB
6	Balaclava Rd	East of Blaxland Rd	WB
7	Eastwood Ave	btw Wingate & Railway	NB
8	Eastwood Ave	btw Wingate & Railway	SB
9	Shaftsbury Rd	Nth of Glen St	NB
10	Shaftsbury Rd	Nth of Glen St	SB
11	Shaftsbury Rd	Sth of Rutledge St	NB
12	Shaftsbury Rd	Sth of Rutledge St	SB
13	Rutledge St	West of Shaftsbury Rd	EB
14	Rutledge St	West of Shaftsbury Rd	WB

Hence if a vehicle was recorded at Site 2 (heading northbound on Blaxland Road) and recorded at Site 1 within a set time period it can then be identified that a vehicle has travelled northbound on Blaxland Road. More specifically the number plate survey provides:

- Data on through movement traffic volumes for the roads surveyed for the major external roads that bisect the town centre. Within matrix terminology these movements are considered as external to external movements; and
- The number plate survey provides some but incomplete information on external to internal and internal to external movements through the recording of a number plate at one of the sites but is unmatched number. In some cases an unmatched number does represent either of the two travel patterns; in others there may be reading errors and may actually be an external to external movement.

In the last dot point there were many unmatched weighted number plate observations far greater than what was expected of the internal-external and external-internal movements. In order to provide a reasonable estimate of these two movements a trip generation and trip distribution was undertaken to provide an estimate of the proportion of internal-external and external-internal movements.

It should also be noted that not all external road links were surveyed including such roads as Ryedale Road, Trelawney Street south and Rowe Street West.

Since the number plate survey does not provide information on internal to internal movements, a seed value was placed in each cell to represent an estimated of these movements.

Overall, there is sufficient information in the development of a prior matrix.

As discussed previously there are four matrix sub-blocs that comprise of the matrix. The number and proportion of each matrix block represent different travel patterns. In Table 1 a summary of trip numbers for each matrix sub-bloc is presented. ***Table 8.2*** shows that the PM peak hour has more trips than the AM peak hour. This reflects greater use of the commercial and retail land uses in the PM peak hour rather than before 8:30am.

Table 8.2: AM and PM peak Hour Trip Totals

Trips	**AM**	**PM**	**Percentages**	
External-external	5416	6018	72%	65%
Internal-external	762	1377	10%	15%
External –internal	1030	1368	14%	15%
Internal- internal	309	525	4%	6%
Total	**7517**	**9288**	**100%**	**100%**

8.7 Bus Routes

Bus flows were pre loaded onto the relevant model links for each bus route. All buses were coded as PCU's, assuming a factor of 2.0.

8.8 Calibration of the Eastwood Transport Model

The principal calibration criteria is the comparison of observed turn volumes versus the modelled traffic for the approximately twenty intersections that have assessed. In total 132 turn movements are used in the calibration process. Considering the area represented by the Transport Model and the total number of intersections being calibrated to and if met, the model will be sufficiently robust for predicting the traffic impacts of changes in the road network and land uses in the study area.

We have used the GEH statistic to measure the level of comparison between the observed and modelled traffic volumes and is defined below. The GEH Statistic is a formula used in traffic engineering, traffic forecasting, and traffic modelling to compare two sets of traffic volumes. The GEH formula gets its name from Geoffrey E. Havers, who invented it in the 1970s while working as a transport planner in London, England. Although its mathematical form is similar to a chi-squared test, is not a true statistical test. Rather, it is an empirical formula that has proven useful for a variety of traffic analysis purposes.

The GEH statistic of less than five is considered an acceptable level of calibration. Overall acceptable model calibration is that 85 percent of the calibration movements have a GEH of less than five.

For both AM and PM peak hour models this criteria has been met.

Plots of observed versus modelled are detailed in **Appendix B**. The Figures show a reasonable correlation between observed and modelled traffic volumes. **Figure 8b** and **8c** show the link volume plots for 2007**.**

Figure 8b
2007 AM Peak Hour

SATURN

WS Atkins
& Leeds ITS

EASS10.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 8c
2007 Pm Peak Hour

SATURN

WS Atkins
& Leeds ITS

EASS11.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

9.0 TRANSPORT & ROAD NETWORK SCENARIO TESTING

Note that two public transport discount options have been assessed for each scenario:

- **Scenario 1** assumes a 20% discount on anticipated traffic volumes due to public transport; and
- **Scenario 2** assumes a 0% discount on anticipated traffic volumes due to public transport;

The State Plan, A New Direction for NSW is about shaping the State's future. The Plan sets out clear targets for improved outcomes and service delivery to which the community will hold us accountable.

Every day in NSW almost two million passenger trips are taken on public transport. The people who use public transport expect a reliable, high quality and safe service. By providing a quality service and increased capacity, public transport will be able to attract an increasing share of journeys.

The target as set out in this document is to increase the share of commute trips made by public transport to and from the Sydney CBD during peak hours from 72% to 75% by 2016 and to increase the proportion of total journeys to work by public transport in the Sydney metropolitan region from 20%-22% to 25%. Given these targets we have used a 20% discount on anticipated traffic volumes due to increase in public transport in Scenario 2.

Periodic (five yearly) reviews of public transport mode splits will be undertaken to track progress against the existing mode spilt, provided by State Transit Authority (STA) and Railcorp trip counters. Should these reviews identify under-achievement of public transport mode split (i.e. a reduction as compared to previously measured levels), a “Contingency Plan” will be put into place which includes the following actions:

- Lobby STA to review bus priority measures to and from Eastwood and to introduce new / additional improvements; and
- Lobby Railcorp to review the capacity of the rail service with the intention of increasing service capacity in peak periods.

A background growth of 1% per annum increase on State Roads and 0.5% per annum increase for Local Roads was adopted. All scenarios and options tested reflect 100% development potential for the town centre.

A total of six road network changes have been assessed to determine whether they provide an improvement to the overall performance of the road network and also what local impact they have on intersection performance.

The network plots for the 2027 base network are provided in **Figure 8d** and **Figure 8e**.

- **OPTION 1** Bus Priority Measures along both sides of Eastwood Station taking into consideration existing and future bus routes planned for the area including:
    - converting the West Parade southbound ramp between West Parade and Rutledge Street to bus only;
    - introducing an eastbound bus lane in Ball Avenue at Blaxland Road intersection; and
    - installing a southbound bus lane in Railway Parade at First Avenue and introducing a b-phase at the intersection.

- A modified bus priority road network was modelled **(OPTION 1a)** which included a bus only section of the West Parade ramp between the Eastwood Shopping Centre access and Rutledge Street, thus allowing all movements into and out of the Shopping centre access with the exception of the right turn out of the centre into west Parade;

- **OPTION 2** Closure of The Avenue from Rowe Street to Progress Avenue and The Avenue to Trelawney Street to facilitate the extension of the Pedestrian Mall;

- **OPTION 3** Extend Trelawney Street to Hillview Lane and Council's Glen Street Car Park;

- **OPTION 4** Widen Hillview Lane to allow two-way traffic flow between Shaftsbury Road and West Parade;

- **OPTION 5** Provision of Right Turn Lane at the intersection of Trelawney Street and Rutledge Street for northbound vehicles wishing to head eastbound; and

- **OPTION 6** Provision of Left Turn from Rutledge Street onto off-ramp to West Parade for southbound vehicles along Rutledge Street.

Figure 8d
2027 AM Do nothing 0%

SATURN

WS Atkins
& Leeds ITS

27AMDN.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

Figure 8e
2027 PM Do nothing 0%

SATURN

WS Atkins
& Leeds ITS

27PMDN.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

10.0 DESCRIPTION OF MATRIX SCENARIOS IN SATURN

Two matrix scenarios have been evaluated for the 2027 forecast year:

Increase Public Transport Usage (SCENARIO 1)

In this scenario the vehicle trips with a trip end in the town centre reduced by 20 percent through increased usage of sustainable transport such as: bus, train, cycle and walk trips. The 20 percent reduction applies to the following trip blocks:

- External to Internal;
- Internal to External.

We have not applied a trip reduction factor for the internal to internal trips because many people are already using sustainable modes and the number of trips compared to the trip matrix is low.

Business as Usual (SCENARIO 2)

In this scenario the proportion of people using private cars remains the same.

The trip numbers for each matrix block for each scenario are presented in ***Table 10.1*** and ***Table 10.2*** following. Overall there is an increase of trips in the AM peak hour over a 20 year period of 22% and 31% for Scenarios 1 and 2 respectively compared to the 2007 Base.

As discussed previously there are more trips in the PM peak hour matrix compared with the AM peak hour largely because the town centre is more active in the PM peak hour and the external roads such as Blaxland Road, Rutledge Street etc are carrying slightly more traffic.

Overall there is an increase of trips in the PM peak hour over a 20 year period of 28% and 27% for Scenarios 1 and 2 respectively compared to the 2007 Base.

Table 10.1: AM Trip Numbers

	AM Peak Hour			Increase from Base Year	
	2007 Base Year	2027 Forecast - Scenario 1	2027 Forecast - Scenario 2	Scenario 1	Scenario 2
External-external	5416	6382	6382	18%	18%
Internal-external	762	1617	2021	112%	165%
External -internal	1030	884	1105	-14%	7%
Internal-internal	309	309	309	0%	0%
Total	**7517**	**9192**	**9817**	**22%**	**31%**

Table 10.2: PM Trip Numbers

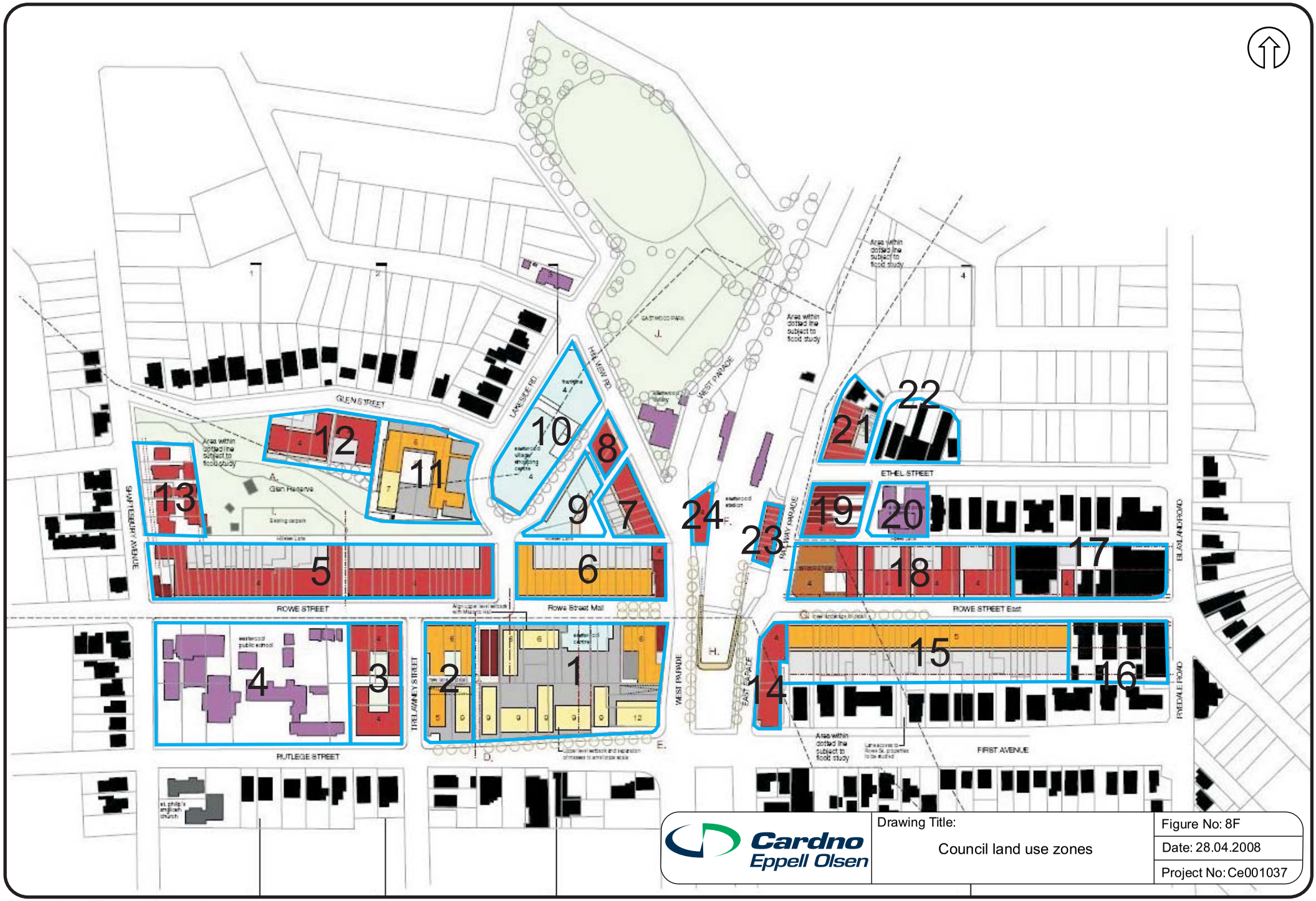
	PM Peak Hour			Increase from Base Year	
	2007 Base Year	2027 Forecast - Scenario 1	2027 Forecast - Scenario 2	Scenario 1	Scenario 2
External-external	6018	7141	7141	19%	19%
Internal-external	1377	1182	1477	-14%	7%
External -internal	1368	2115	2644	55%	93%
Internal-internal	525	525	525	0%	0%
Total	**9288**	**10962**	**11787**	**18%**	**27%**

10.1 Development Trips

Information regarding land use changes was provided by City of Ryde and is summarised in ***Table 10.3*** with the Council Land use zones illustrated in **Figure 8f**.

Table 10.3: Future Land use change

	Existing			Future				
Council Zone	GFA Retail	GFA Commercial	GFA Other	GFA Retail	GFA Residential	GFA Residential net	GFA Commercial	GFA Special
1	7000	7800		7000	37656	28242	8000	0
2	1000		1000 (community centre)	2071	8285	6213	0	0
3	1000	900		2157	9062	6796	900	0
4			4100 (school)	8122	0		0	4873
5	8440	2609		6526	19578	14683	2600	0
6	4400	2200		2792	8377	6282	2200	0
7	1730	800		920	2760	2070	800	0
8	800	400		371	1114	836	400	0
9	1930			1122	1121		0	0
10	5540			5133	0		0	0
11			12880 (car park floorspace) equivalent to 861 car spaces	12880 (car park floorspace) equivalent to 861 car spaces				1760
12		13200		0	6644	4893	13288	0
13	1480			0	5281	3960	0	1760
14	1480			1025	3076	2306	0	0
15	5060	500		5358	16075	12056	500	0
16			8800 (residential flats)	0	4231	3173	2000	0
17		7000		500	0		7000	0
18	3000	1540		4176	6265	4689	1500	0
19	1100			958	1437	1077	0	0
20			1360 (Police)	0	0		0	2833
21	1325	75		1122	1682	1261	0	0
22			4720 (reisdential)	0	3132	2348	0	0
23	630			367	0		0	0
24	530			297	0		0	0



Cardno Eppell Olsen

Drawing Title: Council land use zones

Figure No: 8F

Date: 28.04.2008

Project No: Ce001037

From the landuse changes the net increase was obtained and a trip generation was applied for Scenarios 1 and 2 respectively. The trip rates for Scenario 2 are directly related to the car park provision rates required by City of Ryde for each development and are as follows:

- Retail – 0.8 per 100m2;
- Commercial (office) – 3 per 100m2;
- Residential Unit/apartments:
    - One bedroom – 1 per dwelling;
    - Two bedrooms – 1.2 per dwelling;
    - Three bedrooms – 1.6 per dwelling.

Using the parking rates the following trips ends, shown in ***Table 10.4*** and ***Table 10.5***, apply to each scenario:

Table 10.4: Scenario 1

	Retail		Office		Residential		Total	
	Origin	Destination	Origin	Destination	Origin	Destination	Origin	Destination
2027 AM peak hour	0	0	0	58	1043	0	1043	58
2027 PM peak hour	14	14	58	0	0	1043	72	1057

Table 10.5: Scenario 2

	Retail		Office		Residential		Total	
	Origin	Destination	Origin	Destination	Origin	Destination	Origin	Destination
2027 AM peak hour	0	0	0	72	1303	0	1303	72
2027 PM peak hour	18	18	72	0	0	1303	90	1321

As can be seen the primary increase in study area trips is the result of substantial number of residential apartments in the Town Centre. The above trips ends take into account the following:

- Retail land uses are not active in the AM peak hour; and
- Office land uses follow commuter travel patterns.

All of these trips are either internal to external or external to internal. For trip ends with an external zone the trip distribution is in accordance to proportion of trips for the external zone in question divided by the total external zone trips. That is these additional trips will follow existing travel patterns in the Base Year model because the external road network surrounding the site is expected not to change in the future.

10.2 Assessing the Traffic Effects of Increased Public Transport Usage

This section assesses the impacts of Scenario 1 (increase in public transport trips) versus Scenario 2 (no increase) for each of the forecast peak hour:

- Link Volume Difference Plot of the base year (Do Minimum) network and assigning the Scenario 1 and Scenario 2; and
- Comparison of global network statistics.

In undertaking the above we have used actual traffic volumes for the base year calibration. Within the Saturn model actual and demand volumes are available of which the latter represents incomplete trips in the respective peak hour because of delays in the network.

10.2.1 AM Peak Hour

Figure 9a details a Link Volume Difference Plot for the 2027 AM Peak hour (comparison of Scenario 1 vs. Scenario 2). The negative numbers show the reduction in traffic as a consequence of reduction in vehicle trips in favour of public transport. Overall the trip reduction is not significant although a reduction in traffic is present.

The results show that increased public transport reduces traffic on the sub-arterial and arterial road network by up to 100 cars in a peak hour.

10.2.2 PM Peak Hour

Figure 9b illustrates the Link Volume Difference Plot for the 2027 PM Peak hour. The negative numbers show the reduction in traffic as a consequence of reduction in vehicle trips in favour of public transport. Overall the trip reduction is not significant although a reduction in traffic is present.

The results show that increased public transport reduces traffic on the sub-arterial and arterial road network by up to 100 cars in a peak hour. On Blaxland Road southbound the lower traffic volumes reduces the queuing at the three signalised junctions on this road and hence the actual (non-queued) traffic volumes are marginally higher.

Figure 9a
2027 AM 20% -0%

SATURN

WS Atkins
& Leeds ITS

2027AMVH.UFS
2027AMPT.UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

26-11- 7
SCOTT WILSON

Figure 9b
2027 PM 20% - 0%

SATURN

WS Atkins
& Leeds ITS

2027PMVH.UFS
2027PMPT.UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

26-11- 7
SCOTT WILSON

10.3 Global Statistics

AM Peak Hour

Table 10.6 presents the global statistics for both Scenarios for the AM peak hour. The results show that in Scenario 1 where public transport is advocated for then there is a reduction in distance and hours travelled and the fuel consumption.

Table 10.6: Global Statistics

SCENARIO	Hours	Distance (km)	Fuel consumed (litre)
Scenario 1	694	4858	1040
Scenario 2	853	4886	1144
Reduction	159	28	104

OPTIONS TESTING

11.0 OPTION ASSESSMENT

The following sections summarise the local assessment of each network Option. For the purposes of the assessment we have used Scenario 2 (no public transport increase) for the road based infrastructure assessment as a "worse" case. A Link Volume Difference Plot has been undertaken of the "Do Nothing" versus the "Do Something" Option.

11.1 Option 1 – Bus Priority Measures

In this Option the West Parade priority controlled ramp is not available for general traffic and is designated for buses only both inbound and outbound at Rutledge Street. At the intersection of First Avenue/East Parade/Railway Parade a bus lane has been added on the northern approach (East Parade north leg heading southbound) and general traffic has been reduced to one lane at this location. At the Ball Avenue/Balaclava Road/Blaxland Road intersection a bus only eastbound lane has been added to the western approach to the intersection in Ball Avenue.

2027 AM Peak Hour

The bandwidth plots for the AM peak are shown in **Figure 10a** with zero percent trip reduction (Scenario 2)**. Figure 10b** shows the link volumes for the Scenario 1 Option, with bus priority with 20 percent trip reduction. **Figure 10c** shows the Link Volume Difference Plot of Option 1 minus Do Nothing for the 2027 AM Peak Hour. The closure of West Parade leads to a change in the way drivers access the town centre as shown in **Figure 10c** of the 165 cars which would have used West Parade (as in the Do Nothing case).

2027 PM Peak Hour

The bandwidth plots for the PM peak are shown in **Figure 10d** for Scenario 2*.* **Figure 10e** shows the link volumes for the Scenario 1 Option, with bus priority. **Figure 10f** shows the Link Volume Difference Plot of Option 1 minus Do Nothing for the 2027 AM Peak Hour. The closure of West Parade leads to a change in the way drivers access the town centre as shown in Figure 10f. The closure of West Parade leads to a change in the way drivers access the town centre as shown in Figure 10f of the 230 cars which would have used West Parade (as in the Do Nothing case).

11.2 Option 1a – Modified Bus Priority Measures

A modified bus priority road network was modelled which included a bus only section of the West Parade ramp between the Eastwood Shopping Centre access and Rutledge Street. This option maintains full access to the Eastwood Shopping Centre from West Parade but does not permit traffic heading southbound along West Parade to access Rutledge Street. At the intersection of First Avenue/East Parade/Railway Parade a bus lane has been added on the northern approach (East Parade north leg heading southbound) and general traffic has been reduced to one lane at this location. At the Ball Avenue/Balaclava Road/Blaxland Road intersection a bus only eastbound lane has been added to the western approach to the intersection in Ball Avenue. In the AM and PM peak hours 163 and 213 cars are redistributed to other roads leaving the Town Centre. The outputs are indicated in **Figures 11a-11f**.

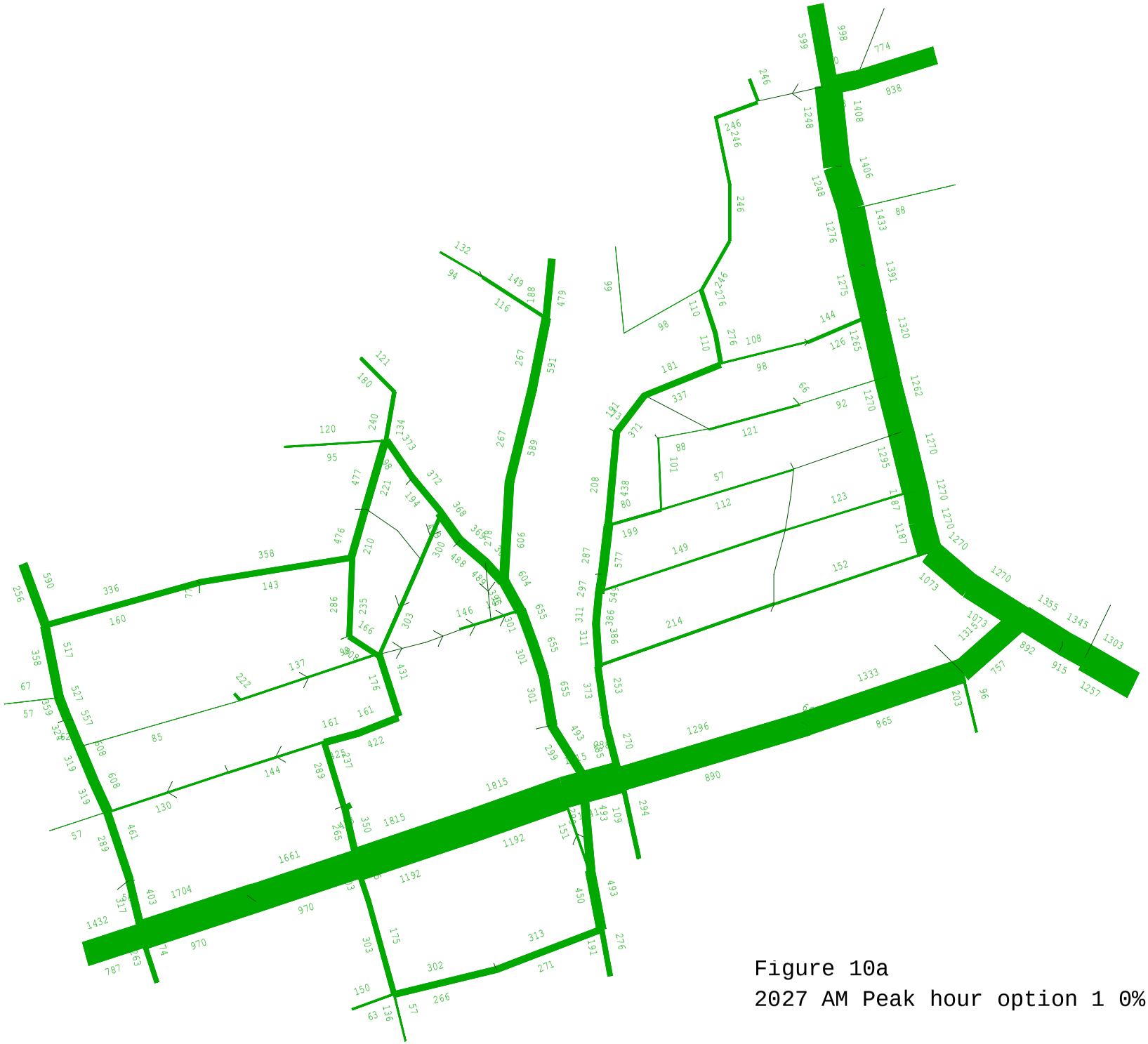


Figure 10a
2027 AM Peak hour option 1 0%

SATURN

WS Atkins
& Leeds ITS

27AMOP1.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

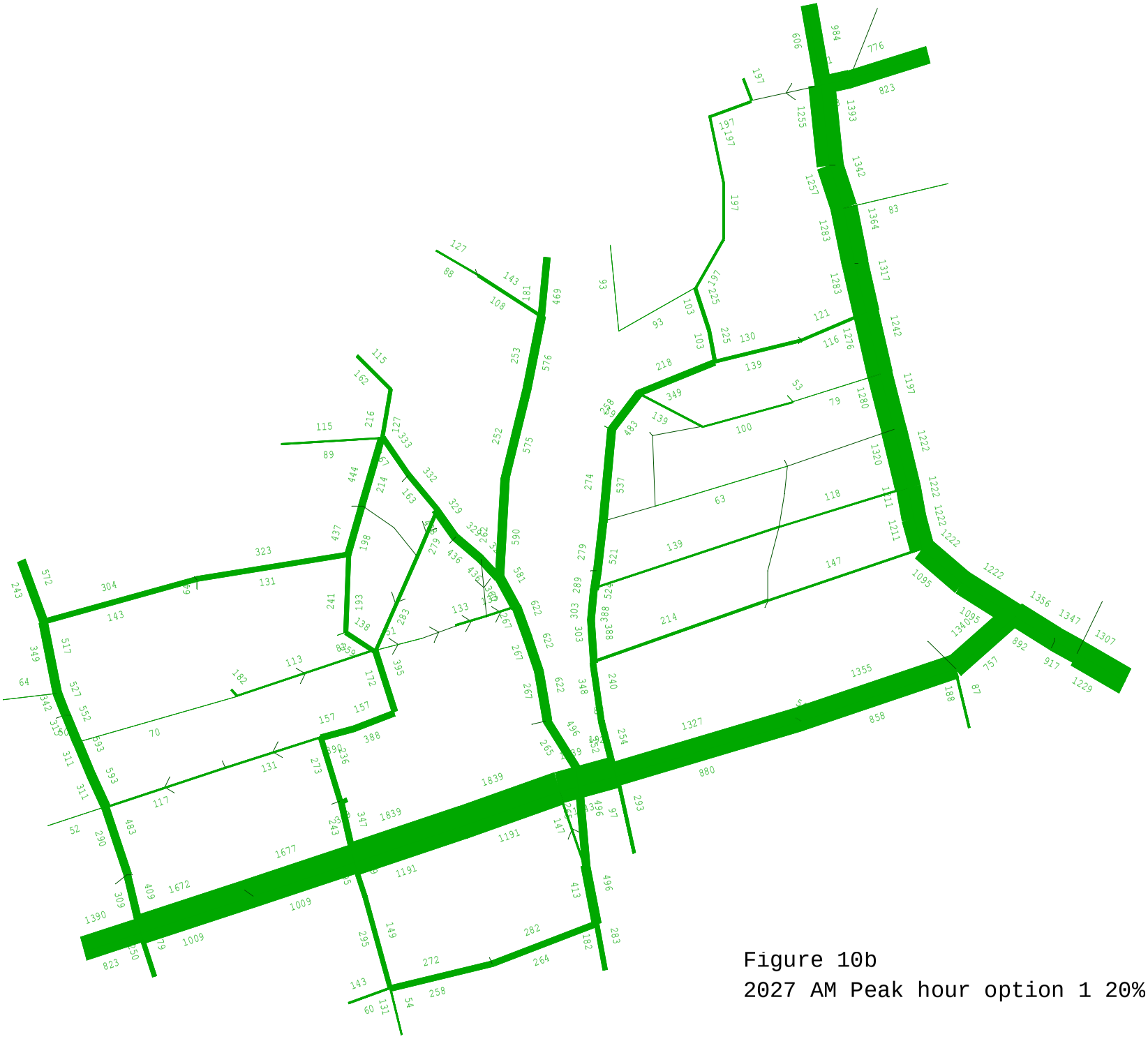


Figure 10b
2027 AM Peak hour option 1 20%

SATURN

WS Atkins
& Leeds ITS

27AMOP1.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

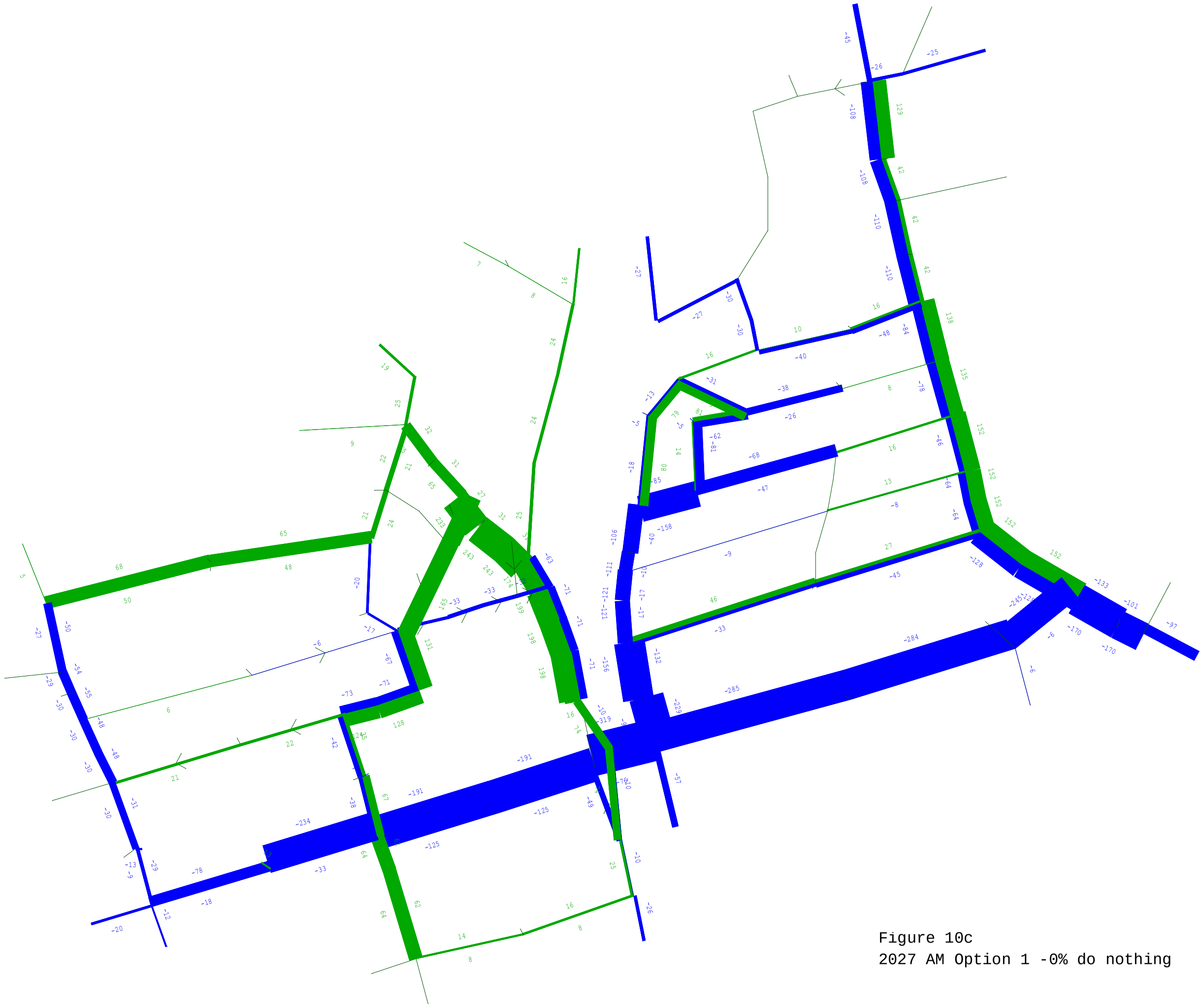


Figure 10c
2027 AM Option 1 -0% do nothing

SATURN

WS Atkins
& Leeds ITS

27AMDN.UFS
27AMOP1UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

Figure 10d
2027 PM Peak hour Option 1 0%

SATURN

WS Atkins
& Leeds ITS

27PMOP1.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

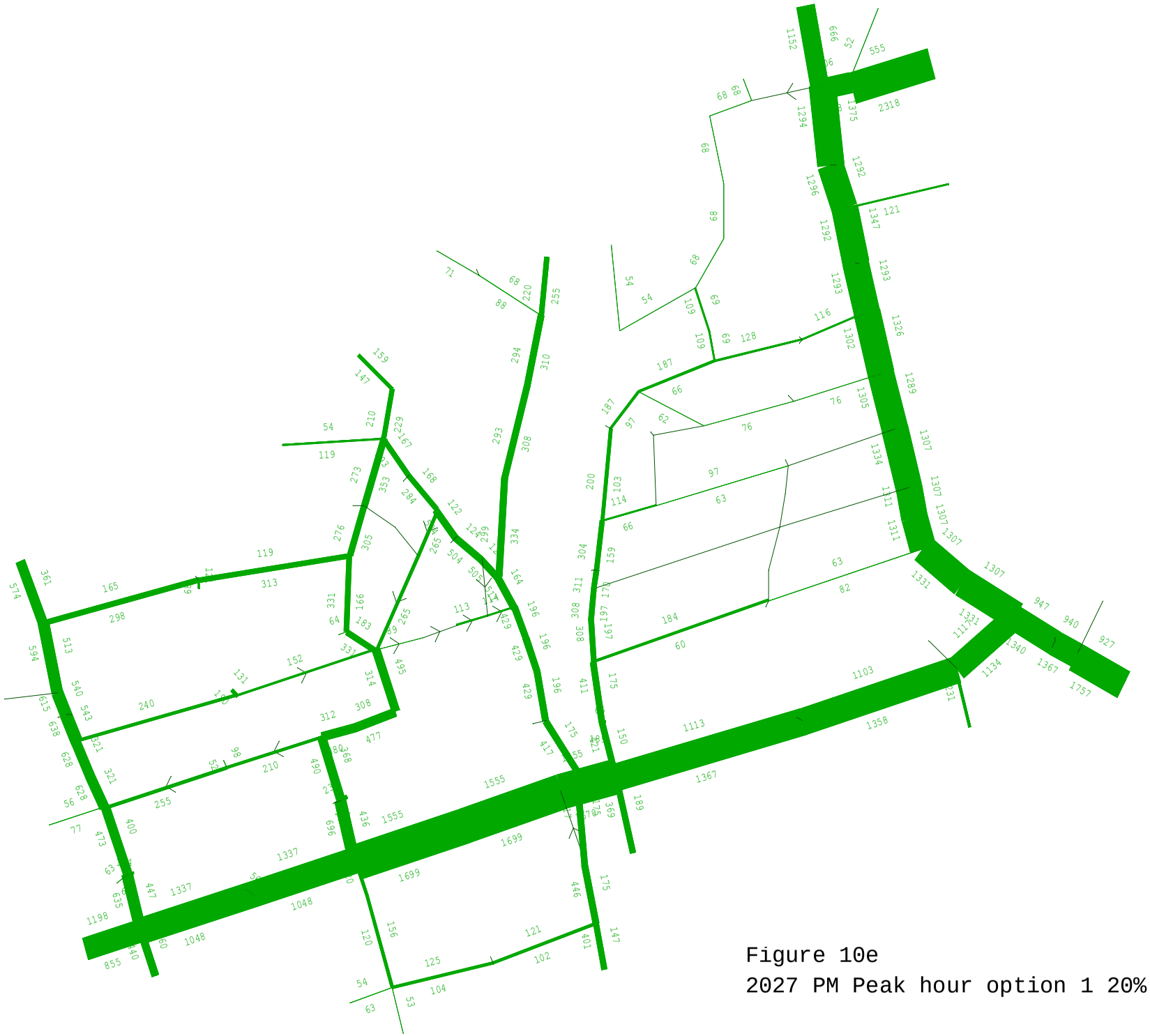


Figure 10e
2027 PM Peak hour option 1 20%

SATURN

WS Atkins
& Leeds ITS

27PMOP1.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 10f
2027 PM Option 1 - 0% do nothing

