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Bathurst Southern Ring Road Route Study

October, 2008

Bathurst Regional Council

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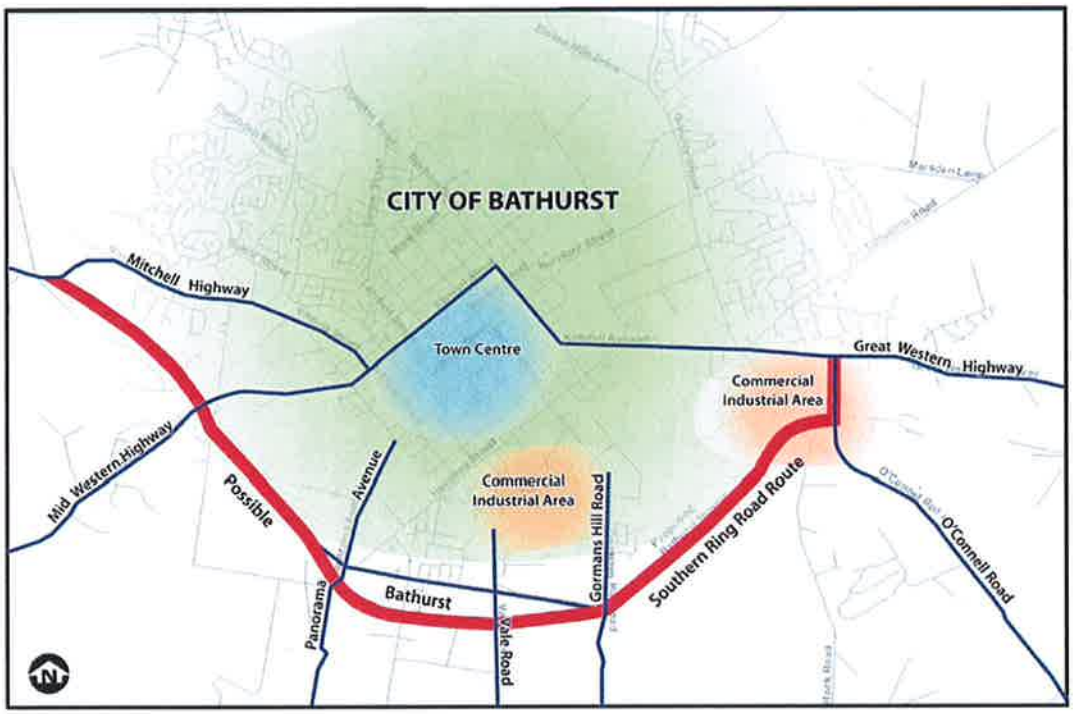
Does Bathurst need a Southern Ring Road Route?

This report has explored how Bathurst Town Centre could benefit from a Southern Ring Road Route in the vicinity of the route shown in the figure below.

The Southern Ring Road Route investigated in this report skirted around South Bathurst, starting east of Littlebourne Street (O'Connell Road) and connecting with Gormans Hill Road, Vale Road, Panorama Avenue, the Mid Western Highway and ending at the Mitchell Highway. The advantage of a route is this general location is that it would not only function as a bypass route to remove heavy vehicles from the town centre, but it would also function as a local ring road for travel from one side of town to the other. Heavy vehicles could also use it when travelling to and from the business areas in South Bathurst.



A possible location for a Southern Ring Road Route

The justification for a Southern Ring Road Route can be summarised as;

- The City of Bathurst is growing. The population of Bathurst is projected to increase by about 2-3% per year over the next 40 years from about 32,600 in 2006 to over 80,000 by 2050. The demand for commercial and industrial land is also projected to increase, from about 167 hectares in 2006, to over 274 hectares by 2050. The demand for industrial land is currently increasing at about 20 hectares per year while the demand for service business land is increasing at about 2.2 hectares per year.

- Commercial and industrial land is concentrated mostly in the South Bathurst area. Commercial and industrial areas attract a high number of trucks and service vehicles. Currently, heavy vehicles are using local streets when travelling through Bathurst, or travelling to and from the commercial and industrial areas. These local streets pass near or through school zones, residential areas, retail shopping areas, playgrounds, recreational areas and tourist areas. Without a more appropriate, heavy

duty route, trucks are becoming more intrusive. They can be noisy, damage the local roads and a safety issue for vulnerable pedestrians, pets and smaller vehicles. The current situation will deteriorate over the long term.

- The Bathurst Southern Ring Road Route is proposed as a solution to these problems. Heavy vehicles would not need to use local streets when travelling through Bathurst or when travelling to and from the business areas in South Bathurst. The Southern Ring Road Route would connect the Great Western Highway (east) with the Mitchell Highway (west) with intersections at Vale Road, Gormans Hill Road, O'Connell Road, the Mid Western Highway, Panorama Avenue and other connecting roads that may be built in the future.

- The proposed Southern Ring Road Route would function as an outer ring road and not as a pure bypass route, as are the Goulburn and Yass bypasses, which do not provide access to local streets linking to the town centres. The Bathurst Southern Ring Road Route will help connect local centres more directly. A ring road route is more attractive for local traffic wanting to use only sections of the Route.

- This study investigated how traffic would use a Southern Ring Road Route. To do this, a traffic model of the Bathurst area was built to predict future traffic levels in 2020 and 2050. To be confident the model could reliably predict future traffic flows, the model was first setup to check whether it could replicate 2006 traffic on major roads. This was done to an acceptable level of accuracy. Future traffic movements were then forecast by the model based on estimates of changes in population, employment and changes in land use, while also taking into account traffic changes due to retail, educational and recreational activity in the Bathurst area.

- The traffic model was based on actual traffic counts and a survey of where vehicle trips started and ended in 2008, plus existing and future population, employment and land area data provided by Bathurst Council.

- In the forecasts, the Southern Ring Road Route was assumed to be a 4 lane divided road (2 lanes in each direction) with high capacity, at-grade intersections at the cross-routes mentioned previously. This capacity for this standard of road would be around 36,000 vehicles per day.

- The traffic model predicted the Southern Ring Road Route would be well used. If a Southern Ring Road Route were opened in 2006, it would attract 8,000 vehicles per day. By 2020, this would increase to around 36,000 vehicles per day and then to almost 90,000 vehicles by 2050, if no other new routes were built by then to help share the traffic load. Clearly, the proposed route could not carry 90,000 vehicles but that level of demand indicates the changes that will need to occur over the next 40 years.

- About 10-15% of total vehicles were assumed to be heavy vehicles. That would be around 1,200 trucks per day in 2006, 4,000 trucks per day by 2020 and about 9,000 trucks per day by 2050. The impact of these vehicles on the town centre if there were no Bypass would be significant.

- Additional evidence regarding the need for the Southern Ring Road Route came from the percentages of through traffic that was forecast to divert to the route. In 2006, approximately 58% of through traffic would have chosen the route, 68% in 2020, 52% in 2030, 47% in 2040 and 44% in 2050. These forecasts assume no other changes were made to the existing road network. Almost 100% of through traffic from the Mitchell Highway, Vale Road and O'Connell Road would use the Route. Initially, a lower percentage of through traffic from the Great Western Highway would choose the Route but this would grow as congestion increases on local roads.

- Another benefit of a Southern Ring Road Route would be reduced traffic on residential streets. For example, total traffic flows on Bentinck Street were estimated to decrease by around 9%, while the number of heavy vehicles would decrease by up to 50%. For Durham Street, west of Bentinck Street, traffic would fall by up to 23%. Heavy vehicles numbers would fall by up to 55%. At Havannah Street, traffic is expected to decrease by 39% (and heavy vehicles by up to 55%). Some heavy vehicles will still need to use these streets for local deliveries to businesses in the area.

- A consequence of not constructing a Southern Ring Road would be a poorer outlook for commercial and industrial growth. Bathurst Regional Council, responding to local residents, might increasingly object to future developments concerned they will have a negative impact on their local environment and amenity. The technical reason for all this concern would be the lack of road capacity to support the development proposals.

- The Southern Ring Road Route could have a positive impact on tourism. Feedback from Goulburn-Mulwaree Council was an immediate drop in tourist visits once the Bypass opened, but recently visits have started to increase. Over the last 5 years, tourist traffic has tripled. Tourists commented that the city is quieter and a more enjoyable place to visit. Goulburn has a large Service Centre on its southern approach which draws tourists off the freeway and where tourist information is distributed. A Bathurst Southern Ring Road would provide the Regional Council with many opportunities to promote Bathurst through directional signs, advertising and by offering new accessible sites for service and information centres.

- The traffic model provided additional evidence regarding the need for the Southern Ring Road Route. It came from the percentages of through traffic that were forecast to divert to the route. In 2006, approximately 58% of through traffic would have chosen the route, 68% in 2020, 52% in 2030, 47% in 2040 and 44% in 2050. These forecasts assume no other changes were made to the existing road network. Almost 100% of through traffic from the Mitchell Highway, Vale Road and O'Connell Road would use the Route. Initially, a lower percentage of through traffic from the Great Western Highway would choose the Route but this would grow as congestion increases on local roads. The reason behind the traffic diversion is related to a quicker travel time between various origins and destinations along the route due to the increasing congestion on travel routes through the town centre.

Executive summary

Bathurst is a major hub for main road transport corridors in Western NSW. The Great Western Highway, Mid Western Highway and Mitchell Highway carry high traffic volumes at Bathurst, combining traffic from regional (through), tourists and local trips. The existing movement of through traffic causes Bathurst town centre particular concern regarding the safe and efficient movement of these vehicles and potential conflicts between through and local traffic, as well as the increasing rate of traffic delay in the town centre.

The objective of this study is to identify whether a case can be made for a Bathurst southern ring road route to reduce the need for increased regional traffic passing through the Bathurst town centre and reduce the need for heavy vehicles to use local roads in the Bathurst Town Centre. For the purposes of this study the location for the southern ring road route is shown in Figure A-1. If it can be proven that Bathurst would benefit from a southern ring road route then further detailed investigations would be required to determine the exact location of the route.

A traffic demand model was developed to predict traffic flows that would divert to a proposed Southern Ring Road Route. The model estimated the light and heavy vehicle traffic flows on existing roads in the Bathurst town centre for 2006, 2020, 2030, 2040 and 2050.

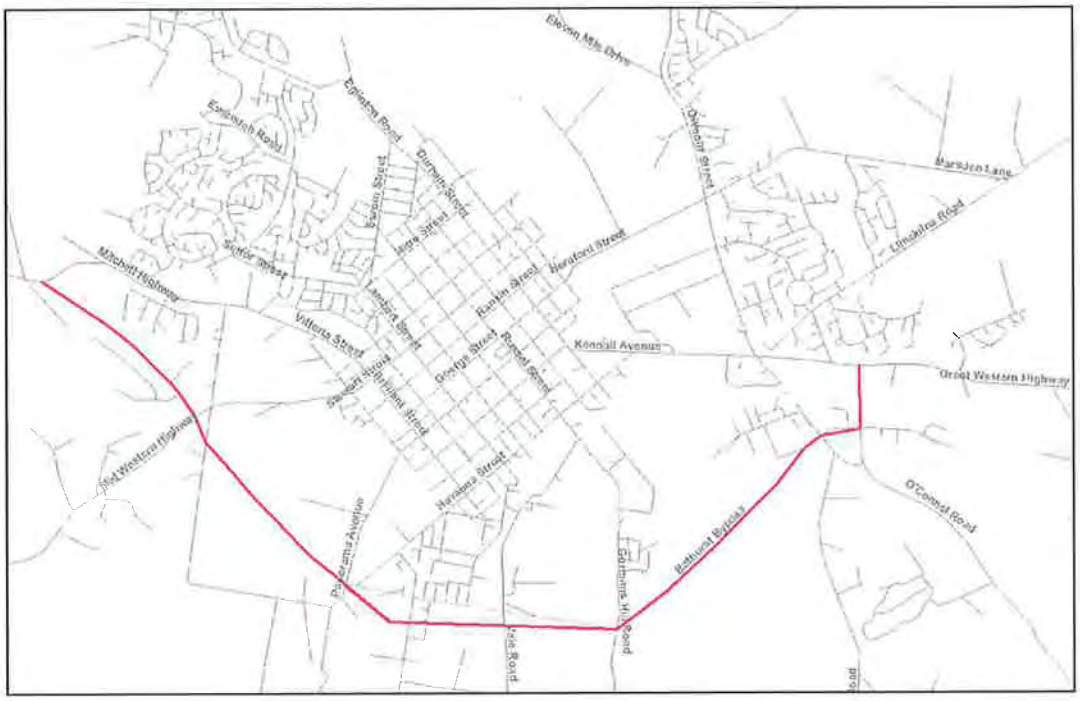


Figure A-1 Alignment for the Southern Ring Road Route adopted for this study

Existing Traffic Conditions:

A survey of existing traffic conditions was carried out between 11 and 17 March 2008. The survey included tube recorders counting at 11 locations around Bathurst which were left in place for at least a week. At these same locations an origin-destination (O-D) survey observed 100% of heavy vehicles

movements and 50% of car movements over a 12-hour period. Summary results from the traffic counters are provided in Table A-1 and the O-D survey results are shown in Table A-2 for each counting station.

Table A-1 Results from the automatic traffic counters

Site ID (refer to Figure 2-4)	Road sections	Daily Average Traffic	Daily Heavy Vehicles	Heavy vehicles as % of all traffic
1 & 2	Mitchell Highway, Evans Plains Creek Bridge	7,505	1,274	17%
3 & 4	Mid Western Highway, west of McDiarmid Street	4,119	638	15%
5 & 6	Vale Road, south of Lloyds Road	3,845	356	9%
7 & 8	O'Connell Road, north of Blue Ridge Road	5,194	762	15%
9 & 10	Great Western Highway (east), west of Ashworth Drive	15,830	1,953	12%
11 & 12	Limekilns Road, south of Culnane Place	5,039	183	4%
13 & 14	Gilmour Street, between Tareena Avenue and Kelso Public School	5,287	366	7%
15 & 16	Durham Street, between Hope Street and Peel Street	10,778	551	5%
17 & 18	Rocket Street, between Seymour Street and Havannah Street	5,460	343	6%
19 & 20	Bentinck Street, between Durham Street and Howick Street	10,547	693	7%
21 & 22	Havannah Street, between Durham Street and Howick Street	9,704	958	10%

Table A-2 Results from the OD Survey

Site ID	Road sections	Tube Count		OD Survey		Sample Size	
		Light Vehicle	Heavy Vehicle	Light Vehicle	Heavy Vehicle	Light Vehicle	Heavy Vehicle
1&2	Mitchell Highway, Evans Plains Creek bridge	4,343	878	1,700	485	39%	55%
3&4	Mid Western Highway, west of McDiarmid Street	2,577	455	975	341	38%	75%
5&6	Vale Road, south of Lloyds Road	2,492	316	1,205	149	48%	47%
7&8	O'Connell Road, north of Blue Ridge Road	3,807	628	1,291	310	34%	49%
9&10	Great Western Highway (east), west of Ashworth Drive	9,693	1,390	4,093	906	42%	65%
11&12	Limekilns Road, south of Culnane Place	3,760	142	-	-	-	-
13&14	Gilmour Street, between Tareena Avenue and Kelso Public School	3,916	344	1,557	182	40%	53%
15&16	Durham Street, between Hope Street and Peel Street	7,888	465	4,047	324	51%	70%
17&18	Rocket Street, between Seymour Street and Havannah Street	4,195	315	1,788	183	43%	58%
19&20	Bentinck Street, between Durham Street and Howick Street	8,087	617	3,439	268	43%	43%
21&22	Havannah Street, between Durham Street and Howick Street	7,175	746	3,467	645	48%	86%

Whilst the target sample size for the O-D survey was 100% for heavy vehicles and 50% for light vehicles as specified in the survey brief to the traffic survey company, the actual sample size achieved was less than required. The sampling ranged from 43% to 86% for heavy vehicles, and 34% to 51% for light vehicles. The low sampling was probably due an underestimation by the survey company on the number of surveyors they needed for the survey. However the sample size was still sufficient for this task. The results were used to calibrate the Bathurst TransCAD traffic model.

The Traffic Model

A traffic model was built of the Bathurst study area to consider present and forecast future traffic patterns with, and without, a southern ring road in the road network. The model was built in the TransCAD modelling software platform program, a GIS-based transport planning package. The base year contained land use descriptions from Council's most recent comprehensive information, which was for the year 2006. The road network in the base model was described as it was in 2007. Traffic was expanded to estimated levels for the years 2006, 2020 and 2050, so the impact of the Southern Ring Road could be measured for each period. One way in which the validity of the model is measured is in its ability to predict traffic movements that match how traffic is currently distributed through the Study Area. A comparison between surveyed and modelled traffic flow is summarised in the following table. It is labelled a 2006 model because that uses generating the traffic were assumed to be those for which we had data, 2006. Future developments can then be added into future years to see how such growth may impact traffic numbers and directions of flow. An annual travel demand growth rate of 1% is assumed for existing established areas.

Table A4 shows that the model replicated most of sites within a range of +/-20 percent and with R2 value 0.95, indicating a close match between counts and model volumes. Thus it is reasonable to conclude that the calibration of the existing situation in the model for the Bathurst study area is acceptable and can form the basis for forecasting future traffic on the proposed Southern Ring Road Route. This level of accuracy is acceptable for a strategic model.

Table A-3 Comparison of surveyed and modelled traffic flow for year 2006 (vehicles/day)

Site ID	Road	Model		Survey		Difference		% Difference	
		NE/NW	SE/SW	NE/NW	SE/SW	NE/NW	SE/SW	NE/NW	SE/SW
1&2	Mitchell Highway, Evans Plains Creek Bridge	3,735	3,765	3,753	3,752	18	-13	0%	0%
3&4	Mid Western Highway, west of McDiarmid Street	2,060	2,055	2,064	2,055	4	0	0%	0%
5&6	Vale Road, south of Lloyds Road	1,920	1,930	1,907	1,938	-13	8	-1%	0%
7&8	O'Connell Road, north of Blue Ridge Road	3,485	1,710	3,497	1,697	12	-13	0%	-1%
9&10	Great Western Highway (east), west of Ashworth Drive	7,815	7,970	7,959	7,871	144	-99	2%	-1%
11&12	Limekilns Road, south of Culnane Place	2,005	2,645	2,348	2,691	343	46	17%	2%
13&14	Gilmour Street, between Tareena Avenue and Kelso Public School	2,220	2,100	2,491	2,796	271	696	12%	33%
15&16	Durham Street, between Hope Street and Peel Street	5,735	7,635	5,178	5,600	-557	-2,035	-10%	-27%
17&18	Rocket Street, between Seymour Street and Havannah Street	3,020	2,230	2,952	2,508	-68	278	-2%	12%
19&20	Bentinck Street, between Durham Street and Howick Street	6,475	5,415	5,616	4,931	-859	-484	-13%	-9%
21&22	Havannah Street, between Durham Street and Howick Street	6,220	5,225	4,616	5,088	-1,604	-137	-26%	-3%

Land Use Changes

Changes in population and commercial/industrial GFA (ha) were forecast as inputs into changing traffic rates in the model and are summarised in the following table.

Table A-4 Changes in population and commercial/industrial GFA (ha)

Year	Population	Annual Population Growth	Growth in Commercial / Industrial floor area (ha)	Rate of growth in Commercial / Industrial floor area
2006	32,653		166.92	
2020	39,690	1.4%	215.79	29.3%
2030	53,200	3.0%	266.65	23.6%
2040	66,800	2.3%	273.23	2.5%
2050	80,300	1.9%	274.17	0.3%

Network Changes

The only change made to the existing road network was the addition of the Southern Ring Road Route. There were no other changes to local, collector or arterial roads within the Bathurst town centre, nor were any changes identified that could be required to accommodate the increasing population and employment levels up to 2050.

Traffic Forecasts

In 2006, 2,200 vehicles (44% of through traffic) were predicted to divert to the Southern Ring Road Route, 3,700 vehicles (52% of through traffic) by 2020 and 10,950 vehicles (37% of through traffic) by 2050. This was based on an assumed average speed of 70km/h on the Southern Ring Road Route and no other changes on the road network.

The transport model predicted that the percentage of through traffic using the Southern Ring Road Route would increase if the travel time on the Southern Ring Road Route were reduced **or** the travel time on alternative through routes were increased. In other words, diversion to the Southern Ring Road Route is dependent upon the absolute travel time differences between alternative routes. Options for reducing travel time on the Southern Ring Road Route were to increase the speed limit, to grade separate critical intersections for Southern Ring Road Route and to provide the number of lanes to meet expected peak traffic demand comfortably. Other options include making alternative routes less attractive by increasing delays and/or reducing capacity.

The transport model predicted the following portions of through heavy vehicle movements would use the Southern Ring Road Route by 2050.

Table A-5 Estimated heavy vehicles using the Southern Ring Road Route 2050

From	Total heavy vehicle through traffic (2050) (vehicles per day)	% of heavy vehicles using the Southern Ring Road Route (vehicles per day)
Great Western Highway (east)	2,700	35%
Mitchell Highway	700	79%
Mid Western Highway	700	71%
Vale Road	1,150	83%
O'Connell Road	750	47%

The transport model predicted a higher portion of heavy vehicle through traffic would use the Southern Ring Road Route, which further strengthens the environmental and safety case for the Southern Ring Road Route.

The transport model results indicated that the Southern Ring Road Route in its proposed location would be used by local traffic, particularly westbound traffic, on the Great Western Highway. A high percentage of this traffic is estimated to turn onto the Southern Ring Road Route and then enter the east side of town via Russell Street. If this is not favoured, then it would be necessary to move the Southern Ring Road Route further south to deter motorists. On the other hand, this could be favoured by Council as it would divert a significant amount of traffic from Havannah and Bentinck Streets.

Hazardous Goods Movements through Bathurst:

The Southern Ring Road Route would provide a safer route for hazardous goods through Bathurst, as it could be located well away from residences, schools and other businesses.

Traffic Model Flow Diagrams

Detailed traffic flow diagrams from the transport model are in Appendix E.

Future Zoning of Industrial land

Approval for future zoning of industrial land is very dependent on good access for heavy vehicles. Without the Southern Ring Road Route heavy vehicles will continue to use existing streets and opposition to the release of more industrial land from local residents and businesses will also increase.

Tables 6-9 and 6-10 summarise traffic volumes on the current main access routes to the industrial land in Lloyds Road via the Havannah Street/ Bentinck Street/ Rocket Street route and the Russell Street/ Alpha Road/ Vale Road route. The traffic model indicates that the Southern Ring Road Route will reduce heavy vehicle traffic on these routes significantly by up to 70% in year 2020.

Potential to divert traffic away from the City

The traffic model provided additional evidence regarding the need for the Southern Ring Road Route. It came from the percentages of through traffic that were forecast to divert to the route. In 2006, approximately 58% of through traffic would have chosen the route, 68% in 2020, 52% in 2030, 47% in 2040 and 44% in 2050. These forecasts assume no other changes were made to the existing road network. Almost 100% of through traffic from the Mitchell Highway, Vale Road and O'Connell Road would use the Route. Initially, a lower percentage of through traffic from the Great Western Highway would choose the Route but this would grow as congestion increases on local roads. The reason behind the

traffic diversion is related to a quicker travel time between various origins and destinations along the route due to the increasing congestion on travel routes through the town centre.

Findings and conclusion

The conclusion from this study is that a Southern Ring Road Route would provide several advantages to Bathurst and further detailed studies to select a preferred route and estimate costs are warranted. These further investigations should also be directed by Bathurst Regional Council whether it prefers the road to function solely as a bypass or whether it should be integrated with the existing road network to relieve some local routes of local traffic.

Contributions of the Southern Ring Road Route were forecast by the transport model, as

- a high percentage of all light and heavy vehicles passing through Bathurst would divert to the Southern Ring Road Route – 44% in 2006, 52% in 2020 and 37% in 2050. The decreasing diversion of traffic to the Southern Ring Road Route is probably due to the strategic nature of the model. The most significant point is that the model is still predicting a high percentage of traffic diverting to the Southern Ring Road Route by 2050.
- the Southern Ring Road Route, in the location shown in this study, would attract a high percentage of local traffic, particularly westbound traffic approaching Bathurst with a destination in the industrial and educational facilities located on the south east of Bathurst
- a significant diversion of traffic from key local streets of around 20-30% on routes such as, Durham and Havannah Streets, with even higher diversions of heavy vehicles from these roads
- a significant increase in traffic on Gorman Hills Road and Russell Street as these roads become the major links to the Southern Ring Road Route from the Bathurst town centre
- a reduction in total light and heavy vehicles on link roads to and through the residential areas
- widening the Great Western Highway, east of the proposed start of the Southern Ring Road Route, should be considered as soon as possible if the route is to accommodate the predicted increases in traffic movements arising from the growth in Bathurst provided to the transport model for 2020
- the Southern Ring Road Route would reduce risks to residents and businesses from the movement of hazardous goods through Bathurst.
- failure to proceed with the Southern Ring Road Route could stifle future commercial and industrial development in South Bathurst

1. Introduction

1.1 Overview

Bathurst Regional Council sought a consultant to help it measure the need for a Southern Ring Road route to remove conflicts between heavy vehicles and local traffic, and thereby improve the amenity of the town.

In 2008, PB developed a Bathurst Area travel demand model using the transport planning software suite "TransCAD". The model assessed the impacts of potential future developments on the capacity of the existing road network for target years over the next 40 years. The model was calibrated and validated against 2006 traffic counts on the major highways and other roads. The model produced traffic forecasts in ten year increments up to 2050 on key roads with and without a possible Bathurst Southern Ring Road Route in the road network for the greater town area.

This report documents the process of PB in assessing the case for a Southern Ring Road Route from a review of existing traffic conditions, the impact of future traffic on the existing road network and the diversion of traffic that might occur if a Southern Ring Road Route were built on the southern alignment.

1.2 Study objectives

The study objectives were;

- to investigate the case for a Bathurst Southern Ring Road Route to reduce or remove the need for increasing through traffic to pass through the town centre
- to investigate the case for the Southern Ring Road Route to divert heavy vehicle traffic within the City and to provide a heavy vehicle route to the key industrial locations within the City
- to divert heavy vehicle traffic within Bathurst
- to provide a heavy vehicle route to the key industrial locations within Bathurst.

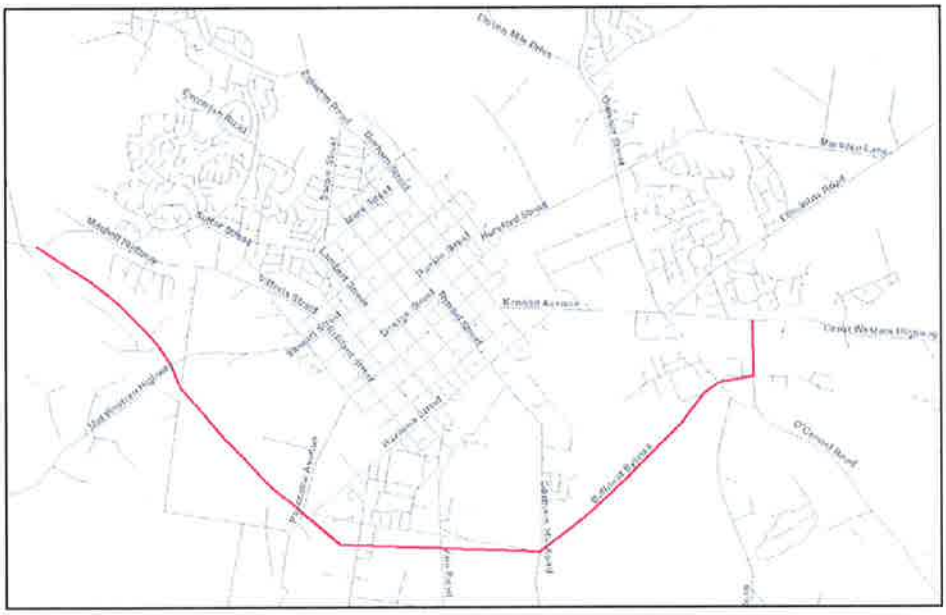
1.3 Study approach

The study approach for assessing the need for the Southern Ring Road Route has been based on a travel demand and assignment model developed specifically for Bathurst Regional Council. The traffic model uses a range of traffic data and population growth assumptions to forecast traffic growth in ten year increments up to year 2050. This report summarises existing and future traffic movements for light and heavy vehicles through Bathurst with and without the proposed Southern Ring Road Route.

The study area covers the city of Bathurst and its surrounding area, as illustrated in Figure 1-1.

The general route of a possible alignment for a Southern Ring Road Route as adopted for this study is shown in Figure 1-2. Further investigations will be required to determine the final location of the Southern Ring Road Route.

Figure 1-1 Model study area



Note: This is a general route only and it should not be interpreted as an actual route for the Southern Ring Road as this would need to be the subject of further investigations

Figure 1-2 Alignment of Southern Ring Road Route adopted for this study

1.4 Structure of report

This report contains six further sections:

- *Section 2:* Existing traffic conditions - describes the road network and land use and traffic conditions on the major highways
- *Section 3:* Traffic distribution - describes regional traffic passing through Bathurst area and the mix of local versus through traffic on the major highways
- *Section 4:* Traffic model assumptions – describes what they were and how they were used in the construction and calibration of the traffic model
- *Section 5:* Likely traffic growth from future land use and network assumptions for next 40 years
- *Section 6:* Traffic forecasts for the likely future travel patterns and growth on the Southern Ring Road Route and major highways
- *Section 7:* Summary of Findings.

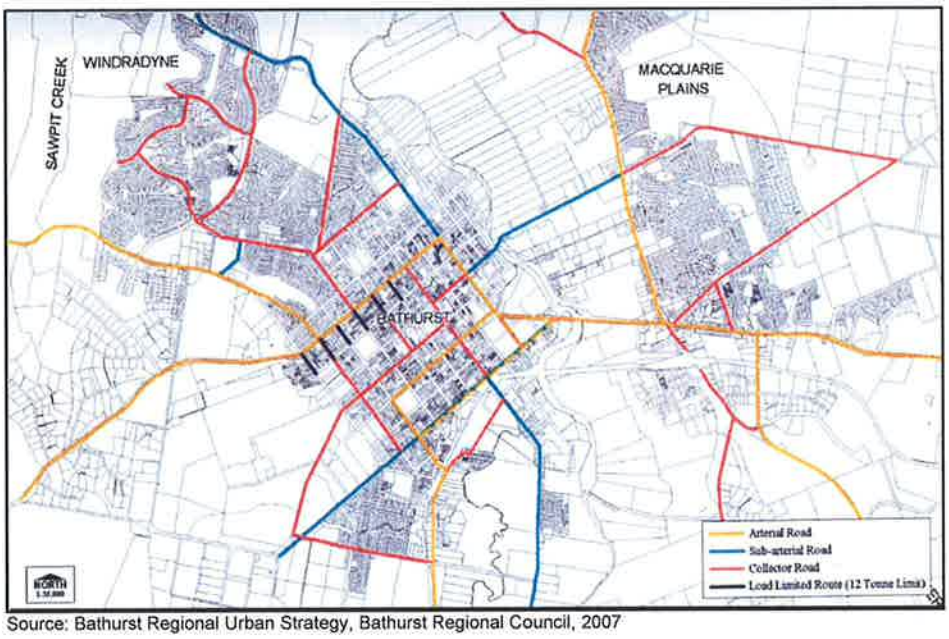
2. Existing traffic condition

2.1 Road network

Bathurst is located approximately 200km west of Sydney at the junction of the Great Western Highway, Mitchell Highway and Mid Western Highway. The City of Bathurst is under the jurisdiction of Bathurst Regional Council.

Figure 2-1 shows the road hierarchy and residential roads south-east of Stewart Street, with load limit restrictions.

RTA approved B-double routes in Bathurst are the Mitchell Highway, Great Western Highway, Mid Western Highway, Vale Road, Bentinck Street, Rocket Street, Littlebourne Street, Adrienne Street, Lee Street/ Stockland Drive, O'Connell Road, Oberon Road, Durham Street and Corporation Avenue.



Source: Bathurst Regional Urban Strategy, Bathurst Regional Council, 2007

Figure 2-1 Road hierarchy, heavy vehicle routes and load restrictions

2.2 Land use

2.2.1 Introduction

Existing and future land use information within and surrounding the Bathurst urban area, including the adjoining villages of Eglinton, Raglan and Perthville, was obtained from the *Bathurst Regional (Interim) Local Environmental Plan 2005* (Bathurst LEP 2005) and associated maps, as well as the *Bathurst Region Urban Strategy* (2007).

The aim of the land use analysis was to estimate population and employment within the Bathurst urban area for the periods 2006, 2020, 2030 2040 and 2050. The main outcomes being a spatial understanding of current and future land use that generate and attract traffic, gross site areas (GSA), number of residential dwellings and gross floor areas for employment land (i.e. commercial and industrial).

2.2.2 Bathurst Regional (Interim) Local Environmental Plan 2005

The Bathurst LEP (2005), prepared under the *Environmental Planning and Assessment Act 1979*, is the principle environmental planning instrument for the Bathurst region. It applies to all land within the local government area. Amongst other objectives, its aims include:

- *to provide interim or transitional planning controls for the local government area of Bathurst Regional Council*
- *To facilitate the orderly and economic development of land.*

The 14 land use zones in the Bathurst LEP 2005 are summarised in Table 2-1.

Table 2-1 Zones in Bathurst LEP 2005 and their applicability and purpose

Zone	Applicability and purpose
1(a) Inner Rural Zone	▪ Applies to the general rural areas located near the urban fringe of Bathurst ▪ The main purpose of this zone is to support continued agricultural viability within close proximity to the Bathurst urban area
1(b) Market Garden Zone	▪ Applies to the market garden area to the east of Bathurst town centre, between the urban area and Macquarie Plains ▪ The main purpose of this zone is to promote vegetable culture on smaller rural lots
1(c) Rural Residential Zone	▪ Applies to rural residential lots at Robin Hill and north-east of White Rock ▪ The main purpose of this zone is to enable rural residential housing on land that is not of high agricultural value
1(d) Rural Special Purposes Zone	▪ Applies to the rural land around Mount Panorama ▪ The main purpose of this zone is to enable development that is consistent with both the existing rural and motor racing activities
1(e) Outer Rural Zone	▪ Applies to the agricultural land located in the outer areas ▪ The main purpose of this zone is to support continued agricultural viability in the outer areas
1(f) Special Rural Small Holdings Zone	▪ Applies to land at the central eastern extremity of the local government area ▪ The main purpose of this zone is to promote rural residential or hobby farm development
2(a) Residential Zone	▪ Applies to the Bathurst residential area, including Eglinton, Perthville and Raglan ▪ The main purpose of this zone is to permit housing within existing and new residential areas, including residential units and dual occupancies
2(v) Village Zone	▪ Applies to the outlying rural villages

Zone	Applicability and purpose
	▪ The main purpose of this zone is to allow housing in a low density residential settlement environment, as well as other non-residential development
3(a) General Business Zone	▪ Applies to the Bathurst CBD and small centres in Windradyne and Kelso ▪ The main purpose of this zone is to permit a diverse range of retail, commercial and professional land uses
3(b) Service Business Zone	▪ Applies to the Service Trade Centre at Robin Hill and the two precincts in Kelso on Sydney Road to the east of the CBD ▪ The main purpose of this zone is to permit service business activities, such as bulky goods salesrooms or showrooms, away from the CBD
4(a) Industrial Zone	▪ Applies to the Kelso, Airport and South Bathurst industrial precincts, as well as historic locations on Bradwardine Road (Simplot), Mid-Western Highway and railway lands ▪ The main purpose of this zone is to provide fully serviced land that is suitable for industrial uses and will contribute to economic and employment growth
5(a) Special Uses – Public Purposes Zone	▪ Applies to education, health and community land, including the airport, Charles Sturt University and TAFE at Mitchell, the cemetery, gaol, hospital, and various schools ▪ The main purpose of this zone is to identify land that may be used for a public purpose and cultural and social needs
6(a) Local Recreation Zone	▪ Applies to the various parks throughout Bathurst, including the golf course ▪ The main purpose of this zone is to provide adequate open space for community and recreational purposes
6(b) Regional Recreation Zone	▪ Applies to publically owned Mount Panorama lands ▪ The main purpose of this zone is to enable development that is complimentary to motor racing and associated activities on Mount Panorama, including sports and recreation

2.2.3 Bathurst Region Urban Strategy (2007)

The Urban Strategy aimed to 'provide a broad land use strategy to guide the future land management and development of the urban areas and urban villages' (p. 7) and was used as the basis for identifying future potential land use scenarios. The Urban Strategy applied to all urban land uses within the Bathurst region, including the adjoining urban villages of Eglinton, Raglan and Perthville. It therefore nominally applies to the Study Area in the model.

The overriding objective of the Urban Strategy was to identify strategic responses and sustainable growth opportunities for the management and development of the urban areas. The Urban Strategy did not apply timeframes to these development opportunities, rather it provided a broad indication of where different types of development might occur in the future based on the expected growth of each land use. This information has been used to determine potential land use scenarios 2020, 2030, 2040 and 2050 within the traffic model.

2.2.4 Relevant Development Control Plans (DCPs)

Primary development controls for the various land uses are contained in the following DCPs:

- business development (2006)
- industrial development (2006)
- residential housing (2006)
- Residential subdivision (2006).

The main controls used were Floor Space Ratios (FSR) and minimum lot sizes, as well as guidelines for dwelling densities, within the various residential precincts.

2.2.5 Methodology

Current land uses within and adjoining the Bathurst urban area were based on the land use zones assigned under Bathurst LEP (2005). However, this method only allows the identification of land zoned for the designated purpose and does not distinguish between developed and undeveloped zoned land, which is particularly important in the case of residential and industrial zoned land. Therefore, the zoned land was compared against a recent Council aerial photograph of the area to determine the extent to which the zoned land had been developed. The accuracy of this base data is therefore limited by the currency of the aerial photograph. Despite this method not being verified by a site-based land use survey, it is the most efficient means of building up a picture of current land use in a timely fashion.

The main outcome of this analysis was a broad land use map, loosely based on the zones developed in the Bathurst LEP (2005). Within these zones, some minor discrepancies were disregarded. For example, the majority of small pocket parks were overlooked and assumed to be residential land use for trip generation/destination purposes.

Each zone was divided into smaller parcels, or travel zones, of a single land use. These parcels were based on ABS census collector district (CD) boundaries, to allow comparison against the 2006 Census data. The most important element of this analysis was the calculated Gross Site Areas (GSA) for each travel zone and each land use overall. These land areas were used as the basis for estimating dwelling numbers and Gross Floor Areas (GFAs) for use in the traffic modelling.

The total dwelling numbers were determined by applying an assumed gross dwelling density to the GSA, as summarised in Table 2-2. The maximum allowable dwelling densities based on the current development controls are also shown for comparison.

Table 2-2 Dwelling densities

Land Use	Assumed gross density (dwellings/hectare)	Maximum gross density (dwellings/hectare)
Residential	5.0	10.0
Medium Density Residential	10.0	30.0
Rural	0.05	<=0.05
Rural Residential	0.4	1.0
Market Garden	0.05	<=0.05

The assumed densities were derived by testing the known dwelling numbers against site areas for several different regions and land uses so as to determine the average, or typical, current densities.

For business, industrial and special use zones, the commonly used basis for forecasting employment numbers is gross floor area (GFA). This can be taken as the sum of the areas of each floor of a commercial/industrial building, which is very difficult to determine without undertaking on-site surveys of floor space. In this instance, GFA has been estimated using an assumed Floor Space Ratio (FSR) for each land use, as shown in Table 2-3. The site area is multiplied by the assumed FSR to determine the employment land use GFA within each travel zone.

Table 2-3 Floor Space Ratios (FSRs)

Land Use	Assumed FSR	Maximum FSR
Business/Retail	0.5:1	2:1
Service Business	0.2:1	1:1
Industrial	0.2:1	1:1
Special Use	0.1:1	N/A

The maximum FSRs achievable under the current development controls were not used in the calculations, as they are for use at a site-specific level and do not make allowance for roads, and paths etc, which would have grossly over-estimated the GFAs. An estimate of the current development intensity (i.e. FSR) based on aerial photo interpretation was used instead.

In addition, the following assumptions were made in deriving dwelling numbers and GFAs;

- the business, industrial and recreation zones did not contain any dwellings
- the gross site areas (GSA) included roads and some small pocket parks, and was not sensitive to minor land use changes and other constraints, such as environmentally sensitive land
- the residential areas would be developed at similar intensities, except for Precinct 1 – Inner town centre, which may be developed at somewhat higher densities (i.e. medium density)
- the assumed growth rate for the medium density residential area (surrounding the CBD) was 4 per cent per annum, through infill housing and redevelopment of older housing

- the assumed floor space growth rate in the CBD (i.e. major business zone) was 2 percent, accounting for infill development and redevelopment
- there would be no further growth in developed residential areas (e.g. developed areas will not change), which ignores minor growth through redevelopment of older housing stock for multi-unit dwellings and dual occupancy development
- the target number of dwellings within the study area was 10, 876 dwellings, based on the 2006 Census. Accordingly, the GSAs were factored by a multiplier of 0.972 to correlate the estimated dwelling values with the 2006 data. Thus the total number of dwellings across the study area (10,885) correlated to the 2006 Census
- the floor areas in the industrial and business zones were not correlated against known values, due to the absence of survey data
- industrial land that was already developed was not assumed to be developed at higher intensities. This ignored minor growth through redevelopment and infill development.
- the overall demand for industrial land was estimated to be 20 hectares per annum, or 200 hectares for each 10 year period based on current growth rates (Urban Strategy 2007)
- the overall demand for service business land is 2.2 hectares per annum, or 22 hectares for each 10 year period, based on current growth rates (Urban Strategy 2007)
- the GFA within the special uses zone will remain constant to 2050, which assumes no growth on this land.

The purpose of the land use modelling component was to capture the zoning of the area and land use intensities to estimate the quantum and distribution of population and employment that will drive the origins and destinations of travel estimated by the model for distribution to the road network. The model was used to project increases in densities and changes in land use in certain areas.

2.2.6 Current land use scenario

The current land use scenario, based on the above analysis, is shown in Figure 2-2.

Figure 2-2 Land use - current

2.3 Traffic

2.3.1 Definition of traffic parameters

Before describing the process used, it is useful to define some terms used in traffic measurements;

AADT (Annual Average Daily Traffic) is by definition the total traffic throughout the year divided by 365. It is the average 24-hour daily volume over the whole year - often used in traffic planning and design.

All AADT traffic count volumes are derived either from complete counts of all traffic on every day at permanent counting stations, or by sample counts over one or two weeks and statistical expansion using factors derived by State Road agencies over a long history of undertaking such analysis.

ADT (Average Daily Traffic) represent volumes derived from a shorter counting period, usually one or two selected weeks in the year.

AWT is Average Weekday Traffic, again derived from the sample week, as opposed to the average over the entire year (AAWT). AWE is average weekend.

2.3.2 AADT

Historic traffic data on major roads in NSW is usually sourced from the Roads and Traffic Authority of NSW (RTA) *Traffic Volume Data for Western Region*, 2002. In general, RTA reports traffic data in terms of annual average daily traffic (AADT). Historical data was also available for:

- Great Western Highway, east of Boyd Street
- Mid Western Highway, west of Browning Street
- Mitchell Highway, north of Mid Western Highway
- Great Western Highway, west of Gilmour Street
- Gilmour Street, north of Great Western Highway
- Durham Street, west of Bentinck Street
- Great Western Highway, north of Mitchell Highway
- Bentinck Street, south of Lambert Street.

Table 2-4 shows traffic volume changes at the above locations for the 11-year period between 1992 and 2002. The RTA data indicated that daily traffic was approximately 20,000 vehicles per day on the Great Western Highway, east of the Bathurst town centre, and approximately 10,000 vehicles per day on the Mitchell Highway, west of the Bathurst town centre. The highest traffic volumes on any route within the Bathurst town centre were of the order of 22,000 vehicles per day on the Great Western Highway, west of Gilmour Street.

Figure 2-3 shows how between 1992 and 2002, traffic outside the town centre grew between 1.1% and 4.1%. At the town boundary traffic, growth was very marginal, changing between a decrease of 4.0% and an increase of 2.2%. The average traffic growth, between 1992 and 2002, was approximately 1.1%, in and around, Bathurst.

Table 2-4 AADT trends at Bathurst (between 1992 and 2002)

Type	Station No	Road	Location	AADT				Growth
				1992	1996	1999	2002	1992-2002
Outside town centre	99.709	Great Western Hwy	East of Boyd St	14,024	19,491	18,801	19,713	4.1%
	99.847[1]	Mid Western Hwy	West of Browning St	3,848	3,807	4,156	4,279	1.1%
	99.307	Mitchell Hwy	North of Mid Western Hwy	-	8,395	10,212	10,105	3.4%[2]
Within town centre	99.337	Great Western Hwy	West of Gilmour St	18,965	26,881	27,891	22,242	1.7%
	99.712	Gilmour St	North of Great Western Hwy	3,543	4,908	-	4,311	2.2%
	99.715	Durham St	West of Bentinck St	-	24,403	24,438	18,611	-4.0%[2]
	99.722	Great Western Hwy	North of Mitchell Hwy	12,102	11,188	12,391	11,225	-0.7%
	99.860	Bentinck St	South of Lambert St	4,262	4,417	2,352	4,711	1.1%

Source: RTA Traffic Volume Data for Western Region, 2002

Notes (1) vehicle counts, (2) traffic growth between 1996 and 2002

The trends in AADT for each of these roads are shown graphically in Figure 2-3. It shows that

- There has been about a 20% decrease in traffic on the Great Western Highway west of Gilmour Street as compared to Durham Street west of Bentinck Street due in part to an increase in the use of Hereford Street as an alternative route.
- A small 1-2% increase in traffic within the town centre has been recorded on the Great Western Highway (west of Gilmour Street), Gilmour Street and Bentinck Street. However there is a decline in traffic on Great Western Highway (north of Mitchell Highway) and Durham Street.
- Traffic flows outside the town centre on the Great Western Highway east of Boyd Street, Mitchell Highway north of the Mid Western Highway, the Mid Western Highway west of Browning Street and Bentinck Street south of Lambert Street are all trending up by a few percentage points in the 10-year period between 1992 and 2002.
- These changes in traffic movements since 1992 may reflect the decrease in agricultural traffic generated west of Bathurst and an increase in business and commercial activity in Bathurst which is biased towards commercial areas east of Bathurst.

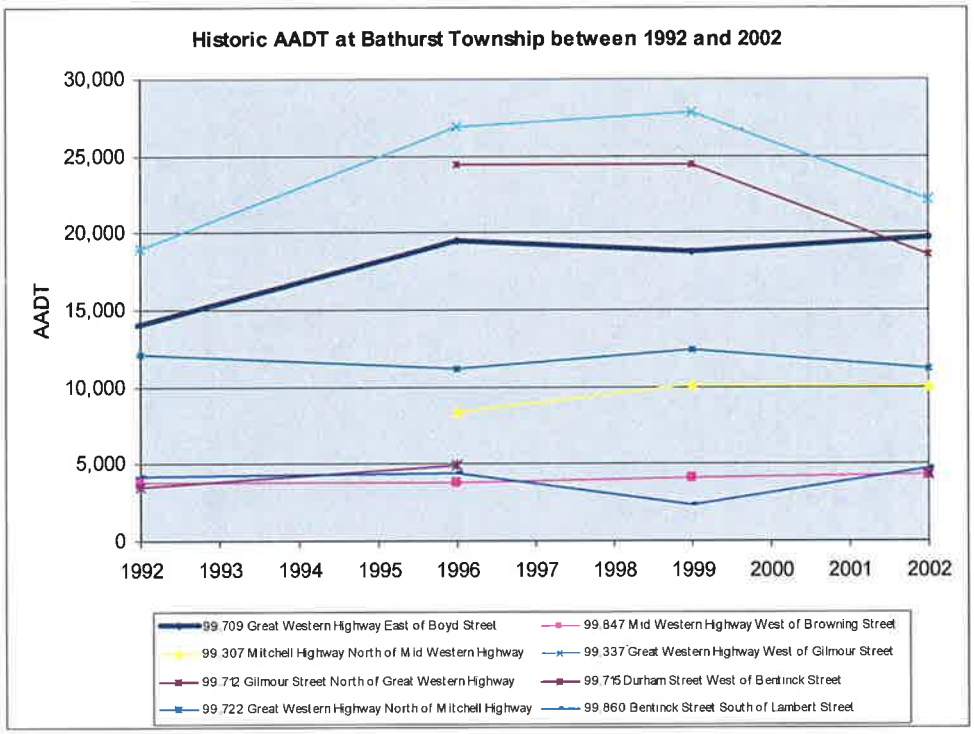


Figure 2-3 AADT trends on routes within Bathurst (1992-2002)

2.3.3 Daily traffic volumes

The most recent traffic information for the study area was obtained from tube counts at the 11 locations listed in Table 2-5. Given that the traffic was counted by direction, 22 weekly patterns were recorded. The tube counters recorded traffic counts 24 hours a day over seven continuous days from *Tuesday 11 March* to *Monday 17 March 2008*. Vehicles where classified into the 12 AUSTROADS categories of traffic types.

Table 2-5 Traffic survey locations

Site	Road	Location	Direction
1	Mitchell Hwy	Evans Plains Creek bridge, Dunkeld	Eastbound
2			Westbound
3	Mid Western Highway	West of McDiarmid Street	Eastbound
4			Westbound
5	Vale Road	south of Lloyds Road	Northbound
6			Southbound
7	O'Connell Road	north of Blue Ridge Road	North-west bound
8			South-east bound
9	Great Western Hwy	west of Ashworth Drive	Westbound
10			Eastbound
11	Limekilns Rd	South of Culnane Place	South-west bound
12			North-east bound
13	Gilmour St	between Tareena Avenue and Kelso Public School	Southbound
14			Northbound
15	Durham St	between Hope Street and Peel Street	South-east bound
16			North-west bound
17	Rocket Street	between Seymour Street and Havannah Street	North-west bound
18			South-east bound
19	Bentinck Street	between Durham Street and Howick Street	North-east bound
20			South-west bound
21	Havannah Street	between Durham Street and Howick Street	North-east bound
22			South-west bound

These survey locations are presented in Figure 2-4.

Figure 2-4 Traffic survey locations

Table 2-6 presents results from the traffic counters. The results are daily traffic flows for the average weekday, weekend and on the critical (busiest) day, which turned out to be Friday for the study area. The average daily figures are not directly comparable with the annual average daily traffic figures (see Table 2-6) due to seasonal variations and the varied years on which counts were taken.

The data also showed that Friday is the critical day for heavy vehicles in and around Bathurst – see Section 2.3.7 for further details.

Table 2-6 Daily traffic volumes from traffic count surveys (2008)

Site ID	Road sections	Average Weekday	Average Weekend	Critical day (Friday)	% Traffic Change	
					Friday Vs Weekday	Weekend Vs Weekday
1 & 2	Mitchell Highway, Evans Plains Creek Bridge	6,516	5,433	7,505	115%	83%
3 & 4	Mid Western Highway, west of McDiarmid Street	3,759	3,089	4,119	110%	82%
5 & 6	Vale Road, south of Lloyds Road	3,488	2,954	3,845	110%	85%
7 & 8	O'Connell Road, north of Blue Ridge Road	5,168	3,681	5,194	100%	71%
9 & 10	Great Western Highway (east), west of Ashworth Drive	14,179	12,837	15,830	112%	91%
11& 12	Limekilns Road, south of Culnane Place	4,816	3,623	5,039	105%	75%
13& 14	Gilmour Street, between Tareena Avenue and Kelso Public School	5,036	4,244	5,287	105%	84%
15& 16	Durham Street, between Hope Street and Peel Street	10,327	8,283	10,778	104%	80%
17& 18	Rocket Street, between Seymour Street and Havannah Street	5,155	3,436	5,460	106%	67%
19& 20	Bentinck Street, between Durham Street and Howick Street	9,924	7,311	10,547	106%	74%
21& 22	Havannah Street, between Durham Street and Howick Street	9,404	6,312	9,704	103%	67%

From Table 2-6 the following traffic characteristics are noted:

- Great Western Highway carried approximately 15,850 vehicles per day (vpd) on the eastern side of Bathurst, Mitchell Highway carried approximately 7,500 vpd to the western side of town, and Mid Western Highway carried approximately 4,100 vpd on the south-west side of town. Traffic at these locations comprised both local and inter-regional traffic which was either through traffic or traffic that had either an origin or destination within the Bathurst study area
- Durham Street, which connects with the Great Western Highway, carried approximately 10,800 vpd, which is significantly higher than the traffic flow on the Mitchell and Mid Western Highway
- traffic on Bentinck Street was slightly higher than Havannah Street within the Bathurst town centre
- critical Friday traffic across the network was about 5% to 15% higher than average weekday traffic
- weekend daily traffic was significantly lower than weekday traffic, for instance it was 10% to 20% lower on the Great Western, Mitchell and Mid Western Highways.

2.3.4 Daily variations

Results of the daily traffic counts at the 11 survey locations are presented in Figure 2-5 which shows the variation of the traffic profile over a one week period. The results indicate that:

- Traffic on the highways vary from day to day. Generally, Friday was the busiest day at 9 out of the 11 survey locations.
- Between Monday and Thursday, traffic on the Mitchell Highway and Great Western Highway is relatively consistent, with a peak on the Friday.
- Durham Street, an arterial road through the town centre, was an exception. Results showed similar traffic levels between Monday and Wednesday, with a decline on Thursday and Friday.
- S1 & 2 (Mitchell Highway) – the traffic trend is consistent from Tuesday to Thursday with a pronounced afternoon peak. Weekend traffic was much lower than weekdays, with a peak occurred in Saturday morning and Sunday afternoon. Of the seven days, the highest traffic was recorded on Friday, where 6,231 light vehicles and 1,274 trucks were recorded.
- S3 & 4 (Mid Western Highway) – the traffic trend is consistent from Tuesday to Friday with even morning and afternoon peak flows. Weekend traffic was lower than weekdays. Of the seven days, the highest traffic was recorded on Friday, where 3,481 light vehicles and 638 trucks were recorded.
- S5 & 6 (Vale Road) – the traffic trend is similar on weekdays with even morning and afternoon peak flows. Weekend traffic was lower than weekdays. Of the seven days, the highest traffic was recorded on Friday, where 3,489 light vehicles and 356 trucks were recorded.
- S7 & 8 (O'Connell Road) – the traffic trend is similar on weekdays with a pronounced afternoon peak. Weekend traffic was lower than weekdays with a peak period occurred during mid-days. Of the seven days, the highest traffic was recorded on Thursday, where 4,704 light vehicles and 753 trucks were recorded.
- S9 & 10 (Great Western Highway) – the traffic trend is consistent from Monday to Thursday with a pronounced afternoon peak. Weekend traffic was lower than weekdays with a peak period occurred during mid-days. Of the seven days, the highest traffic was recorded on Friday, where 13,877 light vehicles and 1,953 trucks were recorded.
- S11 & 12 (Limekilns Road) – the traffic trend is consistent from Monday to Wednesday with fairly similar morning and afternoon peak traffic, and the traffic increased on Thursday and Friday with more traffic recorded during the afternoon peak. Weekend traffic was much lower than weekdays with a peak period occurred during mid-days. Of the seven days, the highest traffic was recorded on Friday, where 4,856 light vehicles and 183 trucks were recorded.
- S13 & 14 (Gilmour Street) – the traffic trend is consistent from Monday to Friday with fairly even morning and afternoon peak traffic. Weekend traffic was lower than weekdays with a peak period occurred during mid-days. Of the seven days, the highest traffic was recorded on Friday, where 4,921 light vehicles and 366 trucks were recorded.

- S15 & 16 (Durham Street) – the traffic trend is consistent from Monday to Wednesday with a prominent afternoon peak period, and the daily traffic generally decreased on Thursday and Friday. Weekend traffic was much lower than weekdays with a peak period occurred during mid-days. Of the seven days, the highest traffic was recorded on Friday, where 10,277 light vehicles and 551 trucks were recorded.
- S17 & 18 (Rocket Street) – the traffic trend is consistent on weekdays with high traffic observed during the afternoon peak period. Weekend traffic was much lower than weekdays with a peak period occurred during mid-days. Of the seven days, the highest traffic was recorded on Friday, where 5,117 light vehicles and 343 trucks were recorded.
- S19 & 20 (Bentinck Street) – highest daily traffic was recorded on Monday and Tuesday. Traffic declined significantly on Wednesday and increased on Thursday and Friday. Prominent afternoon peak periods were observed on weekdays. Weekend traffic was lower than weekdays with a peak period occurred during mid-days. Of the seven days, the highest traffic was recorded on Friday, where 9,854 light vehicles and 693 trucks were recorded.
- S21 & 22 (Havannah Street) – similar patterns were recorded on weekdays with short morning and afternoon peak periods. Mid day traffic was relatively lower on weekdays. Weekend traffic was lower than weekdays with a peak period occurred during mid-days. Of the seven days, the highest traffic was recorded on Friday, where 8,746 light vehicles and 958 trucks were recorded.

