Rockhampton Regional Council

Rockhampton Traffic Study 2008

Final Report

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September 2008

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The Rockhampton Road Traffic Study focussed on evaluating and documenting a road network strategy for Rockhampton into the future. A previous review of the road network needs for Rockhampton was completed in 1991. An updated review was necessary because of the elapsed time since the 1991 study and residential development pressures emerging in the City.

Consideration of the impacts of population growth on the road network was a major element of the process. The scope of the study was:

- to investigate the impacts of population growth on the road network;
- to provide advice on future road network upgrades and enhancements;
- to propose changes to the road hierarchy where appropriate; and
- to assist in developing a Priority Infrastructure Plan for transport.

The study considered two population and employment scenarios. They were:

- City Plan Scenario – based on development in accordance with the current Rockhampton City Plan with a projected population in line with the high series forecasts from the Planning Information Forecasting Unit (PIFU); and
- Parkhurst Accelerated Growth Scenario – based on accelerated growth in the Parkhurst area with development in the Parkhurst area significantly in excess of the Rockhampton City Plan. This scenario assumes all other areas of Rockhampton will develop in accordance with the Rockhampton City Plan, with accelerated growth in the Parkhurst area only. This scenario includes additional population and employment growth in the Parkhurst area in the north of the City.

The study area specifically relates to Rockhampton City. Rockhampton is the economic and administrative centre of a wider region. For this reason, the analysis included the effects of the interaction between Rockhampton and the former Livingstone, Fitzroy, and Mt Morgan Shires. Figure E1 shows the study area and the key roads in the regional road network.

Two previous studies conducted for Rockhampton in the past were:

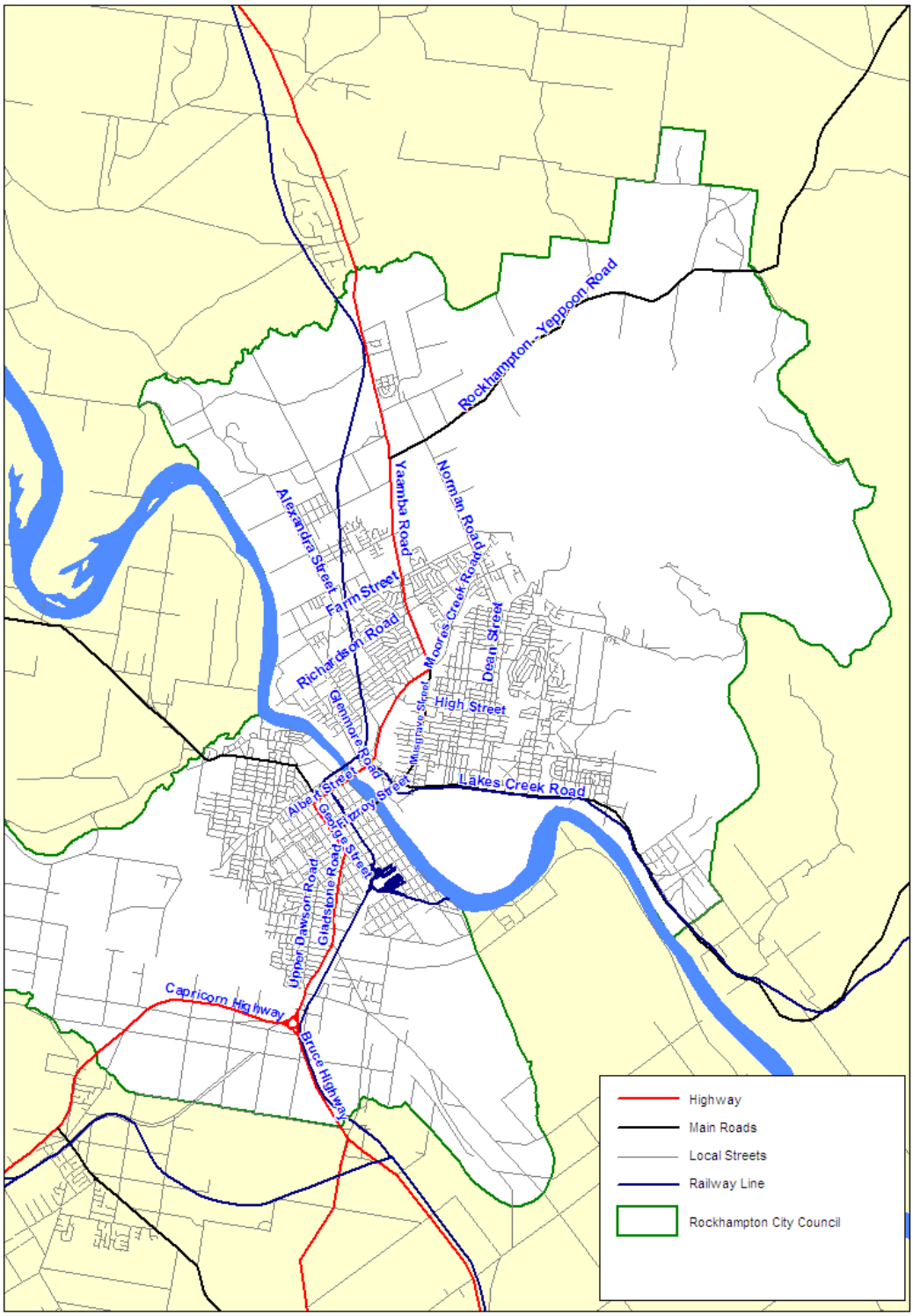
- 1991 Rockhampton Transport Study and
- 2003 Capricornia Transport Study.