SATURN

WS Atkins
& Leeds ITS

27PMDN.UFS
27PMOP1UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
100./mm

29-11- 7
SCOTT WILSON

Figure 11a
2027 AM Peak hour option 1a 0%

SATURN

WS Atkins
& Leeds ITS

E27AMOP1.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

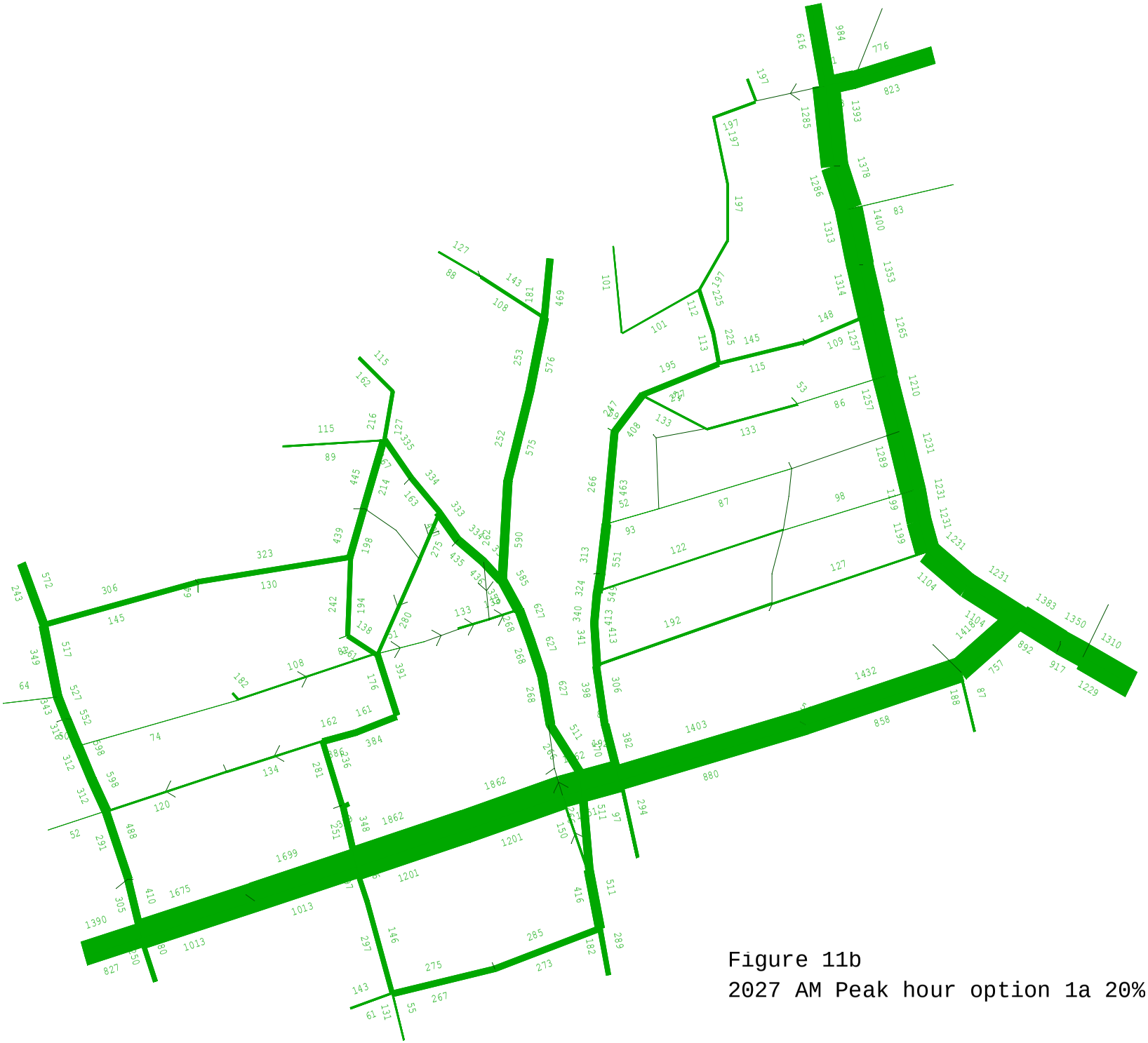


Figure 11b
2027 AM Peak hour option 1a 20%

SATURN

WS Atkins
& Leeds ITS

E27AMOP1.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 11c
2027 AM Peak hour option 1a -0% do nothing

SATURN

WS Atkins
& Leeds ITS

27AMOP1.UFS
27AMDN1.UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

26-11- 7
SCOTT WILSON

Figure 11d
2027 PM Peak hour option 1a 0%

SATURN

WS Atkins
& Leeds ITS

E27PMOP1.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

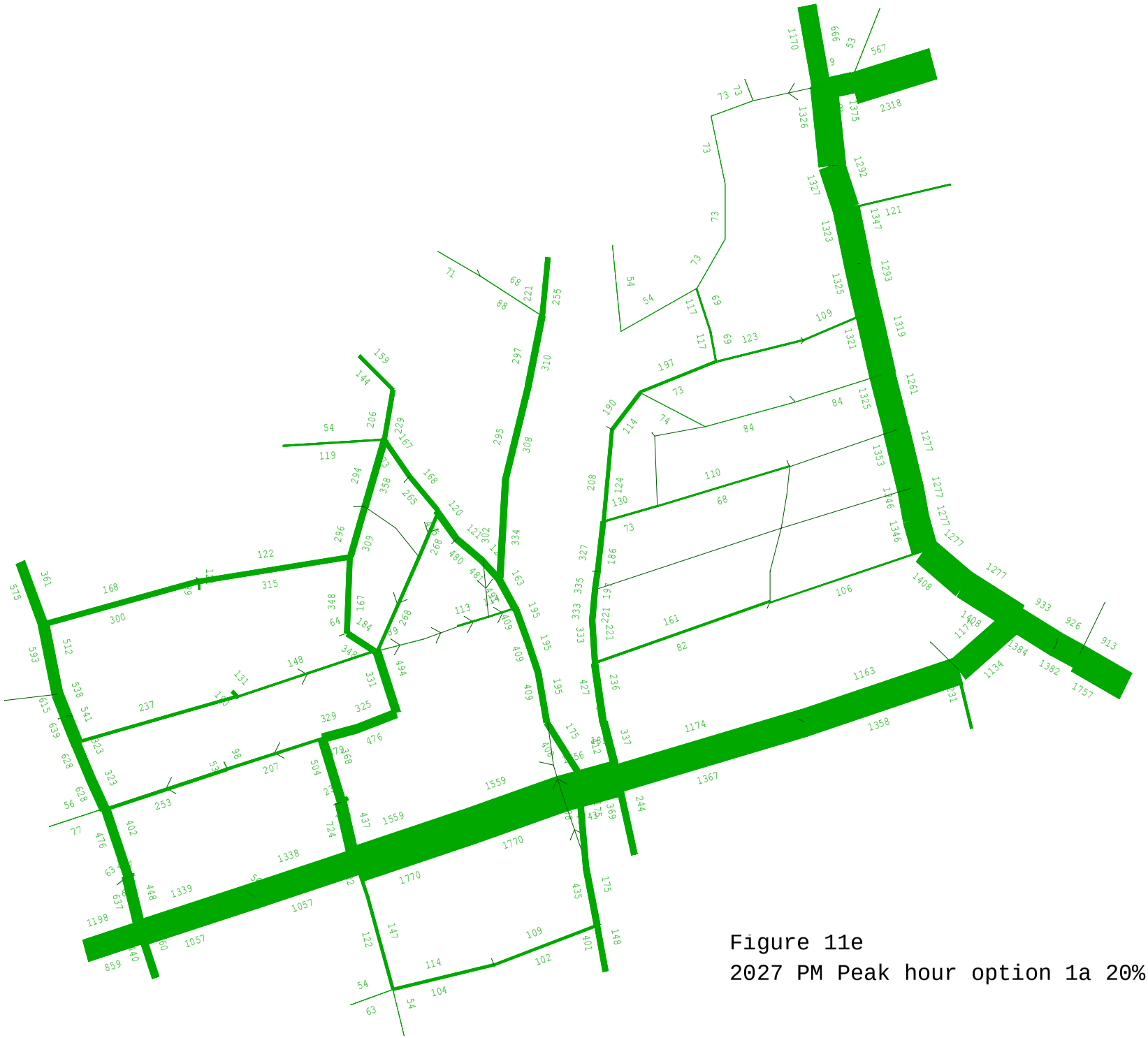


Figure 11e
2027 PM Peak hour option 1a 20%

SATURN

WS Atkins
& Leeds ITS

E27PMOP1.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 11f
2027 PM Peak hour option 1a -0% do nothing

SATURN

WS Atkins
& Leeds ITS

27AMOP1.UFS
27AMDN1.UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

26-11- 7
SCOTT WILSON

11.3 Option 2 – Closure of The Avenue

In this option the section of Rowe Street between Trelawney Street and The Avenue and The Avenue between Rowe Street and Hillview Lane has been closed off to all traffic for conversion into a pedestrian mall. In both AM and PM peak hours over 600 cars are redistributed across the access roads within the Town Centre.

The Link Volume Difference Plots shows that a positive number is the increase in traffic because vehicles need to re-route as The Avenue is closed. As the Figure shows that the re-routing is clear.

Figures 12a to 12f detail the outputs of this option.

11.4 Option 3 – Extend Trelawney Street

This Option (**see Figures 13a-13f**) involves the extension of Trelawney Street from Rowe Street to Hillview Lane to provide improved access to the Glen Street Car Park.

The Link Volume Difference Plot for the AM Peak hour shows that a positive number is the increase in traffic because vehicles because of the new road link. A negative number is a reduction of traffic because a new road link is another route alternative.

The new Trelawney Street Road link will have the expected two-way traffic volumes in the 2027 forecast year:

- In the AM peak hour 140 cars; and
- In the PM peak hour 350 cars.

These traffic volumes are modest.

11.5 Option 4 – Hillview Lane Two-Way

This option involves the reconfiguration of traffic in Hillview Lane to permit two way traffic all the way between Shaftsbury Road and West Parade (**see Figures 14a-14f**).

The Link Volume Difference Plot for the AM Peak hour shows that a positive number is the increase in traffic because of the new road link. A negative number is a reduction of traffic because a new road link is another route alternative.

Allowing Hillview Lane eastbound (west of The Avenue) access leads to the following traffic volumes in the 2027 forecast year:

- In the AM peak hour 147 cars;
- In the PM peak hour 174 cars.

These traffic volumes are modest and overall improve access to the town centre.

Figure 12a
2027 AM Peak hour option 2 0%

SATURN

WS Atkins
& Leeds ITS

E2027AM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 12b
2027 AM Peak hour option 2 20%

SATURN

WS Atkins
& Leeds ITS

E2027AM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

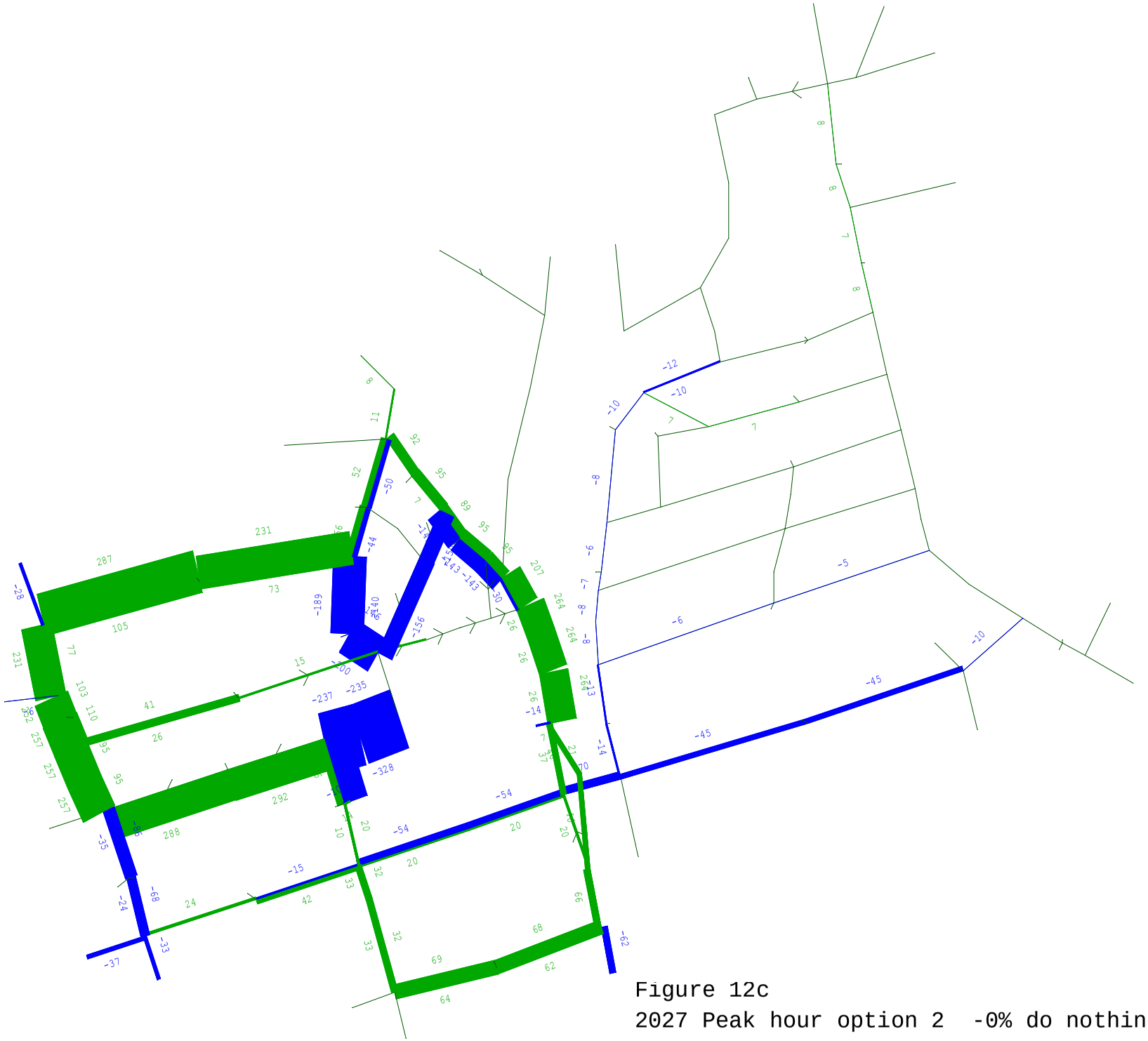


Figure 12c
2027 Peak hour option 2 -0% do nothing

SATURN

WS Atkins
& Leeds ITS

2027AMDN.UFS
2027AMOP2UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

26-11- 7
SCOTT WILSON

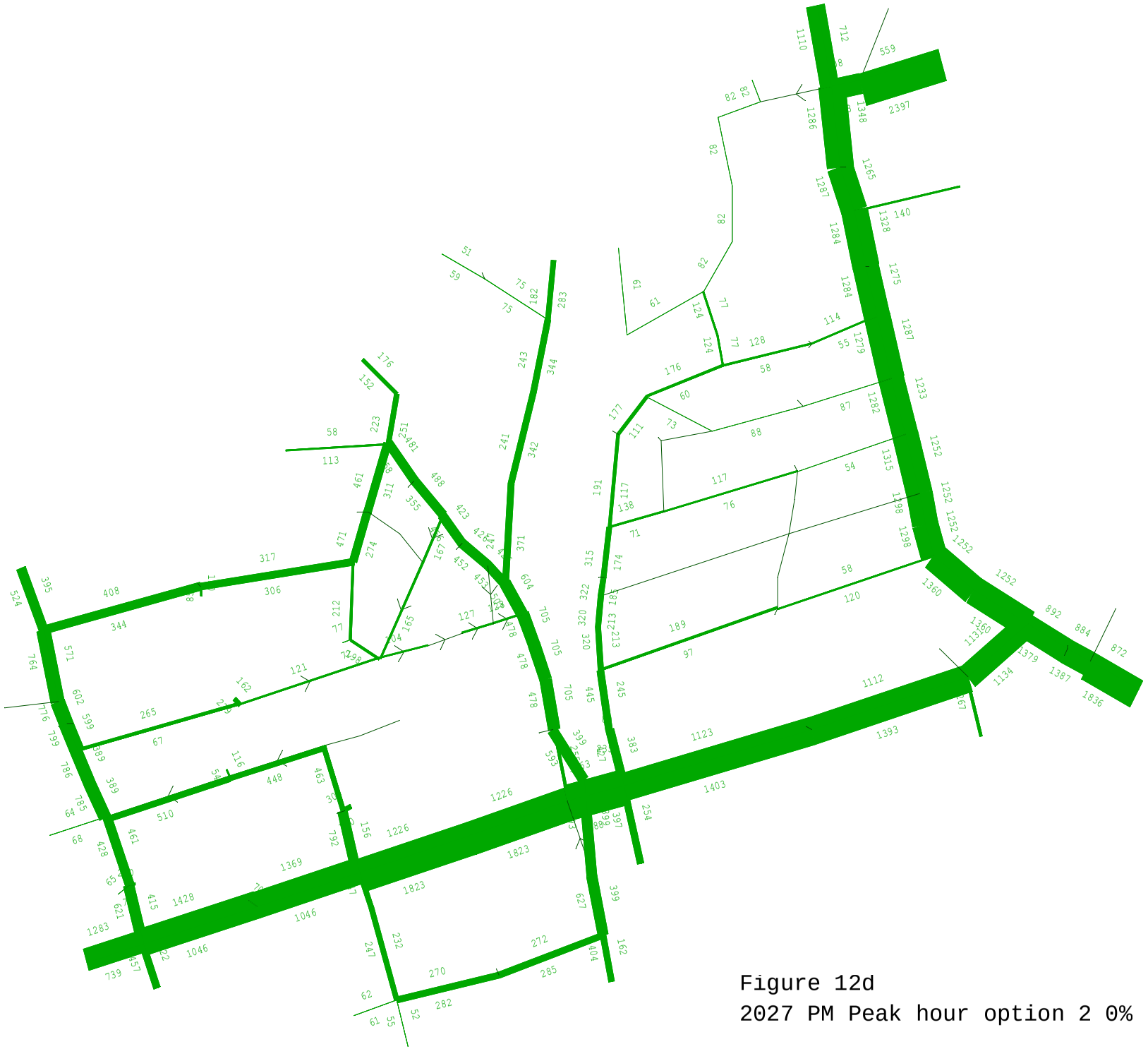


Figure 12d
2027 PM Peak hour option 2 0%

SATURN

WS Atkins
& Leeds ITS

E2027PM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

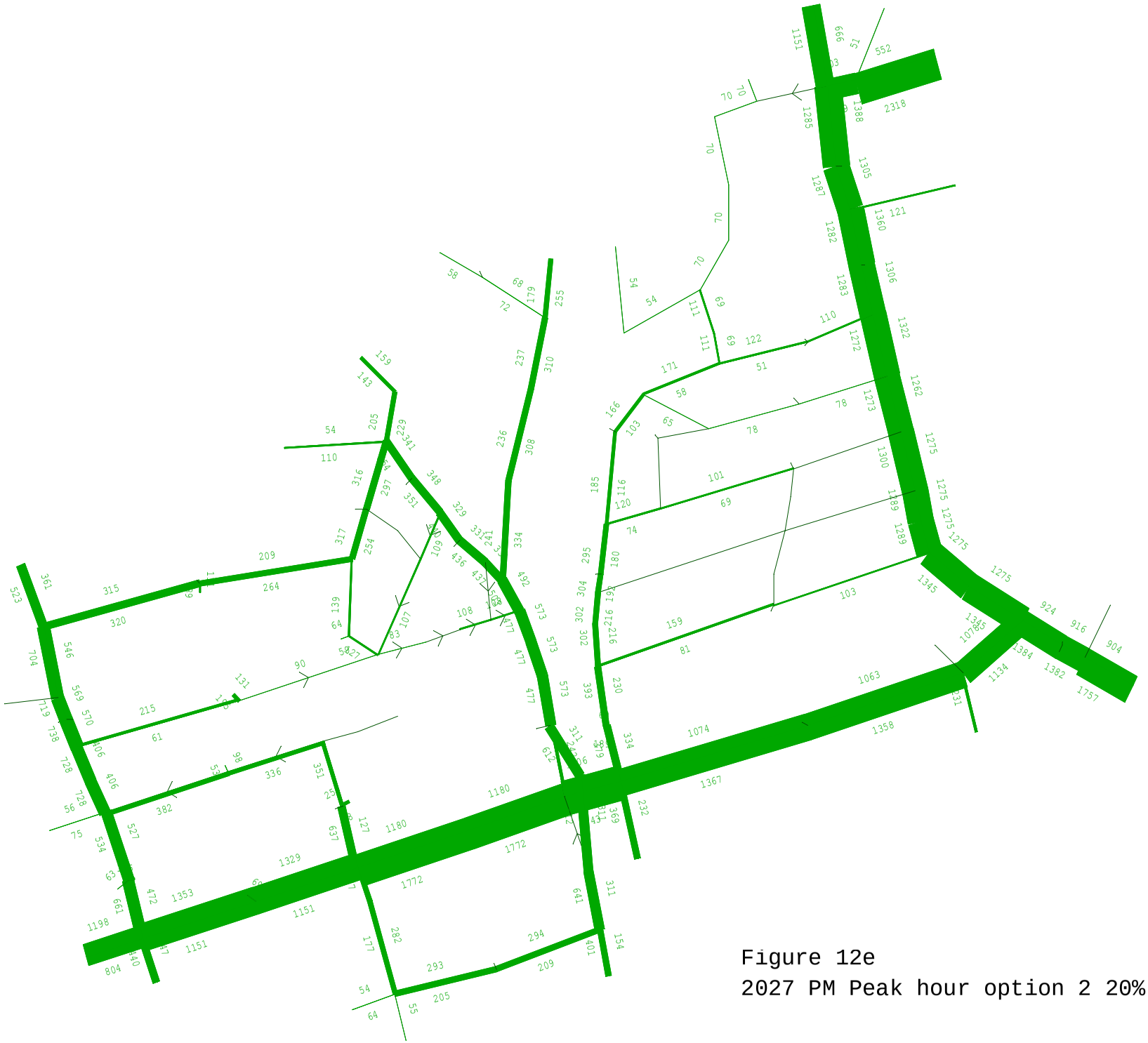


Figure 12e
2027 PM Peak hour option 2 20%

SATURN

WS Atkins
& Leeds ITS

E2027PM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 12f
2027 PM Peak hour option 2 -0% do nothing

SATURN

WS Atkins
& Leeds ITS

2027PMDN.UFS
2027PMOP2UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

26-11- 7
SCOTT WILSON

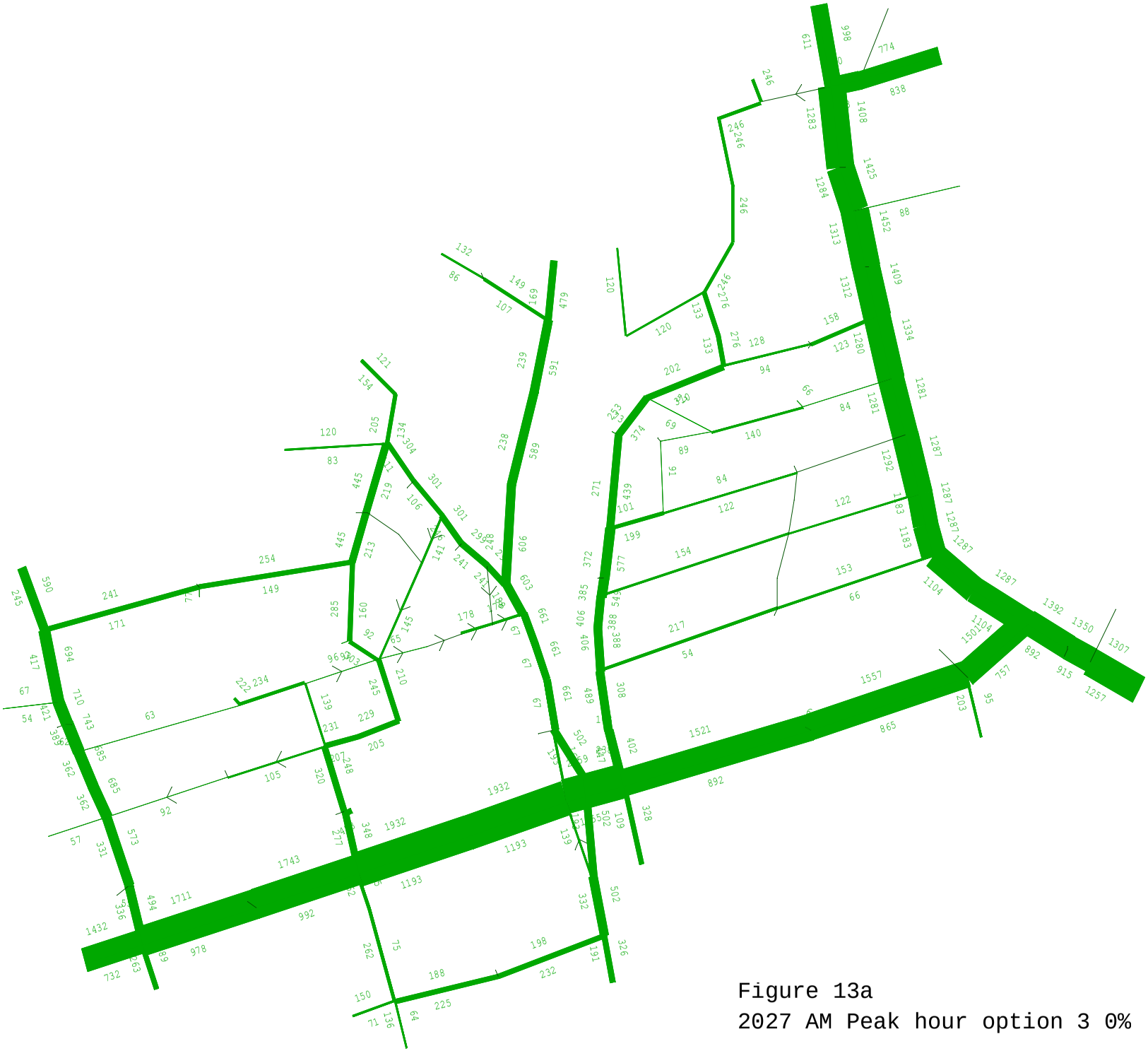


Figure 13a
2027 AM Peak hour option 3 0%

SATURN

WS Atkins
& Leeds ITS

E2027AM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

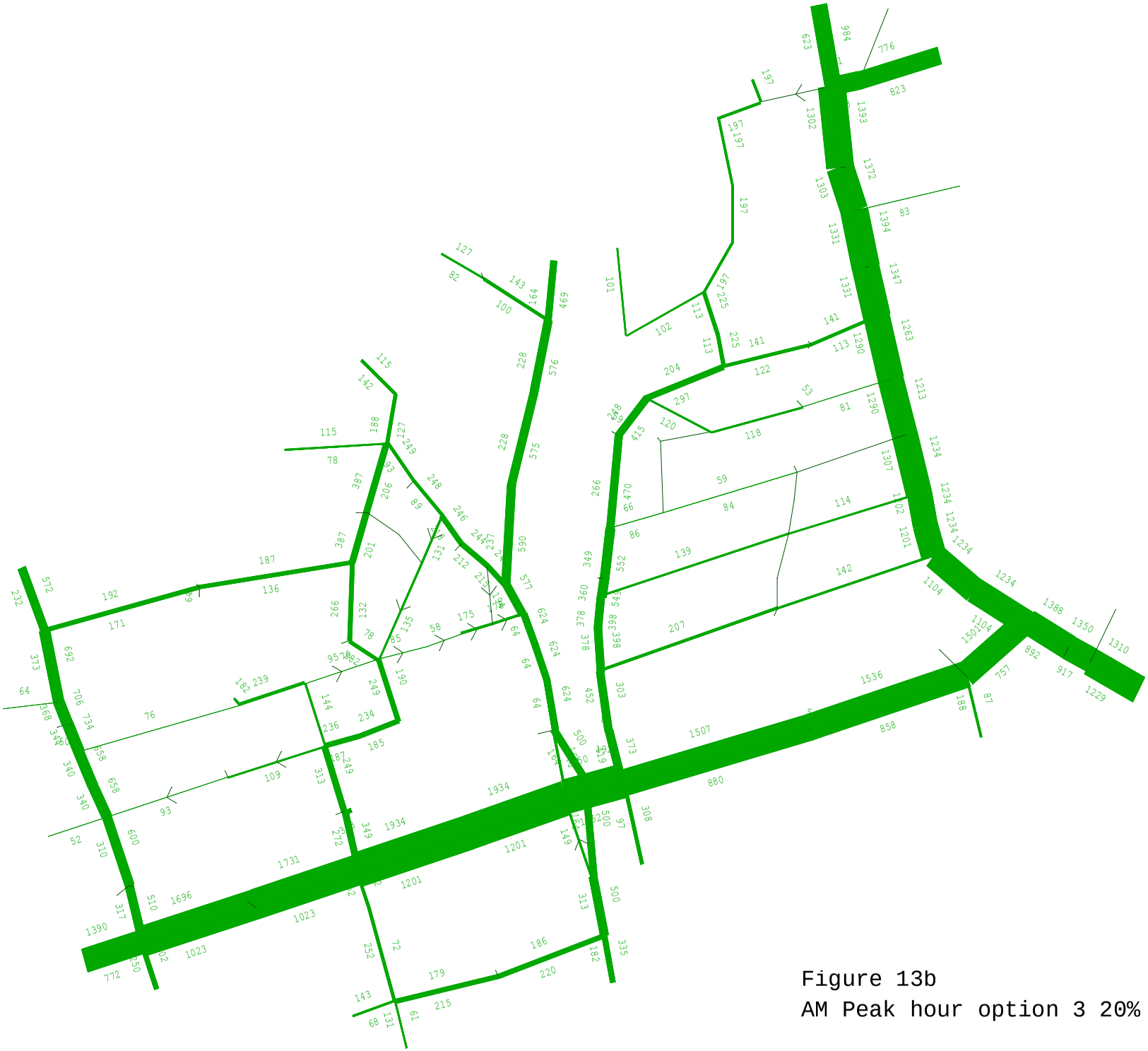


Figure 13b
AM Peak hour option 3 20%

SATURN

WS Atkins
& Leeds ITS

E2027AM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

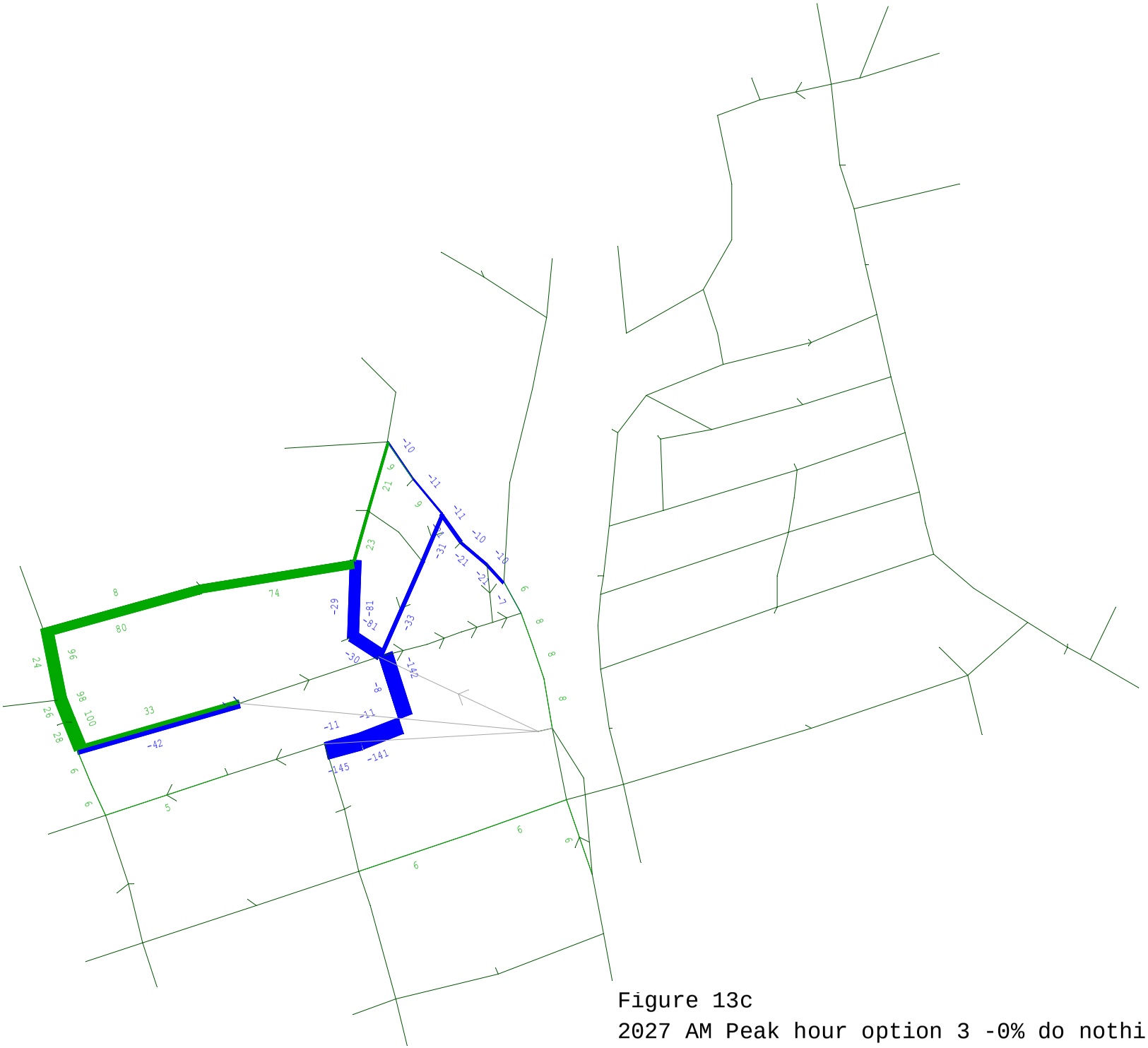


Figure 13c
2027 AM Peak hour option 3 -0% do nothing

SATURN

WS Atkins
& Leeds ITS

27AMDN.UFS
27AMOP3UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

26-11- 7
SCOTT WILSON

Figure 13d
2027 PM Peak hour option 3 0%

SATURN

WS Atkins
& Leeds ITS

E2027PM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 13e
2027 PM peak hour option 3 20%

SATURN

WS Atkins
& Leeds ITS

E2027PM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

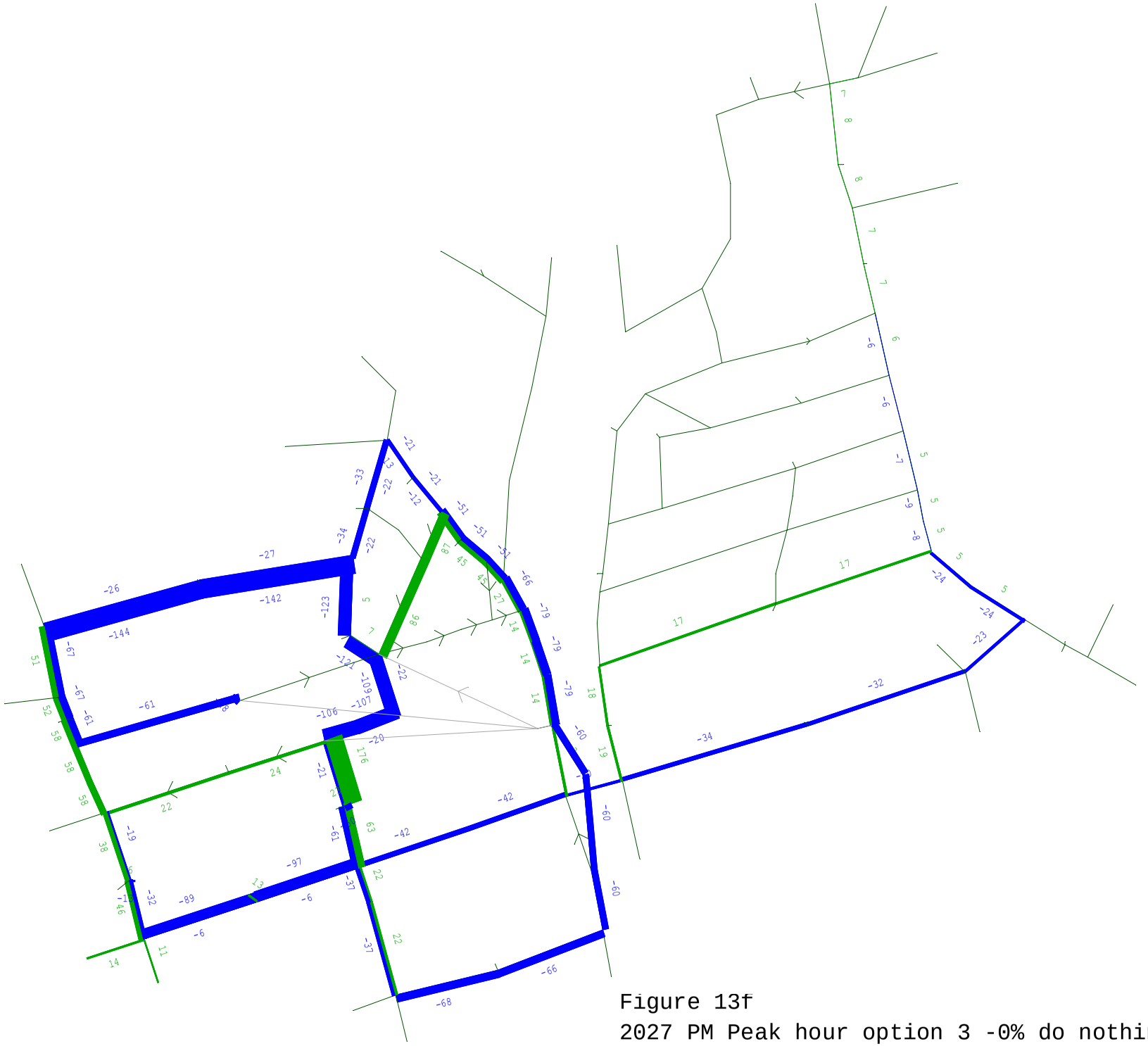


Figure 13f
2027 PM Peak hour option 3 -0% do nothing

SATURN

WS Atkins
& Leeds ITS

27PMDN.UFS
27PMOP3UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

26-11- 7
SCOTT WILSON

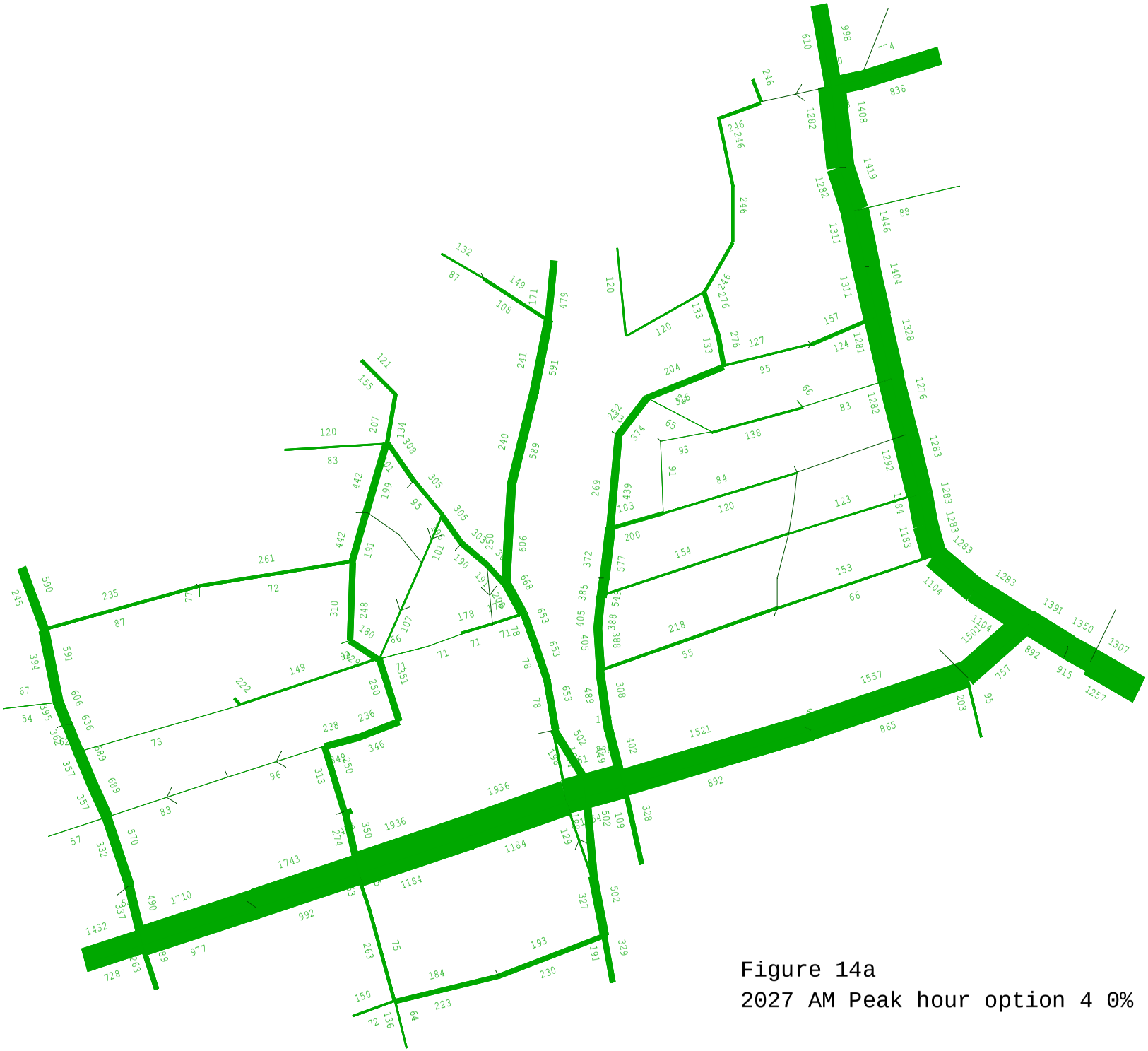


Figure 14a
2027 AM Peak hour option 4 0%

SATURN

WS Atkins
& Leeds ITS

E2027AM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

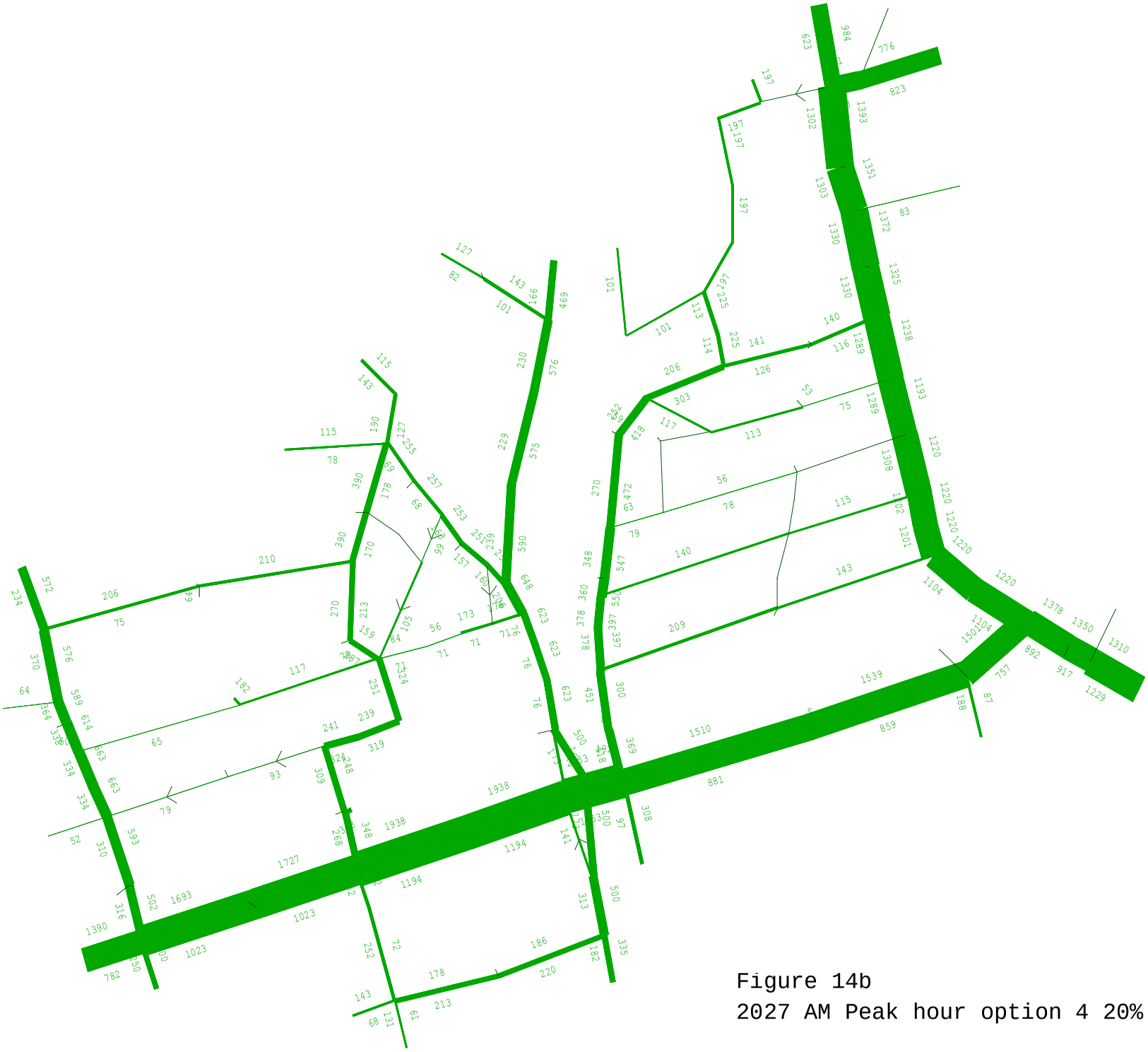


Figure 14b
2027 AM Peak hour option 4 20%

SATURN

WS Atkins
& Leeds ITS

E2027AM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 14c
2027 AM Peak hour option 4 -0% do nothing