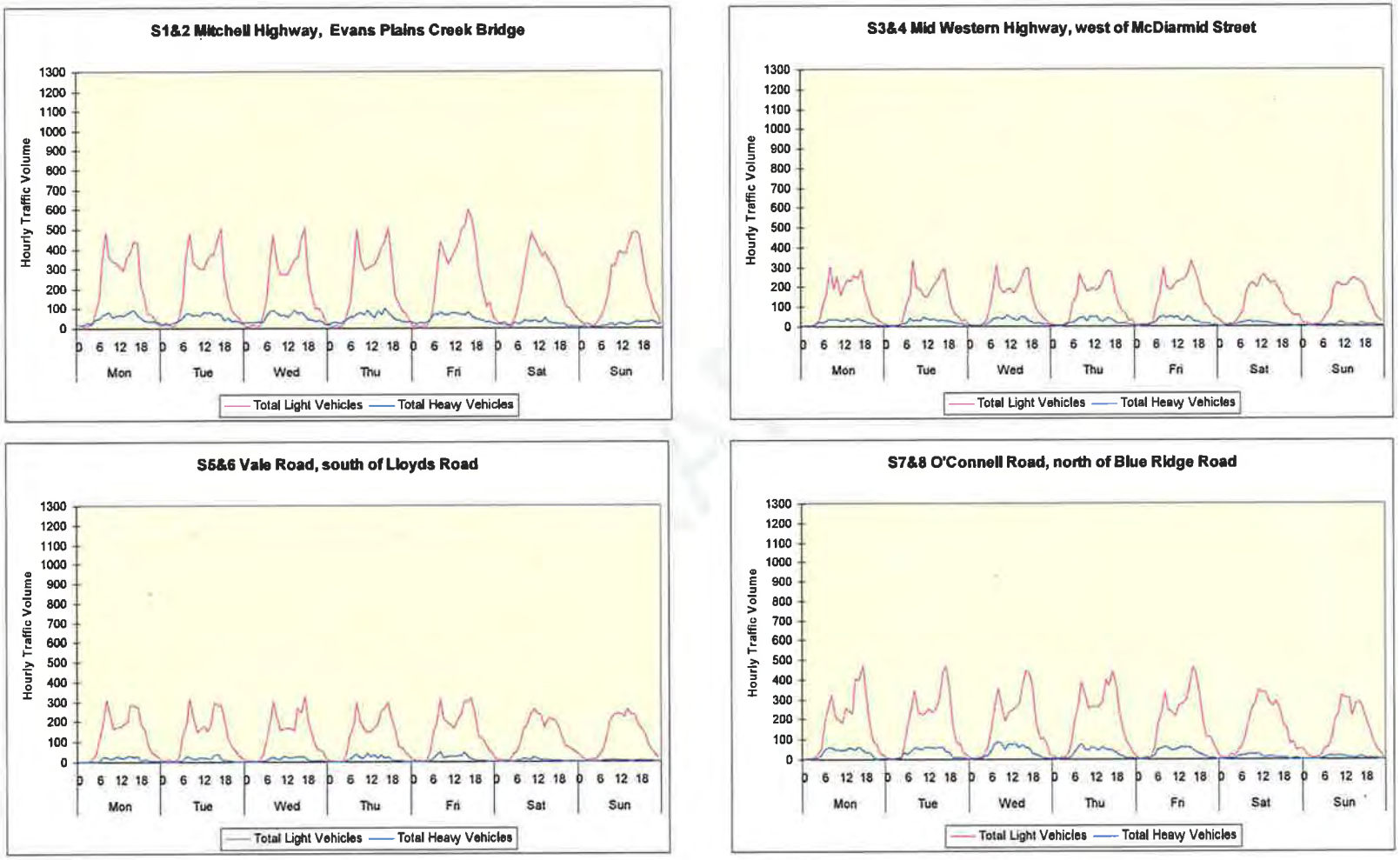
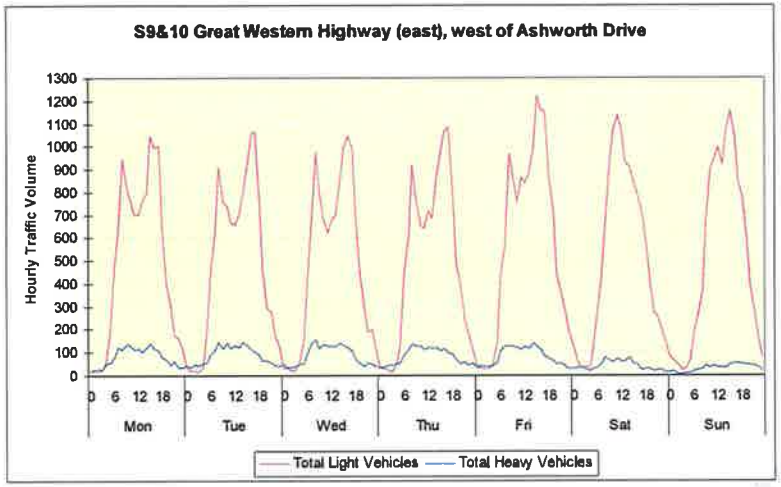
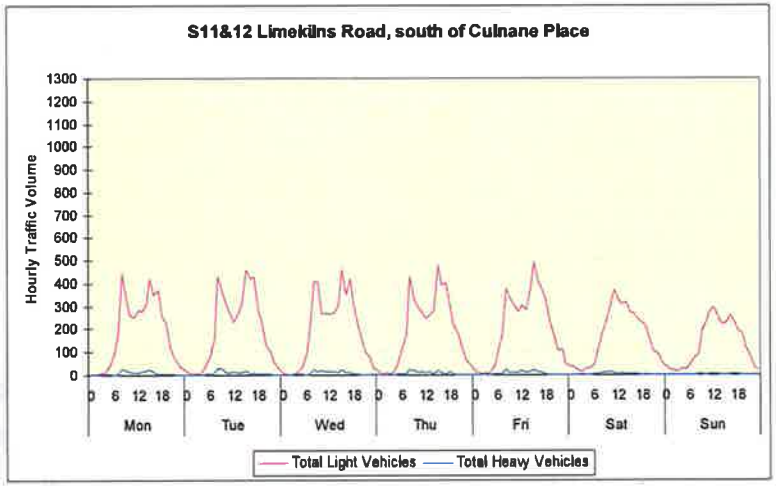
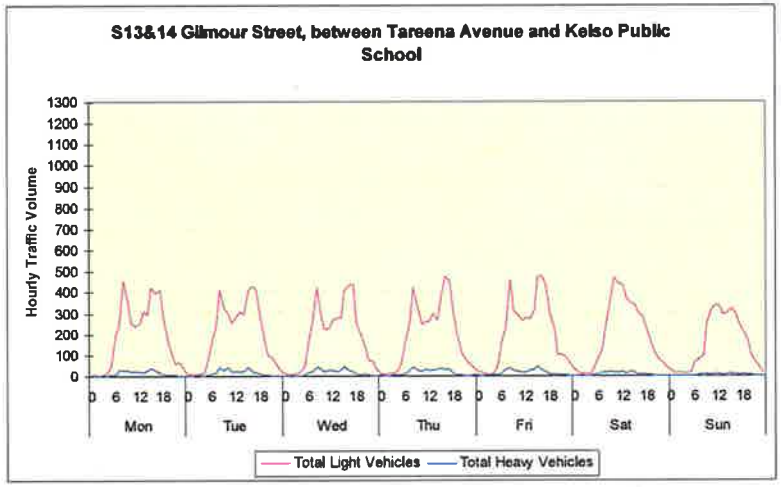


Figure 2-5 Daily traffic variation over a week







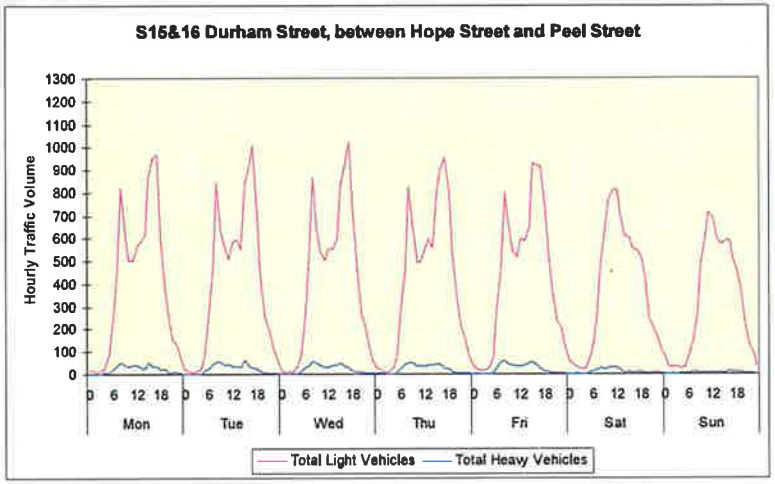
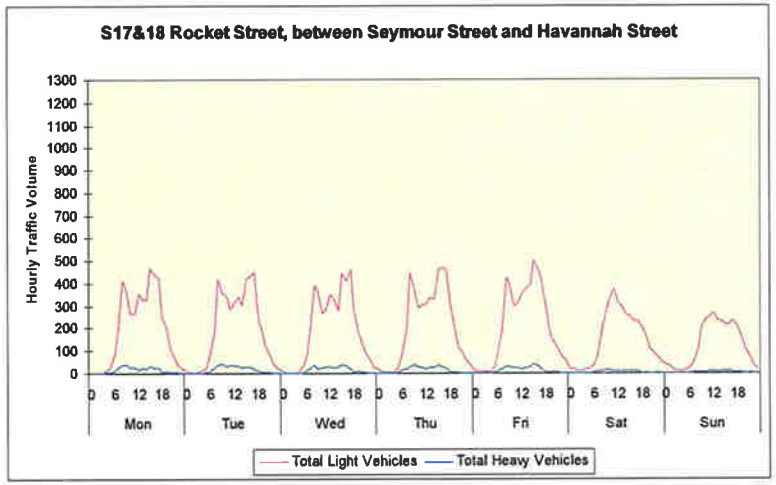
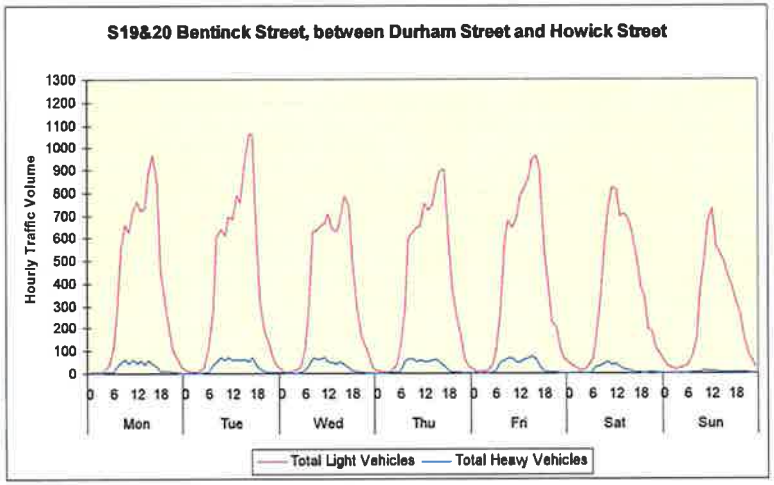


Figure 2-5 Daily traffic variation over a week (cont')





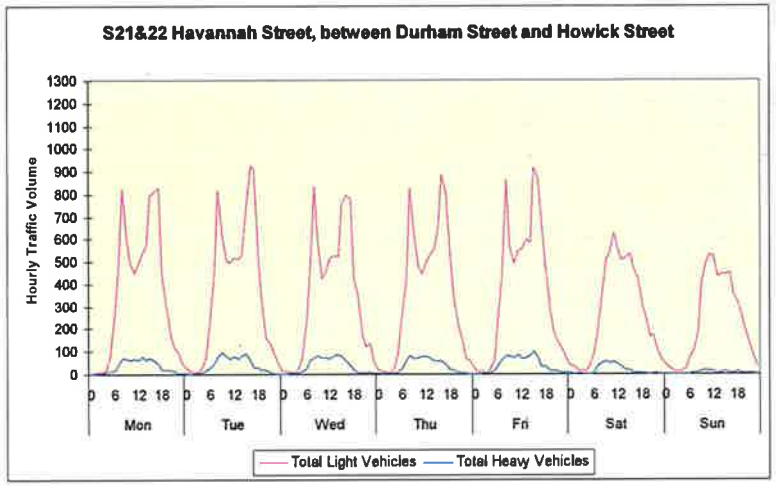


Figure 2-5 Daily traffic variation over a week

2.3.5 Hourly variations

Figure 2-6 shows hourly traffic volumes on the critical day (Friday) by direction of travel. This information was used to establish the pattern of vehicular travel throughout the day, and to identify peak traffic periods. The following points are noted in relation to peak hour traffic behaviour on key roads;

- the AM morning peak period in Bathurst begins is generally from 8am to 9am
- peak morning traffic movements were from 8am to 9am on the major highways due to the influence of local traffic including businesses, schools and other trips within the study area
- the PM afternoon peak occurred between 3pm to 5pm at most locations
- the PM peak was longer than the AM peak. The PM peak flows were fairly steady in the two hour period 3pm to 5pm
  - S1 & 2 (Mitchell Highway) – traffic recorded during the afternoon peak hour was higher than the morning peak in either direction. A total of 322 eastbound and 365 westbound were recorded between 4pm and 5pm
  - S3 & 4 (Mid Western Highway) – the morning peak traffic occurred in the northbound direction, whilst the afternoon peak traffic occurred in the opposite direction. The highest 2-way traffic was recorded during the afternoon peak between 4pm and 5pm, where 156 northbound and 219 southbound vehicles were recorded
  - S5 & 6 (Vale Road) – the morning peak traffic occurred in the northbound direction, whilst the afternoon peak traffic occurred in the opposite direction. The highest 2-way traffic was recorded during the morning peak between 8am and 9am, where 281 northbound and 81 southbound vehicles were recorded
  - S7 & 8 (O'Connell Road) – both the morning and afternoon peak traffic occurred in the northbound direction. The highest 2-way traffic was recorded during the afternoon peak between 4pm and 5pm, where 331 northbound and 180 southbound vehicles were recorded
  - S9 & 10 (Great Western Highway) – the morning peak traffic occurred in the westbound direction, whilst the afternoon peak traffic occurred in the opposite direction. The highest 2-way traffic was recorded during the afternoon peak between 3pm and 4pm, where 726 eastbound and 624 westbound vehicles were recorded
  - S11 & 12 (Limekilns Road) – the morning peak traffic occurred in the southbound direction, whilst the afternoon peak traffic occurred in the opposite direction. The highest 2-way traffic was recorded during the afternoon peak between 3pm and 4pm, where 264 northbound and 247 southbound vehicles were recorded
  - S13 & 14 (Gilmour Street) – the morning peak traffic occurred in the southbound direction, whilst the afternoon peak traffic occurred in the opposite direction over a longer time period. The highest 2-way traffic was recorded during the afternoon peak between 3pm and 4pm, where 283 northbound and 241 southbound vehicles were recorded
  - S15 & 16 (Durham Street) – the morning peak traffic occurred in the southbound direction (towards Bathurst town centre), whilst the afternoon peak traffic occurred in the opposite direction. The highest 2-way traffic was recorded during the afternoon peak between 3pm and 4pm, where 484 northbound and 497 southbound vehicles were recorded

- S17 & 18 (Rocket Street) – both the morning and afternoon peak traffic occurred in the northbound direction. The highest 2-way traffic was recorded during the afternoon peak between 3pm and 4pm, where 289 northbound and 253 southbound vehicles were recorded
- S19 & 20 (Bentinck Street) – traffic recorded during afternoon peak hour was approximately 38% more than that observed during the morning peak hour. The afternoon peak period occurred over a long time period between 12noon and 5pm. The highest 2-way traffic was recorded during the afternoon peak between 4pm and 5pm, where 567 north-eastbound and 458 south-westbound vehicles were recorded. During this peak hour, a total of 64 heavy vehicles or 6% (including two B-doubles) were recorded travelling on this road
- S21 & 22 (Havannah Street) – the morning and afternoon peak periods are prominent with similar 2-way peak traffic flow, but traffic flow recorded during the afternoon peak was more dispersed between 3pm and 5pm. Mid-day traffic was relatively low. The highest 2-way traffic was recorded during the afternoon peak between 3pm and 4pm, where 492 north-eastbound and 522 south-westbound vehicles were recorded. During this peak hour, a total of 99 heavy vehicles or 11% (including two B-doubles) were recorded travelling on this road

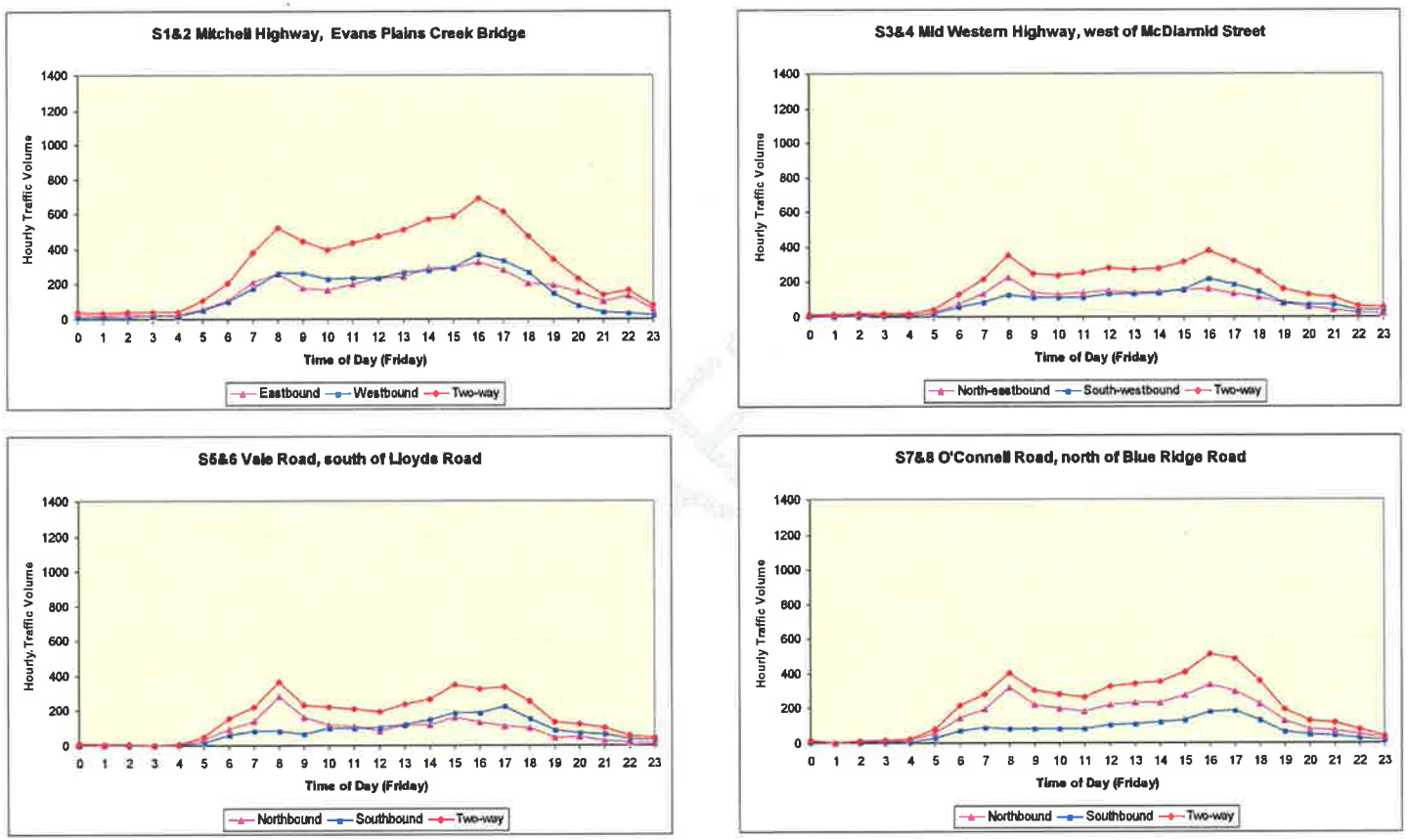


Figure 2-6 Hourly variation on the critical day Friday

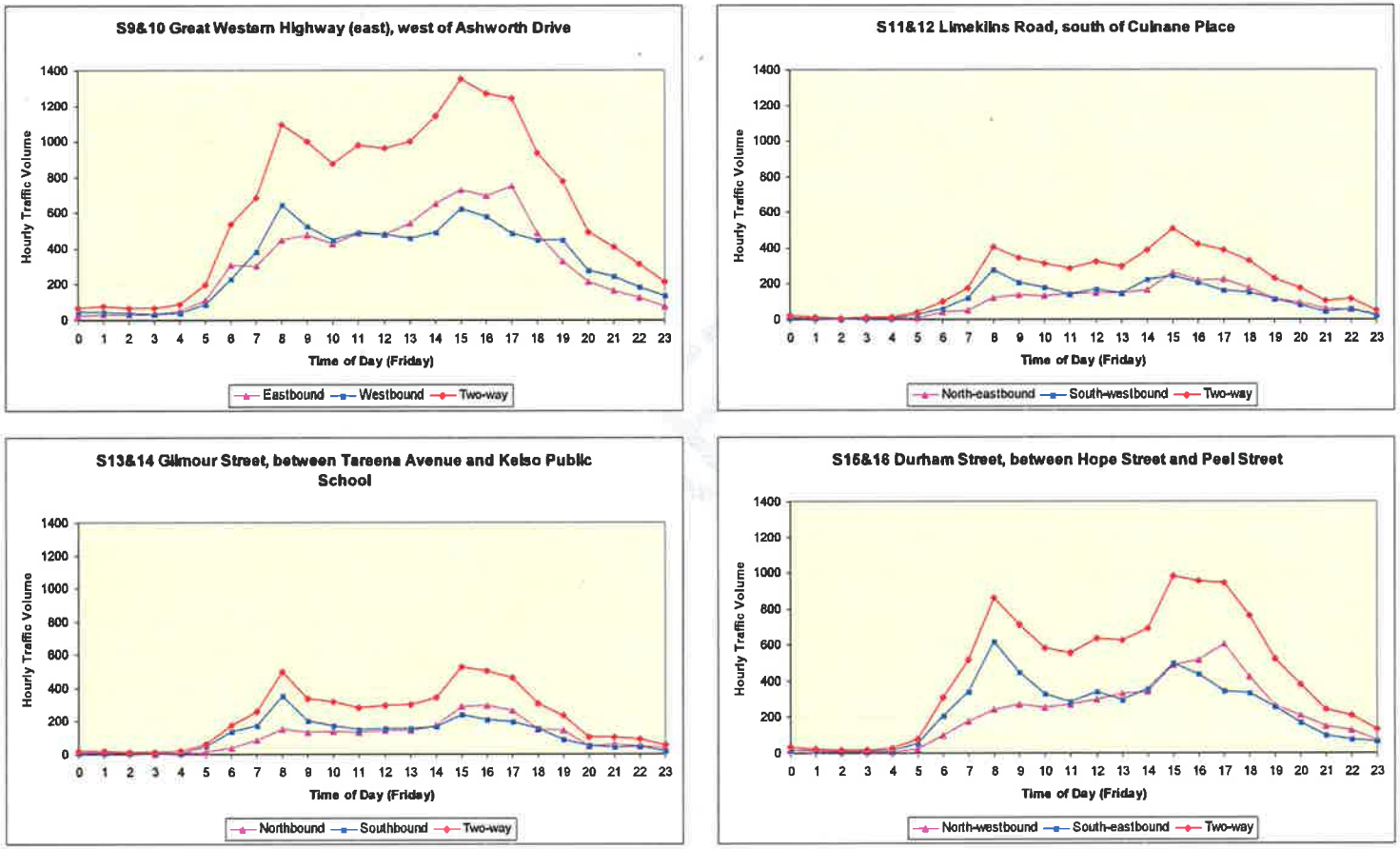
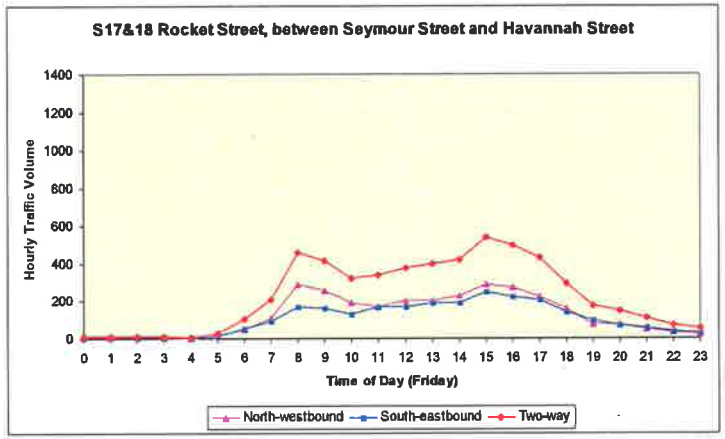
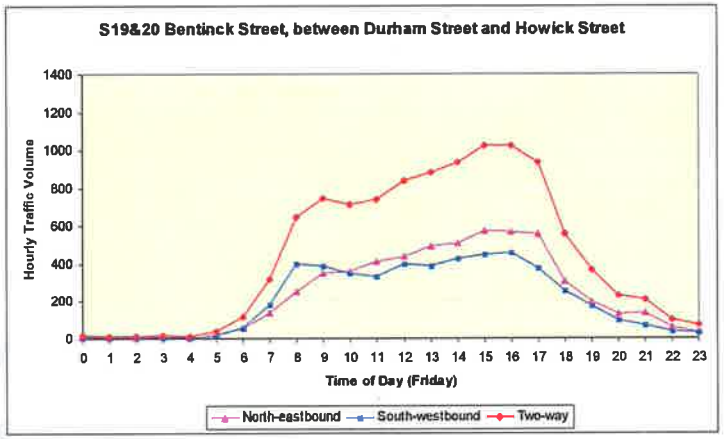


Figure 2-6 Hourly variation on the critical day Friday (cont')





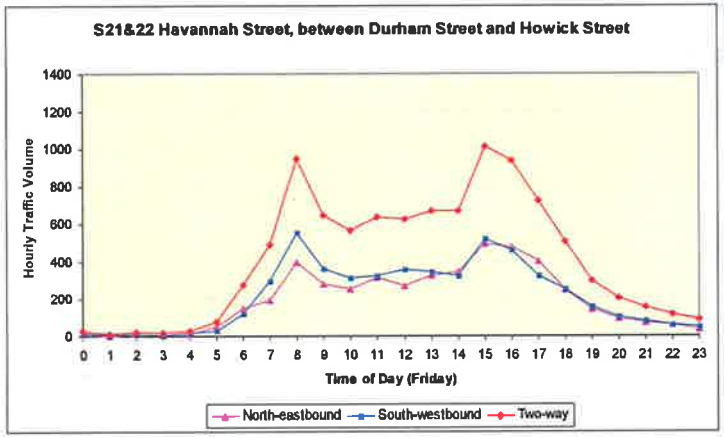


Figure 2-6 Hourly variation on the critical day Friday

Table 2-7 shows AM and PM peak one hour volumes at all survey sites. Peak hour directional data on Vale Road and O'Connell Road indicate a dominant northbound flow while Limekilns Road, Gilmour Street and Durham Street indicate a dominant southbound flow, particularly during the AM peak hour.

Table 2-7 AM and PM peak hour volumes on critical Friday

Site ID	Road sections	AM Peak (8 to 9am)			PM Peak (3 to 4pm)		
		NE/NW	SE/SW	Total (2-way)	NE/NW	SE/SW	Total (2-way)
1 & 2	Mitchell Highway, Evans Plains Creek Bridge	256	264	520	322	365	687
3 & 4	Mid Western Highway, west of McDiarmid Street	225	124	349	156	219	375
5 & 6	Vale Road, south of Lloyds Road	281	81	362	159	188	347
7 & 8	O'Connell Road, north of Blue Ridge Road	315	83	398	331	180	511
9 & 10	Great Western Highway (east), west of Ashworth Drive	449	645	1,094	726	624	1,350
11 & 12	Limekilns Road, south of Culnane Place	121	281	402	264	247	511
13 & 14	Gilmour Street, between Tareena Avenue and Kelso Public School	146	350	496	283	241	524
15 & 16	Durham Street, between Hope Street and Peel Street	242	616	858	484	497	981
17 & 18	Rocket Street, between Seymour Street and Havannah Street	292	169	461	289	253	542
19 & 20	Bentinck Street, between Durham Street and Howick Street	362	391	753	567	458	1,025
21 & 22	Havannah Street, between Durham Street and Howick Street	393	552	945	492	522	1,014

Source: PB survey 2008

2.3.6 Directional split of traffic

Whilst the directional split of traffic on major highways was fairly even on a daily basis, the directional split on other roads tend to be 45% and 55% in either direction. Of note, there was approximately 70% northbound traffic and 30% southbound split in traffic observed on O'Connell Road. Table 2-8 shows the directional split of traffic at all survey stations.

Table 2-8 Directional split of traffic on critical Friday

Site ID	Road sections	Daily traffic (Friday)			Directional split		
		NE/NW	SE/SW	2-way	NE/NW	SE/SW	2-way
1 & 2	Mitchell Highway, Evans Plains Creek Bridge	3,752	3,753	7,505	50%	50%	100%
3 & 4	Mid Western Highway, west of McDiarmid Street	2,064	2,055	4,119	50%	50%	100%
5 & 6	Vale Road, south of Lloyds Road	1,907	1,938	3,845	50%	50%	100%
7 & 8	O'Connell Road, north of Blue Ridge Road	3,497	1,697	5,194	67%	33%	100%
9 & 10	Great Western Highway (east), west of Ashworth Drive	7,959	7,871	15,830	50%	50%	100%
11 & 12	Limekilns Road, south of Culnane Place	2,348	2,691	5,039	47%	53%	100%
13 & 14	Gilmour Street, between Tareena Avenue and Kelso Public School	2,491	2,796	5,287	47%	53%	100%
15 & 16	Durham Street, between Hope Street and Peel Street	5,178	5,600	10,778	48%	52%	100%
17 & 18	Rocket Street, between Seymour Street and Havannah Street	2,952	2,508	5,460	54%	46%	100%
19 & 20	Bentinck Street, between Durham Street and Howick Street	5,616	4,931	10,547	53%	47%	100%
21 & 22	Havannah Street, between Durham Street and Howick Street	4,616	5,088	9,704	48%	52%	100%

Source: PB survey 2008

2.3.7 Heavy vehicles

According to the AUSTROADS vehicle classification system, heavy vehicles include trucks with two or more axles, buses, semi-trailers and B-doubles (classification categories 3-12). Table 2-9 shows the number of heavy vehicles and the percentage of heavy vehicles recorded on the critical day, Friday. In general, Mitchell Highway had a relatively higher portion of heavy vehicles in its traffic stream. The NSW State average is between 8% and 12%. Heavy vehicle data showed that:

- The Great Western Highway carried about 1,950 heavy vehicles per day or about 12% of its total daily traffic
- the second highest number of daily heavy vehicles recorded was on the Mitchell Highway, which carried 1,270 heavy vehicles per day which was about 17% of the total daily traffic
- Havannah Street carried approximately 265 more heavy vehicles (or 38%) than Bentinck Street on the critical Friday
- Bentinck Street is an RTA-approved B-double route, where 22 B-doubles or longer vehicles were recorded on Friday. However, the surveys showed that approximately 33 B-double or longer vehicles also used the Havannah Street route instead, between South

Bathurst and the Great Western Highway, even though Havannah Street is not an approved B-Double route.

Table 2-9 Heavy vehicles distribution on the critical Friday

Site ID	Road sections	Daily Average Traffic	Daily Heavy Vehicles	Heavy vehicles as % of all traffic
1 & 2	Mitchell Highway, Evans Plains Creek Bridge	7,505	1,274	17%
3 & 4	Mid Western Highway, west of McDiarmid Street	4,119	638	15%
5 & 6	Vale Road, south of Lloyds Road	3,845	356	9%
7 & 8	O'Connell Road, north of Blue Ridge Road	5,194	762	15%
9 & 10	Great Western Highway (east), west of Ashworth Drive	15,830	1,953	12%
11 & 12	Limekilns Road, south of Culnane Place	5,039	183	4%
13 & 14	Gilmour Street, between Tareena Avenue and Kelso Public School	5,287	366	7%
15 & 16	Durham Street, between Hope Street and Peel Street	10,778	551	5%
17 & 18	Rocket Street, between Seymour Street and Havannah Street	5,460	343	6%
19 & 20	Bentinck Street, between Durham Street and Howick Street	10,547	693	7%
21 & 22	Havannah Street, between Durham Street and Howick Street	9,704	958	10%

2.4 Network capacity

2.4.1 Assessment criteria

In general, the performance of a road network is assessed in terms of both intersection and mid-block capacity. An urban road network is also largely influenced by the operating conditions of intersections and the number of side streets. Mid-block capacity is often used to assess when a particular road section may require widening or duplicating. Both intersection and mid-block capacities are expressed in terms of Level of Service (LOS).

LOS is fundamental to the planning, design and operation of roads and is the basis for determining the number of lanes to be provided in the road network. In general, there are six levels of service, from A to F, with level of service A representing the best operating condition and level of service F representing the worst operating condition. LOS for the key roads in Bathurst has been assessed according to the AUSTROADS Guide to Traffic Engineering Practice Part 2 – Road Capacity and the RTA Guide to Traffic Generating Developments, 2002.

2.4.2 Mid-block LOS

Mid-block LOS is a term used to describe the delay to vehicles between intersections caused by the interaction of other vehicles in the traffic stream. As traffic volumes increase motorists experience possible reductions in speed, increased difficulty in manoeuvring within the traffic stream and reduced gaps between vehicles. The result is that the "level of service" decreases as the traffic volume increases. A reduction in level of service occurs incrementally with increased traffic and would eventually reach a point when additional road capacity may be required to maintain acceptable performance.

Technical Publications *(including AUSTROADS Guide to Traffic Engineering Practice Part 2 Roadway Capacity, The Highway Capacity Manual – TRB and RTA's Guide to Traffic Generating Developments)* provide an indication of the thresholds for each level of service range. These thresholds are sometimes referred to as maximum service flows which are derived from volume to capacity ratios.

LOS threshold of D was selected for determining the maximum acceptable service flows for roads in the wider road network surrounding the Bathurst study area. Therefore, LOS calculations of E or F would indicate congestion or unacceptable capacity constraints. The LOS bands for urban and rural roads in Table 2-10 were derived from the above published guidelines.

Table 2-10 Link LOS thresholds for urban road peak hour flows per direction

Level of Service	One Lane (veh/hr)	Two Lanes (veh/hr)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Source: Table 4.4, Guide to Traffic Generating Developments, RTA, v2.2, 2002

Table 2-11 Link LOS thresholds for rural road peak hour flows on two-lane roads (veh/hr)

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	420	360	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

Source: Table 4.5, Guide to Traffic Generating Developments, RTA, v2.2, 2002

2.4.3 Measures of mid-block LOS

The mid-block LOS for the 11 survey sites included in the traffic survey are summarised in Table 2-12 which shows that the Great Western Highway and Durham Street are operating at LOS D, leaving little capacity for growth. The traffic surveys recorded the peak hour traffic flows.

Table 2-12 Mid-block LOS for 2008

ID	Road	Land use	HV%	Peak hour traffic volumes		LOS	
				AM	PM	AM	PM
	Arterial roads:						
1 & 2	Mitchell Highway, Evans Plains Creek Bridge	Rural	17%	520	687	B	C
3 & 4	Mid Western Highway, west of McDiarmid Street	Rural	15%	349	375	B	B
5 & 6	Vale Road, south of Lloyds Road	Rural	9%	362	347	B	B
7 & 8	O'Connell Road, north of Blue Ridge Road	Rural	15%	398	511	B	B
9 & 10	Great Western Highway (east), west of Ashworth Drive	Urban	-	645	726	D	D
13 & 14	Gilmour Street, between Tareena Avenue and Kelso Public School	Urban	-	350	283	B	B
17 & 18	Rocket Street, between Seymour Street and Havannah Street	Urban	-	292	289	B	B
19 & 20	Bentinck Street, between Durham Street and Howick Street	Urban	-	391	567	C	C
	Sub-arterial roads:						
15 & 16	Durham Street, between Hope Street and Peel Street	Urban	-	616	497	D	C
21 & 22	Havannah Street, between Durham Street and Howick Street	Urban	-	552	522	C	C
	Collector roads:						
11 & 12	Limekilns Road, south of Culnane Place	Urban	-	281	264	B	B

Note: For urban type, traffic volume is the highest one-way vph; For rural type, traffic volume is the two-way, vph for two-lanes

In summary, the LOS analysis indicated that the Great Western Highway and Durham Street currently have limited capacity for future traffic growth. All other roads in the survey are currently operating with acceptable performance and capacity (between B and C).

3. Traffic distribution

3.1 O-D survey

Traffic distribution was a key input to the Bathurst model. This was derived from the Origin and Destination (O-D) survey data collected by TTM Pty. Ltd. on Thursday 13 March 2008. The data was collected over a 12-hour period between 6.30am and 6.30pm. Full number plates were recorded manually by surveyors at survey locations identical to the location of the tube counters.

Whilst the target sample size for the O-D survey was 100% for heavy vehicles and 50% for light vehicles as specified in the survey brief to the traffic survey company, the actual sample size achieved was less than required. The sampling ranged from 43% to 86% for heavy vehicles, and 34% to 51% for light vehicles. The low sampling was probably due to human error and underestimation by the survey company on the number of surveyors they needed to perform the work.

It was necessary to quantify both through and local traffic to determine the potential use and need for a Bathurst Southern Ring Road Route. Through traffic was identified by matching the number plates of vehicles recorded at one of the 11 survey stations positioned around the Bathurst town centre. Through vehicles were identified as both entering and leaving Bathurst sometime over the 12 hour survey period and those vehicles that entered and left the town centre in less than 30 minutes which would be the main candidates for vehicles that would use the Southern Ring Road Route. Local traffic was traffic that may have entered and left the town centre by the same route or vehicles where there is only a record of the vehicle entering or leaving during but no record of the vehicle. The primary objective of the O-D survey was to assess the nature of through and local traffic movements during a typical weekday.

The traffic survey locations are shown in Figure 2-4.

PB used this O-D data in the traffic model as the basis for determining the through traffic distribution particularly for the major highways.

Table 3-1 is a summary of the traffic movements between selected survey stations during the 12-hour period (6.30am to 6.30pm).

For clarity interpretation of column headings in Table 3-1 are as follows,

- "From" and "To": direction of traffic from one road to another road i.e. from Great Western Highway to Vale Road
- "Traffic from Origin to Destination over 12 hours": total number of traffic movements recorded from matching number plates at the "From" location with the "To" location over the 12 hour survey period for light + heavy vehicles and heavy vehicles only.
- "% of traffic from origin to destination over 12 hours": percentage of vehicles movements from the previous two columns.
- "Through traffic from origin to destination in less than 30 minutes": the number of vehicle movements recorded from matching number plates at the "From" location with the "To" location in which the difference in time between the "From" location and "To" location was

less than 30 minutes. These vehicles were interpreted as though vehicles and were assumed not to stop in Bathurst on their way through.

- "% of through traffic from origin to destination in less than 30 minutes": percentage of through traffic from the previous two columns.

It should be however acknowledged that the O-D survey has limitations on accuracy due to:

- The reported survey stations are major highways and connector roads with Bathurst town centre. A proportion of traffic would be distributed to the local road network, outside the survey stations, for trips travelling to the town centre with a purpose, for example work, shopping, leisure and education etc.
- The target sample size was not achieved with less than 50% of light vehicles and 100% trucks recorded in the survey. See Appendix B for a summary of sample size at each survey station by vehicle type.
- The survey data could not be recovered at the survey station in Limekilns Road due to a faulty recording device. No data was available for analysis for this site. The truck flow at this location was 183 (4%) two-way on the critical Friday. The missing data would not significantly affect the overall origin-destination patterns.

Figures 3-1 to 3-7 graphically show the percentage of non-local traffic (as total traffic and heavy vehicles) between these selected survey stations over the 12-hour period between 6.30am and 6.30pm.

Table 3-1 Traffic movement between selected survey stations during the 12-hour period (6.30am to 6.30pm)

From Origin	To Destination	Traffic from origin to destination over the 12 hour survey period		% of traffic from origin to destination over the 12 hour survey period		Through traffic from origin to destination in less than 30 minutes		% of through traffic from origin to destination in less than 30 minutes	
		All light & heavy vehicle	Heavy vehicle	All light & heavy vehicle	Heavy vehicle	All light & heavy vehicle	Heavy vehicle	All light & heavy vehicle	Heavy vehicle
Great Western Highway	Great Western Highway	798	26	40%	22%	35	1	4%	4%
	Mitchell Highway	315	37	16%	32%	80	18	25%	49%
	Mid Western Highway	55	3	3%	3%	6	2	11%	67%
	Durham Street	270	8	13%	7%	41	3	15%	38%
	Vale Road	53	7	3%	6%	10	2	19%	29%
	Gilmour Street	140	7	7%	6%	25	2	18%	29%
	O'Connell Road	100	14	5%	12%	23	7	23%	50%
	Other local roads in Bathurst	275	15	13%	12%	-	-	-	-
Sub-total		2,006	117	100%	100%	220	35	11%	30%
Mitchell Highway	Mitchell Highway	181	8	30%	17%	5	1	3%	13%
	Great Western Highway	183	23	30%	49%	52	12	28%	52%
	Mid Western Highway	4	1	1%	2%	0	0	0%	0%
	Durham Street south-eastbound	50	4	8%	9%	2	0	4%	0%
	Durham Street north-westbound	32	1	5%	2%	2	0	6%	0%
	Vale Road	15	0	2%	0%	4	0	27%	0%
	Gilmour Street	12	0	2%	0%	0	0	0%	0%
	O'Connell Road	31	3	5%	6%	7	2	23%	67%
	Other local roads in Bathurst	100	7	17%	15%	-	-	-	-
Sub-total		608	47	100%	100%	72	15	12%	32%
Mid Western Highway	Mid Western Highway	146	16	29%	27%	1	0	1%	0%
	Great Western Highway	123	12	24%	20%	26	6	21%	50%
	Mitchell Highway	9	0	2%	0%	0	0	0%	0%
	Durham Road	66	14	13%	24%	4	4	6%	29%

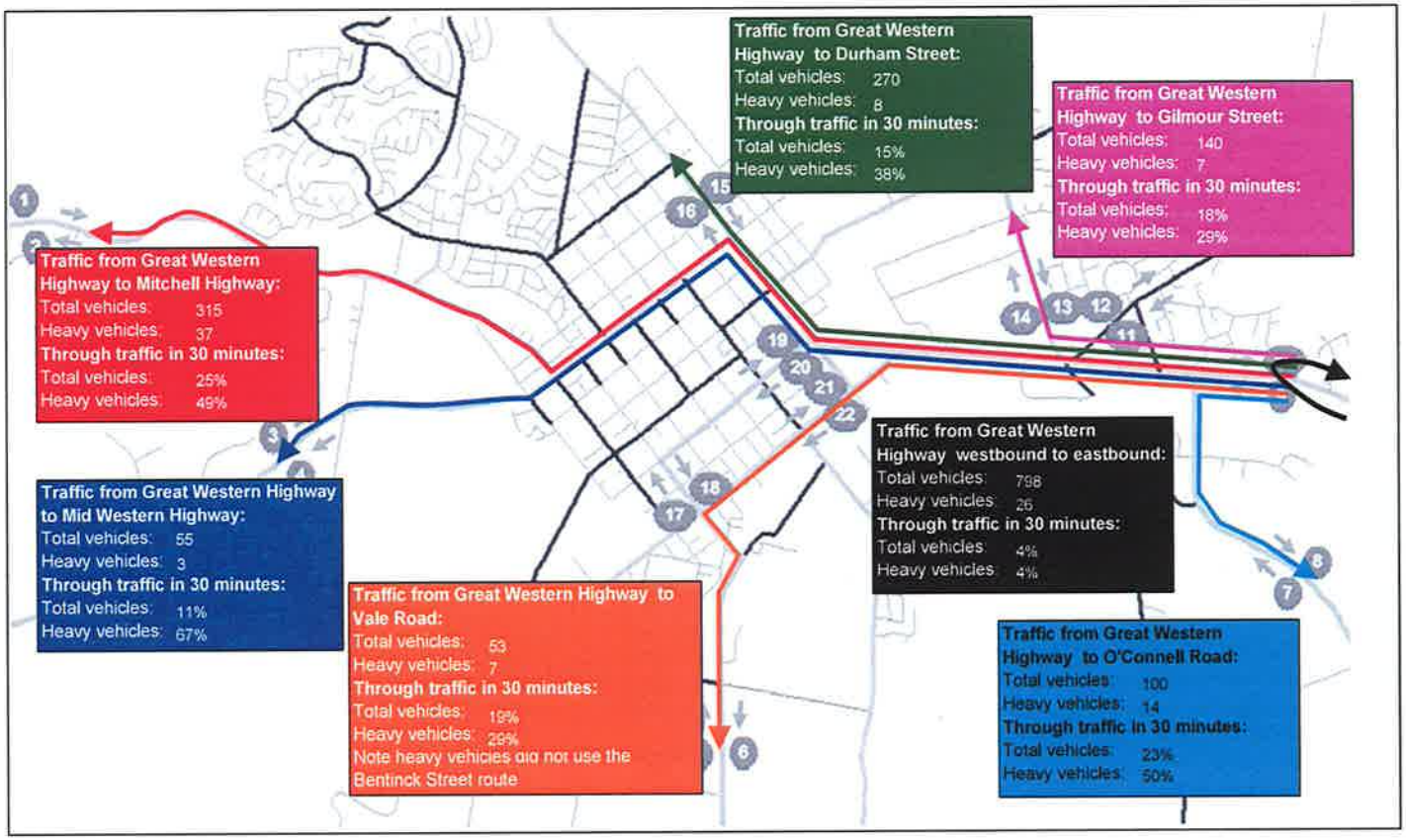
From Origin	To Destination	Traffic from origin to destination over the 12 hour survey period		% of traffic from origin to destination over the 12 hour survey period		Through traffic from origin to destination in less than 30 minutes		% of through traffic from origin to destination in less than 30 minutes	
		All light & heavy vehicle	Heavy vehicle	All light & heavy vehicle	Heavy vehicle	All light & heavy vehicle	Heavy vehicle	All light & heavy vehicle	Heavy vehicle
	Vale Road	11	5	2%	8%	1	1	9%	20%
	Gilmour Street	9	0	2%	0%	0	0	0%	0%
	O'Connell Road	25	10	5%	17%	8	7	32%	70%
	Other local roads in Bathurst	115	2	23%	4%	-	-	-	-
Sub-total		504	59	100%	100%	40	18	8%	31%
Durham Street	Durham Street	1,316	23	55%	28%	72	1	5%	4%
	Great Western Highway	306	10	13%	12%	22	1	7%	10%
	Mitchell Highway	64	5	3%	6%	3	0	5%	0%
	Mid Western Highway	88	5	4%	6%	6	0	7%	0%
	Vale Road	114	15	5%	18%	7	5	6%	33%
	Gilmour Street	72	4	3%	5%	4	0	6%	0%
	O'Connell Road	120	3	5%	4%	15	0	13%	0%
	Other local roads in Bathurst	298	17	12%	21%	-	-	-	-
Sub-total		2,378	82	100%	100%	129	7	5%	9%
Vale Road	Vale Road	231	18	67%	60%	23	5	10%	28%
	Great Western Highway	13	1	4%	3%	2	1	15%	100%
	Mitchell Highway	4	1	1%	3%	1	1	25%	100%
	Mid Western Highway	6	0	2%	0%	2	0	33%	0%
	Durham Street	26	4	8%	13%	4	3	15%	75%
	Gilmour Street	9	0	3%	0%	1	0	11%	0%
	O'Connell Road	12	0	3%	0%	2	1	17%	0%
	Other local roads in Bathurst	42	6	12%	21%	-	-	-	-
Sub-total		343	30	100%	100%	35	11	10%	37%
O'Connell Road	O'Connell Road	410	33	49%	50%	16	5	4%	15%
	Great Western Highway	66	14	8%	21%	6	4	9%	29%

From Origin	To Destination	Traffic from origin to destination over the 12 hour survey period		% of traffic from origin to destination over the 12 hour survey period		Through traffic from origin to destination in less than 30 minutes		% of through traffic from origin to destination in less than 30 minutes	
		All light & heavy vehicle	Heavy vehicle	All light & heavy vehicle	Heavy vehicle	All light & heavy vehicle	Heavy vehicle	All light & heavy vehicle	Heavy vehicle
	Mitchell Highway	32	7	4%	11%	7	5	22%	71%
	Mid Western Highway	6	0	1%	0%	2	0	33%	0%
	Durham Street	91	1	11%	2%	15	1	16%	100%
	Vale Road	33	5	4%	8%	3	2	9%	40%
	Gilmour Street	43	0	5%	0%	7	0	16%	0%
	Other local roads in Bathurst	163	6	18%	8%	-	-	-	-
Sub-total		844	66	100%	100%	56	17	7%	26%
Gilmour Street	Gilmour Street	258	11	35%	42%	25	5	10%	45%
	Great Western Highway	118	1	16%	4%	23	1	19%	100%
	Mitchell Highway	18	3	2%	12%	3	0	17%	0%
	Mid Western Highway	26	1	4%	4%	1	0	4%	0%
	Durham Street	87	4	12%	15%	4	2	5%	50%
	Vale Road	26	1	4%	4%	3	1	12%	100%
	O'Connell Road	62	3	8%	12%	19	3	31%	100%
	Other local roads in Bathurst	147	2	19%	9%	-	-	-	-
Sub-total		742	26	100%	100%	78	12	11%	46%
Total		6,285	372	-	-	630	115	10%	31%

Note:

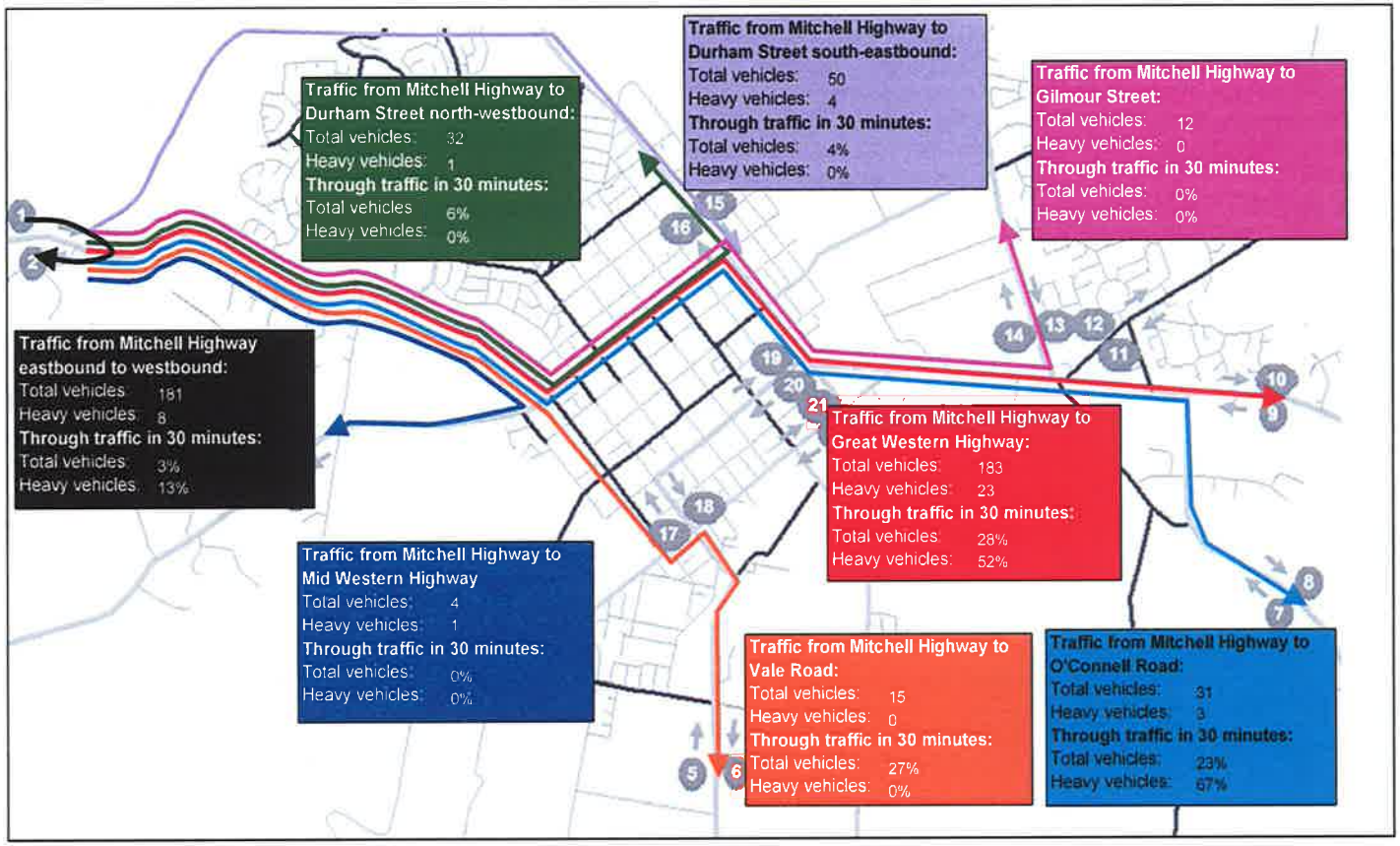
"Traffic at Origin", "Traffic from origin to destination" and "% of traffic from origin to destination" is traffic flows recorded from the traffic survey results. They should not be compared to actual traffic flows recorded by the automatic traffic counters because the traffic survey sampled in average 41% cars and 60% heavy vehicles.

"% of through traffic from origin to destination" was trips that did not stay in Bathurst, as determined by matching number plates from the Origin-Destination Survey. The criterion used was that the travel time less than 20 to 30 minutes depending on the distance between station pairs.



