

Hurstville City Council

**Hurstville City Centre
Traffic Study**

Draft Final Report

ARUP

Hurstville City Council

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Traffic Study**

Draft Final Report

May 2007

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Executive Summary

Arup was appointed by Hurstville City Council, to undertake a traffic study for Hurstville City Centre. The study is part of the ongoing development of a Master Plan for Hurstville City Centre.

A preferred traffic management option was developed through meetings with Council officers and Council's consultants, a stakeholder workshop and a councillors workshop. This took into account future conditions as a result of more intense land use development and general growth in traffic levels.

Preferred Traffic Management Option

One of the main criticisms raised about the Hurstville City Centre is the poor legibility of the road system. This, however, is associated more with movement within the city centre and searching for car parking. Accessibility to the city centre is quite good by car when you consider the various approach routes.

There has been mixed opinion about the present one-way treatment of Forest Road. The benefits can be listed as reducing the traffic flow to be predominantly local traffic, a slow traffic speed environment, increasing the footpath area and allowing parking on both sides of the road. Reinstating two-way traffic flow would increase traffic flow including the potential to attract westbound through traffic. The primary issue is what are the benefits of reintroducing two-way traffic. Forest Road between Queens Road and Rose Street provides access to on-street car parking and the small Palm Court car park. Attracting additional traffic into this section of Forest Road may cause congestion because there is limited car parking to access. The current one-way traffic arrangement in Forest Road is considered to provide the best balanced outcome.

Following consideration of a number of options, a preferred traffic management option was developed, as shown in Figure 13. The plan shows a functional road hierarchy consisting of main traffic routes, secondary traffic routes and other local routes.

Key features of the plan include:

- Retention of current one-way arrangement for Forest Road through the city centre.
- Bus interchange on Woodville Lane as previously proposed.
- Conversion of both The Avenue and Park Road from their current one-way traffic flow arrangements to two-way traffic flow. The Avenue would be designated as a main traffic route, catering mainly for through traffic, and Park Road as a secondary traffic route, catering mainly for local traffic. This road hierarchy would be reinforced by signage and intersection controls, including a 'no right turn' from Queens Road west into Park Road.
- Two-way traffic on The Avenue-Treacy Street between Forest Road and Railway Parade, including the widening of the Treacy Street underpass.
- Retention, in general, of the current traffic flow arrangements in the area bounded by Forest Road and Treacy Street. Detailed traffic analysis would be required to determine the optimum traffic management arrangements, in terms of intersection controls, right turn restrictions, one-way traffic, parking controls etc.
- A complimentary parking management strategy.

Recommendations

The preferred option provides a strategic road network framework to service the Hurstville City Centre as it continues to develop as the Regional Centre in Southern Sydney. It supports a number of the key infrastructure improvements already adopted and proposes further changes to traffic flows to improve traffic legibility and circulation.

The preferred option improves the permeability of the city centre traffic network and will help to reduce the perceived confusion of motorists and pedestrians travelling through the city centre especially for first time visitors. It will also improve the ability for public transport and private vehicles to circulate around the city centre.

Recommendations relating to a number of proposed infrastructure improvement projects are listed in the table below.

Proposed Infrastructure Improvement	Recommendation
Widening of Treacy Street Underpass	Recommended
Queens Road Underpass	Not recommended, at least in short to medium term
Reintroduction of "two way" traffic on Forest Road between Queens Road and Park Road	Not recommended
Reintroduction of two-way traffic on Park Road and The Avenue	Recommended, but no right turn from Queens Road into Park Road. Retain right turn from Queens Road into The Avenue
Widening of Lily Street Overpass	Recommended

1 INTRODUCTION

Arup was appointed by Hurstville City Council (HCC), to undertake a traffic study for Hurstville City Centre (refer to Figure 1). The study is part of the ongoing development of a Master Plan for Hurstville City Centre.

Two working papers were produced as part of this study:

- Working Paper 1 – Background Review and Summary of Existing Conditions (October 2006)
- Working Paper 2 – Proposed Traffic Management Scheme (December 2006)

Working Paper 2 was placed on public exhibition in early 2007. This final report presents a summary of Working Papers 1 & 2 and recommendations for the ongoing development of Hurstville City Centre.

The study area (Figure 1) takes in the Hurstville CBD and the surrounding road network for the purposes of addressing traffic movements. The area includes part of Kogarah Council area south of the railway line.

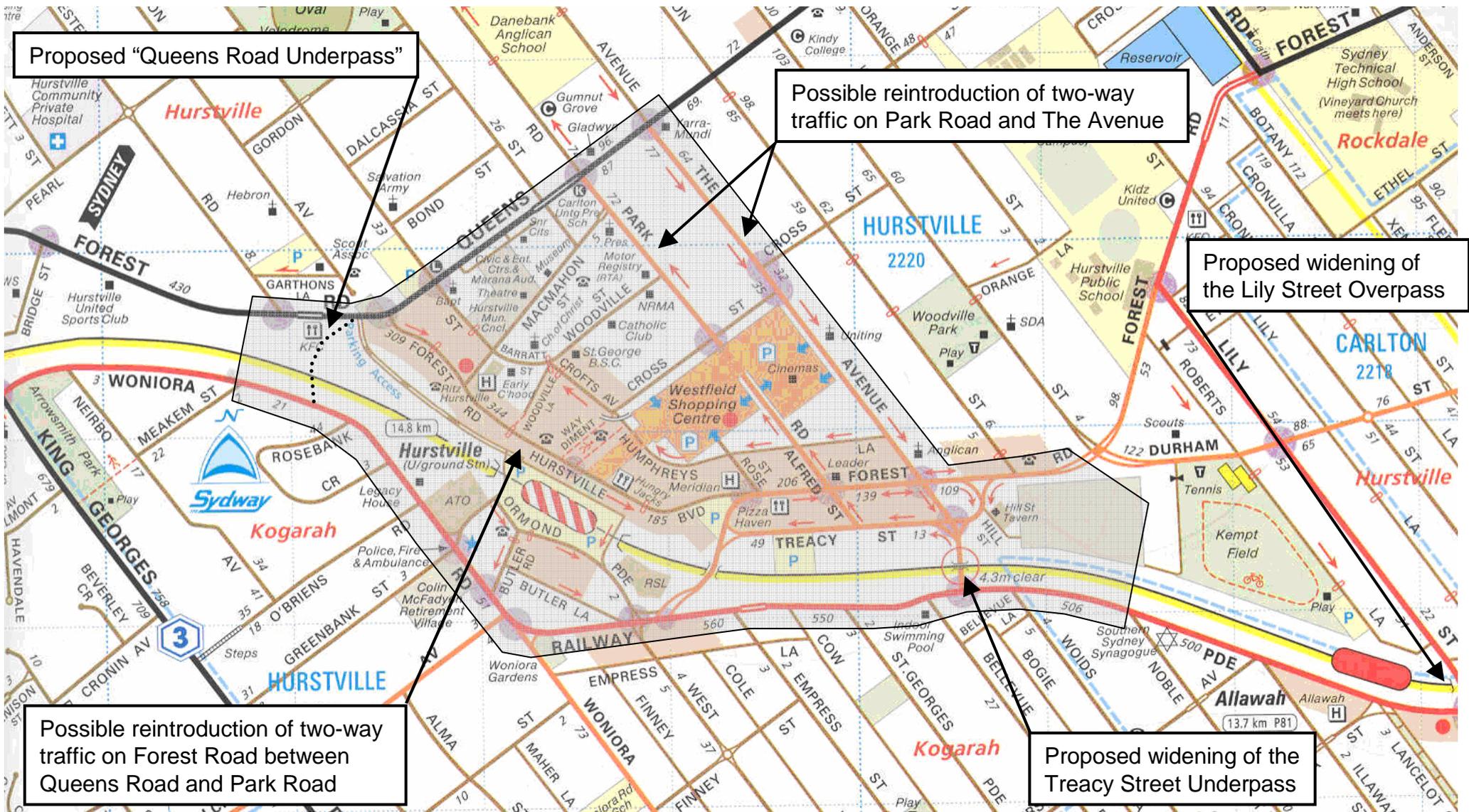
1.1 Background

In 2004, Hurstville Council adopted the Hurstville CBD Master Plan developed by the NSW Government Architect. The thrust of the master plan is to reinforce Hurstville's status as a Regional Centre and a 10 point strategy plan has been developed to guide improvements in public infrastructure and amenity. Many of these points relate to movement and circulation by all modes of transport and to car parking. This study is to provide a detailed assessment of these movement and circulation requirements to facilitate the adopted master plan.

In relation to traffic, a number of infrastructure improvement projects are being considered within the City Centre (refer to Figure 1):

- Proposed widening of the Treacy Street Underpass
- Proposed "Queens Road Underpass"
- Possible reintroduction of two-way traffic on Forest Road between Queens Road and Park Road
- Possible reintroduction of two-way traffic on Park Road and The Avenue
- Proposed widening of the Lily Street Overpass

These projects have been assessed as part of this study, as has the impacts of the proposed Civic Precinct development and other traffic generating developments proposals within the CBD.



1.2 Strategic Objectives

The brief (HCC, 3 May 2006) provides the following strategic objectives for the Traffic Network.

1. Improve the permeability of the CBD Traffic Network.
2. Reduce the perceived confusion of motorists and pedestrians through the CBD, especially for first time visitors to the CBD.
3. Improve the ability for public transport and private vehicles to circulate around the CBD.
4. Model the impact of the proposed infrastructure improvements detailed above.
5. Determine the optimum traffic arrangements for Forest Road between Queens Road and Park Road, i.e. one-way (eastbound), one-way (westbound), two-way, or closed to private vehicles.

1.3 Consultation

Consultation for this study has involved:

- meetings with Council officers and Council's consultants
- stakeholder workshop
- councillors workshop
- consultation with RTA regarding bus priority measures
- public exhibition of Working Paper 2

The various forms of consultation have been used to develop the proposed traffic management plan described later in this document.

1.3.1 Stakeholders Workshop

A stakeholder workshop was held on 23 October 2006. Stakeholders were present from:

- Council
- Chamber of Commerce
- St George Asian Business Association
- Kogarah Council
- Council's consultants
- Multiplex (East Quarter developers)

Arup presented a summary of existing transport conditions and preliminary options. Environmental Partnership presented a preliminary public domain strategy.

Specific issues that were discussed included:

- the merits of Forest Road one or two-way
- the possibility of reverting The Avenue and Park Road to two-way traffic flow
- the need to improve signage
- use of Hudson Street as a rat-run
- Kogarah Council's support for the proposed widening of the Treacy Street underpass and the proposed widening of the Lily Street overpass
- the merits of the proposed "Queens Road Underpass"

- the possibility of replacing bus zones with loading zones as part of the bus interchange project.

1.3.2 Councillors Workshop

A workshop for councillors was held on 8 November 2006. It was attended by a number of councillors and senior council staff. Arup presented a summary of existing conditions and preliminary options. Environmental Partnership presented a preliminary Public Domain strategy.

1.3.3 Public Exhibition

Comments received from the public and the RTA during the public exhibition period have been incorporated into the recommendations of this report,.