SATURN

WS Atkins
& Leeds ITS

27AMDN.UFS
27AMOP4UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
10./mm

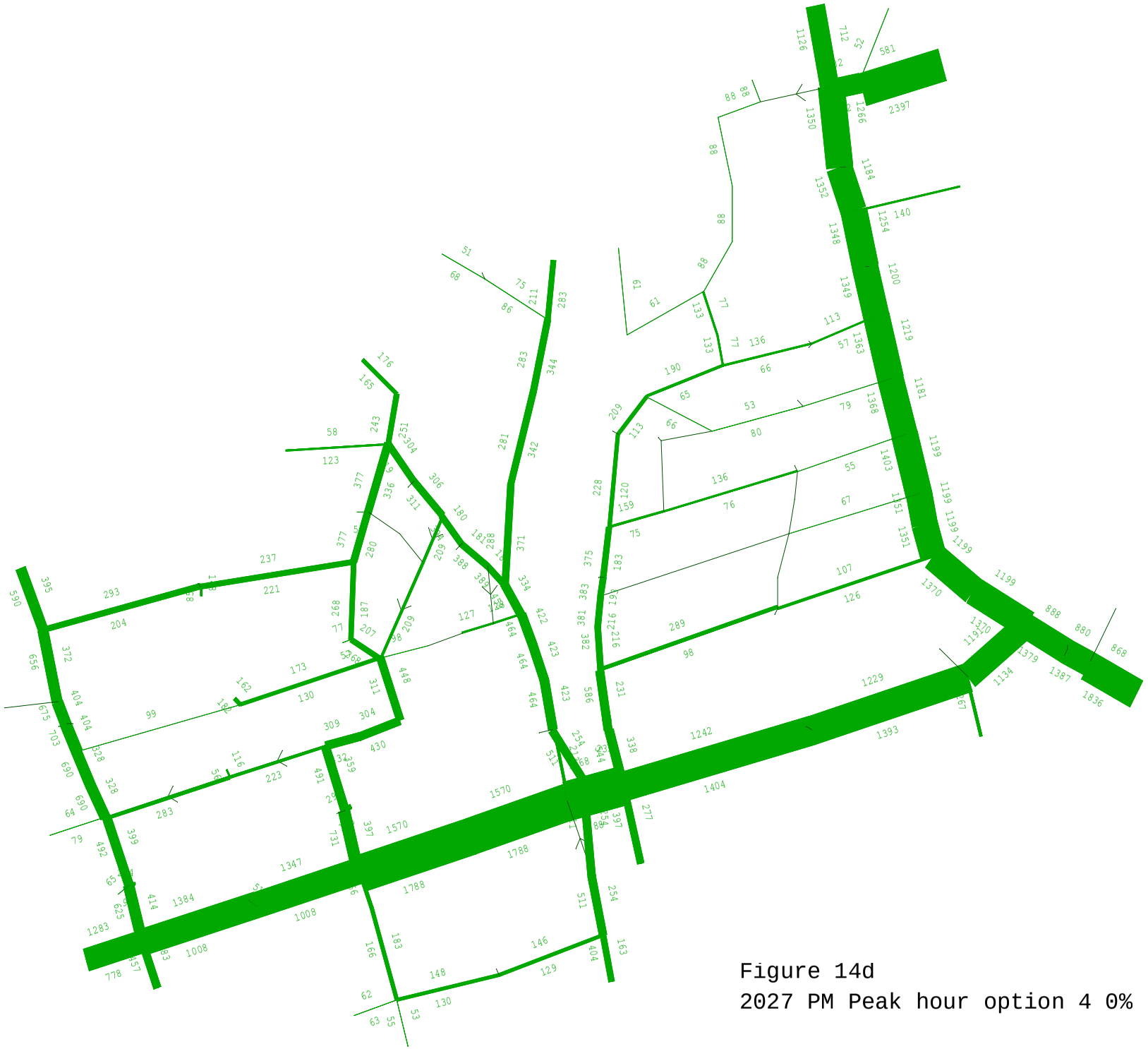


Figure 14d
2027 PM Peak hour option 4 0%

SATURN

WS Atkins
& Leeds ITS

E2027PM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

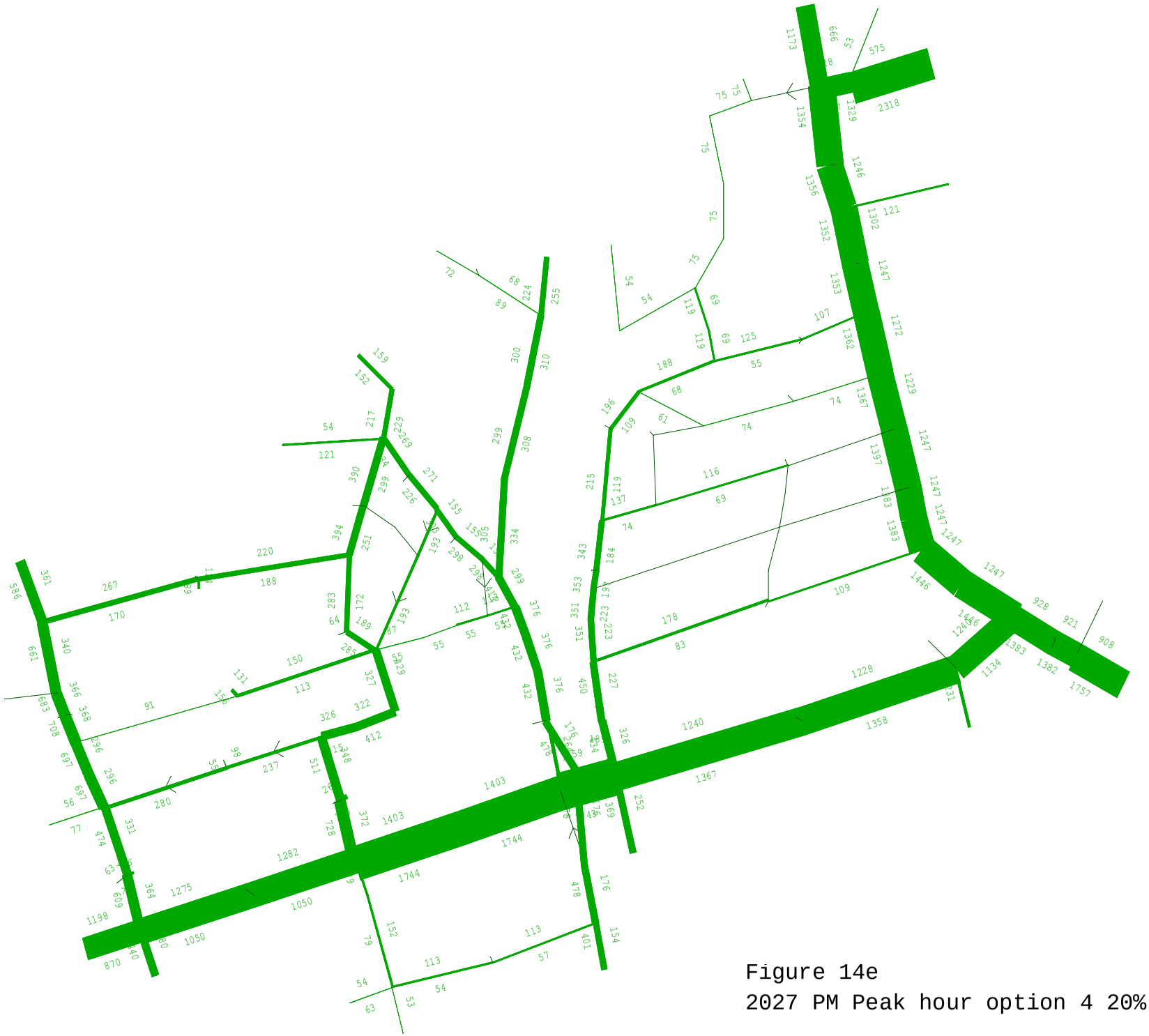


Figure 14e
2027 PM Peak hour option 4 20%

SATURN

WS Atkins
& Leeds ITS

E2027PM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

SATURN

WS Atkins

& Leeds ITS

27PMDN.UFS

27PMOPT4FS

Scale 1765

Link Annot:

+ Actual flo

- Actual flo

Differ: 2-1

Bandwidths =

50./mm

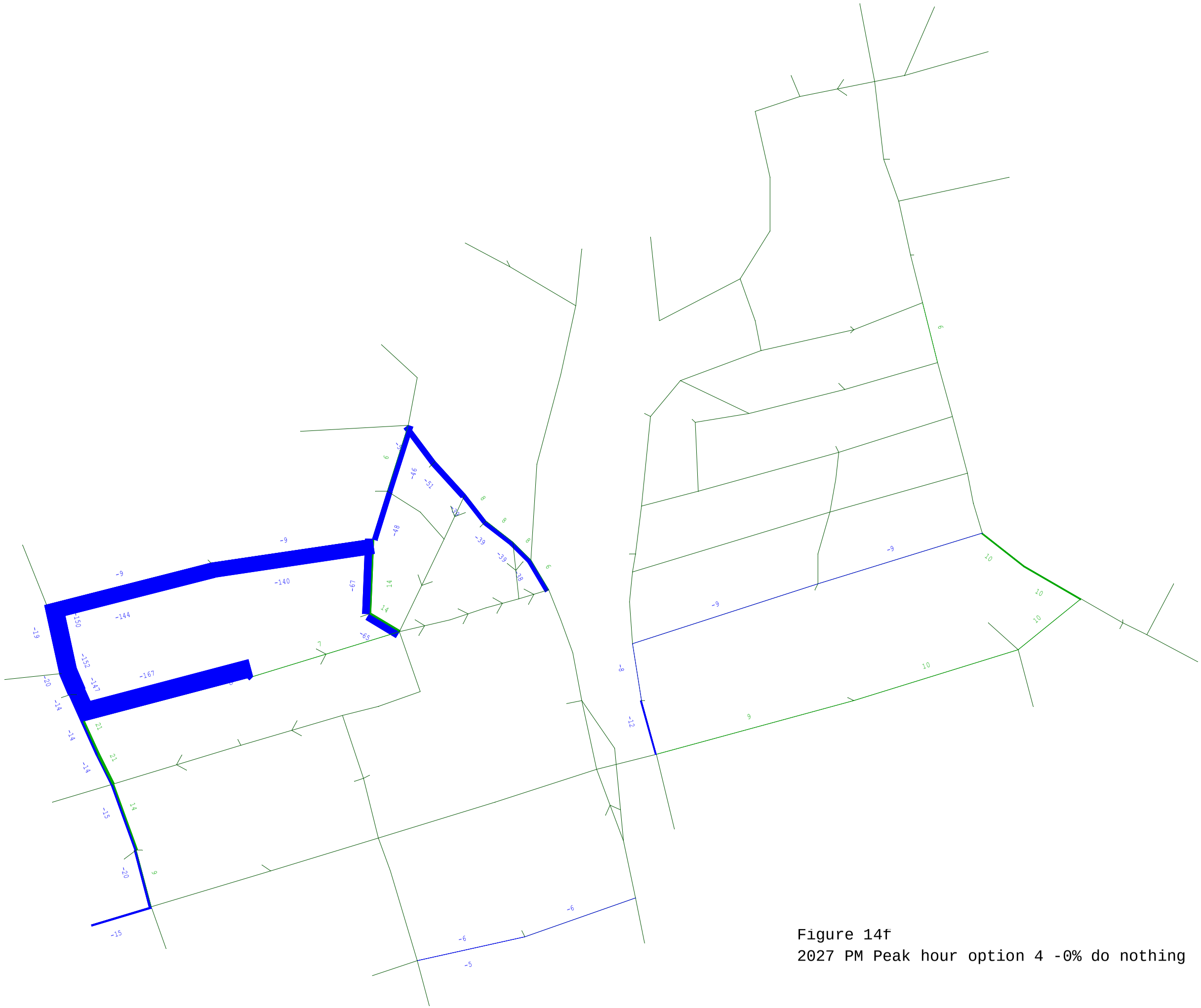


Figure 14f
2027 PM Peak hour option 4 -0% do nothing

27-11- 7

SCOTT WILSON

11.6 Option 5 – Right Turn from Trelawney Street

This option (**see Figures 15a-15f**) comprises of providing additional capacity at the Trelawney Street/Rutledge Street intersection by the introduction of a right turn ban on the southern approach to the intersection.

The right turn bay from Trelawney Street will carry the following additional traffic in the 2027 forecast year:

- In the AM peak hour 20 cars;
- In the PM peak hour 57 cars.

The provision of a right turn lane provides minimal increase in traffic using this lane.

11.7 Option 6 – Left turn lane into West Parade

Option 6 (**Figures 16a-16f**) assesses the merits of introducing a left turn lane from Rutledge Street westbound onto West Parade to allow vehicles to access the Eastwood town Centre without having to traverse Trelawney Street and Rowe Street.

The new left turn into West Parade will have the expected traffic volumes in the 2027 forecast year:

- In the AM peak hour 62 cars;
- In the PM peak hour 195 cars.

The provision of a left turn into West Parade redirects traffic that would otherwise turn left in Trelawney Street south and travel along Clanalpine Street and then onto West Parade underpass into East Eastwood.

Figures **17a** and **17b** detail the options tested as detailed above.

Figure 15a
2027 AM Peak hour option 5 0%

SATURN

WS Atkins
& Leeds ITS

E2027AM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

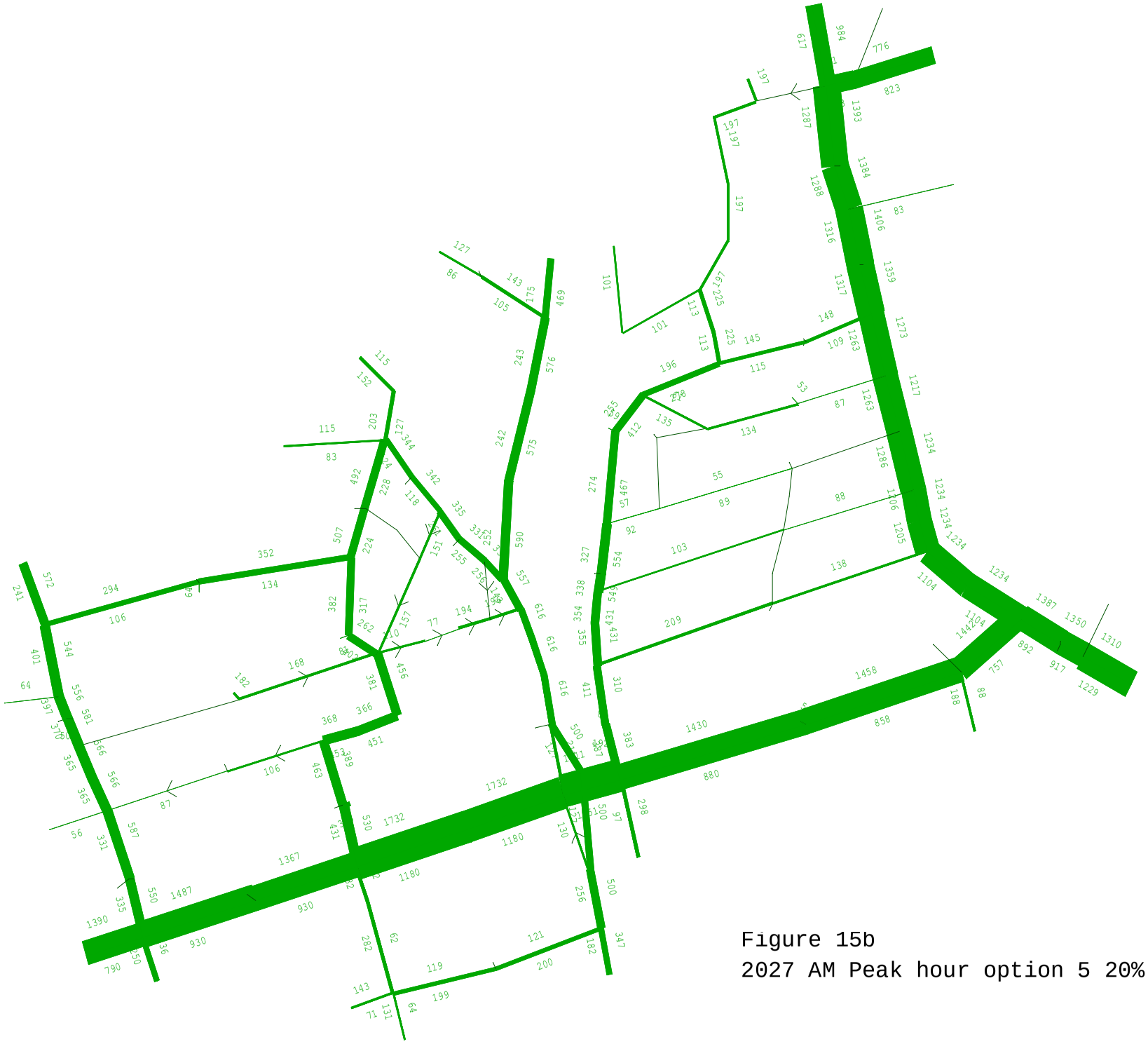


Figure 15b
2027 AM Peak hour option 5 20%

SATURN

WS Atkins
& Leeds ITS

E2027AM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 15c
2027 AM Peak hour option 5 -0% do nothing

SATURN

WS Atkins
& Leeds ITS

27AMDN.UFS
27AMOP5UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

27-11- 7
SCOTT WILSON

2027 AM Peak Hour Do Nothing Network 27-11-07

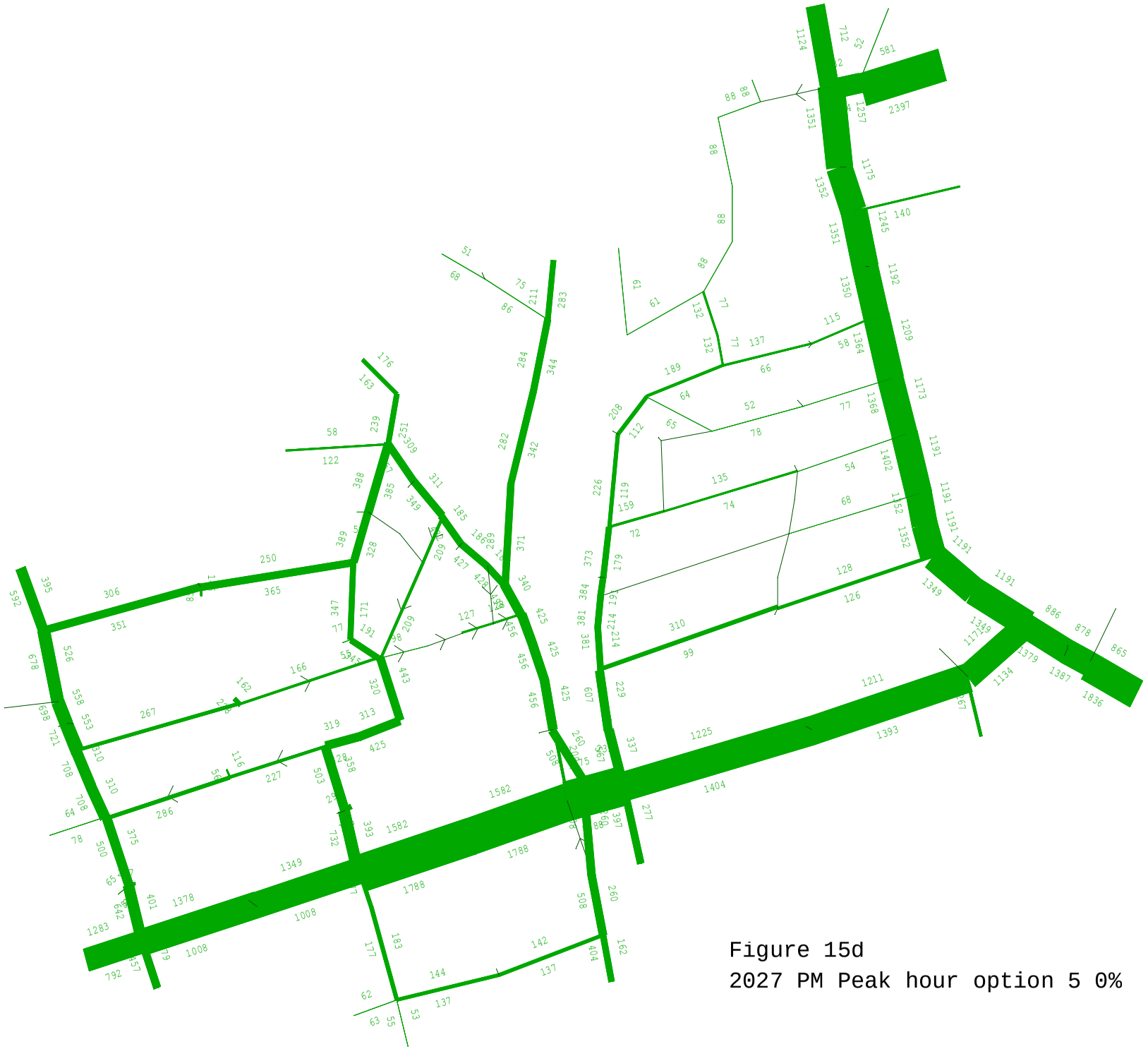


Figure 15d
2027 PM Peak hour option 5 0%

SATURN

WS Atkins
& Leeds ITS

E2027PM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 15e
2027 PM peak hour option 5 20%

SATURN

WS Atkins
& Leeds ITS

E2027PM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 15f
2027 PM Peak hour option 5 -0% do nothing

SATURN

WS Atkins
& Leeds ITS

27PMDN.UFS
27PMOP5UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
100./mm

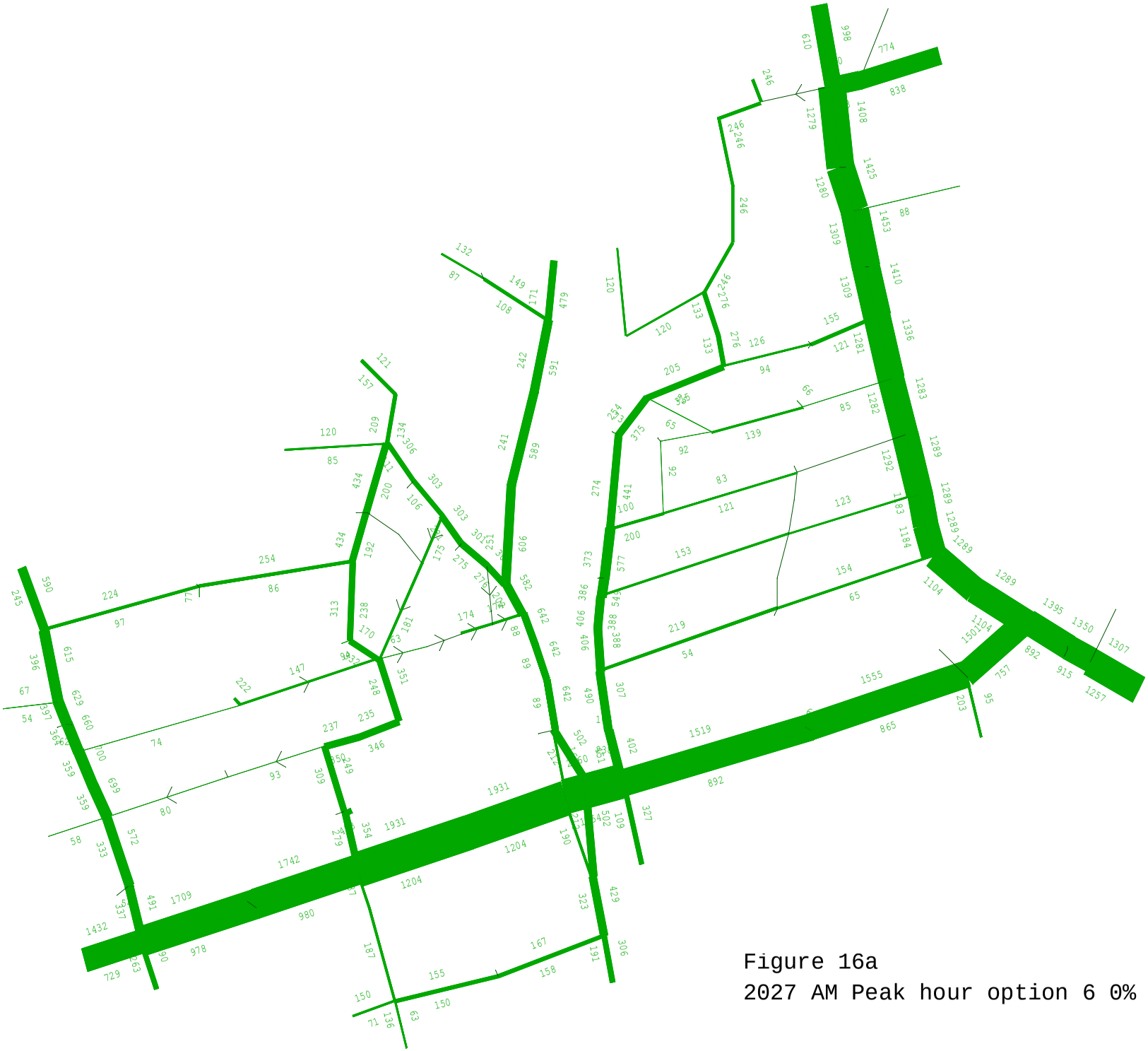


Figure 16a
2027 AM Peak hour option 6 0%

SATURN

WS Atkins
& Leeds ITS

E2027AM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

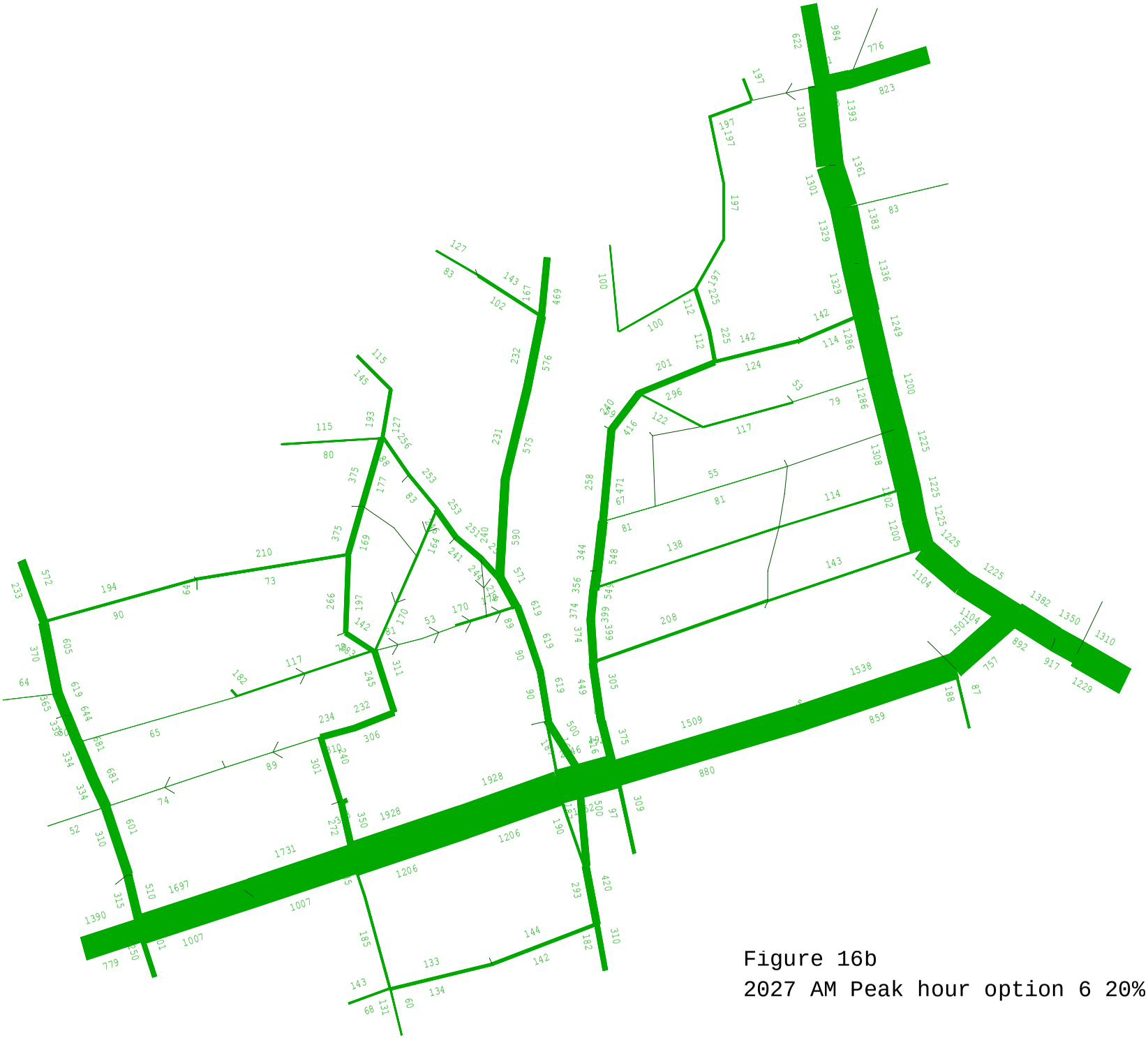


Figure 16b
2027 AM Peak hour option 6 20%

SATURN

WS Atkins
& Leeds ITS

E2027AM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 16c
2027 AM Peak hour option 6 -0% do nothing

SATURN

WS Atkins
& Leeds ITS

27AMDN.UFS
27AMOP6UFS

Scale 1765

Link Annot:

+ Actual flo
- Actual flo

Differ: 2-1

Bandwidths =
50./mm

Figure 16d
2027 PM Peak hour option 6 0%

SATURN

WS Atkins
& Leeds ITS

E2027PM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 16e
2027 PM Peak hour option 6 20%

SATURN

WS Atkins
& Leeds ITS

E2027PM.UFS

Scale 1765

Link Annot:

Actual flow

Bandwidths =
500./mm

19-11- 7
SCOTT WILSON

Figure 16f
2027 Pm Peak hour option 6 -0% do nothing

SATURN

WS Atkins
& Leeds ITS

27PMDN.UFS
27PMOP6UFS

Scale 1765

Link Annot:

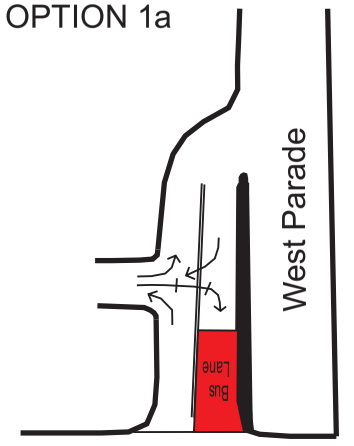
+ Actual flo
- Actual flo

Differ: 2-1

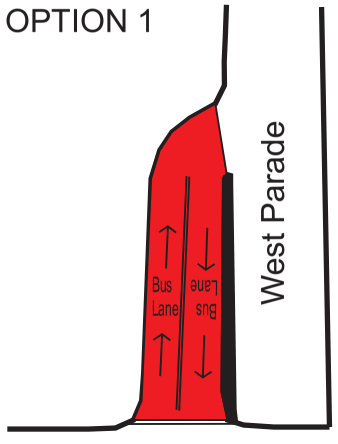
Bandwidths =
50./mm

Wingate
Rd
Ave
Clive Rd
Hillview
Shaftsbury
Glen
St
Lakeside
Rd
Progress
Av
Coolgum Ln
Ln
West
St
St
Clanalpine
St
East
Pde
Doomben
Av
Railway
Av
Ball
May
St
May Ln
Ethel
Ln
Ethel
St
Balaclava
Rd
Blaxland
Lansdowne
St
Second
Av
Rd
Pde

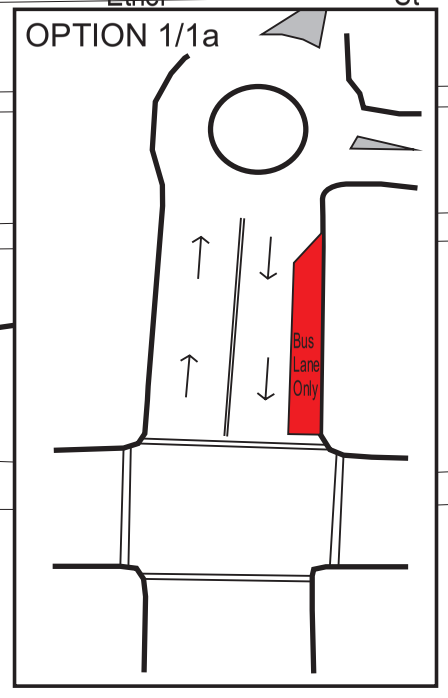
OPTION 1a



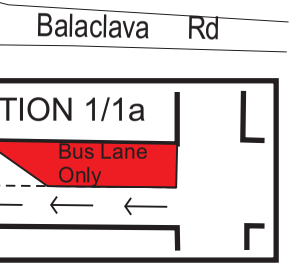
OPTION 1



OPTION 1/1a



OPTION 1/1a

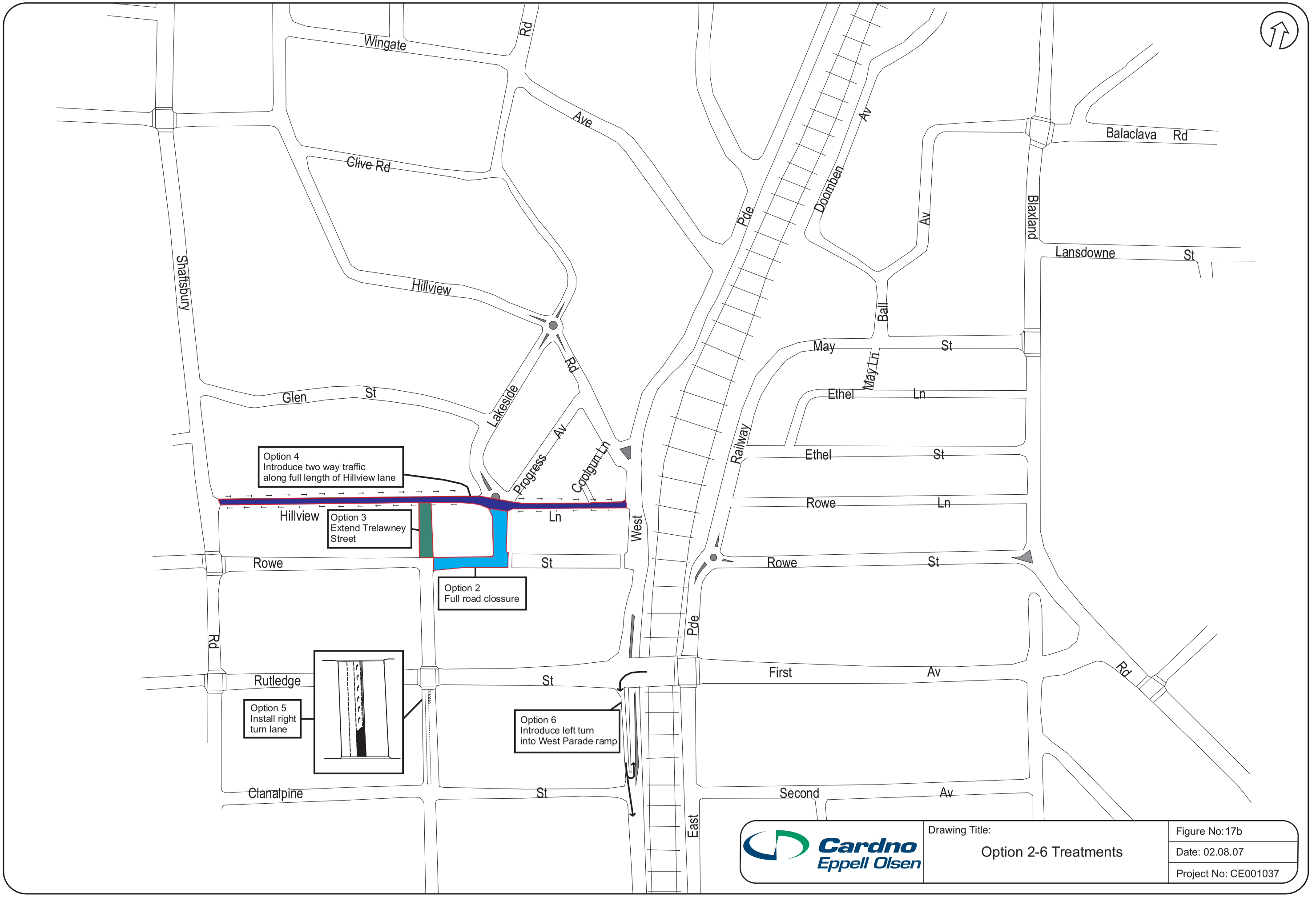


Cardno Eppell Olsen

Drawing Title:
Option 1 and Option 1a Treatments

Figure No:17a
Date: 02.08.07
Project No: CE001037

R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\.cdr



Cardno Eppell Olsen	Drawing Title: Option 2-6 Treatments	Figure No:17b
		Date: 02.08.07
		Project No: CE001037

R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\.cdr

12.0 SIDRA INTERSECTION ASSESSMENT

From turning volumes derived from the SATURN modelling detailed above the performance of the intersections have been assessed under each of the 2 scenarios and 6 options. The outputs are detailed in the attached tables.