Both studies made a number of recommendations for improvements to the transport network within Rockhampton. This study is building on this earlier work and updating the findings to reflect the changes that have occurred. The approach adopted for the study was broadly as follows:

- gather existing data and information to be used to update the existing traffic model;
- utilise the existing CTS Cube traffic model re-calibrated and re-validated to a 2005 base year to provide forecast of future demand on the road network;
- develop a “do minimum” network by including the completed and committed road network projects into the base year road network;
- prepare demographic forecasts for two scenarios and three forecast years for input into the traffic model;
- agree with Rockhampton Council and DMR the method for assessing the performance of the road network;
- identify the network deficiencies for each of the forecast years;
- together with Council and DMR identify a range of road network options to address the network deficiencies; and

- provide advice on the future direction of the road network strategy.

Figure E1 – Study Area



In 2005 the population of the region was approximately 100,000 people of which 60% were resident within Rockhampton City. However 80% of retail jobs and 70% of other jobs were located within Rockhampton City. The overall totals for population within Rockhampton City and the Rockhampton Region are outlined in Table E1.

Table E1 – Base Year (2005) Demographic Data

Area	Households	Persons	Retail Jobs	Non-retail Jobs	Enrolments
Rockhampton	23,947	60,194	6,602	16,671	33,659
Rockhampton Region	39,112	100,056	8,273	23,926	40,099

Estimation of daily traffic flows on the Rockhampton road network were made using an updated version of the Capricornia Transport Study traffic model. This model was updated to a 2005 base year for this study. Outputs from the model were used to evaluation of the performance of the road network. Network evaluation was undertaken in two ways.

- An operational deficiency assessment where the forecast daily flow is compared to desired maximum daily flow based on the physical capacity of the road; and
- A hierarchic deficiency assessment where the desired maximum daily flow is based on the function of road in the network.

The desired maximum daily flows for operational deficiency is outlined in Table E2. To maintain acceptable operating conditions, Rockhampton Regional Council adopted a desired LOS C for their road network which represents approximately 65% of the ultimate capacity of the road. While the road can carry higher volumes it is desirable that operating conditions not deteriorate to the levels of major urban centres.

Table E2 – Operational Deficiency Values

Road Type	Deficiency Capacity (AADT)	Deficiency Capacity (AAWT)	Indicative LOS
Two lane urban road (Rockhampton Council)	12,200 vpd	13,000 vpd	C
Two lane urban road (DMR)	16,000 vpd	17,000 vpd	D/E
Four Lane urban road – Lower Standard	25,400 vpd	27,000 vpd	C
Four Lane urban road – Medium Standard	28,200 vpd	30,000 vpd	C
Four Lane urban road – Higher Standard	37,600 vpd	40,000 vpd	D/E
Six Lane urban road	56,500 vpd	60,000 vpd	D/E

Initially the base year was investigated in order to reveal whether sections of the network road network were already deficient. A number of sections of the road network are currently deficient and these are set out in Table E3.