2 BACKGROUND REVIEW

2.1 Background Documents

A number of major transport studies for Hurstville have been undertaken over the last decade. The following background documents were reviewed:

1. *Hurstville Interchange – Option Selection Study*, 2005, Maunsell Pty Ltd
2. *Hurstville CBD Parking Strategy*, Draft Report 1.1, Nov 2004, Jacana Consulting Pty Ltd.
3. *St George Councils Regional Transport Strategy*, 2001, Transport Network Associates
4. *Traffic, Public Transport and Parking Strategy for Hurstville City CBD*, July 1999, Jacana Consulting Pty Ltd.
5. *Hurstville Town Centre, Traffic, Access & Parking*, June 1997, Arup for Revive Hurstville Group.

Relevant key points from the five reports are summarised below. **Note that the recommendations listed below are from the original reports and have not necessarily been adopted by Council or supported as part of this current traffic study.**

2.1.1 Hurstville Interchange – Option Selection Study, 2005

The report included the following key issues relevant to this traffic study:

- Woodville Lane is the recommended option (as included in Hurstville Concept Master Plan)
- the main cost component of the project is property acquisition
- the demand for bus services will increase in the future
- interchange design criteria includes: bus accessibility, opportunity for layover facilities, pedestrian access needs, co-location of activities (taxi, bike, kiss'n'ride), crime minimisation principles, LEP requirements, opportunities for future expansion

Recommendations of the report included:

- a bus lane on the southern side of Queens Road (Park-Dora) & west side of Park Road (Queens-MacMahon)
- a possible second station entrance northwest of the existing entrance, including a signalised pedestrian crossing of Forest Road opposite Woodville Lane
- consideration of the previously proposed Queens Road underpass (to develop ring road system around CBD – Queens Road, The Avenue, Railway Parade and Woniora Road)
- long term consideration of the proposed Hurstville – Strathfield rail link

Footnote: Woodville Lane has subsequently been adopted by Council as the preferred interchange option.

2.1.2 Hurstville CBD Parking Strategy, 2004

The report included the following key issues relevant to this traffic study:

- the overall parking supply is generally adequate. Town Centre DCP (1999) for parking could be amended with a reduction in parking required for city centre developments (one aim of this would be to encourage development)

- CBD core parking should be paid parking with a maximum 3 hour limit. Westfield should introduce paid parking (and possibly also Council car parks), with first 2 hours free. This would encourage people to use public transport (e.g. Westfield workers) and lead to increased turnover
- on-street paid parking is not recommended (but may possibly be warranted in medium to long term)
- the potential to increase use of public transport and reduce traffic congestion is dependent on limiting availability of all day free parking; Council may need to better manage all-day spaces to discourage commuter parking
- parking restrictions should be extended in CBD West – i.e. more spaces with time restrictions (CBD East is adequate); there is an abundance of unrestricted parking near the CBD
- off-street parking is very costly to provide and therefore should only be introduced when absolutely necessary. However, planning should be occurring for one new car park so it can be brought online when necessary. Potential sites include: The Avenue, Gloucester Road, MacMahon Street, Dora Street North and Treacy Street
- changes to bus zones, taxi zones, loading zones, particularly on Forest Road, will need to be considered as part of the bus interchange project

Footnote: Council is waiting on the outcomes of the traffic study before adopting a parking strategy.

2.1.3 St George Councils Regional Transport Strategy, 2001

The report included the following key issues relevant to this traffic study:

- the study was a broad regional study covering Hurstville, Kogarah and Rockdale LGAs
- the recent growth in cross-regional travel will continue
- the proposed Hurstville-Strathfield railway will lead to major change in employment and recreation opportunities

Road projects in the vicinity of Hurstville City Centre that were recommended included:

- Treacy Street underpass widening (medium term, \$5million @ 2001 costs)
- Queens Road – Woniora Road underpass (requires detailed assessment for medium-long term)

2.1.4 Traffic, Public Transport and Parking Strategy for Hurstville City CBD, 1999

The report included the following key issues relevant to this traffic study:

- there has been little deterioration in vehicle delays within Hurstville CBD over the period 1990-99
- there has been a decline in motor vehicle and pedestrian accidents over the period 1990-99
- since the one-way traffic management scheme was introduced to the CBD, access from the east - for cars, buses and taxis – has become more complex. Access from south has always been restricted due to two crossings of the rail line, both with limited capacity
- the report stated that it is often said that Hurstville is a “hard place to enter and even harder place to leave”

Eight traffic management options were developed as part of the study and tested:

- 1 Retaining existing Forest Road one way scheme
- 2 Two way traffic in Forest Road
- 3 Two way traffic in Forest Road between Park Road and Hill Street only
- 4 Treacy Street underpass widening
- 5 New railway underpass between Queens Road and Woniara Road
- 6 Five reverse one-way schemes in Forest Road
- 7 Grade separation at the intersections of Forest Road/Queens Road and Dora Street/Queens Road
- 8 Two modified options involving some of the above

Combinations of the above options were also tested.

Two way traffic in Forest Road was not recommended in the report because:

- a number of intersections would exceed capacity, particularly Forest Road/Queens Road, Forest Road/Forest Road/Treacy Street (roundabout) and Forest Road/Alfred Street, with accumulated delays doubling the travel time along the central section of Forest Road
- accessibility from the south and west would deteriorate significantly due to increased levels of congestions

Further modelling was undertaken of **two way traffic in Forest Road with grade separation** at the intersections of Forest Road/Queens Road and Dora Street/Queens Road and the railway underpass between Queens Road and Woniara Road. This resolved the intersection capacity problems but the modelling suggested that two-way traffic would result in an unacceptable influx of regional traffic, resulting in congestion, bus delays, loss of pedestrian pavement and amenity and loss of on-street parking.

Traffic management **recommendations of the report** included:

- CBD inner loop and ring road
- a one-way pair between Forest Road (central section) and Humphreys Lane
- two-way traffic in Forest Road between Hill Street and Park Road
- Railway Parade widening between Empress Street and Hillcrest Ave
- Queens Road – Woniara Road underpass
- Treacy Street underpass widening
- new bus interchange

2.1.5 Arup Study for Revive Hurstville Group, 1997

In 1997 Arup developed concept designs for revised traffic circulation routes, many of which would still be relevant today. Key observations included:

- the present layout of one-ways streets and street closures is confusing and inconvenient for unfamiliar drivers
- one-way streets have been configured to allow easy access/egress to the Westfield car park, to the detriment of the remainder of the CBD
- the overall number of parking spaces in the CBD is sufficient but they are not ideally located. There is also a shortage of easily accessible parking on Forest Road

- the bus stops and taxi rank on Forest Road have a significant impact on kerb space
- the road classification needs to be reviewed

A two-way traffic scheme for Forest Road was developed which included the use of Diment Way to improve circulation.

2.2 Transport Infrastructure Improvement Projects

There are a number of transport infrastructure projects proposed for Hurstville as listed in the brief and discussed below.

2.2.1 Hurstville Bus Interchange

Description of Project

- The proposed Hurstville Bus Interchange is described in Section 2.1.1. Woodville Lane is the preferred option.

Background

- Detailed options study undertaken in 2005.

Current Status

- Council is progressing the project with the Ministry of Transport, private landowners and other key stakeholders.

2.2.2 Proposed Widening of Treacy Street Railway Underpass

Description of Project

- widening of Treacy Street railway underpass from two lanes (one lane each way) to four lanes (two lanes each way); refer to Figure 1
- the main purpose of the project is to increase capacity at The Avenue/Treacy Street and The Avenue/Railway Parade intersections.

Background

< 1999	Project has been proposed for some time
2001	St George Councils Regional Transport Strategy: - underpass recommended in medium term
2004	Concept Master Plan – includes widening of underpass as a future improvement

Current Status

- Hurstville Council and Kogarah Council seeking funding from higher levels of government

2.2.3 Proposed "Queens Road Underpass"

Description of Project

- arterial road underpass of Illawarra Rail Line linking Queens Road near Forest Road with Woniora Road (refer to Figure 1)
- the main purpose of the project would be to provide another link across the railway and to form part of a town centre ring road system

Background

- | | |
|------|--|
| 1999 | First developed in the CBD Traffic, Public Transport and Parking Strategy: - underpass recommended in medium term |
| 2001 | St George Councils Regional Transport Strategy: - underpass recommended in medium term |
| 2004 | Concept Master Plan – includes underpass as possible future improvement to provide "better north-south connections" (Strategy 5 of 10) |

Current Status

- no detailed engineering feasibility assessment has been undertaken, apart from traffic modelling in 1999 study

Discussion

- underpass is one of two key missing links in CBD ring road network; the other is the widening of the Treacy Street underpass (refer to Section 2.2.2)
- would require origin-destination surveys and modelling to understand the effect on re-routing of traffic

2.2.4 Possible reintroduction of "two way" traffic on Forest Road between Queens Road and Park Road

Description of Project

- Forest Road reverting to two-way traffic flow between Queens Road and Park Road

Background

- | | |
|------|--|
| 1990 | Forest Road one-way system installed |
| 1993 | Changes implemented: bus zone shortened, angle parking introduced by Memorial Square |
| | It was proposed to revert the section between MacMahon Street and Queens Road to two-way but this was never implemented |
| 1999 | CBD Traffic, Public Transport and Parking Strategy recommendations:
- one-way operation in medium term until Queens Road underpass is built and Treacy Street underpass widened |

- reverse direction of one-way flow in long term with grade-separation at Queens Road/Forest Road
- 1999 - 2003 Works implemented:
- Forest Road/Treacy Street intersection – installation of bus lane and signalisation
 - Forest Road between Hill Street and Park Road – reintroduction of two-way traffic flow
 - implementation of new CBD signage strategy
 - The Avenue/Cross Street – signalisation of intersection
- 2004 Concept Master Plan – no changes proposed to Forest Road, although “easier traffic system” should be pursued
- 2005 Hurstville Interchange Study: the study assumed that Forest Road would remain one-way but the Woodville Lane option could accommodate Forest Road two-way

Current Status

- To be investigated as part of current traffic study

Discussion

- Issues: road safety, pedestrians, vehicle capacity, legibility, parking supply, traders etc.

2.2.5 Proposed widening of the Lily Street Overpass (Allawah)

This project, which is outside Hurstville City Centre, would improve traffic flow in the Hurstville–Allawah–Carlton area (refer to Figure 1).

3 EXISTING CONDITIONS

Transport data for this study has mainly been collected from the reports listed in Section 2.1 and from a number of recent traffic impact assessments. Additional data has not been collected as part of this study.

3.1 Pedestrian Flows

A survey of pedestrian flows was undertaken for the preparation of the East Quarter traffic report¹. The major pedestrian flows are presented in Table 1.

Table 1 Major Pedestrian Flows

Location	Pedestrians Per Hour	
	AM Peak Hour	PM Peak Hour
in Cross Street at Humphreys Lane (both sides of road)	645	1,109
along Forest Road at Rose Street (north side)	232	454
Railway Parade at West Street (south side)	372	343
in Cross Street at Park Road (both sides of road)	358	279
in Cross Street at The Avenue (both sides of road)	328	255
Treacy Street overbridge (east side)	133	31

Source: East Quarter traffic report (2003)

The main pedestrian circulation routes within the city centre are presented in Figure 2. The main origins and destinations are the Railway Station / Super Centre, Westfield, bus stops and car parks. Cross Street is an important pedestrian route feeding into the city centre from the northeast, as is Hillcrest Ave from the southwest. The railway line forms a major barrier to pedestrian movement due to the limited crossings available.