Year 2027 Base Case

A Year 2027 base case which assesses the intersections under their existing layouts loaded with year 2027 traffic volumes is detailed in Table 12.1. This analysis indicates that the road network will be at capacity at some 6 intersections in the Town Centre leading to excessive delays.

- Shaftsbury Road/ Glen Street;
- Shaftsbury Road/ Rutledge Street;
- Trelawney Street/ Rutledge Street;
- Rutledge Street/ West Pde Ramp;
- Blaxland Road/ Balaclava Road; and
- Blaxland Road/ First Avenue.

The main findings of the intersection analysis for the various options are as follows with detailed data provided for each of the Options and scenarios in **Appendix C**.

By reducing vehicle trips as defined in Scenario 1 the Town Centre traffic is reduced resulting in improved intersection performance and reduced delays (fewer intersections are at capacity) and any measures to reduce car dependency are strongly supported.

Option 1 - Bus lanes

The road network in general can cater for the introduction of Option 1 Bus Lanes however, buses making a left turn out of West Parade onto Rutledge Street will still be subjected to considerable delays. The queue lengths and average delays will be considerably reduced during the AM and PM peak periods as general traffic will not impede the buses. With this option, the signalised intersections at Trelawney Street/Rutledge Street and Blaxland Road/Balaclava Road resulted in Level of Service B in the PM peak and Blaxland Road/First Avenue resulted in Level of Service C in the PM peak period. Significant improvements were achieved as compared to the existing network analyses which revealed a Level of Service F for the 3 intersections mentioned above. An option of providing bus priority is supported on the West Parade ramp but will need to be modified to not impede traffic accessing the Shopping Centre Car Park. The modified bus priority road network is assessed in Option 1a.

Option 1a - Modified Bus lanes

A modified bus priority road network was modelled which included a bus only section of the West Parade ramp between the shopping centre access and Rutledge Street. This option maintains full access to the shopping centre from West Parade but does not permit traffic heading southbound along West Parade to access Rutledge Street.

At the intersection of First Avenue/East Parade/Railway Parade a bus lane has been added on the northern approach (East Parade north leg heading southbound) and general traffic has been reduced to one lane at this location. At the Ball Avenue/Balaclava Road/Blaxland Road intersection a bus only eastbound lane has been added to the western approach to the intersection in Ball Avenue.

Similar results to Option 1 were achieved, however, unlike Option 1, it is important to note that with Option 1a, significant queue lengths are expected at the intersection of Rutledge Street/West Parade Ramp.

Option 2 - Closure of The Avenue/Rowe Street

Option 2 Closure of The Avenue/Rowe Street results in excessive delays at a considerable number of intersections and is not recommended. The redistributed traffic cannot be catered for by the road network. Analyses showed an improvement for the intersection performances of Blaxland Road/Balaclava Road and Blaxland Road/First Avenue which achieved a Level Of Service B and C respectively during the PM peak period, however, the road closure will cause major delays at the intersection of West Parade/Hillview Lane and Blaxland Road/Rowe Lane, performing at a Level of Service F.

Option 3 - Trelawney Street Extension

This option provides an alternative parking access to any new development at the current Glen Street Car Park site and would reduce traffic volumes marginally in the area with most pedestrian activity through Lakeside Drive and The Avenue but does result in capacity constraints with 3 intersections exhibiting large delays:

- Shaftsbury Road/ Glen Street;
- Shaftsbury Road/ Rutledge Street; and
- Rutledge Street/ West Parade Ramp.

Level of Services improved for the intersections of Trelawney Street/Rutledge Street, Blaxland Road/Balaclava Road and Blaxland Road/First Avenue as compared to the 2027 estimated traffic volumes on existing road network. This option, however, is not recommended, as it would require acquisition of a strata shopping mall and considerable utility adjustments. The estimated cost is around $10 million.

Option 4 - Hillview Lane Two-Way

The road network can generally cater for this upgrade and given its opportunity to provide additional access points to the town centre is supported. The road widening will also result in additional on-street parking and provide improved loading opportunities for businesses. SIDRA intersection analyses revealed similar improvements for both AM and PM peak periods in Level Of Services mentioned for Option 3. Trelawney Street/Rowe Street & Blaxland Road/First Avenue perform at a Level of Service B in the PM peak period while the intersection of Blaxland Road/Balaclava Road operates at a Level of Service C in the PM peak period with the Option 4 road network.

This option would only be achieved over the long term through land dedication and construction as each adjacent private lands are developed.

Option 5 - Right Turn from Trelawney to Rutledge Street

Analyses showed that the right turning bay reduces the intersection delays and queue lengths significantly. With the right turn bay, the operation of the Trelawney Street/Rutledge Street improved from Level of Service F to Level of Service B.

This option, however, does not provide significant benefits and is not worth pursuing. The right turn bay from Trelawney Street will only carry a small amount of additional traffic in the future and is not considered a viable measure.

Option 6 - Left Turn into West Parade

Traffic distribution from this option indicates generally good operational performance of intersections at Trelawney Street/Rutledge Street, Blaxland Road/Balaclava Road and Blaxland Road/First Avenue with improved level of services, short delays and queue lengths. Although this option will provide benefits in accessing the Town Centre it is not physically possible to allow this movement due to vertical and horizontal alignment constraints and is therefore not recommended on road design and cost constraints grounds.

Table 12.1: Intersection Performance with 2027_Base Volumes

Intersection	Intersection Control	2027_Base AM Peak				2027_Base PM Peak			
		Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)
Shaftsbury / Glen	**Give Way (N-S)**	0.269	18.7	B	9	**>1.000**	**>120**	**F**	**>250**
Shaftsbury / Rowe	Traffic Signals	0.405	21.3	B	91	0.636	31.7	C	111
Shaftsbury / Rutledge	**Traffic Signals**	**>1.000**	**>120**	**F**	**>250**	**>1.000**	**114.1**	**F**	**>250**
Trelawney / Rowe	Give Way (E-W)	0.442	11.7	A	25	0.456	12.1	A	27
Trelawney / Rutledge	**Traffic Signals**	>1.000	29.3	C	241	**>1.000**	**>120**	**F**	**>250**
Hillview Rd / Lakeside	Roundabout	0.298	8.3	A	17	0.229	8.4	A	10
Lakeside / Glen	Give Way (N-S)	0.439	14.2	A	24	0.400	16.9	B	19
West Pde / Hillview Rd	Give Way (N-S)	0.376	3.7	A	26	0.261	6.1	A	14
West Pde / Hillview Ln	Give Way (N-S)	0.320	15.8	B	12	0.411	24.7	B	17
Hillview Rd / Coolgun	Give Way (N-S)	0.160	10.4	A	19	0.055	14.8	B	9
Rutledge / West Pde Ramp	**Give Way (N-S)**	**>1.000**	**>120**	**F**	**>250**	**>1.000**	**>120**	**F**	**>250**
Clanalpine / West Pde	Give Way (N-S)	0.293	11.8	A	11	0.320	118.8	A	13
Railway Pde / Rowe Ln	Give Way (N-S)	0.233	4.6	A	22	0.189	1.9	A	14
Blaxland / Rowe Ln	Give Way (N-S)	0.567	32.7	C	21	0.135	19.0	B	4
Rutledge / East Pde / First Ave	Traffic Signals	0.988	25.2	B	179	0.726	23.5	B	170
Blaxland / Balaclava	**Traffic Signals**	0.961	38.7	C	>250	**>1.000**	**>120**	**F**	**>250**
West Pde / Wingate	Give Way (N-S)	0.509	25.5	B	24	0.149	1.3	A	10
Blaxland / May	Traffic Signals	0.771	15.1	B	177	0.624	9.8	A	111
Blaxland / Rowe St	Give Way (N-S)	0.525	25.5	B	21	0.148	18.2	B	4
Railway Pde / Rowe St	Roundabout	0.278	5.7	A	16	0.312	7.1	A	19
Blaxland / First	**Traffic Signals**	1.000	34.3	C	197	**>1.000**	**82.5**	**F**	**>250**
May / Ball	Give Way (E-W)	0.402	14.0	A	21	0.136	13.9	A	5
Lakeside / Progress	Roundabout	0.119	9.9	A	6	0.226	9.9	A	12

***Results for the approach with the highest delay are presented for give-way intersections. (Please refer to Table 7.2 to compare with existing situation)**

SECTION 5

RECOMMENDATIONS

13.0 PEDESTRIAN ACCESS AND MOBILITY PLAN

13.1 Land Use Releases and Traffic Volume Growth

Substantial growth in residential and commercial floor space is planned for Eastwood in the near future as summarised in ***Table 10.3***. This will have implications on the growth of traffic volumes, which will be generated on Eastwood streets.

To address the existing and future pedestrian need, and encourage walking instead of short distance vehicle trips, the pedestrian environment requires substantial upgrading. Traffic management devices such as roundabouts and signals will also necessarily address pedestrian crossing needs within their design.

13.2 Existing Situation

Eastwood Town Centre is bounded by a number of major roads, including Blaxland Road, Rutledge Street/First Avenue and Shaftsbury Road. These roads provide a definitive boundary for the town centre. These roads are generally high volume traffic roads with limited pedestrian and cycle provision. Running north-south through the town centre is the Northern suburban rail line (i.e. North Sydney to Hornsby). The bisection of the centre by the rail line creates clear east and west town centre precincts. These two town centre precincts also display significantly different characteristics.

On the western side of the town centre, there is a focus on pedestrian movement and amenity. Pedestrian priority treatments are particularly focused around the streets adjacent to the rail station. The key pedestrian activity areas are: adjacent to the train station, along Rowe Street and the pedestrian mall, and along Progress Avenue and Lakeside Road. Progress Avenue in particular is highly active due to the land uses located along it (i.e. restaurants, cafes, shopping). Some of the features on the western side of the town centre include:

- Pedestrian mall along Rowe Street, between West Parade and the Avenue;
- Zebra crossings at either end of the pedestrian mall;
- Zebra crossings at key pedestrian areas along Progress Avenue, Lakeside Road and Rowe Street;
- Bicycle parking facilities in key activity areas (e.g. near library, restaurants and cafes);
- A signed regional cycle route (however no designated facilities);
- Local cycle routes.

On the eastern side of the rail line, the town centre becomes more focused on traffic movements rather than pedestrians and cyclists. Only two zebra crossings are provided on this side of town, both located across Railway Parade/East Parade near the train station. The streets connecting the train station to Blaxland Road also typically have steep grades, making it difficult and less amenable for pedestrians and cyclists.

There are currently three crossing opportunities for pedestrians and cyclists to travel across the rail line. This includes pedestrian underpasses at either end of the train station and traffic signals at Rutledge Street/First Avenue/East Parade.

13.3 Constraints

The major constraint to walking and cycling within Eastwood town centre is the rail line which travels through the area. The rail line separates east from west and provides limited crossing opportunities. Existing crossing opportunities (i.e. underpasses) are unattractive and poor in terms of safety and security. Some overlooking surveillance is provided on the northern underpass on the eastern side of the rail line. This surveillance is provided from the train station platforms and a small café outdoor eating area overlooking the underpass.

On the western side of the rail line, there is a much stronger focus on traffic movements rather than pedestrians and cyclists. The location of major roads carrying through traffic on this side of town creates this traffic dominance.

Other constraints identified for pedestrians and cyclists in Eastwood Town Centre are described below:

- Currently, both sides of the town centre present less active frontages to the train station. Key activity areas are located away from the train station;
- There are steep grades on some streets on the eastern side of the town centre which can be a barrier to some pedestrians and cyclists;
- There are high traffic volumes in key pedestrian activity areas on the western side of the town centre, which creates some conflict;
- The eastern side of the town centre is characterised by long blocks. This creates a less accessible and convenient walking environment;
- There is currently no clear visual connection between the eastern and western town centre precincts;
- Streets on the eastern side of the town centre are typically wide, making it difficult for pedestrians to safely and conveniently cross. This creates less activation along the street;
- The major car parking station located off Lakeside Road is a barrier to pedestrian movements to the west, including to the park adjacent. This isolates the park from key activity areas; and
- Traffic domination on streets surrounding the town centre do not encourage pedestrian and cycle access from surrounding residential areas.

13.4 Opportunities

Some opportunities identified to address the current constraints and improve the pedestrian and cycle environment in Eastwood Town Centre are discussed below:

- A visual and physical connection could be created between the eastern and western precincts across the rail line at the end of the Rowe Street pedestrian mall;
- Hillview Lane and Coolgun Lane could be upgraded to provide a more attractive pedestrian link, thus increasing permeability and connectivity to the train station and bus interchange;
- Lanes in the eastern town centre precinct could be upgraded to provide additional pedestrian and cycle routes as well as services access;
- Mid-block links could be provided on the eastern side of the town centre to break up long blocks. This could include links through developments as well as mid-block crossing points. Crossing points could include kerb build-outs to reduce the crossing distance;
- Additional outdoor dining and retail activities could be provided either side of the train station to increase surveillance of the train station and pedestrian underpasses;
- Future development could focus on addressing the train station to activate this area and provide overlooking surveillance of the train station and underpasses;
- The car park located off Lakeside Road could be redeveloped. This would reduce vehicle and pedestrian conflicts on this road as well as present an opportunity to better integrate the park with the town centre; and
- Signalised pedestrian crossing along Lakeside Road to access Glen Street Car Park

13.5 Bike Plan

A number of regional and local cycle routes are identified in the Ryde Bicycle Strategy and Master Plan 2007 running through the Eastwood Town Centre. Existing and proposed routes include the following (where RR = Regional Cycle Route and LR = Local Cycle Route):

- **Terry Road** (part of RR08). This route has a designated cycle lane;
- **Hillview Road** (part of RR08). This route is signed but has no dedicated on or off road facilities;
- **West Parade** (part of LR04). This route is also signed but has no designated cycle facilities within the town centre;
- **Vimiera Road** (part of RR01). At the Vimiera Street/Blaxland Road traffic signals, cyclists are provided with a set phase (i.e. cycle crossing light similar to pedestrian crossing light);
- **Ball Avenue** (part of RR01). This route is signed and bicycle markings are shown on road, however there are significant space constraints with on-street parking;
- **May Street/Railway Parade** (part of RR01). No designated bicycle facilities are provided on these streets;
- **East Parade** (part of RR01). An off road shared path is provided on the western side of this corridor, south of First Avenue/Rutledge Street; and

- **Rowe Street** (part of RR08). No designated facilities are provided on this street.

The key constraint identified with current cycle planning around the town centre is the regional route on Rowe Street, connecting into Blaxland Road and Edgar Street. This is due to a number of factors. Firstly, Rowe Street has a steep grade travelling up to Blaxland Road which may be a barrier to casual riders. In addition, the right turn needed to get from Rowe Street to Edgar Street via Blaxland Road would not currently be achievable due to existing traffic conditions. There is currently a centre traffic island on Blaxland Road which prevents right turns out of Rowe Street. As such, reconfiguration of the road layout would be required to achieve this link. A potential alternative to this connection is Ethel Street. Ethel Street has flat grades and there are plans to provide pedestrian crossings at its intersection with Blaxland Road. This street would therefore provide a flatter connection to Blaxland Road and new traffic signals could incorporate cycle right turn movements. This would allow cyclists to travel along Blaxland Road for a short period before turning left into Edgar Street.

14.0 ENCOURAGING PUBLIC TRANSPORT, CYCLING AND WALKING

To encourage use of public transport, cycling and walking, a range of options have been identified to move towards transport sustainability in the Eastwood Town Centre. These options have also been identified in the Ryde Council Integrated Transport and Land Use Strategy.

It is important to note that, although each of the individual options may achieve some results in terms of a mode shift, it is best practice to implement a range of complementary measures in order to achieve more comprehensive, long lasting results. For example, providing major infrastructure is not enough in itself to encourage more people to catch public transport, but should also be supported through encouragement and promotion.

A package of the options will therefore need to be developed for Eastwood to address the specific needs and issues of the area and reduce residents' and workers reliance on the car. Selection of options should consider the 'carrots and sticks' approach. There should be encouragement for people to change to more sustainable modes, however there should also be disincentives for private car use in circumstances (e.g. increased parking costs). The 'carrot and sticks' approach may help to achieve the desired mode split shift from private vehicle to public transport for specific trips and for the area.

Implementation, funding and responsibility for rolling out these projects vary, this can be problematic, it would be envisaged that Council would take a lead role in engaging and kick-starting any sustainable transport options.

Possible travel demand projects could include:

- Requiring Travel Plans at new developments in Eastwood;
- Encouraging Travel Plans at existing businesses in Eastwood;
- Encouraging Travel Plans at schools in the study area - St Kevin's, Eastwood Public School and Denistone East Public School;
- Car pooling – engaging with a web based initiative such as Liftshare.org;
- Car clubs – such as GoGet;
- Producing a Transport Access Guide (TAG);
- Working with Travel Smart to develop travel behaviour programs, these could be rolled out in businesses in Eastwood;
- Provide comprehensive travel information in a variety of formats – internet, paper guides/leaflets, at bus stops, trip planners etc;
- Set up bicycle user groups (BUGS); and
- Prepare new residents information packs containing local public and active transport information – similar to those that are produced by Parramatta Council and Australia Post.

Possible infrastructure projects could include:

- Bus priority measures around Eastwood;
- Way finding signage throughout Eastwood Town Centre;
- Improvements to bus infrastructure – new bus shelters, timetable information, seating, lighting and raised kerbs where appropriate;
- End of trip facilities should be incorporated into all new developments in Eastwood;
- Improve walking and cycling networks by carrying out accessibility audits, providing lighting, signage, removing barriers;

14.1 Way-Finding Signage

A way-finding signage strategy for Eastwood is a simple method to encourage and install confidence for walking, cycling or catching public transport. Signage would be provided to key destinations, walking and cycling routes, possibly public transport information, walking distances, key points of interest and so forth. Signage typically includes two types of signs, including map-based signs (i.e. 'you are here') to help orient people, and show routes and pointer/directional signs to help people along the route.

14.2 End of Trip Facilities

Bicycle parking is a cheap and effective way to encourage more people to cycle. Bike parking facilities should be provided within a development and throughout the town centre. The provision of casual parking for people travelling to an area ensures that it is convenient for them to ride to the area. A range of short stay and long stay parking should be provided for these users (e.g. inverted 'u' racks, bike cages, and lockers).

End of trip facilities (i.e. showers, lockers) should also be provided in conjunction with bike parking, particularly in workplaces. Major public end of trip facilities can also be provided in key activity areas, such as the city centre. Brisbane is currently constructing a Cycle Centre beneath King George Square in the CBD. This Cycle Centre will provide parking, showers, lockers and laundering services for commuters in the CBD. A lack of end of trip facilities for short stay and long stay users is a significant barrier to walking and cycling.

14.3 Local Bus Priority Measures

The reliability of bus services can often be a deterrent to changing travel behaviour. This is particularly the case with buses which must compete with traffic, especially in peak periods. There is therefore the potential to provide more adequately for buses through priority measures in the road network.

Some potential priority measures include:

- Dedicated bus lanes on approaches to congested intersections to enable buses to get to the front of the queue;
- Bus bypass lanes (e.g. left turn only, buses excepted);
- Bus priority at traffic signals (i.e. queue jumps);
- Bus only links;
- Additional bus lanes, transit lanes and clearways.

The need for bus priority measures was also identified in the Sydney Metropolitan Strategy.

14.4 Improve Passenger Facilities

Improved passenger facilities at public transport stops, stations and interchanges can increase comfort and convenience for these users. Improvements can be low cost with a high gain, making it more comfortable and safe to catch public transport. Improvements may include the provision of:

- Bus shelters;
- Timetable and route information;
- Real time information (i.e. minutes to next bus);
- Directional and way-finding signage;
- Lighting at the stop/station and on key routes leading to it; and
- Improved pedestrian access to stops/stations/interchanges.

14.5 Walking and Cycling Networks

Walking and cycling are generally viable alternatives for travel over short distances. As such, short trips can be targeted for change to walking and cycling. This can be achieved by providing high quality walking and cycling networks throughout all areas, particularly with 5-10km of key activity areas. Some of the key aims in providing walking and cycling networks include the following:

- Connectivity – routes should connect to surrounding networks and to common attractions and services (e.g. shopping, public transport);
- Attractiveness – routes should provide a high level of amenity in the path environment to attract people to use the facility;
- Safety – the network design and construction prevents against accidental and intentional injury (i.e. crime prevention through environmental design);
- Convenience – the route provides a quick and easy mode of transport;
- Comfort – the route and associated infrastructure (e.g. seating, shade) makes users comfortable and provides protection from the weather;
- Legibility – the route is navigable and users understand the flow and function of the route (via pavement markings which include cycle logo's);

- Accessibility – the route caters for all potential users, including those with limited mobility; and
- Social activity – the street environment does not prioritise traffic movements and places for emphasis on an active walking environment (this is more appropriate in centres/on main streets).

Walking and cycling is also important outside of key centres and should be provided for recreational and long distance commuters. Examples of initiatives being pursued in the area include rail trails, and grade separation at major barriers (e.g. rail line, major road).

14.6 Travel Behaviour Change Programs

Travel behaviour change programs are being used increasingly throughout Australia, implemented under the TravelSmart branding in all states. TravelSmart programs encourage voluntary travel behaviour change through increasing awareness, improved access to information and other opportunities. Typical TravelSmart programs target workplaces, schools, destinations and communities. Each program operates differently, however each is data intensive, requiring detailed information about people's travel needs, particularly in the community and workplace programs. This data collection helps to identify people that are willing to change their travel behaviour and consequently to develop individualised packages of information to assist them in doing this. Information provided to participants in a communities program can include:

- Public transport timetables;
- Journey planners;
- Cycling and walking maps;
- Information on bicycle care and maintenance;
- Healthy lifestyle information;
- Local access maps (showing community facilities, cycle ways, and public transport information); and
- More personalised assistance (such as visits by public transport operators).

14.7 Bicycle User Groups

Bicycle User Groups (BUGs) are active, local groups involved in various cycling activities. Examples of some BUG activities include:

- Organise group rides;
- Organise and keep members up to date on other cycling events (e.g. Promotional events, charity rides);
- Advocacy work, including campaigning for better cycling facilities;
- Working with local councils to achieve good outcomes for cycling;
- Provide information about cycling facilities, particularly in their local areas.

BUGs are an effective way to support existing cyclists in an area as well as encourage more people to cycle in their local area and to work. In Sydney, these groups are supported by Bicycle NSW.

14.8 Employee Travel Program/Green Travel Plans

Employee travel programs, or green travel plans, are workplace initiatives undertaken by the employer and are generally appropriate in large workplaces. The aim of these programs is to provide transport options and encouragement for employees in a workplace to encourage more sustainable travel. In order to develop a comprehensive travel plan, surveys are undertaken to understand travel modes to work, JTW origins and times, barriers to using sustainable modes, and so forth. This data helps to develop initiatives that are responsive to employees needs.

Some of the minor measures that could be introduced through a green travel plan include:

- Bike parking and end of trip facilities;
- Facilitate group JTW walk and cycle travel;
- Training sessions for cyclists (including bike maintenance);
- Providing a fleet of work bicycles and/or public transport passes for employees to travel to meetings; and
- Extra leave for employees that walk/cycle to work to attend bicycle or walking community events.

Some major initiatives that could be considered in a workplace include free yearly public transport passes for employees, a free employee shuttle bus from the nearest public transport station/s to the workplace and so forth. Other measures may also need to be implemented by the employer to encourage more sustainable travel, such as flexible work hours to fit in with convenient public transport travel times.

14.9 Car Pooling

Car pooling, also known as *ride sharing*, is the sharing of a car journey by two or more people, commonly to the same destination (e.g. a workplace) or within the same area. These can be formal or informal arrangements (i.e. organised between co-workers or by a private company that matches riders). The sharing of trips, particularly by co-workers, is an efficient and cost-saving way to travel for those involved and can reduce the number of cars travelling every day. This type of travel allows people to maintain having the flexibility of a private car, whilst travelling in a more sustainable manner than if they had travelled as a single vehicle occupant.

Some potential issues that should be considered with car pooling include:

- participants require a guaranteed ride home (e.g. if they have to work late and they miss their ride, they receive a free taxi ride);
- the pooling service takes people to where they want to go;
- the service needs to be reliable (e.g. on time, regular, informed if any changes);
- social interactions should be managed to avoid potential conflict (e.g. smoking, non-smoking, radio stations etc.);
- incentives should be provided to encourage people to participate (e.g. preferential parking at the destination);
- provide trip origin suburban/sub-regional commuter parking areas such as in the Gosford/Wyong LGAs along the approaches to the F3 freeway; and
- provide alternative travel for use during the day if necessary (e.g. shuttle service if not in walking distance to shops).

14.10 New Resident Transport Information Packages

It is important to target new home owners in new development areas as this group of the population has not yet established travel patterns and habits. A lack of information or misperceptions about sustainable travel choices are often deterrents to using these travel modes. The early provision of correct and abundant information in the form of a new home owner's package is therefore an important tool in establishing sustainable travel behaviour in growth areas.

The package is intended to an information package as well as providing incentives for sustainable travel. Examples of the contents of a home owner's package include:

- information on available public transport services;
- information on existing and proposed (including timing for delivery) pedestrian and cycle networks;
- information on cost savings associated with reduced use of a car, especially doing away with a second household car;
- a one or two year public transport pass;
- subsidised public transport passes for residents after the first one or two years; and
- a free bike with each home purchase.

These are some of the possibilities for a home owner's package. The provision of information and incentives at an early stage may greatly increase the chance to instil in new areas a culture of sustainable travel. It is assumed that sustainable transport infrastructure is in place (i.e. bike paths, footpaths, bus services etc) is in place for use.

14.11 Car Sharing

Car sharing schemes are car rental systems which have a membership basis. The vehicles can be rented out by members for long or short periods (i.e. some schemes even allow half an hour to an hour rental) at affordable rates. Rates are kept at an affordable cost. These 'user pays' systems are usually introduced in close proximity to residential and town centre areas and effectively provide a viable alternative to private car ownership. A mix of land uses will increase the type of use of the vehicles. For example, a car may be used for business trips during the day and recreational trips at nights and on weekends.

Furthermore, such a system should be supported by high quality public transport services. These systems are intended to reduce the need to own a car when it is only being used infrequently and not for day to day travel.

A car share system also needs to be easily accessible for all potential users. One of the options to increase access to the system, which is being implemented in some inner Sydney LGAs, is to provide designated on-street parking spaces for these vehicles. Designated parking means that users will always be able to find a parking space and will also make the system more visible to a wider range of users. For example, on-street parking spaces could be provided in close proximity to a public transport station to enable easy interchange.

15.0 ENGINEERING ACTION PLAN

An Engineering Action Plan has been developed to detail devices and engineering improvements for upgrading vehicular traffic, pedestrian access, cycling and road safety, in order to cater for the existing, 5 year, 10 year and 20 year horizon.

The recommended measures are engineering based. A spreadsheet of the required prioritised and costed engineering actions has been prepared and is shown in **Appendix D**. Up-to-date unit costs from Council have been used for this purpose where possible. These have been supplemented with cost estimates

16.0 RECOMMENDED TRAFFIC MANAGEMENT PLAN

The recommended traffic management improvements to cater for the 20 year horizon are detailed below and in **Figure 18**. The main features of the plan are discussed in more detail below.

16.1 Install Roundabout at Hillview Road/West Parade/Bus Interchange (T1)

The installation of a one (1) lane circulating roundabout at the intersection will provide a number of benefits including improved conditions for buses exiting the bus interchange, reduced speeds of vehicles travelling along West Parade on approach and departure of the roundabout, which provides safer pedestrian conditions. It will also improve conditions for right turning vehicles out of Hillview Road when the Bus/Rail Interchange at Eastwood is upgraded in the future, with measures identified in the Eastwood Interchange Scoping study. Although the intersection has not been assessed under roundabout control, the intersection will operate at a satisfactory level of Service.

16.2 Direction Signposting to West Parade (T2)

Under current conditions vehicles travelling westbound in First Avenue are banned from turning right into West Parade. This results in a funnelling of traffic to the right turn into Trelawney Street. There is an alternative opportunity to access the Town Centre via a series of left turn movements via Trelawney Street – Clanalpine Avenue – West Parade. This route should be signposted to provide alternative access to the Town Centre.

16.3 Conversion of Hillview Lane to two way traffic (T3)

Hillview Lane currently operates as a one way eastbound road between Shaftsbury Road and West Parade with the exception of a small section immediately east of Shaftsbury Road which permits two-way traffic along the frontage of the Child Care Centre and Council Car Park.

The main function of this road is to provide loading and delivery access to a large number of properties with back frontage to the laneway. It also services as the access to the Child Care Centre on the corner of Shaftsbury Road and to the Council owned Car Park mid-block between Shaftsbury Road and Lakeside Road.

This option could only be achieved over the long term through land dedication and construction as each adjacent private lands are developed, so that two clear trafficable lanes are in operation.

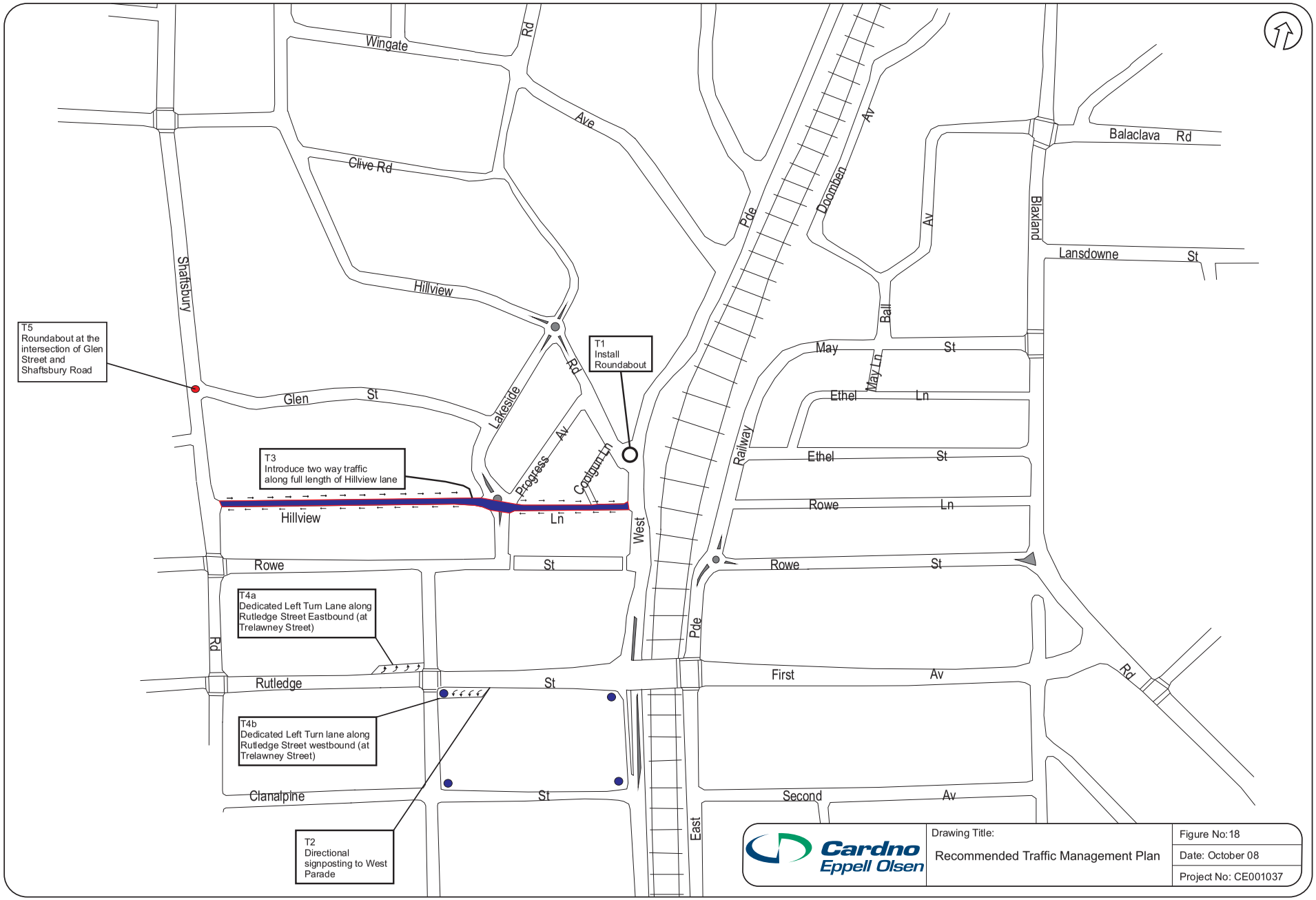
16.4 Dedicated Left Turn Lane along Rutledge Street for (a) Eastbound and (b) westbound traffic (at Trelawney Street) (T4)

(a) The installation of a separate 3.0m wide (30m long) Left Turn Only from Rutledge Street into Trelawney Street will assist with delineation ('through' and 'turn' traffic in the kerbside lane will be separated and will provide some performance benefits at the Rutledge Street / Trelawney Street intersection). Delineating traffic on the eastbound approach to the Trelawney Street intersection (north west corner of the intersection) on Rutledge Street will assist with minimising the likely 'weaving' effect that may occur past the intersection in an eastbound direction as traffic attempts to access the Eastwood Centre from Rutledge Street (due to the entry slip lane being located some 39 metres east of the Trelawney Street intersection).

(b) The installation of a separate 3.0m wide (30m long) Left Turn Only from Rutledge Street into Trelawney Street will assist with delineation ('through' and 'turn' traffic in the kerbside lane will be separated and will provide some performance benefits at the Rutledge Street / Trelawney Street intersection). Delineating traffic on the westbound approach to the Trelawney Street intersection (south east corner of the intersection) on Rutledge Street will assist with minimising any potential blockage if 'right' turn and 'left' turn traffic movements occur simultaneously in conjunction with pedestrian movements.

16.5 Roundabout at the intersection of Glen Street and Shaftsbury Road (T5)

To facilitate improves vehicle priority at this intersection and minimise intersection accident on adjacent approaches due to nature of this intersection and vehicles failing to 'Stop' and/or 'Give Way' (The site has been identified as meeting the criteria for National Blackspot funding and a submission has been forwarded to the RTA for inclusion, as a possible project to receive grant funding in the 2009-2010 financial year).



R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\.cdr

17.0 RECOMMENDED PEDESTRIAN ACCESS AND MOBILITY PLAN

The proposed treatments are detailed below and in **Figure 19**.

17.1 Implementation of a 40 km/hr speed limit in Core CBD area (P1)

A 40 km/h speed limit zone is recommended in the town centre due to the high pedestrian activity and to further promote active transport modes. Some road sections are recommended to be converted to shared zones which are shown in a separate recommendation.

The key strategy and action plans for pedestrian safety in NSW are *Road Safety 2010* and the *Pedestrian Safety Action Plan 2002-2004.* These strategic documents identify the implementation of lower speed limits in high pedestrian areas as a key pedestrian safety measure and formalise a pedestrian safety process that has evolved over many years.

The area to which the speed limit would apply includes;

- Trelawney Street between Rutledge Street and Rowe Street;
- Rowe Street between Shaftsbury Road and The Avenue;
- The Avenue between Rowe Street and Hillview Lane;
- Progress Avenue between Hillview Lane and Hillview Road;
- Lakeside Road between Hillview Lane and Hillview Road;
- West Parade between Rutledge Street and Hillview Road;
- Railway Parade between May Street and Rowe Street;
- East Parade between Rowe Street and First Avenue;
- Rowe Street between Blaxland Road and East Parade; and
- Hillview Road between Lakeside Road and West Parade.

The crash data indicates that a total of 10 pedestrian crashes have occurred in the study area over a three year period reinforcing the requirements of a lower speed limit in core area. Lower vehicle speeds result in fewer pedestrian injuries and deaths.