Table E3 – Base Year Network Deficiencies

Road Section	Hierarchy Classification	Operational Desired Maximum Daily Flow (vpd)	Daily Flow (vpd)
Fitzroy St between southern abutment and Bolsover St	Urban Arterial	32,500	32,100 – 37,600
High St between Aquatic Pl and Ford St	Urban Arterial	13,000	11,900 – 14,100
Norman Rd between Richardson Rd and Moores Creek Rd	Urban arterial	13,000	12,900
Kerrigan St between Berserker St and Moores Creek Rd	Urban Sub arterial	13,000	13,600
Upper Dawson Rd between Caroline St and	Urban Sub arterial	13,000	13,200
Bruce Highway – Yeppen Roundabout to Jellicoe Street including the Yeppen Roundabout	Highway	17,000	22,000

Together with a number of links being deficient five intersections were also identified as being likely to be operating below a desired level of service. They were:

- Farm Street/ Hinchliff Street
- Norman Road/ Moores Creek Road
- Kerrigan Street/ Moores Creek Road/ Feez Street
- Musgrave Street/ High Street
- Fitzroy Street/ East Street
- Fitzroy Street/ Bolsover Street.

Future year road network forecasts were prepared for two land use scenarios and three forecast years. The two scenarios were:

- Scenario 1 – City Plan Scenario based on PIFU High Series forecasts released in 2007 and has development in line with the current land use zoning of the City Plan;
- Scenario 2 – Parkhurst Accelerated Growth Scenario (PAG) which is based on Scenario 1 but with significantly higher population and employment in Parkhurst

For each scenario, forecasts for three future years were prepared. The future years investigated were:

- 2011
- 2016
- 2021

Rockhampton Regional Council decided that the high series forecasts were most relevant for Rockhampton and for this study (City Plan scenario). It was predicted that the population would increase to approximately 66,000 people by 2021 – an increase of 10% from 2005. An alternative land use scenario, the Parkhurst Accelerated Growth (PAG) scenario, was also investigated. Under the PAG scenario, the population increased to approximately 74,000 people by 2021 – a 23% increase from 2005. The size of the increase in population will place significant pressure on the road network in Rockhampton and potentially have detrimental effects on many urban areas as a result of traffic intrusion.

With the forecast increase in population daily traffic was predicted to grow from approximately 286,000 trips per day in 2005 to nearly 344,000 trips per day – a 20% increase from 2005 under the City Plan scenario. Under the PAG scenario, 377,000 trips per day were predicted to occur.

The forecasts of future years demand were based on the estimation population and employment forecasts for each of the three forecast years. Totals of the population and employment for each year are shown in Table E4.

Table E4 – Future Year Demographics

Area	2011		2016		2021	
	Persons	Jobs	Persons	Jobs	Persons	Jobs
City Plan Scenario						
Rockhampton	63,633	25,367	64,599	25,846	65,845	26,333
Rockhampton Region	109,472	35,555	116,765	37,543	125,655	39,984
Parkhurst Accelerated Growth Scenario						
Rockhampton	63,633	25,367	68,062	27,438	73,687	28,851
Rockhampton Region	109,472	35,555	120,229	39,135	133,497	42,501

Rockhampton Regional Council and the Department of Main Roads identified a number of road network upgrades and changes that have occurred since 2005 or are committed to occur prior 2011. These changes and upgrades were made to the base year road network in the model to create a future year “do minimum” road network. Analysis of the impacts of population growth using the “do minimum” network was undertaken for each scenario year for the three forecast years. The reason for the analysis is to identify:

- the future year road network deficiencies if further upgrades to the network were not made; and
- as a basis from which to assess road network options.

The outcome of this analysis and the identified road network deficiencies under the City Plan Scenario is shown in Table E5 and for the Parkhurst Accelerated Growth Scenario is shown in Table E6.