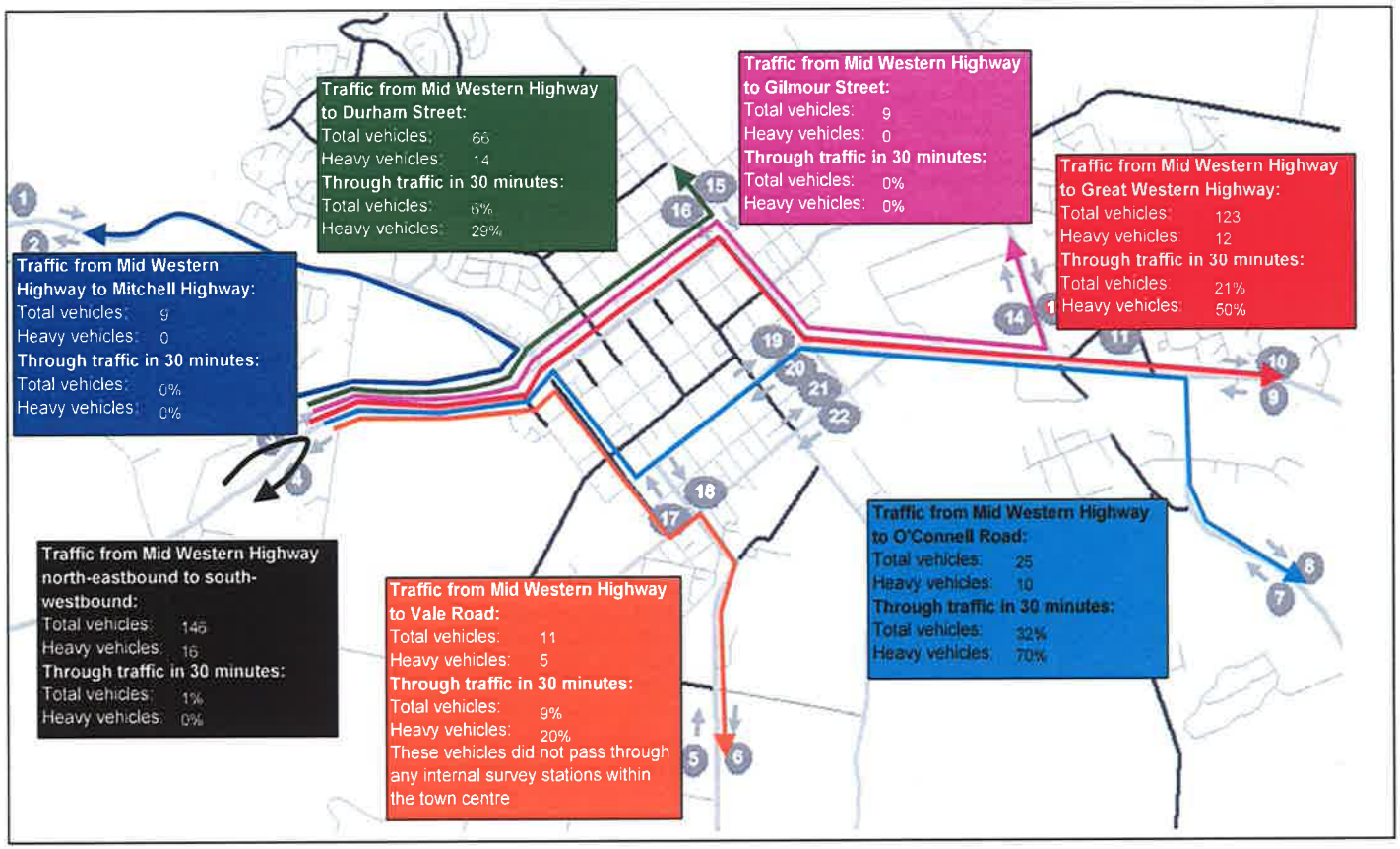
Note: These are indicative routes taken based on the OD survey data

Figure 3-1 Indicative travel routes used by through traffic from Great Western Highway westbound to further destinations via other major roads



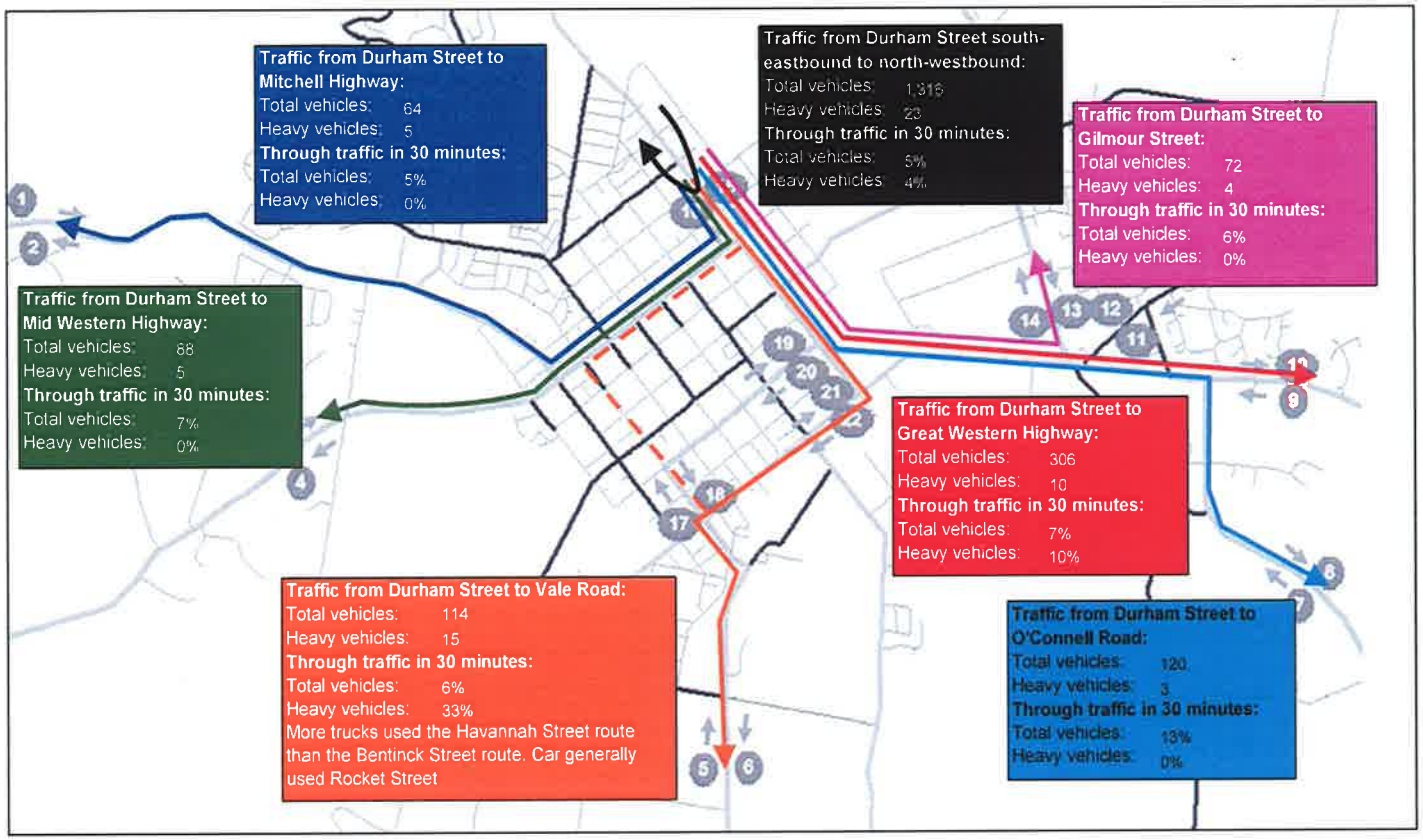
Note: These are indicative routes taken based on the OD survey data

Figure 3-2 Indicative travel routes used by through traffic from Mitchell Highway eastbound to further destinations via other major roads



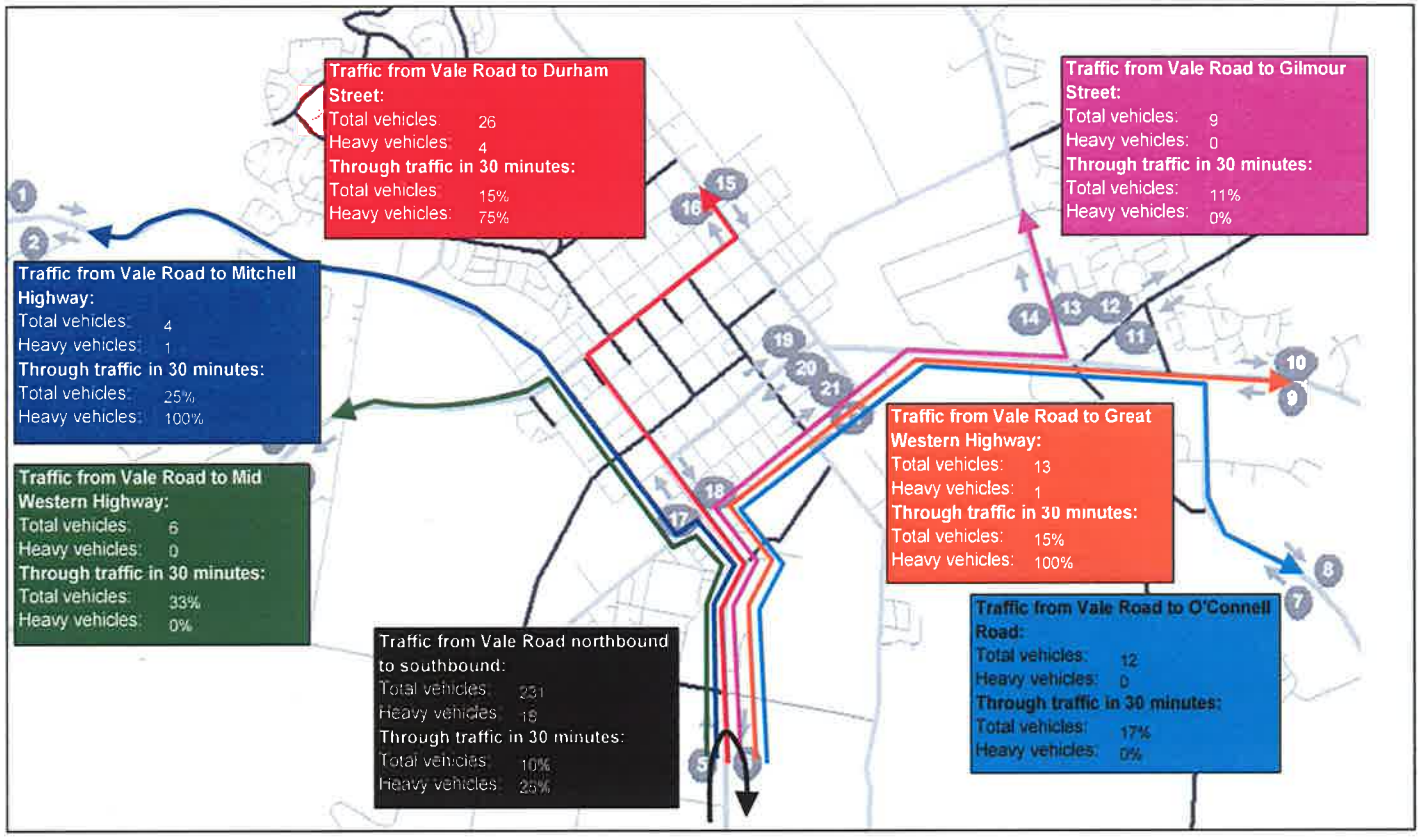
Note: These are indicative routes taken based on the OD survey data

Figure 3-3 Indicative travel routes used by through traffic from Mid Western Highway north-eastbound to further destinations via other major roads



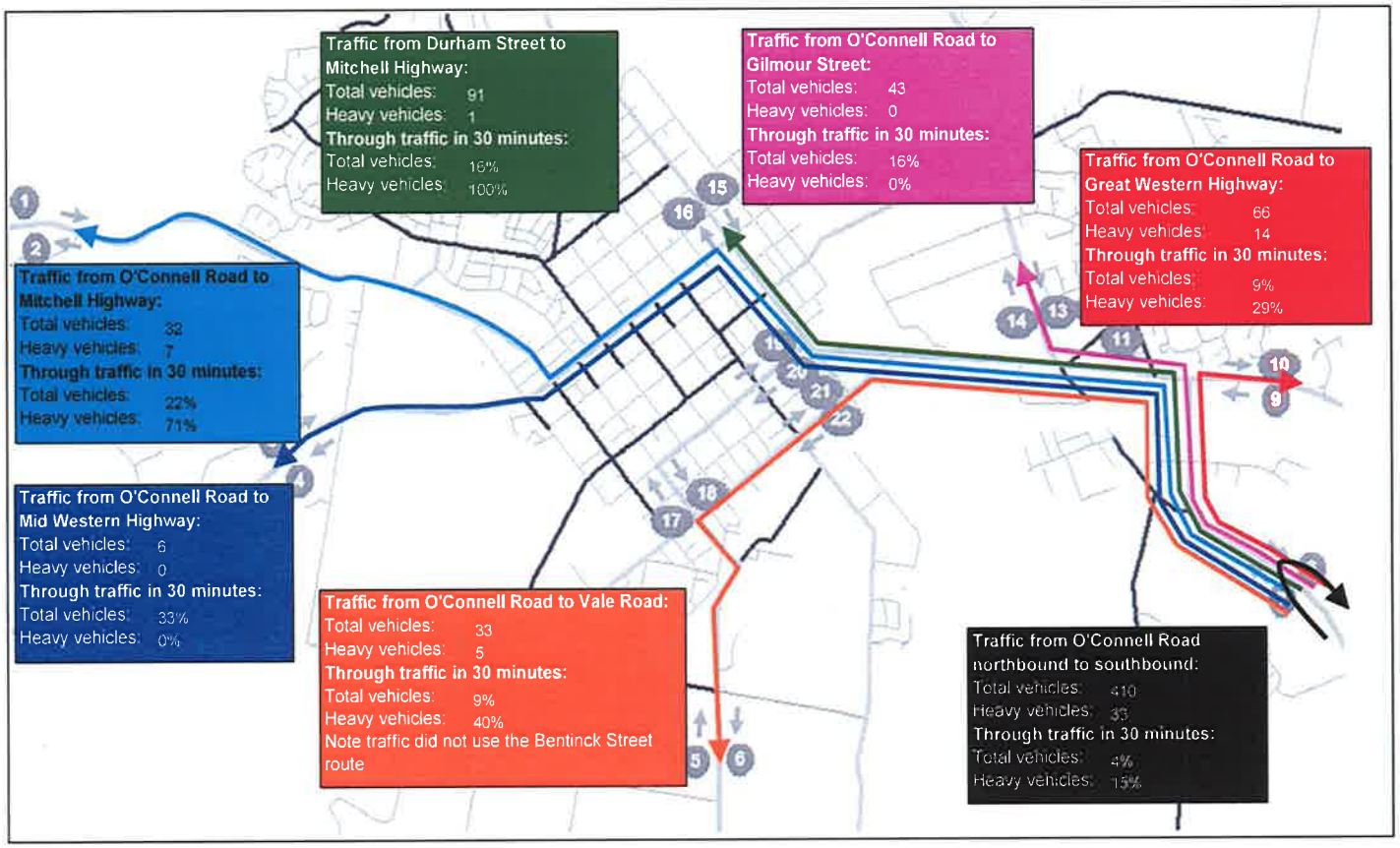
Note: These are indicative routes taken based on the OD survey data

Figure 3-4 Indicative travel routes used by through traffic from Durham Street south-eastbound to further destinations via other major roads



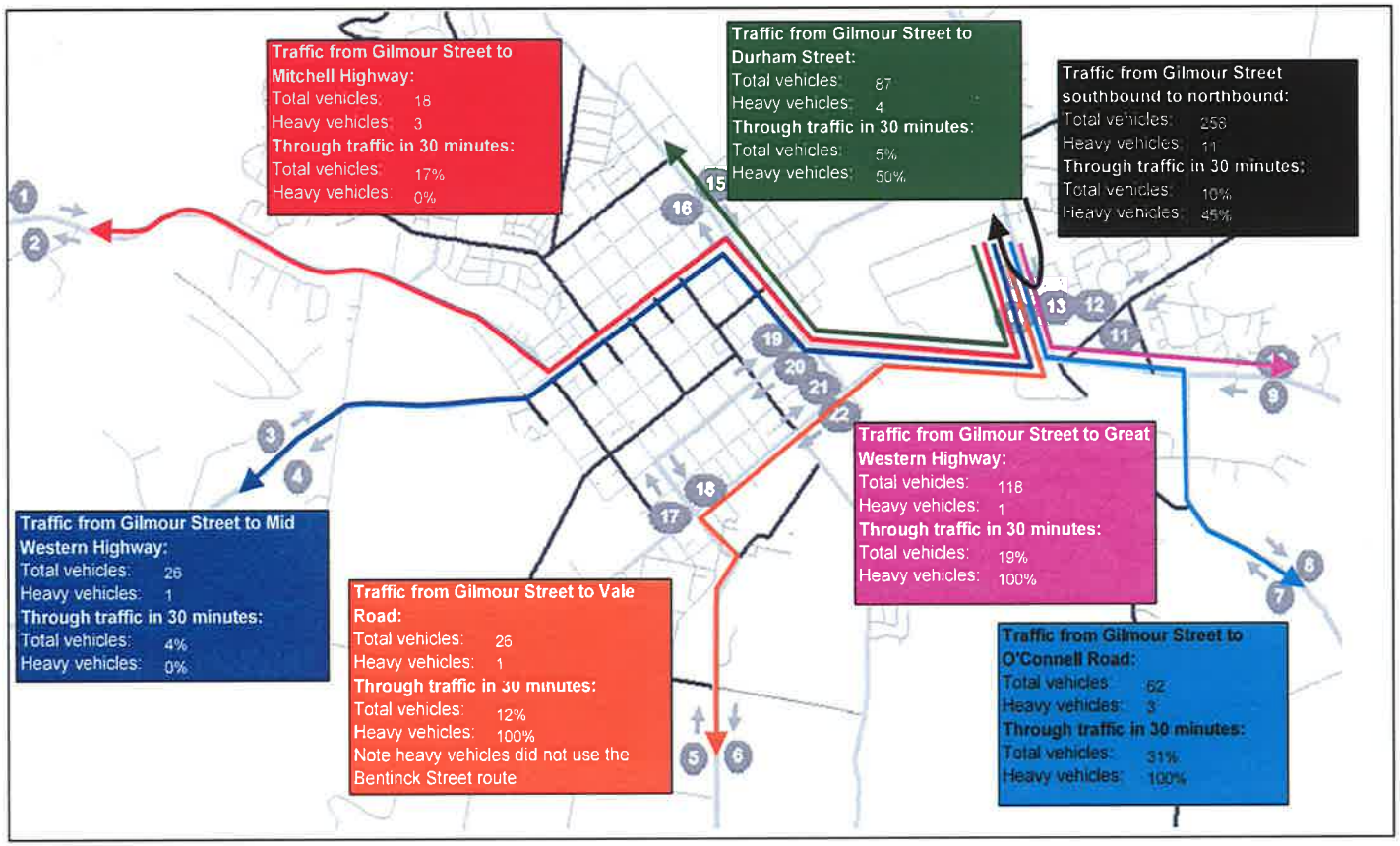
Note: These are indicative routes taken based on the OD survey data

Figure 3-5 Indicative travel routes used by through traffic from Vale Road northbound to further destinations via other major roads



Note: These are indicative routes taken based on the OD survey data

Figure 3-6 Indicative travel routes used by through traffic from O'Connell Road northbound to further destinations via other major roads



Note: These are indicative routes taken based on the OD survey data

Figure 3-7 Indicative travel routes used by through traffic from Gilmour Street southbound to further destinations via other major roads

Table 3-1 and Figure 3-1 indicate that:

- the majority of westbound traffic from the Great Western Highway to City of Bathurst was local traffic. Out of a total of 2,006 vehicles, 798 vehicles entered and left the City of Bathurst via Great Western Highway during the 12-hour period (e.g. for work, shopping etc.). As noted 4% of these round trips were made within 30 minutes.
- the next major travel pattern was represented by 315 westbound vehicles travelling between Great Western Highway and Mitchell Highway. Through traffic was approximately 25% of the total trips between these two survey locations.
- a total of 119 westbound vehicles travelled from Great Western Highway to Mitchell Highway, Mid Western Highway, Vale Road and O'Connell Road, which are potential candidate to use the Southern Ring Road Route.

Table 3-1 and Figure 3-2 indicate that:

- out of a total of 608 vehicles, 183 eastbound vehicles travelled Mitchell Highway to Great Western Highway. Approximately 28% of these trips were made within 30 minutes.
- the next major travel pattern was represented by 181 eastbound vehicles travelling between Mitchell Highway to City of Bathurst as local traffic. This is presented by 798 round trips, of which 3% were made within 30 minutes.
- a total of 63 eastbound vehicles travelled from Mitchell Highway to Great Western Highway, Mid Western Highway, Vale Road and O'Connell Road, which are potential candidate to use the Southern Ring Road Route.

Table 3-1 and Figure 3-3 indicate that:

- the majority of traffic from the Mid Western Highway to City of Bathurst was local traffic. Out of a total of 504 vehicles, 146 vehicles entered and left the City of Bathurst via Mid Western Highway during the 12-hour period (e.g. for work, shopping etc.). As noted 1% of these round trips were made within 30 minutes.
- the next major travel pattern was represented by 123 vehicles travelling between Mid Western Highway and Great Western Highway. Of which 21% were made within 30 minutes.
- a total of 35 vehicles travelled from Mid Western Highway to Great Western Highway, Mitchell Highway, Vale Road and O'Connell Road, which are potential candidate to use the Southern Ring Road Route.

Table 3-1 and Figure 3-4 indicate that:

- the majority of traffic from Durham Street to City of Bathurst was local traffic. Out of a total of 2,378 vehicles, 1,316 vehicles entered and left the City of Bathurst via Durham Street during the 12-hour period. Some of these trips could be generated from the Eglinton, Abercrombie and Lianarth areas etc. Approximately 5% of these round trips were made within 30 minutes.
- the next major travel pattern was represented by 306 vehicles travelling between Durham Street and Great Western Highway. This is presented by 123 trips, of which 21% were made within 30 minutes.

Table 3-1 and Figure 3-5 indicate that:

- the majority of traffic from Vale Road to City of Bathurst was local traffic. Out of a total of 343 vehicles, 231 vehicles entered and left the City of Bathurst via Vale Road during the 12-hour period. Some of these trips could be generated from the South Bathurst and areas located further south etc. As noted 10% of these round trips were made within 30 minutes.
- the next major travel pattern was represented by 42 vehicles travelling between Vale Road and other local roads outside the survey catchment within City of Bathurst.
- a total of 7 vehicles travelled from Vale Road to Great Western Highway, Mitchell Highway, Mid Western Highway and O'Connell Road, which are potential candidate to use the Southern Ring Road Route.

Table 3-1 and Figure 3-6 indicate that:

- the majority of traffic from O'Connell Road to City of Bathurst was local traffic. Out of a total of 844 vehicles, 410 vehicles entered and left the City of Bathurst via O'Connell Road during the 12-hour period. Approximately 4% of these round trips were made within 30 minutes.
- the next major travel pattern was represented by 163 vehicles travelling between O'Connell Road and other local roads outside the survey catchment within City of Bathurst.
- a total of 18 vehicles travelled from O'Connell Road to Great Western Highway, Mitchell Highway, Mid Western Highway and Vale Road, which are potential candidate to use the Southern Ring Road Route.

Table 3-1 and Figure 3-7 indicate that:

- the majority of traffic from Gilmour Street to City of Bathurst was local traffic. Out of a total of 742 vehicles, 258 vehicles entered and left the City of Bathurst via Gilmour Street during the 12-hour period. Approximately 10% of these round trips were made within 30 minutes.
- the next major travel pattern was represented by 147 vehicles travelling between Gilmour Street and other local roads outside the survey catchment within City of Bathurst.

In addition, Figures 3-1 to 3-7 provide the following trip patterns to/from the Great Western Highway (eastern end of the Southern Ring Road Route) in Bathurst for the 12-hour period (6.30am to 6.30pm):

- between Mitchell Highway and the Great Western Highway:
  - approximately 30% of total eastbound traffic observed at the Mitchell Highway survey station was observed at the Great Western Highway survey station and approximately 49% of eastbound heavy vehicle movements on the Mitchell Highway were observed at the Great Western Highway survey station
  - approximately 28% of total eastbound traffic observed at the Mitchell Highway and Great Western Highway survey stations were through traffic with a travel time less than 20 to 30 minutes and approximately 52% of heavy vehicles recorded at these stations were through movements. It is found that none of these trips used the Ophir Road and Durham Street route

- approximately 16% of total westbound traffic observed at the Great Western Highway survey station was observed at the Mitchell Highway survey station and the matching heavy vehicles movements was 32% at each survey station
- approximately 25% of total westbound traffic observed at the Great Western Highway and Mitchell Highway survey stations were through traffic that did not stop at Bathurst (i.e. with a travel time less than 20 to 30 minutes). Approximately 49% of heavy vehicles recorded at these stations were through traffic movements

- between Mid Western Highway and the Great Western Highway:
  - approximately 24% of total eastbound traffic observed at the Mid Western Highway survey station was observed at the Great Western Highway survey station and matching heavy vehicles traffic movements was 20% at the Mid Western survey station
  - Approximately 21% of total eastbound traffic movements observed at the Mid Western Highway and Great Western Highway survey stations were through traffic with a travel time less than 20 to 30 minutes. Approximately 50% of heavy vehicles recorded at these stations were through traffic
  - Approximately 3% of total westbound traffic movements were observed at the Great Western Highway survey station matched with the Mid Western Highway survey station. The matching heavy vehicles traffic was also 3% for this station pair. Overall, the number of matching traffic movements at this station pair is very low
  - approximately 11% of total westbound traffic observed at the Great Western Highway and Mid Western Highway survey stations were through traffic movements
  - approximately 67% of heavy vehicles recorded at these stations were through traffic
- between Vale Road and Great Western Highway:
  - Approximately 3% of traffic observed in Great Western Highway westbound matched with Vale Road southbound. The matching heavy vehicles traffic was 6% for this station pair. Overall, the number of matching traffic at this station pair is low
  - Approximately 19% of traffic observed in Great Western Highway westbound and Vale Road southbound were through traffic (non stopping with a travel time less than 20-30 minutes). Approximately 29% of heavy vehicles recorded at these stations were through traffic
  - The matching traffic between Vale Road northbound and Great Western Highway eastbound is low. However, approximately 15% of traffic observed in Vale Road northbound and Great Western Highway eastbound were through traffic (non stopping). All heavy vehicles recorded at these stations were through traffic
- between Durham Street and Vale Road
  - Approximately 5% of traffic observed in Durham Street southbound matched with Vale Road southbound. The matching heavy vehicles traffic was 18% for this station pair. Overall, the number of matching traffic at this station pair is low
  - Approximately 6% of total southbound traffic movements observed at Durham Street and Vale Road survey stations were through traffic movements with a travel time less than 20-30 minutes. Approximately 33% of heavy vehicles recorded at these stations were through traffic

- Approximately 8% of traffic observed in Vale Road northbound matched with Durham Street northbound. The matching heavy vehicles traffic was 13% for this station pair. Overall, the number of matching traffic at this station pair is low
- Approximately 15% of traffic observed in Vale Road northbound and Durham Street northbound was through traffic (non stopping with a travel time less than 20-30 minutes). Approximately 75% of heavy vehicles recorded at these stations were through traffic
- for the heavy vehicles travelling between Durham Street and Vale Road, approximately 56% used the Bentinck Street route, whilst 44% used the Havannah Street route

- between O'Connell Road and the Great Western Highway:
  - approximately 8% of total northbound traffic observed at the O'Connell Road survey station was observed at the Great Western Highway survey station and approximately 21% of northbound heavy vehicle movements on O'Connell Road were observed at the Great Western Highway survey station
  - approximately 9% of total eastbound traffic observed at the O'Connell Road and Great Western Highway survey stations were through traffic with a travel time less than 30 minutes and approximately 29% of heavy vehicles recorded at these stations were through movements.
  - approximately 5% of total southbound traffic observed at the Great Western Highway survey station was observed at the O'Connell Road survey station and the matching heavy vehicles movements was 12% at each survey station
  - approximately 23% of total southbound traffic observed at the Great Western Highway and O'Connell Road survey stations were through traffic that did not stop at Bathurst (i.e. with a travel time less than 30 minutes). Approximately 50% of heavy vehicles recorded at these stations were through traffic movements
- between Gilmour Street and the Great Western Highway:
  - approximately 7% of total northbound traffic observed at the Great Western Highway survey station was observed at the Gilmour Street survey station and the matching heavy vehicles movements was 6% at each survey station
  - approximately 18% of total northbound traffic observed at the Great Western Highway and Gilmour Street survey stations were through traffic that did not stop at Bathurst (i.e. with a travel time less than 30 minutes). Approximately 29% of heavy vehicles recorded at these stations were through traffic movements
  - approximately 16% of total southbound traffic observed at the Gilmour Street survey station was observed at the Great Western Highway survey station and approximately 4% of southbound heavy vehicle movements on Gilmour Street were observed at the Great Western Highway survey station
  - approximately 19% of total southbound traffic observed at the Gilmour Street and Great Western Highway survey stations were through traffic with a travel time less than 30 minutes and all heavy vehicles recorded at these stations were through movements.

- the majority of heavy vehicle traffic in Bathurst was of a "local" nature being 70% from the major feeding roads
- Through traffic was observed to represent between 21% and 25% of all traffic and in the order of 50% of heavy vehicles travelling east-west between Great Western Highway and Mitchell Highway during a 12 hour day time period between 6.30am and 6.30pm.

4. The traffic model

This section briefly describes the model design i.e. assumptions, input data and modelling steps used to forecast traffic on key roads and intersections within the Bathurst study area. It defines the geographic scope of the model, the structure of the model components, and outlines the calibration process to assess the reliability of the model results. The base year 2006 model was developed to reflect the interaction between existing land uses and the road network. Future year traffic models were developed to assess traffic impacts from a set of land use changes, including residential, industrial and commercial developments in 10-year intervals up to 2050.

4.1 Overview

Features of the transport model adopted for this study were:

- network model: TransCAD
- TransCAD Modelling Period: 24 hours daily
- existing land Use Data: 2006
- modelling year: 2006 (existing), 2020 (future), 2050 (future)
- coverage: Bathurst Study Area including future developments.

The network model was developed using the TransCAD transportation planning software. TransCAD provides a full set of transport and traffic modelling functionalities that can be fully integrated within a Geographic Information System (GIS). The model's GIS capability in terms of data management, data manipulation and presentation greatly enhances the efficiency of the model input and output.

4.2 Modelling objectives

The followings modelling objectives were developed to satisfy Bathurst Regional Council's requirements:

- analyse the likely diversion of through and local traffic to a Southern Link Road Route
- assess the traffic implications of future network changes associated with the Bathurst Southern Ring Road Route proposal.

4.3 Key model inputs

4.3.1 Network

Network structure

The 2006 base year road network has the following three main data components:

- a road link structure that incorporated the main urban and rural arterial, collector and local road networks

- a node coordinate system which defined intersection and travel zone locations and allows for the network to be overlaid on a GIS base map
- a transport zone layer.

Network attributes

The following data sources supplied by the Council were inputs into the 2006 base model network:

1. road hierarchy (see Figure 2-1)
2. posted speed limits
3. GIS mapping files which contain link attributes, including road centre line data (e.g. number of traffic lanes), lot boundary, and land use by zones
4. Aerial photos of the study area.

Extensive data checking was undertaken to ensure the 2006 base network reflected actual road network, land use distribution and traffic behaviour within the Bathurst study area.

Link type

The link type attributes used in the Bathurst Local Area model were used and are shown in Table 4-1. Refer to Figure 2-1 for the road hierarchies assumed in the model.

Table 4-1 Link type (TransCAD)

Link Code	Link Type	Description
99	Centroid connector	zone load points
11	Arterial (Urban)	Urban Within the main urban areas
12	Arterial (Rural)	Rural Arterial roads outside of urban areas
21	Sub arterial (Urban)	Urban
22	Sub arterial (Outer Urban)	Outer Urban
3	Collector	Local access function
4	Load Limited Route	12 Tonne Limit
5	Local road	Roads with distribution function

Speed flow curves

Speed-flow (or volume-delay) curves define, for each link type, the rate at which travel times increase during the traffic assignment process as traffic volumes increase. They therefore form an important input to the modelling of the effects of traffic congestion on travel times. The AM peak speed-flow curves used in Singleton Local model were retained for the Bathurst study area. Speed-flow relationships for this study were developed using the Bureau of Public Roads (BPR) function, which relates congested speed as a function of volume-to capacity ratio according to the following formula:

$$t = t_0\left(1+\alpha(v/C)^{\beta}\right)$$

Note: t = travel time of the link-minutes

t_0 = free flow travel time-minutes

α = link type specific parameter

β = link type specific parameter

C =capacity (vehicle/hr)

V = traffic volume (vehicle/hr).

The constants α and β are used to calibrate the BPR function for local conditions and represent the effects of roadside friction factors including pedestrians, parking access and other general roadside activity. Separate speed-flow curves were applied to roads with different link types. Calibration of speed-flow curves was undertaken as part of the development of the Bathurst Model.

Link capacity

Values for the daily capacities for the respective link types were based on the typical capacities. During the calibration process, capacity of specific links was altered iteratively. Table 4-2 summarised the initial values assumed in the Bathurst model.

Table 4-2 Link capacity (TransCAD)

Link Code	Link Type	Capacity per lane per day (pcu)
99	Centroid connector	100,000
11	Arterial (Urban)	9,000
12	Arterial (Rural)	9,000
21	Sub arterial (Urban)	9,000
22	Sub arterial (Rural)	3,000
3	Collector	5,000
4	Load Limited Route	3,000
5	Local road	3,000

Link impedances

Link impedance, usually measured as travel time, is a key input to the traffic assignment process. The impedance value was estimated based on assumed travel speed by link type.

Travel Zones

The zoning system was based on ABS Census Collection Districts (CCD). The CCD's where further sub-divided to achieve a fine level of detail needed to ensure land use and vehicle access points are properly reflected in the model. PB's model included some 207 travel zones as summarised in Appendix C.

Table 4-3 Travel zones assumed in traffic model

Land use	Number of Zones
Residential	103
Business	18
Industrial	19
Recreation	16
Special others (hospital, schools, recreational)	9
Externals	13
Other (market gardens / rural)	29
Totals	**207**

4.3.2 Traffic demand/trip table

Trip tables are essentially a representation of the travel demand or number of trips that occur between each origin-destination pair ("OD pair") without having regard to the actual route taken through the physical network. PB used trip tables in two key areas:

- for daily model calibration purposes, current year 2006 trip tables, adjusted to match observed traffic volumes in key locations, were used
- future year trip tables were developed for forecast years 2020, 2030, 2040 and 2050 taking into account the calibration adjustment to the base year
- in general, a trip table represents four types of trips as follows:
  - external to external – through traffic with origin and destination are outside of Bathurst study area
  - external to internal – traffic origin is outside of Bathurst but destination is within the Bathurst study area
  - internal to external – traffic origin is within Bathurst study area but destination is outside of Bathurst
  - internal to internal – traffic which travels within Bathurst study area. These are local trips.

Developing a new trip table from survey data is a time consuming and iterative process. The 2006 Trip table is based on the following data sources:

- land use data segregated by dwelling, office, retail, industrial, schools and hospitals
- mid-block and intersection turning movements data
- External traffic contribution factors by agricultural and tourist traffic. For instance, agricultural traffic accounts for a large proportion of external to internal trips and vice versa.
- an iterative process was adopted to estimate base year daily trip table as follows:

- firstly, the production and attraction of trips at each travel zone categorised by land use data was estimated. Production relates to outbound trips and attraction relates to inbound trips. Appropriate daily trip generation rate was used from PB's survey data source, RTA's trip generation guidelines and previous Bathurst traffic studies. Appropriate adjustment factors were applied to reflect the daily travel condition
- secondly, through trips (external to external) was estimated from the O-D survey. We have refined external traffic behaviour via a matrix estimation process which also matched traffic counts at external stations

- the gravity model adopted for this study was based on a typical gravity model used in other similar studies.

4.4 Model calibration

4.4.1 Targets and result summary

Model calibration is the process by which the initial model inputs and parameters are adjusted in a logical and controlled way until the model matches a set of observed traffic data. This calibration process confirms that appropriate parameters are chosen, thus ensuring that when the model is used to make a forecast the results will be consistent with the inputs and current behavioural responses. The model was calibrated at three levels:

- Cordon lines which control total traffic entering and leaving the study area. The external count sites on the Great Western Highway, Mid Western Highway, Mitchell Highway, Littlebourne Street and Vale Road formed the model cordon boundary.
- individual roads based on traffic counts
- model calibration criteria were based on the US Federal Highway Administration (FHWA) and the "Model Reasonableness and Checking Manual" as described below:
  - the correlation coefficient, (R2) for region wide observed traffic counts versus estimated volumes should be greater than 0.88
  - the percent Root Mean Square Error (%RMSE) should be below 30%.

Table 4-4 presents the calibration and validation targets considered and results achieved for this model.

Table 4-4 Calibration and validation targets and results for 2006 daily model

Calibration Objective	Calibration target	Model compliance
Road traffic characteristics lead to realistic route choice	▪ For links: ▪ $R^2 > 0.9$ ▪ %RMSE <30% ▪ % difference within ± 15% = 80% of sites	▪ For links (22 count sites) ▪ R2 = 0.95 ▪ %RMSE =16.7% ▪ % difference within ± 15% = 82% of sites

Note: GEH statistics were calculated using peak one hour passenger car unit volumes

%RMSE = % root mean square error

4.4.2 Observed and modelled link volumes

Within the study area, the 22 counting stations were examined in detail. Adjustments to link attributes were made until modelled traffic volumes were close to the actual traffic volumes. In general, the model replicated most of sites within a range of +/-20 percent (see Table 4-4). Three sites were between +/-20% to 33%. Figure 4-1 shows the scatter plot of the observed and modelled volumes with R2 values 0.95, indicating a close match between counts and model volumes. Thus it is reasonable to conclude that the calibration of the existing situation in the model for the Bathurst study area is acceptable and can form the basis for forecasting future traffic on the proposed Southern Ring Road Route.

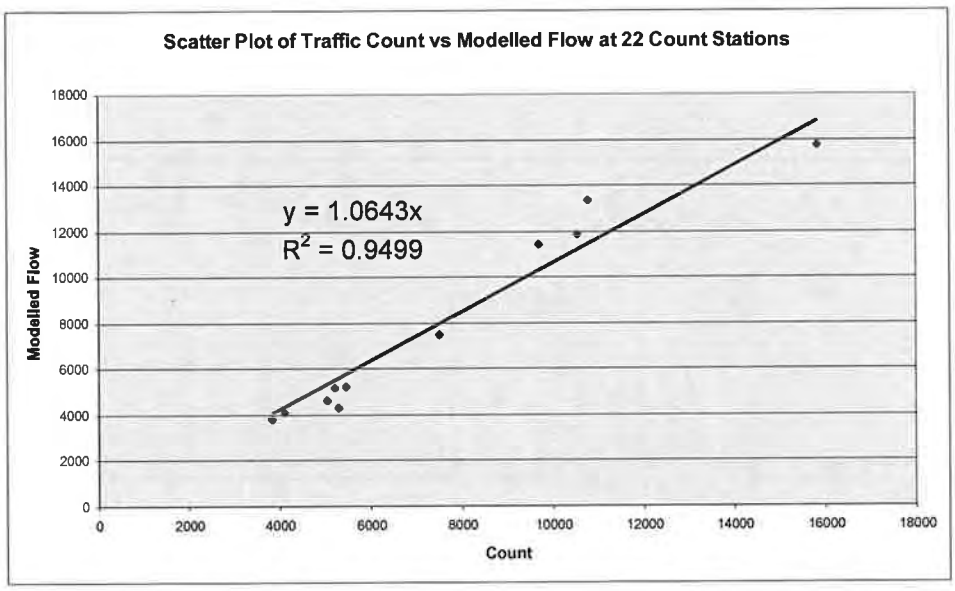


Figure 4-1 Scatter plot of observed and modelled link volumes (2006 daily, vehicles)

Table 4-5 Comparison of surveyed and modelled traffic flow for year 2006 (vehicles/day)

Site ID	Road	Model		Survey		Difference		% Difference	
		NE/NW	SE/SW	NE/NW	SE/SW	NE/NW	SE/SW	NE/NW	SE/SW
1&2	Mitchell Highway, Evans Plains Creek Bridge	3,735	3,765	3,753	3,752	18	-13	0%	0%
3&4	Mid Western Highway, west of McDiarmid Street	2,060	2,055	2,064	2,055	4	0	0%	0%
5&6	Vale Road, south of Lloyds Road	1,920	1,930	1,907	1,938	-13	8	-1%	0%
7&8	O'Connell Road, north of Blue Ridge Road	3,485	1,710	3,497	1,697	12	-13	0%	-1%
9&10	Great Western Highway (east), west of Ashworth Drive	7,815	7,970	7,959	7,871	144	-99	2%	-1%
11&12	Limekilns Road, south of Culnane Place	2,005	2,645	2,348	2,691	343	46	17%	2%
13&14	Gilmour Street, between Tareena Avenue and Kelso Public School	2,220	2,100	2,491	2,796	271	696	12%	33%
15&16	Durham Street, between Hope Street and Peel Street	5,735	7,635	5,178	5,600	-557	-2,035	-10%	-27%
17&18	Rocket Street, between Seymour Street and Havannah Street	3,020	2,230	2,952	2,508	-68	278	-2%	12%
19&20	Bentinck Street, between Durham Street and Howick Street	6,475	5,415	5,616	4,931	-859	-484	-13%	-9%
21&22	Havannah Street, between Durham Street and Howick Street	6,220	5,225	4,616	5,088	-1,604	-137	-26%	-3%

5. Traffic growth and network changes

5.1 Land use changes

The land use changes for each of the decades up to 2050 have been projected based on the strategic planning contained in Bathurst's Urban Strategy (2007), as discussed in Section 2. The resulting land use scenarios for 2020-2050 are based on potential growth on land zoned residential and industrial and land identified "for strategic development purposes only".

Table 5-1 summarises population and commercial / industrial GFA (ha) for each forecast year used in the model. The population estimate for 2020 was based on similar Council approvals to previous years. The estimates for 2030, 2040 are a pro-rata increase based on a target population of 80,000 by 2050 as required in Bathurst Regional Council's study brief as Council had not undertaken any detailed planning for these levels of population. This study has used these target populations purely to test their impact on the road network. Whether these target populations for each decade are achievable is outside the scope of this study.

The commercial / industrial GFAs (ha) were estimated from existing and future land use plans. The estimates for future commercial and industrial GFAs (ha) indicates there is a significant imbalance between population and employment by around 2040. There needs to be a large increase in commercial and industrial GFA by 2040 to correct this imbalance. Implications are that traffic flows beyond 2040 could be underestimated.

Table 5-1 Target population and estimate of commercial / industrial GFA (ha)

Year	Population	% Change in Population per year	Commercial / Industrial GFA (ha)	% Change in Commercial / Industrial GFA
2006	32,653		166.92	
2020	39,690	1.4%	215.79	29.3%
2030	53,200	3.0%	266.65	23.6%
2040	66,800	2.3%	273.23	2.5%
2050	80,300	1.9%	274.17	0.3%

Land use plans for each decade up to 2050 are shown in Figures 5-1 to 5-4.

Figure 5-1 Land use – 2020

Figure 5-2 Land use – 2030

[Insert appropriate figure]

Figure 5-3 Land use – 2040

[Insert appropriate figure]

Figure 5-4 Land use – 2050

[Insert appropriate figure]

5.2 Regional growth

Future traffic conditions in and around Bathurst will be influenced by the combined factors of background traffic growth and by changes to the transport network. Background traffic changes will be driven by planned and known changes in population and employment.

The majority of through traffic to Bathurst originates in Sydney (51%) with about 21% from elsewhere in NSW and 20% from elsewhere in Australia.

Bathurst Regional Council's Urban Strategy (2007) lists reasons why people visit Bathurst; holidays (40%), visiting friend and relatives (22%), business (17%) and just passing through (16%). Special events attracted 4% of visitors and local attractions (1%).

Traffic on the Great Western Highway was assumed to increase at about 1.39% per year up to 2050. The data sources reviewed include the following:

- Bureau of Transport and Regional Services (BTRE), *Demand Projections for AUSLINK Non-Urban Corridors: Methodology and Projections, Working Paper 66.* Main points were that the rate of increase in heavy vehicles (2.10%) on the Great Western Highway is projected to be slightly higher than for light vehicles (1.24%). The average increase is projected to be 1.39%
- An ABS survey of freight movements completed in 2001 and reported in *Freight Movements, Summary* (Catalogue 9220.0). Provides a summary of freight movements by mode around Australia. There was no specific reference to Bathurst or the Great Western Highway
- FDF Pty Ltd's *Freight Info database of 1999 inter-regional freight flows* – this data set forms the basis of the Freight inter-regional database and forecasting package developed for AUSTROADS. It outlines government policies in funding and regulating freight moved by road and other modes and compares these policies with the polices from other countries i.e. the EU, Japan & Mexico
- BTRE Information Sheet 22 *Freight between Australian Cities 1972 to 2001*, which includes historical trends and forecasts to 2020 for the Sydney-Brisbane corridor by mode of transport
- *NSW Freight Scoping Study* prepared by SKM in 2002, which brings together freight data from a range of sources and includes high, medium and low forecasts by mode and major commodity groups for 2005, 2010, 2015 and 2020
- Traffic counts from RTA permanent counting sites.

New developments:

- The existing planning controls reflect these recommendations and they remain relevant for the future planning of Bathurst, particularly given the approval for an intermodal transport terminal to be located in the Parkes area. The intermodal transport terminal has the potential to significantly increase the amount of rail freight transport and heavy vehicle movements through the Bathurst area
- Assumed 7.5 dwellings per hectare for future residential developments.

- The Australian Government Department of Transport and Regional Services undertook the Bells Line of Road Corridor Study in November 2005. The Bells Line of Road if upgraded would significantly improve accessibility between Bathurst and the Sydney region. The report concluded that the upgrade of the road to a four-lane B-Double route is feasible from an engineering perspective, but it does not appear to be feasible from an economic or financial perspective based on a range of growth strategies. It is highly unlikely that private investment would be forthcoming to progress the upgrade without significant government funding, their would be significant environmental and social impacts and that land acquisition was in the order of $230 million in 2004 dollars

5.3 Network changes

The only change made to the existing road network was the addition of the proposed Southern Ring Road Route. There has been no attempt to add additional local, collector or arterial roads to the existing Bathurst road network. The result was that traffic flows on existing local roads quickly exceeded the road capacity as population and commercial / industrial GFA (ha) increased for each of the target years from 2020 to 2050.

Changes to the existing road network to accommodate the increases in population assumed would be the subject of further studies, in particular the widening of the Great Western Highway on the eastern approach to Bathurst.

Figure 5-5 shows the indicative Southern Ring Road Route location suggested by Council which was used in traffic modelling.

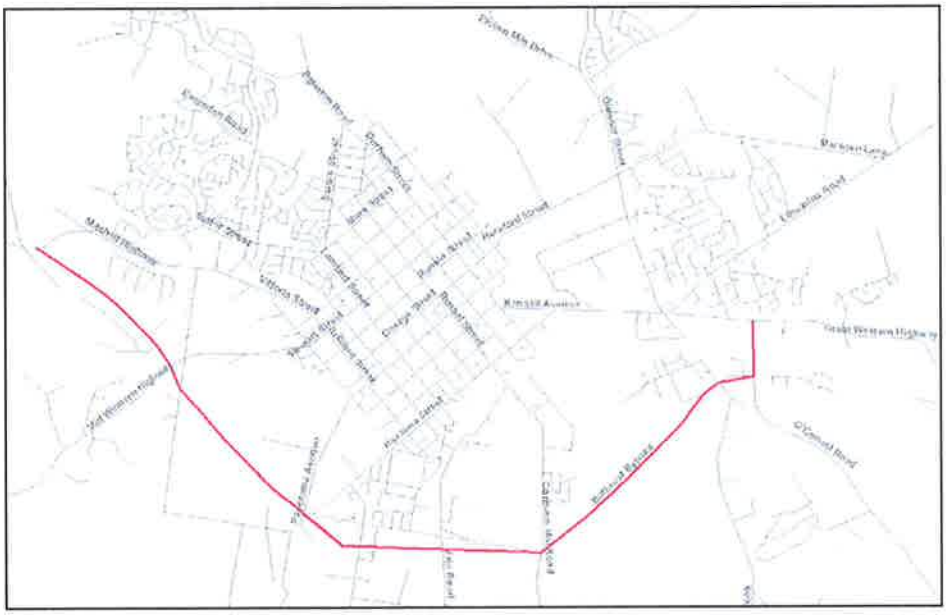


Figure 5-5 Indicative location for a proposed Southern Ring Road Route

5.4 Trip generation rate

The initial daily trip generation rates for the Bathurst model were adopted from the RTA *Guide to Traffic Generating Developments* as follows.

- residential trips were generated at 8.5 trips per day per dwelling
- industrial land generated vehicle trips at the rate of 10 trips per 100 sq.m GFA.

However TransCAD has the facility to adjust the number of trips to and from a particular traffic zone based on the traffic count survey results.

5.5 Future trip distribution

In determining future trip distribution to and from Bathurst study area, PB assessed potential population and industrial growth areas within the study area.

6. Traffic forecasts

The Bathurst transport model forecasts daily traffic flows on the Bathurst road network for years 2006, 2020 and 2050, with and without, a Southern Ring Road Route. Traffic flows for the intervening 10 year periods 2030 & 2040 were interpolated from the 2020 and 2050 modelled results

6.1 Likely diversion of future traffic to a Southern Link Road

This section has considered the likely usage of a Southern Ring Road Route to serve;

- through heavy vehicle movements
- local traffic needs and relief to local roads within Bathurst
- existing and future industrial and service business precincts of Bathurst
- likely future trends in heavy vehicle transport movements considered in light of new zonings and strategically identified uses from the Bathurst Region Urban Strategy.

Other issues considered were;

- the potential for a Southern Ring Road Route to divert tourist traffic away from the Bathurst town centre
- the variation in traffic flows along the Southern Ring Road Route.

6.1.1 Through traffic

Table 6-1 compares results from the model for all through traffic entering Bathurst on the following major access roads, with and without, the Southern Ring Road Route. For example the transport model predicts that of the 2,400 veh/day through traffic that would enter Bathurst from the east in 2006 on the Great Western Highway 450 veh/day would use the Southern Ring Road Route or 19%. In 2020 it is 38% and in 2050 it is 2850. Results for 2050 must be treated cautiously because the local road network assumed in this study for 2050 may be completely different to the road network in 2050. To accommodate a population of 80,000 there will be new roads linking the expanding residential and commercial areas also existing roads and road intersections will need to be upgraded.

- Great Western Highway
- Mitchell Highway
- Mid Western Highway
- Vale Road
- O'Connell Road.

Table 6-1 Through traffic entering Bathurst using the Southern Ring Road Route

Roadway	2006		2020		2050	
	Total Through Traffic	Using the Southern Ring Road Route	Total Through Traffic	Using the Southern Ring Road Route	Total Through Traffic	Using the Southern Ring Road Route
Great Western Highway	2,400	450	3,800	1,450	11,450	2850
Mitchell Highway	950	900	1,200	1,100	4,850	1,300
Mid Western Highway	400	350	550	450	6,200	3,100
Vale Road	200	150	400	300	4,800	2,950
O'Connell Road	1,000	350	1,150	400	2,100	750
TOTAL	4,950	2,200	7,100	3,700	29,400	10,950

Table 6-1 shows the expected traffic using the Southern Ring Road Route. These results are based an average speed of 70km/h on the Southern Ring Road Route and no major changes to the road network.

- 2,200 vehicles (44% of through traffic) in 2006
- 3,700 vehicles (52%) by 2020
- 10,950 vehicles (37%) by 2050.

Tables 6-2 to 6-6 summarise through traffic flows along the Southern Ring Road Route between these access roads by light and heavy vehicle categories.

Table 6-2 Summary of through traffic 2006

From	To	Total Through Traffic	Through traffic on Southern Ring Road Route	Through traffic not on Southern Ring Road Route
Great Western Highway	Mitchell Highway	1,000	300	700
	Mid Western Highway	250	100	150
	Vale Road	50	50	All through traffic on Southern Ring Road Route
	O'Connell Road	250	-	-
Mitchell Highway	Great Western Highway	600	500	100
	Mid Western Highway	50	50	All through traffic on Southern Ring Road Route
	Vale Road	150	150	All through traffic on Southern Ring Road Route
	O'Connell Road	150	150	All through traffic on Southern Ring Road Route
Mid Western Highway	Great Western Highway	200	150	50
	Mitchell Highway	50	50	All through traffic on Southern Ring Road Route
	Vale Road	50	50	All through traffic on Southern Ring Road Route
	O'Connell Road	50	50	All through traffic on Southern Ring Road Route
Vale Road	Great Western Highway	50	50	All through traffic on Southern Ring Road Route
	Mitchell Highway	50	50	All through traffic on Southern Ring Road Route
	Mid Western Highway	0	0	0
	O'Connell Road	50	50	All through traffic on Southern Ring Road Route
O'Connell Road	Great Western Highway	450	-	-
	Mitchell Highway	250	250	All through traffic on Southern Ring Road Route
	Mid Western Highway	50	50	All through traffic on Southern Ring Road Route
	Vale Road	50	50	All through traffic on Southern Ring Road Route
TOTAL		3,800	2100	

Table 6-2 shows that:

- of the total 3,800 through traffic movements in 2006 approximately 58% of this traffic would use the Southern Ring Road Route
- the Southern Ring Road Route is most attractive to bypassing traffic coming from the Mitchell Highway, Mid Western Highway, Vale Road and O'Connell Road where almost 100% of through traffic from these roads will use the Bypass. Only 29% of traffic from the Great Western Highway is projected to use the Southern Ring Road Route.

Table 6-3 Summary of through traffic 2020

From	To	Total Through Traffic	Through traffic on the Southern Ring Road Route	Through traffic not on Southern Ring Road Route
Great Western Highway	Mitchell Highway	1,300	1,000	300
	Mid Western Highway	400	300	100
	Vale Road	200	150	50
	O'Connell Road	400	0	-
Mitchell Highway	Great Western Highway	850	750	100
	Mid Western Highway	50	50	All through traffic on Southern Ring Road Route
	Vale Road	150	150	All through traffic on Southern Ring Road Route
	O'Connell Road	150	150	50
Mid Western Highway	Great Western Highway	350	300	50
	Mitchell Highway	50	50	All through traffic on Southern Ring Road Route
	Vale Road	50	50	All through traffic on Southern Ring Road Route
	O'Connell Road	50	50	50
Vale Road	Great Western Highway	200	150	50
	Mitchell Highway	50	50	All through traffic on Southern Ring Road Route
	Mid Western Highway	50	50	All through traffic on Southern Ring Road Route
	O'Connell Road	50	50	All through traffic on Southern Ring Road Route
O'Connell Road	Great Western Highway	650	0	650
	Mitchell Highway	250	250	All through traffic on Southern Ring Road Route
	Mid Western Highway	100	100	All through traffic on Southern Ring Road Route
	Vale Road	50	50	All through traffic on Southern Ring Road Route
TOTAL		5,400	3,700	

Table 6-3 shows that:

- of the total 5,400 through traffic movements in 2020 approximately 68% of this traffic would use the Southern Ring Road Route
- the Southern Ring Road Route is most attractive to bypassing traffic coming from the Mitchell Highway, Mid Western Highway, Vale Road and O'Connell Road where almost 100% of through traffic from these roads will use the Southern Ring Road Route. The percentage of through traffic from the Great Western Highway that would use the Southern Ring Road Route has increased to 63% of total through traffic from the Great Western Highway

Table 6-4 Summary of through traffic 2030

From	To	Total Through Traffic	Through traffic on Southern Ring Road Route	Through traffic not on Southern Ring Road Route
Great Western Highway	Mitchell Highway	1,450	900	550
	Mid Western Highway	950	600	400
	Vale Road	800	450	350
	O'Connell Road	750	0	-
Mitchell Highway	Great Western Highway	1,000	750	250
	Mid Western Highway	1,150	150	1,050
	Vale Road	150	150	50
	O'Connell Road	150	150	50
Mid Western Highway	Great Western Highway	800	600	200
	Mitchell Highway	1,250	450	800
	Vale Road	250	250	All through traffic on Southern Ring Road Route
	O'Connell Road	100	100	50
Vale Road	Great Western Highway	1,050	950	150
	Mitchell Highway	100	100	All through traffic on Southern Ring Road Route
	Mid Western Highway	600	100	500
	O'Connell Road	100	100	All through traffic on Southern Ring Road Route
O'Connell Road	Great Western Highway	850	0	-
	Mitchell Highway	300	300	All through traffic on Southern Ring Road Route
	Mid Western Highway	150	150	All through traffic on Southern Ring Road Route
	Vale Road	100	100	50
Total		12,050	6,350	

Table 6-4 shows that:

- of the total 12,050 through traffic movements in 2030 approximately 52% of this traffic would use the Southern Ring Road Route
- the percentage of through predicted to use the Southern Ring Road Route from each of the major highways has changed in 2030 possibly indicating the Southern Ring Road Route has reached its capacity to carry additional traffic.

Table 6-5 Summary of through traffic 2040

From	To	Total Through Traffic	Through traffic on Southern Ring Road Route	Through traffic not on Southern Ring Road Route
Great Western Highway	Mitchell Highway	1,600	800	800
	Mid Western Highway	1,500	850	700
	Vale Road	1,400	750	650
	O'Connell Road	1,100	0	-
Mitchell Highway	Great Western Highway	1,150	750	400
	Mid Western Highway	2,250	200	2,100
	Vale Road	150	150	50
	O'Connell Road	150	150	50
Mid Western Highway	Great Western Highway	1,250	900	350
	Mitchell Highway	2,450	850	1,600
	Vale Road	400	400	All through traffic on Southern Ring Road Route
	O'Connell Road	100	100	50
Vale Road	Great Western Highway	1,900	1,700	250
	Mitchell Highway	150	150	All through traffic on Southern Ring Road Route
	Mid Western Highway	1,100	150	950
	O'Connell Road	150	150	All through traffic on Southern Ring Road Route
O'Connell Road	Great Western Highway	1,050	0	-
	Mitchell Highway	350	350	All through traffic on Southern Ring Road Route
	Mid Western Highway	200	200	All through traffic on Southern Ring Road Route
	Vale Road	150	150	50
TOTAL		18,550	8,750	

Table 6-5 shows that:

- of the total 18,550 through traffic movements in 2040 approximately 47% of this traffic would use the Southern Ring Road Route
- the percentage of through predicted to use the Southern Ring Road Route from each of the major highways has changed in 2040 possibly indicating the Southern Ring Road Route has reached its capacity to carry additional traffic.

Table 6-6 Summary of through traffic 2050

From	To	Total Through Traffic	Through traffic on Southern Ring Road Route	Through traffic not on Southern Ring Road Route
Great Western Highway	Mitchell Highway	1,750	700	1,050
	Mid Western Highway	2,000	1,100	950
	Vale Road	1,950	1,050	950
	O'Connell Road	1,450	0	-
Mitchell Highway	Great Western Highway	1,250	750	500
	Mid Western Highway	3,300	250	3,100
	Vale Road	150	150	50
	O'Connell Road	150	150	All through traffic on Southern Ring Road Route
Mid Western Highway	Great Western Highway	1,700	1,200	500
	Mitchell Highway	3,600	1,250	2,400
	Vale Road	550	550	All through traffic on Southern Ring Road Route
	O'Connell Road	100	100	All through traffic on Southern Ring Road Route
Vale Road	Great Western Highway	2,750	2,450	350
	Mitchell Highway	150	150	All through traffic on Southern Ring Road Route
	Mid Western Highway	1,600	200	1,400
	O'Connell Road	150	150	All through traffic on Southern Ring Road Route
O'Connell Road	Great Western Highway	1,200	0	-
	Mitchell Highway	350	350	All through traffic on Southern Ring Road Route
	Mid Western Highway	200	200	All through traffic on Southern Ring Road Route
	Vale Road	200	200	50
TOTAL		24,550	10,950	

Table 6-6 shows that:

- of the total 24,550 through traffic movements in 2050 approximately 44% of this traffic would use the Southern Ring Road Route
- the traffic growth between Mitchell Highway and Great Western Highway become more steady with 750 vehicles expected using the Southern Ring Road Route
- the growth of traffic between Mitchell Highway and Mid Western Highway is significant. Approximately 250 through traffic movements are expected to use the Southern Ring Road Route in 2050
- the percentage of through traffic predicted to use the Southern Ring Road Route from each of the major highways has changed in 2040 possibly indicating the Southern Ring Road Route has reached its capacity to carry additional traffic.

The transport model has predicted a significant number of vehicles will use the Southern Ring Road Route. Further calibration of the model may reduce some of the inconsistencies in the results such as the disproportionate travel movements between the Mitchell Highway to Great Western Highway and Vale Road to Great Western Highway but for the purpose of this study the model clearly indicates that the Southern Ring Road Route will carry a high proportion of the through traffic.

6.1.2 Local traffic

The impact of the Southern Ring Road Route to divert traffic to or from local roads within Bathurst is summarised in Tables 6-7 and 6-8. Table 6-7 shows the patterns for all light and heavy vehicles on these roads and Table 6-8 is the impact for heavy vehicles only.

Table 6-7 indicates that there is expected to be a reduction in total traffic flows on all local streets listed in the table. The decrease is less than 10% of the total of all vehicles (light + heavy) on Bentinck Street, Brilliant Street, Durham Street (east of Bentinck Street), Rocket Street, Russell Street, Stewart Street and Vale Road. The decreases are 20-30% on Durham Street (west of Bentinck Street), the Great Western Highway (east and west of Havannah Street) and Havannah Street.

Table 6-8 highlights the more significant decreases in heavy vehicle movements on these roads, for example up to 55% of heavy vehicles movements would be removed from Havannah Street, 50% from Bentinck Street, 55% from Durham Street east of Bentinck Street and 57% west of Bentinck Street, and up to 71% on the Rocket/Brilliant/Russell Street corridor.

The significant reduction in heavy vehicle movements on local roads in Bathurst is a very strong positive reason for constructing the Southern Ring Road Route.

Figure 6-1 depicts the local road locations of which the traffic flow estimation are shown in Table 6-7 and Table 6-8.

An interesting result is the increase in traffic flows on Vale Road with the Southern Ring Road Route. This is probably due to Vale Road becoming a major access road between the Southern Ring Road Route and the South Bathurst industrial area. Hence traffic flows will increase in line with the increase in commercial and industrial activity in this area.

Caution in interpreting Model Results on Local Roads

The traffic model created for this study is a strategic model which means that caution is needed when interpreting traffic flows on the local roads within the town centre. The model is designed to predict with some confidence traffic flows on major roads, especially the Southern Ring Road Route.

Not all local roads have been included in the model hence traffic flows on the local roads included in the model may represent the cumulative traffic flows on a local road corridor and not necessarily on a particular road.

The overwhelming results in Tables 6-7 and 6-8 are a reduction in traffic flows on local roads. The few instances where traffic movements have been shown to increase is probably due to the strategic nature of this model as previously mentioned.