Signage and pavement markings will clearly define the start of the 40 km/h pedestrian area including:

- Standard 40 km/h speed signs;
- ‘Pedestrian activity’ plates; and
- 40 km/h pavement numerals (i.e. roads with painted speed limit numerals).

17.2 Raised Marked Footcrossings (P2)

There are a number of at-grade marked footcrossings which are recommended to be upgraded to raised thresholds to reduce vehicle speed and to improve safety for pedestrians at the crossing points. These devices will also reduce through traffic volumes. These locations are:

- The Avenue north of Rowe Street;
- Lakeside Road north of Hillview Lane;
- Lakeside Road south of Glen Street;
- West Parade at Rowe Street Mall;
- West Parade at Bus Interchange; and
- Railway Parade south of Ethel Street.

Although none of these locations in isolation have recorded more than one pedestrian crash in the most recent 3 year period of data, it is important to the overall pedestrian amenity of the area that they be upgraded.

17.3 Pedestrian/Cycle Overpass (P3)

The major constraint to walking and cycling within Eastwood Town Centre is the rail line which travels through the area. The rail line separates east from west and provides limited crossing opportunities. A pedestrian cycle path will improve connectivity within the Eastwood Town Centre and is recommended to be located in alignment with the pedestrian mall in Rowe Street which will provide a visual link to the Town Centre.

17.4 Shared Zones (P4)

There is considerable conflict between pedestrians and vehicles under the current arrangement in a number of narrow roadways which are used by pedestrians and loading vehicles with no segregated footpath which results in pedestrians sharing the road with vehicles. These pedestrians are in conflict with the trucks and vans which access the loading docks. Cars can legally travel at 50 km/hr which is unsafe for pedestrians to be mixing with. Even under the proposed 40 km/hr zones, the mixing of pedestrians on the roadway is not appropriate.

Given the narrow widths between the building alignments, there is no opportunity in the short term to provide a footpath and have sufficient width for a travel lane and loading. It is therefore recommended that a Shared Zone be installed in the following road sections:

- Hillview Lane between Shaftsbury Road West Parade; and
- Coolgun Lane between Hillview Road and Hillview Lane.

In shared zones vehicle speeds are limited to 10km/hr and vehicle access in maintained. This provides pedestrian with a safe pedestrian walking environment. The entrance and exit to the shared zone must be well defined by providing contrasting pavement material at the access. Regulatory signs as per RTA guidelines must be installed. It is also recommended that an information brochure is provided by Council to inform the community about the operation and regulations of a Shared Zone.

17.5 Wayfinding Signposting Strategy (P5)

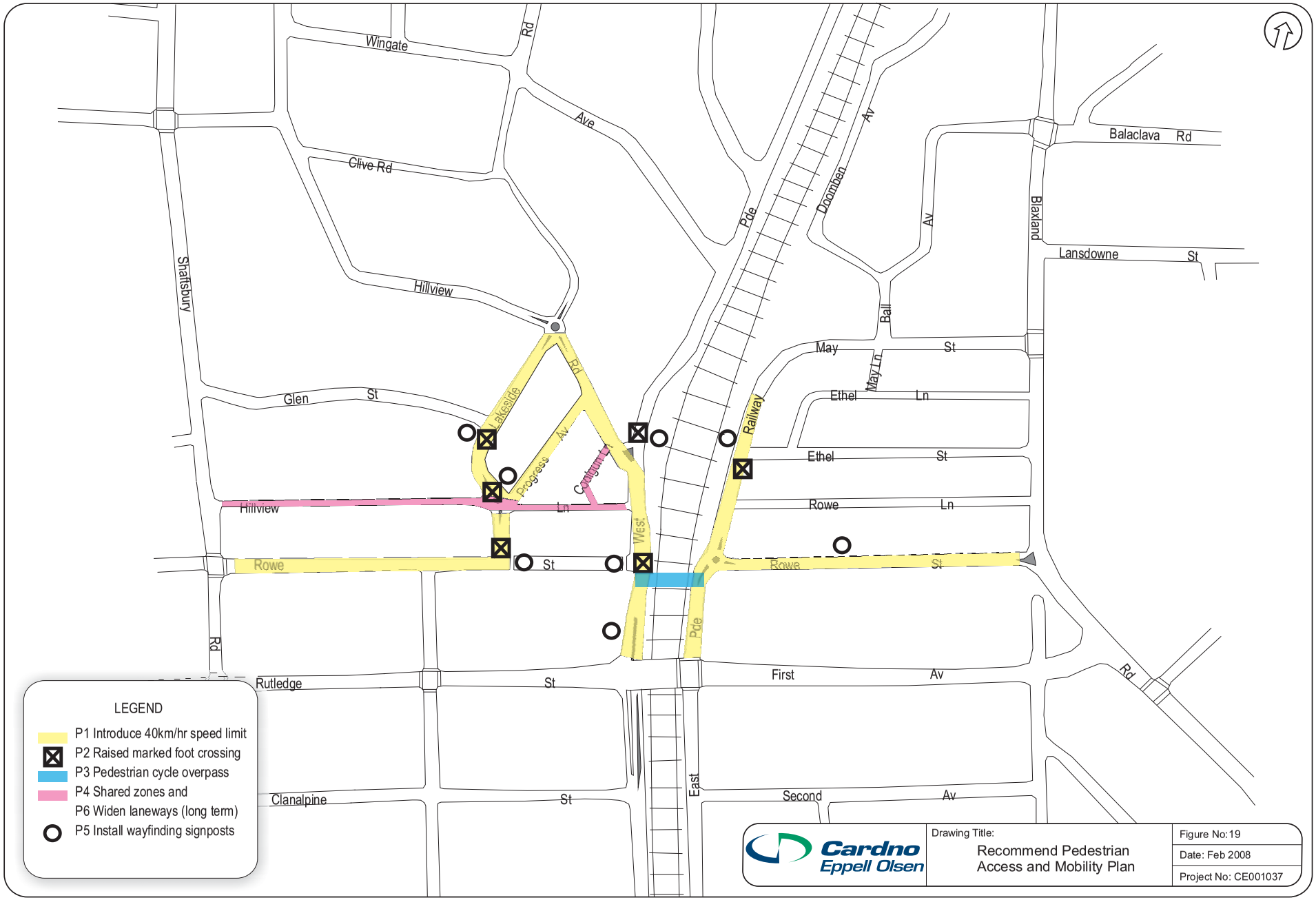
A way-finding signage strategy for Eastwood is a simple method to encourage and instil confidence for walking, cycling or catching public transport. Signage would be provided to key destinations, walking and cycling routes, possibly public transport information, walking distances, key points of interest and so forth. Signage typically includes two types of signs, including map-based signs (i.e. 'you are here') to help orient people, and show routes and pointer/directional signs to help people along the route.

The following locations are recommended;

- Eastwood Railway Station;
- East Parade at railway station access;
- West Parade at railway Station access;
- Rowe Street Mall at The Avenue;
- Rowe Street Mall at West Parade;
- Lakeside Road at Progress Avenue;
- Rowe Street at Council Car Park;
- Eastwood Shopping Centre; and
- Glen Street Car Park.

17.6 Road widening of Laneways (P6)

Hillview Lane and Coolgun Lane should be upgraded to provide a more attractive pedestrian link, thus increasing permeability and connectivity to the train station and bus interchange. These are long term recommendations. As a minimum lane widths of 3.0 meters should be adopted.



R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\.cdr

18.0 RECOMMENDED PUBLIC TRANSPORT PLAN

The proposed treatments are detailed below and in **Figure 20**.

18.1 Bus Lane in West Parade (PT1)

Bus lanes are specially marked lanes that can only be used by buses, taxis, emergency vehicles, motorcycles and bicycles. The analysis of traffic volumes indicate considerable delays and queues forming at this intersection for this traffic movement. Lanes that give priority to buses over other vehicles allow buses free movement when they would otherwise be caught up in traffic congestion. They allow buses to increase their average speed, especially during peak hours, and so attract passengers away from car travel.

A bus lane is recommended on the northern approach to the intersection between Rutledge Street and the Shopping Centre car park access as per Option 1a. This option maintains full ingress to the Eastwood Shopping Centre from West Parade but does not permit general traffic heading southbound along West Parade to access Rutledge Street. To reinforce compliance and prevent general traffic from accessing Rutledge Street via the Access ramp, a sign at the base of the ramp stipulating “No Through Road, Buses, Taxi’s Excepted” be implemented.

Removing the traffic which currently travels south on West Parade from accessing the ramp onto Rutledge Street will result in a reduction in travel time for public transport users which is of considerable importance in encouraging a mode shift away from private car use. It should be noted that the bus lane will not impact traffic accessing the shopping centre with the exception of banning the right turn out of the Shopping Centre, resulting in all traffic turning left out of the Shopping Centre.

18.2 Bus Only Lane in Ball Avenue (PT2)

Ball Avenue is closed at Blaxland Road to east bound traffic. This traffic measure was introduced to prevent though traffic from using residential streets instead of Blaxland Road and First Avenue.

It is recommended that in order to reduce travel times for bus movements into and out of Eastwood that a bus only lane be introduced in Ball Avenue eastbound at Blaxland Road intersection. This will require a bus loop detector so that the green phase only gets called up when a bus is standing on the detector loop.

Further detail design will be undertaken involving bus turning paths that will focus on minimising any potential loss in on-street parking which is likely to be limited to corners and bends which is not uncommon in local roads with limited carriageway width.

Bus operational time limits for the potential modified 545 bus service through Ball Avenue to be reviewed in conjunction with STA representative through further public consultation. Signage stipulating “Local Traffic Only” to be installed along Ball Avenue at the Balaclava Road intersection for westbound traffic to minimise any friction between bus and car movements along Ball Avenue. This will be supplemented with advance warning signs at driveways whose ramp level at the property boundary is below street level.

18.3 Bus Only Lane in East Parade (PT3)

A further bus priority measure is recommended for southbound motorists in East Parade at First Avenue. This will provide buses with an ability to bypass the queue by providing them with their own bus lane. At the signals a b-phase will need to be implemented. The roundabout controlled intersection at Rowe Street/East Parade/Railway Parade will remain unchanged with the southbound bus lane starting at the edge of the first most driveway with additional advance warning signs to advise motorists that Bus Only Lane pavement markings are ahead. The section between Rowe Street and the start of Bus Only lane be signposted “No Stopping” to provide unimpeded access to the Bus Only Lane.

18.4 Bus Shelters (PT4)

It is imperative to provide public transport users with safe and all weather facilities to encourage the use of these modes. All bus stops within the area should be provided with a bus shelter and hard stand area. These measures encourage a reduced use of a car, especially doing away with a second household car.

- Rutledge Street northern side west of Trelawney Street;
- Rutledge Street southern side west of Trelawney Street;
- First Avenue northern side east of East Parade;
- First Avenue southern side east of East Parade;
- Railway Parade eastern side north of Rowe Street;
- Railway Parade western side north of Rowe Street;
- Ball Avenue west of Blaxland Road northern side; and
- Ball Avenue west of Blaxland Road southern side.

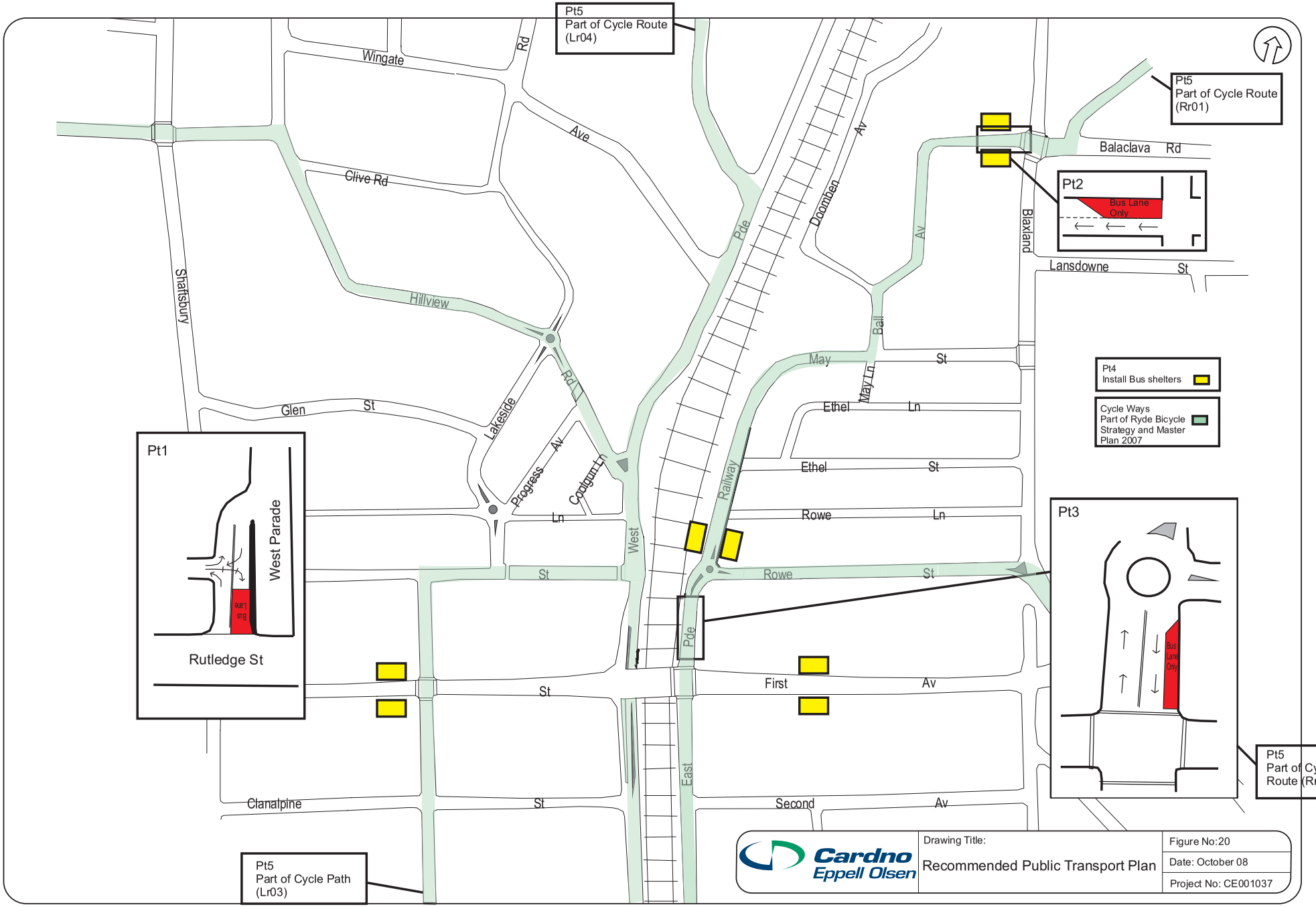
18.5 Bicycle Priority Measures (PT5)

Improved accessibility to the Eastwood Town Centre for cyclists through the provision of high quality on-road / off-road facilities should encourage a ‘mode’ shift towards cycling as an alternative form of transport for ‘short’ trips. The following cycleway routes identified in the Ryde Bicycle Strategy and Master Plan 2007 to provide direct access for cyclists to the Eastwood Town Centre, should be implemented and are listed below:

RR01 – Hornsby to Strathfield Rail Trail (Via the northern railway corridor between Eastwood and Meadowbank. The construction of the proposed Eastwood to Strathfield Rail Trail between Eastwood and Meadowbank in or bedside the rail corridor with an on-road alternative to be developed in the interim);
RR08 – Parramatta to Lane Cove (Via Terry Road, Eastwood, Rowe Street, County Road corridor, Kent Road, Coxs Road, Cressy Road and Magdala Road);
LR03 – Eastwood Station to Meadowbank (Via Trelawney Street, Bellevue Avenue, Dickson Avenue and Station Street); and
LR04 – Eastwood Station to West Ryde Station (Via West Parade, Railway Corridor, Anthony Road, Victoria Road and Ryedale Road).

The provision of cycle forward "Storage Boxes" at specific traffic signal sites to be discussed at a future Bicycle Advisory Committee meeting to determine the preferred locations and referred to the RTA for endorsement.

End of trip facilities (Bicycle Racks) are to be installed along Rowe Street (closest to Shaftsbury Road) and Eastwood Library to meet the demand.



R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\.cdr

19.0 RECOMMENDED PARKING MANAGEMENT PLAN

The proposed treatments are detailed below and in **Figure 21**.

19.1 Additional car parking with redevelopment of sites (PK1)

Additional parking should be provided in all future developments within Eastwood as per Council's DCP as the current occupancy rates are high. Future development of the Glen Street Car Park should restrict access to Glen Street only with no access provided off Lakeside Drive. This would reduce vehicle and pedestrian conflicts on this road as well as present an opportunity to better integrate with the Town Centre. Additional parking within the site should be considered.

19.2 Glen Street Car Park Time Limits (PK2)

The Glen Street Car Park has a combination of 2 hour (ground floor and first floor with some 291 car parking spaces) and 3 hour (first floor with some 229 car parking spaces). In order to increase turnover and provide additional opportunity to park, Council could consider converting some of the 3 hour parking spaces to 2 hour parking. However, Council (Committee of the Whole) at its meeting on 6th May 2008 resolved not to make any changes.

19.3 East Parade Time Limits (PK3)

There are some 27 x 90 degree parking spaces on the western side of East Parade between First Avenue and Rowe Street which are generally used by commuters. It is recommended that these spaces be converted to three (3) hour parking to increase the supply of short term parking and increase turnover of these spaces.

19.4 Parking Directional Signposting to Glen Street Car Park (PK4)

In order to reduce traffic circulating through the Town Centre looking to access Glen Street Car Park it is recommended to install directional signposting to the Glen Street Car Park via Shaftsbury Road and Glen Street. The signs would be located at the following intersections:

- Rutledge Street at Trelawney Street;
- Rutledge Street at Shaftsbury Road; and
- Shaftsbury Road at Glen Street.

19.5 Parking Directional Signposting to other major public and private car parks in Eastwood (PK5)

In order to further reduce circulating through traffic and to better parking management in the Town Centre a series of directional signposting signs to Council's other car parks (i.e. Rowe Street and Hillview Lane Car Parks) and Major Centres (Eastwood Centre) is proposed. These signs should be provided at key intersections as listed in Section 19.4 (above) as a minimum, but supplemented with clear information detailing the number of car parking spaces available at key locations/sites.

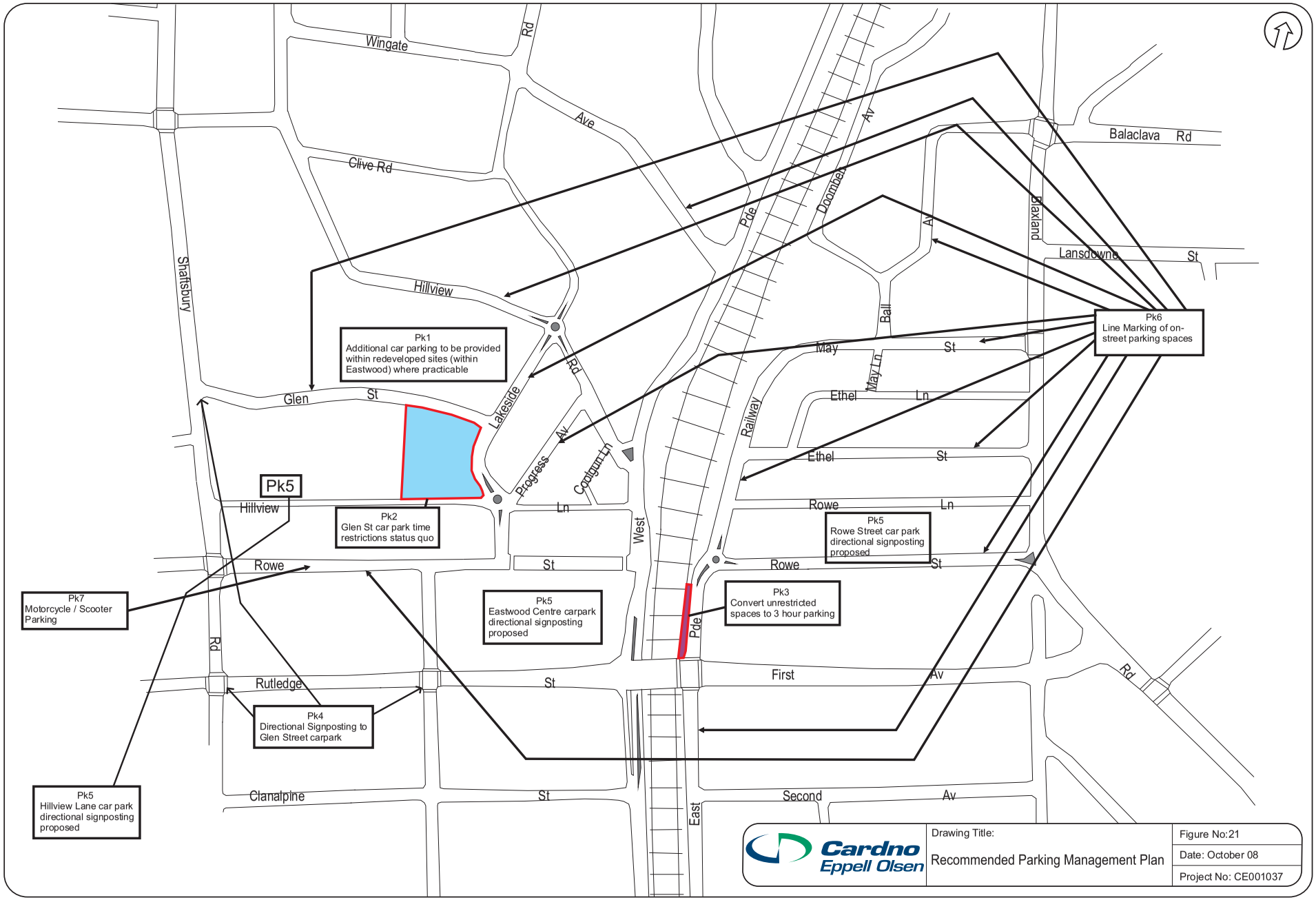
19.6 Line Marking of on-street parking spaces within Eastwood Town Centre (PK6)

To encourage parking compliance and to maintain parking efficiency the following streets are to have on-street parking spaces line marked in accordance with AS 2890.5 Parking Facilities (Part 5: On-street Parking)

- Ball Avenue;
- May Street;
- Ethel Street;
- Rowe Street East;
- Rowe Street West;
- Lakeside Road;
- Wingate Avenue;
- East Parade; and
- Glenn Street;
- Progress Avenue;
- Railway Parade; and
- Hillview Road

19.7 Motorcycle/Scooter Parking (PK7)

Two (2) angled parking spaces in Rowe Street West be converted to motorcycle / scooter parking.



R:\Projects\Current\CE001037 Eastwood Town Centre TMAP\Corel Draw\.cdr


APPENDICES

Appendix A

Crash Data

RS,L&VM RTA NSW Road Traffic Accident Database: 2003 U/L 14000 13 Sep 04 14:09

ACCIDENTS WITHIN RYDE CITY LOCAL GOVERNMENT AREA (LGA): ***** March to December quarters *****

RYDE CITY LGA

DATE	TIME	REPORT NUM.	IDENTIFYING OBJECT	.WEATHER	SURF.	VEHICLES	AGE	STREET	TRAVELLING	SPD	SEVERITY	TU	K	I
BALL AV														
12/09/03	19:00	033832341	50m Nth of MAY	ST	.FINE	DRY. CAR	F17	Nth in BALL	AV	10	TOWAWAY	2	0	0
Evt:000052879097		2101245 R.U.M.	CODE:63 VEHICLE DOOR			CAR	F40	Nth in BALL	AV	0				
* TOTAL BALL AV						ACC:1	FA:0	K:0	IA:0	I:0	TA:1			
BLAXLAND RD														
29/01/03	17:15	031780203	at BALACLAVA	RD	.FINE	DRY. CAR	M43	Nth in BLAXLAN	RD	20	TOWAWAY	2	0	0
Evt:000016397409		1881072 R.U.M.	CODE:21 RIGHT THROUGH			CAR	M24	Sth in BLAXLAN	RD	60				
13/02/03	14:15	031783209	at BALACLAVA	RD	.FINE	DRY. 4 WHEEL DRIVE	F39	Nth in BLAXLAN	RD	10	TOWAWAY	2	0	0
Evt:000016908806		1900637 R.U.M.	CODE:21 RIGHT THROUGH			CAR	M19	Sth in BLAXLAN	RD	50				
24/09/03	20:45	033837927	at BALACLAVA	RD	.FINE	DRY. 4 WHEEL DRIVE	F21	Nth in BLAXLAN	RD	40	TOWAWAY	2	0	0
Evt:000018261544		2140205 R.U.M.	CODE:21 RIGHT THROUGH			CAR	M30	Sth in BLAXLAN	RD	60				
09/11/03	08:25	034844964	at BALACLAVA	RD	.FINE	DRY. CAR	M35	Nth in BLAXLAN	RD	10	INJURY	2	0	1
Evt:000020954383		2151342 R.U.M.	CODE:21 RIGHT THROUGH			CAR	M65	Sth in BLAXLAN	RD	40				
07/12/03	15:10	034853744	at BALACLAVA	RD	.FINE	DRY. 4 WHEEL DRIVE	F33	Nth in BLAXLAN	RD	Unk	TOWAWAY	2	0	0
Evt:000019297321		2190332 R.U.M.	CODE:21 RIGHT THROUGH			CAR	M48	Sth in BLAXLAN	RD	50				
13/05/03	11:10	032809172	30m Nth of BALACLAVA	RD	.RAIN	WET. CAR	M42	Nth in BLAXLAN	RD	50	TOWAWAY	2	0	0
Evt:000019177684		1981106 R.U.M.	CODE:31 LEFT REAR			CAR	F33	Nth in BLAXLAN	RD	10				
05/09/03	20:35	033834681	at BALL	AV	.FINE	DRY. CAR	F23	Sth in BLAXLAN	RD	40	INJURY	2	0	2
Evt:000018486266		2110008 R.U.M.	CODE:21 RIGHT THROUGH			CAR	F28	Nth in BLAXLAN	RD	50				
08/11/03	06:00	034845901	at ETHEL	ST	.FINE	DRY. CAR	F22	Sth in BLAXLAN	RD	60	TOWAWAY	2	0	0
Evt:000019021973		0 R.U.M.	CODE:32 RIGHT REAR			UTILITY	M77	Sth in BLAXLAN	RD	0				
01/04/03	17:45	032793518	5m Sth of ETHEL	ST	.FINE	DRY. CAR	F24	Nth in BLAXLAN	RD	5	TOWAWAY	2	0	0
Evt:000017470829		1940593 R.U.M.	CODE:21 RIGHT THROUGH			CAR	M37	Sth in BLAXLAN	RD	50				
16/03/03	18:45	031792641	at FIRST	AV	.FINE	DRY. CAR	F29	Est in FIRST	AV	20	TOWAWAY	2	0	0
Evt:000016975566		1960017 R.U.M.	CODE:10 CROSS TRAFFIC			CAR	F38	Nth in BLAXLAN	RD	40				
19/12/03	12:16	034854353	at FIRST	AV	.FINE	DRY. CAR	F42	Est in FIRST	AV	40	TOWAWAY	2	0	0
Evt:000019687003		0 R.U.M.	CODE:10 CROSS TRAFFIC			CAR	F75	Nth in BLAXLAN	RD	55				
11/12/03	08:23	034852786	10m Sth of FIRST	AV	.FINE	DRY. CAR	F30	Sth in BLAXLAN	RD	40	INJURY	3	0	1
Evt:000068851394		0 R.U.M.	CODE:30 REAR END			CAR	F20	Sth in BLAXLAN	RD	0				
13/06/03	18:30	032822005	at MAY	ST	.FINE	DRY. CAR	F27	Sth in BLAXLAN	RD	5	INJURY	3	0	1
Evt:000017805211		2021434 R.U.M.	CODE:21 RIGHT THROUGH			STATION WAGON	F53	Nth in BLAXLAN	RD	45				
20/11/03	08:25	034849123	at MAY	ST	.FINE	DRY. CAR	M39	Sth in BLAXLAN	RD	5	INJURY	2	0	1
Evt:000019327369		0 R.U.M.	CODE:21 RIGHT THROUGH			CAR	F33	Nth in BLAXLAN	RD	50				
23/02/03	14:00	031785084	2m Nth of MAY	ST	.OCAST	WET. CAR	F24	Sth in BLAXLAN	RD	55	TOWAWAY	2	0	0
Evt:000016627564		1901127 R.U.M.	CODE:30 REAR END			CAR	M55	Sth in BLAXLAN	RD	0				
16/08/03	09:55	033826209	5m Nth of MAY	ST	.FINE	DRY. CAR	F56	Sth in BLAXLAN	RD	50	TOWAWAY	2	0	0
Evt:000018658967		2080344 R.U.M.	CODE:30 REAR END			4 WHEEL DRIVE	M41	Sth in BLAXLAN	RD	10				

```
 08/05/03 10:15 032804278    30m  Nth of MAY           ST .FINE  DRY. CAR           F39 Sth in BLAXLAN RD   5 TOWAWAY   2  0  0
     Evt:000018051853  1980266 R.U.M. CODE:35 LANE CHANGE LEFT        CAR           M21 Sth in BLAXLAN RD  60
                       *  TOTAL   BLAXLAND RD                                ACC:17    FA:0    K:0    IA:5     I:6     TA:12


FIRST AV

 25/03/03 09:45 031802155     5m  Wst of BLAXLAND      RD .FINE  DRY. CAR           F29 Est in FIRST   AV  20 TOWAWAY   2  0  0
     Evt:000016896310        0 R.U.M. CODE:30 REAR END                CAR           M54 Est in FIRST   AV  10
 15/07/03 09:30 033818398   150m  Wst of BLAXLAND      RD .FINE  DRY. CAR           F40 Wst in FIRST   AV   5 TOWAWAY   2  0  0
     Evt:000018328803        0 R.U.M. CODE:34 LANE CHANGE RIGHT       CAR           M?? Wst in FIRST   AV  20
 04/04/03 12:50 032795998       at       EAST          PD .OCAST DRY. CAR           ??? Wst in FIRST   AV  20 TOWAWAY   2  0  0
     Evt:000019007980  1941230 R.U.M. CODE:21 RIGHT THROUGH           CAR           ??? Est in FIRST   AV  30
 27/06/03 05:50 032823552       at       EAST          PD .RAIN  WET. LIGHT TRUCK    M46 Est in FIRST   AV  40 INJURY    2  0  1
     Evt:000017888646  2040234 R.U.M. CODE:21 RIGHT THROUGH           CAR           M21 Wst in FIRST   AV  70
 02/12/03 17:10 034852378       at       EAST          PD .FINE  DRY. 4 WHEEL DRIVE  F56 Nth in EAST    PD  10 TOWAWAY   2  0  0
     Evt:000019678278  2181292 R.U.M. CODE:21 RIGHT THROUGH           CAR           M38 Sth in EAST    PD  40
 07/08/03 09:35 033836074     1m  Est of EAST          PD .FINE  DRY. STATION WAGON  F18 Nth in EAST    PD  10 INJURY    2  0  1
     Evt:000053065598  2100456 R.U.M. CODE: 0 PED NEARSIDE            PEDESTRIAN    M84 Sth in FIRST   AV
 26/09/03 13:10 033835369    50m  Est of EAST          PD .FINE  DRY. CAR           M57 Est in FIRST   AV  40 TOWAWAY   2  0  0
     Evt:000018707057  2120243 R.U.M. CODE:34 LANE CHANGE RIGHT       STATION WAGON M46 Est in FIRST   AV  50
 14/05/03 17:30 032804608    60m  Est of EAST          PD .RAIN  WET. CAR           F58 Sth in FIRST   AV  20 TOWAWAY   2  0  0
     Evt:000088248192  1981485 R.U.M. CODE:47 EMERGING FROM DRIVE     CAR           M44 Est in FIRST   AV  60
 14/07/03 13:15 033820835   100m  Est of EAST          PD .FINE  DRY. CAR           M48 Est in FIRST   AV  20 TOWAWAY   2  0  0
     Evt:000020033781  2060273 R.U.M. CODE:37 LEFT TURN SIDESWIPE     CAR           F44 Est in FIRST   AV  45
 29/08/03 08:50 033834593    45m  Est of RYEDALE       RD .FINE  DRY. MOTORCYCLE    M41 Wst in FIRST   AV  50 INJURY    1  0  1
     Evt:000018070975  2091461 R.U.M. CODE:80 OFF LEFT/RIGHT BEND     ROLLOVER
                       *  TOTAL   FIRST AV                                   ACC:10    FA:0    K:0    IA:3     I:3     TA:7

HILLVIEW LA

 21/06/03 14:25 032820531       at       COOLGUN       LA .OCAST DRY. 4 WHEEL DRIVE  M35 Est in COOLGUN LA   5 INJURY    2  0  1
     Evt:000017701533        0 R.U.M. CODE:10 CROSS TRAFFIC           CAR           F25 Nth in HILLVIE LA  35
                       *  TOTAL   HILLVIEW LA                                ACC:1     FA:0    K:0    IA:1     I:1     TA:0

HILLVIEW RD

 28/02/03 20:20 031792421       at       PROGRESS      AV .FINE  DRY. CAR           F18 Wst in HILLVIE RD  30 TOWAWAY   2  0  0
     Evt:000033131901  1940380 R.U.M. CODE:39 OTHER SAME DIRECTION    PASSENGER VAN  M52 Wst in HILLVIE RD  20
                       *  TOTAL   HILLVIEW RD                                ACC:1     FA:0    K:0    IA:0     I:0     TA:1


LAKESIDE RD

 10/11/03 13:30 034869673    10m  Sth of GLEN          ST .FINE  DRY. CAR           M73 Est in LAKESID RD Unk INJURY    1  0  1
     Evt:000019466678  2180240 R.U.M. CODE:90 FELL IN/FROM VEHICLE    ROLLOVER
                       *  TOTAL   LAKESIDE RD                                ACC:1     FA:0    K:0    IA:1     I:1     TA:0
```

```
PROGRESS AV

 25/02/03 14:45 031785271    50m  Sth of HILLVIEW       RD .FINE  DRY. 4 WHEEL DRIVE  M55 Nth in PROGRES AV   5 TOWAWAY   2  0  0
     Evt:000016652136        0 R.U.M. CODE:44 PARKING VEHICLES         CAR               Sth in PROGRES AV   0
                       *  TOTAL   PROGRESS AV                                 ACC:1     FA:0    K:0    IA:0     I:0     TA:1

RUTLEDGE ST

 11/06/03 17:10 032817252    20m  Wst of EAST           PD .FINE  DRY. CAR            F31 Wst in RUTLEDG ST  10 TOWAWAY   4  0  0
     Evt:000018300407  2020572 R.U.M. CODE:30 REAR END                 CAR            F34 Wst in RUTLEDG ST   0
 10/05/03 08:30 032803109       at       SHAFTSBURY     RD .FINE  DRY. LIGHT TRUCK    M57 Wst in RUTLEDG ST  40 TOWAWAY   2  0  0
     Evt:000017845840  1980620 R.U.M. CODE:10 CROSS TRAFFIC            CAR            F55 Nth in SHAFTSB RD  30
 26/05/03 18:15 032809408       at       SHAFTSBURY     RD .OCAST WET. CAR            M58 Wst in RUTLEDG ST  10 TOWAWAY   2  0  0
     Evt:000089071192  2000247 R.U.M. CODE:21 RIGHT THROUGH            CAR            M18 Est in RUTLEDG ST  50
 01/06/03 10:20 032809662       at       SHAFTSBURY     RD .FINE  DRY. CAR            M41 Est in RUTLEDG ST  50 TOWAWAY   2  0  0
     Evt:000017838969        0 R.U.M. CODE:10 CROSS TRAFFIC            CAR            F41 Nth in SHAFTSB RD   5
 07/03/03 20:20 031789526       at       TRELAWNEY      ST .FINE  DRY. CAR            F20 Est in RUTLEDG ST   5 TOWAWAY   2  0  0
     Evt:000017075862        0 R.U.M. CODE:21 RIGHT THROUGH            CAR            F30 Wst in RUTLEDG ST  60
 04/09/03 12:20 033831867       at       TRELAWNEY      ST .FINE  DRY. CAR            F53 Nth in RUTLEDG ST  50 TOWAWAY   2  0  0
     Evt:000018505338  2100367 R.U.M. CODE:30 REAR END                 CAR            F20 Nth in RUTLEDG ST  20
 19/07/03 13:45 033819937       at       WEST           PD .FINE  DRY. CAR            M75 Wst in RUTLEDG ST  40 TOWAWAY   3  0  0
     Evt:000018745365        0 R.U.M. CODE:21 RIGHT THROUGH            LIGHT TRUCK    M52 Est in RUTLEDG ST  50
                       *  TOTAL   RUTLEDGE ST                                 ACC:7    FA:0    K:0    IA:0     I:0     TA:7

SHAFTSBURY RD

 20/02/03 17:15 031784686       at       GLEN           ST .OCAST DRY. CAR            M31 Nth in SHAFTSB RD  15 TOWAWAY   3  0  0
     Evt:000016747479  1901281 R.U.M. CODE:30 REAR END                 CAR            F43 Nth in SHAFTSB RD   0
 23/07/03 11:45 033822388       at       GLEN           ST .FINE  DRY. CAR            M79 Nth in SHAFTSB RD   5 TOWAWAY   2  0  0
     Evt:000018100866  2080527 R.U.M. CODE:21 RIGHT THROUGH            CAR            M21 Sth in SHAFTSB RD  50
 01/03/03 14:50 031786686       at       ROWE           ST .FINE  DRY. 4 WHEEL DRIVE  F17 Est in SHAFTSB RD  20 TOWAWAY   2  0  0
     Evt:000016828668  1911194 R.U.M. CODE:10 CROSS TRAFFIC            CAR            M27 Sth in ROWE    ST  30
 13/06/03 19:30 032812687       at       ROWE           ST .FINE  DRY. LIGHT TRUCK    M20 Nth in SHAFTSB RD Unk TOWAWAY   2  0  0
     Evt:000017433825        0 R.U.M. CODE:21 RIGHT THROUGH            CAR            M73 Sth in SHAFTSB RD  50
 07/04/03 10:45 032799069       at       RUTLEDGE       ST .FINE  DRY. CAR            M67 Sth in SHAFTSB RD  20 INJURY    5  0  1
     Evt:000017435419  1950153 R.U.M. CODE:10 CROSS TRAFFIC            CAR            F20 Wst in RUTLEDG ST  50
                       *  TOTAL   SHAFTSBURY RD                               ACC:5     FA:0    K:0    IA:1     I:1     TA:4

WEST PD

 17/04/03 19:15 032799334       at       ACCESS ROAD       .RAIN  WET. 4 WHEEL DRIVE  F27 Sth in WEST    PD   5 TOWAWAY   2  0  0
     Evt:000017097310  1960095 R.U.M. CODE:21 RIGHT THROUGH            CAR            M23 Nth in WEST    PD  50
                       *  TOTAL   WEST PD                                     ACC:1     FA:0    K:0    IA:0     I:0     TA:1

                      **  TOTAL   EASTWOOD                                    ACC:44   FA:0    K:0    IA:11    I:12    TA:33
```

RS,L&VM RTA NSW Road Traffic Accident Database: 2004 U/L 13479 29 Jul 05 08:39

ACCIDENTS WITHIN RYDE CITY LOCAL GOVERNMENT AREA (LGA): ***** March to December quarters *****