Table E5 – Identified Network Deficiencies – City Plan Scenario

Road Section	Hierarchy Classification	Operational Desired Maximum Daily Flow (vpd)	Daily Flow (vpd)
2011			
Fitzroy River Bridge	Major Urban Arterial	32,500 vpd	39,830 vpd
Bruce Highway north of the Rockhampton Yeppoon Road	Highway	17,000 vpd	20,400 vpd
High Street	Urban Arterial	13,000 vpd	14,900 – 16,000 vpd
Norman Road	Urban arterial	13,000 vpd	13,800 vpd
Kerrigan Street	Urban Sub-arterial	13,000 vpd	14,000 vpd
Upper Dawson Road	Urban Sub-arterial	13,000 vpd	13,800 vpd
2016			
No additional deficiencies			
2021			
Capricorn Highway	Main Road	17,000 vpd	16,100 – 16,500 vpd
Neville Hewitt Bridge	Major Urban Arterial	40,000 vpd	40,700 vpd
Moores Creek Road	Major Urban Arterial	40,000 vpd	40,700 vpd
Norman Road	Urban Arterial	13,000 vpd	13,000 vpd
Fitzroy Street	Major Urban Arterial	26,000 vpd	25,100 – 27,900 vpd
Elphinstone Street		13,000 vpd	12,600 12,800 vpd

Table E6 – Identified Network Deficiencies – Parkhurst Accelerated Growth Scenario

Road Section	Hierarchy Classification	Operational Desired Maximum Daily Flow (vpd)	Daily Flow (vpd)
2011			
Fitzroy River Bridge	Major Urban Arterial	32,500	39,830
Yaamba Road between Rockhampton – Yeppoon rd and Boundary St (West)	Highway	17,000	18,600
2016			
Yaamba Road between Boundary St (West) and Boundary St (East)	Highway	17,000	22,100
Alexandra Street between Belmont Road and Farm Street	Urban arterial	13,000	13,300 – 16,700
2021			
Neville Hewitt Bridge	Major Urban	40,000	40,532

Road Section	Hierarchy Classification	Operational Desired Maximum Daily Flow (vpd)	Daily Flow (vpd)
	Arterial		
Yaamba Rd between Boundary St (East) and Olive St	Highway	17,000	22,600 – 23,000
Capricorn Highway between Bruce Highway and Gracemere	Main Road	17,000	16,200 – 16,500
Moores Creek Rd between Knight St and Neville Hewitt Bridge	Major Urban Arterial	40,000	40,500
Norman Rd between Farm St and Rockhampton – Yeppoon Rd	Urban Arterial	13,000	14,100 – 15,000
Alexandra St between Moores Creek Rd and Main St	Urban Arterial	26,000	27,600 – 28,000
Alexandra St between Richardson St and Hinchliff St	Urban Sub-arterial	13,000	14,700 – 16,000
Hinchliff St between Alexandra St and Farm St	Urban Sub-arterial	13,000	13,700 – 14,700
Farm St between Hinchliff St and Alexandra St	Urban Sub-arterial	13,000	16,400 – 18,700
Fitzroy St between Bolsover St and George St	Major Urban Arterial	26,000	26,400 – 30,000

Table E7 – Identified Intersection Improvements

Location	Proposed Upgrade	Required Between
Alexandra Street and Main Street	Additional capacity and signal improvements	2011 and 2016
Alexandra Street and Richardson Street	Additional capacity and signal changes	2016 and 2021 (Parkhurst)
Farm Street and Hinchliff Street	Signal controlled intersection	2008 and 2011
High Street and Aquatic Place	Signal controlled intersection	2011 and 2016
Lion Creek Road and Exhibition Street	Signal controlled intersection	2008 and 2011
Moores Creek Road, Feez Street and Kerrigan Street	Additional capacity	2008 and 2011
Moores Creek Road, Norman Road and German Street	Signal controlled intersection	2008 and 2011

The recommended upgrades to the road network identified through the analysis are discussed in Table E8 (2008 – 2011), Table E9 (2011 – 2016) and Table E10 (2016 – 2021) under both the City Plan and Parkhurst Accelerated Growth Scenarios.

Table E8 – Recommended Network Upgrades (2008 – 2011)