3.2 Bus Routes

Existing bus routes within the city centre are shown on Figure 3. Hurstville is served by two main bus interchange zones – Forest Road and Ormond Parade, with supplementary stops on Cross Street and Park Road. 20 bus routes serve Hurstville, as described in the Hurstville Interchange report. There are no bus routes that cross the railway line and hence there are no cross-regional services between Hurstville LGA and Kogarah LGA. The current complex road configuration contributes to a considerable number of city centre streets being used by buses, and buses proceeding down Forest Road must approach from the northwest.

Figure 4 shows a possible arrangement of bus routes that would operate with the Woodville Lane bus interchange, based on information contained in the Hurstville Interchange report. The bus stops on Forest Road would be removed but services to the east will still travel along the central section of Forest Road. A possible layover area could be located on Cross Street adjacent to Westfield.

¹ Jacana Consulting (December 2003), *95 Forest Road, Hurstville – Traffic Impact Study*, Prepared for Sydney Land Holdings.

Recommendations relating to bus priority measures along Queens Road, between Park Road and Dora Street, are discussed in Appendix A.

3.3 Rail Data

Weekday patronage data for Hurstville Railway Station is presented in Table 2 below.

Table 2 Hurstville Railway Station Patronage Data – 2005 Average Weekday

02:00 – 06:00		06:00 – 09:30		09:30 – 15:00		15:00 – 18:30		18:30 – 02:00		24 Hours	
In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
120	120	5,800	1,810	4,260	3,680	2,670	5,930	510	1,820	13,360	13,360

In – total people entering the station through the ticket barriers, i.e. catching a train

Out – total people exiting the station through the ticket barriers, i.e. alighting a train

Source: RailCorp, 2006

It can be seen that in the AM peak, the ratio of people catching trains from Hurstville to alighting at Hurstville is over 3 to 1. This suggests that Hurstville is more of a residential node than an employment node, i.e. it has a net out-flux of people on a typical weekday. The data also suggests Hurstville residents use trains for travel to work (e.g. to City) but few workers use trains to travel to work in Hurstville

Hurstville is the 14th busiest Sydney station in the AM peak (7,610), busier than Kogarah (17th – 6,620), Sutherland (21st - 5,630) and Rockdale (25th – 5,110).

3.4 Origin-Destination Data

The primary origins of Hurstville workers is presented on Figure 5, based on 2001 ABS Census data as contained in the East Quarter traffic report. Approximately 11,000 people work in Hurstville CBD. The proportion of workers in Hurstville north of the railway line to south of the railway line is approximately 2.3:1.

It appears that very few of those who work in Hurstville live within walking distance of their place of employment. It can be seen that a considerable proportion of workers come from the south, either by private car, bus or train.

3.5 Road Hierarchy

The administrative road hierarchy of the Hurstville area is shown on Figure 6. It can be seen that the Forest Road-Queens Road-Croydon Road is the only state route through Hurstville CBD. Forest Road and Forest Road are non-classified roads. Woniara Road–Railway Parade is a regional route designated for carrying significant volumes of through traffic.

Based on the current administrative road hierarchy, management of the road network within the study area is generally the responsibility of Hurstville Council and to a lesser extent Kogarah Council, although all traffic signals are the responsibility of the RTA.

3.6 Parking

Figure 7, which is based on data presented in the Concept Master Plan, summarises the existing supply of off-street parking within the city centre. Table 3 summarises the total number of on and off-street car parking spaces.

Table 3 Total Parking Supply

Location	Spaces
<i>North of Railway Line (Hurstville LGA)</i>	
Council - 3hr limit	1,225
Council - unrestricted	195
On-street – time restricted	460
On-street - unrestricted	340
Westfield - unrestricted	2,160
Total	4,380

Location	Spaces
<i>South of Railway Line (Kogarah LGA)</i>	
Super Centre – paid parking	250
Australia Taxation Office Building	160
Woniora Gardens	60
Total	470

Source: Hurstville City Centre Master Plan

It can be seen that over 70% of off-street spaces are contained within the Westfield development – 2160 owned by Westfield and 860 by Council.

A review of the current parking suggests the overall existing CBD supply within the CBD is generally adequate at the moment, although there is a shortage of conveniently located short-term parking, both on and off-street. This assessment will change over time as development activity occurs.

Figure 7 also presents the locations that have been identified by Council for additional off-street parking including an indication of the number of new spaces that could be provided. It should be noted, however, that if all these parking areas were developed, Westfield would still have 65% of the overall supply.

3.7 Traffic Volumes

3.7.1 Daily

Annual Average Daily Traffic (AADT) volumes for Hurstville are presented in Table 4 below. The drop in traffic on Forest Road, between 1999 and 2002, can mainly be attributed to the M5 East, between King Georges Road and General Holmes Drive. The motorway opened in 2001, resulting in changes to traffic patterns in the area, re-routing through traffic from a number of arterial routes.

Table 4 AADT Traffic Volumes on Forest Road

Location	Year			
	1993	1996	1999	2002
Forest Road – West of Carrington Ave (west of CBD)	23,845	25,079	31,976	23,428

Source: RTA

3.7.2 Peak Hours

Existing peak hour traffic volumes for Hurstville are presented in Figure 8 and Figure 9, based on data contained in the East Quarter traffic report and the Dora Street medical centre traffic report². The majority of volumes are 2003 values apart from those in the vicinity of the medical centre which are 2005 values.

In terms of existing traffic volumes, the higher order streets within the study area include:

- Queens Road
- Railway Parade
- Woniora Road
- Forest Road (west of Queens Road and east of Forest Road)
- The Avenue
- Treacy Street
- Park Road

3.8 Intersection Performance

In urban areas, the performance of a road network is generally a function of the performance of key intersections. Performance is quantified in terms of Level of Service (LOS), which is an index of the operational performance of traffic at an intersection and is based on the average delay per vehicle. LOS ranges from A – very good to F – highly congested conditions, as described in Table 5.

Table 5 Level of Service Definitions for Vehicles

Level of Service	Average Delay per Vehicle (seconds) [RTA Definition]
A	< 14.5
B	$14.5 \leq 28.5$
C	$28.5 \leq 42.5$
D	$42.5 \leq 56.5$
E	$56.5 \leq 70.5$
F	≥ 70.5

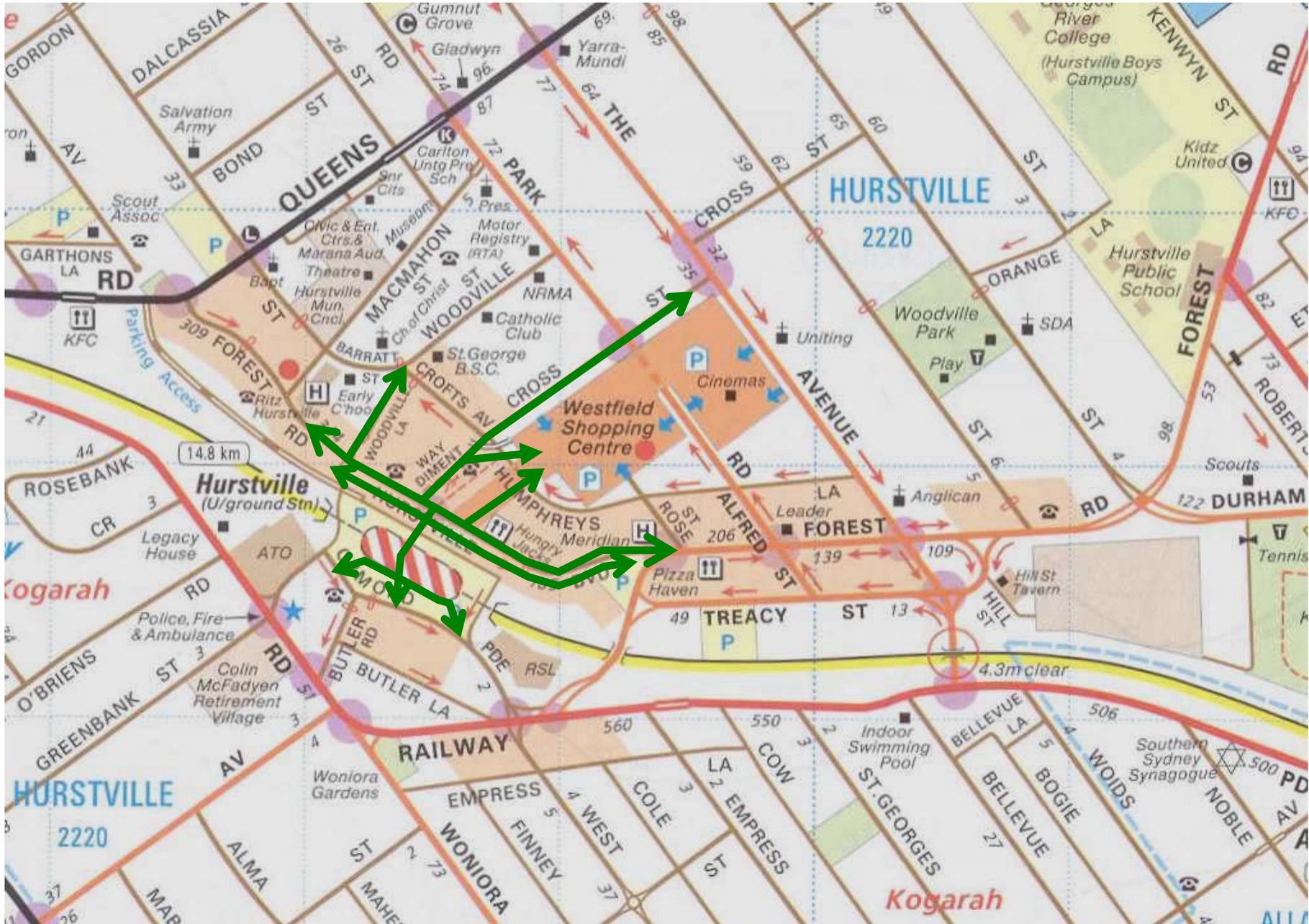
According to the East Quarter and Dora Street medical centre traffic reports, the PM peak is generally the critical time period for the operation of the road network within Hurstville City Centre. Based on analysis contained in these reports, Figure 10 presents the existing level of service at key intersections in the PM peak.