RYDE CITY LGA

```
    DATE   TIME REPORT NUM.       IDENTIFYING OBJECT      .WEATHER SURF.   VEHICLES    AGE STREET TRAVELLING SPD SEVERITY TU  K  I


 EASTWOOD
================
   BALACLAVA RD

    18/07/04 16:05 043900886    50m  Est of VIMIERA        RD .FINE  DRY. UTILITY        M23 Est in BALACLA RD  10 TOWAWAY   2  0  0
      Evt:000021028320            R.U.M. CODE:40 U TURN                  CAR            F49 Est in BALACLA RD  40
                           *  TOTAL   BALACLAVA RD                              ACC:1    FA:0    K:0    IA:0     I:0     TA:1

   BALL AV

    22/08/04 16:02 043913862       at       DOOMBEN        AV .FINE  DRY. CAR            F39 Est in DOOMBEN AV  10 INJURY    2  0  1
      Evt:000023385384            R.U.M. CODE:11 RIGHT FAR               PASSENGER VAN  F53 Sth in BALL    AV  40
    26/07/04 19:10 043912259       at       MAY            ST .RAIN  WET. CAR            M20 Est in MAY     ST  15 INJURY    2  0  1
      Evt:000021286627            R.U.M. CODE: 0 PED NEARSIDE            PEDESTRIAN     F22 Est in BALL    AV
                           *  TOTAL   BALL AV                                   ACC:2     FA:0    K:0    IA:2     I:2     TA:0

   BLAXLAND RD

    11/01/04 09:30 041859781       at       BALACLAVA      RD .FINE  DRY. LIGHT TRUCK    M30 Nth in BLAXLAN RD   2 INJURY    2  0  1
      Evt:000038381301            R.U.M. CODE:32 RIGHT REAR              CAR            M20 Nth in BLAXLAN RD   0
    22/01/04 09:45 041868185       at       BALACLAVA      RD .FINE  DRY. CAR            F46 Nth in BLAXLAN RD Unk TOWAWAY   2  0  0
      Evt:000019425970            R.U.M. CODE:21 RIGHT THROUGH           STATION WAGON  M73 Sth in BLAXLAN RD  50
    27/02/04 06:30 041873266       at       BALACLAVA      RD .FINE  DRY. CAR            M75 Nth in BLAXLAN RD  10 INJURY    2  0  1
      Evt:000020371940            R.U.M. CODE:21 RIGHT THROUGH           4 WHEEL DRIVE  F57 Sth in BLAXLAN RD  30
    02/04/04 21:50 042879776       at       BALACLAVA      RD .FINE  DRY. 4 WHEEL DRIVE  M19 Nth in BLAXLAN RD  15 TOWAWAY   2  0  0
      Evt:000020596051            R.U.M. CODE:21 RIGHT THROUGH           CAR            F20 Sth in BLAXLAN RD  60
    24/04/04 12:14 042884043       at       BALACLAVA      RD .FINE  DRY. PASSENGER VAN  M41 Nth in BLAXLAN RD  20 INJURY    2  0  2
      Evt:000021647016            R.U.M. CODE:21 RIGHT THROUGH           CAR            M52 Sth in BLAXLAN RD  50
    01/05/04 23:10 042883179       at       BALACLAVA      RD .FINE  WET. CAR            F40 Nth in BLAXLAN RD  15 INJURY    2  0  1
      Evt:000020630746            R.U.M. CODE:21 RIGHT THROUGH           CAR            M34 Sth in BLAXLAN RD  40
    23/06/04 19:09 042895773       at       BALACLAVA      RD .FINE  DRY. CAR            M26 Sth in BLAXLAN RD   5 TOWAWAY   2  0  0
      Evt:000039520602            R.U.M. CODE:21 RIGHT THROUGH           CAR            M73 Nth in BLAXLAN RD  60
    24/08/04 07:19 043922642       at       BALACLAVA      RD .FINE  DRY. LIGHT TRUCK    M45 Nth in BLAXLAN RD  20 TOWAWAY   2  0  0
      Evt:000021475647            R.U.M. CODE:21 RIGHT THROUGH           CAR            F25 Sth in BLAXLAN RD  50
    07/10/04 14:50 044921303       at       BALACLAVA      RD .FINE  DRY. CAR            F40 Nth in BLAXLAN RD   5 TOWAWAY   2  0  0
      Evt:000084818994            R.U.M. CODE:21 RIGHT THROUGH           CAR            F17 Sth in BLAXLAN RD  60
    26/07/04 23:05 043903702     5m  Nth of BALACLAVA      RD .RAIN  WET. CAR            M23 Sth in BLAXLAN RD  60 TOWAWAY   2  0  0
      Evt:000021405045            R.U.M. CODE:30 REAR END                CAR            M38 Sth in BLAXLAN RD  20
```

```
 27/09/04 16:30 043917165     5m  Sth of BALACLAVA      RD .FINE  DRY. CAR           ??? Nth in BLAXLAN RD  15 INJURY    2  0  1
   Evt:000175209991            R.U.M. CODE:30 REAR END                 CAR           ??? Nth in BLAXLAN RD   0

BLAXLAND RD  (Cont...)

 06/09/04 07:45 043911814    20m  Sth of BALACLAVA      RD .FINE  DRY. CAR           F23 Sth in BLAXLAN RD  40 INJURY    2  0  1
   Evt:000021606117            R.U.M. CODE:30 REAR END                 CAR           F51 Sth in BLAXLAN RD   0
 11/03/04 22:05 041872401      at       BALL           AV .FINE  DRY. CAR           M41 Sth in BLAXLAN RD Unk INJURY    2  0  1
   Evt:000037623702            R.U.M. CODE:21 RIGHT THROUGH            MOTORCYCLE    M38 Nth in BLAXLAN RD  50
 19/11/04 17:00 044928164      at       BALL           AV .RAIN  WET. CAR           F28 Sth in BLAXLAN RD  40 TOWAWAY   2  0  0
   Evt:000022603505            R.U.M. CODE:21 RIGHT THROUGH            4 WHEEL DRIVE M27 Nth in BLAXLAN RD  55
 02/04/04 19:34 042881091    10m  Nth of ETHEL          ST .FINE  DRY. CAR           F24 Est in ETHEL   ST   5 TOWAWAY   2  0  0
   Evt:000020125335            R.U.M. CODE:13 RIGHT NEAR               CAR           M64 Nth in BLAXLAN RD  50
 30/07/04 19:30 043905181    10m  Nth of ETHEL          ST .FINE  DRY. CAR           M30 Nth in BLAXLAN RD  50 INJURY    2  0  1
   Evt:000021723163            R.U.M. CODE: 0 PED NEARSIDE             PEDESTRIAN    F17 Est in BLAXLAN RD
 16/09/04 12:50 043914449    15m  Nth of ETHEL          ST .FINE  DRY. CAR           M21 Sth in BLAXLAN RD  55 TOWAWAY   4  0  0
   Evt:000021898213            R.U.M. CODE:30 REAR END                 CAR           M31 Sth in BLAXLAN RD   0
 12/12/04 08:15 044933189      at       FIRST          AV .FINE  DRY. CAR           M61 Nth in BLAXLAN RD  40 TOWAWAY   2  0  0
   Evt:000077549495            R.U.M. CODE:10 CROSS TRAFFIC            CAR           M52 Est in FIRST   AV   5
 25/04/04 03:50 042882834    15m  Est of FIRST          AV .FINE  DRY. 4 WHEEL DRIVE M52 Est in BLAXLAN RD  50 TOWAWAY   1  0  0
   Evt:000020424761            R.U.M. CODE:71 OFF RD LEFT => OBJ       UTILITY POLE
 21/07/04 13:45 043902192      at       LANDSDOWNE     ST .FINE  DRY. 4 WHEEL DRIVE F29 Nth in BLAXLAN RD Unk INJURY    2  0  1
   Evt:000021614303            R.U.M. CODE:30 REAR END                 LIGHT TRUCK   M18 Nth in BLAXLAN RD   0
 29/01/04 08:45 041865285      at       MAY            ST .FINE  DRY. CAR           M64 Wst in BLAXLAN RD  20 TOWAWAY   3  0  0
   Evt:000019498524            R.U.M. CODE:47 EMERGING FROM DRIVE      CAR           M32 Nth in BLAXLAN RD  50
 24/03/04 21:35 041874405      at       MAY            ST .FINE  DRY. CAR           M21 Est in BLAXLAN RD  10 TOWAWAY   3  0  0
   Evt:000020056209            R.U.M. CODE:21 RIGHT THROUGH            CAR           M22 Wst in BLAXLAN RD  60
 24/05/04 09:00 042888043      at       MAY            ST .FINE  DRY. LIGHT TRUCK   M74 Sth in BLAXLAN RD   5 TOWAWAY   2  0  0
   Evt:000021147528            R.U.M. CODE:21 RIGHT THROUGH            CAR           M22 Nth in BLAXLAN RD  60
 03/12/04 18:09 044936775      at       MAY            ST .FINE  DRY. CAR           M48 Sth in BLAXLAN RD   5 INJURY    2  0  1
   Evt:000023186465            R.U.M. CODE:21 RIGHT THROUGH            CAR           M31 Nth in BLAXLAN RD  60
 29/03/04 14:20 041876853     5m  Sth of MAY            ST .FINE  DRY. CAR           M22 Nth in BLAXLAN RD  50 TOWAWAY   2  0  0
   Evt:000019944844            R.U.M. CODE:30 REAR END                 CAR           M75 Nth in BLAXLAN RD   0
 03/06/04 18:30 042896734     5m  Sth of MAY            ST .FINE  DRY. CAR           F32 Nth in BLAXLAN RD Unk INJURY    2  0  2
   Evt:000160387191            R.U.M. CODE:30 REAR END                 CAR           M21 Nth in BLAXLAN RD   0
 18/08/04 14:20 043908666     5m  Sth of MAY            ST .RAIN  WET. CAR           M?? Nth in BLAXLAN RD  45 TOWAWAY   2  0  0
   Evt:000072194495            R.U.M. CODE:30 REAR END                 CAR           M63 Nth in BLAXLAN RD   0
                       *  TOTAL   BLAXLAND RD                                ACC:27    FA:0    K:0    IA:11    I:13    TA:16

FIRST AV

 22/03/04 07:35 042899589      at       EAST           PD .OCAST DRY. CAR           F33 Est in FIRST   AV  40 INJURY    2  0  1
   Evt:000037809002            R.U.M. CODE:21 RIGHT THROUGH            MOTORCYCLE    M42 Wst in FIRST   AV Unk
 02/04/04 09:50 042877192      at       EAST           PD .FINE  DRY. CAR           M76 Nth in FIRST   AV  10 TOWAWAY   2  0  0
   Evt:000020661928            R.U.M. CODE:21 RIGHT THROUGH            CAR           F54 Sth in FIRST   AV  50
 30/06/04 19:24 042899995      at       EAST           PD .FINE  DRY. CAR           M22 Nth in EAST    PD  15 INJURY    2  0  1
```

```
    Evt:000021023248          R.U.M. CODE:21 RIGHT THROUGH          CAR           F34 Sth in EAST    PD  15
  28/05/04 16:40 042892168    1m  Est of EAST          PD .FINE  DRY. CAR           F34 Wst in FIRST   AV Unk INJURY    2  0  1
    Evt:000020917745          R.U.M. CODE: 0 PED NEARSIDE           PEDESTRIAN    M 8 Nth in FIRST   AV
  25/03/04 10:00 041878188   10m  Est of EAST          PD .FINE  DRY. CAR           F20 Wst in FIRST   AV  10 INJURY    3  0  1
    Evt:000020709578          R.U.M. CODE:30 REAR END               STATION WAGON F35 Wst in FIRST   AV   0
  25/06/04 18:55 042895915   10m  Est of EAST          PD .FINE  DRY. CAR           F55 Est in FIRST   AV  30 TOWAWAY   2  0  0
    Evt:000021175334          R.U.M. CODE:30 REAR END               STATION WAGON F49 Est in FIRST   AV   0
  24/04/04 15:00 042881806  110m  Est of EAST          PD .FINE  DRY. CAR           M35 Est in FIRST   AV  60 TOWAWAY   2  0  0
    Evt:000020623534          R.U.M. CODE:31 LEFT REAR              CAR           M22 Est in FIRST   AV  10
  29/10/04 20:19 044927419     at       RAILWAY      PD .FINE  DRY. CAR           F27 Wst in FIRST   AV  10 TOWAWAY   3  0  0
    Evt:000021847937          R.U.M. CODE:21 RIGHT THROUGH          CAR           M44 Est in FIRST   AV  55
  18/07/04 16:15 043907968  100m  Est of RAILWAY       PD .OCAST DRY. CAR           F40 Est in FIRST   AV  40 TOWAWAY   3  0  0
    Evt:000021590803          R.U.M. CODE:30 REAR END               CAR           F57 Est in FIRST   AV   0
                        *  TOTAL   FIRST AV                                ACC:9     FA:0    K:0    IA:4     I:4     TA:5

 HILLVIEW LA

  07/08/04 18:30 043908195   50m  Wst of LAKESIDE      RD .FINE  DRY. CAR           M18 Est in HILLVIE LA  50 INJURY    1  0  1
RS,L&VM RTA NSW  Road Traffic Accident Database:                2004  U/L 13479 29 Jul 05 08:39                      PAGE    10
                        *  TOTAL   HILLVIEW LA                             ACC:1     FA:0    K:0    IA:1     I:1     TA:0

 HILLVIEW RD

  23/10/04 17:00 044935329     at       LAKESIDE     RD .FINE  DRY. CAR           M18 Est in HILLVIE RD  40 TOWAWAY   2  0  0
    Evt:000021848660          R.U.M. CODE:10 CROSS TRAFFIC          CAR           F35 Nth in LAKESID RD  20
                        *  TOTAL   HILLVIEW RD                             ACC:1     FA:0    K:0    IA:0     I:0     TA:1
 MAY ST

  25/10/04 17:30 044927372     at       MAY          LA .FINE  DRY. CAR           M57 Nth in MAY     LA Unk TOWAWAY   3  0  0
    Evt:000022003223          R.U.M. CODE:13 RIGHT NEAR             MOTORCYCLE    M30 Wst in MAY     ST  55
                        *  TOTAL   MAY ST                                  ACC:1     FA:0    K:0    IA:0     I:0     TA:1

 ROWE ST

  23/12/04 16:05 044936091   80m  Wst of BLAXLAND      RD .OCAST DRY. CAR           M23 Est in ROWE    ST   5 TOWAWAY   2  0  0
    Evt:000022623311          R.U.M. CODE:42 LEAVING PARKING        CAR           F55 Est in ROWE    ST  50
                        *  TOTAL   ROWE ST                                 ACC:1     FA:0    K:0    IA:0     I:0     TA:1
 RUTLEDGE ST

  29/03/04 12:50 041875907     at       SHAFTSBURY   RD .FINE  DRY. LARGE RIGID    M38 Wst in RUTLEDG ST Unk TOWAWAY   2  0  0
    Evt:000020333421          R.U.M. CODE:30 REAR END               CAR           M74 Wst in RUTLEDG ST   0
  01/04/04 14:55 042878431     at       SHAFTSBURY   RD .FINE  DRY. CAR           F65 Wst in RUTLEDG ST  50 TOWAWAY   3  0  0
    Evt:000154390491          R.U.M. CODE:10 CROSS TRAFFIC          CAR           M31 Nth in SHAFTSB RD   5
  19/05/04 06:30 042896635     at       SHAFTSBURY   RD .FINE  DRY. LARGE RIGID    M62 Est in RUTLEDG ST  50 INJURY    2  0  1
    Evt:000067915295          R.U.M. CODE:10 CROSS TRAFFIC          CAR           M19 Nth in SHAFTSB RD  10
  05/07/04 14:20 043898702     at       SHAFTSBURY   RD .FINE  DRY. CAR           M36 Wst in RUTLEDG ST  20 TOWAWAY   2  0  0
    Evt:000022276016          R.U.M. CODE:21 RIGHT THROUGH          CAR           F22 Est in RUTLEDG ST  60
```

```
08/08/04 08:30 043905701       at       SHAFTSBURY     RD .FINE  DRY. CAR            M?? Sth in SHAFTSB RD   0 TOWAWAY   2  0  0
  Evt:000021758450          R.U.M. CODE:11 RIGHT FAR                 CAR            M26 Wst in RUTLEDG ST  50
19/08/04 16:10 043913821       at       SHAFTSBURY     RD .FINE  DRY. CAR            F20 Wst in RUTLEDG ST  20 INJURY    2  0  1
  Evt:000021246725          R.U.M. CODE:21 RIGHT THROUGH             CAR            F77 Est in RUTLEDG ST  50
23/05/04 09:45 042887941       at       TRELAWNEY      ST .FINE  DRY. 4 WHEEL DRIVE  F27 Wst in RUTLEDG ST  30 TOWAWAY   2  0  0
  Evt:000020758332          R.U.M. CODE:21 RIGHT THROUGH             CAR            M25 Est in RUTLEDG ST  50
17/12/04 20:10 044934734       at       TRELAWNEY      ST .FINE  DRY. CAR            M22 Wst in RUTLEDG ST  20 TOWAWAY   2  0  0
  Evt:000022658757          R.U.M. CODE:21 RIGHT THROUGH             4 WHEEL DRIVE  M57 Est in RUTLEDG ST  55
05/11/04 11:40 044929019       at       WEST           PD .OCAST WET. CAR            F24 Wst in RUTLEDG ST  10 TOWAWAY   2  0  0
  Evt:000041757302          R.U.M. CODE:21 RIGHT THROUGH             CAR            F38 Est in RUTLEDG ST  55
                      *  TOTAL   RUTLEDGE ST                                  ACC:9    FA:0    K:0    IA:2     I:2     TA:7

   SHAFTSBURY RD

26/09/04 00:30 043918314       at       GLEN           ST .FINE  DRY. CAR            M28 Nth in SHAFTSB RD   5 INJURY    2  0  1
  Evt:000021903373          R.U.M. CODE:21 RIGHT THROUGH             4 WHEEL DRIVE  F40 Sth in SHAFTSB RD  50
04/10/04 16:05 044917653       at       GLEN           ST .FINE  DRY. STATION WAGON  F42 Nth in SHAFTSB RD   5 TOWAWAY   2  0  0
  Evt:000021877327          R.U.M. CODE:42 LEAVING PARKING           LIGHT TRUCK    M24 Nth in SHAFTSB RD  35
10/11/04 12:15 044927689       at       GLEN           ST .FINE  DRY. CAR            F73 Wst in GLEN    ST  10 TOWAWAY   2  0  0
  Evt:000023386908          R.U.M. CODE:13 RIGHT NEAR                CAR            F32 Sth in SHAFTSB RD  50
01/06/04 09:00 042892263       at       HILLVIEW       LA .FINE  DRY. 4 WHEEL DRIVE  F22 Sth in SHAFTSB RD  10 INJURY    2  0  1
  Evt:000020839027          R.U.M. CODE:37 LEFT TURN SIDESWIPE       CAR            F48 Sth in SHAFTSB RD  45
14/09/04 18:15 043914361       at       NUMBER 193     HN .FINE  DRY. CAR            M?? Sth in SHAFTSB RD  50 TOWAWAY   2  0  0
  Evt:000022269607          R.U.M. CODE:63 VEHICLE DOOR              CAR            F39 Sth in SHAFTSB RD   0
02/08/04 16:30 043904285       at       RICHARDS       AV .RAIN  WET. CAR            M70 Est in RICHARD AV Unk TOWAWAY   2  0  0
  Evt:000021678751          R.U.M. CODE:13 RIGHT NEAR                LIGHT TRUCK    M19 Nth in SHAFTSB RD  40
26/03/04 09:44 041882393       at       ROWE           ST .FINE  DRY. CAR            F80 Sth in SHAFTSB RD  50 TOWAWAY   2  0  0
  Evt:000020158047          R.U.M. CODE:10 CROSS TRAFFIC             CAR            F44 Wst in ROWE    ST   5
18/03/04 12:00 041879567     5m  Sth of TRELAWNEY      ST .FINE  DRY. CAR            F77 Wst in TRELAWN ST  15 INJURY    1  0  1
  Evt:000020401706          R.U.M. CODE:87 OFF LFT/LFT BND=>OBJ      FENCE
12/10/04 19:30 044927268    50m  Sth of TRELAWNEY      ST .FINE  DRY. LIGHT TRUCK    F30 Sth in SHAFTSB RD  40 INJURY    2  0  1
  Evt:000021761560          R.U.M. CODE:30 REAR END                  STATION WAGON  F49 Sth in SHAFTSB RD   0
                      *  TOTAL   SHAFTSBURY RD                                ACC:9     FA:0    K:0    IA:4     I:4     TA:5

  WEST PD

20/02/04 09:00 041867394   150m  Nth of RUTLEDGE STREE OP .FINE  WET. CAR            F42 Sth in WEST    PD  20 INJURY    3  0  2
  Evt:000020069913          R.U.M. CODE:30 REAR END                  CAR            F36 Sth in WEST    PD   0
                      *  TOTAL   WEST PD                                      ACC:1     FA:0    K:0    IA:1     I:2     TA:0

   WEST ST

06/02/04 10:30 041868284       at       RUTLEDGE       ST .FINE  DRY. CAR            F34 Est in RUTLEDG ST   5 TOWAWAY   2  0  0
  Evt:000019466244          R.U.M. CODE:10 CROSS TRAFFIC             CAR            F83 Nth in WEST    ST  40
                      *  TOTAL   WEST ST                                      ACC:1     FA:0    K:0    IA:0     I:0     TA:1

                     **  TOTAL   EASTWOOD                                     ACC:62   FA:0    K:0    IA:25    I:28    TA:37
```

ACCIDENTS WITHIN RYDE CITY LOCAL GOVERNMENT AREA (LGA): ***** March to December quarters *****

RYDE CITY LGA

DATE	TIME	REPORT NUM.	IDENTIFYING OBJECT	.WEATHER	SURF.	VEHICLES	AGE	STREET TRAVELLING	SPD	SEVERITY	TU	K	I
EASTWOOD													
BALACLAVA RD													
13/05/05	19:51	052969128	5m Est of BLAXLAND RD	.	OCAST	WET. LIGHT TRUCK	M37	Nth in BLAXLAN RD	30	TOWAWAY	2	0	0
Evt:000024148403			R.U.M. CODE:81 OFF LEFT/RT BND=>OBJ			CAR		Est in BALACLA RD	0				
27/09/05	08:50	053995691	20m Est of BLAXLAND RD	.	OCAST	WET. CAR	F33	Wst in BALACLA RD	60	TOWAWAY	2	0	0
Evt:000025295643			R.U.M. CODE:34 LANE CHANGE RIGHT			CAR	F25	Wst in BALACLA RD	60				
* TOTAL BALACLAVA RD						ACC:2		FA:0	K:0	IA:0	I:0	TA:2	
BALL AV													
05/05/05	18:15	052969049	at DOOMBEN AV	.	FINE	DRY. CAR	M40	Est in DOOMBEN AV	20	INJURY	2	0	1
Evt:000024021619			R.U.M. CODE:13 RIGHT NEAR			PEDAL CYCLE	F29	Nth in BALL AV					
* TOTAL BALL AV						ACC:1		FA:0	K:0	IA:1	I:1	TA:0	
BLAXLAND RD													
16/02/05	06:05	051967312	at BALACLAVA RD	.	FINE	DRY. MOTORCYCLE	M24	Nth in BLAXLAN RD	30	TOWAWAY	2	0	0
Evt:000023468929			R.U.M. CODE:21 RIGHT THROUGH			CAR	M52	Sth in BLAXLAN RD	60				
22/03/05	22:20	051957225	at BALACLAVA RD	.	RAIN	WET. CAR	M19	Sth in BLAXLAN RD	50	INJURY	1	0	1
Evt:000023205715			R.U.M. CODE:70 OFF ROAD TO LEFT			ROLLOVER							
09/04/05	22:20	052957991	at BALACLAVA RD	.	FINE	DRY. CAR	F36	Wst in BALACLA RD	15	TOWAWAY	3	0	0
Evt:000023390872			R.U.M. CODE:10 CROSS TRAFFIC			CAR	M20	Nth in BLAXLAN RD	60				
28/04/05	22:00	052961166	at BALACLAVA RD	.	FINE	DRY. CAR	M33	Nth in BLAXLAN RD	5	TOWAWAY	2	0	0
Evt:000023778968			R.U.M. CODE:21 RIGHT THROUGH			CAR	M26	Sth in BLAXLAN RD	60				
10/05/05	09:30	052964063	at BALACLAVA RD	.	FINE	DRY. CAR	F32	Nth in BLAXLAN RD	60	TOWAWAY	2	0	0
Evt:000023722061			R.U.M. CODE:10 CROSS TRAFFIC			CAR	M29	Wst in BALACLA RD	30				
30/05/05	21:50	052968545	at BALACLAVA RD	.	FINE	DRY. CAR	F21	Nth in BLAXLAN RD	5	TOWAWAY	2	0	0
Evt:000023857536			R.U.M. CODE:21 RIGHT THROUGH			LIGHT TRUCK	M22	Sth in BLAXLAN RD	60				
04/07/05	11:00	053981899	at BALACLAVA RD	.	FINE	DRY. LIGHT TRUCK	M19	Sth in BLAXLAN RD	65	INJURY	2	0	2
Evt:000045909902			R.U.M. CODE:21 RIGHT THROUGH			LIGHT TRUCK	M30	Nth in BLAXLAN RD	5				
20/08/05	16:00	053988118	at BALACLAVA RD	.	OCAST	DRY. CAR	M37	Nth in BLAXLAN RD	20	INJURY	2	0	1
Evt:000081306297			R.U.M. CODE:21 RIGHT THROUGH			CAR	F42	Sth in BLAXLAN RD	60				
21/08/05	20:50	053992388	at BALACLAVA RD	.	FINE	DRY. CAR	F48	Nth in BLAXLAN RD	15	TOWAWAY	2	0	0
Evt:000025418553			R.U.M. CODE:21 RIGHT THROUGH			CAR	F22	Sth in BLAXLAN RD	60				
20/10/05	19:19	054002213	at BALACLAVA RD	.	RAIN	WET. CAR	M25	Nth in BLAXLAN RD	10	TOWAWAY	2	0	0
Evt:000025339118			R.U.M. CODE:21 RIGHT THROUGH			CAR	F37	Sth in BLAXLAN RD	60				

```
 25/12/05 10:50 054015664       at       BALACLAVA      RD .FINE  DRY. CAR            M35 Nth in BLAXLAN RD  15 INJURY    2  0  1
   Evt:000025414344           R.U.M. CODE:21 RIGHT THROUGH             CAR            M57 Sth in BLAXLAN RD  60
 17/03/05 17:45 051954277    10m  Nth of BALACLAVA      RD .RAIN  WET. CAR            M19 Wst in BLAXLAN RD   5 TOWAWAY   2  0  0
   Evt:000023421138           R.U.M. CODE:47 EMERGING FROM DRIVE       CAR            F24 Sth in BLAXLAN RD  55
 03/09/05 22:15 053000302   100m  Sth of BALACLAVA      RD .RAIN  WET. CAR            M22 Sth in BLAXLAN RD  15 TOWAWAY   2  0  0
   Evt:000024617059           R.U.M. CODE:21 RIGHT THROUGH             4 WHEEL DRIVE  F20 Nth in BLAXLAN RD  60
 24/06/05 12:15 052981795    50m  Nth of ETHEL          ST .OCAST WET. CAR            F34 Nth in BLAXLAN RD  50 TOWAWAY   2  0  0
   Evt:000024277673           R.U.M. CODE:30 REAR END                  LIGHT TRUCK    M49 Nth in BLAXLAN RD  50
 27/03/05 09:39 051954962   100m  Sth of FIRST          AV .FINE  DRY. STATION WAGON  M18 Nth in BLAXLAN RD  60 TOWAWAY   3  0  0
   Evt:000023180720           R.U.M. CODE:30 REAR END                  CAR            F51 Nth in BLAXLAN RD   0
 08/02/05 18:00 051949355    20m  Nth of LANSDOWNE      ST .FINE  DRY. CAR            F28 Sth in BLAXLAN RD  10 TOWAWAY   2  0  0
   Evt:000023331374           R.U.M. CODE:21 RIGHT THROUGH             CAR            M51 Nth in BLAXLAN RD  40
 30/09/05 16:10 053996915    50m  Sth of LANSDOWNE      ST .FINE  DRY. CAR            F20 Sth in BLAXLAN RD  30 TOWAWAY   4  0  0
   Evt:000025200306           R.U.M. CODE:30 REAR END                  CAR            M73 Sth in BLAXLAN RD   0
 01/02/05 08:10 051949286       at       MAY            ST .FINE  DRY. CAR            M29 Sth in BLAXLAN RD  10 INJURY    2  0  2
   Evt:000023024579           R.U.M. CODE:21 RIGHT THROUGH             CAR            F29 Nth in BLAXLAN RD  50
 21/04/05 11:10 052961857       at       MAY            ST .OCAST DRY. 4 WHEEL DRIVE  F53 Est in MAY     ST  30 TOWAWAY   2  0  0
   Evt:000023458715           R.U.M. CODE:10 CROSS TRAFFIC             LIGHT TRUCK    ??? Sth in BLAXLAN RD  50
 28/04/05 14:30 052963279       at       MAY            ST .FINE  DRY. CAR            M27 Sth in BLAXLAN RD  35 INJURY    2  0  3
   Evt:000023614448           R.U.M. CODE:21 RIGHT THROUGH             CAR            F19 Nth in BLAXLAN RD  50
 18/06/05 15:00 052973049       at       MAY            ST .FINE  DRY. CAR            M85 Sth in BLAXLAN RD  40 INJURY    2  0  1
   Evt:000024079527           R.U.M. CODE:21 RIGHT THROUGH             CAR            F20 Nth in BLAXLAN RD  60
                       *  TOTAL   BLAXLAND RD                                  ACC:21    FA:0    K:0    IA:7     I:11    TA:14

 CLIVE RD

 30/01/05 15:15 051943928   150m  Est of HILLVIEW       RD .OCAST DRY. CAR            M57 Est in CLIVE   RD Unk TOWAWAY   2  0  0
   Evt:000024603485           R.U.M. CODE:93 PKD VEH RUNAWAY=>OBJ      LIGHT TRUCK        Wst in CLIVE   RD   0
                       *  TOTAL   CLIVE RD                                     ACC:1     FA:0    K:0    IA:0     I:0     TA:1

ETHEL ST

 31/08/05 09:20 053988791    40m  Wst of BLAXLAND       RD .FINE  DRY. OTHER MOT.VEH. ??? Est in ETHEL   ST Unk TOWAWAY   2  0  0
   Evt:000025202367           R.U.M. CODE:71 OFF RD LEFT => OBJ        CAR                Est in ETHEL   ST   0
 23/04/05 18:47 052960943       at       RAILWAY        PD .FINE  DRY. CAR            M75 Nth in RAILWAY PD   5 INJURY    3  0  1
   Evt:000134410392           R.U.M. CODE: 2 PED FAR SIDE              PEDESTRIAN     M30 Wst in RAILWAY PD
                       *  TOTAL   ETHEL ST                                     ACC:2     FA:0    K:0    IA:1     I:1     TA:1

FIRST AV

 16/10/05 16:40 054002105     5m  Wst of BLAXLAND       RD .RAIN  WET. CAR            F60 Sth in BLAXLAN RD  40 INJURY    3  0  1
   Evt:000024899820           R.U.M. CODE:13 RIGHT NEAR                CAR            M32 Est in FIRST   AV   0
 07/02/05 15:20 051946453       at       EAST           PD .FINE  DRY. CAR            M74 Est in FIRST   AV Unk TOWAWAY   3  0  0
   Evt:000023266219           R.U.M. CODE:21 RIGHT THROUGH             CAR            M44 Wst in FIRST   AV  70
 06/04/05 11:20 052960302       at       EAST           PD .FINE  DRY. UTILITY        M42 Sth in EAST    PD  35 INJURY    2  0  1
   Evt:000023587768           R.U.M. CODE:21 RIGHT THROUGH             PEDAL CYCLE    M67 Nth in EAST    PD
 13/04/05 08:30 052959268       at       EAST           PD .FINE  DRY. CAR            F49 Wst in FIRST   AV  15 TOWAWAY   2  0  0
```

```
    Evt:000023369476           R.U.M. CODE:21 RIGHT THROUGH            CAR            M27 Est in FIRST   AV  70
 22/06/05 08:22 052973355       at       EAST           PD .FINE  DRY. STATION WAGON  F53 Est in FIRST   AV  10 TOWAWAY   2  0  0
    Evt:000024938365           R.U.M. CODE:21 RIGHT THROUGH            CAR            F40 Wst in FIRST   AV  60
 30/06/05 13:30 052976159       at       EAST           PD .RAIN  WET. CAR            M83 Sth in EAST    PD  20 TOWAWAY   1  0  0
    Evt:000024398518           R.U.M. CODE:87 OFF LFT/LFT BND=>OBJ     UTILITY POLE

 FIRST AV

 23/08/05 14:30 053014889       at       EAST           PD .FINE  DRY. LARGE RIGID    ??? Est in FIRST   AV  20 INJURY    2  0  1
    Evt:000024634014           R.U.M. CODE: 0 PED NEARSIDE             PEDESTRIAN     F?? Unk in FIRST   AV
 11/11/05 10:20 054019139       at       EAST           PD .FINE  DRY. CAR            M23 Est in FIRST   AV  60 TOWAWAY   3  0  0
    Evt:000025422046           R.U.M. CODE:30 REAR END                 CAR            M58 Est in FIRST   AV   0
 28/11/05 14:52 054021764       at       EAST           PD .RAIN  WET. CAR            F50 Wst in FIRST   AV  10 INJURY    3  0  1
    Evt:000025842677           R.U.M. CODE:21 RIGHT THROUGH            CAR            M22 Est in FIRST   AV  20
 10/12/05 07:35 054014037       at       EAST           PD .FINE  DRY. CAR            M36 Sth in FIRST   AV  20 TOWAWAY   2  0  0
    Evt:000025732068           R.U.M. CODE:21 RIGHT THROUGH            CAR            M59 Nth in FIRST   AV Unk
 17/12/05 10:45 054015425       at       EAST           PD .FINE  DRY. CAR            M31 Est in FIRST   AV  10 TOWAWAY   2  0  0
    Evt:000025329830           R.U.M. CODE:21 RIGHT THROUGH            CAR            M25 Wst in FIRST   AV  60
 10/06/05 20:00 052978561    10m  Est of EAST           PD .FINE  DRY. CAR            F30 Est in FIRST   AV  55 TOWAWAY   1  0  0
    Evt:000024001248           R.U.M. CODE:66 OBJECT ON ROAD           OTH NON FIXED
 26/10/05 09:40 054002488    10m  Wst of RYEDALE        RD .FINE  DRY. CAR            M17 Est in FIRST   AV  35 TOWAWAY   2  0  0
    Evt:000025326034           R.U.M. CODE:34 LANE CHANGE RIGHT        CAR            F64 Est in FIRST   AV  50
 13/12/05 22:30 054024687    15m  Wst of RYEDALE        RD .RAIN  WET. CAR            ??? Wst in FIRST   AV  15 INJURY    2  0  1
    Evt:000026089267           R.U.M. CODE:40 U TURN                   TOW TRUCK      ??? Wst in FIRST   AV  50
 20/05/05 19:50 052967963    10m  Est of WEST           PD .FINE  DRY. CAR            M24 Wst in FIRST   AV  30 TOWAWAY   2  0  0
    Evt:000025591985           R.U.M. CODE:30 REAR END                 LIGHT TRUCK    M48 Wst in FIRST   AV   0
                        *  TOTAL   FIRST AV                                    ACC:15    FA:0    K:0    IA:5     I:5     TA:10

HILLLVIEW LA

 06/06/05 11:59 052983211   250m  Est of SHAFTSBURY     RD .FINE  DRY. CAR            F42 Est in HILLLVI LA   5 INJURY    2  0  1
    Evt:000026416786           R.U.M. CODE: 0 PED NEARSIDE             PEDESTRIAN     F76 Sth in HILLLVI LA


                      *  TOTAL   HILLLVIEW LA                                ACC:1     FA:0    K:0    IA:1     I:1     TA:0
 HILLVIEW RD

 13/11/05 19:47 054013767       at       LAKESIDE       RD .FINE  DRY. CAR            M19 Sth in LAKESID RD  40 TOWAWAY   2  0  0
    Evt:000146863692           R.U.M. CODE:10 CROSS TRAFFIC            TAXI           M?? Wst in HILLVIE RD  40
 23/11/05 08:35 054013824   200m  Wst of LAKESIDE       RD .OCAST DRY. CAR            M78 Est in HILLVIE RD Unk INJURY    1  0  2
    Evt:000025866728           R.U.M. CODE:87 OFF LFT/LFT BND=>OBJ     UTILITY POLE
                        *  TOTAL   HILLVIEW RD                                 ACC:2     FA:0    K:0    IA:1     I:2     TA:1

 LAKESIDE RD

 12/01/05 06:35 051939023    50m  Nth of CLIVE          RD .FINE  DRY. CAR            M17 Nth in LAKESID RD  65 TOWAWAY   1  0  0
    Evt:000022491825           R.U.M. CODE:71 OFF RD LEFT => OBJ       FENCE
```

```
                      *  TOTAL   LAKESIDE RD                                  ACC:1     FA:0    K:0    IA:0     I:0     TA:1

MIDSON RD

PROGRESS AV

 15/10/05 17:40 054000892   100m  Sth of HILLVIEW       RD .OCAST DRY. CAR            M56 Sth in PROGRES AV   2 INJURY    2  0  1
   Evt:000027009884            R.U.M. CODE: 3 PED ON CARRIAGEWAY      PEDESTRIAN     F28 Unk in PROGRES AV
                      *  TOTAL   PROGRESS AV                                  ACC:1     FA:0    K:0    IA:1     I:1     TA:0

RAILWAY PD

 28/04/05 18:15 052963292    20m  Nth of ROWE           ST .FINE  DRY. OTHER MOT.VEH. ??? Sth in RAILWAY PD Unk INJURY    2  0  1
   Evt:000023788573            R.U.M. CODE: 0 PED NEARSIDE            PEDESTRIAN     M25 Wst in RAILWAY PD

                      *  TOTAL   RAILWAY PD                                   ACC:1     FA:0    K:0    IA:1     I:1     TA:0

RUTLEDGE ST
 29/04/05 23:45 052963329       at       EAST          PD .FINE  DRY. CAR            F19 Sth in EAST    PD   5 TOWAWAY   2  0  0
   Evt:000023572322            R.U.M. CODE:21 RIGHT THROUGH           CAR            F18 Nth in EAST    PD  50
 03/09/05 21:15 053990063       at       EAST          PD .RAIN  WET. 4 WHEEL DRIVE  M46 Est in RUTLEDG ST   5 TOWAWAY   2  0  0
   Evt:000024618259            R.U.M. CODE:21 RIGHT THROUGH           CAR            F55 Wst in RUTLEDG ST  55
 20/01/05 19:15 051941414       at       SHAFTSBURY    RD .FINE  WET. CAR            M20 Nth in SHAFTSB RD  10 INJURY    2  0  1
   Evt:000022910668            R.U.M. CODE:13 RIGHT NEAR              CAR            F35 Wst in RUTLEDG ST  60
 09/10/05 19:20 054998388       at       SHAFTSBURY    RD .FINE  DRY. CAR            F27 Est in RUTLEDG ST  30 TOWAWAY   2  0  0
   Evt:000024962247            R.U.M. CODE:10 CROSS TRAFFIC           CAR            M58 Nth in SHAFTSB RD  50
 11/12/05 17:35 054015296       at       SHAFTSBURY    RD .FINE  DRY. CAR            F19 Sth in RUTLEDG ST  30 TOWAWAY   2  0  0
   Evt:000025275430            R.U.M. CODE:21 RIGHT THROUGH           4 WHEEL DRIVE  ?45 Nth in RUTLEDG ST  55
 02/04/05 19:50 052962926       at       TRELAWNEY     ST .FINE  DRY. CAR            M18 Wst in RUTLEDG ST  20 TOWAWAY   2  0  0
   Evt:000044334402            R.U.M. CODE:21 RIGHT THROUGH           CAR            M33 Est in RUTLEDG ST  60
 10/06/05 06:20 052973911       at       TRELAWNEY     ST .FINE  DRY. CAR            F26 Sth in TRELAWN ST  20 TOWAWAY   2  0  0
   Evt:000026213781            R.U.M. CODE:13 RIGHT NEAR              CAR            M64 Est in RUTLEDG ST  60
 29/06/05 13:45 052984623       at       TRELAWNEY     ST .OCAST DRY. CAR            F22 Wst in RUTLEDG ST  20 INJURY    2  0  1
   Evt:000024566650            R.U.M. CODE:21 RIGHT THROUGH           OTHER BUS      M?? Est in RUTLEDG ST  50
 22/01/05 22:20 051942527     5m  Est of TRELAWNEY      ST .FINE  DRY. CAR            M?? Wst in RUTLEDG ST Unk TOWAWAY   2  0  0
   Evt:000023196450            R.U.M. CODE:32 RIGHT REAR              CAR            F28 Wst in RUTLEDG ST   0
                      *  TOTAL   RUTLEDG ST                                   ACC:9    FA:0    K:0    IA:2     I:2     TA:7
SHAFTSBURY RD

 02/12/05 14:15 054011221       at       GLEN          ST .FINE  DRY. CAR            F82 Wst in GLEN    ST  10 TOWAWAY   2  0  0
   Evt:000087554996            R.U.M. CODE:13 RIGHT NEAR              UTILITY        M33 Sth in SHAFTSB RD  40
 07/03/05 17:40 051951323       at       HILLVIEW      LA .FINE  DRY. CAR            M20 Nth in SHAFTSB RD   5 TOWAWAY   2  0  0
   Evt:000045442601            R.U.M. CODE:21 RIGHT THROUGH           PASSENGER VAN  M47 Sth in SHAFTSB RD  20
 20/01/05 10:45 051941427       at       ROWE          ST .FINE  DRY. CAR            M83 Nth in SHAFTSB RD  30 TOWAWAY   2  0  0
   Evt:000023032631            R.U.M. CODE:10 CROSS TRAFFIC           CAR            M79 Wst in ROWE    ST  10
 22/12/05 10:00 054014526       at       ROWE          ST .FINE  DRY. CAR            M55 Wst in ROWE    ST  10 TOWAWAY   2  0  0
   Evt:000048795002            R.U.M. CODE:13 RIGHT NEAR              CAR            F23 Sth in SHAFTSB RD  40
```

```
 23/03/05 10:50 051953404       at       TRELAWNEY      ST .RAIN  WET. LARGE RIGID    M33 Sth in SHAFTSB RD Unk TOWAWAY   2  0  0
   Evt:000024115239           R.U.M. CODE:49 OTHER MANOEUVRING        CAR            F73 Nth in SHAFTSB RD   0
                       *  TOTAL   SHAFTSBURY RD                                ACC:5     FA:0    K:0    IA:0     I:0     TA:5

WINGATE AV

 21/05/05 13:20 052967983    50m  Est of LAKESIDE       RD .FINE  DRY. CAR            M46 Nth in WINGATE AV  10 INJURY    2  0  1
   Evt:000023787723           R.U.M. CODE: 2 PED FAR SIDE             PEDESTRIAN     F82 Sth in WINGATE AV
                       *  TOTAL   WINGATE AV                                   ACC:1     FA:0    K:0    IA:1     I:1     TA:0

                      **  TOTAL   EASTWOOD                                     ACC:63   FA:0    K:0    IA:21    I:26    TA:42
```