Recommended Action	City Plan Scenario Required	Parkhurst Accelerated Growth Scenario Required	Indicative Construction Cost
Construction of two lanes in each direction on the Bruce Highway between Rockhampton – Yeppoon Road and Boundary Road (West) with planning for the section from Boundary Road (West) to Boundary (East)	✓	✓	$9.3M
Construction of two lanes in each direction on Norman Road between Moores Creek Road and Farm Street	✓	✓	$4.8M
Intersection works to reduce delay on the Fitzroy River Bridge until an additional crossing of the river is built, at Fitzroy Street/ East Street, Fitzroy/ Bolsover Street and Bridge Street/ Lakes Creek Road/ Queen Elizabeth drive	✓	✓	$6.0M
Construction of two lanes in each direction between Ford Street and Moores Creek Road along High including a new bridge across Moores Creek and intersection works at Musgrave Street/ High Street, High Street/ Aquatic place and Moore Creek Road/ High Street.	✓	✓	$12.5M[1]
Construction of two lanes in each direction on Upper Dawson Road between Larnach Street and Derby Street.	✓	✓	$0.3M
Construction of two lanes in each direction on the Bruce Highway between the Yeppen Roundabout and Jellicoe Street including upgrade to the Yeppen Roundabout	✓	✓	Due to the need to address flooding constraints it was not possible to estimate an indicative cost
Construction of two lanes in each direction on Kerrigan Street between Moores Creek Rd and Berserker St including upgrades to intersections at Berserker St and Moores Creek Rd.	✓	✓	$7.2M
Plan and identify procurement of the Alexandra Street rail grade separation	✓	✓	-

Table E9 – Recommended Network Upgrades (2011 – 2016)

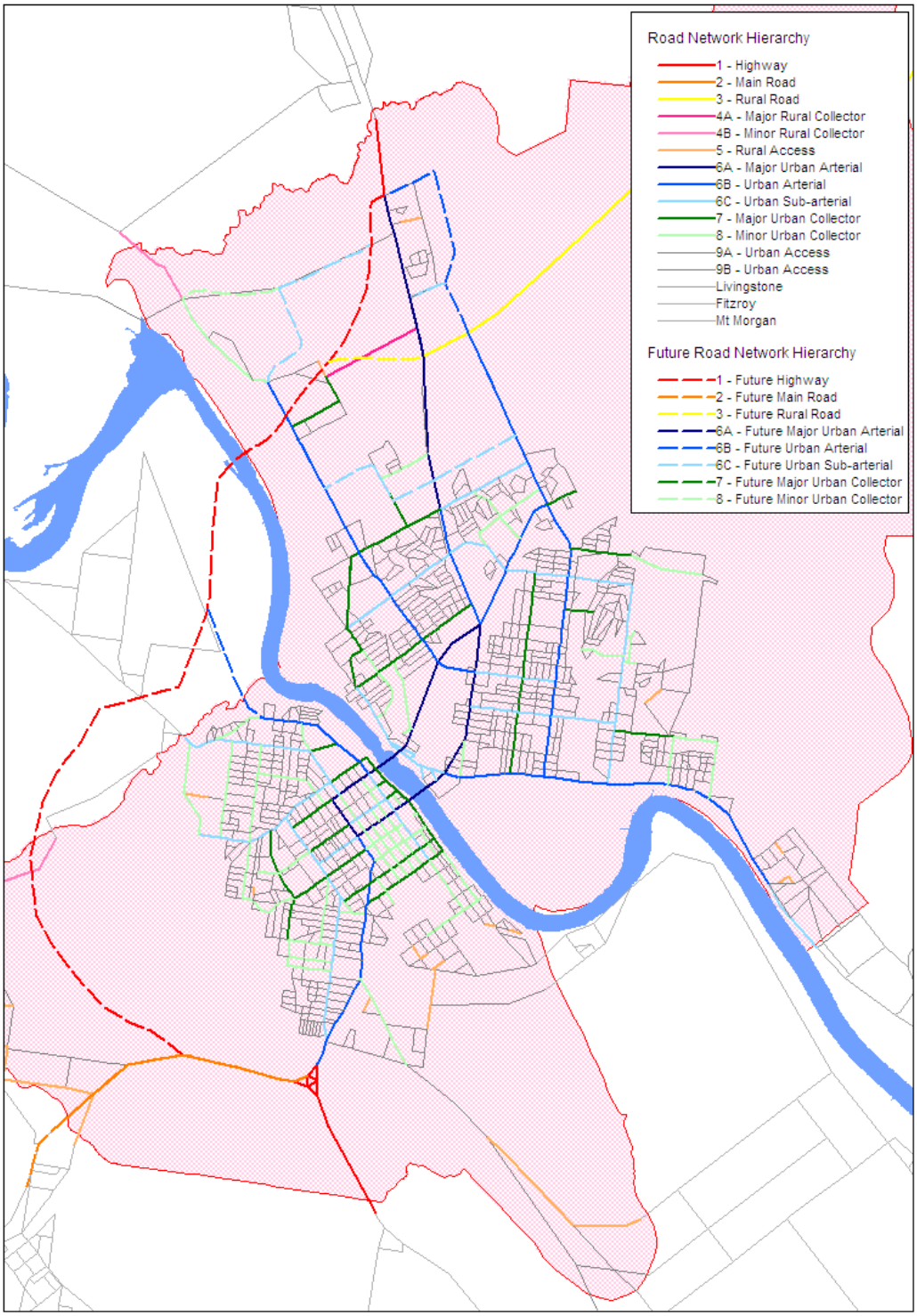
Recommended Action	City Plan Scenario Required	Parkhurst Accelerated Growth Scenario Required	Indicative Construction Cost
Alexandra Street rail grade separation	✓	✓	$14.5M
Construct a western alignment of the Bruce Highway between Olive Street in the north and the Capricorn Highway in the south including a mid-pint access to Lion Creek Road, interchange with Alexandra Street and a connection to Rockhampton – Yeppoon Road. The ultimate alignment will be the subject of further investigation given the various geographical and flooding issues that will require resolution.	✓	✓	The extensive nature of the project with various significant constraints prevents an indicative price from being estimated.
Construct a new link road as one lane in each direction between the Bruce Highway and Alexandra Street including a grade separated crossing of the railway line. (Maloney Street connection), also including a downgrading of Farm Street.	✓	✓	$10.5M
Local area management works on Haynes Street and Hollingsworth Street areas to reinforce the residential nature. Required after the Alexandra Street rail grade separation.		✓	$1.2M
Construction of two lanes in each direction on Norman Road to between Farm Street and Nagle Drive	✓	✓	$4.5M
William Palfrey Road must be constructed as part of the urban growth in Parkhurst. Two lanes in each direction should be constructed.		✓	$12.5M
Alexandra Street extension to William Palfrey Road (McLaughlin Street re-alignment) constructed as part of the urban development in Parkhurst.		✓	$7.0M
Construct two lanes in each direction on Alexandra Street between Farm Street and Belmont Road.		✓	$18.2M