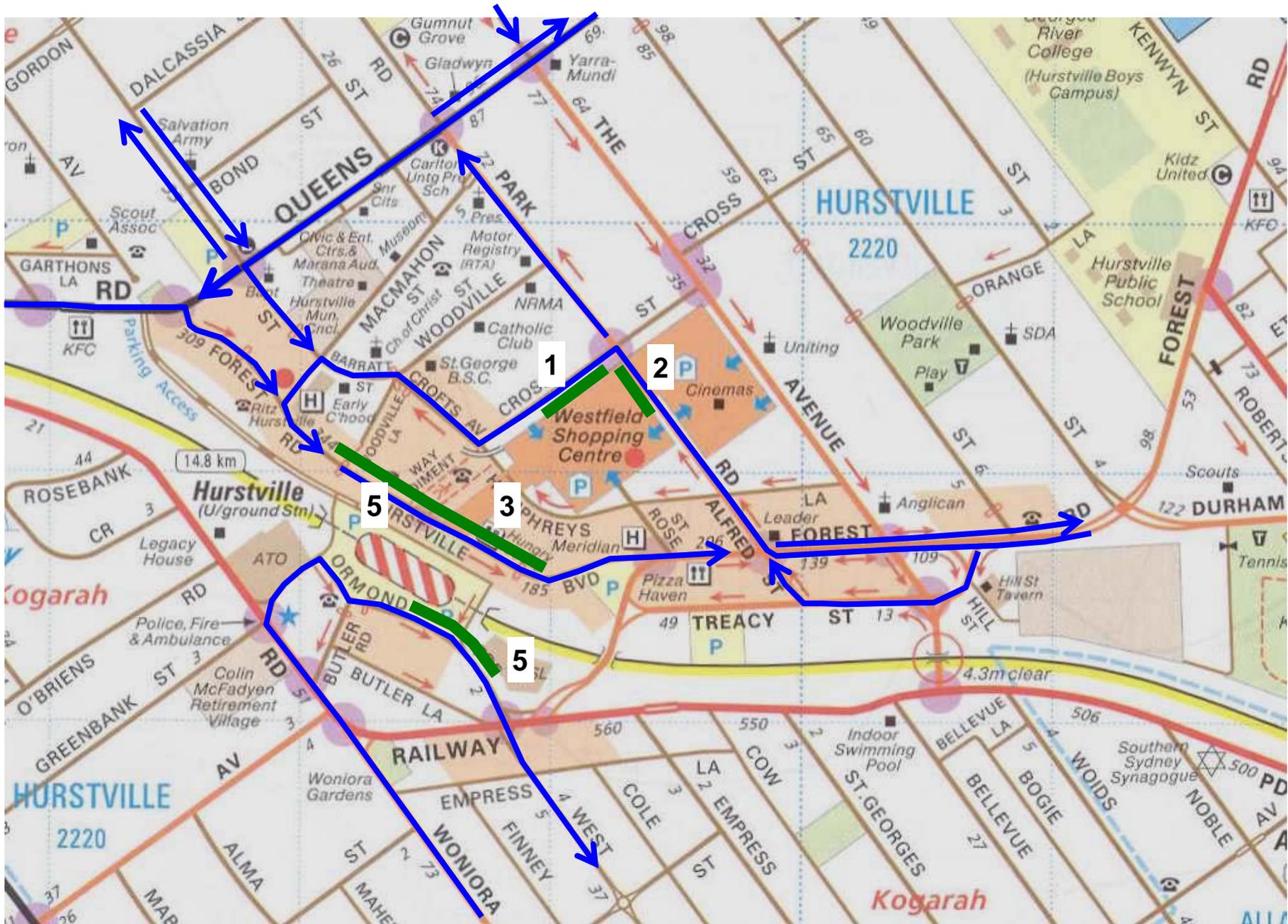
Intersections currently operating at or close to capacity, i.e. LOS C or D, include:

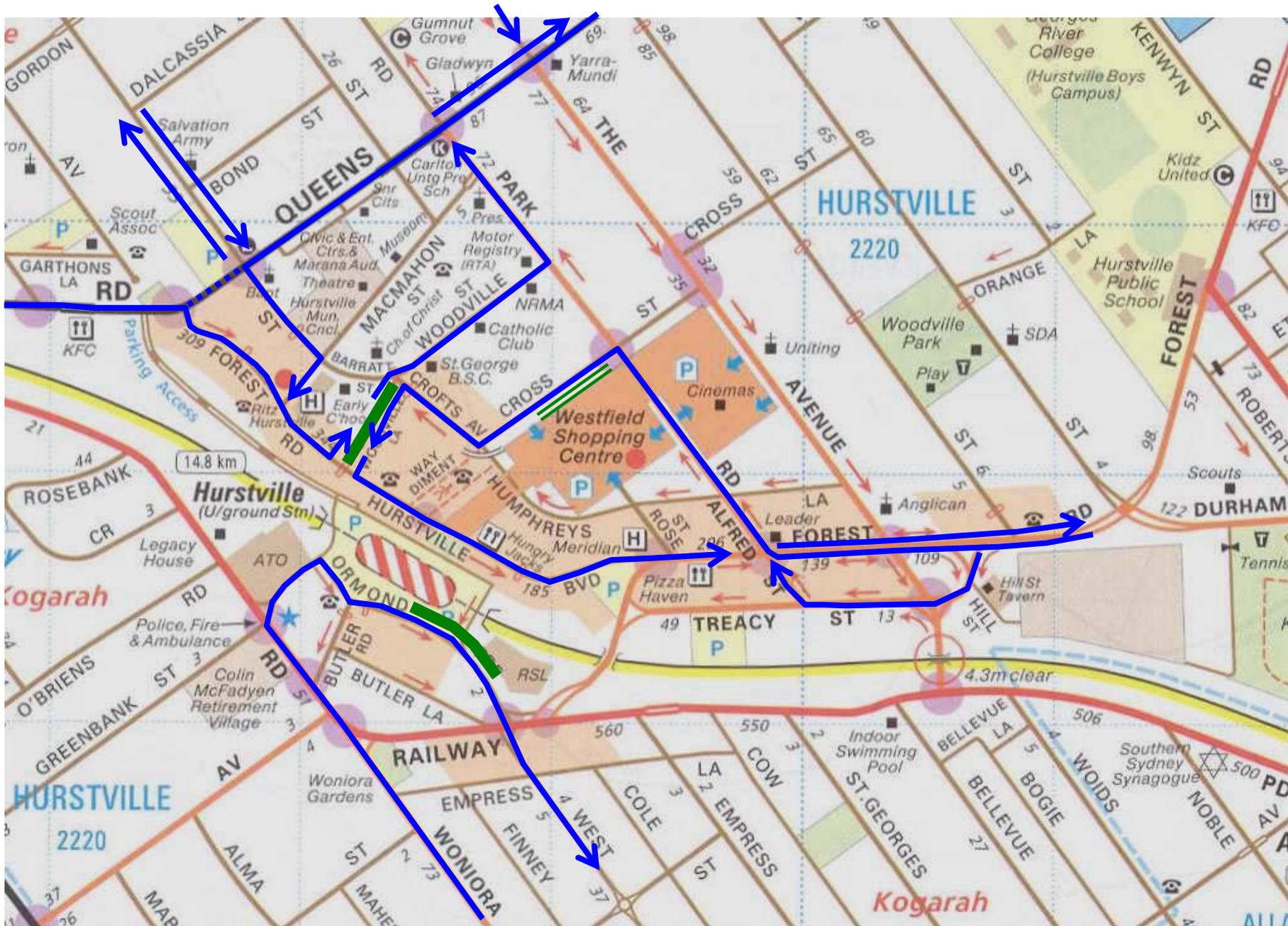
- Woniora Road/Hillcrest Ave/Railway Parade
- Railway Parade/Ormond Parade/West Street/Treacy Street bridge
- Railway Parade/Treacy Street

All other intersections within the city centre are generally operating at LOS B or better at most time periods. Higher traffic congestion may occur during weekend peaks, often due to a lack of parking restrictions at these times.

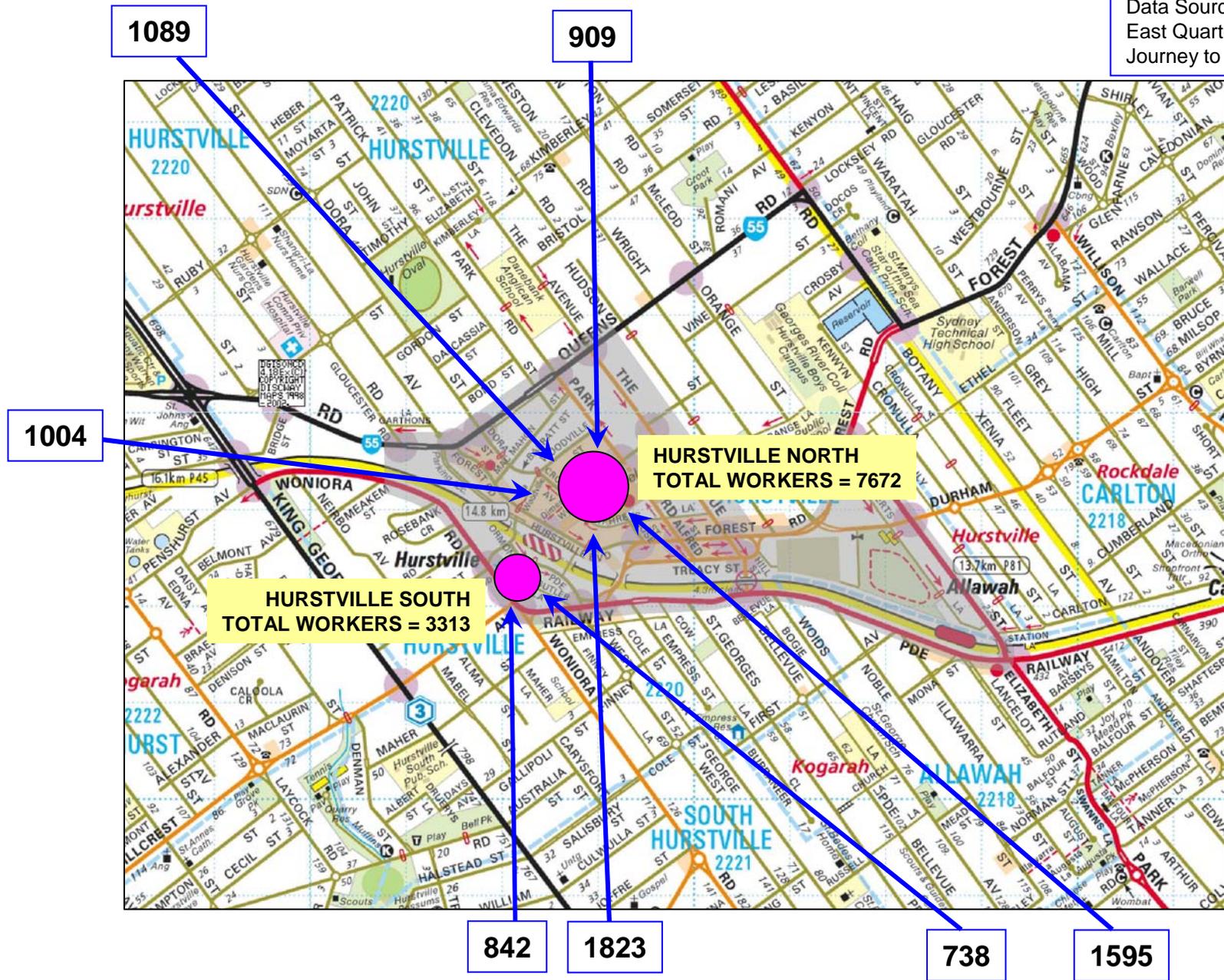
² Colston Budd Hunt & Kafes (November 2005).