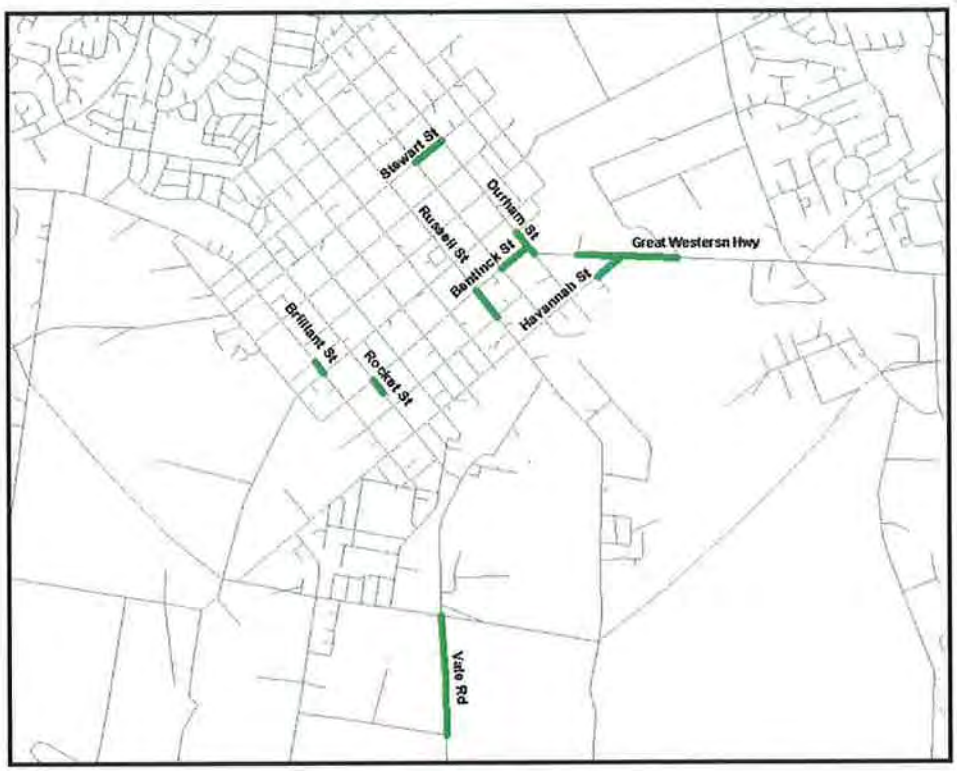


Figure 6-1 Link location map for local roads

Table 6-7 Traffic forecast on local roads (2-way – all vehicles)

Roadway	Location	NO Southern Ring Road Route					WITH Southern Ring Road Route				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Bentinck St	west of Durham Street	11,900	21,150	29,200	37,250	45,250	10,800	19,250	27,550	35,850	44,100
Brilliant St	north of William Street	7,450	10,450	14,700	18,900	23,100	6,800	9,900	11,850	13,800	15,700
Durham St	east of Bentinck Street	28,100	45,750	63,800	81,850	99,900	26,000	36,350	51,350	66,300	81,250
Durham St	west of Bentinck Street	27,800	44,000	58,750	73,500	88,200	25,100	39,350	49,050	58,700	68,350
Great Western Hwy	east of Havannah Street	32,500	59,900	86,650	113,350	140,050	26,300	40,100	61,950	83,800	105,650
Great Western Hwy	west of Havannah Street	23,350	41,900	61,000	80,100	99,150	20,100	28,900	43,150	57,400	71,650
Havannah St	south of Great Western Highway	9,300	18,650	26,450	34,250	42,000	6,250	11,450	19,300	27,150	34,950
Rocket St	south of Bentinck Street	5,300	6,500	14,750	23,000	31,200	5,150	8,100	15,000	21,850	28,700
Russell St	south of Bentinck Street	6,300	7,900	12,050	16,200	20,300	6,350	8,350	12,800	17,250	21,700
Stewart St	west of Durham Street	10,500	25,650	41,650	57,650	73,600	10,150	18,400	33,850	49,300	64,700
Vale Rd	south of Lloyds Road	3,850	5,700	11,450	17,200	22,900	3,750	6,050	12,300	18,550	24,800

Difference of Traffic forecast on local roads (2-way – all vehicles)

Roadway	Location	Difference					% Difference				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Bentinck St	west of Durham Street	-1,100	-1,900	-1,650	-1,400	-1,150	-9%	-9%	-6%	-4%	-3%
Brilliant St	north of William Street	-650	-550	-2,850	-5,100	-7,400	-9%	-5%	-19%	-27%	-32%
Durham St	east of Bentinck Street	-2,100	-9,400	-12,450	-15,550	-18,650	-7%	-21%	-20%	-19%	-19%
Durham St	west of Bentinck Street	-2,700	-4,650	-9,700	-14,800	-19,850	-10%	-11%	-17%	-20%	-23%
Great Western Hwy	east of Havannah Street	-6,200	-19,800	-24,700	-29,550	-34,400	-19%	-33%	-29%	-26%	-25%
Great Western Hwy	west of Havannah Street	-3,250	-13,000	-17,850	-22,700	-27,500	-14%	-31%	-29%	-28%	-28%
Havannah St	south of Great Western Highway	-3,050	-7,200	-7,150	-7,100	-7,050	-33%	-39%	-27%	-21%	-17%
Rocket St	south of Bentinck Street	-150	1,600	250	-1,150	-2,500	-3%	25%	2%	-5%	-8%
Russell St	south of Bentinck Street	50	450	750	1,050	1,400	1%	6%	6%	6%	7%
Stewart St	west of Durham Street	-350	-7,250	-7,800	-8,350	-8,900	-3%	-28%	-19%	-14%	-12%
Vale Rd	south of Lloyds Road	-100	350	850	1,350	1,900	-3%	6%	7%	8%	8%

Table 6-8 Traffic forecast on local roads (2-way – Heavy Vehicles only)

Roadway	Location	NO Southern Ring Road Route					WITH Southern Ring Road Route				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Bentinck St	west of Durham Street	600	1,100	1,800	2,500	3,150	500	550	1,150	1,750	2,300
Brilliant St	north of William Street	500	500	650	800	950	150	150	250	300	350
Durham St	east of Bentinck Street	1,700	2,700	4,200	5,700	7,200	1,250	1,150	2,250	3,350	4,400
Durham St	west of Bentinck Street	1,450	2,350	3,350	4,350	5,350	1,150	1,050	1,600	2,100	2,600
Great Western Hwy	east of Havannah Street	2,600	4,200	6,700	9,150	11,600	1,550	1,650	3,250	4,850	6,400
Great Western Hwy	west of Havannah Street	1,500	2,800	4,500	6,200	7,850	1,050	900	2,100	3,300	4,500
Havannah St	south of Great Western Highway	1,100	1,450	2,250	3,050	3,800	500	800	1,200	1,550	1,900
Rocket St	south of Bentinck Street	750	600	1,250	1,900	2,500	350	450	850	1,250	1,650
Russell St	south of Bentinck Street	150	300	750	1,200	1,600	150	300	450	600	700
Stewart St	west of Durham Street	650	1,550	2,100	2,600	3,100	450	450	950	1,400	1,850
Vale Rd	south of Lloyds Road	400	450	1,400	2,300	3,200	300	600	1,550	2,500	3,400

Difference of traffic forecast on local roads (2-way – Heavy Vehicles only)

Roadway	Location	Difference					% Difference				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Bentinck St	west of Durham Street	-100	-550	-650	-750	-850	-17%	-50%	-36%	-30%	-27%
Brilliant St	north of William Street	-350	-350	-400	-500	-600	-70%	-70%	-62%	-63%	-63%
Durham St	east of Bentinck Street	-450	-1,550	-1,950	-2,350	-2,800	-26%	-57%	-46%	-41%	-39%
Durham St	west of Bentinck Street	-300	-1,300	-1,750	-2,250	-2,750	-21%	-55%	-52%	-52%	-51%
Great Western Hwy	east of Havannah Street	-1,050	-2,550	-3,450	-4,300	-5,200	-40%	-61%	-51%	-47%	-45%
Great Western Hwy	west of Havannah Street	-450	-1,900	-2,400	-2,900	-3,350	-30%	-68%	-53%	-47%	-43%
Havannah St	south of Great Western Highway	-600	-650	-1,050	-1,500	-1,900	-55%	-45%	-47%	-49%	-50%
Rocket St	south of Bentinck Street	-400	-150	-400	-650	-850	-53%	-25%	-32%	-34%	-34%
Russell St	south of Bentinck Street	0	0	-300	-600	-900	0%	0%	-40%	-50%	-56%
Stewart St	west of Durham Street	-200	-1,100	-1,150	-1,200	-1,250	-31%	-71%	-55%	-46%	-40%
Vale Rd	south of Lloyds Road	-100	150	150	200	200	-25%	33%	11%	9%	6%

Tables 6-7 and 6-8 indicate that:

- Traffic is expected to reduce in local roads if the Southern Ring Road proceeds.
- Traffic in Bentinck Street is expected to reduce in the range of 3% to 9%, whilst the reduction in truck traffic is more significant in the range of 30% to 50%.
- Trucks would be diverted from Bentinck Street, however, the reduction in truck flow would be more significant in Havannah Street. This indicates Havannah Street carries more through truck traffic if the Ring Road will not be in place.
- Traffic reduction in Brilliant Street is expected to be in the range of 5% and 32%. About a third of the traffic would be shifted to Southern Ring Road Route by 2050.
- Traffic in Durham Street and the Great Western Highway would be reduced in the order of 20%. There would be a significant reduction in trucks in the order of 50%. Approximately 35,000 daily vehicles (including 5,000 trucks) would be diverted to the Southern Ring Road Route. This would ease traffic congestion problems considerably in these roads.
- Although there would be some marginal increases expected in Rocket Street and Russell Street as connecting roads to the Southern Ring Road Route in 2020, the truck flow would be declined significantly by about 30% to 50% at these locations. By 2050, a proportion of traffic is expected to be diverted from Rocket Street.
- Over 7,000 vehicles would be expected to be diverted per day from Stewart Street (Great Western Highway). This includes over 1,000 daily trucks shifting to the Southern Ring Road Route.
- Vale Road to the south of Lloyds Road is expected to experience a margin increase in traffic flow as this section of Vale Road connects directly with the Southern Ring Road Route.
- Truck traffic is expected to be reduced significantly in local roads as through traffic would be shifted to the Southern Ring Road Route. The most significant reduction is seen in the Great Western Highway, Durham Street, Havannah Street and Stewart Street (Great Western Highway) where over 1,000 trucks are expected to be shifted per day. More than 5,000 trucks would be diverted from the Great Western Highway to the east of Havannah Street.

6.1.3 Service to industrial areas

The industrial areas are shown in Figures 5-1 to 5-4. Access to the industrial areas is via;

- Littlebourne Street / Hampden Park Road / Lee Street
- Russell Street/Vale Road or Havannah/Russell/Rocket/Vale Roads.

Table 6-9 shows projected traffic movements to the Industrial Areas with the Southern Ring Road Route. There is a decrease in total vehicle and heavy vehicle movements to Lee Street. This is due to the shift of westbound traffic using the Southern Ring Road Route.

Figure 6-2 depicts the local road locations of which the traffic flow estimation are shown in Table 6-9 and Table 6-10.

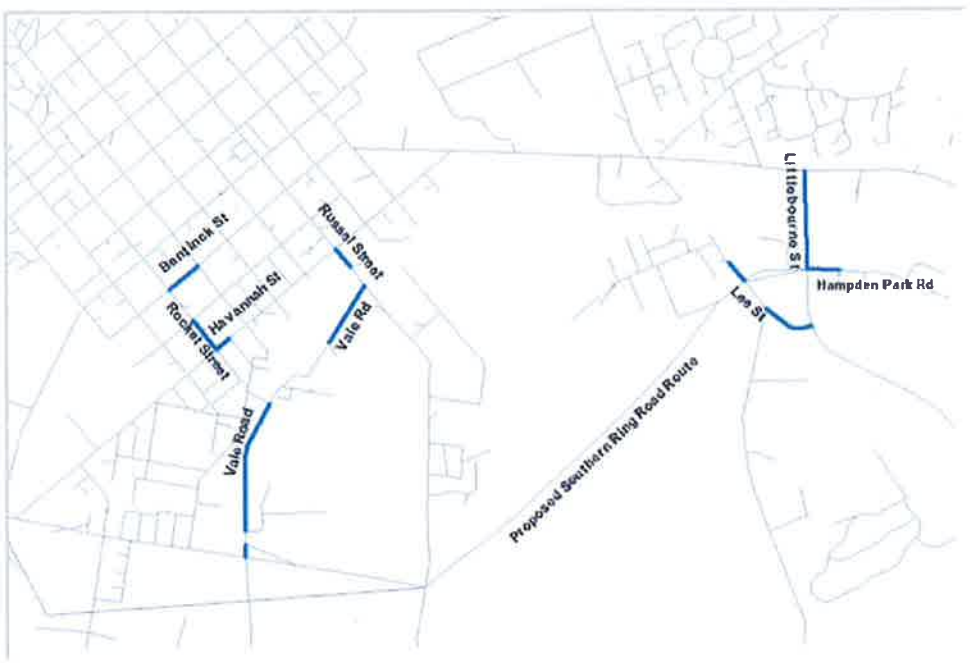


Figure 6-2 Link location map for roads in industrial area

Table 6-9 Traffic forecast to industrial areas (2-way – All Vehicles)

Roadway	Location	NO Southern Ring Road Route					WITH Southern Ring Road Route				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Lee St	west of Littlebourne Street	2,050	10,000	11,850	13,700	15,550	1,850	4,600	7,350	10,100	12,800
Lee St	west of Southern Ring Road Route	6,650	10,900	12,800	14,650	16,500	6,550	11,000	12,700	14,350	16,000
Hampden Park Rd	east of Littlebourne Street	2,600	12,500	14,800	17,050	19,300	2,600	12,500	14,800	17,050	19,300
Havannah St	east of Rocket Street	6,650	9,350	12,050	14,700	17,350	6,200	8,250	14,250	20,250	26,250
Bentinck St	east of Rocket Street	4,900	10,750	18,750	26,750	34,700	5,050	10,050	16,400	22,750	29,100
Rocket St	north of Havannah St	5,250	6,350	13,300	20,250	27,150	5,150	9,000	16,950	24,900	32,800
Russell St	Railway overpass	4,700	6,550	13,800	21,050	28,300	7,000	15,400	22,150	28,850	35,550
Alpha St	south of Russell Street	1,300	2,750	6,800	10,800	14,800	600	1,150	7,600	14,050	20,500
Vale Rd	south of Rocket Street	4,100	5,850	10,750	15,650	20,500	3,350	10,450	18,650	26,850	35,000
Vale Rd	north of Lloyds Road	2,900	5,000	11,050	17,100	23,150	3,650	11,050	19,700	28,300	36,900

Difference of traffic forecast to industrial areas (2-way – All Vehicles)

Roadway	Location	Difference					% Difference				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Lee St	west of Littlebourne Street	-200	-5,400	-4,500	-3,600	-2,750	-10%	-54%	-38%	-26%	-18%
Lee St	west of Southern Ring Road Route	-100	100	-100	-300	-500	-2%	1%	-1%	-2%	-3%
Hampden Park Rd	east of Littlebourne Street	0	0	0	0	0	0%	0%	0%	0%	0%
Havannah St	east of Rocket Street	-450	-1,100	2,200	5,550	8,900	-7%	-12%	18%	38%	51%
Bentinck St	east of Rocket Street	150	-700	-2,350	-4,000	-5,600	3%	-7%	-13%	-15%	-16%
Rocket St	north of Havannah St	-100	2,650	3,650	4,650	5,650	-2%	42%	27%	23%	21%
Russell St	Railway overpass	2,300	8,850	8,350	7,800	7,250	49%	135%	61%	37%	26%
Alpha St	south of Russell Street	-700	-1,600	800	3,250	5,700	-54%	-58%	12%	30%	39%
Vale Rd	south of Rocket Street	-750	4,600	7,900	11,200	14,500	-18%	79%	73%	72%	71%
Vale Rd	north of Lloyds Road	750	6,050	8,650	11,200	13,750	26%	121%	78%	65%	59%

Table 6-10 Traffic forecast to industrial areas (2-way – heavy vehicles only)

Roadway	Location	NO Southern Ring Road Route					WITH Southern Ring Road Route				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Lee St	west of Littlebourne Street	100	1,350	1,600	1,800	2,000	400	750	1,000	1,250	1,500
Lee St	west of Southern Ring Road Route	200	1,150	1,400	1,600	1,800	200	1,150	1,400	1,650	1,850
Hampden Park Rd	east of Littlebourne Street	250	300	350	350	350	250	300	350	350	350
Havannah St	east of Rocket Street	650	750	1,100	1,400	1,700	300	450	900	1,300	1,700
Bentinck St	east of Rocket Street	400	650	1,400	2,100	2,800	350	450	750	1,050	1,350
Rocket St	north of Havannah St	750	650	1,250	1,800	2,350	350	450	1,000	1,500	2,000
Russell St	Railway overpass	800	950	1,700	2,450	3,200	500	900	1,400	1,850	2,300
Alpha St	south of Russell Street	200	350	800	1,250	1,650	100	100	600	1,100	1,600
Vale Rd	south of Rocket Street	600	750	1,400	2,050	2,700	350	750	1,450	2,150	2,850
Vale Rd	north of Lloyds Road	400	700	1,600	2,500	3,350	650	1,100	1,900	2,650	3,400

Difference of traffic forecast to industrial areas (2-way – heavy vehicles only)

Roadway	Location	Difference					% Difference				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Lee St	west of Littlebourne Street	300	-600	-600	-550	-500	300%	-44%	-38%	-31%	-25%
Lee St	west of Southern Ring Road Route	0	0	0	50	50	0%	0%	0%	3%	3%
Hampden Park Rd	east of Littlebourne Street	0	0	0	0	0	0%	0%	0%	0%	0%
Havannah St	east of Rocket Street	-350	-300	-200	-100	0	-54%	-40%	-18%	-7%	0%
Bentinck St	east of Rocket Street	-50	-200	-650	-1,050	-1,450	-13%	-31%	-46%	-50%	-52%
Rocket St	north of Havannah St	-400	-200	-250	-300	-350	-53%	-31%	-20%	-17%	-15%
Russell St	Railway overpass	-300	-50	-300	-600	-900	-38%	-5%	-18%	-24%	-28%
Alpha St	south of Russell Street	-100	-250	-200	-150	-50	-50%	-71%	-25%	-12%	-3%
Vale Rd	south of Rocket Street	-250	0	50	100	150	-42%	0%	4%	5%	6%
Vale Rd	north of Lloyds Road	250	400	300	150	50	63%	57%	19%	6%	1%

Table 6-9 and 6-10 indicate that:

- Overall traffic would be reduced in Lee Street, Littlebourne Street, Bentinck Street with the Southern Ring Road Route. Traffic would use Vale Road (north of Lloyds Road) to access the industrial area in South Bathurst.
- Truck traffic would be reduced significantly in the range of 30% to 40% by year 2020 in the Havannah Street/ Bentinck Street/ Rocket Street route to and from the industrial area in South Bathurst. A large proportion of truck traffic would access the area via the Southern Ring Road Route and Vale Road. This reduction is also expected beyond year 2020 and more truck traffic will be declined in Bentinck Street.
- Truck traffic would be reduced significantly in the Russell Street/ Alpha Road/ Vale Road route to and from the industrial area in South Bathurst. A large proportion of truck traffic would access the area via the Southern Ring Road Route and Vale Road.

6.1.4 Trends in heavy vehicle movements

The Bathurst transport model has projected that heavy vehicle movements would increase at approximately 1% per year.

6.1.5 Potential to divert traffic away from the City

The traffic model provided additional evidence regarding the need for the Southern Ring Road Route. It came from the percentages of through traffic that were forecast to divert to the route. In 2006, approximately 58% of through traffic would have chosen the route, 68% in 2020, 52% in 2030, 47% in 2040 and 44% in 2050. These forecasts assume no other changes were made to the existing road network. Almost 100% of through traffic from the Mitchell Highway, Vale Road and O'Connell Road would use the Route. Initially, a lower percentage of through traffic from the Great Western Highway would choose the Route but this would grow as congestion increases on local roads.

The reason behind the traffic diversion is related to a quicker travel time between various origins and destinations along the route due to the increasing congestion on travel routes through the town centre.

6.2 Need for a Southern Link Road Southern Ring Road Route

The report has highlighted the need for the Southern Ring Road Route comes from

- the diversion of existing and future heavy vehicle traffic away from existing and future residential areas
- the relief to local traffic routes within Bathurst.

6.2.1 Diversion of heavy vehicles from residential areas

A benefit of a Southern Ring Road Route would be reduced traffic on residential streets. For example, total traffic flows on Bentinck Street were estimated to decrease by around 9%, while the number of heavy vehicles would decrease by up to 50%. For Durham Street, west of Bentinck Street, traffic would fall by up to 23%. Heavy vehicles numbers would fall by up to 55%. At Havannah Street, traffic is expected to decrease by 39% (and heavy vehicles by

up to 55%). Some heavy vehicles will still need to use these streets for local deliveries to businesses in the area

Figure 6-3 depicts the local road locations of which the traffic flow estimation are shown in Table 6-11 and Table 6-12.

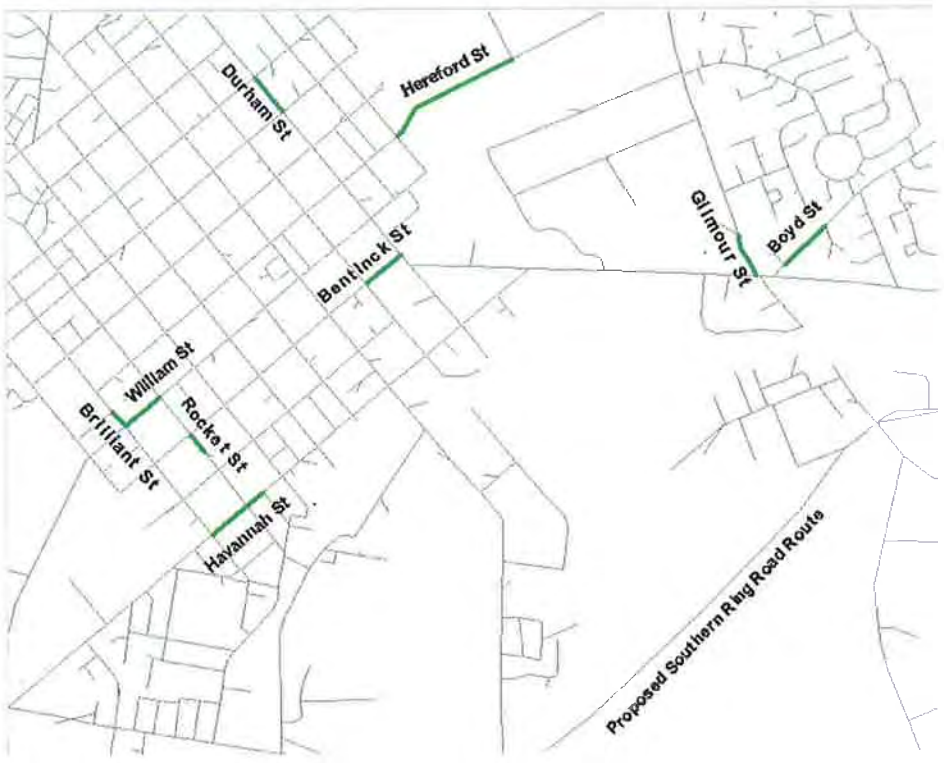


Figure 6-3 Link location map for roads in residential area

6.2.2 Relief to local traffic routes within Bathurst

The traffic model predicted the Southern Ring Road Route would be well used. If a Southern Ring Road Route were opened in 2006, it would attract 8,000 vehicles per day. By 2020, this would increase to around 36,000 vehicles per day, and then to almost 90,000 vehicles by 2050, if no other new routes were built by then to help share the traffic load. Clearly, the proposed route could not carry 90,000 vehicles but that level of demand indicates the changes that will need to occur over the next 40 years.

About 10-15% of total vehicles were assumed to be heavy vehicles. That would be around 1,200 trucks per day in 2006, 4,000 trucks per day by 2020 and about 9,000 trucks per day by 2050. The impact of these vehicles on the town centre if there were no Bypass would be significant.

Additional evidence regarding the need for the Southern Ring Road Route came from the percentages of through traffic that was forecast to divert to the route. In 2006, approximately 58% of through traffic would have chosen the route, 68% in 2020, 52% in 2030, 47% in 2040 and 44% in 2050. These forecasts assume no other changes were made to the existing

road network. Almost 100% of through traffic from the Mitchell Highway, Vale Road and O'Connell Road would use the Route. Initially, a lower percentage of through traffic from the Great Western Highway would choose the Route but this would grow as congestion increases on local roads.

Table 6-11 Traffic forecast to residential areas (2-way – All Vehicles)

Roadway		NO Southern Ring Road Route					WITH Southern Ring Road Route				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Bentinck St	west of Durham Street	11,900	21,150	29,200	37,250	45,250	10,800	19,250	27,550	35,850	44,100
Boyd St	north of Great Western Highway	4,650	10,300	14,600	18,850	23,100	5,050	8,050	10,600	13,150	15,700
Brilliant St	north of William Street	7,450	10,450	40,300	70,100	99,900	6,800	9,900	33,700	57,500	81,250
Durham St	west of Stewart Street	14,750	18,050	41,450	64,850	88,200	14,500	16,900	34,050	51,200	68,350
Gilmour St	north of Great Western Highway	5,450	18,450	59,000	99,550	140,050	5,900	10,000	41,900	73,800	105,650
Havannah St	north of Rocket Street	6,650	9,350	39,300	69,250	99,150	6,200	8,250	29,400	50,550	71,650
Havannah St	south of Rocket Street	3,250	7,800	19,200	30,600	42,000	2,300	5,050	15,050	25,000	34,950
Hereford St	east of Durham Street	11,150	23,500	26,100	28,650	31,200	10,100	15,700	20,050	24,400	28,700
Rocket St	south of Bentinck Street	5,300	6,500	11,100	15,700	20,300	5,150	8,100	12,650	17,200	21,700
William St	west of Rocket Street	2,200	5,350	28,100	50,850	73,600	1,750	4,050	24,300	44,500	64,700

Difference of traffic forecast to residential areas (2-way – All Vehicles)

Roadway	Location	Difference					% Difference				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Bentinck St	west of Durham Street	-1,100	-1,900	-1,650	-1,400	-1,150	-9%	-9%	-6%	-4%	-3%
Boyd St	north of Great Western Highway	400	-2,250	-4,000	-5,700	-7,400	9%	-22%	-27%	-30%	-32%
Brilliant St	north of William Street	-650	-550	-6,600	-12,600	-18,650	-9%	-5%	-16%	-18%	-19%
Durham St	west of Stewart Street	-250	-1,150	-7,400	-13,650	-19,850	-2%	-6%	-18%	-21%	-23%
Gilmour St	north of Great Western Highway	450	-8,450	-17,100	-25,750	-34,400	8%	-46%	-29%	-26%	-25%
Havannah St	north of Rocket Street	-450	-1,100	-9,900	-18,700	-27,500	-7%	-12%	-25%	-27%	-28%
Havannah St	south of Rocket Street	-950	-2,750	-4,150	-5,600	-7,050	-29%	-35%	-22%	-18%	-17%
Hereford St	east of Durham Street	-1,050	-7,800	-6,050	-4,250	-2,500	-9%	-33%	-23%	-15%	-8%
Rocket St	south of Bentinck Street	-150	1,600	1,550	1,500	1,400	-3%	25%	14%	10%	7%
William St	west of Rocket Street	-450	-1,300	-3,800	-6,350	-8,900	-20%	-24%	-14%	-12%	-12%

Table 6-12 Traffic forecast to residential areas (2-way - Heavy vehicles Only)

Roadway		NO Southern Ring Road Route					WITH Southern Ring Road Route				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Bentinck St	west of Durham Street	600	1,100	1,800	2,500	3,150	500	550	1,150	1,750	2,300
Boyd St	north of Great Western Highway	200	600	1,000	1,350	1,700	200	250	550	850	1,100
Brilliant St	north of William Street (assumed no load limits in place)	500	500	650	800	950	150	150	250	300	350
Durham St	west of Stewart Street	550	700	1,050	1,400	1,750	500	450	700	950	1,200
Gilmour St	north of Great Western Highway	300	850	1,200	1,500	1,800	350	550	700	850	950
Havannah St	north of Rocket Street	650	750	1,100	1,400	1,700	300	450	900	1,300	1,700
Havannah St	south of Rocket Street	200	650	950	1,250	1,550	50	150	550	950	1,300
Hereford St	east of Durham Street	400	1,150	1,550	1,950	2,350	400	500	700	900	1,050
Rocket St	south of Bentinck Street	750	600	1,250	1,900	2,500	350	450	850	1,250	1,650
William St	west of Rocket Street	150	200	450	700	950	150	150	400	650	850

Difference of traffic forecast to residential areas (2-way - Heavy vehicles Only)

Roadway	Location	Difference					% Difference				
		2006	2020	2030	2040	2050	2006	2020	2030	2040	2050
Bentinck St	west of Durham Street	-100	-550	-650	-750	-850	-17%	-50%	-36%	-30%	-27%
Boyd St	north of Great Western Highway	0	-350	-450	-500	-600	0%	-58%	-45%	-37%	-35%
Brilliant St	north of William Street	-350	-350	-400	-500	-600	-70%	-70%	-62%	-63%	-63%
Durham St	west of Stewart Street	-50	-250	-350	-450	-550	-9%	-36%	-33%	-32%	-31%
Gilmour St	north of Great Western Highway	50	-300	-500	-650	-850	17%	-35%	-42%	-43%	-47%
Havannah St	north of Rocket Street	-350	-300	-200	-100	0	-54%	-40%	-18%	-7%	0%
Havannah St	south of Rocket Street	-150	-500	-400	-300	-250	-75%	-77%	-42%	-24%	-16%
Hereford St	east of Durham Street	0	-650	-850	-1,050	-1,300	0%	-57%	-55%	-54%	-55%
Rocket St	south of Bentinck Street	-400	-150	-400	-650	-850	-53%	-25%	-32%	-34%	-34%
William St	west of Rocket Street	0	-50	-50	-50	-100	0%	-25%	-11%	-7%	-11%

Tables 6-11 and 6-12 indicate that:

- overall traffic would be reduced in residential streets as a large proportion of through traffic would be shifted to the Southern Ring Road Route
- Truck traffic would be reduced significantly in residential streets with the Southern Ring Road Route. Significant reduction could be seen in Bentinck Street, Gilmour Street, Hereford Street and Rocket Street where thoroughfare traffic shift to major roads and the Southern Ring Road Route.

6.3 Sensitivity tests

6.3.1 Speed changes in the Southern Ring Road Route

The traffic model was developed based on an average traffic speed for the Southern Ring Road Route of 70km/h. A sensitivity test was undertaken to determine whether increasing the average speed on the Southern Ring Road Route to 100km/h made a difference to traffic flows on the Southern Ring Road Route. The results for 2020 in Table 6-13 show that traffic flows on the Southern Ring Road Route would increase by around 30% if the average speed on the Southern Ring Road Route was increased from 70 to 100 km/h, thus indicating that traffic flows on the Southern Ring Road Route are sensitive to its average travel speed. To achieve an average travel speed of 100 km/h would require grade separations along the corridor which would add to the cost and delivery time of the project.

Table 6-13 Comparison of traffic volume for speed changes from 70km/h to 100km/h in the Southern Ring Road Route in year 2020 (2-way all vehicles)

Southern Ring Road Route section	Southern Ring Road Route 70km/h	Southern Ring Road Route 100km/h	Difference	% Difference
between Mitchell Highway and Mid Western Highway	9,200	12,400	3,200	35%
between Mid Western Highway and Panorama Avenue	17,550	22,300	4,750	27%
between Panorama Avenue and College Road (existing road section)	17,150	21,700	4,550	27%
between College Road and Vale Road (existing road section)	17,000	21,600	4,600	27%
between Vale Road and O'Connell Road	36,600	36,850	250	1%

6.3.2 Widening the Great Western Highway

The Great Western Highway east and west of the proposed intersection with the Southern Ring Road Route currently contains two lanes and operates at, or near, capacity. Table 6-14 shows that widening this section of the Great Western Highway from 2 to 4 lanes will result in a decrease of through traffic on the Southern Ring Road Route by up to a 28%.

Table 6-14 Widening Great Western Highway from 2 lanes to 4 lanes in year 2020 with the Southern Ring Road Route (2-way all vehicles)

Road	Location	2-lane (existing)	4-lanes	Difference	% Difference
Kendall Street	west of Durham Street	Existing 4 lanes	31,950	2,550	9%
Great Western Highway	west of Havannah Street	Existing 4 lanes	31,600	2,700	9%
Great Western Highway	east of Havannah Street	Existing 4 lanes	42,650	2,550	6%
Great Western Highway	west of Gilmour Street	Existing 4 lanes	38,250	3,000	9%
Great Western Highway	east of Limekilns Road	21,800	30,300	8,500	39%
Great Western Highway	west of O'Connell Road	27,500	37,600	10,100	37%
Great Western Highway	east of O'Connell Road	40,100	40,100	0	0%
Proposed Southern Ring Road Route	between Mitchell Highway and Mid Western Highway	9,200	9,000	-200	-2%
Proposed Southern Ring Road Route	between Mid Western Highway and Panorama Avenue	17,550	15,700	-1,850	-11%
Proposed Southern Ring Road Route	between Panorama Avenue and College Road (existing road section)	17,150	15,150	-2,000	-12%
Proposed Southern Ring Road Route	between College Road and Vale Road (existing road section)	17,000	15,150	-1,850	-11%
Proposed Southern Ring Road Route	between Vale Road and O'Connell Road	36,600	26,350	-10,250	-28%

6.4 Suitable alternatives

This report has assumed a particular location for the Southern Ring Road Route between the Great Western Highway and the Mitchell Highway. It begins at the Great Western Highway/Littlebourne Street intersection and finishes at the Mitchell Highway beyond the existing residential areas. Other locations are possible and options may need to be investigated in the future to select the preferred alignment based on a reduction of through traffic in the Bathurst Town Centre and residential areas. For example, starting the Southern Ring Road Route further to the east, skirting around the southern side of Bathurst and finishing further west on the Mitchell Highway would allow the road to function more as a bypass but may reduce the route's capacity to be a local traffic relief route for moving industrial traffic out of the town centre.

6.8 Indicative construction staging

Table 6-15 Number of lanes required by forecast year

Year	Southern Ring Road Route section	Highest daily traffic volume (1-way)	1-hour traffic volume	Capacity (pcu/ hour)[1]	Volume/ capacity ratio	No. of lanes required in each direction
2020	between Mitchell Highway and Mid Western Highway	7,900	721	1,500	0.48	1
	between Mid Western Highway and Panorama Avenue	12,800	1,169	1,500	0.78	2
	between Panorama Avenue and College Road (existing road section)	11,850	1,082	1,500	0.72	2
	between College Road and Vale Road (existing road section)	11,900	1,086	1,500	0.72	2
	between Vale Road and O'Connell Road	24,050	2,196	1,500	1.46	2
2030	between Mitchell Highway and Mid Western Highway	16,000	1,461	1,500	0.97	1
	between Mid Western Highway and Panorama Avenue	20,100	1,835	1,500	1.22	2
	between Panorama Avenue and College Road (existing road section)	18,700	1,707	1,500	1.14	2
	between College Road and Vale Road (existing road section)	19,400	1,771	1,500	1.18	2
	between Vale Road and O'Connell Road	33,850	3,090	1,500	2.06	3
2040	between Mitchell Highway and Mid Western Highway	24,100	2,200	1,500	1.47	2
	between Mid Western Highway and Panorama Avenue	27,400	2,502	1,500	1.67	2
	between Panorama Avenue and College Road (existing road section)	25,500	2,328	1,500	1.55	2
	between College Road and Vale Road (existing road section)	26,850	2,451	1,500	1.63	2
	between Vale Road and	43,650	3,985	1500	2.66	3

[1] RTA Guide to Traffic Generating Developments: One-way mid block capacity per lane for an undivided 4 lane rural road

Year	Southern Ring Road Route section	Highest daily traffic volume (1-way)	1-hour traffic volume	Capacity (pcu/ hour)[1]	Volume/ capacity ratio	No. of lanes required in each direction
	O'Connell Road					
2050	between Mitchell Highway and Mid Western Highway	32,150	2,935	1,500	1.96	2
	between Mid Western Highway and Panorama Avenue	34,650	3,163	1,500	2.11	3
	between Panorama Avenue and College Road (existing road section)	32,300	2,949	1,500	1.97	2
	between College Road and Vale Road (existing road section)	34,300	3,132	1,500	2.09	3
	between Vale Road and O'Connell Road	53,450	4,880	1,500	3.25	4

7. Summary of findings

Bathurst is a major hub of main road transport corridors in Western NSW. The Great Western Highway, Mid Western Highway and Mitchell Highway carry high traffic volumes through Bathurst, combining traffic from regional (through), tourists and local trips. The existing movement of through traffic in the Bathurst town centre is of particular concern for Council given the risks of safe and efficient movement of these vehicles and the conflicts between through and local traffic, as well as the increasing traffic delays in the town centre.

The objective of this study was to identify the need for a Bathurst southern ring road route to reduce the need for increased regional traffic to pass through the Bathurst town centre and reduce the need for heavy vehicles to use local roads in the Bathurst Town Centre. A traffic demand model was developed to predict traffic flows that would divert to a proposed Southern Ring Road Route and changes to traffic flows on existing roads in the Bathurst town centre for 2006, 2020, 2030, 2040 and 2050.

Traffic counts and an origin-destination study of general and heavy traffic were taken at 11 key locations in the Study Area. The results are summarised in the next two tables.

Table 7-1 Results from the automatic traffic counters

Site ID (refer to Figure 2-4)	Road sections	Daily Average Traffic	Daily Heavy Vehicles	Heavy vehicles as % of all traffic
1&2	Mitchell Highway, Evans Plains Creek Bridge	7,505	1,274	17%
3&4	Mid Western Highway, west of McDiarmid Street	4,119	638	15%
5&6	Vale Road, south of Lloyds Road	3,845	356	9%
7&8	O'Connell Road, north of Blue Ridge Road	5,194	762	15%
9&10	Great Western Highway (east), west of Ashworth Drive	15,830	1,953	12%
11&12	Limekilns Road, south of Culnane Place	5,039	183	4%
13&14	Gilmour Street, between Tareena Avenue and Kelso Public School	5,287	366	7%
15&16	Durham Street, between Hope Street and Peel Street	10,778	551	5%
17&18	Rocket Street, between Seymour Street and Havannah Street	5,460	343	6%
19&20	Bentinck Street, between Durham Street and Howick Street	10,547	693	7%
21&22	Havannah Street, between Durham Street and Howick Street	9,704	958	10%

Table 7-2 Results from the OD Survey (6.30am to 6.30pm on 13/03/2008)

Site ID	Road sections	Tube Count		OD Survey		Sample Size	
		Light Vehicle	Heavy Vehicle	Light Vehicle	Heavy Vehicle	Light Vehicle	Heavy Vehicle
1&2	Mitchell Highway, Evans Plains Creek bridge	4,343	878	1,700	485	39%	55%
3&4	Mid Western Highway, west of McDiarmid Street	2,577	455	975	341	38%	75%
5&6	Vale Road, south of Lloyds Road	2,492	316	1,205	149	48%	47%
7&8	O'Connell Road, north of Blue Ridge Road	3,807	628	1,291	310	34%	49%
9&10	Great Western Highway (east), west of Ashworth Drive	9,693	1,390	4,093	906	42%	65%
11&12	Limekilns Road, south of Culnane Place	3,760	142	-	-	-	-
13&14	Gilmour Street, between Tareena Avenue and Kelso Public School	3,916	344	1,557	182	40%	53%
15&16	Durham Street, between Hope Street and Peel Street	7,888	465	4,047	324	51%	70%
17&18	Rocket Street, between Seymour Street and Havannah Street	4,195	315	1,788	183	43%	58%
19&20	Bentinck Street, between Durham Street and Howick Street	8,087	617	3,439	268	43%	43%
21&22	Havannah Street, between Durham Street and Howick Street	7,175	746	3,467	645	48%	86%

The sample size ranged from 43% to 86% for heavy vehicles, and 34% to 51% for light vehicles which was adequate for calibrating the TransCAD traffic model for the Bathurst Area.

The traffic model

A traffic model was built of the Bathurst study area to consider present and forecast future traffic patterns with, and without, a southern ring road in the road network. The model was built in the TransCAD modelling software platform program, a GIS-based transport planning package. The base year contained land use descriptions from Council's most recent comprehensive information, which was for the year 2006. The road network in the base model was described as it was in 2007. Traffic was expanded to estimated levels for the years 2006, 2020 and 2050, so the impact of the Southern Ring Road could be measured for each period. One way in which the validity of the model is measured is in its ability to predict traffic movements that match how traffic is currently distributed through the Study Area. A comparison between surveyed and modelled traffic flow is summarised in the following table. It is labelled a 2006 model because that uses generating the traffic were assumed to be those for which we had data, 2006. Future developments can then be added into future years to see how such growth may impact traffic numbers and directions of flow. An annual travel demand growth rate of 1% is assumed of existing established areas.

Land use changes

Changes in population and commercial / industrial GFA (ha) were forecast as inputs into changing traffic rates in the model and are summarised in the following table.

Table 7-3 Changes in population and commercial / industrial GFA (ha)

Year	Population	% Change in Population per year	Commercial / Industrial GFA (ha)	% Change in Commercial / Industrial GFA
2006	32,653		166.92	
2020	39,690	1.4%	215.79	29.3%
2030	53,200	3.0%	266.65	23.6%
2040	66,800	2.3%	273.23	2.5%
2050	80,300	1.9%	274.17	0.3%

Network changes

The only change made to the existing road network was the addition of the Southern Ring Road Route. There were no other changes to local, collector or arterial roads within the Bathurst town centre, nor were any be required to accommodate the increasing population and employment levels up to 2050.

Traffic forecasts

In 2006, 2,200 vehicles (44% of through traffic) were predicted to divert to the Southern Ring Road Route, 3,700 vehicles (52% of through traffic) by 2020 and 10,950 vehicles (37% of through traffic) by 2050. This was based on an assumed average speed of 70km/h on the Southern Ring Road Route and no other changes on the road network.

The transport model predicted that the percentage of through traffic using the Southern Ring Road Route would increase if the travel time on the Southern Ring Road Route were reduced or the travel time on alternative through routes were increased. In other words, diversion to the Southern Ring Road Route is dependent upon the absolute travel time differences between alternative Southern Ring Road Route routes. Options for reducing travel time on the Southern Ring Road Route are to increase the speed limit, to grade separate critical intersections and to provide additional lanes to meet growing traffic demand. Other options include making alternative routes less attractive to through traffic reducing travel speeds and/or reducing their capacity.

The transport model predicted the following portions of through heavy vehicle movements would use the Southern Ring Road Route by 2050.

Table 7-4 Estimated heavy vehicles using the Southern Ring Road Route 2050

From	Total heavy vehicle through traffic (2050) (vehicles per day)	% of heavy vehicles using the Southern Ring Road Route (vehicles per day)
Great Western Highway (east)	2,700	35%
Mitchell Highway	700	79%
Mid Western Highway	700	71%
Vale Road	1,150	83%
O'Connell Road	750	47%

The transport model predicted a higher portion of heavy vehicle through traffic would use the Southern Ring Road Route, which further strengthens the environmental and safety case for the Southern Ring Road Route.

The transport model results indicated that the Southern Ring Road Route in its proposed location would be used by local traffic, particularly westbound traffic, on the Great Western Highway. A high percentage of this traffic is estimated to turn onto the Southern Ring Road Route and then enter the east side of town via Russell Street. If this is not favoured, then it would be necessary to move the Southern Ring Road Route further south to deter motorists. On the other hand, this could be favoured by Council as it would divert a significant amount of traffic from Havannah and Bentinck Streets.

Hazardous goods movements through Bathurst

The Southern Ring Road Route would provide a safer route for hazardous goods through Bathurst, as it could be located well away from residences, schools and other businesses.

Traffic model flow diagrams

Detailed traffic flow diagrams from the transport model are included in Appendix E. They show;

- 2006 vehicle flows without Southern Ring Road Route
- 2006 heavy vehicles flows without Southern Ring Road Route
- 2006 vehicle flows with Southern Ring Road Route
- 2006 heavy vehicle flows with Southern Ring Road Route
- **2020** vehicle flows without Southern Ring Road Route
- **2020** heavy vehicles flows without Southern Ring Road Route
- **2020** vehicle flows with Southern Ring Road Route
- **2020** vehicle flows with Southern Ring Road Route (Great Western Highway Widening)
- **2020** heavy vehicle flows with Southern Ring Road Route
- **2020** heavy vehicle flows with Southern Ring Road Route (Great Western Highway Widening)
- 2050 vehicle flows without Southern Ring Road Route
- 2050 heavy vehicles flows without Southern Ring Road Route
- 2050 vehicle flows with Southern Ring Road Route
- 2050 vehicle flows with Southern Ring Road Route (Great Western Highway Widening)
- 2050 heavy vehicle flows with Southern Ring Road Route
- 2050 heavy vehicle flows with Southern Ring Road Route (Great Western Highway Widening)

Conclusion

The conclusion from this study is that a southern ring road route would provide many benefits to Council to justify further investigation of the option. Results from the study clearly indicate that future investigations should concentrate on integrating the Southern Ring Road Route with the existing road network to relieve local traffic congestion and not treat the Southern Ring Route purely as a bypass route.

Benefits of the southern ring road route forecast by the transport model include:

- a high percentage of all light and heavy vehicles passing through Bathurst would use the Southern Ring Road Route – 44% in 2006, 52% in 2020 and 37% in 2050
- the Southern Ring Road Route in the location shown in this study would attract a high percentage of local traffic, particularly westbound traffic approaching Bathurst with a destination in the industrial and educational facilities located on the south east of Bathurst
- a significant diversion of traffic from key local streets of around 20-30% on routes such as Brilliant, Durham and Havannah Streets, with even higher diversions of heavy vehicles from these roads

- a significant increase in traffic on Gorman Hills Road and Russell Street as these roads become the major links to the Southern Ring Road Route from the Bathurst town centre
- a reduction in total light and heavy vehicles on link roads to and through the residential areas
- widening the Great Western Highway, east of the proposed start of the Southern Ring Road Route, should be considered as soon as possible if the route is to accommodate the predicted increases in traffic movements arising from the growth in Bathurst provided to the transport model for 2020
- The Southern Ring Road Route would reduce risks to residents and businesses from the movement of hazardous goods through Bathurst.

Appendix A

Traffic survey data – tube counts

80216

Mitchell Hwy
Westbound

Time	Week 1 Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
0000-0100	24	26	13	20	31	19	20	22	23
0100-0200	44	26	21	10	31	25	17	25	26
0200-0300	27	28	25	25	34	14	5	23	23
0300-0400	15	23	18	16	13	5	20	18	16
0400-0500	31	23	31	22	8	7	25	24	20
0500-0600	49	49	63	53	37	22	65	56	48
0600-0700	108	114	117	102	52	28	103	109	89
0700-0800	208	235	191	206	104	52	223	213	174
0800-0900	264	292	264	256	142	55	277	259	215
0900-1000	184	181	203	177	110	152	206	190	179
1000-1100	160	154	177	164	242	142	180	171	177
1100-1200	211	164	181	198	236	186	169	185	183
1200-1300	214	156	181	233	230	183	159	197	197
1300-1400	246	190	181	243	214	189	180	208	206
1400-1500	268	219	237	281	224	222	244	252	244
1500-1600	238	223	240	292	208	245	225	244	239
1600-1700	295	244	262	277	179	256	266	279	261
1700-1800	284	273	282	277	155	258	251	273	254
1800-1900	167	170	189	206	134	178	139	173	168
1900-2000	114	95	110	190	93	140	107	123	121
2000-2100	63	66	86	152	77	114	58	85	88
2100-2200	57	90	68	100	75	72	59	75	74
2200-2300	54	63	44	129	43	46	50	68	61
2300-2400	34	27	33	57	34	19	30	36	33
Totals	3372	3122	3217	3753	2748	2615	3117	3316	3135

Time	Week 2 Tue 18	Wed 19						Averages Weekday	7-day
0000-0100	25	29						27	27
0100-0200	25	30						28	28
0200-0300	18	26						22	22
0300-0400	28	22						25	25
0400-0500	23	26						25	25
0500-0600	57	59						58	58
0600-0700	103	105						104	104
0700-0800	227	194						211	211
0800-0900	261	256						259	259
0900-1000	194	220						207	207
1000-1100	170	104						137	137
1100-1200	168	0						84	84
1200-1300	179							179	179
1300-1400	211							211	211
1400-1500	198							198	198
1500-1600	245							245	245
1600-1700	268							268	268
1700-1800	282							282	282
1800-1900	182							182	182
1900-2000	103							103	103
2000-2100	75							75	75
2100-2200	56							56	56
2200-2300	49							49	49
2300-2400	29							29	29
Totals	3175	1073						3063	3063

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Mitchell Hwy
Eastbound

Time	Week 1 Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
0000-0100	7	15	19	11	17	16	12	13	14
0100-0200	7	7	12	13	14	12	13	10	11
0200-0300	14	16	18	13	10	9	17	16	14
0300-0400	10	16	13	22	16	5	20	16	15
0400-0500	22	22	20	17	13	7	17	20	17
0500-0600	48	37	45	49	43	16	54	47	42
0600-0700	86	93	72	100	79	24	56	89	79
0700-0800	203	208	183	174	112	65	175	189	160
0800-0900	261	298	312	264	214	138	290	287	254
0900-1000	214	230	218	262	271	185	236	233	232
1000-1100	203	185	185	231	209	182	211	203	209
1100-1200	154	173	206	233	247	211	224	198	209
1200-1300	168	179	201	236	207	239	182	193	202
1300-1400	170	182	192	267	154	202	171	196	195
1400-1500	189	219	204	279	213	231	187	216	217
1500-1600	201	208	239	295	163	260	234	235	229
1600-1700	222	284	275	265	157	262	298	283	262
1700-1800	288	296	307	333	148	236	247	294	265
1800-1900	149	162	177	269	115	192	138	179	172
1900-2000	96	117	93	147	79	105	93	109	103
2000-2100	57	62	74	76	37	90	48	63	63
2100-2200	55	53	51	38	35	54	40	47	47
2200-2300	34	43	59	35	42	30	31	40	39
2300-2400	22	19	33	20	34	21	22	23	23
Totals	2911	3106	3210	3752	2693	2813	3027	3201	3073

Time	Week 2 Tue 18	Wed 19						Averages Weekday	7-day
0000-0100	7	21						14	14
0100-0200	8	9						9	9
0200-0300	15	14						15	15
0300-0400	16	18						17	17
0400-0500	21	23						22	22
0500-0600	41	38						40	40
0600-0700	105	99						102	102
0700-0800	195	186						191	191
0800-0900	296	296						296	296
0900-1000	216	242						229	229
1000-1100	249	130						190	190
1100-1200	154	0						77	77
1200-1300	185							185	185
1300-1400	206							206	206
1400-1500	157							157	157
1500-1600	193							193	193
1600-1700	281							281	281
1700-1800	287							287	287
1800-1900	188							188	188
1900-2000	103							103	103
2000-2100	61							61	61
2100-2200	44							44	44
2200-2300	28							28	28
2300-2400	29							29	29
Totals	3085	1076						2962	2962

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Mitchell Hwy
Combined

Time	Week 1 Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
0000-0100	31	41	32	40	48	35	32	35	37
0100-0200	51	33	33	22	45	37	30	36	37
0200-0300	41	45	43	38	44	23	26	39	37
0300-0400	25	39	31	38	29	14	40	35	31
0400-0500	43	45	51	39	21	14	42	44	36
0500-0600	97	86	108	103	80	38	119	102	90
0600-0700	194	207	189	202	132	62	159	198	168
0700-0800	411	443	374	380	216	117	398	401	334
0800-0900	525	590	576	520	356	193	567	555	475
0900-1000	398	411	421	440	421	337	444	423	411
1000-1100	363	339	362	395	511	324	391	374	386
1100-1200	365	337	383	431	485	420	393	383	401
1200-1300	382	335	382	469	437	402	391	390	398
1300-1400	416	372	373	510	368	391	351	404	402
1400-1500	457	438	441	570	437	453	431	467	461
1500-1600	439	431	479	587	371	505	458	479	467
1600-1700	520	528	537	542	336	518	504	561	523
1700-1800	572	569	589	610	303	494	498	568	519
1800-1900	316	332	366	469	249	370	277	352	340
1900-2000	210	212	203	337	163	245	199	232	224
2000-2100	120	128	160	228	114	204	106	148	151
2100-2200	112	143	119	138	110	126	99	122	121
2200-2300	88	106	103	164	85	76	81	108	100
2300-2400	56	46	66	77	60	40	52	59	57
Totals	6283	6228	6427	7505	5441	5428	6144	6517	6208

Time	Week 2 Tue 18	Wed 19						Averages Weekday	7-day
0000-0100	32	50						41	41
0100-0200	33	38						36	36
0200-0300	33	40						37	37
0300-0400	44	40						42	42
0400-0500	43	51						47	47
0500-0600	98	97						98	98
0600-0700	208	204						206	206
0700-0800	422	380						401	401
0800-0900	557	552						555	555
0900-1000	410	462						436	436
1000-1100	419	234						327	327
1100-1200	322	0						161	161
1200-1300	364							364	364
1300-1400	417							417	417
1400-1500	355							355	355
1500-1600	438							438	438
1600-1700	549							549	549
1700-1800	569							569	569
1800-1900	370							379	379
1900-2000	206							206	206
2000-2100	136							136	136
2100-2200	100							100	100
2200-2300	77							77	77
2300-2400	58							58	58
Totals	6250	2149						6024	6024

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Mid Western Hwy
Westbound

Time	Week 1 Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
0000-0100	11	3	11	8	21	7	6	9	10
0100-0200	8	7	5	2	7	10	3	5	6
0200-0300	3	4	3	10	5	7	6	6	6
0300-0400	6	6	6	7	8	3	1	5	6
0400-0500	10	12	14	12	10	4	15	13	11
0500-0600	23	14	28	17	11	2	37	24	19
0600-0700	47	58	55	55	36	18	58	64	46
0700-0800	83	89	83	84	41	35	78	85	72
0800-0900	133	124	114	124	83	33	112	121	101
0900-1000	105	86	113	103	97	79	85	103	98
1000-1100	92	93	88	112	107	90	171	112	108
1100-1200	114	117	104	112	106	139	100	109	110
1200-1300	101	113	120	132	135	110	101	113	116
1300-1400	128	102	111	131	155	101	144	123	126
1400-1500	127	109	119	134	144	130	134	125	128
1500-1600	153	141	171	159	120	121	166	158	147
1600-1700	101	184	190	218	139	128	166	192	174
1700-1800	204	178	188	184	124	105	205	196	173
1800-1900	126	131	114	140	85	86	138	131	119
1900-2000	59	61	95	81	65	75	83	74	72
2000-2100	53	53	54	70	51	67	42	54	56
2100-2200	40	44	48	72	30	37	37	48	44
2200-2300	21	25	22	37	31	21	21	25	25
2300-2400	23	19	24	36	36	17	18	24	25
Totals	1858	1827	1870	2055	1617	1407	1938	1910	1796

Time	Week 2 Tue 18	Wed 19						Averages Weekday	7-day
0000-0100	13	7						10	10
0100-0200	2	4						3	3
0200-0300	3	1						2	2
0300-0400	4	4						4	4
0400-0500	11	11						11	11
0500-0600	18	22						20	20
0600-0700	56	52						54	54
0700-0800	83	93						88	88
0800-0900	124	122						123	123
0900-1000	110	103						110	110
1000-1100	92							92	92
1100-1200	110							110	110
1200-1300	113							113	113
1300-1400	109							109	109
1400-1500	121							121	121
1500-1600	160							160	160
1600-1700	165							165	165
1700-1800	227							227	227
1800-1900	136							136	136
1900-2000	79							79	79
2000-2100	47							47	47
2100-2200	37							37	37
2200-2300	23							23	23
2300-2400	27							27	27
Totals	1876	419						1871	1871

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Mid Western Hwy
Eastbound

Time	Week 1 Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
0000-0100	5	10	5	3	16	17	3	5	8
0100-0200	3	2	8	8	8	8	2	5	6
0200-0300	5	6	3	2	2	7	3	4	4
0300-0400	4	4	1	8	3	3	5	4	4
0400-0500	4	7	5	7	8	7	10	7	7
0500-0600	21	26	22	21	20	11	25	23	21
0600-0700	81	77	90	73	38	16	83	81	65
0700-0800	116	139	105	131	55	21	113	119	97
0800-0900	246	233	183	225	121	65	221	226	189
0900-1000	119	140	147	136	140	112	136	137	133
1000-1100	127	114	116	125	131	142	119	120	125
1100-1200	87	129	134	127	112	115	88	115	115
1200-1300	85	127	124	147	129	106	132	124	123
1300-1400	90	108	124	136	132	121	124	118	121
1400-1500	118	122	103	141	113	113	127	123	120
1500-1600	110	131	117	164	109	134	128	120	128
1600-1700	174	137	131	136	110	106	120	134	127
1700-1800	121	128	129	131	82	128	116	126	121
1800-1900	81	79	89	110	74	123	82	89	91
1900-2000	71	57	53	75	44	66	58	63	61
2000-2100	33	34	40	57	39	48	32	39	41
2100-2200	21	26	37	37	35	29	27	30	30
2200-2300	15	20	21	23	25	17	10	18	19
2300-2400	18	10	17	18	26	14	8	14	16
Totals	1704	1880	1836	2044	1602	1553	1798	1850	1772

Time	Week 2 Tue 18	Wed 19						Averages Weekday	7-day
0000-0100	3	8						6	6
0100-0200	5	2						4	4
0200-0300	7	7						7	7
0300-0400	3	5						4	4
0400-0500	8	7						8	8
0500-0600	18	22						20	20
0600-0700	100	82						91	91
0700-0800	101	114						108	108
0800-0900	221	221						221	221
0900-1000	120	151						136	136
1000-1100	126							126	126
1100-1200	104							104	104
1200-1300	87							87	87
1300-1400	123							123	123
1400-1500	121							121	121
1500-1600	118							118	118
1600-1700	157							157	157
1700-1800	134							134	134
1800-1900	106							106	106
1900-2000	58							58	58
2000-2100	33							33	33
2100-2200	28							28	28
2200-2300	18							18	18
2300-2400	10							10	10
Totals	1919	430						1836	1836

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Mid Western Hwy
Combined

Time	Week 1 Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
0000-0100	16	15	16	11	37	24	9	13	18
0100-0200	12	9	13	10	15	18	5	10	12
0200-0300	8	10	6	14	7	14	9	9	10
0300-0400	10	10	7	16	12	6	6	10	10
0400-0500	14	20	19	19	18	11	25	19	18
0500-0600	44	40	50	38	31	13	62	47	40
0600-0700	128	135	145	128	74	34	130	136	112
0700-0800	199	227	188	215	96	56	191	204	169
0800-0900	379	357	297	349	200	98	342	345	290
0900-1000	224	243	260	247	240	192	225	240	234
1000-1100	219	207	204	237	238	232	208	233	233
1100-1200	201	246	238	249	218	255	188	224	225
1200-1300	187	240	244	279	264	216	236	237	238
1300-1400	218	210	235	267	287	222	278	242	245
1400-1500	245	231	228	275	257	243	261	248	249
1500-1600	263	272	288	313	229	255	294	286	273
1600-1700	315	321	321	354	338	236	286	328	300
1700-1800	325	306	317	315	206	244	324	321	294
1800-1900	207	210	203	256	187	209	220	219	210
1900-2000	130	118	138	156	109	141	142	137	133
2000-2100	85	87	94	127	90	116	74	93	96
2100-2200	61	70	85	109	65	66	64	78	74
2200-2300	40	45	43	60	56	38	31	44	45
2300-2400	41	29	41	54	62	31	26	38	41
Totals	3562	3667	3696	4116	3219	2960	3734	3760	3568

Time	Week 2 Tue 18	Wed 19						Averages Weekday	7-day
0000-0100	16	16						16	16
0100-0200	7	6						7	7
0200-0300	10	9						9	9
0300-0400	7	9						8	8
0400-0500	19	18						19	19
0500-0600	36	44						40	40
0600-0700	156	134						145	145
0700-0800	184	207						196	196
0800-0900	345	342						344	344
0900-1000	236	254						245	245
1000-1100	218							218	218
1100-1200	214							214	214
1200-1300	210							210	210
1300-1400	232							232	232
1400-1500	242							242	242
1500-1600	278							278	278
1600-1700	322							322	322
1700-1800	361							361	361
1800-1900	242							242	242
1900-2000	137							137	137
2000-2100	80							80	80
2100-2200	65							65	65
2200-2300	41							41	41
2300-2400	37							37	37
Totals	3885	1039						3707	3707

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Vale Rd
Northbound

Time	Week 1 Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
0000-0100	1	1	2	2	4	14	1	1	4
0100-0200	3	0	3	0	2	5	0	1	2
0200-0300	1	4	2	3	2	3	1	2	2
0300-0400	1	1	0	2	4	3	1	1	2
0400-0500	5	7	1	3	4	5	15	6	6
0500-0600	24	24	27	34	20	8	27	27	23
0600-0700	95	93	95	94	37	25	91	93	74
0700-0800	140	137	134	139	52	34	127	135	109
0800-0900	261	257	266	281	118	62	207	245	215
0900-1000	158	157	145	161	125	98	148	154	142
1000-1100	87	97	100	117	127	110	105	101	106
1100-1200	89	85	97	106	136	113	114	98	106
1200-1300	98	96	90	84	107	130	84	90	98
1300-1400	83	82	101	114	114	110	104	97	101
1400-1500	87	90	109	117	72	130	121	105	107
1500-1600	154	112	129	159	100	137	165	145	137
1600-1700	128	105	115	133	93	129	130	122	119
1700-1800	83	106	108	110	100	114	101	102	104
1800-1900	66	82	78	99	85	95	58	77	81
1900-2000	50	69	67	44	65	50	54	59	60
2000-2100	31	31	27	49	46	40	27	33	37
2100-2200	19	14	18	30	24	28	13	19	21
2200-2300	15	20	18	15	20	12	15	17	16
2300-2400	9	6	5	10	19	7	6	7	9
Totals	1688	1671	1737	1906	1482	1486	1779	1757	1680

Time	Week 2 Tue 18	Wed 19						Averages Weekday	7-day
0000-0100	0	1						1	1
0100-0200	3	3						3	3
0200-0300	2	3						3	3
0300-0400	4	3						4	4
0400-0500	6	5						6	6
0500-0600	26	24						25	25
0600-0700	100	85						93	93
0700-0800	123	123						123	123
0800-0900	268	283						276	276
0900-1000	174	159						167	167
1000-1100	124	108						116	116
1100-1200	92							92	92
1200-1300	95							95	95
1300-1400	86							86	86
1400-1500	104							104	104
1500-1600	142							142	142
1600-1700	123							123	123
1700-1800	96							96	96
1800-1900	70							70	70
1900-2000	62							62	62
2000-2100	29							29	29
2100-2200	18							18	18
2200-2300	11							11	11
2300-2400	6							6	6
Totals	1764	797						1748	1748

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Vale Rd
Southbound

Time	Week 1 Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
0000-0100	6	3	5	8	7	21	0	5	7
0100-0200	5	3	2	5	8	11	0	3	5
0200-0300	7	1	2	3	2	5	1	3	3
0300-0400	2	1	2	0	3	6	2	1	2
0400-0500	1	1	2	4	4	5	2	2	3
0500-0600	10	15	15	16	12	6	14	14	13
0600-0700	51	44	50	61	15	11	41	49	39
0700-0800	79	73	73	82	39	38	74	76	65
0800-0900	79	65	67	81	56	81	72	73	71
0900-1000	75	82	73	67	73	115	84	77	82
1000-1100	70	74	79	101	107	131	81	81	92
1100-1200	91	105	87	38	147	120	89	94	106
1200-1300	93	91	83	106	144	113	112	97	106
1300-1400	90	99	97	120	127	116	104	102	108
1400-1500	107	84	95	145	108	120	105	107	109
1500-1600	174	172	161	188	125	95	149	169	152
1600-1700	189	158	166	187	123	105	173	175	157
1700-1800	216	243	213	222	101	77	198	218	181
1800-1900	138	136	145	154	88	70	136	142	124
1900-2000	77	83	99	85	64	79	110	91	85
2000-2100	51	51	49	70	32	41	58	56	50
2100-2200	37	50	52	67	48	30	38	48	46
2200-2300	22	38	25	37	40	18	23	29	29
2300-2400	12	17	27	32	26	8	15	21	20
Totals	1677	1689	1671	1939	1590	1433	1690	1733	1657