Saturn Modelling Background Data

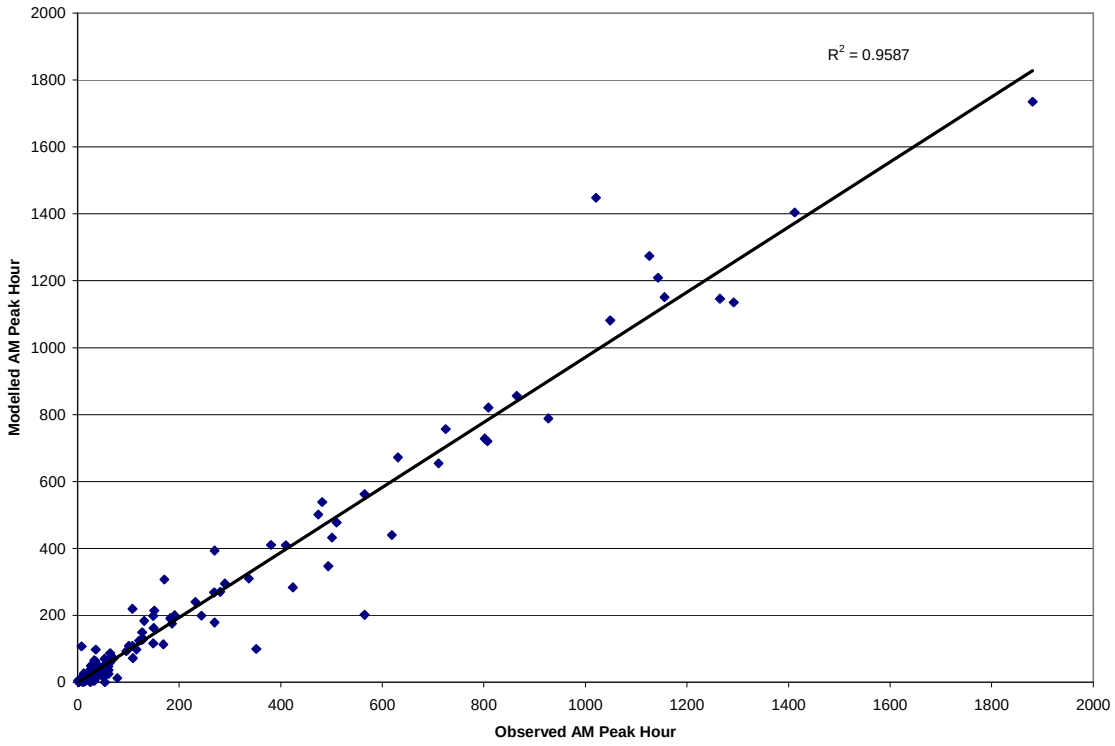
Zone Listings

Zone Type	Zone Number	Description
External	1	Blaxland Road North
	2	Vimiera Road
	3	Balaclava Road
	4	Lansdowne Street
	5	Edgar Street
	6	Blaxland Road South
	7	Denistone Road
	8	Ryedale Road
	9	East parade
	10	West Parade
	11	Trelawney St
	12	Clanalpine St
	13	Shaftsbury Road south
	14	Rutledge Street
	15	Rowe Street
	16	Richards Ave
	17	Shaftsbury Road north
	18	Hillview Road
	19	Lakeside Road
	20	Wingate Avenue
	21	Eastwood Ave
	22	West Parade
	23	Doomden Avenue
Public off street carpark	101	Rowe Street public off street carpark
	102	Eastwood shopping centre carpark
	103	Glen Street carpark
	104	Hillview Lane carpark
Residential	150	East of Blaxland Road between Lansdowne St and Balaclava Road
	151	East of Blaxland Road between Lansdowne Street to opposite Rowe Street
	152	East of Blaxland Road between Edgar Street and opposite Rowe St
	153	South of First Avenue between Denistone Road and Blaxland Road
	154	South of First Avenue between East Parade and Ryedale Road
	155	South of Ethel St between Blaxland Road and northern side of block
	156	North of Ethel Street between Blaxland Road and southern side of block
	157	South of May Street between Blaxland Road on northern side of block
	158	North of May Street between Ball Avenue and Blaxland Road
	159	South of Ball Avenue between Blaxland Road on northern side of block
	160	North of Wingate Avenue and next to West Parade
	161	North of Hillview Road and next to Lakeside Road
	162	North of Glen Street
	163	West of Shaftsbury Road and north of Richards Road

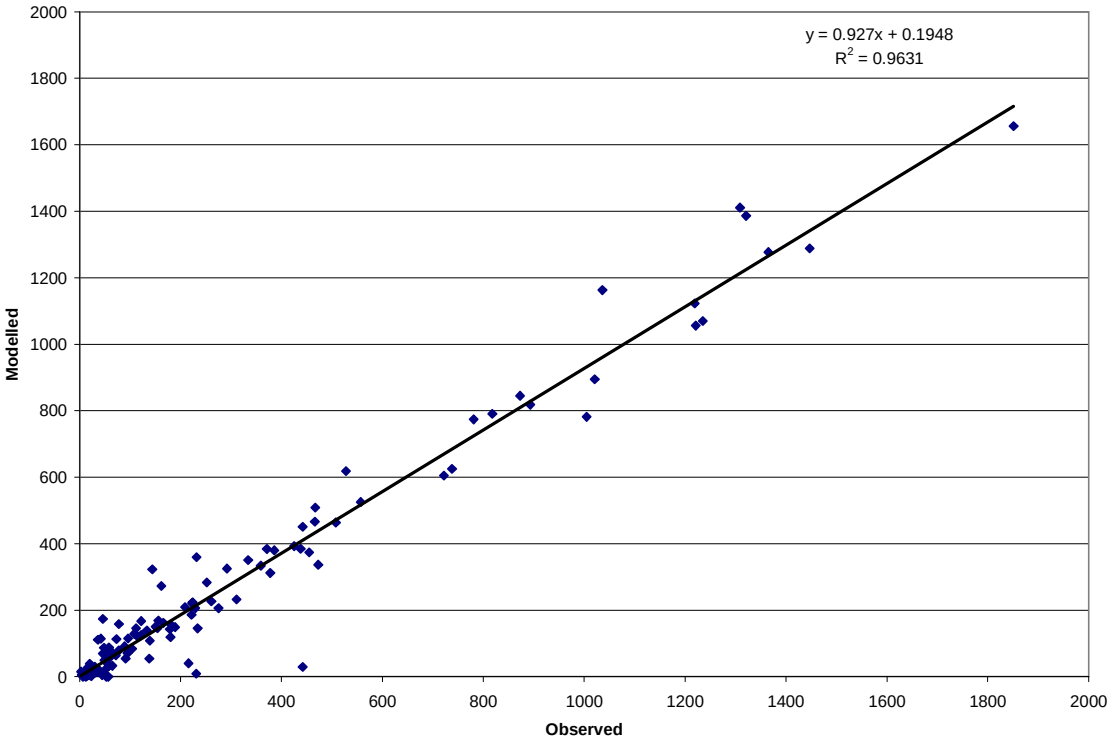
Zone Type	Zone Number	Description
	164	West of Shaftsbury Road and south of Richards Avenue and Rowe St
	165	West of Shaftsbury Road and north of Rutledge Street
	166	South of Rutledge Street between Trelawney Street and Shaftsbury Road
	167	South of Clanalpine Street between West Pde nd Trelawney Street
	168	East of Shaftsbury Road between Glen Reserve and Rowe Lane
	169	South of Clanalpine Street between Trelawney Street and West parade
	170	North side of first avenue
On Street parking	203	Rowe St (East)
	204	Rowe St (East)
	205	Ethel St
	206	Ethel St
	207	May St
	208	May St
	209	Railway Pde (north)
	210	Railway Pde (south)
	214	Trelawney
	215	Trelawney
	216	Rowe St (West)
	217	Rowe St (West)
	218	Glen St
	219	Glen St
	220	Lakeside Rd (South)
	221	Lakeside Rd (South)
	222	Hillview Rd
	223	Hillview Rd
	224	Lakeside Rd (North)
	225	Lakeside Rd (North)
	226	West Pde
	227	West Pde
	228	Wingate Ave
Residential	250	Residential north of May Street and west of Ball Avenue
Commercial/Retail	251	South of May Street between Ethel Lane
	252	East of Railway Parade and south of Ethel St
	253	East of East Parade and north of Rowe Street
	254	West of Blaxland Road and between Rowe Street and Rowe Lane
	255	East of East Parade and between First Avenue and Rowe St
	256	South of Rowe Street and between West Parade and Trelawney Street
	257	Between West Parade, Rowe Street and The Avenue
	258	Between Hillview Road, Progress Street and Hillview Lane
	259	Between Lakeside , Progress and Hillview Road
	260	South of Glen Street and west of Glen Street carpark
	261	North of Rowe street between The Avenue and Shaftsbury Road
	262	Bagswood Public School

Zone Type	Zone Number	Description
	263	Ryedale Road commercial

2007 AM Peak Hour Calibration Results



2007 PM Peak Hour Calibration Results



Weekday AM Peak Hour Calibration

Description	Observed	MODELLED	GEH
Left into First Avenue from Blaxland Road	381	410	1.46
Northbound through on Blaxland Road at the intersection with First Avenue	501	432	3.19
Left into Blaxland Road from First Avenue	631	672	1.61
Right in Blaxland Road from First Avenue	807	720	3.15
Southbound through on Blaxland Road at the intersection with First Avenue	711	654	2.18
Right into First Avenue from Blaxland Road	494	347	7.17
Left from Progress Avenue into Hillview Lane	41	20	3.80
Travel from Progress Avenue into The Avenue at the roundabout	131	183	4.15
Right from Progress Avenue into Lakeside Road	31	10	4.64
From The Avenue into Lakeside Drive	565	201	18.60
From The Avenue into Hillview Lane	27	24	0.59
From Hillview Lane west into The Avenue	15	13	0.53
Through movement Hillview Lane at roundabout	5	6	0.43
From Hillview Lane West into Lakeside Road	23	12	2.63
Northbound through movement on Shaftsbury Road at intersection with Glen Street	183	189	0.44
Right into Glen Street from Shaftsbury Road	66	76	1.19
Left into Glen Street from Shaftsbury Road	61	36	3.59
Southbound through on Shaftsbury Road at the intersection with Glen Street	474	501	1.22
Left into Shaftsbury Road from Glen Street	26	49	3.76
Right into Shaftsbury Road from Glen Street	18	19	0.23
Left into Rowe Street West from Shaftsbury Road	11	14	0.85
Northbound through Movement on Shaftsbury Road at intersection with Rowe Street	149	198	3.72

Description	Observed	MODELLED	GEH
Left into Shaftsbury Road from Rowe Street West	10	11	0.31
Right into Shaftsbury Road from Rowe Street West	14	13	0.27
Southbound through movement on Shaftsbury Road at Rowe Street	482	538	2.48
Right from Shaftsbury Road into Rowe Street West	1	5	2.31
Left from Rowe Street East into Shaftsbury Road	30	21	1.78
Through from Rowe Street East to Rowe Street West	28	4	6.00
Right from Rowe Street east into Shaftsbury Road	51	14	6.49
Left from Rutledge Street into Shaftsbury Road	39	43	0.62
Eastbound through movement on Rutledge Street at the intersection with Shaftsbury Road	1156	1151	0.15
Left from Shaftsbury Road into Rutledge Street east	281	270	0.66
Southbound through movement on Shaftsbury Road at the intersection of Rutledge Street	191	200	0.64
Right from Shaftsbury Road into Rutledge Street west	27	38	1.93
Left from Rutledge Street east into Shaftsbury Road	38	36	0.33
Westbound through movement on Rutledge Street at the intersection with Shaftsbury Road	725	756	1.14
Right from Rutledge Street east into Shaftsbury Road	36	97	7.48
Left from Shaftsbury Road south into Rutledge Street	5	5	0.00
Northbound through movement on Shaftsbury Road at the intersection with Rutledge	108	108	0.00
Right from Shaftsbury Road south into Rutledge Street	126	126	0.00
Left from Trelawney Street into Rowe Street	61	25	5.49
Right from Trelawney Street into Rowe Street	151	214	4.66
Left from Rowe Street into Trelawney Street	171	307	8.80
Westbound through movement on Rowe Street at the intersection of Trelawney Street	60	47	1.78
Left from Trelawney Street south into Rutledge Street	36	38	0.33
Northbound through movement on Trelawney Street at Rutledge Street	25	0	7.07
Right from Trelawney Street into Rutledge Street east	109	72	3.89
Left from Rutledge Street into Trelawney Street North	96	93	0.31
Rutledge Street eastbound through at Trelawney Street	1021	1448	12.15
Right from Rutledge Street west into Trelawney Street	10	7	1.03
Left into Rutledge Street from Trelawney Street north	232	240	0.52
Southbound through movement on Trelawney Street at the intersection with Rutledge Street	25	6	4.83
Right from Trelawney Street north in Rutledge Street	55	30	3.83
Left from Rutledge Street East into Trelawney Street	103	104	0.10
Eastbound through movement on Rutledge Street at Trelawney Street	809	821	0.42
Right from Rutledge Street east into Trelawney Street	186	175	0.82
Left from Hillview Road West into Lakeside Road	33	4	6.74
Eastbound through movement on Hillview Road at roundabout	46	39	1.07
Right from Hillview Road West into Lakeside Road	63	66	0.37
	31	22	1.75
Southbound through movement on Lakeside Road wt roundabout with Hillview Road	116	97	1.84
Right from Lakeside Road north into Hillview Road	15	3	4.00
Left from Hillview Road east into Lakeside Road	53	70	2.17
Westbound through movement onto Hillview Road at	45	45	0.00

Description	Observed	MODELLED	GEH
roundabout with Lakeside Road			
Right from Hillview Road East into Lakeside Road	51	48	0.43
Left from Lakeside Road south into Hillview Road	17	18	0.24
Northbound through movement on Lakeside Road at roundabout with Hillview Road	169	113	4.72
Right from Lakeside Road south into Hillview Road	71	71	0.00
Left from Glen Street into Lakeside Road	64	87	2.65
Right from Glen Street into Lakeside Road	57	32	3.75
Southbound through movement on Lakeside Road at Glen Street	127	149	1.87
Right turn into Glen Street from Lakeside Road north	33	65	4.57
Left into Glen Street from Lakeside Road	35	37	0.33
Northbound through movement on Lakeside Road at Glen Street	101	109	0.78
Right into Progress Avenue from Lakeside Road	2	0	2.00
Left into Progress Avenue from Lakeside Road	3	1	1.41
Northbound West Parade north of Hillview Lane	290	295	0.29
Southbound west parade south of Hillview Road	619	440	7.78
Left from Hillview Lane into West Parade	17	23	1.34
Right from Hillview Lane into West Parade	9	7	0.71
Left into West Parade from Rutledge Street west	31	25	1.13
Eastbound Through movement on Rutledge Street at the intersection with West Parade	1881	1735	3.43
Left from West Parade North into Rutledge Street	270	178	6.15
Westbound through movement on Rutledge Street at the intersection with West Parade	1049	1081	0.98
Left from West Parade South into Rutledge Street	14	19	1.23
Left from West Parade south into Clanalpine Street	25	13	2.75
Northbound through movement on West Parade at Clanalpine Street	150	162	0.96
Left from Clanalpine Street into West Parade	108	219	8.68
Right from Clanalpine Street into West Parade	23	25	0.41
Southbound through movement on West Parade at the intersection with Clanalpine Street	269	268	0.06
Right from West Parade into Clanalpine Street	64	61	0.38
Northbound through movement on East Parade at the intersection with Rowe Lane	424	283	7.50
Right turn from East Parade into Rowe Lane	12	26	3.21
Left into Rowe Lane from East Parade	8	107	13.06
Southbound through movement on East Parade at Rowe Lane	270	393	6.76
Left from Rowe Lane into East Parade	10	15	1.41
Right from Rowe Lane into East Parade	9	2	2.98
Southbound on Blaxland Road north of Rowe Lane	1292	1135	4.51
Northbound on Blaxland Road south of Rowe Lane	4	5	0.47
Northbound on Blaxland Road south of Rowe Lane	1143	1209	1.92
Left from East Parade south into Rutledge Street	32	32	0.00
East Parade Northbound at the intersection with First Avenue	63	57	0.77
Right from East Parade South into First Avenue	9	15	1.73
Left from Rutledge Street (west) into East Parade	337	310	1.50
Eastbound through movement on First Avenue at the intersection with East parade	1412	1404	0.21
Right turn from Rutledge Street into East Parade south	244	199	3.02

Description	Observed	MODELLED	GEH
Left from East Parade North into First Avenue	25	37	2.16
Southbound through movement on East Parade at the intersection with First Avenue	78	12	9.84
Right turn from East Parade north into Rutledge Street	183	192	0.66
Left from First Avenue (east) into East Parade	15	6	2.78
Westbound through movement on First Avenue at the intersection of East Parade	865	856	0.31
Right turn from First Avenue into East Parade north	35	62	3.88
Left turn into Ball Avenue from Blaxland Road	11	0	4.69
Northbound through movement on Blaxland Road at the intersection with Balaclava Road	510	477	1.49
Right turn from Blaxland Road into Balaclava Road	927	788	4.75
Left turn into Balaclava Road from Blaxland Road	24	22	0.42
Southbound through movement on Blaxland Road at the intersection of Balaclava Road	802	728	2.68
Left from Balaclava Road into Blaxland Road	565	562	0.13
From Balaclava Road into Ball Avenue	54	0	10.39
Right turn from Balaclava Road into Blaxland Road	129	129	0.00
Left from Wingate Avenue into West Parade	10	10	0.00
Right from Wingate Avenue into West Parade	128	128	0.00
Southbound through movement on West Parade at the intersection with Wingate Avenue	410	409	0.05
Right turn from West Parade into Wingate Avenue	24	24	0.00
Left into Wingate Avenue from West Parade	58	60	0.26
Northbound through movement on West Parade at the intersection with Wingate Avenue	121	124	0.27
Left from May Street into Blaxland Road	352	99	16.85
Right from May Street into Blaxland Road	58	36	3.21
Southbound through movement on Blaxland Road at May Street	1265	1146	3.43
Right turn into May Street from Blaxland Road	149	116	2.87
Left into May Street from Blaxland Road	2	2	0.00
Northbound through movement on Blaxland Road at May Street	1126	1274	4.27

Description	PM Count	MODELLED	GEH
Left into First Avenue from Blaxland Road	467	509	1.90
Northbound through on Blaxland Road at the intersection with First Avenue	873	845	0.96
Left into Blaxland Road from First Avenue	528	618	3.76
Right in Blaxland Road from First Avenue	557	525	1.38
Southbound through on Blaxland Road at the intersection with First Avenue	425	393	1.58
Right into First Avenue from Blaxland Road	738	625	4.33
Left from Progress Avenue into Hillview Lane	17	8	2.55
Travel from Progress Avenue into The Avenue at the roundabout	72	64	0.97
Right from Progress Avenue into Lakeside Road	52	24	4.54
From The Avenue into Lakeside Drive	292	325	1.88
From The Avenue into Hillview Lane	8	4	1.63
From Hillview Lane west into The Avenue	154	146	0.65
Through movement Hillview Lane at roundabout	23	1	6.35
From Hillview Lane West into Lakeside Road	10	13	0.88
Northbound through movement on Shaftsbury Road at intersection with Glen Street	508	464	2.00
Right into Glen Street from Shaftsbury Road	73	113	4.15
Left into Glen Street from Shaftsbury Road	46	69	3.03
Southbound through on Shaftsbury Road at the intersection with Glen Street	229	206	1.56
Left into Shaftsbury Road from Glen Street	97	81	1.70
Right into Shaftsbury Road from Glen Street	114	122	0.74
Left into Rowe Street West from Shaftsbury Road	18	4	4.22
Northbound through Movement on Shaftsbury Road at intersection with Rowe Street	438	385	2.61
Left into Shaftsbury Road from Rowe Street West	20	39	3.50
Right into Shaftsbury Road from Rowe Street West	11	6	1.71
Southbound through movement on Shaftsbury Road at Rowe Street	311	232	4.79
Right from Shaftsbury Road into Rowe Street West	7	3	1.79
Left from Rowe Street East into Shaftsbury Road	95	71	2.63
Through from Rowe Street East to Rowe Street West	64	71	0.85
Right from Rowe Street east into Shaftsbury Road	122	167	3.74
Left from Rutledge Street into Shaftsbury Road	36	111	8.75
Eastbound through movement on Rutledge Street at the intersection with Shaftsbury Road	781	774	0.25
Left from Shaftsbury Road into Rutledge Street east	180	119	4.99
Southbound through movement on Shaftsbury Road at the intersection of Rutledge Street	166	162	0.31
Right from Shaftsbury Road into Rutledge Street west	49	49	0.00
Left from Rutledge Street east into Shaftsbury Road	42	114	8.15
Westbound through movement on Rutledge Street at the intersection with Shaftsbury Road	893	818	2.56
Right from Rutledge Street east into Shaftsbury Road	181	156	1.93
Left from Shaftsbury Road south into Rutledge Street	6	6	0.00
Northbound through movement on Shaftsbury Road at the intersection with Rutledge	162	273	7.53
Right from Shaftsbury Road south into Rutledge Street	89	91	0.21
Left from Trelawney Street into Rowe Street	222	186	2.52

Description	PM Count	MODELLED	GEH
Right from Trelawney Street into Rowe Street	359	334	1.34
Left from Rowe Street into Trelawney Street	252	283	1.90
Westbound through movement on Rowe Street at the intersection of Trelawney Street	59	81	2.63
Left from Trelawney Street south into Rutledge Street	3	15	4.00
Northbound through movement on Trelawney Street at Rutledge Street	26	11	3.49
Right from Trelawney Street into Rutledge Street east	65	33	4.57
Left from Rutledge Street into Trelawney Street North	96	79	1.82
Rutledge Street eastbound through at Trelawney Street	1021	895	4.07
Right from Rutledge Street west into Trelawney Street	442	29	26.91
Left into Rutledge Street from Trelawney Street north	232	359	7.39
Southbound through movement on Trelawney Street at the intersection with Rutledge Street	30	12	3.93
Right from Trelawney Street north in Rutledge Street	40	17	4.31
Left from Rutledge Street East into Trelawney Street	189	149	3.08
Westbound through movement on Rutledge Street at Trelawney Street	1221	1056	4.89
Right from Rutledge Street east into Trelawney Street	442	451	0.43
Left from Hillview Road West into Lakeside Road	45	5	8.00
Eastbound through movement on Hillview Road at roundabout	28	20	1.63
Right from Hillview Road West into Lakeside Road	13	21	1.94
Left from Lakeside Road north into Hillview Lane east	39	14	4.86
Southbound through movement on Lakeside Road at roundabout with Hillview Road	151	150	0.08
Right from Lakeside Road north into Hillview Road	30	30	0.00
Left from Hillview Road east into Lakeside Road	96	115	1.85
Westbound through movement onto Hillview Road at roundabout with Lakeside Road	91	55	4.21
Right from Hillview Road East into Lakeside Road	138	54	8.57
Left from Lakeside Road south into Hillview Road	17	28	2.32
Northbound through movement on Lakeside Road at roundabout with Hillview Road	156	169	1.02
Right from Lakeside Road south into Hillview Road	46	174	12.20
Left from Glen Street into Lakeside Road	78	158	7.36
Right from Glen Street into Lakeside Road	53	5	10.30
Southbound through movement on Lakeside Road at Glen Street	112	145	2.91
Right turn into Glen Street from Lakeside Road north	58	88	3.51
Left into Glen Street from Lakeside Road	108	129	1.93
Northbound through movement on Lakeside Road at Glen Street	223	221	0.13
Northbound West Parade north of Hillview Lane	386	380	0.31
Southbound West parade south of Hillview Road	144	323	11.71
Left from Hillview Lane into West Parade	59	34	3.67
Right from Hillview Lane into West Parade	139	108	2.79
Left into West Parade from Rutledge Street west	46	10	6.80
Eastbound Through movement on Rutledge Street at the intersection with West Parade	1365	1277	2.42
Left from West Parade North into Rutledge Street	473	337	6.76
Westbound through movement on Rutledge Street at the intersection with West Parade	1851	1656	4.66
Left from West Parade South into Rutledge Street	12	1	4.90

Description	PM Count	MODELLED	GEH
Left from West Parade south into Clanalpine Street	26	11	3.49
Northbound through movement on West Parade at Clanalpine Street	334	351	0.92
Left from Clanalpine Street into West Parade	104	84	2.06
Right from Clanalpine Street into West Parade	27	23	0.80
Southbound through movement on West Parade at the intersection with Clanalpine Street	179	143	2.84
Right from West Parade into Clanalpine Street	33	14	3.92
Northbound through movement on East Parade at the intersection with Rowe Lane	371	384	0.67
Right turn from East Parade into Rowe Lane	15	3	4.00
Left into Rowe Lane from East Parade	11	3	3.02
Southbound through movement on East Parade at Rowe Lane	261	227	2.18
Left from Rowe Lane into East Parade	58	32	3.88
Right from Rowe Lane into East Parade	4	5	0.47
Southbound on Blaxland Road north of Rowe Lane	1219	1123	2.81
Left in to Rowe Lane from Blaxland Road	24	20	0.85
Northbound on Blaxland Road south of Rowe Lane	1309	1411	2.77
Left from East Parade south into Rutledge Street	224	224	0.00
East Parade Northbound at the intersection with First Avenue	59	58	0.13
Right from East Parade South into First Avenue	11	12	0.29
Left from Rutledge Street (west) into East Parade	378	312	3.55
Eastbound through movement on First Avenue at the intersection with East Parade	1036	1163	3.83
Right turn from Rutledge Street into East Parade south	133	139	0.51
Left from East Parade North into First Avenue	57	55	0.27
Southbound through movement on East Parade at the intersection with First Avenue	122	125	0.27
Right turn from East Parade north into Rutledge Street	234	145	6.47
Left from First Avenue (east) into East Parade	22	16	1.38
Westbound through movement on First Avenue at the intersection of East Parade	1447	1288	4.30
Right turn from First Avenue into East Parade north	37	15	4.31
Left turn into Ball Avenue from Blaxland Road	7	1	3.74
Northbound through movement on Blaxland Road at the intersection with Balaclava Road	818	791	0.95
Right turn from Blaxland Road into Balaclava Road	722	605	4.54
Left turn into Balaclava Road from Blaxland Road	61	61	0.00
Southbound through movement on Blaxland Road at the intersection of Balaclava Road	466	466	0.00
Left from Balaclava Road into Blaxland Road	1005	782	7.46
From Balaclava Road into Ball Avenue	57	0	10.68
Right turn from Balaclava Road into Blaxland Road	455	374	3.98
Left from Wingate Avenue into West Parade	6	5	0.43
Right from Wingate Avenue into West Parade	58	58	0.00
Southbound through movement on West Parade at the intersection with Wingate Avenue	209	209	0.00
Right turn from West Parade into Wingate Avenue	11	8	0.97
Left into Wingate Avenue from West Parade	78	79	0.11
Northbound through movement on West Parade at the intersection with Wingate Avenue	275	206	4.45
Left from May Street into Blaxland Road	231	9	20.27
Right from May Street into Blaxland Road	48	87	4.75

Description	PM Count	MODELLED	GEH
Southbound through movement on Blaxland Road at May Street	1235	1070	4.86
Right turn into May Street from Blaxland Road	216	40	15.56
Left into May Street from Blaxland Road	20	21	0.22
Northbound through movement on Blaxland Road at May Street	1321	1386	1.77

Appendix C

SIDRA Outputs

Intersection Performance with Option 1 (0%)

Intersection No.	Intersection	Intersection Control	Option 1 AM Peak - Bus Lanes FULL					Option 1 PM Peak - Bus Lanes FULL				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.516	25.1	B	24	4	0.960	80.5	F	165	28
2	Shaftsbury / Rowe	Traffic Signals	0.373	19.3	B	70	12	0.626	25.1	B	83	14
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	56.1	D	>500	>83	>1.000	116.1	F	405	68
4	Trelawney / Rowe	Give Way (E-W)	0.389	11.3	A	19	3	0.745	18.4	B	82	14
5	Trelawney / Rutledge	Traffic Signals	>1.000	31.5	C	298	50	0.792	26.0	B	246	41
6	Hillview Rd / Lakeside	Roundabout	0.341	9.3	A	20	3	0.243	9.4	A	14	2
7	Lakeside / Glen	Give Way (N-S)	0.569	15.7	B	45	8	0.441	14.8	B	23	4
10	West Pde / Hillview Rd	Give Way (N-S)	0.420	6.0	A	31	5	0.306	8.9	A	15	3
11	West Pde / Hillview Ln	Give Way (N-S)	0.409	23.2	B	18	3	0.245	16.2	B	9	2
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.203	16.4	B	36	6	0.089	16.6	B	15	3
12	Rutledge / West Pde Ramp	Give Way (N-S)	1.000	>120	F	129	22	1.000	>120	F	62	10
13	Clanalpine / West Pde	Give Way (N-S)	0.400	11.5	A	20	3	0.240	11.7	A	8	1
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.175	4.3	A	16	3	0.171	1.0	A	11	2
15	Blaxland / Rowe Ln	Give Way (N-S)	0.519	29.4	C	19	3	0.246	27.7	B	7	1
16	Rutledge / East Pde / First Ave (1 northern approach lanes plus bus priority)	Traffic Signals	0.816	35.6	C	218	36	0.807	26.3	B	197	33
16a	Rutledge / East Pde / First Ave (2 northern approach lanes plus bus priority)	Traffic Signals	0.871	38.9	C	232	39	0.807	26.4	B	197	33
17	Blaxland / Balaclava (no bus priority)	Traffic Signals	0.927	47.7	D	338	56	0.814	30.2	C	190	32
17a	Blaxland / Balaclava (bus lane in Ball Ave)	Traffic Signals	0.937	47.4	D	384	64	0.880	34.6	C	195	33
18	West Pde / Wingate	Give Way (N-S)	0.521	26.5	B	24	4	0.187	15.9	B	6	1
19	Blaxland / May	Traffic Signals	0.622	10.5	A	132	22	0.538	6.1	A	80	13
20	Blaxland / Rowe St	Give Way (N-S)	0.511	24.8	B	20	3	0.380	29.7	C	12	2
21	Railway Pde / Rowe St	Roundabout	0.253	5.1	A	13	2	0.292	6.9	A	15	3
22	Blaxland / First	Traffic Signals	>1.000	22.7	B	106	18	>1.000	24.0	B	120	20
23	May / Ball	Give Way (E-W)	0.410	14.2	A	22	4	0.097	12.1	A	3	1
24	Lakeside / Progress	Roundabout	0.280	8.4	A	14	2	0.311	9.9	A	16	3

Intersection Performance with Option 1 (-20%)

Intersection No.	Intersection	Intersection Control	Option 1 AM Peak - Bus Lanes FULL					Option 1 PM Peak - Bus Lanes FULL				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.407	20.8	B	17	3	0.807	36.8	C	73	12
2	Shaftsbury / Rowe	Traffic Signals	0.364	19.0	B	68	11	0.618	24.4	B	80	13
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	54.1	D	>500	>83	>1.000	68.4	E	259	43
4	Trelawney / Rowe	Give Way (E-W)	0.360	10.8	A	16	3	0.717	17.1	B	75	13
5	Trelawney / Rutledge	Traffic Signals	1.000	33.7	C	317	53	0.789	24.5	B	227	38
6	Hillview Rd / Lakeside	Roundabout	0.308	8.9	A	18	3	0.227	9.0	A	12	2
7	Lakeside / Glen	Give Way (N-S)	0.470	13.4	A	32	5	0.224	5.8	A	13	2
10	West Pde / Hillview Rd	Give Way (N-S)	0.413	6.1	A	31	5	0.280	9.1	A	13	2
11	West Pde / Hillview Ln	Give Way (N-S)	0.315	19.2	B	12	2	0.210	15.5	B	7	1
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.181	14.5	B	29	5	0.077	15.4	B	12	2
12	Rutledge / West Pde Ramp	Give Way (N-S)	1.000	>120	F	135	23	1.000	>120	F	62	10
13	Clanalpine / West Pde	Give Way (N-S)	0.362	11.2	A	15	3	0.185	11.8	A	6	1
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.170	3.9	A	15	3	0.164	0.9	A	10	2
15	Blaxland / Rowe Ln	Give Way (N-S)	0.526	30.9	C	19	3	0.192	27.4	B	5	1
16	Rutledge / East Pde / First Ave (1 northern approach lanes plus bus priority)	Traffic Signals	0.822	32.3	C	213	36	0.797	24.5	B	180	30
16	Rutledge / East Pde / First Ave (2 northern approach lanes plus bus priority)	Traffic Signals	0.857	35.4	C	223	37	0.797	24.7	B	180	30
17	Blaxland / Balaclava (no bus priority)	Traffic Signals	0.919	45.7	D	323	54	0.897	27.9	B	164	27
17	Blaxland / Balaclava (bus lane in Ball Ave)	Traffic Signals	0.935	46.6	D	393	66	0.897	27.9	B	164	27
18	West Pde / Wingate	Give Way (N-S)	0.479	24.6	B	21	4	0.163	15.3	B	6	1
19	Blaxland / May	Traffic Signals	0.633	12.8	A	126	21	0.517	5.4	A	68	11
20	Blaxland / Rowe St	Give Way (N-S)	0.517	25.8	B	20	3	0.192	27.5	B	5	1
21	Railway Pde / Rowe St	Roundabout	0.248	5.0	A	13	2	0.252	6.7	A	14	2
22	Blaxland / First	Traffic Signals	>1.000	22.7	B	106	18	>1.000	24.1	B	107	18
23	May / Ball	Give Way (E-W)	0.395	15.8	B	20	3	0.106	4.1	A	0	0
24	Lakeside / Progress	Roundabout	0.255	8.1	A	13	2	0.283	9.6	A	15	3

Intersection Performance with Option 1A (0%)