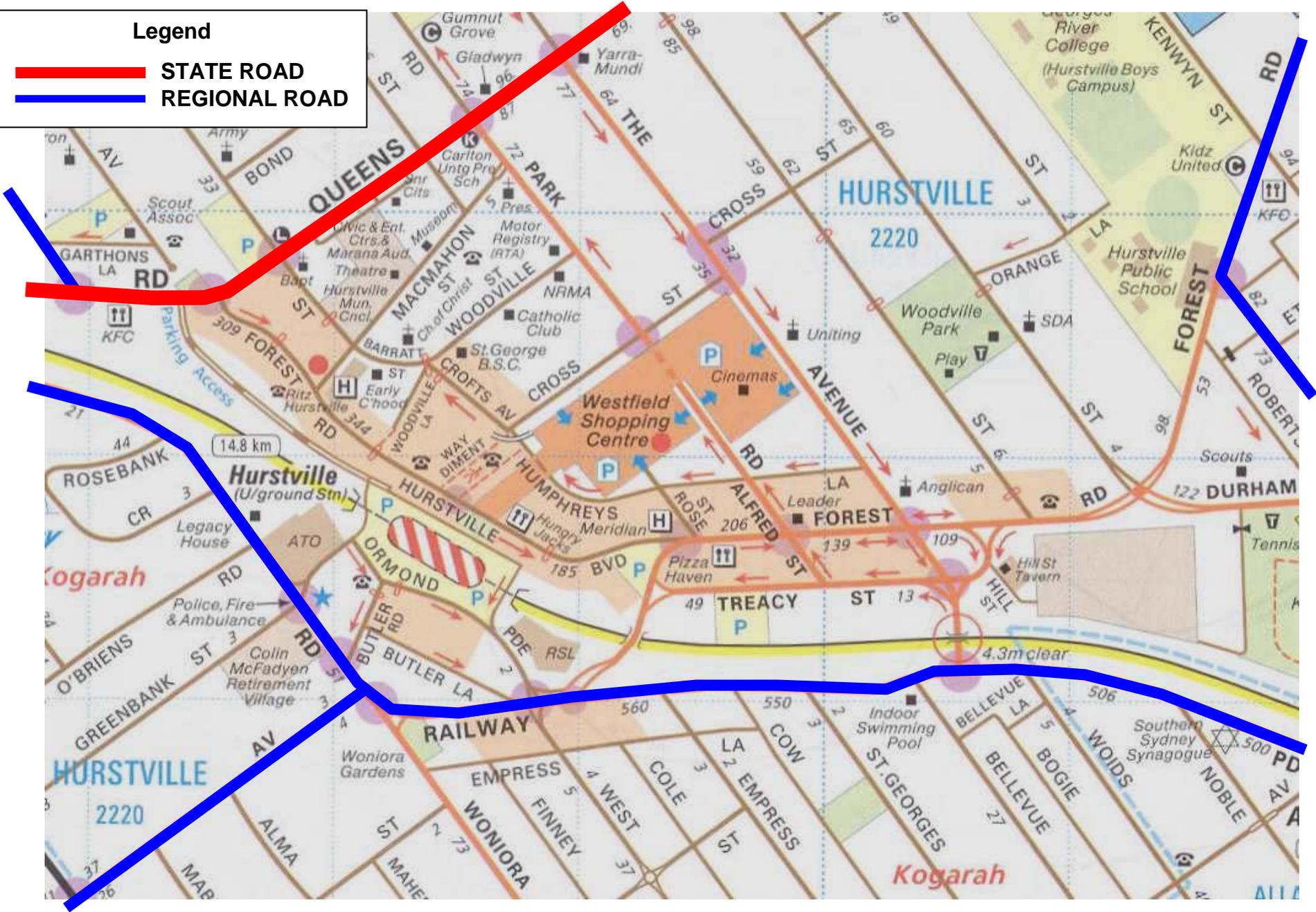


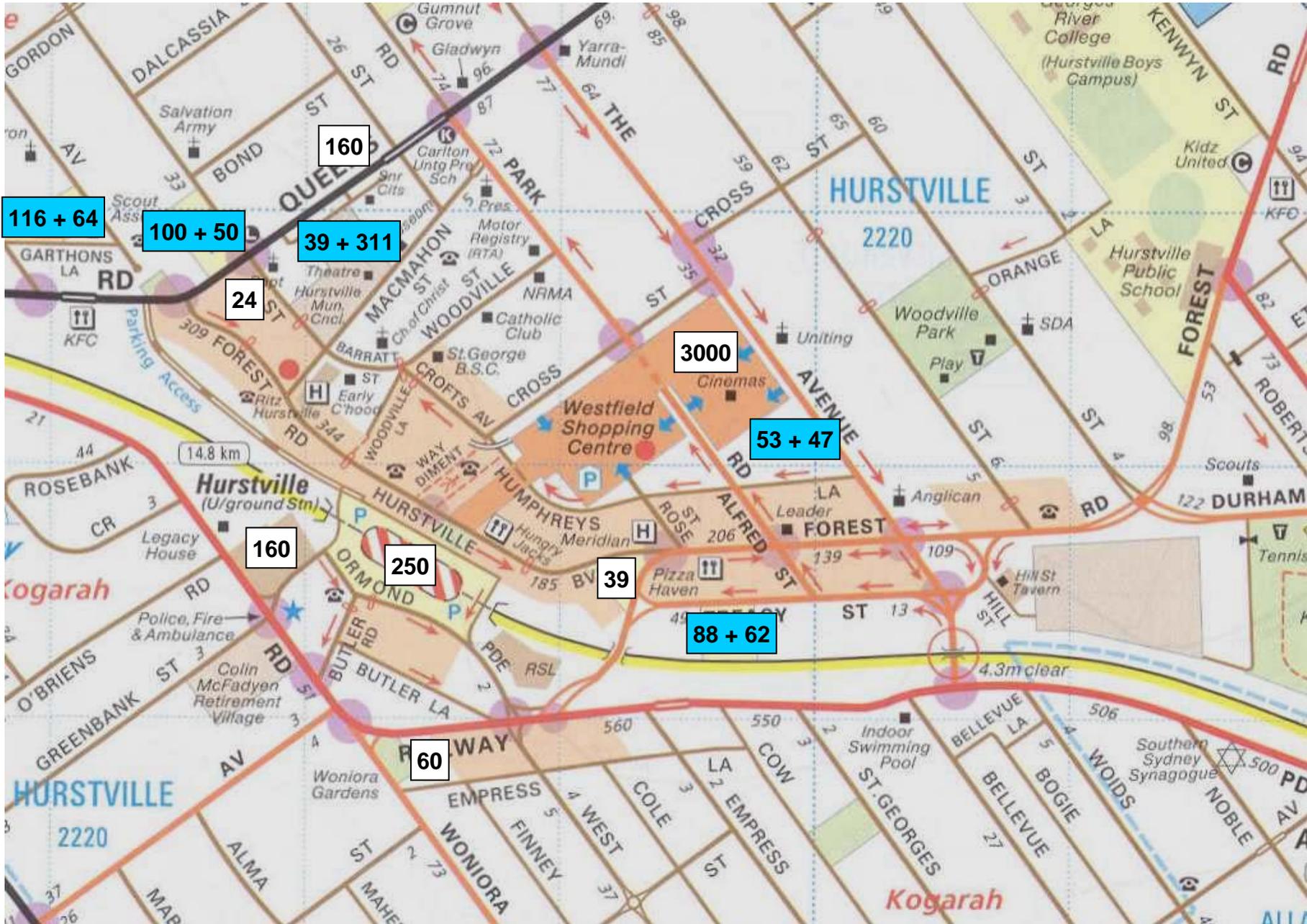
Data Source:
 East Quarter traffic study
 Journey to Work 2001 ABS Census