Time	Week 2 Tue 18	Wed 19						Averages Weekday	7-day
0000-0100	4	6						5	5
0100-0200	4	5						5	5
0200-0300	1	1						1	1
0300-0400	4	2						3	3
0400-0500	1	3						2	2
0500-0600	13	10						12	12
0600-0700	46	51						49	49
0700-0800	83	73						78	78
0800-0900	77	58						68	68
0900-1000	84	102						93	93
1000-1100	99	126						112	112
1100-1200	91							91	91
1200-1300	89							89	89
1300-1400	107							107	107
1400-1500	99							99	99
1500-1600	159							159	159
1600-1700	183							183	183
1700-1800	258							258	258
1800-1900	158							158	158
1900-2000	96							96	96
2000-2100	50							50	50
2100-2200	38							38	38
2200-2300	23							23	23
2300-2400	13							13	13
Totals	1779	437						1790	1790

80216
Vale Rd
Combined

Time	Week 1 Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
0000-0100	9	4	7	10	11	35	1	6	11
0100-0200	8	3	5	5	10	16	0	4	7
0200-0300	8	5	4	6	5	7	2	5	5
0300-0400	3	2	2	2	7	8	3	2	4
0400-0500	6	8	3	7	8	10	17	8	8
0500-0600	34	39	42	50	32	14	41	41	34
0600-0700	146	137	145	155	52	36	132	141	113
0700-0800	218	210	207	221	91	72	201	211	174
0800-0900	329	332	333	362	174	143	332	338	287
0900-1000	228	239	218	228	198	213	242	231	224
1000-1100	157	171	179	218	234	241	186	182	198
1100-1200	180	191	186	206	283	248	202	193	214
1200-1300	191	187	173	190	251	243	196	187	204
1300-1400	173	181	198	234	241	226	208	199	209
1400-1500	194	174	204	262	180	270	226	212	216
1500-1600	278	268	290	347	225	232	314	314	289
1600-1700	317	263	281	320	216	234	303	297	276
1700-1800	299	348	331	332	204	191	299	320	285
1800-1900	204	218	223	253	173	166	194	219	204
1900-2000	127	151	166	129	130	134	174	149	144
2000-2100	82	82	76	118	78	67	85	89	87
2100-2200	56	64	70	97	72	58	51	68	67
2200-2300	37	58	43	52	60	30	38	46	45
2300-2400	21	23	32	42	45	15	21	28	29
Totals	3365	3360	3408	3847	2982	2529	3468	3490	3337

Time	Week 2 Tue 18	Wed 19						Averages Weekday	7-day
0000-0100	4	7						6	6
0100-0200	7	8						8	8
0200-0300	3	4						4	4
0300-0400	8	5						7	7
0400-0500	7	8						8	8
0500-0600	39	34						37	37
0600-0700	146	136						141	141
0700-0800	206	196						201	201
0800-0900	345	341						343	343
0900-1000	258	261						260	260
1000-1100	222	234						228	228
1100-1200	183							183	183
1200-1300	184							184	184
1300-1400	193							193	193
1400-1500	203							203	203
1500-1600	301							301	301
1600-1700	306							306	306
1700-1800	354							354	354
1800-1900	228							228	228
1900-2000	158							158	158
2000-2100	79							79	79
2100-2200	56							56	56
2200-2300	34							34	34
2300-2400	19							19	19
Totals	3543	1234						3538	3538

80216

O'connell Rd
Northbound

Time	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
	Week 1								
0000-0100	6	11	10	5	26	4	6	7	10
0100-0200	9	2	2	5	12	3	3	4	5
0200-0300	9	8	8	5	9	5	4	7	7
0300-0400	9	8	11	17	3	12	12	11	10
0400-0500	23	22	14	13	6	22	14	19	16
0500-0600	57	57	52	34	16	48	58	54	46
0600-0700	139	142	144	56	48	154	134	143	117
0700-0800	229	223	180	82	48	209	217	214	171
0800-0900	346	354	311	154	92	308	319	328	276
0900-1000	263	274	221	213	151	205	221	237	222
1000-1100	166	202	195	216	181	174	192	186	189
1100-1200	207	219	181	258	232	159	202	194	207
1200-1300	204	210	219	213	264	197	211	208	208
1300-1400	211	201	230	227	193	194	186	204	205
1400-1500	220	232	232	200	151	176	191	210	200
1500-1600	283	290	275	185	182	205	227	272	247
1600-1700	337	282	331	192	196	311	333	319	283
1700-1800	303	382	294	170	163	319	215	307	271
1800-1900	245	253	222	123	138	232	232	237	207
1900-2000	129	151	124	113	101	129	114	129	123
2000-2100	74	89	77	51	60	55	60	71	67
2100-2200	71	55	73	55	32	45	53	60	55
2200-2300	50	41	49	32	19	25	33	40	36
2300-2400	13	17	26	35	9	15	13	17	19
Totals	3601	3653	3487	2655	2296	3286	3349	3479	3191

TRUE

Time	Wed 19							Averages Weekday	Averages 7-day
	Week 2								
0000-0100	11							11	11
0100-0200	3							3	3
0200-0300	8							8	8
0300-0400	9							9	9
0400-0500	16							16	16
0500-0600	63							63	63
0600-0700	142							142	142
0700-0800	213							213	213
0800-0900	339							339	339
0900-1000	259							259	259
1000-1100	212							212	212
1100-1200	195							195	195
1200-1300	183							183	183
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	1653							1653	1653

80216

O'connell Rd
Southbound

Time	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
	Week 1								
0000-0100	2	6	4	3	15	1	3	4	5
0100-0200	5	2	0	2	6	2	0	2	2
0200-0300	5	6	5	2	3	4	2	4	4
0300-0400	3	5	6	12	3	5	7	6	6
0400-0500	10	11	6	9	4	11	5	9	8
0500-0600	27	20	27	20	11	20	31	27	24
0600-0700	65	78	79	26	14	76	66	71	58
0700-0800	104	110	88	34	26	96	93	97	78
0800-0900	100	110	83	46	37	70	93	90	76
0900-1000	97	94	81	70	44	58	62	78	72
1000-1100	67	89	84	84	67	69	80	76	77
1100-1200	100	106	81	117	112	63	87	87	95
1200-1300	109	100	103	134	114	102	97	103	109
1300-1400	121	102	109	134	116	104	102	108	111
1400-1500	112	114	128	101	77	100	106	110	106
1500-1600	147	154	130	96	103	113	129	145	132
1600-1700	165	136	160	107	97	148	164	159	142
1700-1800	174	161	185	87	86	157	162	169	156
1800-1900	141	145	131	52	57	137	141	139	115
1900-2000	66	96	88	57	52	71	70	74	69
2000-2100	43	58	47	27	37	45	34	45	42
2100-2200	47	34	42	35	24	35	30	38	35
2200-2300	30	24	29	18	14	9	14	21	20
2300-2400	11	9	15	21	5	10	10	11	12
Totals	1751	1803	1697	1294	1126	1593	1610	1691	1552

Time	Wed 19							Averages Weekday	Averages 7-day
	Week 2								
0000-0100	6							6	6
0100-0200	2							2	2
0200-0300	5							5	5
0300-0400	4							4	4
0400-0500	8							8	8
0500-0600	37							37	37
0600-0700	67							67	67
0700-0800	98							98	98
0800-0900	81							81	81
0900-1000	98							98	98
1000-1100	90							90	90
1100-1200	93							93	93
1200-1300	84							84	84
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	673							673	673

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O'connell Rd
Combined

Time	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
	Week 1								
0000-0100	8	19	14	8	41	5	9	11	15
0100-0200	14	5	2	7	18	5	3	6	8
0200-0300	14	15	13	7	12	9	6	11	11
0300-0400	12	14	19	29	6	17	19	16	17
0400-0500	33	33	20	22	10	33	19	28	24
0500-0600	84	85	79	54	27	68	89	81	70
0600-0700	204	220	214	82	62	230	200	214	173
0700-0800	333	333	290	116	74	305	306	311	250
0800-0900	446	464	396	200	129	378	406	419	349
0900-1000	359	368	302	283	205	260	283	316	294
1000-1100	233	291	279	300	248	243	272	264	267
1100-1200	307	325	262	375	344	222	289	281	302
1200-1300	313	312	322	347	378	299	308	311	317
1300-1400	332	303	339	346	311	298	288	312	317
1400-1500	332	346	362	301	228	276	297	321	305
1500-1600	429	444	405	281	285	448	356	416	379
1600-1700	502	418	491	299	293	459	496	477	426
1700-1800	477	482	480	263	249	537	507	493	428
1800-1900	386	398	353	175	195	369	373	376	321
1900-2000	195	247	192	170	153	200	184	204	192
2000-2100	117	147	124	78	97	100	94	116	109
2100-2200	118	89	115	90	56	81	83	97	90
2200-2300	80	67	78	50	33	34	47	61	56
2300-2400	24	26	41	56	14	25	23	28	30
Totals	5352	5456	5184	3939	3422	4879	4959	5168	4743

Time	Wed 19							Averages Weekday	Averages 7-day
	Week 2								
0000-0100	17							17	17
0100-0200	5							5	5
0200-0300	13							13	13
0300-0400	13							13	13
0400-0500	24							24	24
0500-0600	100							100	100
0600-0700	209							209	209
0700-0800	311							311	311
0800-0900	420							430	420
0900-1000	357							357	357
1000-1100	302							302	302
1100-1200	288							288	288
1200-1300	267							267	267
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	2326							2326	2326

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Great Western Hwy (East)
Westbound

Time	Week 1 Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	7-day
0000-0100	53	42	42	104	56	18	56	42	53
0100-0200	48	42	46	60	39	25	27	38	42
0200-0300	29	30	30	43	27	25	44	33	34
0300-0400	31	35	34	33	15	21	23	29	28
0400-0500	47	46	38	23	18	49	32	42	36
0500-0600	50	86	85	65	24	87	103	90	77
0600-0700	279	246	230	132	71	264	249	252	209
0700-0800	486	401	384	213	161	440	411	424	357
0800-0900	680	642	605	343	169	630	661	[illegible]	[illegible]
0900-1000	521	507	525	495	333	577	463	509	482
1000-1100	428	358	447	537	428	511	464	450	459
1100-1200	398	359	494	[illegible]	452	427	414	418	452
1200-1300	411	392	482	[illegible]	499	445	379	422	453
1300-1400	406	377	459	403	411	420	388	410	418
1400-1500	487	449	493	490	471	413	427	454	461
1500-1600	581	569	624	444	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1600-1700	569	554	577	434	533	540	532	552	533
1700-1800	526	538	488	427	450	490	526	514	493
1800-1900	370	415	449	304	418	378	378	398	387
1900-2000	233	260	447	349	262	340	237	283	293
2000-2100	171	222	279	168	244	162	183	203	204
2100-2200	98	141	246	131	190	127	171	157	158
2200-2300	95	98	195	127	87	68	87	109	108
2300-2400	93	106	135	83	64	104	103	108	99
Totals	7143	6958	7871	6544	6126	7019	6821	7162	6840

Time	Week 2 Wed 19							Averages Weekday	7-day
0000-0100	47							47	47
0100-0200	51							51	51
0200-0300	36							36	36
0300-0400	42							42	42
0400-0500	37							37	37
0500-0600	110							110	110
0600-0700	208							208	208
0700-0800	395							395	395
0800-0900	593							593	593
0900-1000	531							531	531
1000-1100	460							460	460
1100-1200	400							400	400
1200-1300	428							428	428
1300-1400	362							362	362
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	3748							3748	3748

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Great Western Hwy (East)
Eastbound

Time	Week 1 Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	7-day
0000-0100	23	27	24	50	38	20	26	24	30
0100-0200	21	18	30	23	42	18	26	23	25
0200-0300	22	35	28	29	23	32	27	27	27
0300-0400	34	25	32	37	12	30	28	30	28
0400-0500	52	50	48	33	10	46	53	50	43
0500-0600	102	97	112	86	52	162	119	118	104
0600-0700	281	297	305	192	131	280	300	296	258
0700-0800	327	318	300	236	126	300	330	315	277
0800-0900	452	414	450	410	235	426	391	427	395
0900-1000	404	375	476	505	390	452	409	420	428
1000-1100	363	378	427	590	504	367	414	398	441
1100-1200	350	392	497	589	534	364	366	396	443
1200-1300	382	448	483	554	532	375	409	419	455
1300-1400	417	424	540	527	541	441	438	452	476
1400-1500	507	531	649	508	629	501	512	540	548
1500-1600	540	523	726	443	524	558	490	569	561
1600-1700	596	625	682	405	559	564	649	626	583
1700-1800	569	644	752	314	454	633	638	644	570
1800-1900	388	464	487	291	406	343	464	429	406
1900-2000	206	292	330	200	254	226	285	280	265
2000-2100	158	215	211	121	190	178	172	187	178
2100-2200	140	151	165	151	132	110	155	144	143
2200-2300	150	131	120	97	79	127	116	130	118
2300-2400	63	57	79	68	40	38	57	59	57
Totals	5629	6832	7964	6463	6550	6617	6874	7002	6861

Time	Week 2 Wed 19							Averages Weekday	7-day
0000-0100	26							26	26
0100-0200	17							17	17
0200-0300	30							30	30
0300-0400	37							37	37
0400-0500	49							49	49
0500-0600	104							104	104
0600-0700	290							290	290
0700-0800	317							317	317
0800-0900	412							412	412
0900-1000	421							421	421
1000-1100	357							357	357
1100-1200	407							407	407
1200-1300	412							412	412
1300-1400	482							482	482
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	3361							3361	3361

80216

Great Western Hwy (East)
Combined

Time	Week 1 Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	7-day
0000-0100	76	69	66	154	94	38	82	66	83
0100-0200	69	60	76	92	81	43	53	60	68
0200-0300	51	65	67	72	50	47	71	60	60
0300-0400	65	60	66	70	36	51	51	59	56
0400-0500	99	96	87	56	37	97	85	93	80
0500-0600	192	183	197	152	76	249	222	209	182
0600-0700	560	543	535	324	202	553	549	548	467
0700-0800	813	719	684	449	297	740	741	739	633
0800-0900	1132	1056	1055	753	394	1056	1052	1079	934
0900-1000	925	882	1003	1000	725	959	872	928	909
1000-1100	811	778	874	1130	933	898	878	847	900
1100-1200	748	751	991	[illegible]	986	811	780	814	895
1200-1300	793	840	965	[illegible]	1031	820	787	841	907
1300-1400	825	801	1001	990	964	861	826	863	894
1400-1500	1004	980	1141	998	1100	914	939	996	1009
1500-1600	1121	1092	1350	887	[illegible]	[illegible]	1050	1160	1127
1600-1700	1168	1180	1269	839	1092	1104	1181	1179	1118
1700-1800	1095	1183	1240	741	904	1108	1167	1159	1063
1800-1900	758	879	935	595	824	721	842	827	793
1900-2000	465	552	777	449	636	466	522	563	557
2000-2100	329	437	490	290	434	340	355	390	382
2100-2200	239	292	411	282	322	237	326	301	301
2200-2300	245	229	311	219	176	195	213	239	227
2300-2400	155	165	214	151	104	142	160	167	156
Totals	13772	13890	15835	13006	12676	13636	13795	14186	13801

Time	Week 2 Wed 19							Averages Weekday	7-day
0000-0100	73							73	73
0100-0200	68							68	68
0200-0300	66							66	66
0300-0400	79							79	79
0400-0500	86							86	86
0500-0600	214							214	214
0600-0700	498							498	498
0700-0800	712							712	712
0800-0900	1005							1005	1005
0900-1000	952							952	952
1000-1100	845							845	845
1100-1200	807							807	807
1200-1300	840							840	840
1300-1400	844							844	844
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	7109							7109	7109

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Boyd St (To Limeslink Rd)
Westbound

Week 1

Time	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
0000-0100	4	4	8	20	17	5	7	**6**	**9**
0100-0200	1	1	5	15	7	2	1	**3**	**5**
0200-0300	0	5	2	8	8	1	5	**3**	**4**
0300-0400	7	6	5	11	8	8	3	**6**	**7**
0400-0500	10	6	6	13	13	12	9	**9**	**10**
0500-0600	27	34	28	32	13	35	26	**31**	**27**
0600-0700	62	78	59	34	37	63	56	**64**	**54**
0700-0800	136	130	123	77	49	124	114	**125**	**108**
0800-0900	263	316	281	124	66	259	212	**266**	**246**
0900-1000	236	206	207	159	141	203	246	**218**	**199**
1000-1100	156	175	178	179	143	143	175	**166**	**164**
1100-1200	158	165	144	145	155	144	147	**151**	**150**
1200-1300	140	127	172	159	141	150	139	**143**	**145**
1300-1400	136	139	149	162	123	135	166	**141**	**143**
1400-1500	173	152	224	167	126	189	178	**193**	**173**
1500-1600	240	247	245	140	93	211	226	**246**	**204**
1600-1700	181	202	206	131	131	175	217	**196**	**178**
1700-1800	180	162	165	137	110	147	165	**165**	**153**
1800-1900	151	145	154	117	108	156	135	**142**	**134**
1900-2000	96	101	114	106	78	103	112	**106**	**102**
2000-2100	57	72	84	67	52	47	65	**65**	**63**
2100-2200	43	47	44	43	35	35	43	**42**	**41**
2200-2300	33	28	51	45	18	24	22	**32**	**32**
2300-2400	10	24	22	33	11	10	13	**16**	**18**
Totals	**2545**	**2564**	**2682**	**2171**	**1684**	**2423**	**2562**	**2557**	**2377**

Week 2

Time	Wed 19	Averages Weekday	Averages 7-day
0000-0100	8	**8**	**8**
0100-0200	3	**3**	**3**
0200-0300	2	**2**	**2**
0300-0400	4	**4**	**4**
0400-0500	10	**10**	**10**
0500-0600	19	**19**	**19**
0600-0700	77	**77**	**77**
0700-0800	127	**127**	**127**
0800-0900	313	**313**	**313**
0900-1000	268	**268**	**268**
1000-1100	186	**186**	**186**
1100-1200	148	**148**	**148**
1200-1300	160	**160**	**160**
1300-1400			
1400-1500			
1500-1600			
1600-1700			
1700-1800			
1800-1900			
1900-2000			
2000-2100			
2100-2200			
2200-2300			
2300-2400			
Totals	**1325**	**1325**	**1325**

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Boyd St (To Limeslink Rd)
Eastbound

Week 1

Time	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
0000-0100	8	17	12	18	21	3	11	**10**	**13**
0100-0200	3	2	5	18	17	0	2	**2**	**7**
0200-0300	2	7	4	13	13	2	0	**3**	**6**
0300-0400	3	3	4	7	9	4	4	**4**	**4**
0400-0500	5	8	6	14	10	5	8	**7**	**9**
0500-0600	13	15	7	6	8	15	14	**13**	**11**
0600-0700	26	35	37	13	14	34	27	**32**	**27**
0700-0800	58	50	50	31	24	50	50	**52**	**45**
0800-0900	132	138	121	63	24	130	147	**138**	**111**
0900-1000	147	144	138	83	58	137	149	**156**	**127**
1000-1100	125	124	130	127	88	133	142	**131**	**124**
1100-1200	123	127	141	135	128	119	133	**128**	**130**
1200-1300	137	125	150	128	104	141	122	**135**	**144**
1300-1400	149	133	149	153	120	152	137	**144**	**142**
1400-1500	141	125	166	157	96	137	140	**145**	**140**
1500-1600	233	249	264	138	133	221	242	**243**	**211**
1600-1700	185	186	217	141	136	189	208	**198**	**182**
1700-1800	241	244	223	112	127	229	272	**242**	**207**
1800-1900	158	157	173	111	90	137	155	**156**	**140**
1900-2000	131	126	115	103	104	126	127	**122**	**117**
2000-2100	83	107	83	77	56	73	68	**85**	**81**
2100-2200	53	68	62	57	47	56	59	**58**	**57**
2200-2300	51	36	54	46	15	25	36	**41**	**38**
2300-2400	22	20	27	21	9	19	23	**22**	**20**
Totals	**2258**	**2263**	**2349**	**1870**	**1522**	**2154**	**2280**	**2261**	**2099**

Week 2

Time	Wed 19	Averages Weekday	Averages 7-day
0000-0100	17	**17**	**17**
0100-0200	1	**1**	**1**
0200-0300	4	**4**	**4**
0300-0400	4	**4**	**4**
0400-0500	5	**5**	**5**
0500-0600	9	**9**	**9**
0600-0700	30	**30**	**30**
0700-0800	49	**49**	**49**
0800-0900	151	**151**	**151**
0900-1000	182	**182**	**182**
1000-1100	136	**136**	**136**
1100-1200	145	**145**	**145**
1200-1300	158	**158**	**158**
1300-1400			
1400-1500			
1500-1600			
1600-1700			
1700-1800			
1800-1900			
1900-2000			
2000-2100			
2100-2200			
2200-2300			
2300-2400			
Totals	**992**	**992**	**992**

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Boyd St (To Limeslink Rd)
Combined

Week 1

Time	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
0000-0100	12	21	20	38	38	8	18	**16**	**22**
0100-0200	4	3	11	33	24	2	3	**5**	**11**
0200-0300	2	12	6	22	21	3	5	**6**	**10**
0300-0400	10	9	10	18	14	12	7	**10**	**11**
0400-0500	15	14	12	27	24	17	17	**16**	**19**
0500-0600	40	49	35	39	22	50	42	**43**	**38**
0600-0700	88	113	96	47	41	97	83	**95**	**81**
0700-0800	194	180	173	108	73	174	164	**177**	**152**
0800-0900	395	454	402	187	90	389	359	**404**	**357**
0900-1000	383	350	345	242	199	340	395	**374**	**326**
1000-1100	283	299	310	306	231	276	317	**297**	**289**
1100-1200	281	287	285	280	283	263	279	**279**	**284**
1200-1300	277	252	322	287	245	291	261	**279**	**289**
1300-1400	284	272	298	315	243	287	281	**284**	**285**
1400-1500	314	289	390	324	222	326	322	**328**	**312**
1500-1600	473	496	509	278	226	432	478	**481**	**416**
1600-1700	366	388	423	272	267	364	425	**395**	**358**
1700-1800	420	407	388	249	237	376	437	**407**	**366**
1800-1900	310	302	327	228	198	293	291	**299**	**274**
1900-2000	227	227	229	209	181	229	239	**227**	**218**
2000-2100	140	179	177	144	109	120	134	**150**	**145**
2100-2200	96	115	106	100	82	91	102	**101**	**98**
2200-2300	74	67	115	93	34	49	58	**72**	**70**
2300-2400	32	44	49	54	20	29	35	**38**	**39**
Totals	**4803**	**4827**	**5041**	**4041**	**3206**	**4577**	**4840**	**4618**	**4476**

Week 2

Time	Wed 19	Averages Weekday	Averages 7-day
0000-0100	25	**25**	**25**
0100-0200	4	**4**	**4**
0200-0300	6	**6**	**6**
0300-0400	8	**8**	**8**
0400-0500	15	**15**	**15**
0500-0600	28	**28**	**28**
0600-0700	107	**107**	**107**
0700-0800	176	**176**	**176**
0800-0900	464	**464**	**464**
0900-1000	450	**450**	**450**
1000-1100	322	**322**	**322**
1100-1200	293	**293**	**293**
1200-1300	318	**318**	**318**
1300-1400			
1400-1500			
1500-1600			
1600-1700			
1700-1800			
1800-1900			
1900-2000			
2000-2100			
2100-2200			
2200-2300			
2300-2400			
Totals	**2217**	**2217**	**2217**

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Gilmour St
Northbound

Time	Week 1							Averages	
	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Weekday	7-day
0000-0100	4	10	13	21	14	7	5	8	11
0100-0200	7	5	8	7	7	0	0	4	5
0200-0300	4	3	7	7	11	2	4	4	5
0300-0400	4	5	2	4	6	3	6	4	4
0400-0500	7	9	6	3	6	1	5	6	6
0500-0600	9	14	11	16	4	14	12	12	11
0600-0700	40	33	20	24	20	33	31	34	31
0700-0800	87	90	85	56	35	93	70	85	74
0800-0900	151	136	146	110	40	138	127	140	121
0900-1000	136	129	129	174	86	141	135	134	134
1000-1100	101	106	140	216	134	116	173	128	142
1100-1200	117	152	132	212	191	124	140	133	149
1200-1300	134	140	142	240	174	133	145	139	159
1300-1400	127	176	141	186	126	156	144	149	151
1400-1500	135	137	172	166	150	144	154	146	150
1500-1600	246	236	283	159	165	244	236	249	224
1600-1700	254	283	290	148	156	236	261	265	233
1700-1800	276	297	261	141	123	248	265	273	233
1800-1900	131	174	151	121	105	172	174	160	147
1900-2000	96	122	143	87	94	108	110	116	110
2000-2100	71	55	48	54	51	65	60	62	58
2100-2200	51	45	59	43	37	33	54	48	46
2200-2300	40	28	45	34	18	32	29	35	32
2300-2400	37	26	37	20	11	24	22	27	24
Totals	2258	3411	2492	2201	1747	2284	2367	2362	2260

Time	Week 2							Averages	
	Wed 19							Weekday	7-day
0000-0100	5							5	5
0100-0200	2							2	2
0200-0300	4							4	4
0300-0400	5							5	5
0400-0500	7							7	7
0500-0600	15							15	15
0600-0700	31							31	31
0700-0800	94							94	94
0800-0900	157							157	157
0900-1000	116							116	116
1000-1100	127							127	127
1100-1200	129							129	129
1200-1300	128							128	128
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	820							820	820

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Gilmour St
Southbound

Time	Week 1							Averages	
	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Weekday	7-day
0000-0100	6	6	4	10	10	4	1	4	6
0100-0200	2	1	7	6	6	3	3	3	4
0200-0300	5	8	6	4	5	0	3	4	5
0300-0400	6	8	8	7	4	6	13	8	7
0400-0500	12	13	7	4	4	12	6	10	8
0500-0600	42	41	46	25	12	40	54	45	37
0600-0700	150	143	139	73	45	169	139	148	122
0700-0800	190	191	172	74	46	165	167	182	147
0800-0900	315	330	308	161	65	345	326	333	279
0900-1000	216	226	205	222	166	236	217	220	213
1000-1100	149	160	173	271	186	160	157	158	178
1100-1200	132	135	149	244	181	133	128	135	157
1200-1300	153	146	152	214	170	138	158	149	162
1300-1400	173	147	155	197	172	167	167	166	171
1400-1500	168	169	169	205	156	171	163	168	172
1500-1600	209	196	242	193	166	232	215	219	205
1600-1700	202	223	210	153	148	182	186	201	187
1700-1800	182	190	196	153	132	162	162	178	168
1800-1900	127	127	155	97	112	127	118	131	122
1900-2000	90	75	91	72	79	75	90	84	83
2000-2100	74	52	50	53	51	46	38	53	53
2100-2200	35	31	42	34	29	30	30	32	33
2200-2300	32	31	46	28	18	32	30	34	31
2300-2400	4	17	10	16	2	10	6	11	11
Totals	2664	2666	2797	2516	1966	2631	2620	2676	2551

Time	Week 2							Averages	
	Wed 19							Weekday	7-day
0000-0100	3							3	3
0100-0200	1							1	1
0200-0300	4							4	4
0300-0400	8							8	8
0400-0500	12							12	12
0500-0600	58							58	58
0600-0700	138							138	138
0700-0800	201							201	201
0800-0900	346							346	346
0900-1000	221							221	221
1000-1100	148							148	148
1100-1200	138							138	138
1200-1300	142							142	142
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	1420							1420	1420

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Gilmour St
Combined

Time	Week 1							Averages	
	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Weekday	7-day
0000-0100	10	16	17	31	24	11	6	12	16
0100-0200	9	6	16	13	13	3	3	7	9
0200-0300	9	11	12	11	17	2	7	8	10
0300-0400	10	13	10	11	10	9	19	12	12
0400-0500	19	22	15	7	10	13	11	16	14
0500-0600	51	55	57	41	16	56	66	57	49
0600-0700	190	176	173	97	65	202	170	182	153
0700-0800	277	281	257	130	81	262	257	267	221
0800-0900	466	466	456	271	105	483	453	473	391
0900-1000	352	355	334	396	251	377	352	354	347
1000-1100	241	266	313	495	320	276	335	286	320
1100-1200	249	287	280	456	372	257	268	268	306
1200-1300	287	286	294	454	344	271	303	288	320
1300-1400	300	323	296	383	298	323	331	315	322
1400-1500	303	296	341	371	306	315	317	314	321
1500-1600	455	432	525	352	331	476	451	464	429
1600-1700	456	506	503	301	304	418	449	466	420
1700-1800	458	487	457	294	255	427	427	451	401
1800-1900	258	301	306	218	217	299	292	291	270
1900-2000	186	197	234	159	173	183	200	202	193
2000-2100	145	117	104	107	102	111	99	115	112
2100-2200	76	76	101	77	66	63	84	80	78
2200-2300	72	59	91	62	36	64	59	69	63
2300-2400	31	43	58	36	13	34	28	38	34
Totals	4922	5077	5289	4777	3713	4915	4987	5038	4811

Time	Week 2							Averages	
	Wed 19							Weekday	7-day
0000-0100	8							8	8
0100-0200	3							3	3
0200-0300	8							8	8
0300-0400	13							13	13
0400-0500	19							19	19
0500-0600	73							73	73
0600-0700	169							169	169
0700-0800	295							295	295
0800-0900	503							503	503
0900-1000	337							337	337
1000-1100	275							275	275
1100-1200	267							267	267
1200-1300	270							270	270
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	2240							2240	2240

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Durham St
Northbound

Time	Week 1 Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	7-day
0000-0100	11	16	18	35	44	10	16	14	21
0100-0200	6	10	14	21	14	5	7	9	11
0200-0300	5	5	12	18	18	3	6	6	9
0300-0400	6	3	7	13	17	5	4	5	8
0400-0500	11	6	8	6	11	6	3	7	7
0500-0600	26	25	23	24	9	25	33	26	23
0600-0700	87	96	97	49	31	96	85	92	77
0700-0800	162	153	175	75	68	155	171	166	139
0800-0900	[illegible]	247	243	159	81	244	251	255	216
0900-1000	273	264	258	229	168	210	258	255	238
1000-1100	246	240	253	342	252	226	250	243	258
1100-1200	225	252	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1200-1300	277	285	295	[illegible]	[illegible]	311	315	297	322
1300-1400	316	320	326	362	271	311	312	317	317
1400-1500	306	279	327	319	297	310	285	305	306
1500-1600	436	428	485	314	295	477	436	453	410
1600-1700	530	473	516	302	224	593	510	518	459
1700-1800	[illegible]	[illegible]	[illegible]	275	267	[illegible]	[illegible]	[illegible]	[illegible]
1800-1900	494	458	422	251	229	365	452	422	379
1900-2000	277	304	262	247	215	234	241	264	254
2000-2100	150	207	208	134	132	140	154	172	161
2100-2200	137	129	147	123	79	95	118	127	120
2200-2300	69	78	127	104	51	76	82	86	84
2300-2400	35	37	68	58	10	30	41	42	40
Totals	4831	4962	5181	4291	3570	4752	4850	4963	4668

Time	Week 2 Wed 19							Averages Weekday	7-day
0000-0100	22							22	22
0100-0200	7							7	7
0200-0300	6							6	6
0300-0400	7							7	7
0400-0500	3							3	3
0500-0600	25							25	25
0600-0700	85							85	85
0700-0800	187							187	187
0800-0900	263							263	263
0900-1000	275							275	275
1000-1100	282							282	282
1100-1200									
1200-1300									
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	1162							1162	1162

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Durham St
Southbound

Time	Week 1 Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	7-day
0000-0100	8	13	15	25	41	3	5	9	16
0100-0200	4	12	9	18	14	9	7	8	10
0200-0300	4	2	6	13	12	2	2	3	6
0300-0400	8	7	9	14	17	8	8	8	10
0400-0500	21	19	18	13	14	26	19	21	19
0500-0600	59	52	56	35	25	65	60	60	52
0600-0700	197	220	206	88	49	192	203	204	165
0700-0800	344	332	341	179	87	310	362	338	279
0800-0900	[illegible]	[illegible]	[illegible]	363	186	[illegible]	[illegible]	[illegible]	[illegible]
0900-1000	424	426	446	432	329	440	422	432	417
1000-1100	327	297	329	[illegible]	355	300	346	320	344
1100-1200	308	295	294	438	[illegible]	295	255	279	315
1200-1300	307	297	337	[illegible]	[illegible]	294	302	307	329
1300-1400	274	313	299	353	332	302	310	301	313
1400-1500	326	314	354	296	288	324	292	322	313
1500-1600	[illegible]	423	[illegible]	305	260	[illegible]	[illegible]	[illegible]	[illegible]
1600-1700	423	[illegible]	435	259	260	425	438	441	392
1700-1800	406	365	342	281	253	374	419	381	349
1800-1900	358	356	336	267	239	251	282	317	298
1900-2000	220	239	256	197	157	184	200	220	208
2000-2100	124	133	169	111	109	98	106	126	122
2100-2200	92	75	90	82	57	64	78	81	79
2200-2300	53	67	79	70	49	58	51	66	64
2300-2400	32	36	64	57	26	37	33	41	41
Totals	5405	5383	5602	4766	3843	5118	5330	5368	5078

Time	Week 2 Wed 19							Averages Weekday	7-day
0000-0100	18							18	18
0100-0200	3							3	3
0200-0300	2							2	2
0300-0400	11							11	11
0400-0500	21							21	21
0500-0600	62							62	62
0600-0700	202							202	202
0700-0800	342							342	342
0800-0900	677							677	677
0900-1000	478							478	478
1000-1100	299							299	299
1100-1200									
1200-1300									
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	2115							2115	2115

80216
Durham St
Combined

Time	Week 1 Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	7-day
0000-0100	19	29	33	60	85	13	21	23	37
0100-0200	10	22	23	39	28	14	14	17	21
0200-0300	9	7	18	31	30	4	8	9	15
0300-0400	14	10	16	27	34	13	12	13	18
0400-0500	32	25	26	19	25	32	22	27	26
0500-0600	85	77	79	59	34	90	93	87	75
0600-0700	284	316	303	137	80	287	288	296	242
0700-0800	506	501	516	254	155	465	533	504	419
0800-0900	[illegible]	[illegible]	[illegible]	522	269	[illegible]	[illegible]	[illegible]	[illegible]
0900-1000	697	690	714	661	497	650	680	686	656
1000-1100	573	527	582	796	607	526	596	563	602
1100-1200	533	537	553	[illegible]	[illegible]	541	546	542	610
1200-1300	584	582	632	[illegible]	[illegible]	605	617	604	651
1300-1400	590	633	625	714	603	613	631	618	630
1400-1500	634	593	681	615	585	640	577	627	619
1500-1600	875	851	[illegible]	619	568	919	898	905	819
1600-1700	953	946	952	561	604	985	957	959	851
1700-1800	[illegible]	[illegible]	841	556	520	[illegible]	[illegible]	[illegible]	[illegible]
1800-1900	762	824	758	518	468	616	734	739	660
1900-2000	487	543	518	444	372	418	444	484	462
2000-2100	274	340	378	245	241	238	262	298	283
2100-2200	229	214	243	215	135	159	196	208	199
2200-2300	122	165	206	174	100	134	133	152	148
2300-2400	67	75	133	115	36	67	74	83	81
Totals	10236	10335	10793	9057	7513	9911	10270	10331	9746

Time	Week 2 Wed 19							Averages Weekday	7-day
0000-0100	40							40	40
0100-0200	10							10	10
0200-0300	8							8	8
0300-0400	18							18	18
0400-0500	24							24	24
0500-0600	87							87	87
0600-0700	287							287	287
0700-0800	529							529	529
0800-0900	940							940	940
0900-1000	753							753	753
1000-1100	581							581	581
1100-1200									
1200-1300									
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	3277	0	0	0	0	0	0	3277	3277

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Rocket St
Northbound

Time	Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
	Week 1								
0000-0100	1	4	9	5	10	18	5	5	7
0100-0200	8	2	3	3	9	11	1	3	5
0200-0300	1	1	3	2	5	4	1	2	2
0300-0400	1	0	3	6	8	5	0	2	3
0400-0500	4	2	4	2	6	6	5	3	4
0500-0600	15	16	15	16	14	9	20	16	15
0600-0700	46	53	56	51	26	15	51	52	43
0700-0800	129	116	121	112	44	30	115	119	95
0800-0900	287	277	272	292	128	60	299	285	238
0900-1000	262	224	254	256	182	97	253	248	217
1000-1100	160	152	175	189	187	158	161	171	172
1100-1200	182	173	163	172	206	149	153	169	171
1200-1300	169	216	183	205	186	145	212	197	184
1300-1400	157	164	198	205	177	128	192	183	174
1400-1500	182	172	197	232	139	151	188	194	180
1500-1600	258	264	262	295	145	138	277	271	234
1600-1700	252	226	255	276	119	143	263	254	219
1700-1800	193	225	244	224	133	131	227	223	197
1800-1900	120	154	154	156	125	115	133	143	137
1900-2000	98	100	121	78	93	73	117	103	97
2000-2100	60	50	62	78	57	60	56	64	63
2100-2200	36	32	41	48	42	38	34	38	39
2200-2300	29	28	31	33	40	19	21	28	29
2300-2400	13	8	13	22	25	10	4	12	14
Totals	2682	2669	2888	2955	2078	1712	2798	2797	2530

Time	Tue 18	Wed 19						Averages Weekday	7-day
	Week 2								
0000-0100	5	7						6	6
0100-0200	7	2						5	5
0200-0300	0	2						1	1
0300-0400	3	3						3	3
0400-0500	7	7						7	7
0500-0600	14	21						18	18
0600-0700	55	49						52	52
0700-0800	130	108						119	119
0800-0900	303	303						303	303
0900-1000	241							241	241
1000-1100	213							213	213
1100-1200	194							194	194
1200-1300	191							191	191
1300-1400	205							205	205
1400-1500	179							179	179
1500-1600	238							238	238
1600-1700	244							244	244
1700-1800	247							247	247
1800-1900	132							132	132
1900-2000	105							105	105
2000-2100	60							60	60
2100-2200	35							35	35
2200-2300	17							17	17
2300-2400	8							8	8
Totals	2832	592						2822	2822

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Rocket St
Southbound

Time	Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
	Week 1								
0000-0100	6	7	12	7	9	21	2	7	9
0100-0200	5	0	2	10	10	27	0	3	7
0200-0300	0	0	1	6	7	9	0	1	3
0300-0400	2	1	3	5	4	5	1	2	3
0400-0500	5	5	2	4	12	5	6	4	6
0500-0600	17	8	14	10	9	6	9	11	11
0600-0700	43	39	45	55	16	13	46	46	37
0700-0800	82	81	93	95	40	28	97	92	75
0800-0900	161	151	158	171	74	55	159	160	133
0900-1000	[illegible]	[illegible]	156	162	112	110	144	158	144
1000-1100	139	137	144	134	153	86	128	136	132
1100-1200	127	142	163	163	162	111	145	149	146
1200-1300	153	172	143	171	164	131	157	159	156
1300-1400	158	185	166	195	134	108	157	172	158
1400-1500	140	134	158	192	127	81	159	157	143
1500-1600	215	222	239	[illegible]	121	85	228	222	195
1600-1700	242	218	237	223	124	88	201	224	190
1700-1800	226	255	240	211	106	111	219	236	190
1800-1900	140	127	163	142	76	91	122	139	123
1900-2000	85	94	101	96	78	79	93	94	89
2000-2100	57	68	58	70	53	46	56	62	58
2100-2200	33	56	52	63	50	39	44	49	48
2200-2300	26	34	27	46	37	17	18	29	28
2300-2400	10	17	28	35	22	10	16	21	20
Totals	2241	2324	2404	2518	1719	1368	2203	2338	2111

Time	Tue 18	Wed 19						Averages Weekday	7-day
	Week 2								
0000-0100	7	14						11	11
0100-0200	1	4						3	3
0200-0300	1	2						2	2
0300-0400	2	5						4	4
0400-0500	5	2						4	4
0500-0600	10	7						9	9
0600-0700	44	45						45	45
0700-0800	88	79						84	84
0800-0900	153	134						144	144
0900-1000	161							161	161
1000-1100	160							160	160
1100-1200	131							131	131
1200-1300	158							158	158
1300-1400	171							171	171
1400-1500	150							150	150
1500-1600	209							209	209
1600-1700	218							218	218
1700-1800	226							226	226
1800-1900	113							113	113
1900-2000	87							87	87
2000-2100	57							57	57
2100-2200	49							49	49
2200-2300	23							23	23
2300-2400	13							13	13
Totals	2228	292						2228	2228

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Rocket St
Combined

Time	Tue 11	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Averages Weekday	7-day
	Week 1								
0000-0100	7	11	21	12	18	30	7	12	16
0100-0200	13	2	5	13	19	33	1	7	12
0200-0300	1	1	4	9	12	13	1	3	6
0300-0400	3	1	5	11	12	10	1	4	6
0400-0500	9	7	6	6	18	11	11	8	10
0500-0600	32	24	29	26	23	17	29	28	26
0600-0700	91	92	101	106	42	28	97	97	80
0700-0800	211	207	214	207	84	58	212	210	170
0800-0900	452	429	430	463	202	115	458	455	371
0900-1000	417	385	410	418	294	207	397	405	361
1000-1100	319	289	319	323	340	244	289	308	303
1100-1200	309	315	326	341	368	260	298	318	320
1200-1300	322	388	326	376	350	276	369	356	340
1300-1400	315	349	364	400	311	236	349	355	332
1400-1500	322	306	355	424	266	242	347	351	323
1500-1600	474	486	507	541	266	223	506	503	429
1600-1700	494	444	492	499	243	231	464	479	410
1700-1800	419	480	484	435	239	242	446	453	392
1800-1900	260	281	316	298	201	206	255	282	260
1900-2000	183	194	222	174	171	152	210	197	187
2000-2100	123	128	120	148	110	106	112	126	121
2100-2200	69	88	93	111	92	77	78	88	87
2200-2300	55	62	58	73	77	35	38	57	57
2300-2400	23	25	41	57	47	20	20	33	33
Totals	4923	4993	5292	5473	3797	3081	4991	5135	4650

Time	Tue 18	Wed 19						Averages Weekday	7-day
	Week 2								
0000-0100	12	21						17	17
0100-0200	8	6						7	7
0200-0300	1	4						3	3
0300-0400	4	6						5	5
0400-0500	13	9						11	11
0500-0600	24	28						26	26
0600-0700	99	94						97	97
0700-0800	218	187						203	203
0800-0900	456	437						447	447
0900-1000	402							402	402
1000-1100	373							373	373
1100-1200	325							325	325
1200-1300	349							349	349
1300-1400	376							376	376
1400-1500	329							329	329
1500-1600	447							447	447
1600-1700	462							462	462
1700-1800	473							473	473
1800-1900	245							245	245
1900-2000	192							192	192
2000-2100	117							117	117
2100-2200	84							84	84
2200-2300	40							40	40
2300-2400	21							21	21
Totals	5070	794						5050	5050

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Bentinck St
Northbound

Time	Week 1 Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
0000-0100	5	5	6	23	25	3	0	6	11
0100-0200	6	5	6	13	16	1	2	4	7
0200-0300	1	1	6	16	16	4	3	3	7
0300-0400	6	4	10	14	10	3	2	5	7
0400-0500	10	13	6	8	20	10	5	9	10
0500-0600	17	21	22	29	19	23	17	20	20
0600-0700	65	61	56	35	20	60	65	61	52
0700-0800	113	146	136	79	41	133	140	134	113
0800-0900	290	271	250	180	81	235	238	257	221
0900-1000	334	327	352	336	179	357	330	340	316
1000-1100	367	361	364	422	271	358	343	359	353
1100-1200	382	371	409	477	290	418	403	396	406
1200-1300	421	427	436	507	391	442	376	430	429
1300-1400	351	428	490	409	308	433	479	436	414
1400-1500	323	447	507	379	288	408	483	434	405
1500-1600	356	471	577	365	290	523	606	507	455
1600-1700	391	550	558	353	235	594	712	564	487
1700-1800	492	577	500	254	271	542	741	568	474
1800-1900	300	334	306	218	172	263	371	315	279
1900-2000	181	213	186	207	147	188	203	196	191
2000-2100	103	141	133	86	86	125	115	123	114
2100-2200	87	101	135	129	55	77	85	97	96
2200-2300	44	41	62	45	28	46	45	48	47
2300-2400	15	12	35	45	8	9	19	18	20
Totals	4589	5337	5629	4637	3328	5255	5791	5320	4937

Time	Week 2 Wed 19							Averages Weekday	Averages 7-day
0000-0100	3							3	3
0100-0200	2							2	2
0200-0300	6							6	6
0300-0400	7							7	7
0400-0500	7							7	7
0500-0600	19							19	19
0600-0700	63							63	63
0700-0800	165							165	165
0800-0900	338							338	338
0900-1000	448							448	448
1000-1100	450							450	450
1100-1200	447							447	447
1200-1300									
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	1955							1955	1955

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Bentinck St
Southbound

Time	Week 1 Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
0000-0100	16	3	13	24	30	3	13	11	15
0100-0200	0	4	5	22	13	6	5	4	8
0200-0300	3	4	6	7	8	4	4	4	5
0300-0400	5	3	4	3	7	4	3	4	4
0400-0500	8	11	7	6	8	7	10	9	8
0500-0600	17	18	18	14	9	15	19	17	16
0600-0700	50	70	56	29	23	58	62	62	51
0700-0800	130	101	181	67	42	145	174	177	145
0800-0900	407	385	398	176	76	369	412	390	318
0900-1000	361	366	391	282	188	366	379	373	333
1000-1100	350	340	350	352	259	313	327	336	327
1100-1200	352	340	332	385	292	366	361	350	347
1200-1300	340	364	400	353	349	361	369	371	365
1300-1400	339	345	390	318	269	348	375	359	341
1400-1500	352	357	427	345	253	364	331	366	347
1500-1600	381	432	448	327	211	412	392	413	372
1600-1700	432	396	456	283	196	420	405	420	369
1700-1800	346	355	377	271	176	332	391	360	321
1800-1900	218	271	255	174	150	203	217	233	213
1900-2000	138	173	173	142	118	130	126	150	144
2000-2100	73	113	90	102	72	78	79	88	88
2100-2200	48	70	72	62	36	36	56	56	54
2200-2300	38	27	39	49	27	26	38	34	35
2300-2400	17	26	34	37	16	20	19	23	24
Totals	4491	4680	4935	3849	2829	4399	4571	4615	4251

Time	Week 2 Wed 19							Averages Weekday	Averages 7-day
0000-0100	16							16	16
0100-0200	7							7	7
0200-0300	3							3	3
0300-0400	2							2	2
0400-0500	13							13	13
0500-0600	14							14	14
0600-0700	70							70	70
0700-0800	185							185	185
0800-0900	388							388	388
0900-1000	414							414	414
1000-1100	348							348	348
1100-1200	353							353	353
1200-1300									
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	1814							1814	1814

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Bentinck St
Combined

Time	Week 1 Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
0000-0100	21	14	19	47	55	6	22	16	26
0100-0200	6	9	11	35	29	7	7	8	15
0200-0300	4	5	12	23	24	8	7	7	12
0300-0400	11	7	14	17	17	7	5	9	11
0400-0500	18	24	13	15	28	17	15	17	19
0500-0600	34	39	40	34	28	39	36	37	36
0600-0700	125	131	114	63	43	118	127	123	103
0700-0800	303	337	319	169	83	282	314	311	258
0800-0900	697	656	648	356	157	604	650	652	539
0900-1000	695	693	743	612	367	723	709	713	649
1000-1100	717	701	714	774	530	671	670	695	682
1100-1200	734	711	740	862	579	784	764	747	753
1200-1300	761	811	836	860	740	803	745	791	794
1300-1400	690	773	880	727	574	781	854	796	754
1400-1500	675	804	934	724	541	772	814	800	752
1500-1600	737	903	1025	692	501	935	998	920	827
1600-1700	823	946	[illegible]	636	431	1014	1115	965	856
1700-1800	768	932	837	525	397	874	1134	929	795
1800-1900	518	605	561	384	322	466	588	548	482
1900-2000	319	386	369	349	265	327	329	346	335
2000-2100	176	254	232	198	158	203	194	212	204
2100-2200	135	171	207	191	91	113	141	153	150
2200-2300	82	68	101	114	55	72	83	81	82
2300-2400	32	38	69	82	24	29	38	41	44
Totals	9080	10017	10564	8486	6149	9654	10362	9935	9187

Time	Week 2 Wed 19							Averages Weekday	Averages 7-day
0000-0100	19							19	19
0100-0200	9							9	9
0200-0300	9							9	9
0300-0400	9							9	9
0400-0500	20							20	20
0500-0600	33							33	33
0600-0700	133							133	133
0700-0800	350							350	350
0800-0900	727							727	727
0900-1000	962							962	962
1000-1100	798							798	798
1100-1200	800							800	800
1200-1300									
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	3769							3769	3769

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Havannah St
Northbound

Time	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
	Week 1								
0000-0100	3	9	10	19	24	1	11	7	11
0100-0200	7	11	1	17	14	0	3	4	8
0200-0300	5	10	10	8	7	7	9	8	8
0300-0400	6	5	4	12	5	8	7	7	7
0400-0500	13	13	11	7	8	15	24	15	13
0500-0600	48	60	59	21	20	67	51	55	46
0600-0700	153	163	148	58	46	150	144	152	123
0700-0800	198	164	193	104	46	157	191	180	150
0800-0900	348	301	381	200	87	330	333	340	281
0900-1000	298	289	261	284	180	273	297	280	274
1000-1100	226	253	251	297	229	348	261	248	262
1100-1200	252	262	311	317	271	334	279	289	276
1200-1300	273	292	269	264	252	271	283	278	275
1300-1400	295	293	304	245	216	304	294	302	282
1400-1500	312	294	346	226	209	314	298	312	286
1500-1600	408	342	492	210	241	421	413	415	362
1600-1700	423	457	460	331	236	418	510	457	391
1700-1800	429	475	401	203	174	479	506	468	382
1800-1900	234	279	248	151	158	234	280	256	227
1900-2000	180	202	141	131	109	174	168	173	158
2000-2100	73	115	85	85	93	86	91	93	92
2100-2200	68	72	69	114	69	58	66	67	74
2200-2300	70	41	58	56	32	53	37	56	52
2300-2400	22	10	35	34	18	20	25	24	26
Totals	4350	4486	4633	3337	2732	4386	4606	4484	4070

Time	Wed 19							Averages Weekday	Averages 7-day
	Week 2								
0000-0100	6							6	6
0100-0200	2							2	2
0200-0300	8							8	8
0300-0400	6							6	6
0400-0500	16							16	16
0500-0600	51							51	51
0600-0700	163							163	163
0700-0800	207							207	207
0800-0900	333							332	332
0900-1000	352							352	352
1000-1100	227							227	227
1100-1200									
1200-1300									
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	1370							1370	1370

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Havannah St
Southbound

Time	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
	Week 1								
0000-0100	7	13	15	26	21	1	21	12	15
0100-0200	7	10	8	20	12	5	8	8	10
0200-0300	8	7	10	0	6	5	7	8	6
0300-0400	9	7	8	6	5	8	10	8	7
0400-0500	15	16	14	6	7	11	15	14	12
0500-0600	37	42	28	19	5	28	32	33	27
0600-0700	110	130	123	45	30	118	122	119	96
0700-0800	314	303	293	101	63	282	314	301	239
0800-0900	562	592	553	186	103	578	567	564	444
0900-1000	381	336	362	272	231	337	418	361	351
1000-1100	269	308	313	287	260	307	310	301	296
1100-1200	278	256	324	302	273	275	285	284	293
1200-1300	310	293	355	202	284	286	310	309	305
1300-1400	312	306	346	265	223	306	290	310	295
1400-1500	299	317	322	305	244	322	315	315	303
1500-1600	437	365	522	235	215	442	418	436	389
1600-1700	437	469	461	250	237	462	473	461	402
1700-1800	375	375	325	231	188	394	429	380	331
1800-1900	215	275	254	161	173	232	253	246	223
1900-2000	175	182	157	129	145	150	172	164	156
2000-2100	106	113	106	77	102	105	80	103	96
2100-2200	62	63	83	63	64	74	77	76	72
2200-2300	74	33	58	52	41	47	45	61	60
2300-2400	37	42	50	30	17	27	27	37	33
Totals	4823	4871	5090	3544	2991	4854	4888	4927	4458

Time	Wed 19							Averages Weekday	Averages 7-day
	Week 2								
0000-0100	9							9	9
0100-0200	9							9	9
0200-0300	5							5	5
0300-0400	11							11	11
0400-0500	15							15	15
0500-0600	26							26	26
0600-0700	119							119	119
0700-0800	321							321	321
0800-0900	521							521	521
0900-1000	431							431	431
1000-1100	415							415	415
1100-1200									
1200-1300									
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	1926							1926	1926

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Havannah St
Combined

Time	Wed 12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Averages Weekday	Averages 7-day
	Week 1								
0000-0100	10	32	36	47	45	2	32	16	26
0100-0200	14	21	9	37	26	5	11	12	19
0200-0300	13	17	20	17	13	16	16	16	16
0300-0400	16	12	14	18	10	17	17	15	15
0400-0500	28	29	25	15	15	26	39	29	25
0500-0600	85	102	78	39	25	83	83	88	72
0600-0700	263	283	271	98	76	268	266	270	218
0700-0800	512	467	486	205	109	479	505	494	398
0800-0900	907	911	946	385	200	918	896	912	738
0900-1000	679	685	643	566	417	679	715	679	625
1000-1100	495	551	564	584	508	555	580	549	548
1100-1200	530	518	635	575	544	613	564	582	569
1200-1300	583	575	624	566	539	557	593	586	579
1300-1400	607	592	660	540	439	610	574	612	577
1400-1500	611	611	668	531	453	636	611	627	589
1500-1600	833	707	1014	554	456	863	832	850	751
1600-1700	864	946	941	481	466	879	983	919	791
1700-1800	814	846	726	434	362	873	935	838	713
1800-1900	449	554	502	312	331	466	533	502	450
1900-2000	359	384	298	260	254	324	349	337	314
2000-2100	179	228	231	166	195	191	171	194	190
2100-2200	130	155	152	177	133	132	146	143	146
2200-2300	144	74	116	108	73	100	102	107	102
2300-2400	59	61	85	64	35	47	52	61	58
Totals	9173	9357	9713	6903	5723	9310	9504	9411	8536

Time	Wed 19							Averages Weekday	Averages 7-day
	Week 2								
0000-0100	15							15	15
0100-0200	11							11	11
0200-0300	17							17	17
0300-0400	17							17	17
0400-0500	31							31	31
0500-0600	77							77	77
0600-0700	282							282	282
0700-0800	528							528	528
0800-0900	853							853	853
0900-1000	783							783	783
1000-1100	642							642	642
1100-1200									
1200-1300									
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									
1900-2000									
2000-2100									
2100-2200									
2200-2300									
2300-2400									
Totals	3296							3296	3296

Appendix B

Traffic survey data – O-D survey

Sample size of the OD survey data

ID	Road	Tube count (13/03/2008)						OD survey (13/03/2008)						Sample Size (%)					
		Light vehicles (6.30am to 6.30pm)			Heavy Vehicles (6.30am to 6.30pm)			Light vehicles (6.30am to 6.30pm)			Heavy Vehicles (6.30am to 6.30pm)			Light vehicles (6.30am to 6.30pm)			Heavy Vehicles (6.30am to 6.30pm)		
		NE/ NW	SE/ SW	Two-way	NE/ NW	SE/ SW	Two-way	NE/ NW	SE/ SW	Two-way	NE/ NW	SE/ SW	Two-way	NE/ NW	SE/ SW	Two-way	NE/ NW	SE/ SW	Two-way
1&2	Mitchell Highway, Evans Plains Creek Bridge	2,118	2,225	4,343	446	432	878	735	965	1,700	208	277	485	35%	43%	39%	47%	64%	55%
3&4	Mid Western Highway, west of McDiarmid Street	1,306	1,271	2,577	232	223	455	574	401	975	159	182	341	44%	32%	38%	69%	82%	75%
5&6	Vale Road, south of Lloyds Road	1,325	1,167	2,492	166	150	316	273	932	1,205	39	110	149	21%	80%	48%	23%	73%	47%
7&8	O'Connell Road, north of Blue Ridge Road	2,556	1,251	3,807	453	175	628	667	624	1,291	143	167	310	26%	50%	34%	32%	95%	49%
9&10	Great Western Highway (east), west of Ashworth Drive	4,795	4,898	9,693	721	669	1,390	1,827	2,266	4,093	446	460	906	38%	46%	42%	62%	69%	65%
11&12	Limekilns Road, south of Culnane Place	1,702	2,058	3,760	68	74	142	-	-	-	-	-	-	-	-	-	-	-	-
13&14	Gilmour Street, between Tareena Avenue and Kelso Public School	1,827	2,089	3,916	160	184	344	700	857	1,557	90	92	182	38%	41%	40%	56%	50%	53%
15&16	Durham Street, between Hope Street and Peel Street	3,665	4,223	7,888	220	245	465	1,926	2,121	4,047	142	182	324	53%	50%	51%	65%	74%	70%
17&18	Rocket Street, between Seymour Street and Havannah Street	2,306	1,889	4,195	187	128	315	941	847	1,788	89	94	183	41%	45%	43%	48%	73%	58%
19&20	Bentinck Street, between Durham Street and Howick Street	4,221	3,866	8,087	400	217	617	1,830	1,609	3,439	220	48	268	43%	42%	43%	55%	22%	43%
21&22	Havannah Street, between Durham Street and Howick Street	3,441	3,734	7,175	302	444	746	1,613	1,854	3,467	232	413	645	47%	50%	48%	77%	93%	86%
												Minimum		21%	32%	34%	23%	22%	43%
												Maximum		53%	80%	51%	77%	95%	86%

Bathurst Local Area Study

Prepared For

PB

By

TTM Group

08.05.08

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1.0 Background

TTM has been commissioned to undertake an origin-destination survey the majority of roads entering and exiting the Bathurst local area. The study involved automatic counts at 11 sites in the same locations as the O-D cordon points.

2.0 Methodology

The origin-destination survey was conducted on Thursday 13.3.08 between the hours of 6.30am to 6.30pm. The automatic counts were conducted from the 12.3.08 – 20.3.08.

2.1 Origin-destination survey

The following table lists each of the 11 survey cordon points (refer also to the attached site map).

Station Number	Cordon Point	Direction
Site 1	Mitchell Hwy	EB
Site 2		WB
Site 3	Mid Western Hwy	EB
Site 4		WB
Site 5	Vale Rd	NB
Site 6		SB
Site 7	O'Connell Rd	NB
Site 8		SB
Site 9	Great Western Hwy	WB
Site 10		EB
Site 11	Limekilns Rd	WB
Site 12		EB
Site 13	Gilmour St	SB
Site 14		NB
Site 15	Durham St	SB
Site 16		NB
Site 17	Rocket St	NB
Site 18		SB
Site 19	Bentinck St	NB
Site 20		SB
Site 21	Havannah St	NB
Site 22		SB

Dictaphones were used to record the number plates of vehicles passing each cordon point by direction. The sampling technique employed on the survey was as follows:

Class 1	Light vehicles	Record all number plates on which the last number is a 2, 4, 6, 8, or 0
Class 2	2 axle HV	Record the number plate of all vehicles
Class 3	3-4 axle HV	Record the number plate of all vehicles
Class 4	5+ axle HV	Record the number plate of all vehicles
Class 5	Buses	Record the number plate of all vehicles

The achieved sample rate was approximately 40% of light vehicles at the survey sites.