Intersection No.	Intersection	Intersection Control	Option 1a AM Peak - Bus Lanes SEGMENT					Option 1a PM Peak - Bus Lanes SEGMENT				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.542	26.6	B	26	4	0.966	84.4	F	173	58
2	Shaftsbury / Rowe	Traffic Signals	0.371	19.3	B	69	12	0.626	25.2	B	43	14
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	55.4	D	>500	>83	>1.000	117.2	F	411	137
4	Trelawney / Rowe	Give Way (E-W)	0.388	11.3	A	19	3	0.745	18.4	B	81	27
5	Trelawney / Rutledge	Traffic Signals	>1.000	34.4	C	287	48	0.817	26.4	B	251	84
6	Hillview Rd / Lakeside	Roundabout	0.343	9.4	A	20	3	0.242	9.4	A	13	4
7	Lakeside / Glen	Give Way (N-S)	0.566	15.5	B	45	8	0.236	5.9	A	13	4
10	West Pde / Hillview Rd	Give Way (N-S)	0.420	6.0	A	31	5	0.309	9.1	A	15	5
11	West Pde / Hillview Ln	Give Way (N-S)	0.427	24.3	B	19	3	0.244	16.1	B	9	3
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.204	16.6	B	37	6	0.088	16.6	B	14	5
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	96	16	1.000	>120	F	>500	>83
13	Clanalpine / West Pde	Give Way (N-S)	0.411	11.6	A	21	4	0.233	11.7	A	8	3
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.208	4.4	A	19	3	0.198	1.0	A	13	4
15	Blaxland / Rowe Ln	Give Way (N-S)	0.452	27.9	B	16	3	0.183	28.7	C	5	2
16	Rutledge / East Pde / First Ave (1 northern approach lanes plus bus priority)	Traffic Signals	0.891	40.2	C	235	39	0.867	31.5	C	228	76
16a	Rutledge / East Pde / First Ave (2 northern approach lanes plus bus priority)	Traffic Signals	0.904	44.7	D	264	44	0.840	30.4	C	226	75
17	Blaxland / Balaclava (no bus priority)	Traffic Signals	0.927	49.5	D	366	61	0.817	30.0	C	181	60
17a	Blaxland / Balaclava (bus lane in Ball Ave)	Traffic Signals	0.945	51.3	D	428	71	0.884	34.6	C	179	60
18	West Pde / Wingate	Give Way (N-S)	0.521	26.5	B	24	4	0.187	15.9	B	6	2
19	Blaxland / May	Traffic Signals	0.624	10.5	A	132	22	0.522	5.4	A	70	23
20	Blaxland / Rowe St	Give Way (N-S)	0.469	24.6	B	18	3	0.304	32.4	C	9	3
21	Railway Pde / Rowe St	Roundabout	0.248	5.5	A	14	2	0.268	6.6	A	15	5
22	Blaxland / First	Traffic Signals	>1.000	22.8	B	106	18	>1.000	24.4	B	111	37
23	May / Ball	Give Way (E-W)	0.387	13.6	A	19	3	0.094	12.0	A	3	1
24	Lakeside / Progress	Roundabout	0.279	8.4	A	14	2	0.313	9.9	A	16	5

Intersection Performance with Option 1A (-20%)

Intersection No.	Intersection	Intersection Control	Option 1a AM Peak - Bus Lanes SEGMENT					Option 1a PM Peak - Bus Lanes SEGMENT				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.416	21.1	B	18	3	0.811	37.3	C	74	12
2	Shaftsbury / Rowe	Traffic Signals	0.370	19.1	B	69	12	0.609	24.4	B	80	13
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	53.9	D	>500	>83	>1.000	708.8	F	259	43
4	Trelawney / Rowe	Give Way (E-W)	0.370	10.8	A	17	3	0.743	17.9	B	83	14
5	Trelawney / Rutledge	Traffic Signals	1.000	39.1	C	346	58	0.817	25.2	B	234	39
6	Hillview Rd / Lakeside	Roundabout	0.310	9.0	A	18	3	0.219	8.2	A	12	2
7	Lakeside / Glen	Give Way (N-S)	0.470	13.4	A	32	5	0.229	5.9	A	13	2
10	West Pde / Hillview Rd	Give Way (N-S)	0.410	6.0	A	30	5	0.282	9.1	A	13	2
11	West Pde / Hillview Ln	Give Way (N-S)	0.320	19.6	B	13	2	0.202	15.3	B	7	1
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.183	14.5	B	29	5	0.076	14.7	B	11	2
12	Rutledge / West Pde Ramp	Give Way (N-S)	1.000	>120	F	62	10	1.000	>120	F	62	10
13	Clanalpine / West Pde	Give Way (N-S)	0.372	11.4	A	17	3	0.186	11.8	A	6	1
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.192	4.3	A	17	3	0.176	1.1	A	11	2
15	Blaxland / Rowe Ln	Give Way (N-S)	0.423	27.7	B	14	2	0.137	27.7	B	4	1
16	Rutledge / East Pde / First Ave (1 northern approach lanes plus bus priority)	Traffic Signals	0.897	36.0	C	225	38	0.904	27.2	B	192	32
16a	Rutledge / East Pde / First Ave (2 northern approach lanes plus bus priority)	Traffic Signals	0.939	45.0	D	273	46	0.871	27.2	B	193	32
17	Blaxland / Balaclava (no bus priority)	Traffic Signals	0.920	47.6	D	352	59	0.909	28.7	C	155	26
17a	Blaxland / Balaclava (bus lane in Ball Ave)	Traffic Signals	0.939	49.7	D	420	70	0.902	28.4	B	164	27
18	West Pde / Wingate	Give Way (N-S)	0.479	24.6	B	21	4	0.163	15.4	B	6	1
19	Blaxland / May	Traffic Signals	0.631	10.4	A	123	21	0.510	4.9	A	61	10
20	Blaxland / Rowe St	Give Way (N-S)	0.421	27.7	B	14	2	0.143	27.9	B	4	1
21	Railway Pde / Rowe St	Roundabout	0.269	5.0	A	14	2	0.256	6.3	A	14	2
22	Blaxland / First	Traffic Signals	>1.000	23.0	B	106	18	>1.000	24.6	B	121	20
23	May / Ball	Give Way (E-W)	0.328	13.5	A	14	2	0.094	12.3	A	3	1
24	Lakeside / Progress	Roundabout	0.260	8.1	A	13	2	0.285	9.6	A	15	3

Intersection Performance with Option 2 (0%)

Intersection No.	Intersection	Intersection Control	Option 2 AM Peak - Closure of The Avenue					Option 2 PM Peak - Closure of The Avenue				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.470	19.1	B	21	4	>1.000	>120	F	>500	>83
2	Shaftsbury / Rowe	Traffic Signals	1.000	36.0	C	123	21	1.000	26.1	B	81	14
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	113.1	F	>500	>83	>1.000	>120	F	449	75
4	Trelawney / Rowe	Give Way (E-W)	0.330	8.3	A	15	3	0.395	8.3	A	19	3
5	Trelawney / Rutledge	Traffic Signals	>1.000	60.1	E	425	71	0.999	41.0	C	352	59
6	Hillview Rd / Lakeside	Roundabout	0.325	8.5	A	19	3	0.338	9.6	A	20	3
7	Lakeside / Glen	Give Way (N-S)	0.599	12.7	A	59	10	0.331	9.6	A	14	2
10	West Pde / Hillview Rd	Give Way (N-S)	0.339	2.0	A	25	4	0.249	5.4	A	14	2
11	West Pde / Hillview Ln	Give Way (N-S)	0.716	43.1	D	45	8	0.941	>120	F	75	13
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.214	8.5	A	22	4	0.231	15.6	B	39	7
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	>500	>83	0.951	74.6	F	99	17
13	Clanalpine / West Pde	Give Way (N-S)	0.372	12.1	A	17	3	0.422	13.7	A	21	4
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.056	14.5	B	2	0	0.169	0.9	A	11	2
15	Blaxland / Rowe Ln	Give Way (N-S)	>1.000	>120	F	184	31	0.180	26.5	B	5	1
16	Rutledge / East Pde / First Ave	Traffic Signals	0.805	23.6	B	177	30	0.861	28.7	C	236	39
17	Blaxland / Balaclava	Traffic Signals	0.933	50.0	D	380	63	0.905	28.6	C	155	26
18	West Pde / Wingate	Give Way (N-S)	0.499	25.2	B	23	4	0.174	15.0	B	6	1
19	Blaxland / May	Traffic Signals	0.663	10.4	A	126	21	0.537	5.8	A	79	13
20	Blaxland / Rowe St	Give Way (N-S)	0.510	25.3	B	20	3	0.306	29.7	C	9	2
21	Railway Pde / Rowe St	Roundabout	0.271	5.7	A	16	3	0.260	6.6	A	15	3
22	Blaxland / First	Traffic Signals	>1.000	23.0	B	106	18	>1.000	24.9	B	128	21
23	May / Ball	Give Way (E-W)	0.391	13.7	A	20	3	0.093	12.0	A	3	1
24	Lakeside / Progress	Roundabout	0.110	7.7	A	5	1	0.123	9.8	A	6	1

Intersection Performance with Option 2 (-20%)

Intersection No.	Intersection	Intersection Control	Option 2 AM Peak - Closure of The Avenue					Option 2 PM Peak - Closure of The Avenue				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.678	14.9	B	70	12	>1.000	>120	F	420	70
2	Shaftsbury / Rowe	Traffic Signals	1.000	34.0	C	116	19	1.000	34.7	C	138	23
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	>120	F	>500	>83	>1.000	>120	F	>500	>83
4	Trelawney / Rowe	Give Way (E-W)	0.290	8.3	A	12	2	0.301	8.2	A	13	2
5	Trelawney / Rutledge	Traffic Signals	>1.000	36.6	C	363	61	0.804	23.9	B	225	38
6	Hillview Rd / Lakeside	Roundabout	0.319	8.7	A	18	3	0.238	8.9	A	13	2
7	Lakeside / Glen	Give Way (N-S)	0.575	11.7	A	52	9	0.208	9.0	A	8	1
10	West Pde / Hillview Rd	Give Way (N-S)	0.343	2.0	A	25	4	0.183	6.6	A	9	2
11	West Pde / Hillview Ln	Give Way (N-S)	0.463	27.7	B	21	4	0.596	43.5	D	25	4
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.208	8.2	A	20	3	0.079	13.6	A	11	2
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	>500	>83	0.427	75.0	F	11	2
13	Clanalpine / West Pde	Give Way (N-S)	0.339	11.7	A	14	2	0.436	13.4	A	22	4
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.204	4.4	A	19	3	0.160	1.1	A	10	2
15	Blaxland / Rowe Ln	Give Way (N-S)	0.476	29.2	C	17	3	0.142	25.6	B	4	1
16	Rutledge / East Pde / First Ave	Traffic Signals	0.789	22.0	B	172	29	0.867	24.3	B	188	31
17	Blaxland / Balaclava	Traffic Signals	0.923	49.9	D	361	60	0.819	30.6	C	187	31
18	West Pde / Wingate	Give Way (N-S)	0.464	23.8	B	21	4	0.135	1.4	A	9	2
19	Blaxland / May	Traffic Signals	0.620	10.2	A	129	22	0.537	5.9	A	83	14
20	Blaxland / Rowe St	Give Way (N-S)	0.488	25.2	B	19	3	0.240	28.0	B	7	1
21	Railway Pde / Rowe St	Roundabout	0.245	5.6	A	14	2	0.238	6.5	A	13	2
22	Blaxland / First	Traffic Signals	>1.000	23.1	B	106	18	>1.000	24.9	B	124	21
23	May / Ball	Give Way (E-W)	0.348	14.2	A	16	3	0.085	11.9	A	3	1
24	Lakeside / Progress	Roundabout	0.076	7.8	A	3	1	0.080	9.5	A	3	1

Intersection Performance with Option 3 (0%)

Intersection No.	Intersection	Intersection Control	Option 3 AM Peak - Extend Trelawney Street					Option 3 PM Peak - Extend Trelawney Street				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.372	16.6	B	15	3	>1.000	>120	F	375	63
2	Shaftsbury / Rowe	Traffic Signals	0.312	15.7	B	79	13	0.807	28.1	B	107	18
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	108.0	F	>500	>83	>1.000	101.2	F	>500	>83
4	Trelawney / Rowe	Give Way (E-W)	0.128	8.2	A	0	0	0.219	7.1	A	0	0
5	Trelawney / Rutledge	Traffic Signals	>1.000	43.0	D	429	72	0.822	25.4	B	220	37
6	Hillview Rd / Lakeside	Roundabout	0.322	8.3	A	16	3	0.280	10.7	A	16	3
7	Lakeside / Glen	Give Way (N-S)	0.429	14.5	A	25	4	0.202	4.6	A	11	2
10	West Pde / Hillview Rd	Give Way (N-S)	0.367	3.6	A	27	5	0.269	6.6	A	15	3
11	West Pde / Hillview Ln	Give Way (N-S)	0.311	15.5	B	12	2	0.395	24.1	B	16	3
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.161	10.1	A	18	3	0.075	14.4	A	11	2
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	>500	>83	>1.000	>120	F	>500	>83
13	Clanalpine / West Pde	Give Way (N-S)	0.295	11.8	A	11	2	0.226	11.9	A	8	1
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.056	14.6	B	2	0	0.047	10.1	A	1	0
15	Blaxland / Rowe Ln	Give Way (N-S)	0.510	29.0	C	18	3	0.503	36.3	C	17	3
16	Rutledge / East Pde / First Ave	Traffic Signals	0.814	24.4	B	195	33	0.867	26.1	B	210	35
17	Blaxland / Balaclava	Traffic Signals	0.930	49.8	D	373	62	0.832	30.2	C	176	29
18	West Pde / Wingate	Give Way (N-S)	0.497	25.0	B	23	4	0.185	15.7	B	6	1
19	Blaxland / May	Traffic Signals	0.661	10.4	A	125	21	0.517	5.3	A	63	11
20	Blaxland / Rowe St	Give Way (N-S)	0.525	25.5	B	21	4	0.665	39.3	C	27	5
21	Railway Pde / Rowe St	Roundabout	0.278	5.7	A	16	3	0.372	7.5	A	24	4
22	Blaxland / First	Traffic Signals	>1.000	23.0	B	106	18	>1.000	24.7	B	108	18
23	May / Ball	Give Way (E-W)	0.400	14.0	A	21	4	0.097	12.1	A	3	1
24	Lakeside / Progress	Roundabout	0.141	6.2	A	7	1	0.287	8.8	A	15	3

Intersection Performance with Option 3 (-20%)

Intersection No.	Intersection	Intersection Control	Option 3 AM Peak - Extend Trelawney Street					Option 3 PM Peak - Extend Trelawney Street				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.321	8.5	A	24	4	>1.000	>120.0	F	124	21
2	Shaftsbury / Rowe	Traffic Signals	0.300	15.8	B	76	13	0.881	28.7	C	104	17
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	112.9	F	>500	>83	>1.000	57.5	E	332	55
4	Trelawney / Rowe	Give Way (E-W)	0.131	8.1	A	0	0	0.214	6.9	A	0	0
5	Trelawney / Rutledge	Traffic Signals	1.000	42.2	C	409	68	0.792	23.4	B	199	33
6	Hillview Rd / Lakeside	Roundabout	0.248	7.8	A	13	2	0.310	9.5	A	18	3
7	Lakeside / Glen	Give Way (N-S)	0.312	13.1	A	14	2	0.268	9.7	A	10	2
10	West Pde / Hillview Rd	Give Way (N-S)	0.364	3.8	A	27	5	0.241	6.2	A	13	2
11	West Pde / Hillview Ln	Give Way (N-S)	0.272	14.4	A	10	2	0.331	22.3	B	13	2
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.133	9.6	A	14	2	0.082	11.7	A	10	2
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	>500	>83	>1.000	>120	F	>500	>83
13	Clanalpine / West Pde	Give Way (N-S)	0.277	11.7	A	10	2	0.184	12.0	A	6	1
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.160	4.3	A	14	2	0.043	10.2	A	1	0
15	Blaxland / Rowe Ln	Give Way (N-S)	0.495	29.5	C	17	3	0.153	29.5	C	4	1
16	Rutledge / East Pde / First Ave	Traffic Signals	0.819	22.8	B	189	32	0.867	24.8	B	188	31
17	Blaxland / Balaclava	Traffic Signals	0.930	50.4	D	377	63	0.834	30.5	C	185	31
18	West Pde / Wingate	Give Way (N-S)	0.460	23.5	B	20	3	0.164	15.4	B	6	1
19	Blaxland / May	Traffic Signals	0.623	10.2	A	131	22	0.520	5.2	A	64	11
20	Blaxland / Rowe St	Give Way (N-S)	0.497	25.3	B	19	3	0.245	33.1	C	7	1
21	Railway Pde / Rowe St	Roundabout	0.259	5.7	A	15	3	0.272	6.3	A	15	3
22	Blaxland / First	Traffic Signals	>1.000	23.2	B	106	18	>1.000	24.3	B	111	19
23	May / Ball	Give Way (E-W)	0.345	14.1	A	16	3	0.091	12.2	A	3	1
24	Lakeside / Progress	Roundabout	0.143	6.6	A	7	1	0.273	8.6	A	14	2

Intersection Performance with Option 4 (0%)

Intersection No.	Intersection	Intersection Control	Option 4 AM Peak - 2 way Hillview Lane					Option 4 PM Peak - 2 way Hillview Lane				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.253	18.6	B	9	2	0.907	78.2	F	87	15
2	Shaftsbury / Rowe	Traffic Signals	0.309	15.0	B	78	13	0.677	26.1	B	88	15
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	108.0	F	>500	>83	>1.000	113.6	F	393	66
4	Trelawney / Rowe	Give Way (E-W)	0.428	11.4	A	23	4	0.694	16.0	B	71	12
5	Trelawney / Rutledge	Traffic Signals	>1.000	43.5	D	408	68	0.816	25.8	B	240	40
6	Hillview Rd / Lakeside	Roundabout	0.287	8.3	A	16	3	0.300	10.3	A	18	3
7	Lakeside / Glen	Give Way (N-S)	0.468	15.7	B	29	5	0.257	9.6	A	10	2
10	West Pde / Hillview Rd	Give Way (N-S)	0.350	2.6	A	26	4	0.266	6.3	A	15	3
11	West Pde / Hillview Ln	Give Way (N-S)	0.329	16.3	B	13	2	0.446	27.0	B	19	3
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.163	9.3	A	17	3	0.104	12.6	A	14	2
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	>500	>83	>1.000	>120	F	>500	>83
13	Clanalpine / West Pde	Give Way (N-S)	0.291	11.8	A	11	2	0.232	12.2	A	8	1
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.056	14.6	B	2	0	0.047	10.1	A	1	0
15	Blaxland / Rowe Ln	Give Way (N-S)	0.515	29.2	C	19	3	0.386	33.6	C	12	2
16	Rutledge / East Pde / First Ave	Traffic Signals	0.811	24.4	B	195	33	0.867	26.5	B	210	35
17	Blaxland / Balaclava	Traffic Signals	0.929	49.7	D	371	62	0.828	30.4	C	175	29
18	West Pde / Wingate	Give Way (N-S)	0.499	25.1	B	23	4	0.186	15.8	B	6	1
19	Blaxland / May	Traffic Signals	0.640	10.3	A	127	21	0.523	4.9	A	58	10
20	Blaxland / Rowe St	Give Way (N-S)	0.525	25.5	B	21	4	0.572	37.2	C	20	3
21	Railway Pde / Rowe St	Roundabout	0.279	5.7	A	16	3	0.356	7.3	A	22	4
22	Blaxland / First	Traffic Signals	>1.000	23.0	B	106	18	>1.000	24.6	B	108	18
23	May / Ball	Give Way (E-W)	0.405	14.2	A	22	4	0.096	12.1	A	3	1
24	Lakeside / Progress	Roundabout	0.147	10.0	A	7	1	0.437	12.3	A	25	4

Intersection Performance with Option 4 (-20%)

Intersection No.	Intersection	Intersection Control	Option 4 AM Peak - 2 way Hillview Lane					Option 4 PM Peak - 2 way Hillview Lane				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.210	17.6	B	17	3	0.751	46.4	D	44	7
2	Shaftsbury / Rowe	Traffic Signals	0.282	14.4	A	75	13	0.796	26.1	B	87	15
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	106.0	F	>500	>83	>1.000	61.4	E	298	50
4	Trelawney / Rowe	Give Way (E-W)	0.418	11.1	A	22	4	0.718	16.5	B	79	13
5	Trelawney / Rutledge	Traffic Signals	>1.000	40.7	C	403	67	0.788	23.4	B	218	36
6	Hillview Rd / Lakeside	Roundabout	0.249	7.8	A	14	2	0.294	9.3	A	17	3
7	Lakeside / Glen	Give Way (N-S)	0.349	13.4	A	17	3	0.246	9.8	A	9	2
10	West Pde / Hillview Rd	Give Way (N-S)	0.346	2.9	A	26	4	0.241	6.2	A	13	2
11	West Pde / Hillview Ln	Give Way (N-S)	0.293	15.1	B	11	2	0.355	23.5	B	14	2
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.136	8.8	A	13	2	0.089	10.8	A	10	2
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	>500	>83	>1.000	>120	F	>500	>83
13	Clanalpine / West Pde	Give Way (N-S)	0.278	11.7	A	10	2	0.182	12.0	A	6	1
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.052	14.7	B	2	0	0.186	1.1	A	12	2
15	Blaxland / Rowe Ln	Give Way (N-S)	0.499	29.6	C	18	3	0.173	30.1	C	5	1
16	Rutledge / East Pde / First Ave	Traffic Signals	0.822	22.9	B	190	32	0.867	24.8	B	188	31
17	Blaxland / Balaclava	Traffic Signals	0.929	50.3	D	375	63	0.828	30.4	C	184	31
18	West Pde / Wingate	Give Way (N-S)	0.461	23.6	B	20	3	0.164	15.4	B	6	1
19	Blaxland / May	Traffic Signals	0.623	10.4	A	131	22	0.520	5.1	A	64	11
20	Blaxland / Rowe St	Give Way (N-S)	0.501	25.4	B	19	3	0.293	33.9	C	9	2
21	Railway Pde / Rowe St	Roundabout	0.259	5.7	A	15	3	0.273	6.4	A	16	3
22	Blaxland / First	Traffic Signals	>1.000	23.2	B	106	18	>1.000	24.3	B	111	19
23	May / Ball	Give Way (E-W)	0.351	14.3	A	16	3	0.091	12.2	A	3	1
24	Lakeside / Progress	Roundabout	0.156	6.7	A	7	1	0.153	12.0	A	7	1

Intersection Performance with Option 5 (0%)

Intersection No.	Intersection	Intersection Control	Option 5 AM Peak - Right Turn at Trelawney					Option 5 PM Peak - Right Turn at Trelawney				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.384	9.6	A	31	5	>1.000	>120	F	>500	>83
2	Shaftsbury / Rowe	Traffic Signals	0.324	18.3	B	69	12	0.711	26.3	B	90	15
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	105.8	F	>500	>83	>1.000	112.9	F	>500	>83
4	Trelawney / Rowe	Give Way (E-W)	0.732	17.7	B	81	14	0.711	16.4	B	76	13
5	Trelawney / Rutledge	Traffic Signals	0.768	20.9	B	159	27	0.816	25.5	B	237	40
6	Hillview Rd / Lakeside	Roundabout	0.316	8.4	A	18	3	0.311	10.3	A	18	3
7	Lakeside / Glen	Give Way (N-S)	0.939	53.4	D	161	27	0.284	10.0	A	11	2
10	West Pde / Hillview Rd	Give Way (N-S)	0.371	3.8	A	26	4	0.225	7.6	A	11	2
11	West Pde / Hillview Ln	Give Way (N-S)	0.358	16.0	B	16	3	0.448	27.3	B	19	3
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.185	10.6	A	22	4	0.107	13.6	A	15	3
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	>500	>83	>1.000	>120	F	>500	>83
13	Clanalpine / West Pde	Give Way (N-S)	0.207	11.9	A	7	1	0.228	12.2	A	8	1
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.056	14.6	B	2	0	0.047	10.1	A	1	0
15	Blaxland / Rowe Ln	Give Way (N-S)	0.454	28.1	B	16	3	0.390	33.6	C	12	2
16	Rutledge / East Pde / First Ave	Traffic Signals	0.788	23.5	B	165	28	0.848	26.5	B	217	36
17	Blaxland / Balaclava	Traffic Signals	0.931	49.9	D	376	63	0.834	30.2	C	173	29
18	West Pde / Wingate	Give Way (N-S)	0.504	25.4	B	23	4	0.186	15.8	B	6	1
19	Blaxland / May	Traffic Signals	0.661	10.6	A	125	21	0.525	5.4	A	64	11
20	Blaxland / Rowe St	Give Way (N-S)	0.498	25.1	B	19	3	0.658	39.8	C	26	4
21	Railway Pde / Rowe St	Roundabout	0.256	5.5	A	15	3	0.364	7.4	A	23	4
22	Blaxland / First	Traffic Signals	>1.000	22.9	B	106	18	>1.000	24.7	B	107	18
23	May / Ball	Give Way (E-W)	0.382	13.4	A	19	3	0.097	12.1	A	3	1
24	Lakeside / Progress	Roundabout	0.220	11.5	A	11	2	0.176	12.5	A	8	1

Intersection Performance with Option 5 (-20%)

Intersection No.	Intersection	Intersection Control	Option 5 AM Peak - Right Turn at Trelawney					Option 5 PM Peak - Right Turn at Trelawney				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.291	18.3	B	11	2	0.906	61.9	E	117	20
2	Shaftsbury / Rowe	Traffic Signals	0.273	15.7	B	64	11	0.805	26.5	B	88	15
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	49.3	D	439	73	>1.000	55.3	D	314	52
4	Trelawney / Rowe	Give Way (E-W)	0.689	16.4	B	70	12	0.717	16.4	B	79	13
5	Trelawney / Rutledge	Traffic Signals	0.731	19.3	B	145	24	0.783	23.7	B	216	36
6	Hillview Rd / Lakeside	Roundabout	0.314	8.4	A	18	3	0.302	9.5	A	18	3
7	Lakeside / Glen	Give Way (N-S)	0.796	28.4	B	81	14	0.218	6.0	A	12	2
10	West Pde / Hillview Rd	Give Way (N-S)	0.364	3.9	A	25	4	0.241	6.3	A	13	2
11	West Pde / Hillview Ln	Give Way (N-S)	0.285	14.0	A	11	2	0.349	23.4	B	14	2
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.178	10.4	A	21	4	0.097	11.8	A	12	2
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	>500	>83	>1.000	>120	F	>500	>83
13	Clanalpine / West Pde	Give Way (N-S)	0.194	12.0	A	7	1	0.146	12.1	A	5	1
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.052	14.7	B	2	0	0.187	1.1	A	12	2
15	Blaxland / Rowe Ln	Give Way (N-S)	0.385	27.2	B	13	2	0.167	29.9	C	5	1
16	Rutledge / East Pde / First Ave	Traffic Signals	0.784	22.7	B	168	28	0.871	24.8	B	188	31
17	Blaxland / Balaclava	Traffic Signals	0.977	49.3	D	427	71	0.831	30.6	C	191	32
18	West Pde / Wingate	Give Way (N-S)	0.471	24.2	B	21	4	0.164	15.4	B	6	1
19	Blaxland / May	Traffic Signals	0.655	10.4	A	123	21	0.522	5.1	A	64	11
20	Blaxland / Rowe St	Give Way (N-S)	0.483	25.1	B	18	3	0.277	33.7	C	8	1
21	Railway Pde / Rowe St	Roundabout	0.280	5.3	A	15	3	0.272	6.4	A	16	3
22	Blaxland / First	Traffic Signals	>1.000	23.0	B	106	18	>1.000	24.3	B	116	19
23	May / Ball	Give Way (E-W)	0.331	13.6	A	14	2	0.087	12.1	A	3	1
24	Lakeside / Progress	Roundabout	0.236	10.9	A	12	2	0.157	12.3	A	7	1

Intersection Performance with Option 6 (0%)

Intersection No.	Intersection	Intersection Control	Option 6 AM Peak - Left Turn into West Parade					Option 6 PM Peak - Left Turn into West Parade				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.276	18.5	B	10	2	>1.000	>120	F	344	>83
2	Shaftsbury / Rowe	Traffic Signals	0.318	14.8	B	79	13	0.828	26.2	B	93	16
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	108.0	F	>500	>83	>1.000	116.7	F	>500	>83
4	Trelawney / Rowe	Give Way (E-W)	0.424	11.4	A	23	4	0.679	15.4	B	67	11
5	Trelawney / Rutledge	Traffic Signals	0.821	20.0	B	207	35	0.803	23.4	B	212	35
6	Hillview Rd / Lakeside	Roundabout	0.289	8.4	A	16	3	0.273	11.5	A	16	3
7	Lakeside / Glen	Give Way (N-S)	0.455	15.5	B	27	5	0.252	9.6	A	10	2
10	West Pde / Hillview Rd	Give Way (N-S)	0.375	3.9	A	27	5	0.266	6.5	A	15	3
11	West Pde / Hillview Ln	Give Way (N-S)	0.318	16.1	B	13	2	0.428	26.1	B	18	3
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.163	10.7	A	20	3	0.103	14.9	B	16	3
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	>500	>83	>1.000	>120	F	27	>83
13	Clanalpine / West Pde	Give Way (N-S)	0.180	9.8	A	6	1	0.133	4.2	A	4	1
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.219	4.6	A	20	3	0.047	10.1	A	1	0
15	Blaxland / Rowe Ln	Give Way (N-S)	0.514	29.1	C	19	3	0.325	32.2	C	10	2
16	Rutledge / East Pde / First Ave	Traffic Signals	0.814	24.4	B	195	33	0.867	26.1	B	210	35
17	Blaxland / Balaclava	Traffic Signals	0.927	49.5	D	366	61	0.828	30.5	C	177	30
18	West Pde / Wingate	Give Way (N-S)	0.499	25.1	B	23	4	0.179	15.3	B	6	1
19	Blaxland / May	Traffic Signals	0.305	41.3	C	34	6	0.518	5.3	A	63	11
20	Blaxland / Rowe St	Give Way (N-S)	0.529	25.6	B	21	4	0.494	35.9	C	19	3
21	Railway Pde / Rowe St	Roundabout	0.279	5.7	A	17	3	0.334	7.1	A	20	3
22	Blaxland / First	Traffic Signals	>1.000	23.0	B	106	18	>1.000	24.5	B	110	18
23	May / Ball	Give Way (E-W)	0.406	14.2	A	22	4	0.096	12.1	A	3	1
24	Lakeside / Progress	Roundabout	0.144	10.0	A	7	1	0.242	10.0	A	12	2

Intersection Performance with Option 6 (-20%)

Intersection No.	Intersection	Intersection Control	Option 6 AM Peak - Left Turn into West Parade					Option 6 PM Peak - Left Turn into West Parade				
			Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)	Degree of Saturation	Delay (s)	Level of Service	Back of Queue (m)	Back of Queue (approximate no of cars assuming an average car length of 6m)
1	Shaftsbury / Glen	Give Way (N-S)	0.240	17.3	B	8	1	0.861	48.0	D	92	15
2	Shaftsbury / Rowe	Traffic Signals	0.291	14.1	A	76	13	0.778	25.7	B	84	14
3	Shaftsbury / Rutledge	Traffic Signals	>1.000	>120	F	>500	>83	>1.000	60.0	E	298	50
4	Trelawney / Rowe	Give Way (E-W)	0.401	10.8	A	20	3	0.641	14.3	A	58	10
5	Trelawney / Rutledge	Traffic Signals	0.861	21.8	B	243	41	0.784	21.8	B	190	32
6	Hillview Rd / Lakeside	Roundabout	0.244	7.8	A	13	2	0.239	11.0	A	13	2
7	Lakeside / Glen	Give Way (N-S)	0.337	12.9	A	17	3	0.213	9.4	A	8	1
10	West Pde / Hillview Rd	Give Way (N-S)	0.372	4.2	A	27	5	0.243	6.7	A	13	2
11	West Pde / Hillview Ln	Give Way (N-S)	0.278	14.9	B	10	2	0.327	22.2	B	13	2
11a	Hillview Rd / Coolgun	Give Way (N-S)	0.137	10.0	A	15	3	0.090	14.0	A	13	2
12	Rutledge / West Pde Ramp	Give Way (N-S)	>1.000	>120	F	>500	>83	>1.000	>120	F	172	29
13	Clanalpine / West Pde	Give Way (N-S)	0.175	10.2	A	6	1	0.044	12.5	A	1	0
14	Railway Pde / Rowe Ln	Give Way (N-S)	0.053	14.5	B	2	0	0.042	10.2	A	1	0
15	Blaxland / Rowe Ln	Give Way (N-S)	0.495	29.5	C	17	3	0.159	29.5	C	4	1
16	Rutledge / East Pde / First Ave	Traffic Signals	0.815	22.0	B	179	30	0.868	24.8	B	189	32
17	Blaxland / Balaclava	Traffic Signals	0.927	50.2	D	370	62	0.811	29.8	C	245	41
18	West Pde / Wingate	Give Way (N-S)	0.463	23.7	B	21	4	0.156	14.9	B	5	1
19	Blaxland / May	Traffic Signals	0.639	10.3	A	128	21	0.519	5.1	A	63	11
20	Blaxland / Rowe St	Give Way (N-S)	0.500	25.3	B	19	3	0.278	33.3	C	8	1
21	Railway Pde / Rowe St	Roundabout	0.256	5.7	A	15	3	0.269	6.4	A	15	3
22	Blaxland / First	Traffic Signals	>1.000	23.2	B	106	18	>1.000	24.3	B	112	19
23	May / Ball	Give Way (E-W)	0.342	14.0	A	16	3	0.087	12.1	A	3	1
24	Lakeside / Progress	Roundabout	0.164	8.3	A	8	1	0.152	11.9	A	7	1

Appendix D

Engineering Action Plan

EASTWOOD TMAP ENGINEERING WORKS SCHEDULE

Item	Location	Treatment	Timeframe	Issue Addressed by Treatment				Cost	
				Pedestrians	Crashes	traffic/parking management	Through traffic	Item Description	Total
TRAFFIC									
T1	Hillview Road/West parade/exit from bus interchange	Roundabout	short term	✓		✓		roundabout	$100,000
T2	Hillview Lane between Shaftsbury Road and West Parade	Conversion of Hillview Lane to two way traffic	long term			✓	✓	Increase road from 5 metres to 11metre wide road for a length of 434 m. Land dedication and construction by developers	$1,000,000
T3	Rutledge Street/Trelawney Street/Clanalpine Street/West Parade	Direction Signposting to West Parade	short term			✓	✓	Signs	$4,000
T4	Rutledge Street at Trelawney Street intersection	Dedicated left turn lane along Rutledge Street (eastbound and westbound approach)	long term			✓	✓	Road widening (some 3 metres), signs, linemarking, traffic signals adjustments, relocation of mains and services (does not include costs associated with the purchasing of land to facilitate the dedicated left turn lane)	$566,000
T5	Intersection fo Glen Street and Shaftesbury Road	Install roundabout at Glen Street/Shaftesbury Road	short term		✓	✓	✓	roundabout	$105,000
TRAFFIC TOTAL									**$1,775,000**
PEDESTRIANS									
P1	• Trelawney Street between Rutledge Street and Rowe Street; • Rowe Street between Shaftsbury Road and The Avenue; • The Avenue between Rowe Street and Hillview Lane; • Progress Avenue between Hillview Lane and Hillview Road; • Lakeside Road between Hillview Lane and Hillview Road; • West Parade between Rutledge Street and Hillview Road; • Railway Parade between May Street and Rowe Street; • East Parade between Rowe Street and First Avenue; • Rowe Street between Blaxland Road and East Parade; • Hillview Road between Lakeside Road and West Parade.	Implementation of a 40 km/hr speed limit in Core CBD area	short term	✓	✓	✓	✓	Standard 40 km/h speed signs	$2,400
								Pedestrian activity plate	$2,400
								40 km/h pavement numerals (i.e. roads with painted speed limit numerals).	$6,240
P2	• The Avenue north of Trelawney Street • Lakeside Drive north of Hillview Lane • Lakeside Drive south of Glen Street • West Parade at Rowe Street mall • West parade at bus interchange • East Parade south of Ethel Street	Raised Marked Footcrossings	short term	✓	✓	✓	✓	Raised marked threshold	$72,000
P3	Across railway line linking Rowe Street	Pedestrian/Cycle overpass	medium term	✓				Pedestrian/cycleway bridge 3 metres wide	$324,000
P4	• Hillview Lane between Shaftsbury Road West Parade • Coolgun Lane between Hillview Road and Hillview Lane	Shared Zones	short term	✓	✓	✓		Shared zones	$20,000
P5	• Eastwood Railway Station; • East Parade at railway station access; • West Parade at railway Station access; • Rowe Street Mall at The Avenue; • Rowe Street Mall at West Parade; • Lakeside Road at Progress Avenue; • Rowe Street at Council Car Park; • Eastwood Shopping Centre; • Glen Street Car Park.	Wayfinding Signposting Strategy	short term	✓				Wayfinding signs	$10,000
P6	Coolgun Lane	Road widening of Lane	long term	✓		✓		Road widening 105m by 3 metres. Land dedication and construction by developers	$110,250
PEDESTRIANS TOTAL									**$547,290**
PUBLIC TRANSPORT									

EASTWOOD TMAP ENGINEERING WORKS SCHEDULE

PT1	West Parade at Rutledge Street northern approach	Bus Lane in West Parade	short term			✓		Bus Lane (cold applied) plus signs and markings	$12,250
PT2	Ball Avenue at Blaxland Road eastern approach	Bus Lane in Ball Avenue	short term			✓		Bus Lane (cold applied) plus signs and markings plus remove blister	$10,000
								Signal modifications	$15,000
PT3	Railway Parade at First Avenue northern approach	Bus Lane in Railway Parade	short term			✓	✓	Bus Lane (cold applied) plus signs and markings	$22,400
								Signal modifications	$15,000
PT4	• Rutledge Street northern side west of Trelawney Street; • Rutledge Street southern side west of Trelawney Street; • First Avenue northern side east of East Parade; • First Avenue southern side east of East Parade; • Railway Parade eastern side north of Rowe Street; • Railway Parade western side north of Rowe Street; • Ball Avenue west of Blaxland Road northern side; • Ball Avenue west of Blaxland Road southern side.	Bus Shelters	short term		✓	✓	✓	Bus shelter	$80,000
PT5	• RR01 - Hornsby to Strathfield Rail Trail • RR08 - Parramatta to Lane Cove • LR03 - Eastwood Station to Meadowbank • LR04 - Eadtwood Station to West Ryde Station	Bicycle Priority measures (pro-rata of costs to facilitate route implementation)	medium term			✓	✓	Signs, linemarking, civil improvements (intersection treatments)	$409,760
PUBLIC TRANSPORT TOTAL									**$564,410**
PARKING									
PK2	Glen Street Car Park	Glen Street Car Park implement 2 hour time limit as required	short term			✓		Signs	$1,500
PK3	East Parade western side between First Avenue and Rowe Street	90 degree parking spaces on the western side of East Parade between First Avenue and Rowe Street. to be formalised and	short term			✓	✓	Formalise parking	$87,500
PK4	• Rutledge Street at Trelawney Street • Rutledge Street at Shaftsbury Road • Shaftsbury Road at Glen Street	Directional signposting to Glen Street Car Park	short term			✓	✓	Signs	$10,000
PK5	• Rutledge Street at Trelawney Street • Rutledge Street at Shaftsbury Road • Shaftsbury Road at Glen Street	Parking Directional Signposting to other major public and private car parks in Eastwood	short term			✓	✓	Signs	$15,000
PK6	• Ball Avenue • May Street • Ethel Street • Rowe Street East • Rowe Street West • Lakeside Road • Wingate Avenue • East Parade • Glen Street	Linemarking of on street parking spaces within Eastwood Town Centre	medium term			✓		Signs and linemarking	$10,000
PK7	Rowe Street West	Motorcycle/Scooter Parking	short term			✓		Signs and linemarking	$1,500
PARKING TOTAL									**$125,500**
TOTAL									**$3,012,200**