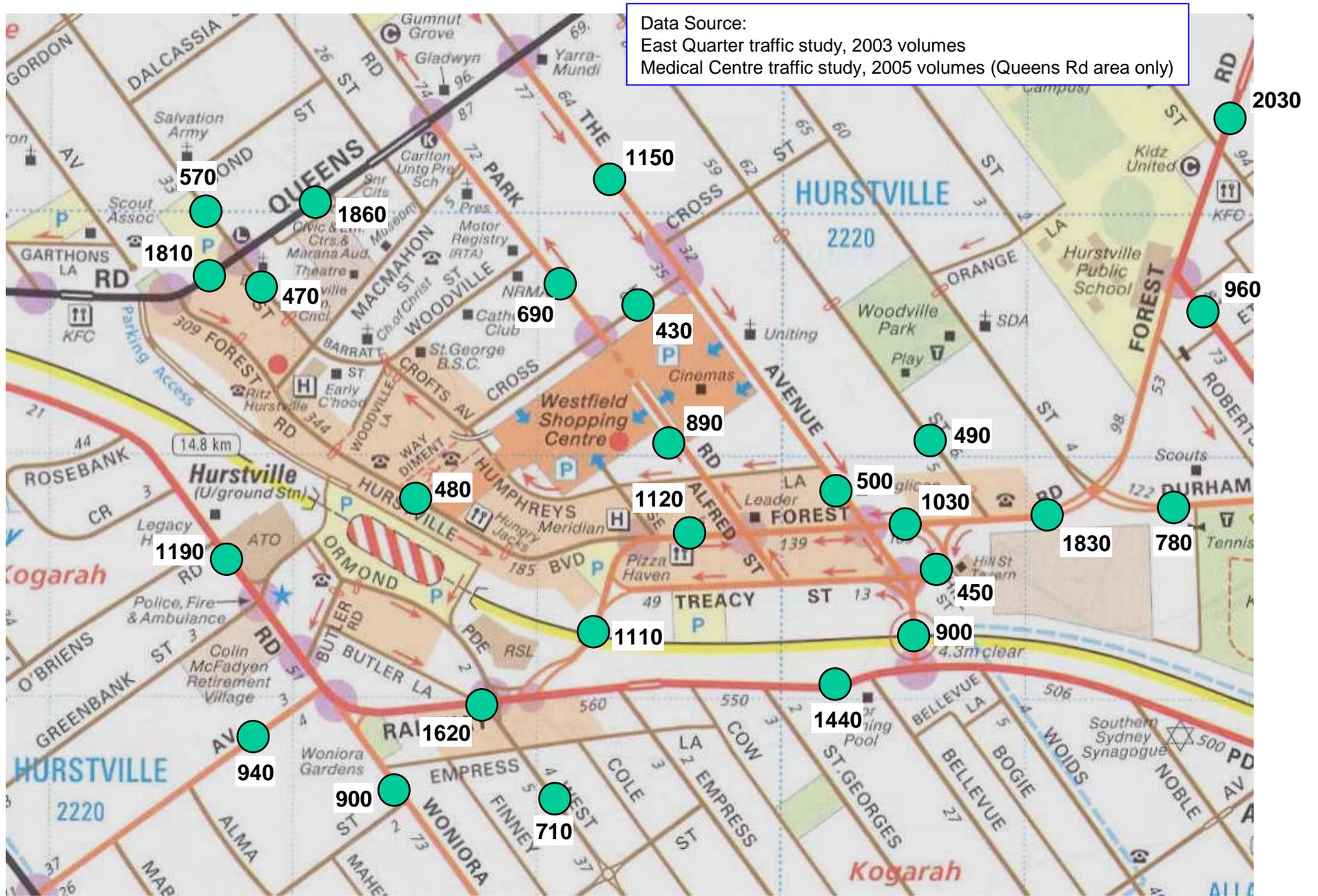


Legend

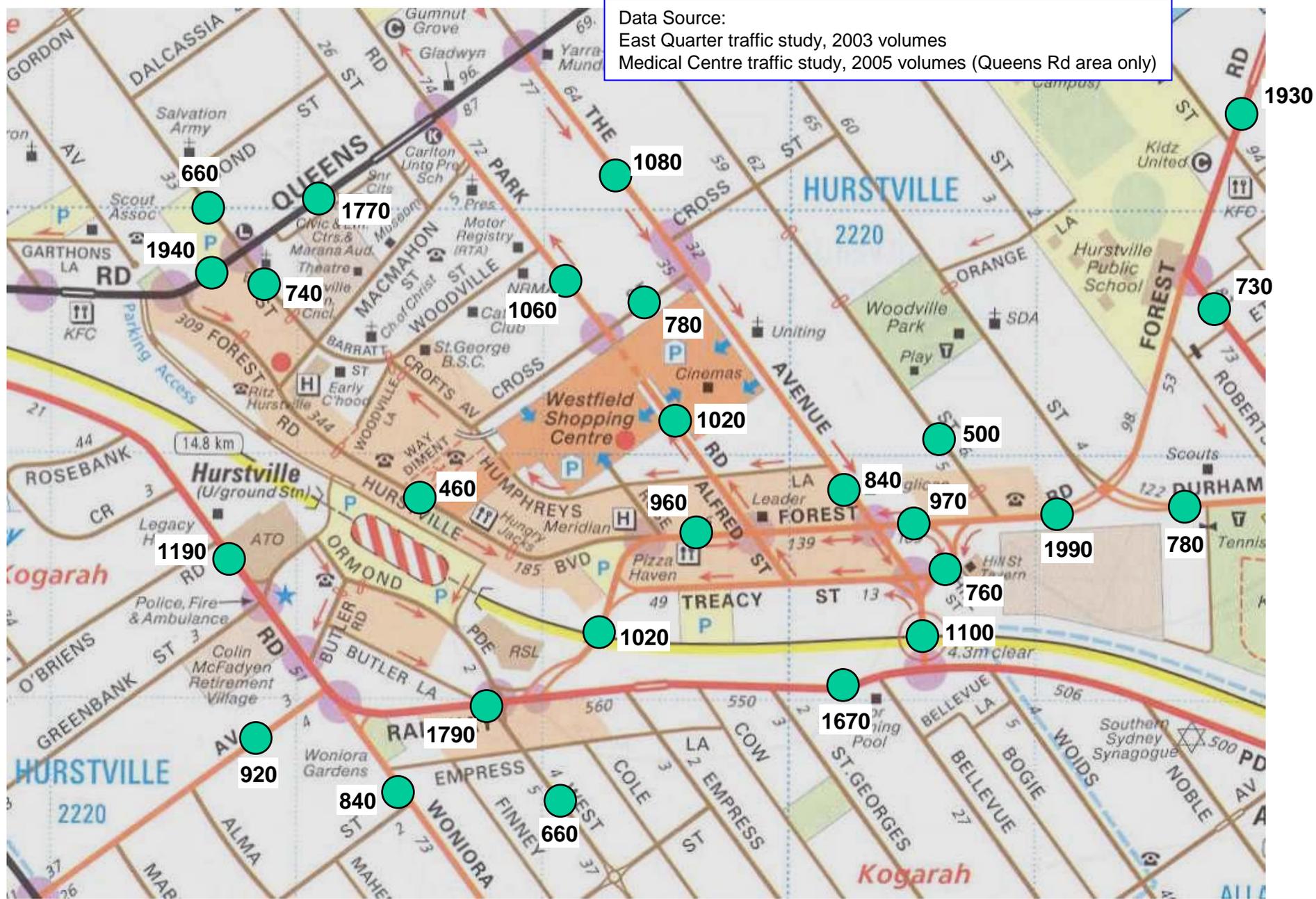
- STATE ROAD
- REGIONAL ROAD







Data Source:
 East Quarter traffic study, 2003 volumes
 Medical Centre traffic study, 2005 volumes (Queens Rd area only)



4 TRAFFIC ANALYSIS

4.1 Approach

Forecasts of year 2016 AM/PM weekday peak volumes have been used to assess the future performance of the road network.

Year 2016 peak hour volumes have been derived from:

- base traffic flows
- estimated increase in background traffic on major through routes
- estimated increase due to future development within city centre from:
 - approved developments (based on information provided by Council)
 - long term development forecasts (based on information contained in SGS report - *Hurstville City Centre Forecasting Study, Sep 06*)

4.2 Future Development within Hurstville

4.2.1 Approved Developments

The approved developments included in the assessment, based on information provided by Council, were:

- Dora Street Medical Centre
- Barratt and Woodville Streets Mixed Use
- New Illawarra Catholic Club
- The Avenue Commercial
- East Quarter

Dora Street Medical Centre

- 12,000m² commercial in eight stories, under construction at corner of Queens Road/Dora Street, on an existing car park
- same day surgery centre consisting of 6 operating theatres and endoscopy suites together with accommodation for over 120 doctors, dentists and other medical personnel.
- parking for approximately 410 vehicles including 150 public parking spaces which will be provided and operated by Council (an increase of 50% on the public parking currently available at this site)

Barratt and Woodville Streets Mixed Use

- mixed use development approved consisting of 65 dwellings, 432m² retail and 1,727m² commercial

New Illawarra Catholic Club

- multi-storey 2,384m² commercial development approved

The Avenue Commercial Development

- 15,000m² commercial development, which includes public parking, under construction

East Quarter

- 630 residential apartments, 10,000m² retail and commercial development approved

4.2.2 Long Term Development Forecasts

The SGS report contained, for the long term, a forecast of the net increase in dwellings, retail floorspace and commercial floorspace for each precinct (excluding approved developments):

- Retail Core
- City Centre North
- City Centre West
- Western Bookend
- City Centre East
- Eastern Bookend

The SGS report provides sufficient level of detail for the strategic nature of the 2016 traffic forecasts contained in this study.

4.3 Forecast Future Traffic Flows

4.3.1 Background Traffic Growth

For the purposes of this traffic assessment, traffic on Forest Road-Queens Road and Woniara Road-Railway Parade was forecast to grow by 10% to the assessment year 2016, over and above traffic growth from city centre development.

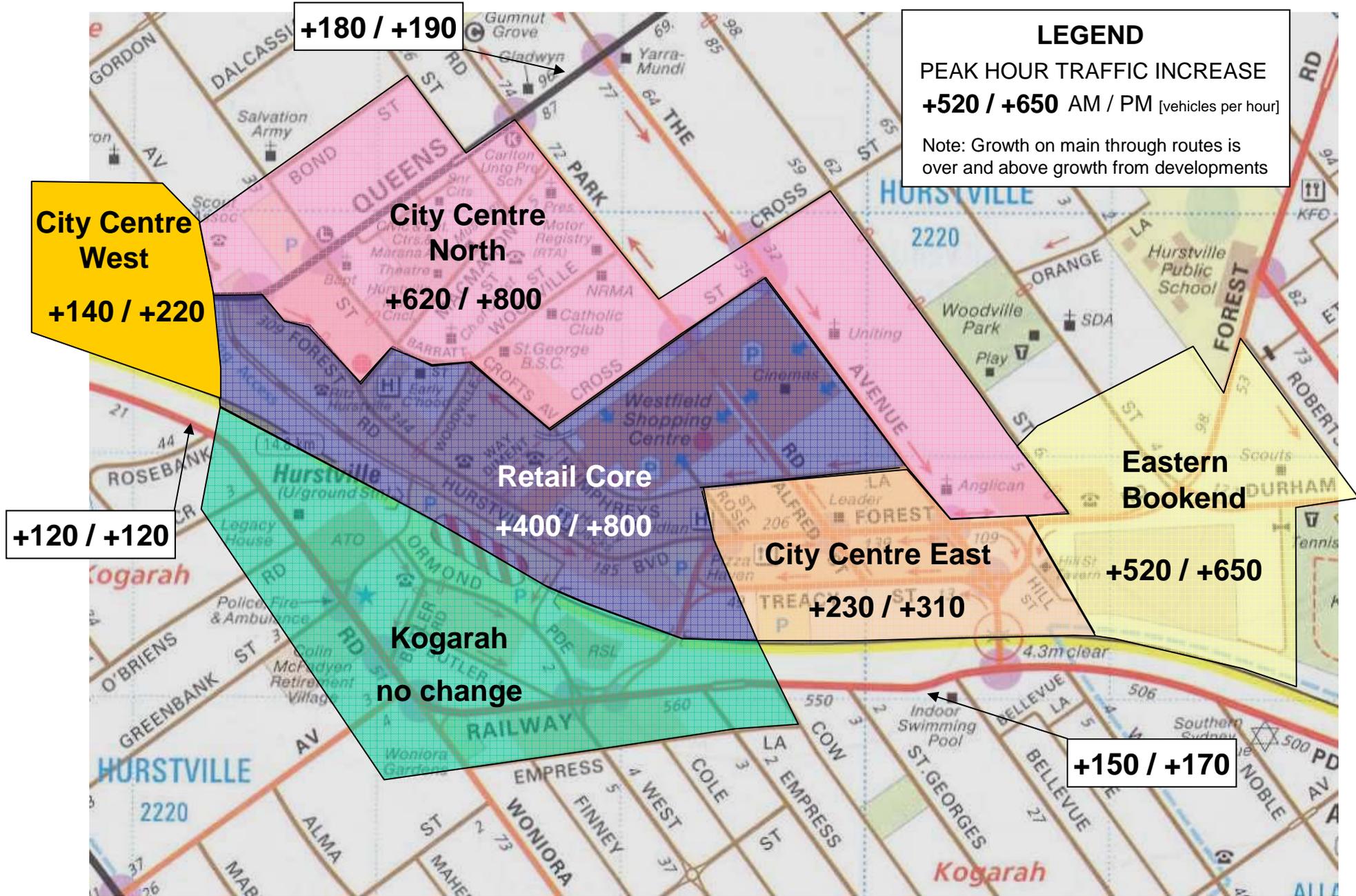
4.3.2 Future Development

Table 6 summarises the forecast net increase in traffic generation from assumed development within the city centre. Traffic generation rates are based on RTA rates for town centres with good public transport and constrained parking.

Figure 11 gives an indication of the net increase in traffic for the various precincts and main roads within the study area, for the year 2016 AM/PM peak hour scenario.