Where visible, staff recorded the presence of hazardous vehicle signs on trucks. This data has been reported in a separate spreadsheet.

2.2 Survey notes

- The weather was fine for the duration of the survey.
- Due to equipment malfunction at site 11/12 Limekilns Rd no data was retrievable from the dictaphone.
- There were no observed accidents or traffic incidents during the survey
- All automatic count equipment was functioning normally throughout the survey

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2.3 Automatic count surveys
Automatic counters were placed at each of the 11 O-D survey locations for a period of not less than 7 days. 16 counters were required for the 11 sites.

The auto count equipment was checked prior to the commencement of the O-D survey in order to ensure all sites were operational.

3.0 Analysis

3.1 O-D Data analysis

Data was keypunched and analysed through the ODAPA software. A matrix of movements has been generated for each survey period. The data is also presented in tabular / graphical format in terms of the key movements through the area based on the proportion of vehicles undertaking these movements.

For the analysis it has been assumed that a 90% sample rate for trucks and 40% sample rate for cars was achieved at the survey sites. An error rate of 10% has been assumed during analysis. Analysis has been provided using a 5 minute search frame (for peak periods) and a 'whole of period' search frame (for the 12 hour analysis).

3.2 O-D Data observations

The following notes the key movements from one of the seven main entry points to one of the seven main exit points.

Site 1 Mitchell Hwy
The highest number of matches for vehicles entering at this cordon point, for light vehicles was with station 2 (Mitchell Hwy) with a percentage of **30.84%.** The highest number of matches for heavy vehicles was with station 10 (Great Western Hwy East) with a percentage of **48.94%.**

Site 3 Mid Western Hwy
The highest number of matches for vehicles entering at this cordon point, for light vehicles was with station 4 (Mid Western Hwy) with a percentage of **29.21%.** The highest number of matches for heavy vehicles was with station 4 (Mid Western Hwy)) with a percentage of **27.12%.**

Site 5 Vale Rd
The highest number of matches for vehicles entering at this cordon point was with station 6 (Vale Rd) with a percentage of **68.05%** for light vehicles and **60%** for heavy vehicles.

Site 7 O'Connell Rd
The highest number of matches for vehicles entering at this cordon point was with station 8 (O'connell Rd) with a percentage of **48.46%** for light vehicles and **50%** for heavy vehicles.

Site 9 Great Western Hwy (East)
The highest number of matches for vehicles entering at this cordon point, for light vehicles was with station 10 (Great Western Hwy East) with a percentage of **40.87%**. The highest number of matches for heavy vehicles was with station 2 (Mitchell Hwy) with a percentage of **31.62%.**

Site 13 Gilmour St
The highest number of matches for vehicles entering at this cordon point was with station 14 (Gilmour St) with a percentage of **34.5%** for light vehicles and **42.31%** for heavy vehicles.

Site 15 Durham St
The highest number of matches for vehicles entering at this cordon point was with station 16 (Durham St) with a percentage of **56.32%** for light vehicles and **28.05%** for heavy vehicles.

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3.3 Automatic count survey analysis

The data report for the auto counts has been provided in MS Excel format detailing 15 minutes Austroads class totals by direction at each site in addition to a weekly vehicle count summary for all vehicles.

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Bathurst Origin Destination Survey
Light Vehicles Matrix Matches
0630 - 1830
For vehicles sighted at the internal station and atleast one external station

ttm

Station No. 17

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		7	.	.	.	.	.	.	.	.	.	.	.	.	7
2	.		.	.	.	.	.	.	.	.	.	.	3	.	3
3	.	.		.	.	.	3	.	.	3	7	3	3	3	22
4	.	.	.		.	.	.	.	3	.	.	.	.	.	3
5	.	3	3	.		58	.	10	.	7	.	3	3	7	94
6	3	.	.	7	14		3	7	.	3	7	.	7	14	65
7	.	.	.	.	.	3		7	3	3	.	.	10	10	36
8	.	.	.	.	.	3	3		.	3	.	.	3	3	15
9	.	.	.	.	3	3	.	3		45	3	10	14	10	91
10	.	.	.	.	3	.	3	3	10		.	3	17	3	42
13	.	3	.	.	.	10	.	.	.	3		7	7	.	30
14	.	.	.	.	.	3	3	3	.	.	3		3	.	15
15	3	.	3	.	3	21	3	10	3	3	7	3		34	93
16	.	.	.	.	.	3	7	10	3	7	3	10	34		81
Matched	6	13	6	7	23	108	25	53	22	77	30	39	104	84	

Station No. 18

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		17	.	.	.	.	.	.	.	.	.	.	.	.	17
2	.		3	.	.	.	.	3	.	.	3	3	10	.	22
3	.	.		3	.	3	7	5	.	.	7	3	7	7	40
4	.	.	.		.	.	.	.	3	3	.	.	3	.	9
5	.	.	.	.		45	.	7	.	.	.	.	7	.	59
6	3	3	3	3	1		3	3	3	10	.	3	.	14	51
7	.	.	3	.	.	7		17	7	.	.	3	14	14	65
8	.	.	.	.	.	3	3		.	.	.	7	10	.	23
9	.	3	3	7	.	10	.	.		38	.	3	7	10	81
10	.	.	7	.	.	10	3	.	24		.	10	7	7	68
13	.	.	.	.	.	.	.	10	3	3		10	7	3	36
14	.	.	3	.	.	10	.	3	.	7	3		3	3	32
15	.	.	3	.	3	27	3	3	3	17	7	14		41	121
16	.	3	3	3	.	17	3	7	7	7	.	10	38		98
Matched	3	26	28	16	6	132	22	56	50	85	20	66	113	99	

Station No. 19

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		14	3	.	.	.	.	.	.	7	.	10	17	7	58
2	.		.	.	.	.	.	.	3	3	3	10	3	3	25
3	.	.		17	.	.	10	10	3	7	3	10	3	27	90
4	.	.	.		.	.	.	.	.	14	.	.	3	7	24
5	.	3	3	.		27	.	7	.	7	10	3	.	7	67
6	.	3	3	.	.		.	7	10	10	3	7	.	14	57
7	.	3	3	.	.	10		89	3	21	7	10	10	41	197
8	3	3	3	.	.	.	21		3	17	3	7	3	17	80
9	3	.	.	.	.	.	.	3		130	10	27	7	31	211
10	3	3	.	3	.	10	3	7	106		10	21	21	10	197
13	.	3	.	.	10	31	3	7	10	10		55	7	21	157
14	.	3	.	.	10	14	.	7	3	14	27		7	24	109
15	.	3	3	.	14	14	7	21	31	31	31	24		192	371
16	.	.	.	3	10	31	14	21	21	34	3	31	75		243
Matched	9	38	18	23	44	137	58	179	193	305	110	215	156	401	

Station No. 20

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		17	.	.	.	.	.	.	.	3	.	7	10	3	40
2	.		.	.	.	.	.	.	.	.	3	7	3	3	16
3	.	.		7	.	.	3	.	3	.	14	.	3	17	47
4	.	.	.		.	.	.	.	3	7	.	.	3	.	13
5	.	.	.	.		14	.	.	3	7	.	3	3	7	37
6	.	7	.	.	7		3	.	.	3	.	.	7	3	30
7	.	3	.	.	3	.		45	10	.	3	.	21	3	88
8	.	.	.	3	.	.	10		.	.	.	.	10	10	33
9	3	21	3	7	3	3	3	7		93	10	14	24	14	205
10	3	3	.	.	3	10	3	3	51		7	7	21	3	114
13	.	3	3	.	.	.	.	7	.	.		41	3	14	71
14	.	.	3	.	.	.	.	3	.	3	24		7	10	50
15	3	7	3	10	3	7	7	10	14	3	24	7		147	245
16	.	7	.	3	.	.	7	7	10	7	3	3	58		105
Matched	9	68	12	30	19	34	36	82	94	126	88	89	173	234	

Station No. 21

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		.	.	.	.	.	.	3	.	14	.	.	3	14	34
2	.		.	.	.	.	.	3	3	7	.	.	10	7	30
3	3	.		.	.	.	7	.	7	14	3	3	7	14	58
4	.	.	.		.	.	.	.	.	3	.	.	.	3	6
5	.	.	.	.		27	.	7	3	.	.	.	3	10	50
6	.	.	.	.	3		.	14	7	17	.	10	.	3	54
7	3	.	.	.	.	3		58	3	3	.	7	10	10	97
8	.	.	.	.	.	3	27		3	3	.	3	7	10	56
9	.	3	3	3	.	3	10	17		141	.	14	17	10	221
10	.	3	10	3	.	10	14	7	72		.	17	14	14	164
13	.	3	3	.	3	3	.	.	7	7		48	7	3	84
14	3	10	3	.	7	7	.	.	7	7	17		7	14	82
15	.	3	3	3	7	7	3	14	31	55	.	14		93	233
16	.	7	.	7	3	7	3	17	17	45	.	14	41		161
Matched	9	29	22	16	23	70	64	140	160	316	20	130	126	205	

Station No. 22

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		.	.	.	.	.	.	.	.	3	3	.	.	3	9
2	.		.	.	.	.	.	.	.	.	.	.	.	.	0
3	.	.		.	.	.	.	.	7	.	3	3	3	10	26
4	.	.	.		.	.	.	.	.	.	.	.	7	.	7
5	.	.	.	.		14	.	.	.	3	.	.	.	3	20
6	.	.	.	.	.		.	.	7	.	3	3	.	3	16
7	.	3	.	.	.	.		41	3	7	.	3	3	3	63
8	.	3	.	.	.	3	3		.	3	3	7	.	7	29
9	3	3	.	.	.	10	10	3		75	10	10	10	7	141
10	.	.	.	.	.	3	3	3	24		3	3	.	.	39
13	.	7	.	3	.	7	.	.	10	10		27	17	.	81
14	.	.	.	.	.	.	.	.	3	.	7		.	.	10
15	.	10	.	10	.	7	3	7	.	31	10	10		72	160
16	.	3	.	3	.	3	7	7	7	10	3	.	27		70
Matched	3	29	0	16	0	47	26	61	61	142	45	66	67	108	

Bathurst Origin Destination Survey
Heavy Vehicles Matrix Matches
0630 - 1830
For vehicles sighted at the internal station and atleast one external station

Station No. 17

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		2	.	.	.	.	.	.	.	.	.	.	.	.	2
2	2		.	.	.	.	.	.	.	.	.	.	.	.	2
3	.	.		.	.	.	.	.	.	.	.	.	.	.	0
4	.	.	.		.	.	.	.	.	.	.	.	.	.	0
5	.	.	.	.		2	.	.	.	.	.	.	.	.	2
6	.	.	.	.	.		.	.	.	2	.	.	.	.	2
7	.	.	.	.	.	.		.	.	.	.	.	.	.	0
8	.	.	.	.	.	.	.		.	.	.	.	.	.	0
9	.	.	.	.	.	.	.	.		5	.	.	.	.	5
10	.	.	.	.	.	.	.	.	2		.	.	.	.	2
13	.	.	.	.	.	.	.	.	.	.		.	.	.	0
14	.	.	.	.	.	.	.	.	.	.	.		.	.	0
15	.	.	.	.	.	.	.	.	.	3	.	.		.	3
16	.	.	.	.	.	3	3	5	2	3	3	5	15		39
Matched	2	2	0	0	0	5	3	5	4	13	3	5	15	0	

Station No. 18

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		.	.	.	.	.	.	.	.	.	.	.	.	.	0
2	.		.	.	.	3	.	.	.	.	.	.	.	.	3
3	.	.		.	.	3	.	2	.	.	.	.	.	.	5
4	.	.	.		.	.	.	.	.	.	.	.	.	.	0
5	.	.	.	.		5	.	.	.	.	.	.	.	.	5
6	.	2	.	.	2		.	2	2	.	.	.	.	.	8
7	.	.	.	.	.	.		.	.	.	.	.	.	.	0
8	.	.	.	.	.	.	.		.	.	.	.	.	.	0
9	.	.	.	.	.	2	.	.		.	.	.	2	.	4
10	.	.	.	.	.	3	.	.	.		.	.	3	.	5
13	.	.	.	.	.	.	.	.	.	.		.	.	.	0
14	.	.	.	.	.	.	.	.	.	.	.		.	.	0
15	.	.	.	.	.	3	.	.	.	.	.	.		.	3
16	.	2	2	2	.	8	2	3	3	3	.	5	18		48
Matched	0	4	2	2	2	26	2	7	5	3	0	5	23	0	

Station No. 19

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		.	.	.	.	.	.	.	.	2	.	.	.	.	2
2	.		.	.	.	.	.	.	.	.	.	.	.	.	0
3	.	.		2	.	.	.	.	.	.	.	.	.	.	2
4	.	.	.		.	.	.	.	.	.	.	.	.	.	0
5	.	.	.	.		.	.	.	.	.	.	.	.	.	0
6	.	.	.	.	.		.	.	.	2	.	.	.	.	2
7	.	.	.	.	.	.		.	.	2	.	.	.	.	2
8	.	.	.	.	.	.	.		.	2	.	.	.	2	4
9	.	.	.	.	.	.	.	.		23	.	2	.	2	27
10	.	.	.	.	.	.	.	.	.		.	3	.	3	6
13	.	.	.	.	.	.	.	.	.	.		.	.	.	0
14	.	.	.	.	.	.	.	.	.	.	.		.	.	0
15	.	.	.	.	.	.	.	.	.	2	.	.		.	2
16	.	.	.	2	5	14	6	11	9	17	2	14	34		114
Matched	0	0	0	4	5	14	6	11	9	50	2	19	34	7	

Station No. 20

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		.	.	.	.	.	.	.	.	.	.	.	5	.	5
2	.		.	.	.	.	.	.	.	.	.	.	.	.	0
3	.	.		2	.	.	.	.	.	.	.	.	.	.	2
4	.	.	.		.	.	.	.	.	.	.	.	.	.	0
5	.	.	.	.		.	2	.	.	.	.	.	3	.	5
6	.	.	.	.	.		.	.	.	.	.	.	2	.	2
7	.	.	.	.	.	.		.	.	.	.	.	.	.	0
8	.	.	.	.	.	.	2		.	.	.	.	.	.	2
9	.	.	.	.	.	.	.	.		2	2	2	6	6	18
10	.	.	.	.	.	.	.	.	6		2	2	5	3	18
13	.	.	.	.	.	.	.	.	.	.		.	2	2	4
14	.	.	.	.	.	.	.	.	.	.	2		2	.	4
15	.	.	.	.	.	.	2	.	2	8	5	2		2	21
16	.	3	2	2	.	.	3	3	5	5	2	3	26		52
Matched	0	3	2	4	0	0	9	3	13	13	13	9	51	13	

Station No. 21

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		.	.	.	.	.	.	.	.	.	5	.	2	.	7
2	.		.	.	.	.	.	.	.	.	.	.	2	.	2
3	.	.		.	.	.	.	.	.	.	.	.	.	.	0
4	.	.	.		.	.	.	.	.	.	.	.	.	.	0
5	.	.	.	.		5	.	.	2	.	.	.	.	2	9
6	.	2	.	.	2		.	.	.	5	2	.	.	5	16
7	.	.	.	.	.	5		.	.	.	.	.	.	.	5
8	.	2	.	.	.	3	.		.	.	.	.	.	2	7
9	.	.	.	.	.	.	.	.		.	.	.	.	3	3
10	.	.	.	.	.	3	.	.	3		.	.	2	3	11
13	.	.	.	.	.	.	.	.	.	.		3	.	.	3
14	.	.	.	.	.	.	.	2	.	.	3		.	6	11
15	.	.	.	.	3	2	.	.	.	.	5	.		11	21
16	.	3	.	3	3	5	2	8	8	23	2	8	26		91
Matched	0	7	0	3	8	23	2	10	13	28	17	11	32	32	

Station No. 22

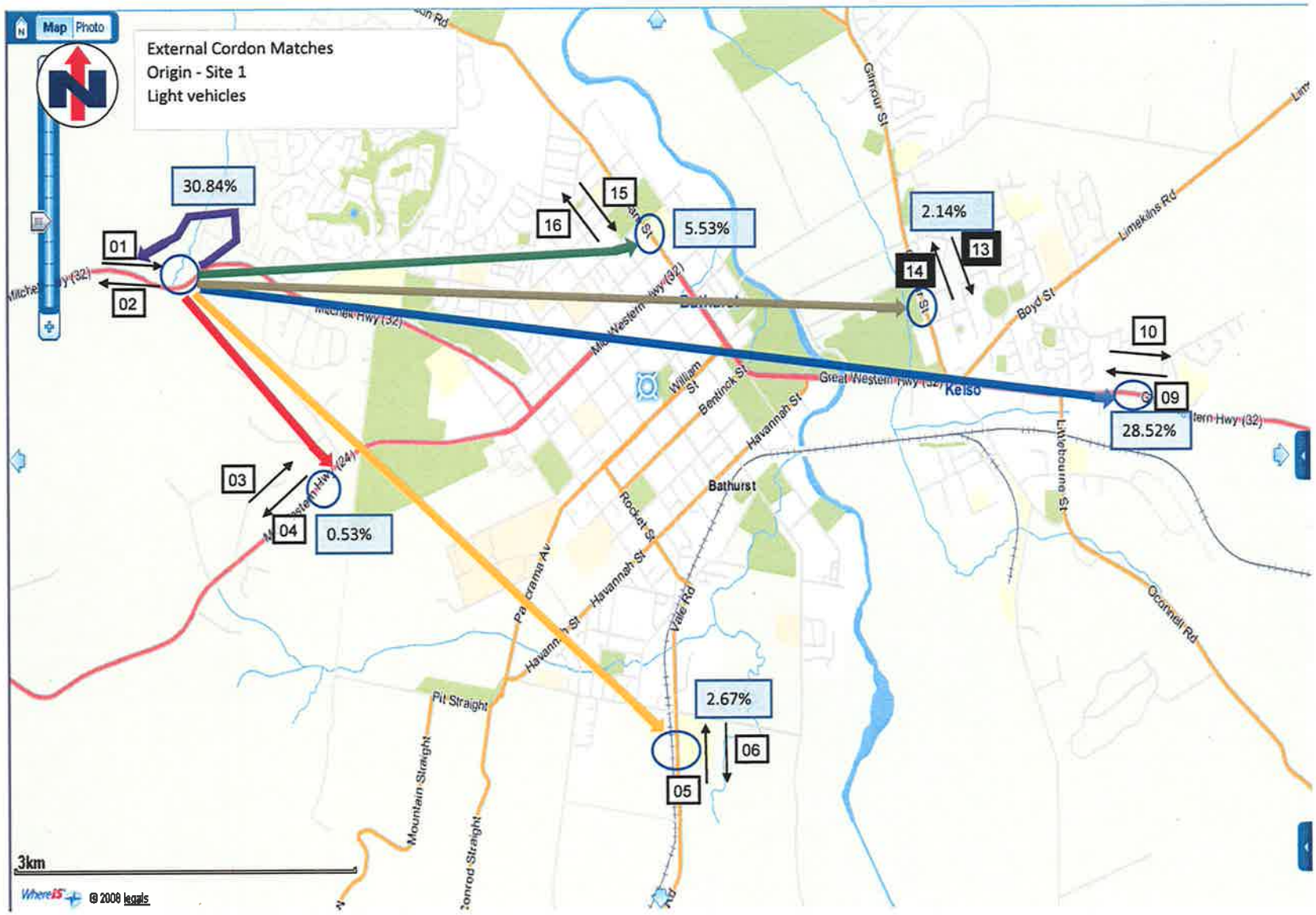
	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		.	.	.	.	.	.	.	.	.	.	.	.	5	5
2	.		.	.	.	.	.	.	.	.	.	.	.	.	0
3	.	.		.	.	.	.	.	.	.	.	.	.	2	2
4	.	.	.		.	.	.	.	.	.	.	.	.	.	0
5	.	.	.	.		2	.	.	.	.	2	.	2	.	6
6	.	.	.	.	2		.	2	.	3	2	.	6	2	17
7	.	.	.	.	.	5		.	.	.	.	.	.	.	5
8	.	.	.	.	.	5	2		.	.	.	.	2	2	11
9	.	2	.	.	.	2	2	.		21	.	.	2	.	29
10	2	.	.	.	.	3	.	.	5		.	.	5	.	15
13	.	.	.	.	.	.	.	.	.	.		.	2	.	2
14	.	.	.	.	.	.	.	.	.	.	2		2	2	6
15	.	.	.	.	5	11	.	.	.	3	.	2		9	30
16	.	2	.	2	.	6	3	3	3	8	3	.	26		56
Matched	2	4	0	2	7	34	7	5	8	35	9	2	47	22	

Bathurst Origin Destination Survey
Light Vehicles Vehicles Matrix Matches
0630 - 1830

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		173	12	3	.	15	6	28	56	160	19	12	46	31	561
2	123		12	3	.	3	.	6	31	49	19	12	31	28	317
3	12	9		130	3	6	15	15	31	111	9	9	43	52	445
4	6	12	80		6	3	6	.	15	93	19	3	46	12	301
5	3	3	3	6		213	.	12	12	12	3	9	15	22	313
6	15	25	9	6	99		15	12	28	37	22	12	28	77	385
7	12	25	3	6	6	28		377	37	52	34	43	65	90	778
8	6	15	9	3	.	6	250		52	22	65	19	71	34	552
9	31	278	19	52	3	46	31	86		772	68	133	108	262	1889
10	43	56	28	62	3	19	40	49	701		111	56	207	96	1471
13	6	15	6	25	.	25	6	59	71	117		247	56	83	716
14	3	19	6	3	3	22	15	31	52	34	179		49	40	456
15	19	59	40	83	9	99	28	117	102	296	83	68		1293	2296
16	12	68	15	22	6	43	25	62	145	127	46	49	1006		1626

Bathurst Origin Destination Survey
Heavy Vehicles Vehicles Matrix Matches
0630 - 1830

	1	2	3	4	5	6	7	8	9	10	13	14	15	16	Matched
1		8	0	1	0	0	1	3	5	23	1	0	4	1	47
2	14		0	0	0	1	0	5	1	4	3	0	1	0	29
3	0	0		16	0	5	0	10	1	12	0	0	1	14	59
4	0	0	19		0	0	0	0	0	3	0	0	5	1	28
5	0	1	0	0		18	0	0	1	1	0	0	5	4	30
6	0	1	0	1	18		1	5	4	10	3	0	8	5	56
7	1	7	1	0	0	5		33	4	14	0	0	0	1	66
8	0	1	0	1	0	3	49		10	7	4	0	0	1	76
9	1	37	3	3	0	7	3	14		26	3	7	5	8	117
10	4	10	3	1	0	5	14	10	70		3	4	5	4	133
13	0	3	0	1	0	1	0	3	1	1		11	1	4	26
14	0	1	0	0	0	1	1	3	4	0	15		5	3	33
15	3	5	5	5	4	15	0	3	0	10	5	4		23	82
16	5	32	15	16	4	23	11	29	70	62	22	25	497		811


Map
Photo
External Cordon Matches
Origin - Site 1
Light vehicles
30.84%
01
02
16
15
5.53%
2.14%
14
13
10
09
28.52%
03
04
0.53%
05
06
2.67%
Kelso
Bathurst
Great Western Hwy (32)
Mitchell Hwy (32)
William St
Bentinck St
Havannah St
Rocket St
Vale Rd
Pit Straight
Mountain Straight
Conrod Straight
Glanmour St
Limekilns Rd
Boyd St
Littlebourne St
Gormell Rd
3km
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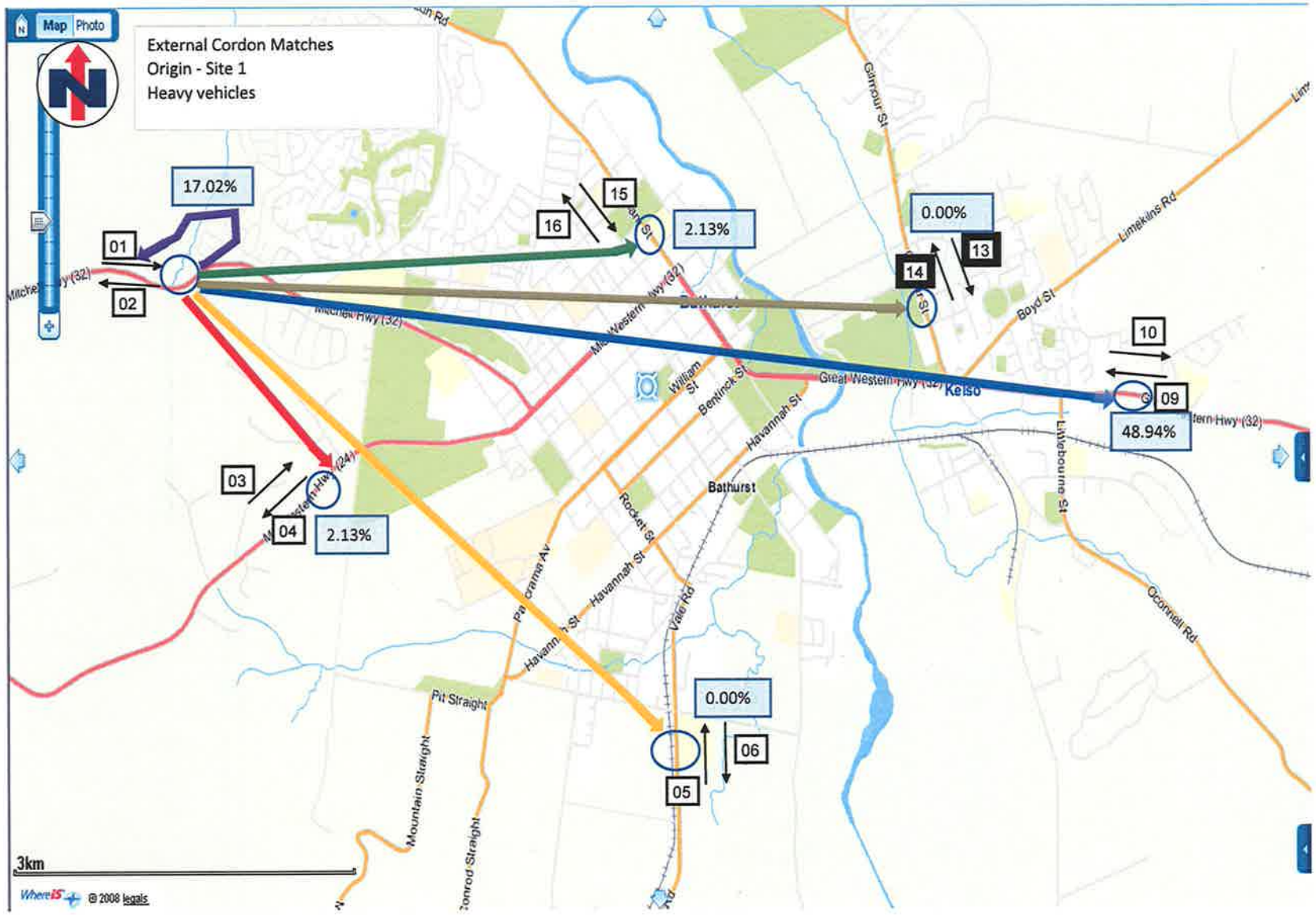
Map
Photo
External Cordon Matches
Origin - Site 1
Heavy vehicles
17.02%
01
02
15
16
2.13%
0.00%
13
14
10
09
48.94%
03
04
2.13%
0.00%
06
05
Bathurst
Kelso
Great Western Hwy (32)
Michell Hwy (32)
William St
Bentinck St
Havannah St
Rocket St
Vaio Rd
Pit Straight
Mountain Straight
Conrod Straight
Limekilns Rd
Boyd St
Gilmour St
Lucknow St
Gormans Rd
3km
WhereIS
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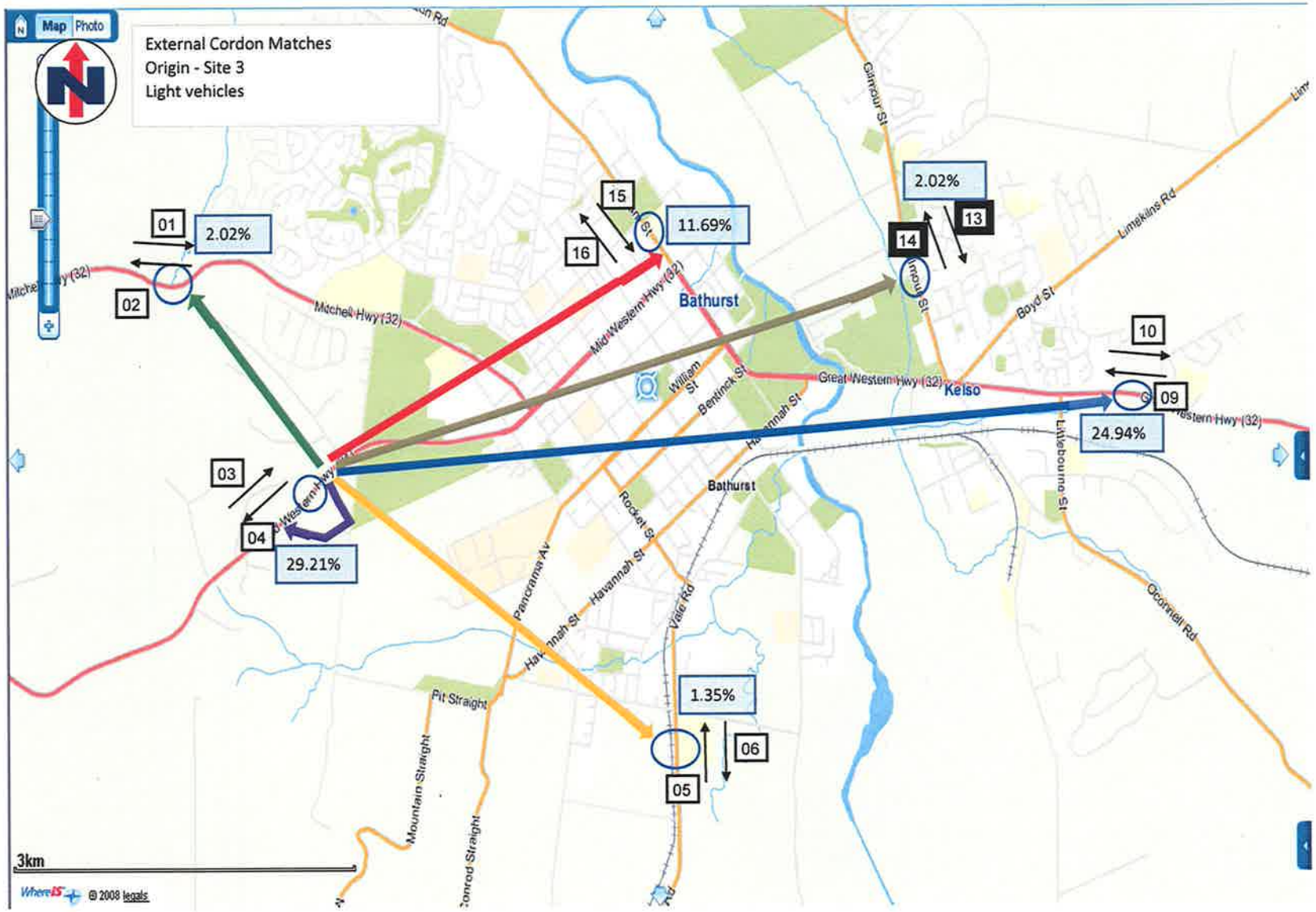
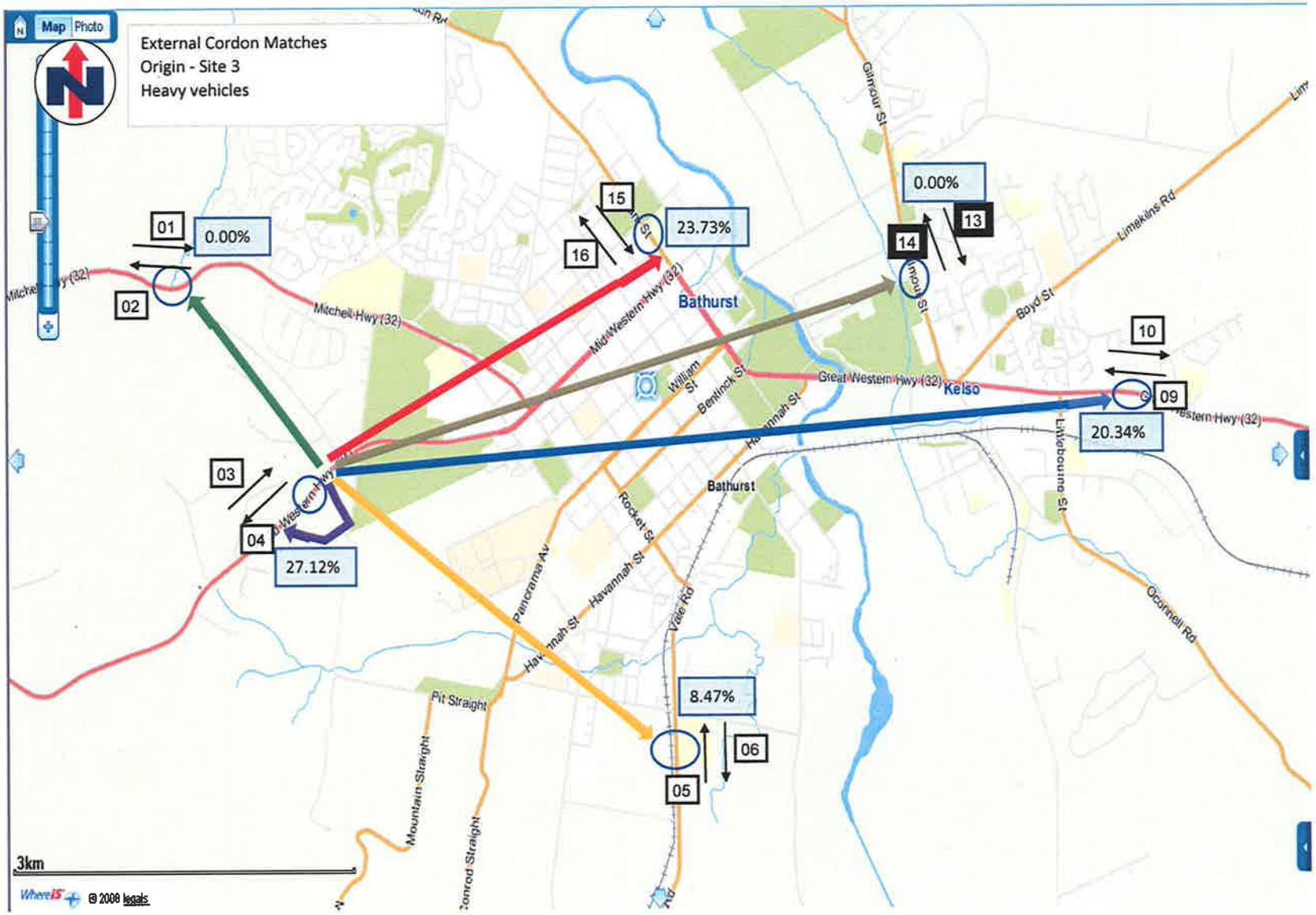
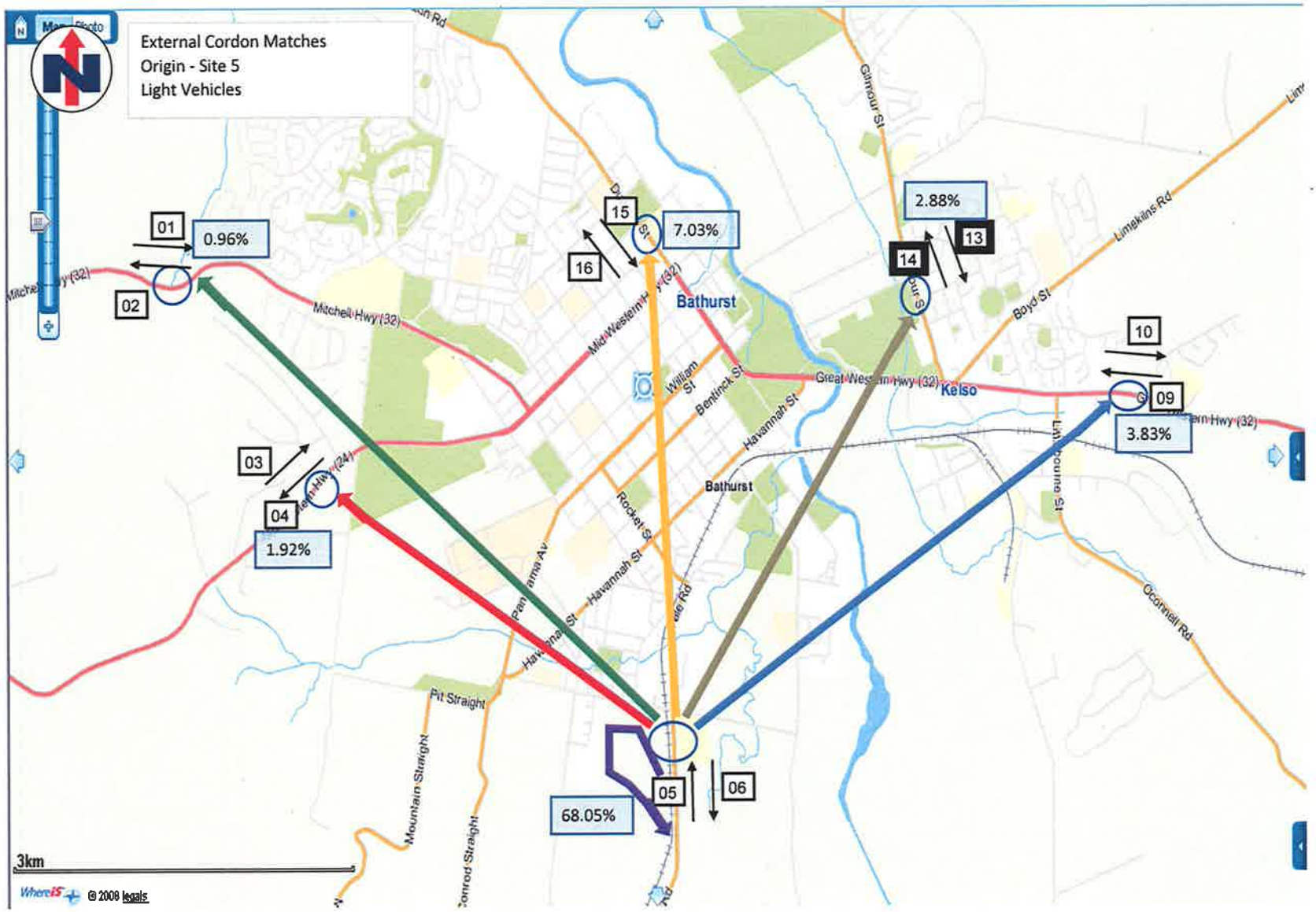

Map
Photo
External Cordon Matches
Origin - Site 3
Light vehicles
01
2.02%
02
03
04
29.21%
05
1.35%
06
09
24.94%
10
11.69%
13
14
2.02%
15
16
Bathurst
Kelso
Mitchell Hwy (32)
Mid Western Hwy (32)
Great Western Hwy (32)
William St
Bentinck St
Havannah St
Rocket St
Panorama Av
Vale Rd
Pit Straight
Mountain Straight
Conrod Straight
Gilmour St
Limekilns Rd
Boyd St
Littlebourne St
Oconnell Rd
3km
© 2008 Legals


Map
Photo
External Cordon Matches
Origin - Site 3
Heavy vehicles
01
0.00%
02
03
04
27.12%
05
8.47%
06
15
16
23.73%
13
14
0.00%
09
10
20.34%
Bathurst
Kelso
Mitchell Hwy (32)
Mid Western Hwy (32)
Great Western Hwy (32)
William St
Bentinck St
Havannah St
Rocket St
Pancrama Av
Vale Rd
Pit Straight
Mountain Straight
Conrod Straight
Gilmour St
Limekilns Rd
Boyd St
Littlebourne St
Ocurnell Rd
3km
© 2008 Nearmaps


External Cordon Matches
Origin - Site 5
Light Vehicles
01
0.96%
02
03
04
1.92%
05
68.05%
06
15
7.03%
16
2.88%
13
14
10
09
3.83%
Bathurst
Kelso
Mitchell Hwy (32)
Great Western Hwy (32)
Mid Western Hwy (32)
William St
Bentinck St
Havannah St
Rocket St
Panorama Av
Pit Straight
Mountain Straight
Conrod Straight
Gilmour St
Limeklins Rd
Boyd St
Lindsay St
Lambourne St
Gormans Hill Rd
3km
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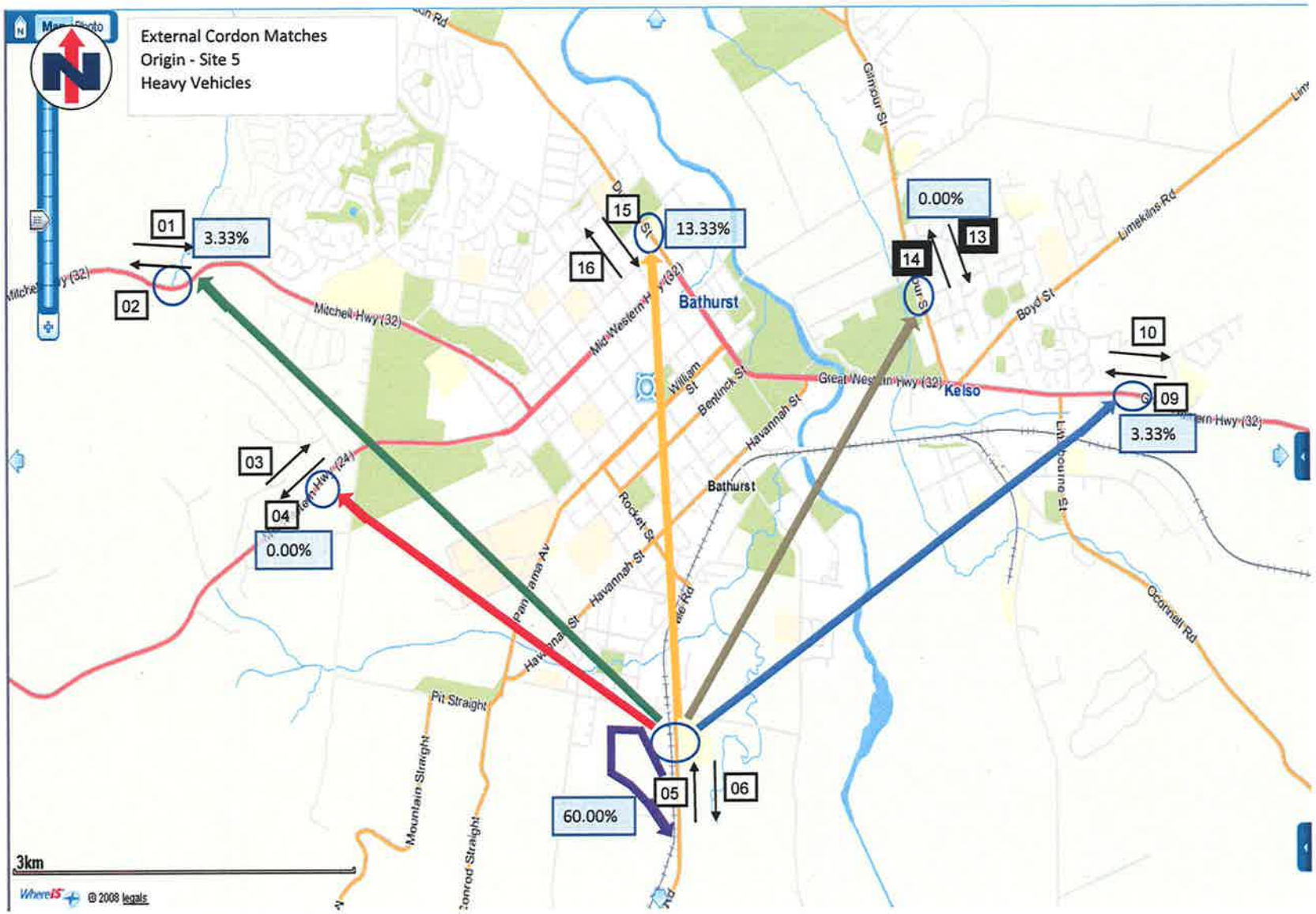
External Cordon Matches
Origin - Site 5
Heavy Vehicles
01
3.33%
02
03
04
0.00%
05
60.00%
06
15
13.33%
16
0.00%
13
14
10
09
3.33%
Bathurst
Kelso
Mitchell Hwy (32)
Great Western Hwy (32)
Havannah St
Rocket St
Pit Straight
Mountain Straight
Conrod Straight
Boyd St
Limekilns Rd
Gormans Hill Rd
3km
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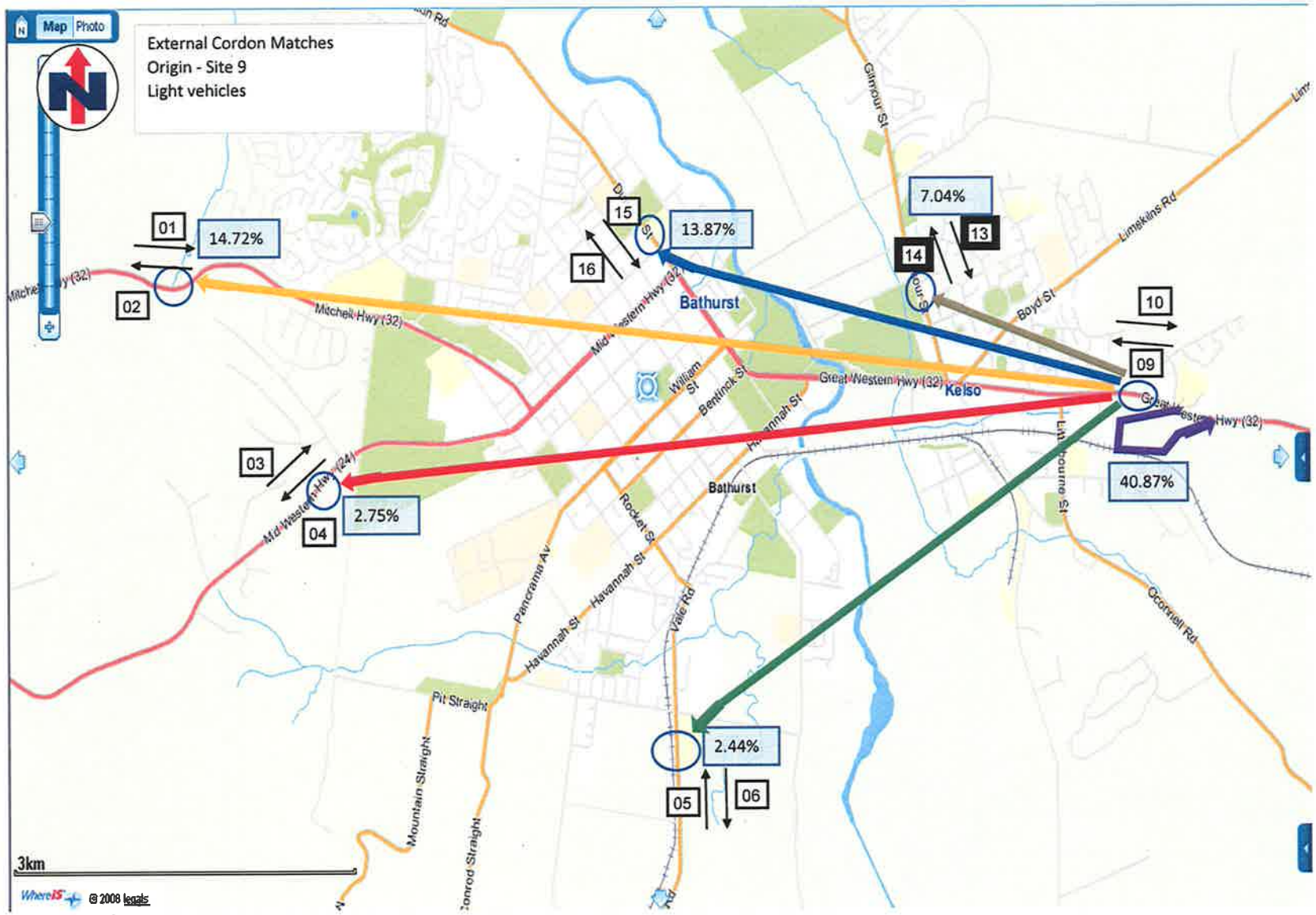
Map
Photo
External Cordon Matches
Origin - Site 9
Light vehicles
01
14.72%
02
15
13.87%
16
7.04%
13
14
10
09
40.87%
03
2.75%
04
2.44%
05
06
Bathurst
Kelso
Mitchell Hwy (32)
Great Western Hwy (32)
Boyd St
Limekilns Rd
Glenrowan St
William St
Bentinck St
Havannah St
Rocket St
Vale Rd
Pancrama Av
Pit Straight
Mountain Straight
Conrod Straight
Lithgow St
Mid Western Hwy (24)
3km
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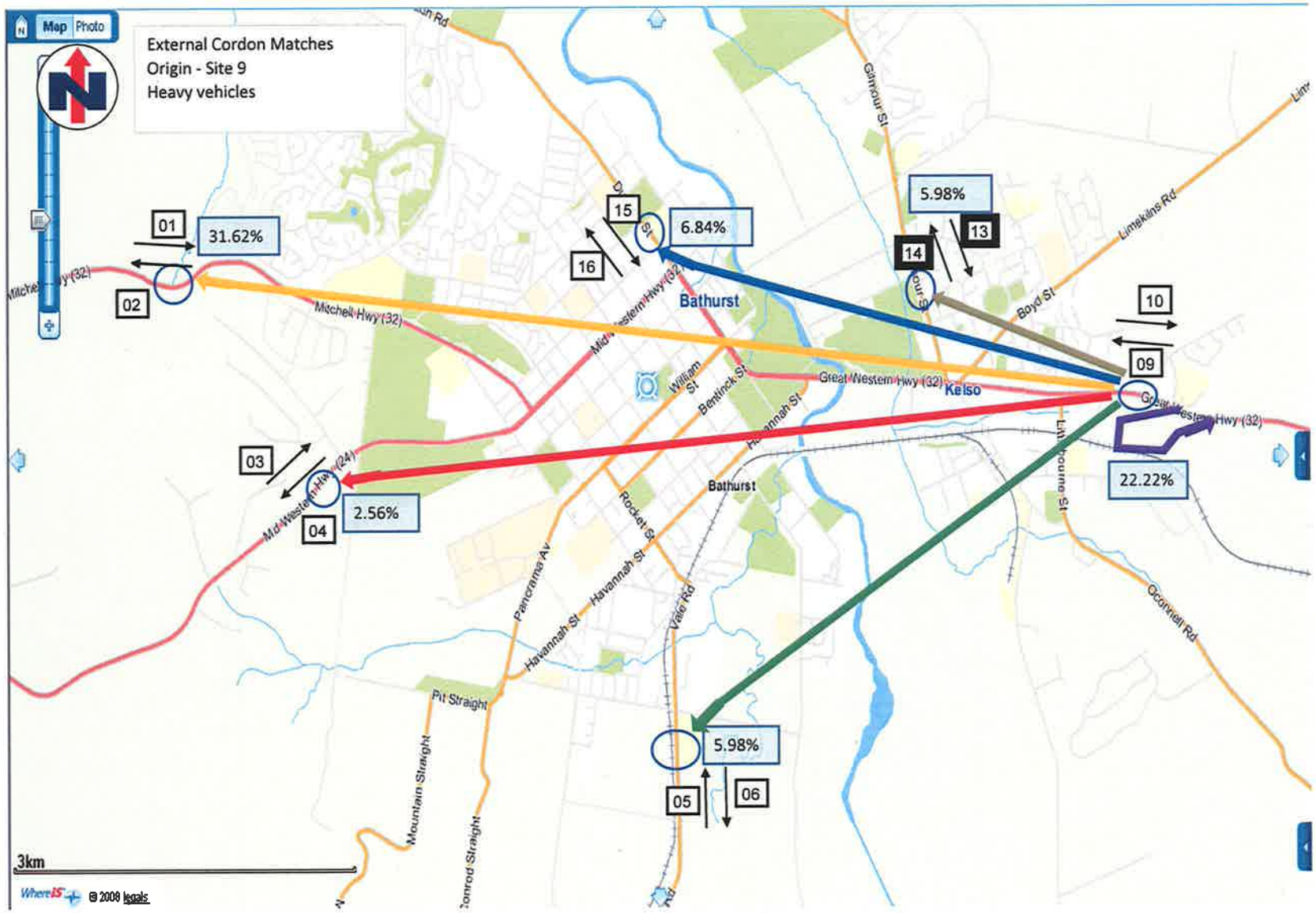
Map
Photo
External Cordon Matches
Origin - Site 9
Heavy vehicles
01
31.62%
02
03
2.56%
04
15
6.84%
16
5.98%
13
14
10
09
22.22%
05
5.98%
06
Bathurst
Kelso
Mitchell Hwy (32)
Great Western Hwy (32)
Mid Western Hwy (24)
William St
Bentinck St
Havannah St
Rocket St
Pancrama Av
Vale Rd
Pit Straight
Mountain Straight
Conrod Straight
Limekilns Rd
Boyd St
Gilmour St
Lithgow St
Ocotwell Rd
3km
WhereIS
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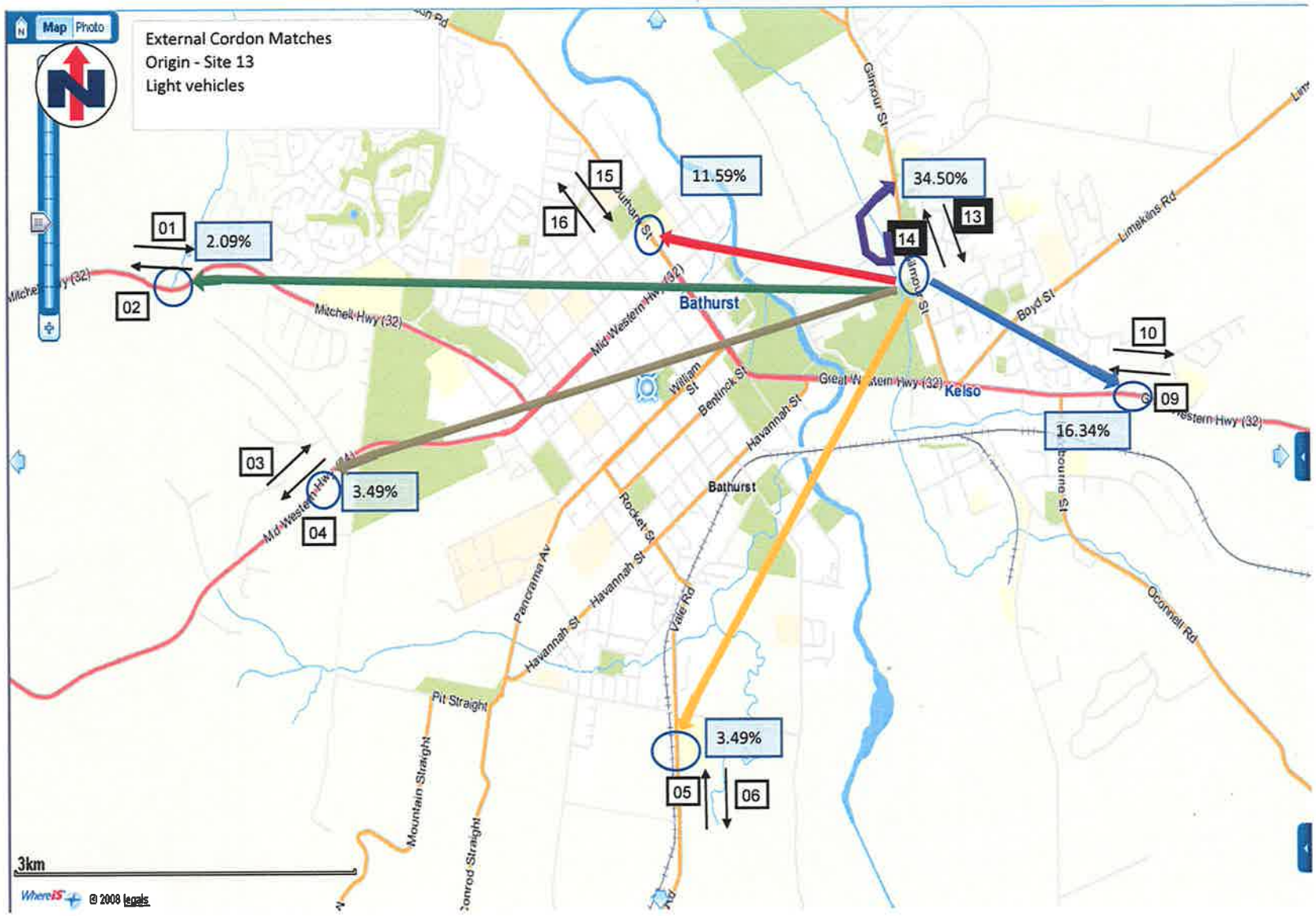
Map
Photo
External Cordon Matches
Origin - Site 13
Light vehicles
01
2.09%
02
15
16
11.59%
34.50%
13
14
10
09
16.34%
03
3.49%
04
3.49%
05
06
Bathurst
Kelso
Mitchell Hwy (32)
Mid Western Hwy (32)
Great Western Hwy (32)
William St
Bentinck St
Havannah St
Rocket St
Pancrama Av
Vale Rd
Pit Straight
Mountain Straight
Conrod Straight
Gilmour St
Limekilns Rd
Boyd St
Cornwall Rd
3km
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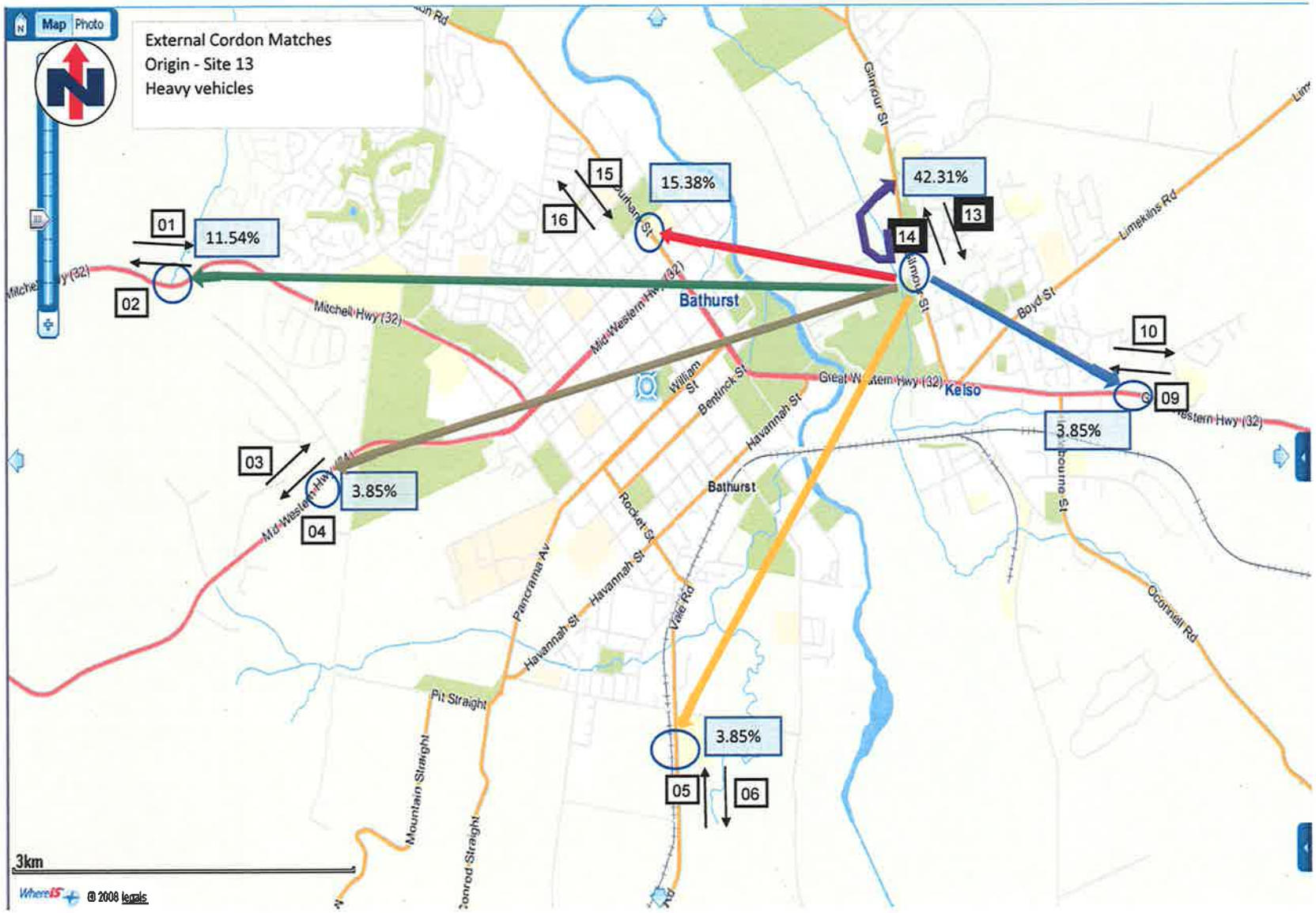
Map
Photo
External Cordon Matches
Origin - Site 13
Heavy vehicles
01
11.54%
02
15
16
15.38%
42.31%
13
14
10
09
3.85%
03
3.85%
04
05
3.85%
06
Bathurst
Kelso
Mitchell Hwy (32)
Mid Western Hwy (32)
Great Western Hwy (32)
William St
Bentinck St
Havannah St
Rocket St
Pit Straight
Mountain Straight
Conrod Straight
Panorama Av
Vale Rd
Limekilns Rd
Boyd St
Gilmour St
Durham St
Ocotmill Rd
3km
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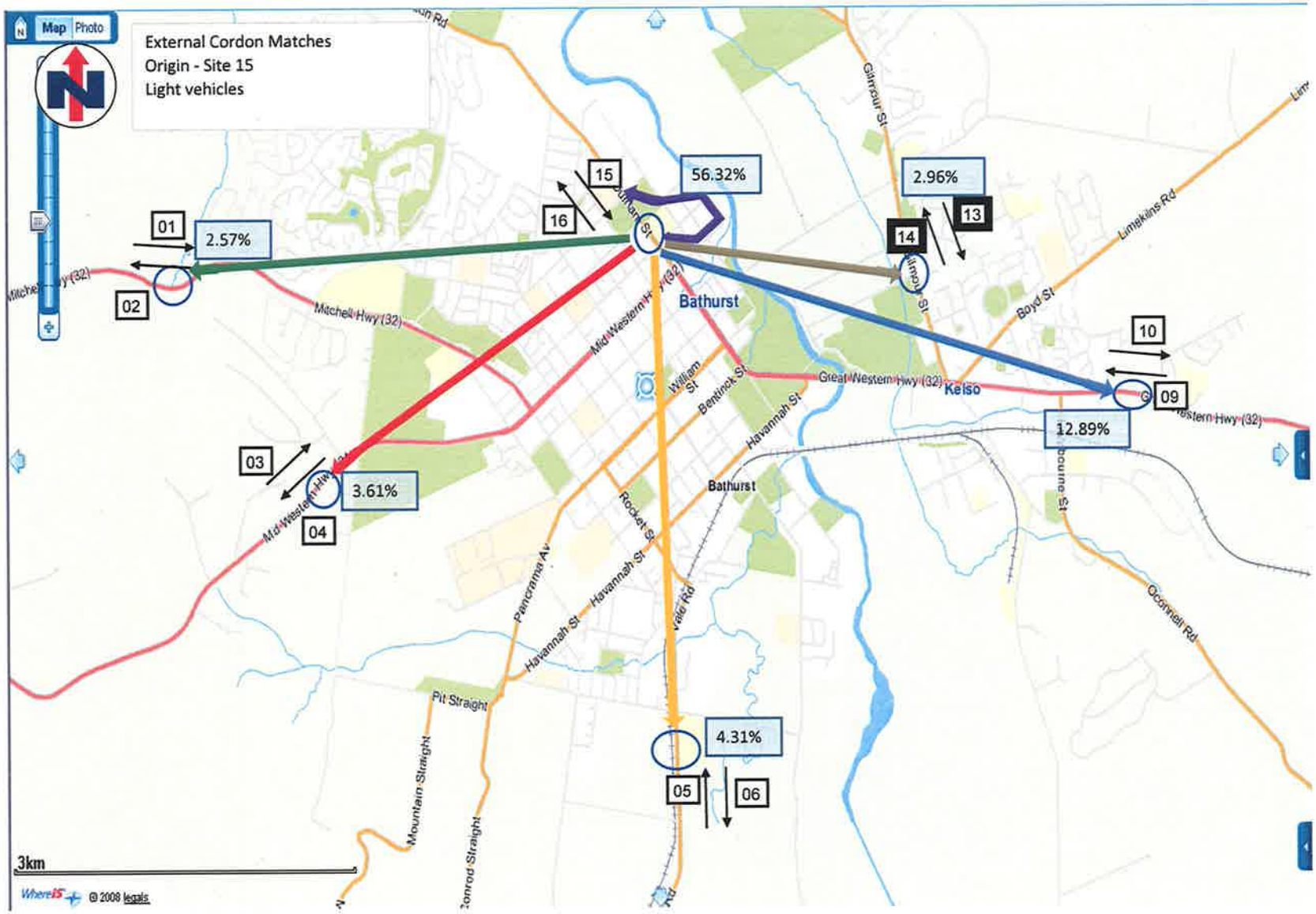
Map
Photo
External Cordon Matches
Origin - Site 15
Light vehicles
01
2.57%
02
03
3.61%
04
15
16
56.32%
2.96%
13
14
10
09
12.89%
05
4.31%
06
Bathurst
Kelso
Mitchell Hwy (32)
Mid Western Hwy (32)
Great Western Hwy (32)
William St
Bentinck St
Havannah St
Rocket St
Pit Straight
Mountain Straight
Conrod Straight
Pancrama Av
Vaila Rd
Gilmour St
Limekilns Rd
Boyd St
Gormans Rd
3km
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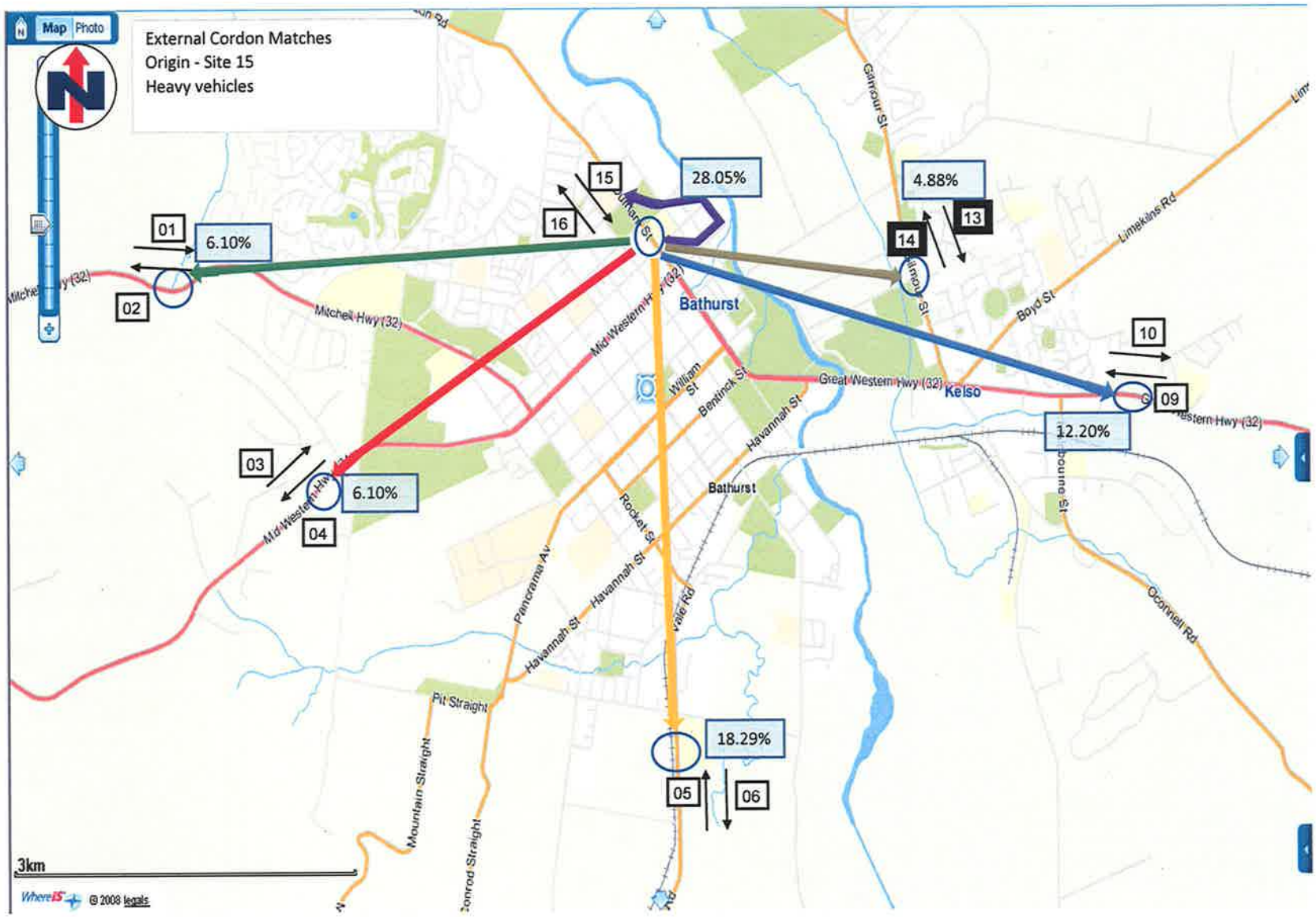
Map
Photo
External Cordon Matches
Origin - Site 15
Heavy vehicles
01
6.10%
02
03
6.10%
04
05
18.29%
06
09
12.20%
10
13
4.88%
14
15
16
28.05%
Bathurst
Kelso
Mitchell Hwy (32)
Great Western Hwy (32)
Mid Western Hwy (32)
William St
Bentinck St
Havannah St
Rocket St
Panorama Av
Vale Rd
Pit Straight
Mountain Straight
Conrod Straight
Gilmour St
Limekilns Rd
Boyd St
O'connell Rd
3km
WhereIS
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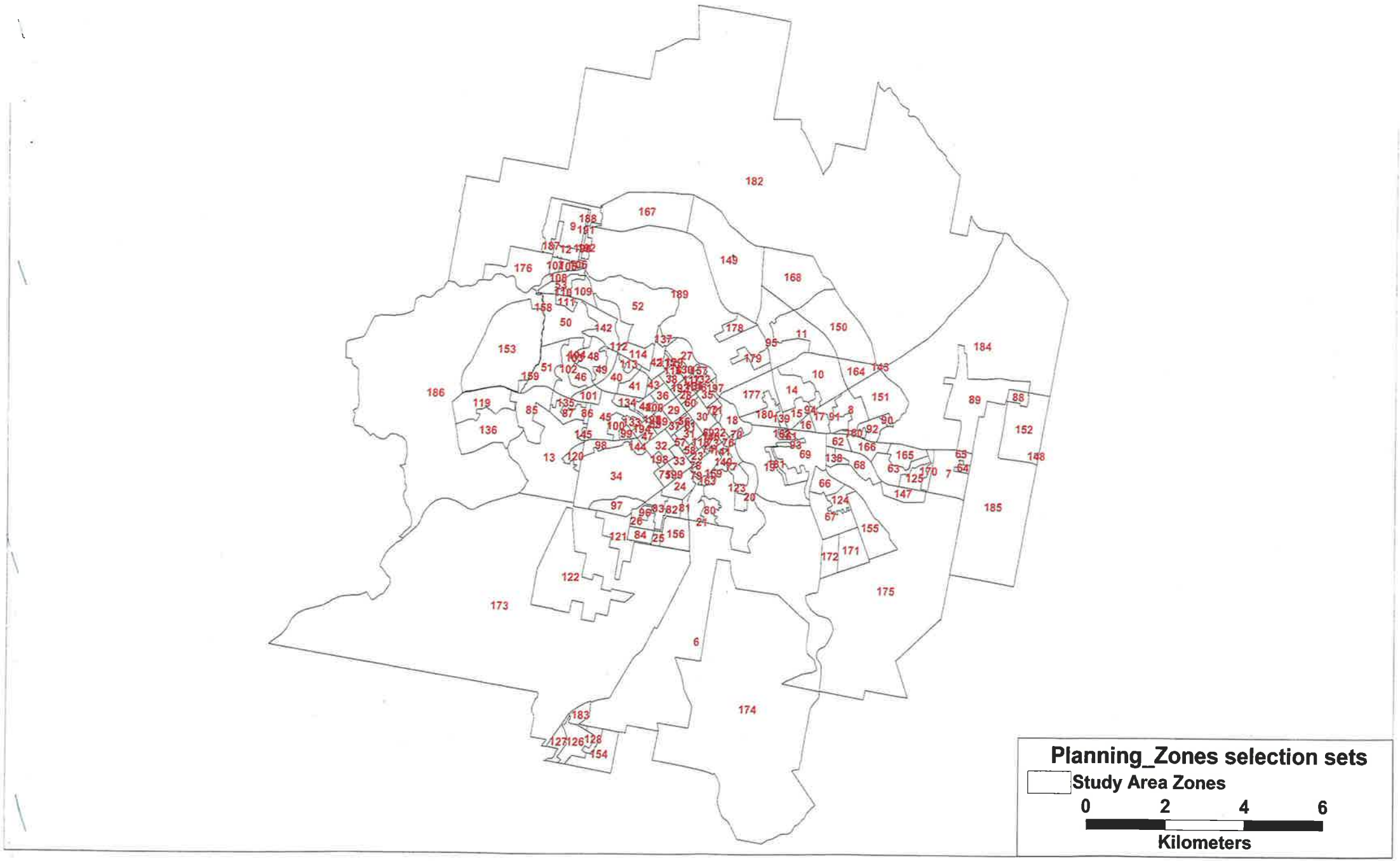
Appendix C