Table 6 Nett Increase in Traffic Generation from Developments

Scenario	No. of Dwellings	Retail (m ² GLFA)	Commercial (m ² GFA)	Vehicle Trips - AM Peak			Vehicle Trips - PM Peak		
				Total			Total		
				In	Out	Tot.	In	Out	Tot.
1. Approved Developments (Council data)									
Dora St Medical Centre	0	0	12,000	153	27	180	27	153	180
Barratt & Woodville Sts Mixed Use	65	432	1,727	29	24	53	30	41	70
New Illawarra Catholic Club	0	0	2,384	30	5	36	5	30	36
The Avenue Commercial	0	0	15,000	191	34	225	34	191	225
East Quarter	630	2,140	7,690	155	202	357	225	217	443
Sub-Total	695	2,572	38,801	559	292	851	321	633	954
2. Long Term Potential Development (SGS report, excluding approved developments)									
Retail Core	100	9,950	3,050	106	75	180	232	346	578
City Centre North	235	3,980	15,250	235	116	351	176	334	510
City Centre West	200	1,990	3,050	65	71	136	99	116	215
Western Bookend	850	995	1,525	85	245	330	246	124	370
City Centre East	350	1,990	6,100	114	120	234	145	168	314
Eastern Bookend	370	995	1,525	51	111	162	120	82	202
Sub-Total	2,105	19,900	30,500	656	738	1,393	1,019	1,170	2,189
Grand Total	2,800	22,472	69,301	1,214	1,030	2,244	1,340	1,803	3,143



5 PROPOSED TRAFFIC MANAGEMENT SCHEME

5.1 Preliminary Options

5.1.1 Traffic Accessibility and Circulation

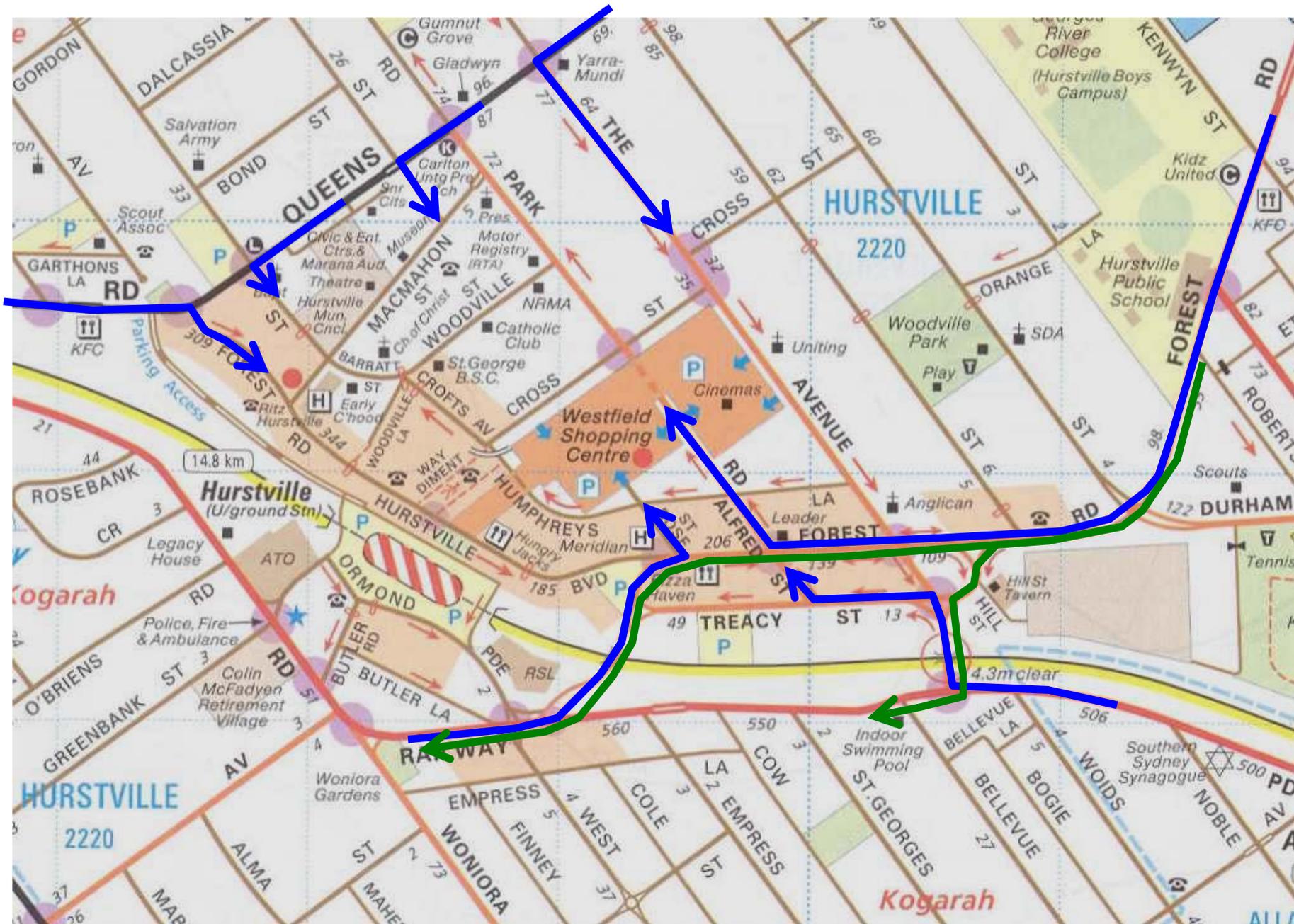
One of the main criticisms raised about the Hurstville City Centre is the poor legibility of the road system. This most likely resulted from the one-way road system that was installed in Forest Road, The Avenue and Park Road. The poor legibility also results from the barrier created by the railway corridor with only two major road crossings in the vicinity of the city centre.

Accessibility to the city centre is quite good by car when you consider the various approach routes, as shown on Figure 12. From the north on Queens Road there are four streets that can be used for access by a combination of left or right hand turns. From the south on Railway Parade either of the railway crossing points can be used to access Rose Street or Park Road. From the east on Forest Road, the reintroduction of two way traffic up to Park Road has improved access by creating a right hand turn into Park Road. In fact, if travelling through Hurstville from the east on Forest Road drivers must make a left turn onto Treacy Street to access Railway Parade otherwise there is no option other than to turn right into Park Road.

The legibility issue is associated more with movement within the city centre and searching for car parking. There has been mixed opinion about the one-way treatment of Forest Road. The benefits can be listed as reducing the traffic flow to be predominantly local traffic, a slow traffic speed environment, increasing the footpath area and allowing parking on both sides of the road. Reinstating two-way traffic flow would increase traffic flow including the potential to attract westbound through traffic. The primary issue is what are the benefits of reintroducing two-way traffic? Forest Road between Queens Road and Rose Street provides access to on-street car parking and the Palm Court car park with only 39 car spaces. Attracting additional traffic into this section of Forest Road may cause congestion because there is limited car parking to access. The current one-way traffic arrangement in Forest Road (see photo) is considered to provide the best balanced outcome.

Given that the road system provides good access to Westfield where 70% of the public car parking occurs, the challenge is to improve the pedestrian connectivity of this car park to the remainder of Hurstville retail and business area. This will partly be addressed by the Public Domain and Urban Form studies being conducted concurrently to this study, however there may be other improvements that could be made to assist the movement of pedestrians between the Westfield car park and the city centre.





5.1.2 Preliminary Options Considered

The principle of defining the primary routes for access around the city centre and then considering all roads within this cordon as local access routes has been used to develop a number of options. Queens Road to the north and the combination of Railway Parade to the west and south and Forest Road and Treacy Street to the south form these routes. To the east, the one-way pair of The Avenue and Park Road form the eastern boundary.

Options that have been considered to better define the road system include:

- Two-way traffic on The Avenue as the primary east side through traffic route.
- Two-way traffic on Park Road as a local circulation route.
- Two-way traffic on Treacy Street.
- Two-way traffic on Forest Road between Treacy Street and Park Road.
- Two-way traffic on Forest Road between Queens Road and Park Road.
- Queens Road Underpass to create a ring road system.

5.2 Preferred Option

Following a review of all issues associated with the preliminary options considered, a preferred traffic management option was developed as shown in Figure 13. The plan shows a functional road hierarchy consisting of:

- main traffic routes
- secondary traffic routes
- other local routes

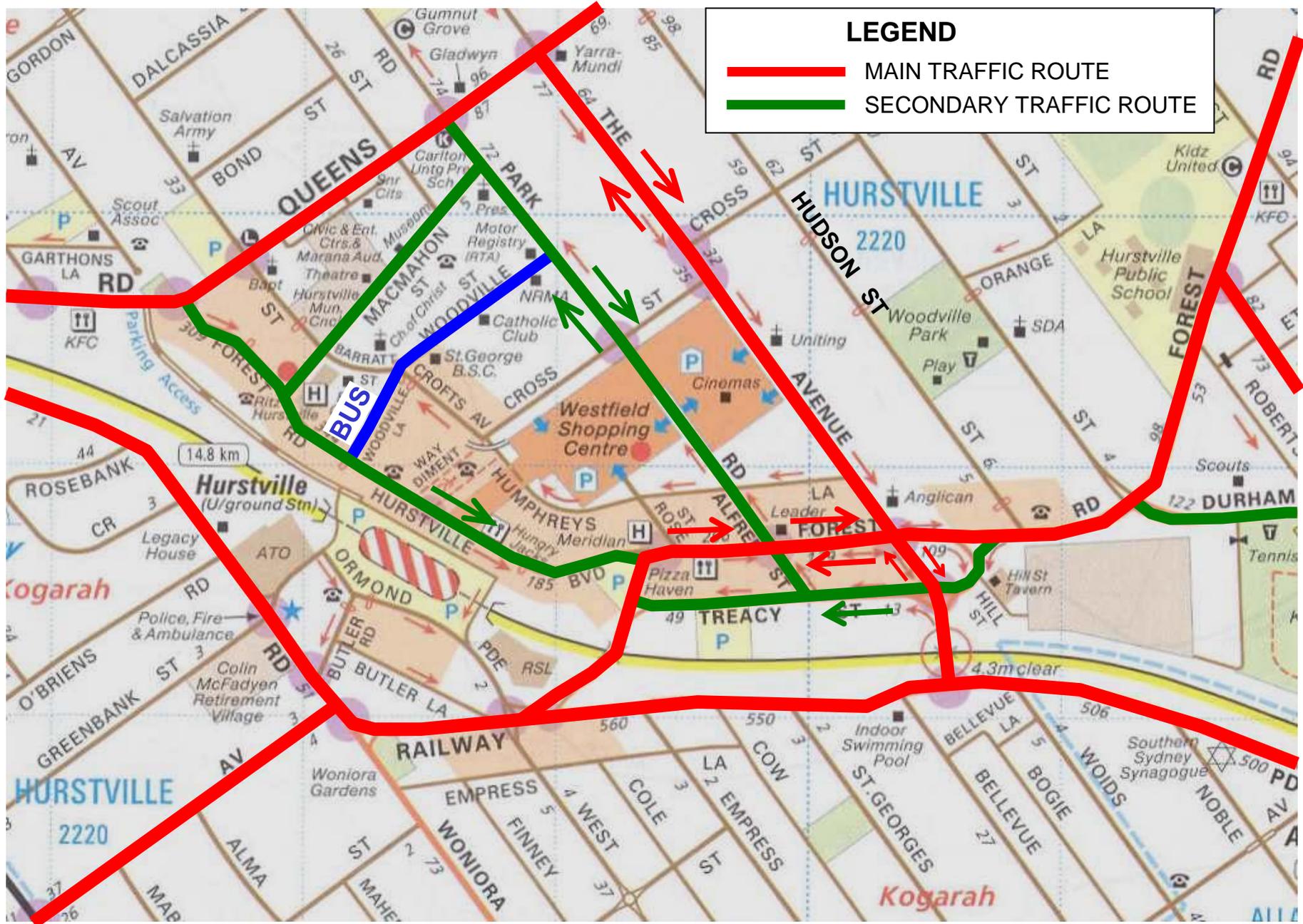
Key features of the plan include:

- Retention of current one-way arrangement for Forest Road through the city centre. It may be possible to reintroduce two-way traffic on Forest Road between Queens Road and MacMahon Street should this be needed for future bus routing, subject to more detailed traffic investigation.
- Bus interchange on Woodville Lane as previously proposed. Bus routes for accessing the new interchange are shown on Figure 4, including a layover area on Cross Street.
- Conversion of both The Avenue and Park Road from their current one-way traffic flow arrangements to two-way traffic flow. This would involve changes to a number of signalised intersections. The Avenue would be designated as a main traffic route, catering mainly for through traffic, and Park Road as a secondary traffic route, catering mainly for local traffic. This road hierarchy would be reinforced by signage and intersection controls, including a 'no right turn' from Queens Road west into Park Road.
- Two-way traffic on The Avenue-Treacy Street between Forest Road and Railway Parade, including the widening of the Treacy Street underpass. Widening of the underpass is a critical component of the overall traffic management plan, enabling The Avenue to form a main traffic route between Queens Road and Railway Parade.
- Retention, in general, of the current traffic flow arrangements in the area bounded by Forest Road and Treacy Street. It is likely that some one-way streets would need to be retained, due to narrow road reserves and a desire to dissuade through traffic from using certain routes. Detailed traffic analysis would be required to determine the optimum traffic management arrangements, in terms of intersection controls, right turn

restrictions, one-way traffic, parking controls etc, particularly for the Forest Road/Park Road (see photo) and Forest Road/The Avenue intersections.

- A complimentary parking management strategy, which seeks to:
 - limit the availability of long term parking within the city centre
 - reduce parking levels in new developments
 - introduce paid parking in Westfield for parking over 2 or 3 hours
 - provide additional parking on the periphery of the city centre, but only when suitable sites become available





5.3 Traffic Assessment of Preferred Option

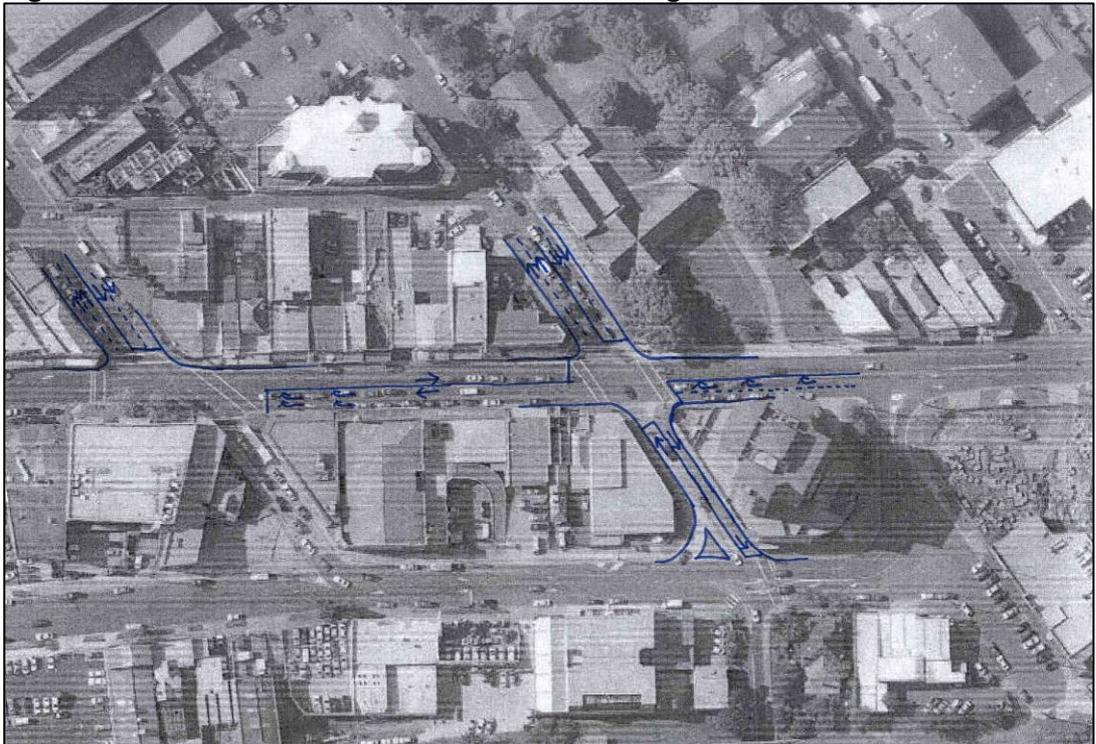
The traffic performance of the preferred option for the year 2016 was assessed by:

- reassigning base traffic flows according to the reconfigured road network
- manually assigning the forecast development traffic (Table 6) to the road network using an assumed trip distribution
- intersection modelling of key intersections for the AM/PM peaks.

The analysis suggested the following:

- the Queens Road intersections would perform at an acceptable level of service
- widening of the Treacy Street underpass is a necessary feature of the preferred option
- the Railway Parade intersections near the railway station would continue to operate at a poor level of service
- detailed analysis would be required to determine the most appropriate configuration of the road network around the area bound by Forest Road-The Avenue-Treacy Street. Some of the one-way flow arrangements in this area may need to be retained. Turn bans and parking restrictions may need to be investigated. Figure 14 below indicates a number of the changes that would be required to allow the reintroduction of two-way traffic into The Avenue and Park Road.

Figure 14 Possible The Avenue and Park Road Configuration



5.4 Proposed Infrastructure Improvement Projects

Recommendations relating to the proposed infrastructure improvement projects listed in the Introduction are discussed below.

Widening of Treacy Street Underpass

The proposed widening of the Treacy Street underpass is a fundamental component of the preferred traffic management option. It is needed to increase capacity of the road network, in particular the Treacy Street/The Avenue and Railway Parade/Treacy Street intersections. Congestion in this area will increase significantly when the East Quarter develops. The consequence of not widening the underpass would be an increase in traffic congestion, particularly in the southern section of the city centre.

Queens Road Underpass

The proposed Queens Road underpass is not recommended, at least in the short to medium term. Although it would provide a useful road link, the benefits would not outweigh the construction cost. It would mainly serve through traffic rather than traffic bound for the city centre. A pedestrian-only link on the same alignment across the railway, however, may warrant further investigation.

Reintroduction of “two way” traffic on Forest Road between Queens Road and Park Road

A key element of the preferred traffic management option is the retention of the current one-way arrangement on Forest Road.

Motorists currently have to make a conscious decision to turn into Forest Road. Reversing the direction of flow is likely to result in a significant increase in traffic because traffic from the east would find it easier to naturally feed into Forest Road.

Converting the road to two-way traffic would approximately double traffic volumes, reducing the amenity of the street. It would also require the carriageway to be widened, resulting in narrower footpaths and less space for streetscape works.

The current flows on Forest Road are at an appropriate level. An increase in flows would be undesirable because the road will always have limited on-street parking and does not provide access to off-street parking areas.

Reintroduction of two-way traffic on Park Road and The Avenue

Conversion of both The Avenue and Park Road from their current one-way traffic flow arrangements to two-way traffic flow would improve accessibility to the city centre. It would also allow for The Avenue to be designated as a main traffic route, catering mainly for through traffic, and Park Road to be designated as a secondary traffic route, catering mainly for local traffic. To reinforce this road hierarchy, no right turn would be permitted from Queens Road into Park Road. Detailed analysis would be required to determine the most appropriate configuration of all intersections along The Avenue and Park Road.

Further recommendations relating to bus priority measures along Queens Road, between Park Road and Dora Street, are discussed in Appendix A.

Proposed widening of Lily Street Overpass

The proposed widening of Lily Street overpass would improve traffic flow in the Hurstville–Allawah–Carlton area and is therefore recommended. It should be included in any planning controls for the area.

6 RECOMMENDATIONS

The preferred option provides a strategic road network framework to service the Hurstville City Centre as it continues to develop as the Regional Centre in Southern Sydney. It supports a number of the key infrastructure improvements already adopted and proposes further changes to traffic flows to improve traffic legibility and circulation.

The preferred option improves the permeability of the city centre traffic network and will help to reduce the perceived confusion of motorists and pedestrians travelling through the city centre especially for first time visitors. It will also improve the ability for public transport and private vehicles to circulate around the city centre.

Recommendations relating to the proposed infrastructure improvement projects listed in Section 1.1 are presented in Table 7 below.

Table 7 Summary of Recommendations

Proposed Infrastructure Improvement	Recommendation
Widening of Treacy Street Underpass	Recommended
Queens Road Underpass	Not recommended, at least in short to medium term
Reintroduction of "two way" traffic on Forest Road between Queens Road and Park Road	Not recommended
Reintroduction of two-way traffic on Park Road and The Avenue	Recommended, but no right turn from Queens Road into Park Road. Retain right turn from Queens Road into The Avenue
Widening of Lily Street Overpass	Recommended

Recommendations relating to bus priority measures along Queens Road, between Park Road and Dora Street, are discussed in Appendix A.

7 APPENDIX A – BUS PRIORITY MEASURES

7.1 Background

In June 2004 Council's Transportation Analyst, submitted a bus priority scheme to the RTA as shown on Figure A1. It included bus priority measures on Park Road and Queens Road.

The NSW Government has identified 43 Strategic Bus Corridors (SBC) across Sydney. The RTA has funding to implement works on these corridors for a three year period – 2006/07 to 2008/09. In May 2006 the RTA advised that funding for the Hurstville works were available under the SBC Program.

Four SBC serve Hurstville:

- 24. Hurstville - Miranda
- 25. Hurstville - Bankstown
- 27. Hurstville – Burwood
- 30. Hurstville – Bondi Junction

The primary roads used for these corridors through Hurstville are illustrated on Figure A2. The routes shown are indicative only and subject to change as the SBC program is gradually implemented. Route 24 passes through Kogarah LGA and not Hurstville LGA. The primary routes used by the other three corridors are Forest Road and Queens Road.

As part of the SBC program, the RTA investigated an initial selection of 16 corridors. The study, undertaken by Sinclair Knight Merz, investigated Hurstville – Burwood corridor (No. 27). It identified Queens Road/Park Road as a constraint due to traffic volumes on Park Road. The proposed treatment was a bus lane between MacMahon Street and Queens Road to provide an early start 'B' signal to allow buses to turn right (as per Council's 2004 proposal). The Queens Road bus priority measures were not specifically mentioned in the SKM report.

7.2 Investigations

Arup conducted a desktop investigation of the future bus routes used to access the new Hurstville Bus Interchange, assuming Park Road and The Avenue are converted to two-way traffic as per the recommendation of this study. For the inbound journey, the left turn from Queens Road into Dora Street would carry a significant number of bus movements. For the outbound journey, the right turn from Park Road into Queens Road would be significant. Both of these turning movements are located along SBC No. 27.

The proposed bus priority measure on Park Road would be an important measure to improve the flow of buses along that corridor. The measure becomes even more critical if Park Road is converted to two-way traffic and capacity for Park Road traffic exiting to Queens Road is reduced.

The proposed bus priority measure on Queens Road would also be an important measure. Queues often extend back along Queens Road from Dora Street towards Park Road. The extent of these queues is likely to increase as development in Hurstville increases. The proposed measure would be important in allowing buses to bypass these queues. The bus priority measure could either be along the full length of the slip lane, i.e. from Dora Street to Patrick Street, or for a shorter length back from Dora Street. The former would be preferable as it provides a longer bus facility.

7.3 Implications

The bus priority measure on Park Road would involve land acquisition, i.e. a small portion of the Council-owned property which is to be demolished in mid-2007. Land acquisition would have minor implications for the temporary car park and the civic precinct redevelopment proposed for the site. The conversion of Park Road to two-way traffic should occur at the same time as the Park Road bus priority measures.

The bus priority measure on Queens Road would have implications for the civic precinct redevelopment. It would also impact on the existing slip lane. This slip lane provides access to a small number of properties, but this is likely to cease when the civic precinct redevelopment occurs. The slip lane is also used for parking.

7.4 Recommendations

The proposed bus priority measures would provide significant benefits to the movement of buses in and around Hurstville. The measures would support the proposed bus interchange. The measures would support the recommendations of this traffic study, i.e. improve the ability for public transport to circulate around the city centre.

Figure A1 Proposed Park Road and Queens Road Bus Priority Measures (Source: Hurstville Council)