Existing and future
population and employment
+ zone map


Planning_Zones selection sets
Study Area Zones
0 2 4 6
Kilometers

TOD UNIQUE ID	CURRENT DWELLINGS	PROJECTED (2020) DWELLING	PROJECTED (2030) DWELLING	PROJECTED (2040) DWELLING	PROJECTED (2050) DWELLINGS	MAXIMUM DWELLINGS UNDER CURRENT PROVISIONS	CURRENT POPULATION	PROJECTED (2020) POPULATION	PROJECTED (2030) POPULATION	PROJECTED (2040) POPULATION	PROJECTED (2050) POPULATION	PRESENT GROSS FLOOR AREA (GFA)	PROJECTED (2020) GFA	PROJECTED (2030) GFA	PROJECTED (2040) GFA	PROJECTED (2050) GFA	MAXIMUM GFA
0																	
1																	
2																	
3																	
4																	
5																	
6	60.934	60.934	60.934	60.934	60.934	62.889	182.801	182.801	182.801	182.801	182.801						
7	469.364	469.364	469.364	469.364	469.364	965.770	1408.093	1408.093	1408.093	1408.093	1408.093						
8	0.000	249.960	249.960	249.960	249.960	514.320	0.000	749.879	749.879	749.879	749.879						
9	311.302	311.302	311.302	311.302	311.302	640.546	933.907	933.907	933.907	933.907	933.907						
10	585.392	585.392	585.392	585.392	585.392	1204.510	1756.176	1756.176	1756.176	1756.176	1756.176						
11	0.000	465.603	465.603	465.603	465.603	958.030	0.000	1396.808	1396.808	1396.808	1396.808						
12	154.733	154.733	154.733	154.733	154.733	318.380	464.198	464.198	464.198	464.198	464.198						
13	107.811	107.811	107.811	107.811	107.811	277.252	323.433	323.433	323.433	323.433	323.433						
14	338.674	338.674	338.674	338.674	338.674	696.845	1016.022	1016.022	1016.022	1016.022	1016.022						
15	148.604	148.604	148.604	148.604	148.604	305.770	445.813	445.813	445.813	445.813	445.813						
16	71.150	71.150	71.150	71.150	71.150	146.400	213.451	213.451	213.451	213.451	213.451						
17	144.084	144.084	144.084	144.084	144.084	296.470	432.253	432.253	432.253	432.253	432.253						
18																	
19	8.506	8.506	8.506	8.506	8.506	8.751	25.517	25.517	25.517	25.517	25.517						
20	8.496	8.496	8.496	8.496	8.496	8.740	25.487	25.487	25.487	25.487	25.487						
21												13.833	13.833	13.833	13.833	13.833	79.165
22																	
23	104.111	108.775	112.606	117.111	121.795	321.330	312.333	365.385	365.385	365.385	365.385						
24	183.300	183.300	183.300	183.300	183.300	377.160	549.899	549.899	549.899	549.899	549.899						
25	0.418	0.418	0.418	0.418	0.000	0.000	1.254	1.254	1.254	1.254	1.254						
26	1.217	1.217	1.217	1.217	1.217	0.000	3.651	3.651	3.651	3.651	3.651						
27	2.088	2.088	2.088	2.088	2.088	2.149	6.265	6.265	6.265	6.265	6.265						
28	104.091	108.755	112.585	117.089	121.772	321.270	312.274	365.317	365.317	365.317	365.317						
29	209.806	218.598	226.516	236.053	245.444	647.530	629.419	738.331	738.331	738.331	738.331						
30																	
31												16.910	17.268	17.593	17.943	18.304	67.605
32	342.323	356.324	370.479	385.292	400.704	1057.173	1027.569	1202.111	1202.111	1202.111	1202.111	10.375	10.583	10.794	11.010	11.235	41.500
33	260.039	270.441	281.258	292.509	304.209	802.590	780.117	912.627	912.627	912.627	912.627						
34												50.386	50.386	50.386	50.386	50.386	N/A
35	189.668	197.253	205.143	213.349	221.883	585.090	569.999	665.648	665.648	665.648	665.648						
36	104.116	104.116	104.116	104.116	104.116	214.230	312.347	312.347	312.347	312.347	312.347						
37	91.232	94.881	98.676	102.624	106.728	281.580	273.696	320.185	320.185	320.185	320.185						
38	78.781	78.781	78.781	78.781	78.781	162.100	236.342	236.342	236.342	236.342	236.342						
39	143.090	150.894	158.930	163.207	169.735	447.810	435.271	509.206	509.206	509.206	509.206						
40	197.311	197.311	197.311	197.311	197.311	405.990	591.933	591.933	591.933	591.933	591.933						
41	170.100	170.100	170.100	170.100	170.100	350.000	510.300	510.300	510.300	510.300	510.300						
42	135.390	135.390	135.390	135.390	135.390	278.580	406.170	406.170	406.170	406.170	406.170						
43	60.580	60.580	60.580	60.580	60.580	124.630	181.740	181.740	181.740	181.740	181.740						
44	108.942	108.942	108.942	108.942	108.942	224.160	326.825	326.825	326.825	326.825	326.825						
45																	
46	132.440	132.440	132.440	132.440	132.440	272.510	397.320	397.320	397.320	397.320	397.320						
47	107.666	112.309	116.801	121.473	126.332	333.300	323.998	374.996	374.996	374.996	374.996						
48	218.034	218.034	218.034	218.034	218.034	448.630	654.101	654.101	654.101	654.101	654.101						
49	124.712	124.712	124.712	124.712	124.712	256.610	374.137	374.137	374.137	374.137	374.137						
50	0.000	585.037	585.037	585.037	585.037	1203.780	0.000	1755.111	1755.111	1755.111	1755.111						
51	0.000	334.393	334.393	334.393	334.393	688.050	0.000	1003.177	1003.177	1003.177	1003.177						
52	10.500	10.500	10.500	10.500	10.500	10.802	31.499	31.499	31.499	31.499	31.499						
53	0.000	125.014	125.014	125.014	125.014	257.230	0.000	375.042	375.042	375.042	375.042						
54																	
55												1.144	1.165	1.192	1.220	1.248	5.352
56												3.502	3.572	3.642	3.716	3.791	14.008
57	80.375	83.590	86.933	90.411	94.027	248.070	241.124	282.081	282.081	282.081	282.081						
58	73.833	76.786	79.858	83.053	86.376	227.880	221.499	259.123	259.123	259.123	259.123						
59												1.400	1.428	1.457	1.486	1.515	5.600
60	91.047	94.689	98.477	102.416	106.512	281.010	273.142	319.537	319.537	319.537	319.537						
61																	
62												4.283	4.283	4.281	4.283	4.281	21.415
63												0.636	0.636	0.636	0.636	0.636	3.182
64																	
65												20.918	20.918	20.918	20.918	20.918	104.591
66	1.842	1.842	1.842	1.842	1.842	0.000	5.526	5.526	5.526	5.526	5.526						
67	30.567	30.567	30.567	30.567	30.567	78.620	91.702	91.702	91.702	91.702	91.702						
68																	
69												2.025	2.025	2.025	2.025	2.025	10.125
70												3.422	3.422	3.422	3.422	3.422	17.112
71	50.583	52.606	54.710	56.899	59.175	156.120	151.749	177.524	177.524	177.524	177.524						
72	80.443	83.660	87.007	90.487	94.107	248.280	241.329	282.320	282.320	282.320	282.320						
73												1.996	2.035	2.079	2.118	2.160	7.982
74	73.595	80.699	83.926	87.284	90.775	229.490	232.784	272.325	272.325	272.325	272.325						
75												1.478	1.507	1.537	1.568	1.599	5.920
76	45.742	47.572	49.475	51.454	53.512	141.185	137.227	160.536	160.536	160.536	160.536	3.538	3.538	3.538	3.538	3.538	N/A
77	7.596	7.596	7.596	7.596	7.596	15.692	22.789	22.789	22.789	22.789	22.789						
78	12.247	12.247	12.247	12.247	12.247	25.200	36.742	36.742	36.742	36.742	36.742						
79	4.466	4.466	4.466	4.466	4.466	9.180	13.399	13.399	13.399	13.399	13.399						
80	1.172	1.172	1.172	1.172	1.172	1.205	3.515	3.515	3.515	3.515	3.515						
81																	
82	105.613	105.613	105.613	105.613	105.613	217.310	316.838	316.838	316.838	316.838	316.838	2.057	2.057	2.057	2.057	2.057	10.284
83	127.755	127.755	127.755	127.755	127.755	262.870	383.264	383.264	383.264	383.264	383.264						
84																	
85	4.080	4.080	4.080	4.080	4.080	0.000	12.239	12.239	12.239	12.239	12.239						
86	28.718	28.718	28.718	28.718	28.718	59.090	86.153	86.153	86.153	86.153	86.153						
135												4.185	4.130	4.130	4.130	4.130	20.650
114												7.347	7.347	7.347	7.347	7.347	36.735
88												39.336	39.336	39.336	39.336	39.336	N/A
90	31.255	31.255	31.255	31.255	31.253	64.310	93.764	93.764	93.764	93.764	93.764						
91	167.884	167.884	167.884	167.884	167.884	345.440	503.652	503.652	503.652	503.652	503.652						
92	128.489	128.489	128.489	128.489	128.489	264.380	385.466	385.466	385.466	385.466	385.466						
125												5.971	5.971	5.971	5.971	5.971	29.853
94												0.834	0.851	0.870	0.887	0.905	3.344
95	542.444	542.444	542.444	542.444	542.444	1116.140	1627.332	1627.332	1627.332	1627.332	1627.332						
96												1.542	1.645	1.645	1.645	1.645	N/A
97																	
98																	
131												0.377	0.377	0.377	0.377	0.377	1.885
100												4.185	4.185	4.185	4.185	4.185	N/A
101												4.730	4.730	4.730	4.730	4.730	N/A
102	289.005	289.005	289.005	289.005	289.005	594.660	867.014	867.014	867.014	867.014	867.014						
103																	
104												0.000	0.955	0.974	0.994	1.013	4.820
105	0.000	4.410	4.410	4.410	4.410	11.383	0.000	13.230	13.230	13.230	13.230	2.833	2.917	3.004	3.412	3.460	5.327
106	1.274	1.274	1.274	1.274	1.274	3.276	3.821	3.821	3.821	3.821	3.821						
107	0.433	0.433	0.433	0.433	0.433	0.445	1.298	1.298	1.298	1.298	1.298						
108	1.082	1.082	1.082	1.082	1.082	1.113	3.245	3.245	3.245	3.245	3.245						

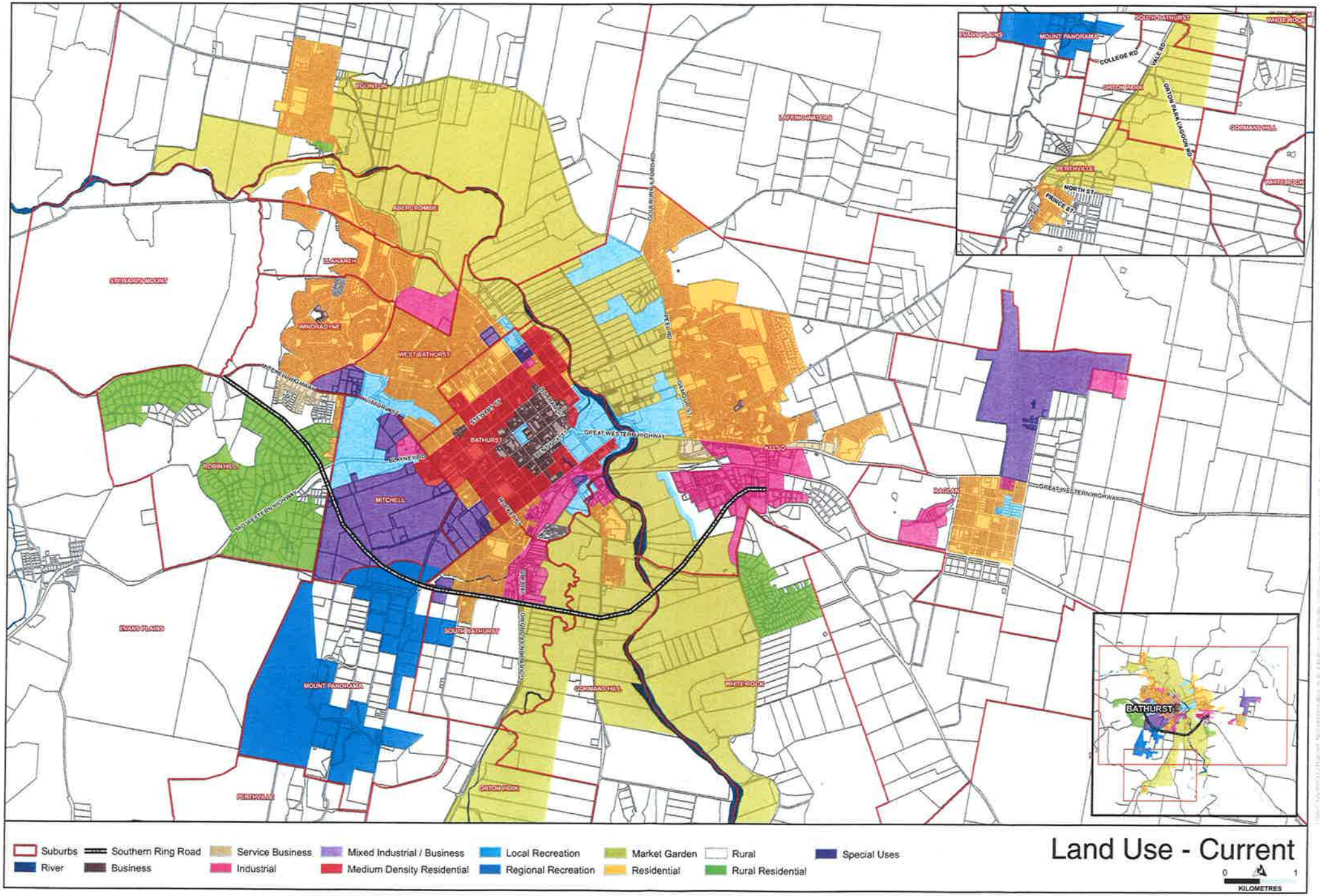
TOD UNIQUE ID	CURRENT DWELLINGS	PROJECTED (2020) DWELLING	PROJECTED (2030) DWELLING	PROJECTED (2040) DWELLING	PROJECTED (2050) DWELLINGS	MAXIMUM DWELLINGS UNDER CURRENT PROVISIONS	CURRENT POPULATION	PROJECTED (2020) POPULATION	PROJECTED (2030) POPULATION	PROJECTED (2040) POPULATION	PROJECTED (2050) POPULATION	PRESENT GROSS FLOOR AREA (GFA)	PROJECTED (2020) GFA	PROJECTED (2030) GFA	PROJECTED (2040) GFA	PROJECTE D (2050) GFA	MAXIMUM GFA
109	148 779	148 779	148 779	148 779	148 779	306 130	446 338	446 338	446 338	446 338	446 338						
110	25 559	25 559	25 559	25 559	25 559	52 590	76 676	76 676	76 676	76 676	76 676						
111	72 054	72 054	72 054	72 054	72 054	148 260	216 163	216 163	216 163	216 163	216 163						
112	186 503	186 503	186 503	186 503	186 503	383 750	559 508	559 508	559 508	559 508	559 508						
113	56 293	56 293	56 293	56 293	56 293	115 830	168 880	168 880	168 880	168 880	168 880						
114												3 305	3 305	3 305	3 305	3 305	18 525
115	28 280	28 280	28 280	28 280	28 280	58 195	84 841	84 841	84 841	84 841	84 841						
116												1 090	1 090	1 090	1 090	1 090	N/A
117												1 009	1 009	1 009	1 009	1 009	N/A
118												4 757	4 542	4 428	4 517	4 607	17 026
119	34 927	34 927	34 927	34 927	34 927	89 834	104 782	104 782	104 782	104 782	104 782						
120	0 000	7 542	7 542	7 542	7 542	18 397	0 000	22 625	22 625	22 625	22 625						
121																	
122																	
123	149 921	149 921	149 921	149 921	149 921	308 480	449 764	449 764	449 764	449 764	449 764						
124	0 000	11 278	11 278	11 278	11 278	29 007	0 000	33 834	33 834	33 834	33 834						
125												0 000	0 000	0 282	0 282	0 282	1 410
126	257 847	257 847	257 847	257 847	257 847	535 550	773 542	773 542	773 542	773 542	773 542						
127	1 200	1 200	1 200	1 200	1 200	0 000	3 599	3 599	3 599	3 599	3 599						
128	0 000	75 364	75 364	75 364	75 364	155 070	0 000	226 092	226 092	226 092	226 092						
129	25 228	25 228	25 228	25 228	25 228	51 910	75 685	75 685	75 685	75 685	75 685						
130																	
131												0 000	0 000	31 750	31 750	31 750	158 748
132	91 436	91 293	88 897	102 853	106 567	242 210	274 308	320 902	320 902	320 902	320 902						
133	50 432	50 432	50 432	50 432	50 432	103 770	151 297	151 297	151 297	151 297	151 297						
134	96 884	96 884	96 884	96 884	96 884	199 350	290 652	290 652	290 652	290 652	290 652						
140												0 000	0 000	0 928	1 857	1 857	9 283
136	0 000	50 740	50 740	50 740	50 740	130 504	0 000	152 220	152 220	152 220	152 220						
137	0 531	0 531	0 531	0 531	0 531	0 546	1 592	1 592	1 592	1 592	1 592						
138												0 000	0 000	10 730	10 730	10 730	53 650
139	37 947	37 947	37 947	37 947	37 947	78 080	113 841	113 841	113 841	113 841	113 841						
140																	
141												0 462	0 462	0 462	0 462	0 462	N/A
142	272 238	272 238	272 238	272 238	272 238	560 160	816 713	816 713	816 713	816 713	816 713						
143	0 058	0 054	0 054	0 054	0 058	0 009	0 174	0 174	0 174	0 174	0 174						
144	108 448	112 784	117 295	121 987	126 867	264 710	325 338	380 600	380 600	380 600	380 600						
145	17 865	17 865	17 865	17 865	17 865	36 760	53 596	53 596	53 596	53 596	53 596						
146	26 305	27 357	28 343	29 477	30 656	80 350	78 915	91 969	91 969	91 969	91 969						
147												0 000	0 000	1 534	1 534	1 534	7 668
63												0 000	10 565	10 565	10 565	10 565	52 826
149	0 000	0 000	0 000	342 368	684 736	3291 670	0 000	0 000	0 000	1027 104	2054 209						
150	0 000	0 000	0 000	195 144	390 289	1878 200	0 000	0 000	0 000	585 433	1170 866						
151	0 000	0 000	0 000	117 407	234 814	1129 800	0 000	0 000	0 000	352 221	704 443						
68												0 000	8 585	8 565	8 565	8 565	42 825
153	0 000	0 000	0 000	331 733	663 466	3189 420	0 000	0 000	0 000	995 199	1990 398						
154	0 000	0 000	0 000	70 850	140 699	676 470	0 000	0 000	0 000	212 049	422 097						
155	0 000	0 000	11 895	23 790	36 001	92 594	0 000	0 000	35 841	71 281	108 007						
93												0 000	7 029	7 029	7 029	7 029	35 144
157	67 018	68 780	72 488	76 388	78 451	206 850	201 052	235 210	235 210	235 210	235 210						
158	0 000	12 014	12 014	12 014	12 014	34 720	0 000	36 042	36 042	36 042	36 042						
159	0 000	5 754	5 754	5 754	5 754	11 840	0 000	17 263	17 263	17 263	17 263						
161												0 000	0 000	0 453	0 907	0 907	4 534
162												0 000	0 000	0 451	0 901	0 901	4 503
166												0 000	0 000	3 810	7 618	7 618	38 090
147												0 000	7 163	7 163	7 163	7 163	35 814
164	0 000	0 000	0 000	46 429	92 858	446 380	0 000	0 000	0 000	139 295	278 589						
165																	
67												0 000	3 690	3 690	3 690	3 690	18 448
167	0 000	0 000	0 000	203 611	407 223	1957 605	0 000	0 000	0 000	610 832	1221 665						
168	0 000	0 000	0 000	192 959	385 918	1855 190	0 000	0 000	0 000	578 877	1157 758						
169	0 175	0 175	0 175	0 175	0 180	0 525	0 525	0 525	0 525	0 525	0 525						
170	0 704	0 704	0 704	0 704	0 000	2 117	2 112	2 112	2 112	2 112	2 112						
171	0 000	0 000	8 053	16 105	24 402	62 752	0 000	0 000	24 158	48 316	73 206						
172	2 053	2 058	2 058	2 058	2 058	0 000	6 174	6 174	6 174	6 174	6 174						
173	150 277	150 277	150 277	150 277	150 277	0 000	450 830	450 830	450 830	450 830	450 830						
174	83 783	83 783	83 783	83 783	83 783	0 000	251 349	251 349	251 349	251 349	251 349						
175	60 651	60 651	60 651	60 651	60 651	0 000	181 954	181 954	181 954	181 954	181 954						
176	5 363	5 363	5 363	5 361	5 363	5 517	16 089	16 089	16 089	16 089	16 089						
177	4 296	4 296	4 296	4 296	4 296	8 430	12 888	12 888	12 888	12 888	12 888						
178																	
179																	
180																	
181																	
182	240 222	240 222	240 222	240 222	240 222	0 000	720 667	720 667	720 667	720 667	720 667						
183	1 075	1 075	1 075	1 075	1 075	1 106	3 226	3 226	3 226	3 226	3 226						
184	56 854	56 854	56 854	56 854	56 854	0 000	170 562	170 562	170 562	170 562	170 562						
185	29 084	29 084	29 084	29 084	29 084	0 000	87 253	87 253	87 253	87 253	87 253						
186	73 427	73 427	73 427	73 427	73 427	0 000	220 281	220 281	220 281	220 281	220 281						
187	0 000	0 000	303 512	303 512	303 512	624 518	0 000	0 000	910 536	910 536	910 536						
188	0 000	11 193	11 193	11 193	11 193	23 030	0 000	33 578	33 578	33 578	33 578						
189	37 440	37 440	37 440	37 440	37 440	38 518	112 321	112 321	112 321	112 321	112 321						
190	23 415	23 415	23 415	23 415	23 415	48 180	70 246	70 246	70 246	70 246	70 246						
191	0 000	0 000	4 955	4 955	4 955	9 990	0 000	0 000	14 565	14 565	14 565						
192	0 000	0 000	49 766	49 766	49 766	102 400	0 000	0 000	149 299	149 299	149 299						
193	104 082	104 082	104 082	104 082	104 082	214 160	312 245	312 245	312 245	312 245	312 245						
194	107 061	107 061	107 061	107 061	107 061	220 290	321 183	321 183	321 183	321 183	321 183						
195	92 355	92 355	92 355	92 355	92 355	190 030	277 064	277 064	277 064	277 064	277 064						
196	62 427	62 427	62 427	62 427	62 427	128 450	187 280	187 280	187 280	187 280	187 280						
197	113 262	113 262	113 262	113 262	113 262	233 050	339 787	339 787	339 787	339 787	339 787						
198	210 039	210 039	210 039	210 039	210 039	433 180	630 118	630 118	630 118	630 118	630 118						
199	141 791	141 791	141 791	141 791	141 791	291 750	425 372	425 372	425 372	425 372	425 372						
200	51 944	54 021	56 182	58 430	60 767	160 320	155 831	162 300	162 300	162 300	162 300						

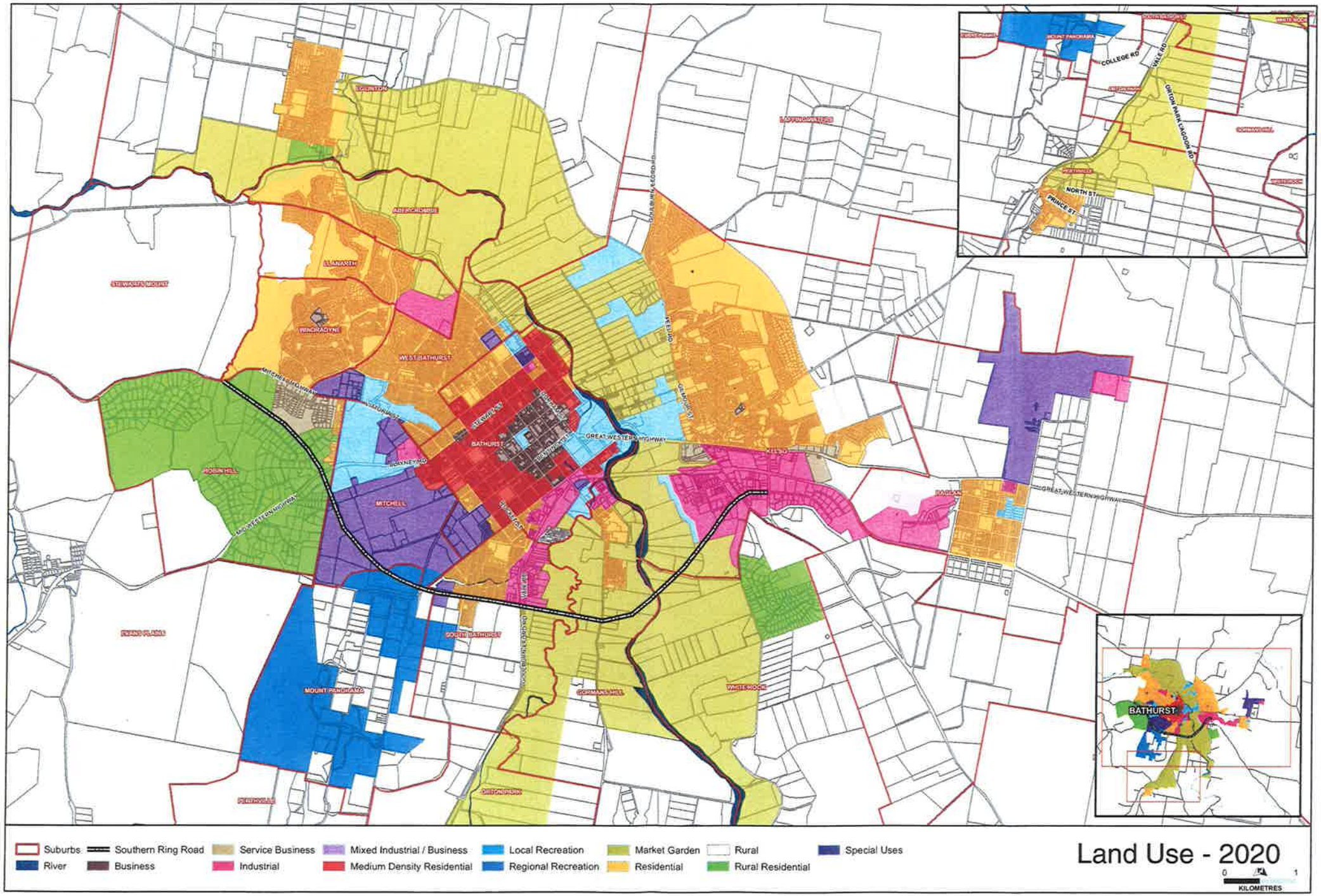
Appendix D

Existing and future land use plans

PARSONS BRINCKERHOFF

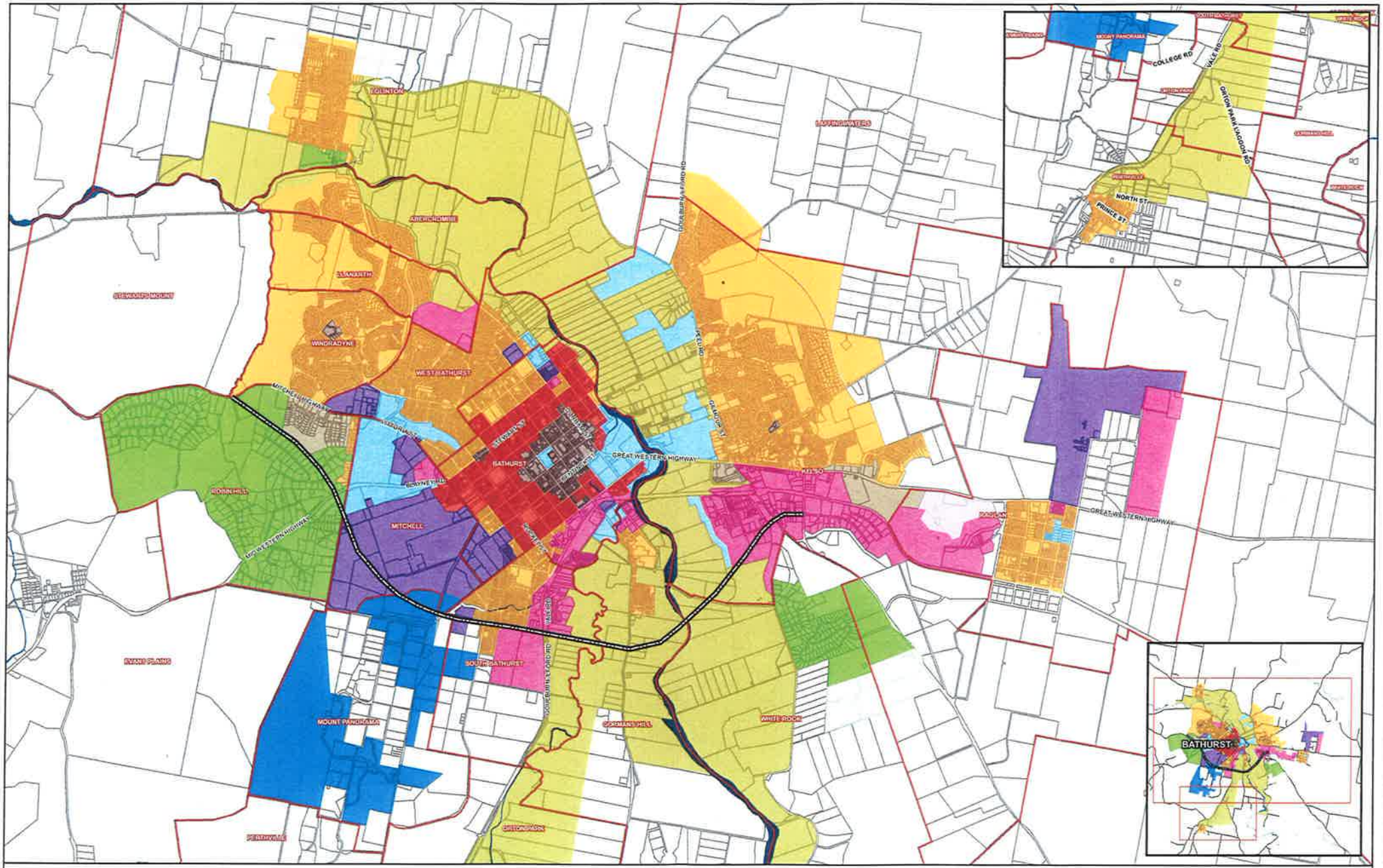
Bathurst Regional Council




COLLEGE RD
NORTH ST
PRINCE ST
GREAT WESTERN HIGHWAY
BATHURST
KELSO
RAGLAN
WEST BATHURST
LLANARTH
WINDRADYNE
ABERCROMBIE
LEWIS RIDGE
MOUNT PANORAMA
GORMANS HILL
WHITE ROCK
PERTHVILLE
ORTON PARK
SOUTH BATHURST
MITCHELL
ROBIN HILL
BURNEY RD
STEWARTS MOUNT
Suburbs
River
Southern Ring Road
Business
Service Business
Industrial
Mixed Industrial / Business
Medium Density Residential
Local Recreation
Regional Recreation
Market Garden
Residential
Rural
Rural Residential
Special Uses
Land Use - 2020
0
1
KILOMETRES

PARSONS BRINCKERHOFF

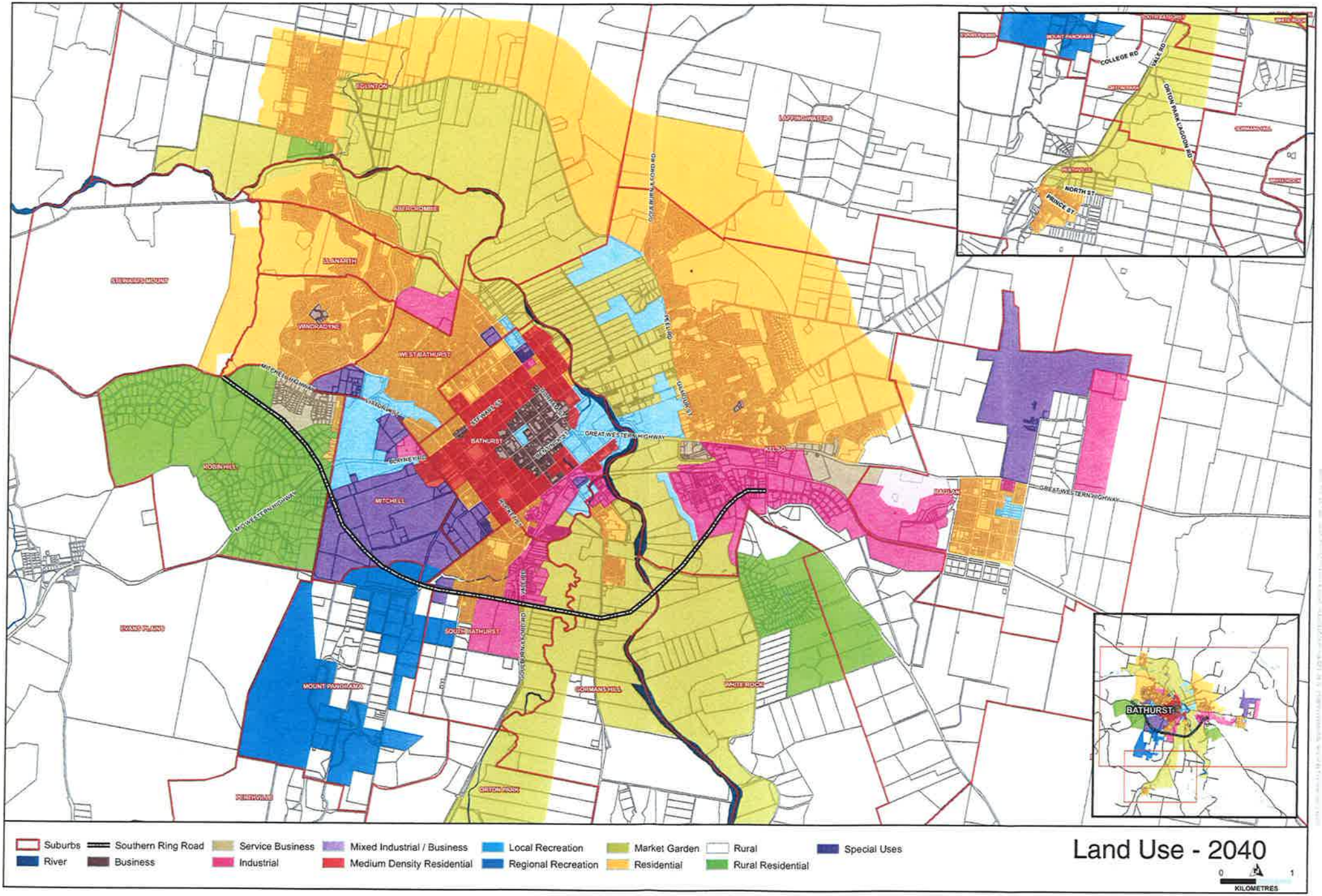
Bathurst Regional Council



Land Use - 2030

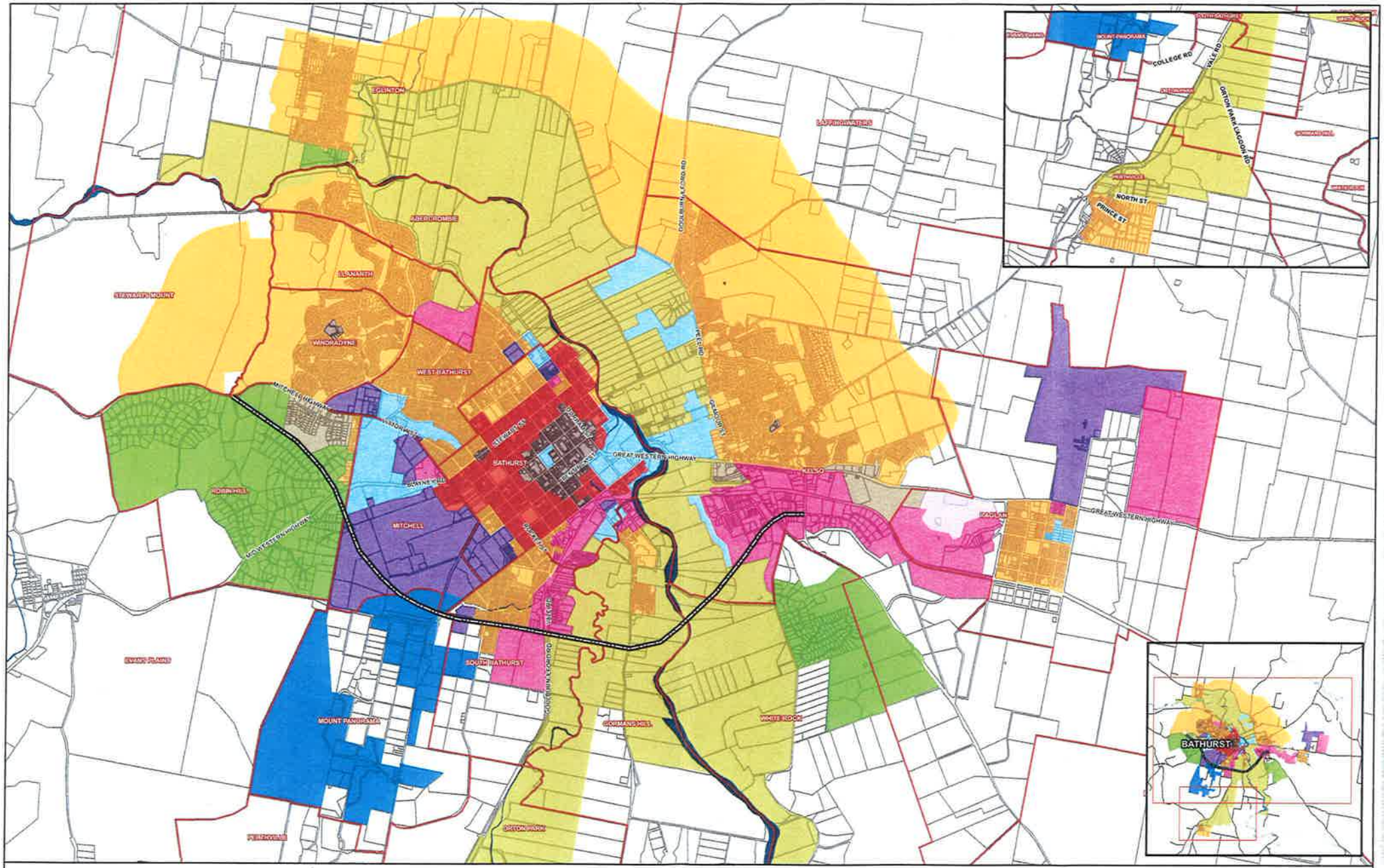
PARSONS BRINCKERHOFF

Bathurst Regional Council



PARSONS BRINCKERHOFF

Bathurst Regional Council



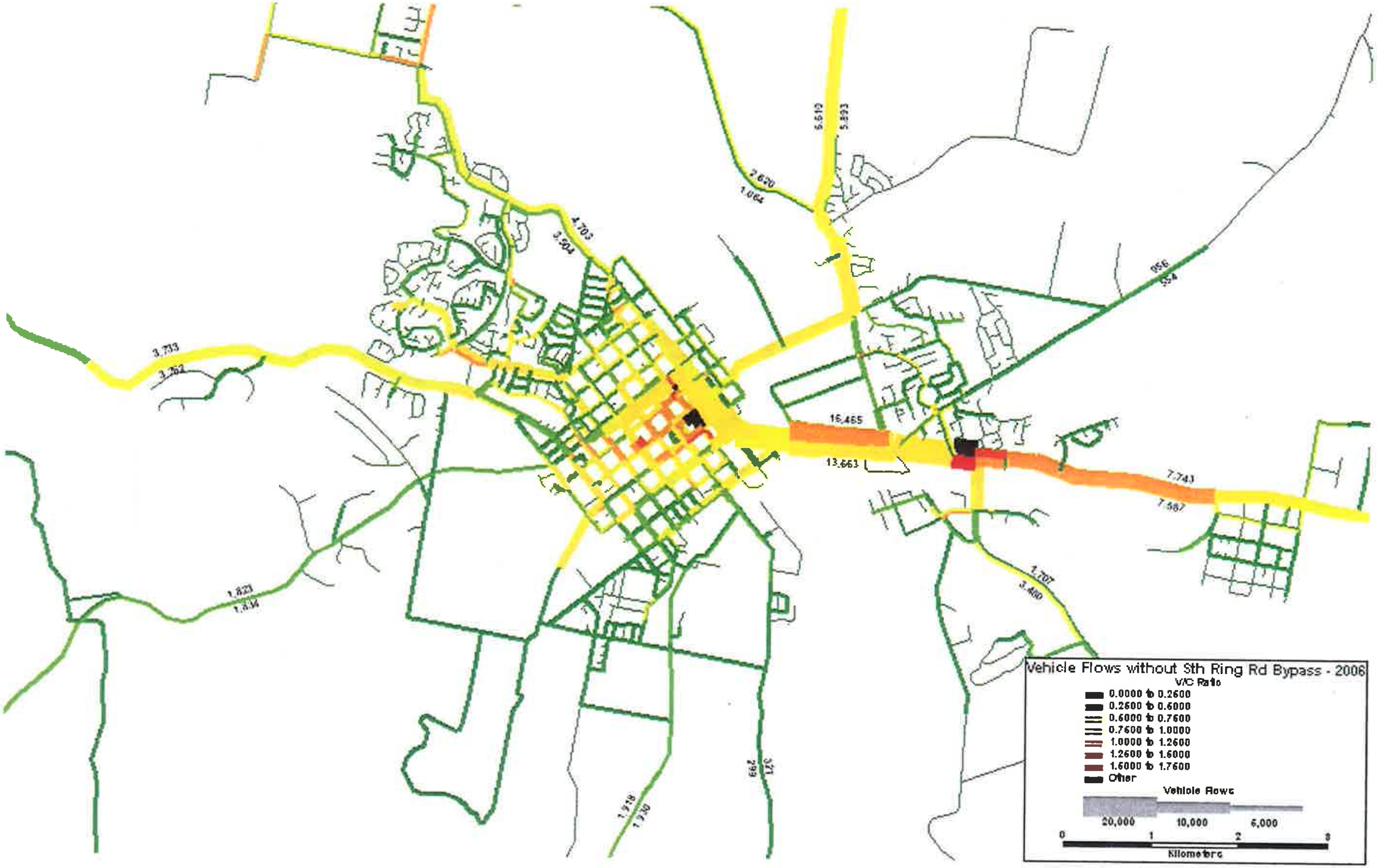
Appendix E

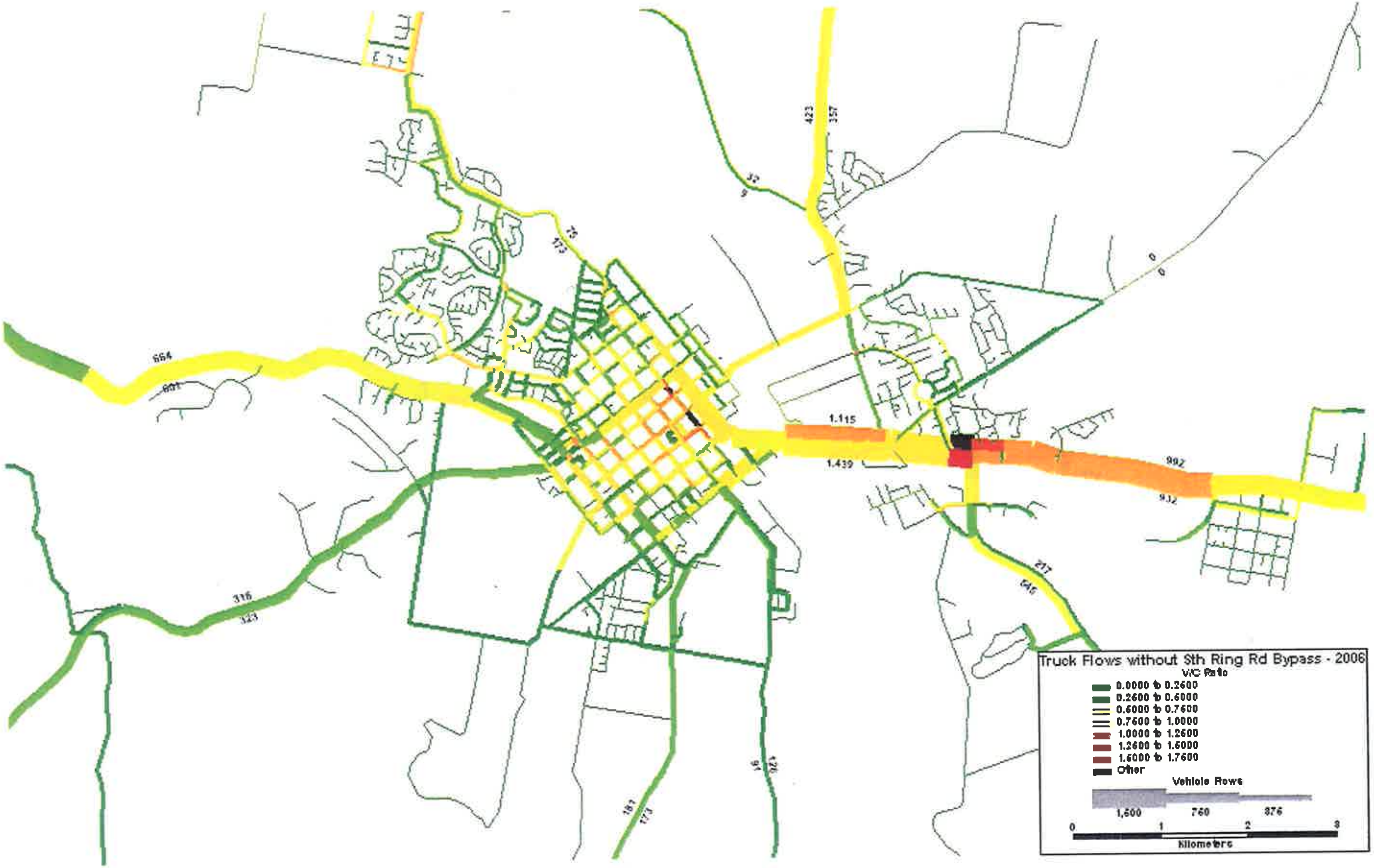
Traffic flow maps from traffic model

Traffic flow maps from traffic model

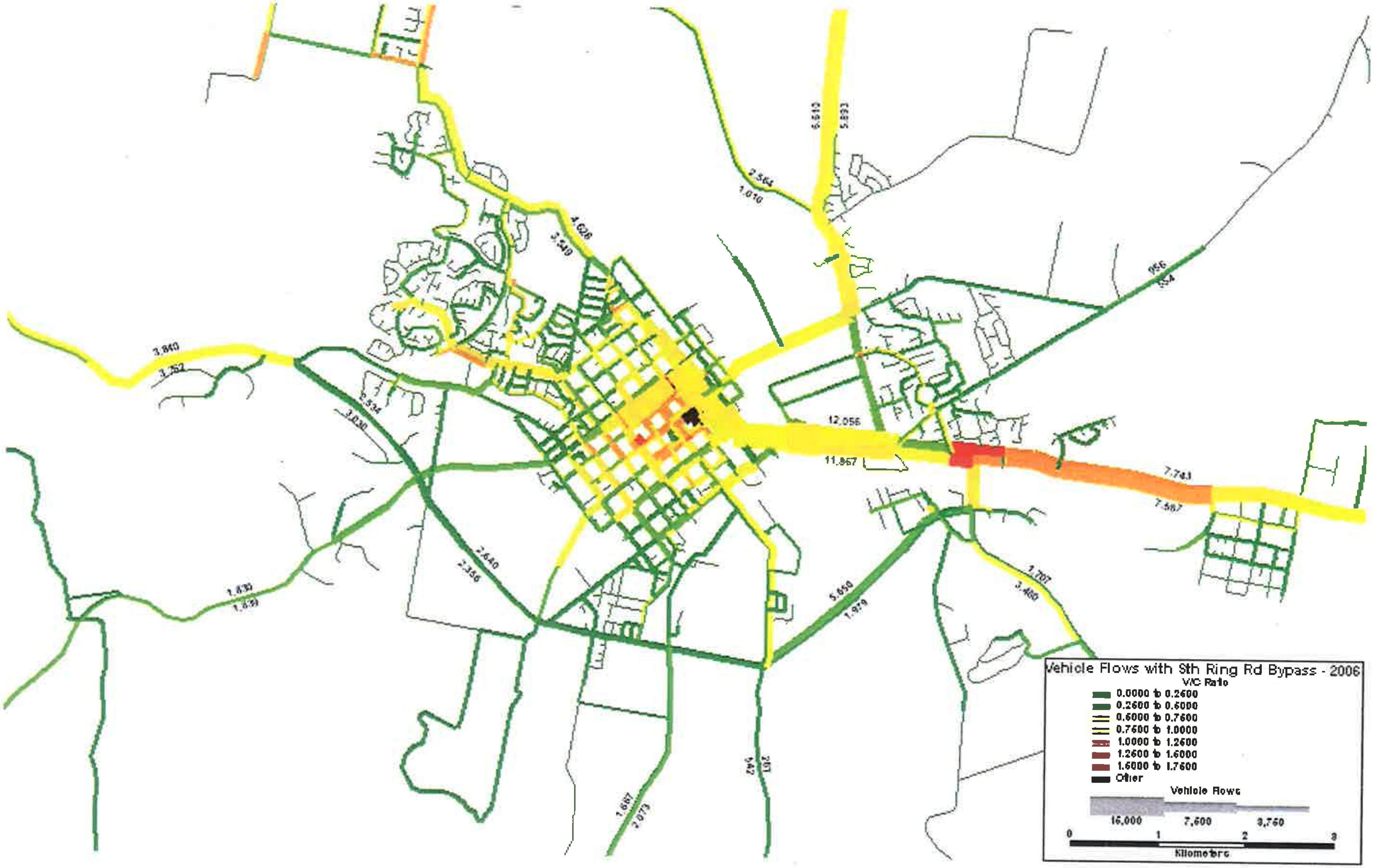
All vehicles and heavy vehicles

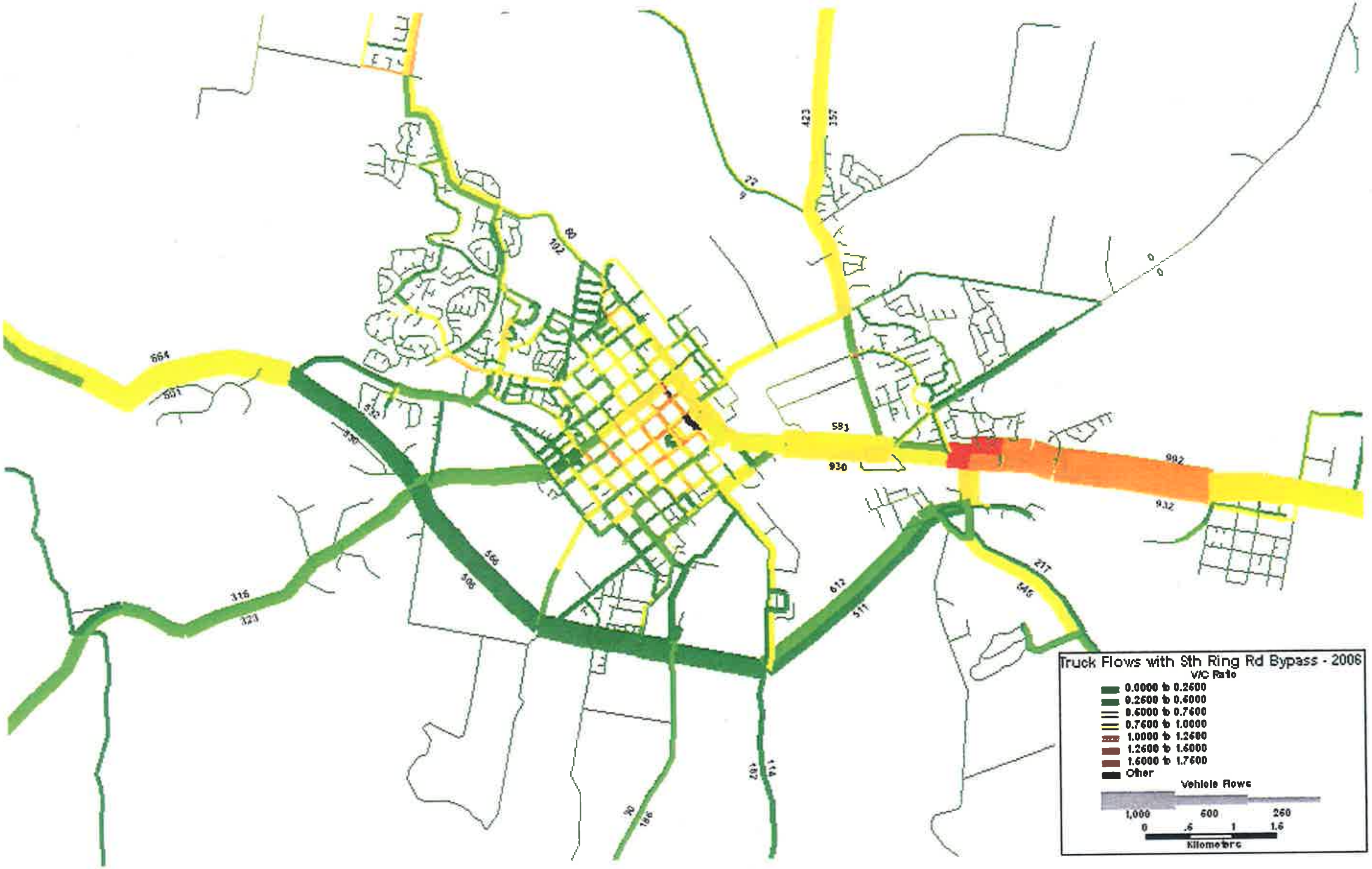
- 2006 vehicle Flows without Bypass
- 2006 heavy vehicles Flows without Bypass
- 2006 vehicle Flows with Bypass
- 2006 heavy vehicles Flows with Bypass
- **2020** vehicle Flows without Bypass
- **2020** heavy vehicles Flows without Bypass
- **2020** vehicle Flows with Bypass
- **2020** vehicle Flows with Bypass (GWH Widening)
- **2020** heavy vehicles Flows with Bypass
- **2020** heavy vehicles Flows with Bypass (GWH Widening)
- 2050 vehicle Flows without Bypass
- 2050 heavy vehicles Flows without Bypass
- 2050 vehicle Flows with Bypass
- 2050 vehicle Flows with Bypass (GWH Widening)
- 2050 heavy vehicles Flows with Bypass
- 2050 heavy vehicles Flows with Bypass (GWH Widening).

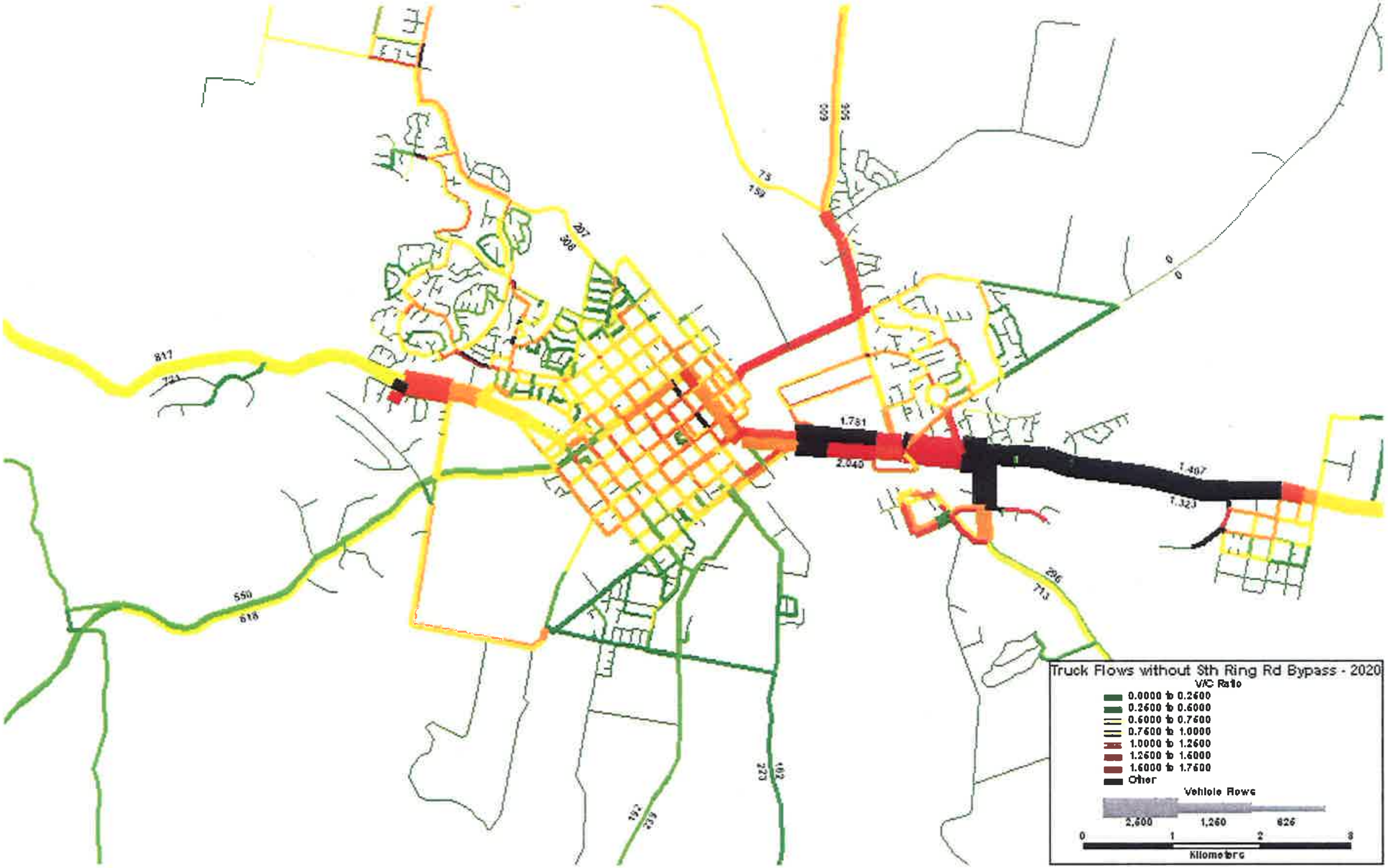

Vehicle Flows without Sth Ring Rd Bypass - 2006
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
20,000
10,000
6,000
0
1
2
3
Kilometers
16,465
13,663
7,743
7,587
5,610
5,593
2,620
1,064
4,703
3,504
3,733
3,762
1,823
1,834
1,707
3,400
956
954
1,918
1,930
321
299

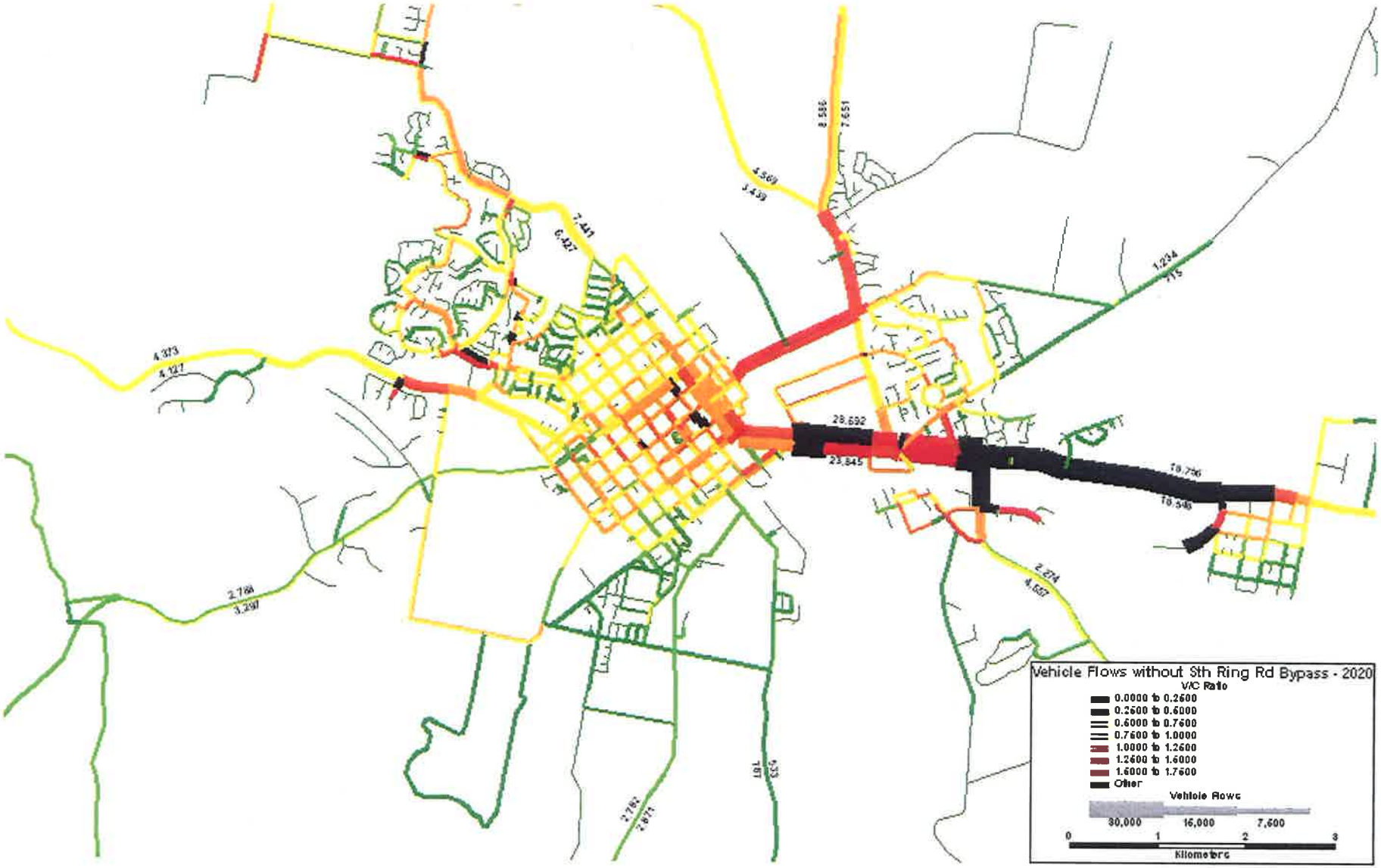


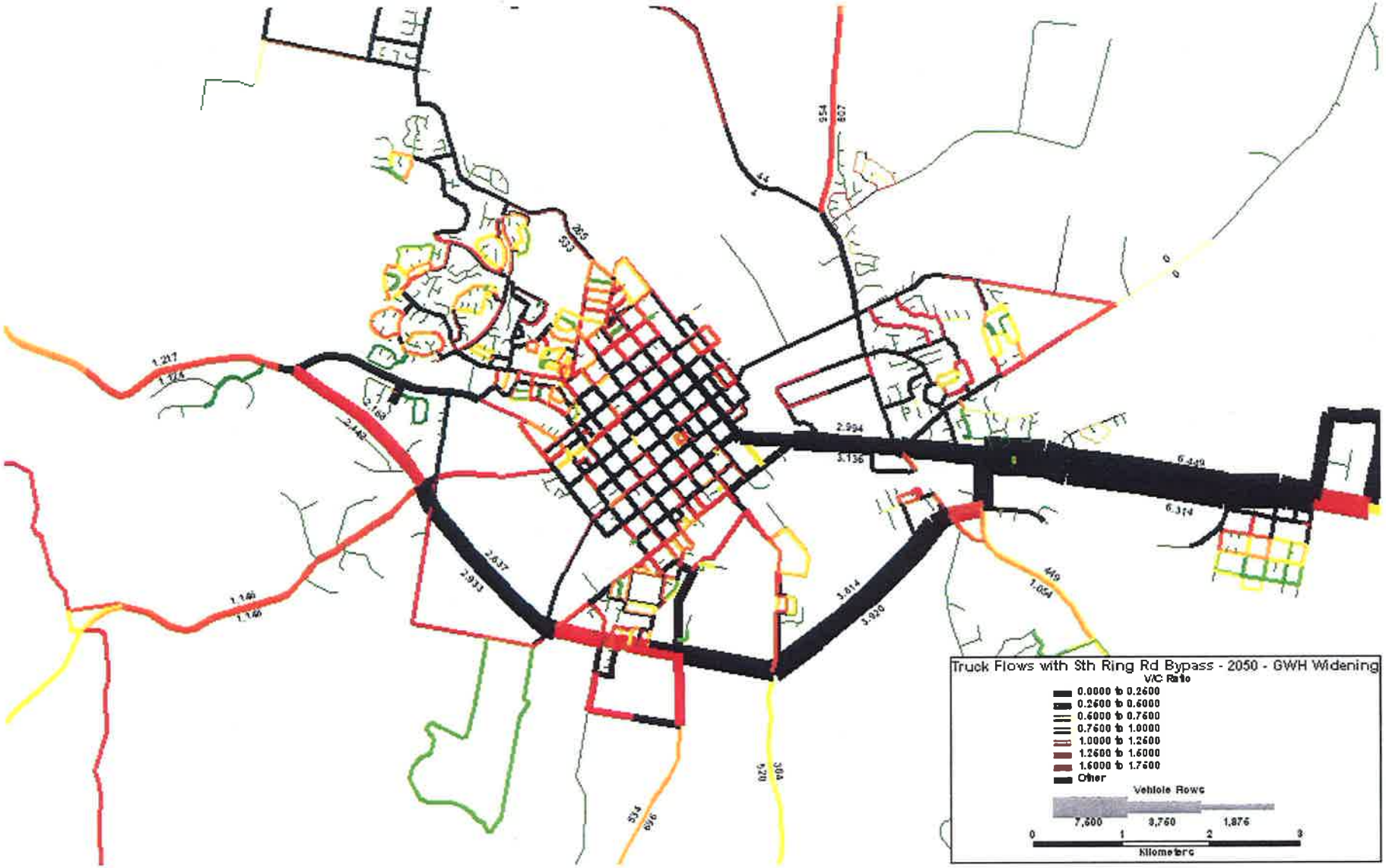
Truck Flows without 5th Ring Rd Bypass - 2006
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
1,500
760
376
0
1
2
3
Kilometers
664
601
316
323
75
173
423
357
37
9
0
0
1.115
1.439
992
932
217
646
181
173
91
126

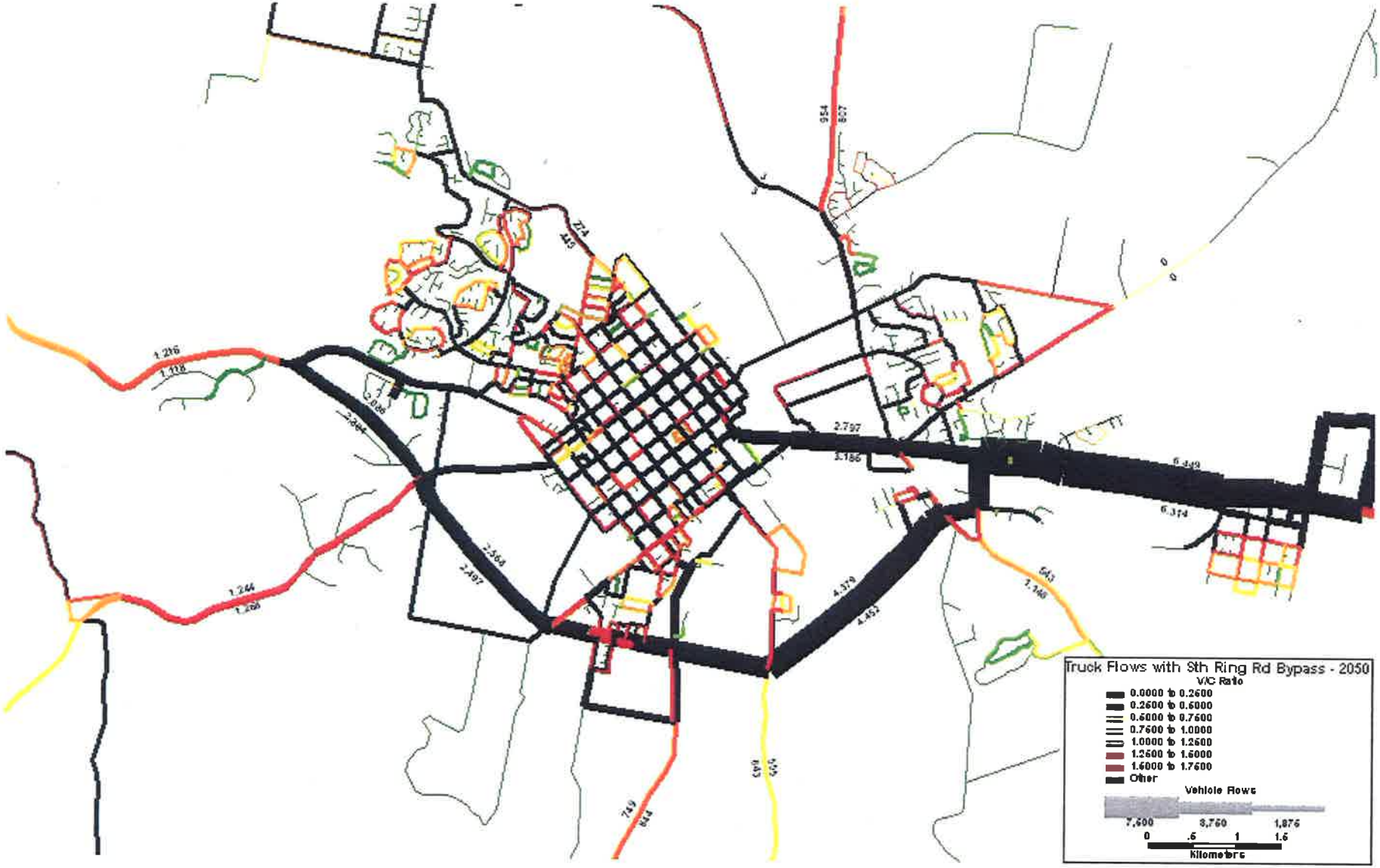

Vehicle Flows with Sth Ring Rd Bypass - 2006
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
16,000
7,600
3,750
0
1
2
3
Kilometers
6,610
5,893
2,564
1,010
4,628
3,549
3,840
3,752
2,534
3,030
12,056
11,867
7,743
7,587
956
554
1,707
3,480
5,650
1,979
2,640
2,356
1,830
1,839
207
542
1,687
2,073

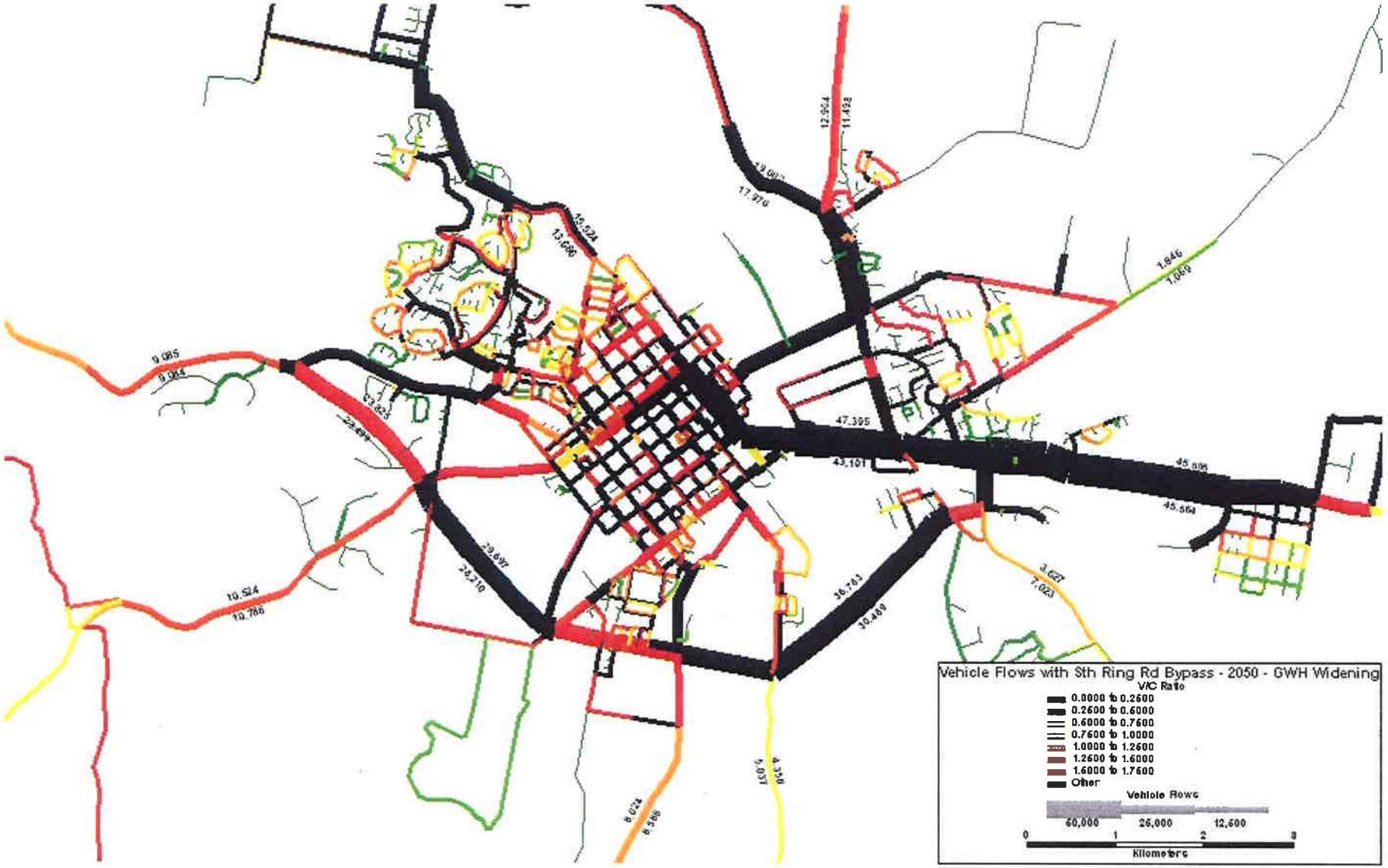

Truck Flows with Sth Ring Rd Bypass - 2006
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
1,000
600
250
0
.5
1
1.6
Kilometers
664
501
332
330
566
506
316
323
80
102
423
357
22
9
583
930
992
932
612
511
217
545
114
182
90
186

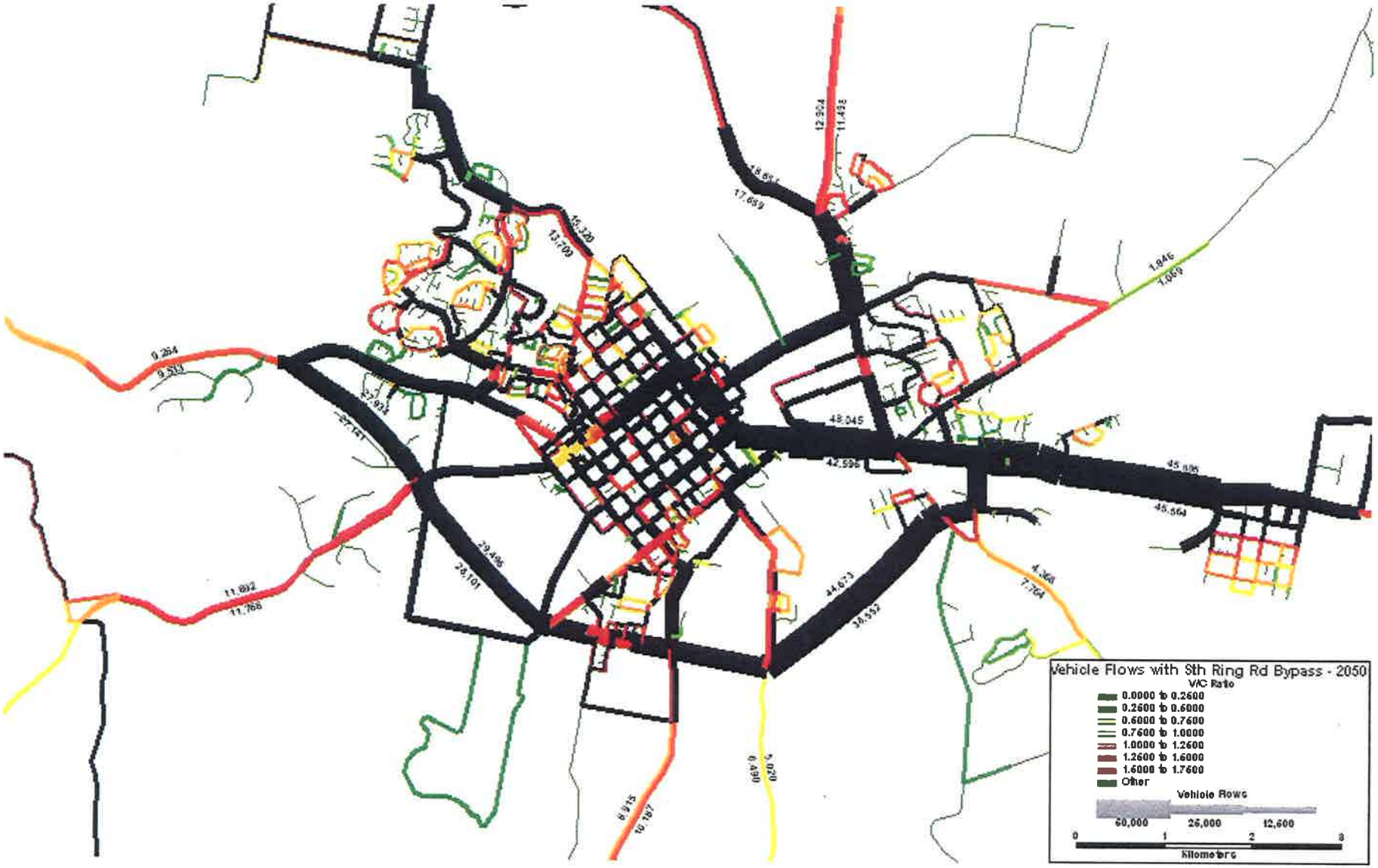

Truck Flows without Sth Ring Rd Bypass - 2020
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
2,600
1,260
626
0
1
2
3
Kilometers
817
721
550
618
207
308
73
159
600
506
1,781
2,040
1,407
1,323
296
713
192
239
223
182
0
0

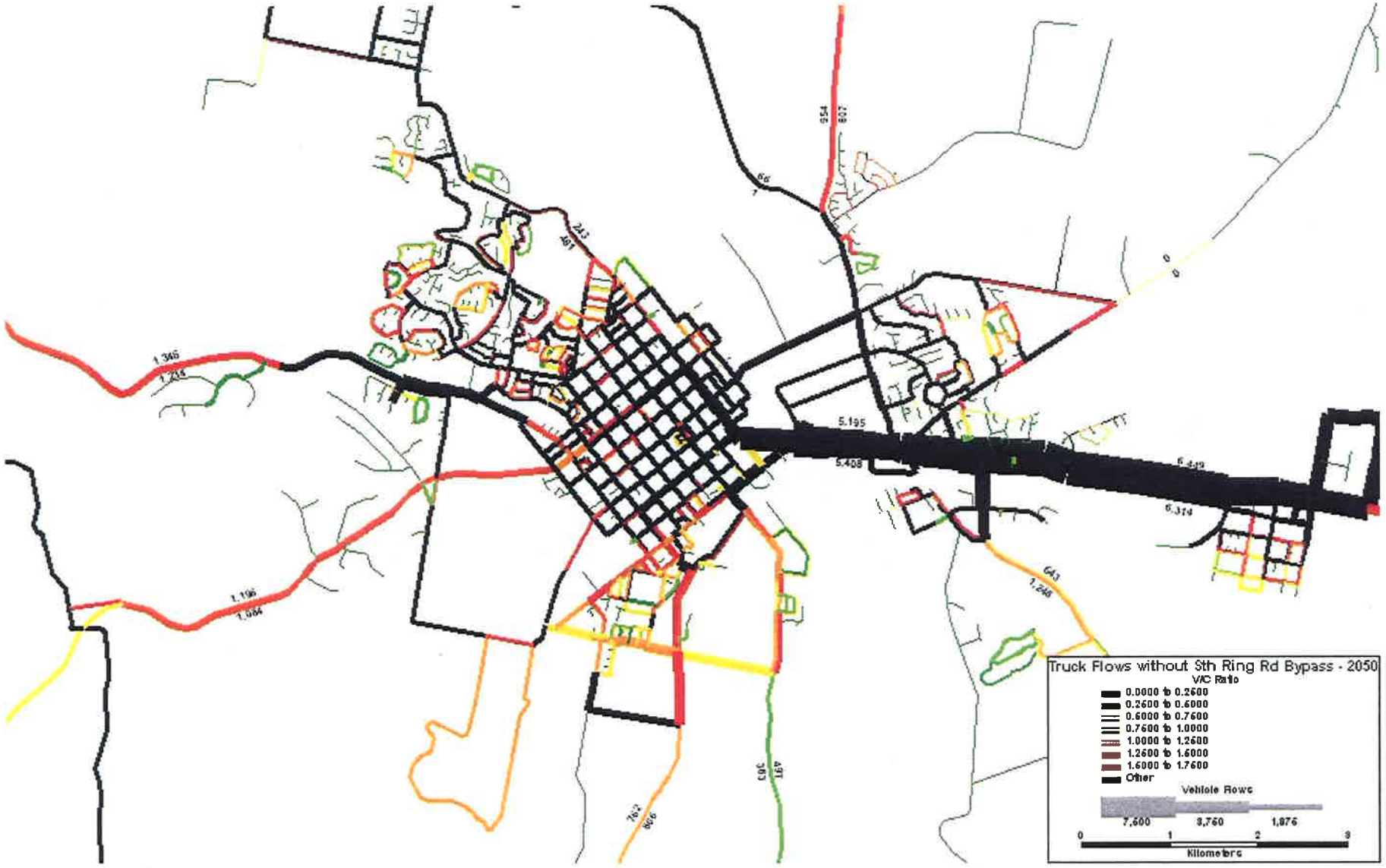

Vehicle Flows without Sth Ring Rd Bypass - 2020
V/C Ratio
0.0000 to 0.2500
0.2500 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
30,000
16,000
7,600
0
1
2
3
Kilometers
28,592
23,845
19,736
19,548
4,373
4,127
2,766
3,297
2,782
2,873
2,274
4,557
4,569
3,439
7,441
6,427
1,234
715

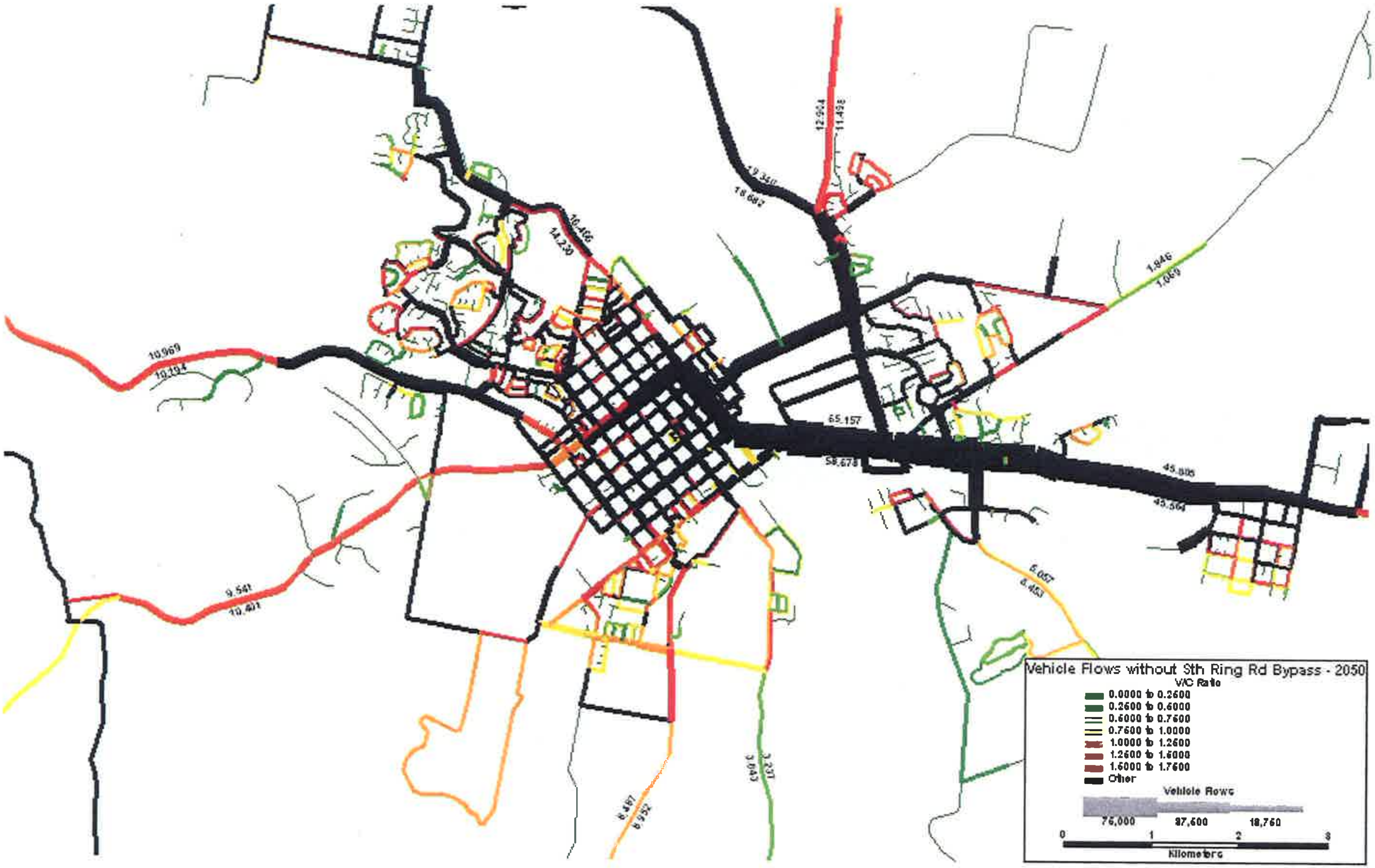

Truck Flows with Sth Ring Rd Bypass - 2050 - GWH Widening
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
7,500
3,750
1,875
0
1
2
3
Kilometers

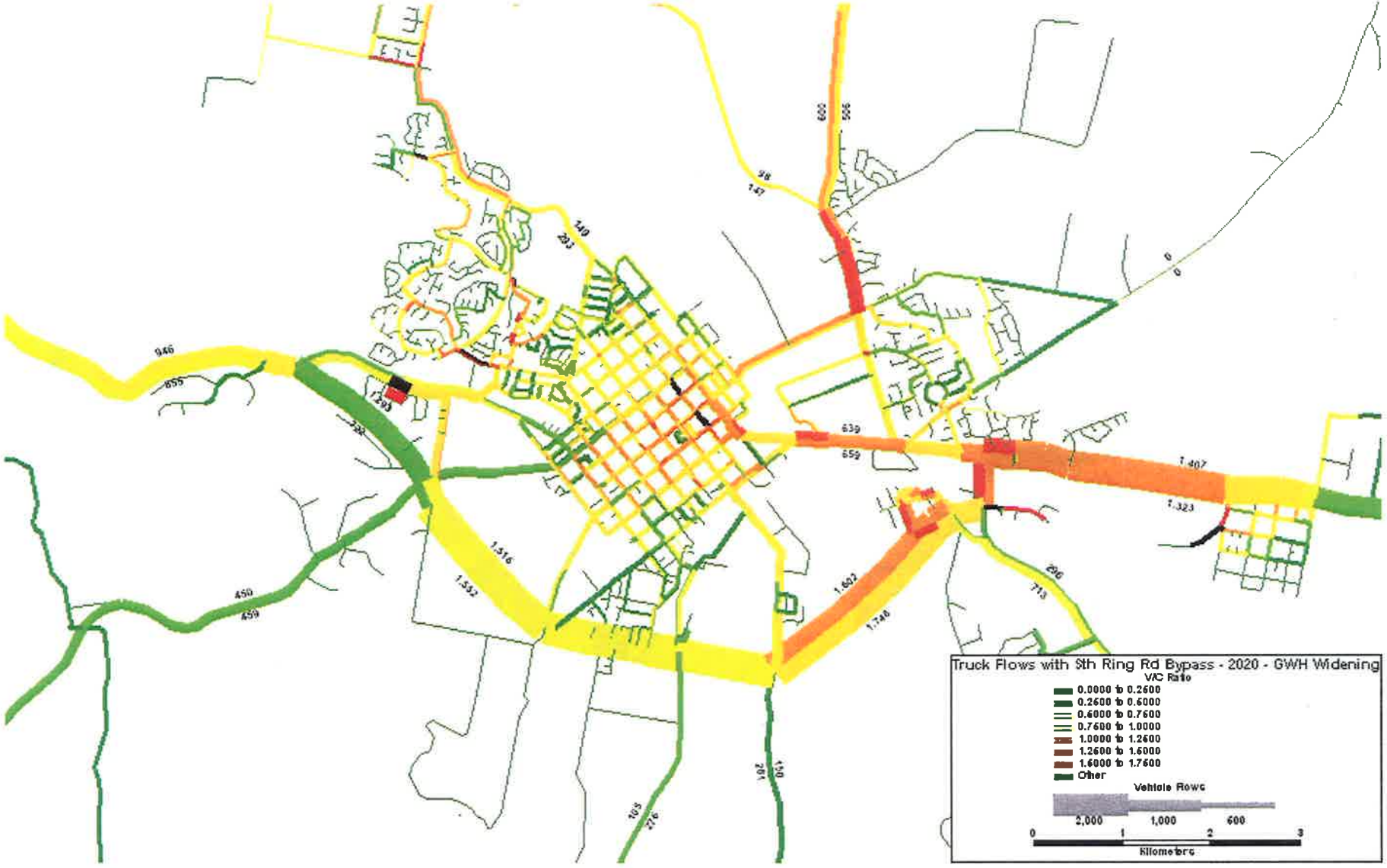

Truck Flows with 9th Ring Rd Bypass - 2050
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
7,500
3,750
1,875
0
.5
1
1.5
Kilometers

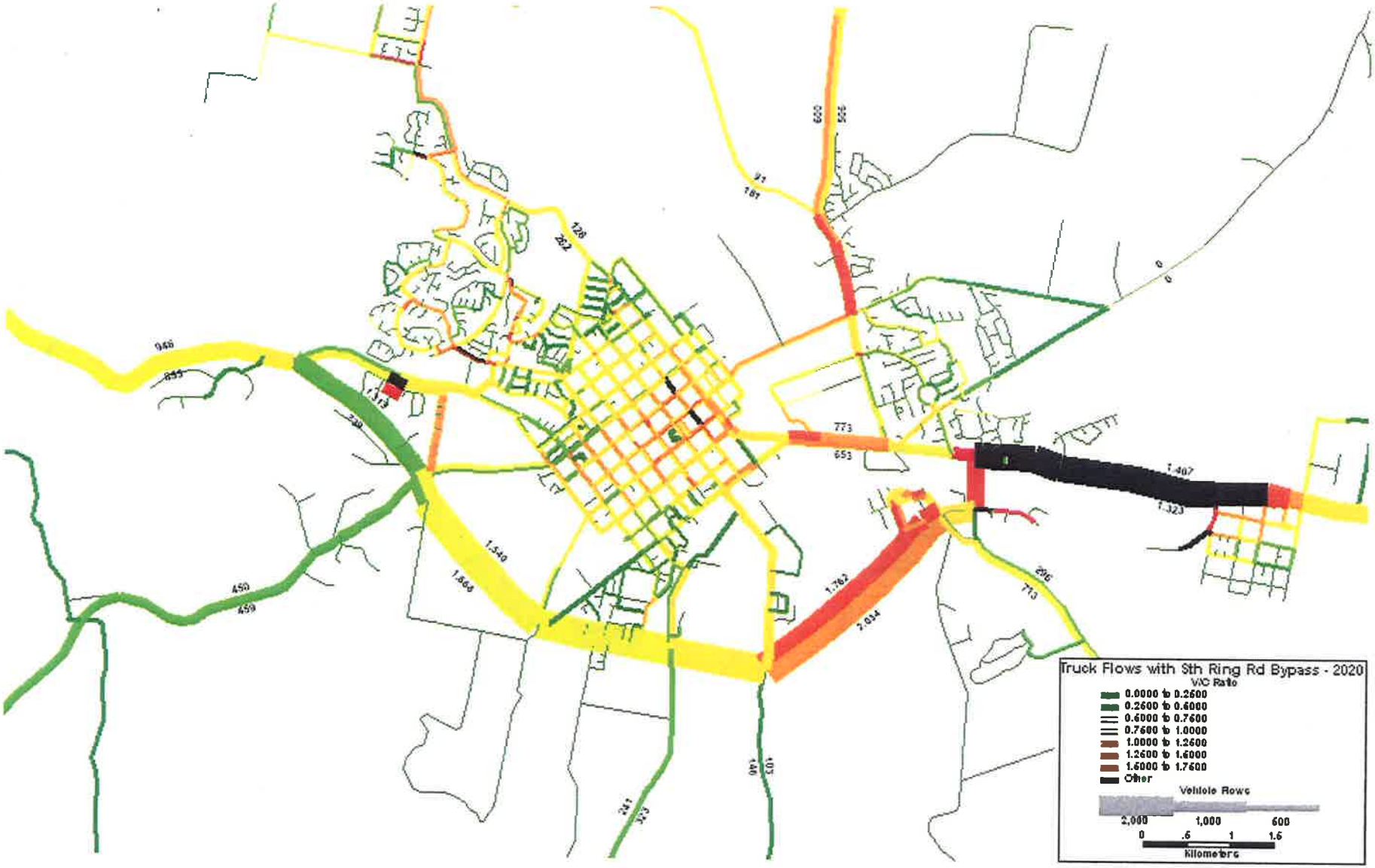

Vehicle Flows with Sth Ring Rd Bypass - 2050 - GWH Widening
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
50,000
25,000
12,500
0
1
2
3
Kilometers

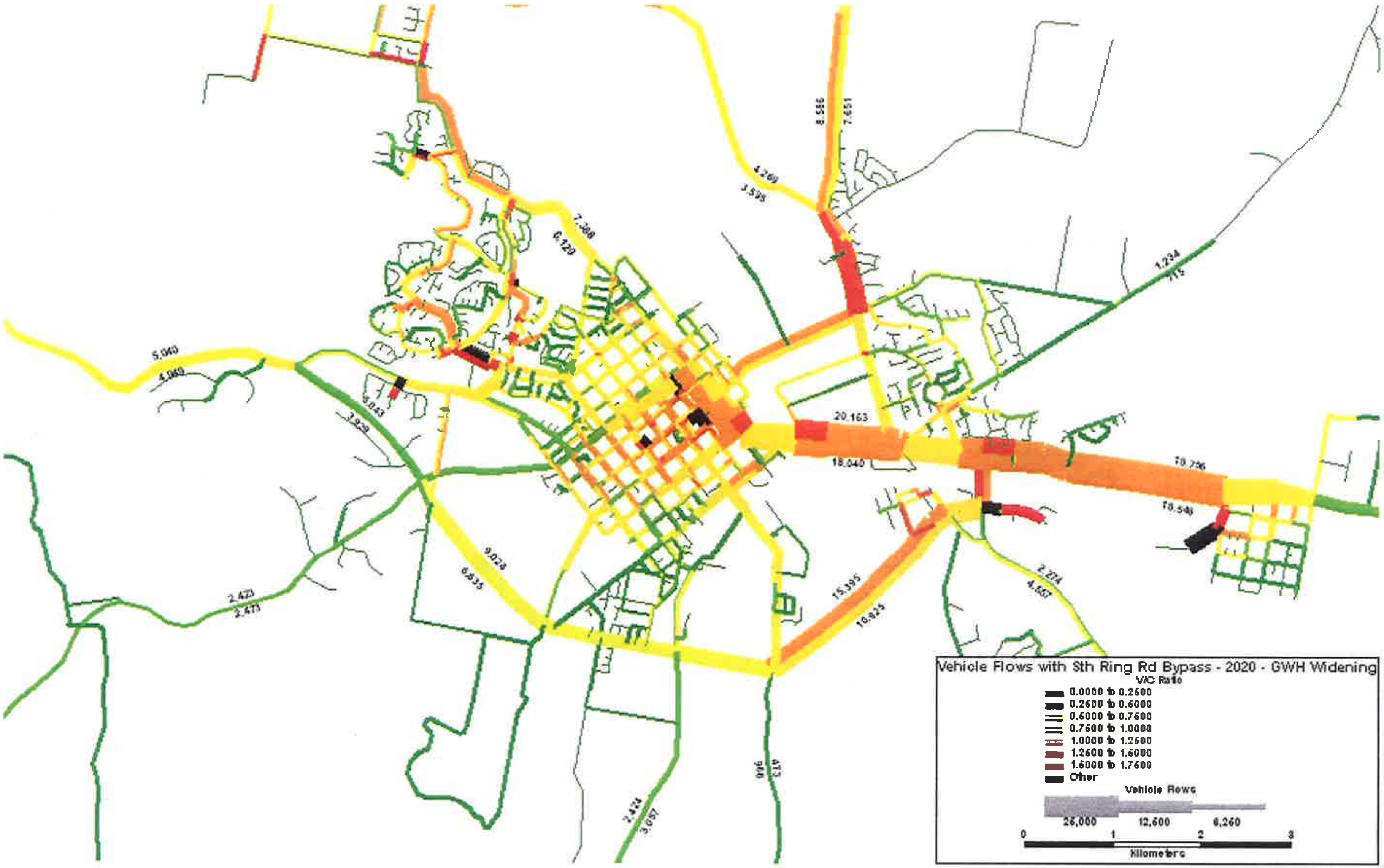

Vehicle Flows with Sth Ring Rd Bypass - 2050
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
50,000
25,000
12,500
0
1
2
3
Kilometers

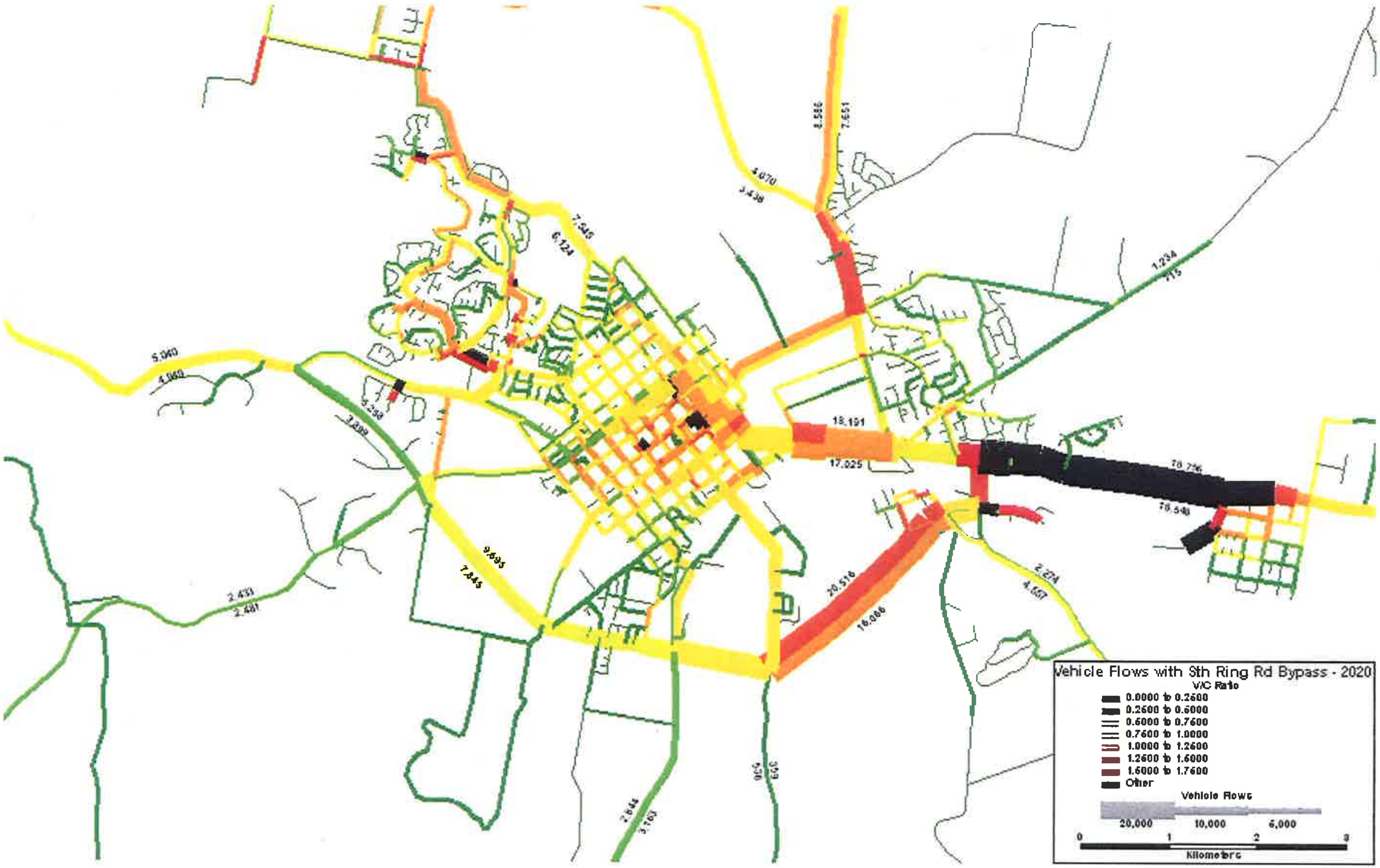

Truck Flows without Sth Ring Rd Bypass - 2050
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
7,500
3,750
1,875
0
1
2
3
Kilometers


Vehicle Flows without 5th Ring Rd Bypass - 2050
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
75,000
37,500
18,750
0
1
2
3
Kilometers
10,969
10,194
9,541
10,401
10,466
14,230
19,340
18,682
12,904
11,498
1,946
1,069
65,157
58,678
45,805
45,564
5,057
4,453
8,487
6,952
3,643
3,237


946
855
1293
639
659
1,407
1,323
1,516
1,552
1,602
1,748
450
459
713
Truck Flows with Sth Ring Rd Bypass - 2020 - GWH Widening
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
2,000
1,000
600
0
1
2
3
Kilometers


Truck Flows with Sth Ring Rd Bypass - 2020
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
2,000
1,000
600
0
.6
1
1.6
Kilometers


Vehicle Flows with 5th Ring Rd Bypass - 2020 - GWH Widening
V/C Ratio
0.0000 to 0.2600
0.2600 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
25,000
12,500
6,250
0
1
2
3
Kilometers
5,040
4,060
3,043
3,929
9,024
6,635
2,423
2,473
7,388
6,129
4,269
3,595
8,586
7,651
1,234
715
20,163
18,040
18,756
18,548
15,395
10,825
2,274
4,537
966
473
2,424
3,057


Vehicle Flows with Sth Ring Rd Bypass - 2020
V/C Ratio
0.0000 to 0.2500
0.2500 to 0.6000
0.6000 to 0.7600
0.7600 to 1.0000
1.0000 to 1.2600
1.2600 to 1.6000
1.6000 to 1.7600
Other
Vehicle Flows
20,000
10,000
5,000
0
1
2
3
Kilometers
5,040
4,960
2,433
2,481
9,695
7,845
7,545
6,124
4,070
3,438
8,556
7,651
18,191
17,025
20,516
16,066
20,726
18,548
2,224
4,557
1,234
715