Table E10 – Recommended Network Upgrades (2016 – 2021)

Recommended Action	City Plan Scenario Required	Parkhurst Accelerated Growth Scenario Required	Indicative Construction Cost
Construct two lanes in each direction on the Capricorn Highway between the Bruce Highway and Gracemere		✓	$4.3M
Construct two lanes in each direction on Norman Road between Nagle Drive and Rockhampton Yeppoon Road.		✓	$4.9M
Construct one lane in each direction on Norman Road between Rockhampton – Yeppoon Road and Norman Road (North) including a bridge across Limestone Creek.	✓	✓	$20.1M
Construct an additional two lanes in each direction along the Bruce Highway western alignment (2016 network recommendation) between Alexandra Street and Lion Creek Road connection.		✓	The extensive nature of the project with various significant constraints prevents an indicative price from being estimated.
Construct and additional two lanes along Norman Road between Moores Creek Rd and Dean Street, including a new bridge over Moore Creek.		✓	$8.6M

As well as the recommended upgrades to network discussed in the tables above changes to the road network hierarchy were also required to accommodate the changes to the network and to accommodate the growth in Rockhampton. The recommended future road network hierarchy is shown on Figure E2.

Figure E2 – Recommended Future Year Road Network Hierarchy



1 Introduction

1.1.1 General

Rockhampton Council engaged Arup to undertake a traffic and road network study of the City. The study focussed on evaluating and documenting a road network strategy for the City into the future. A previous review of the road network needs for Rockhampton was completed in 1991. An updated review was necessary because of the elapsed time since the 1991 study and residential development pressures emerging in the City.

Consideration of the impacts of population growth on the road network was a major element of the process. The scope of the study was:

- to investigate the impacts of population growth on the road network;
- to provide advice on future road network upgrades and enhancements;
- to propose changes to the road hierarchy where appropriate; and
- to assist in developing a Priority Infrastructure Plan for transport.

The study considered two population and employment scenarios. They were:

- City Plan Scenario – based on development in accordance with the current Rockhampton City Plan with a projected population in line with the high series forecasts from the Planning Information Forecasting Unit (PIFU); and
- Parkhurst Accelerated Growth Scenario – based on accelerated growth in the Parkhurst area with development in the Parkhurst area significantly in excess of the Rockhampton City Plan. This scenario assumes all other areas of Rockhampton will develop in accordance with the Rockhampton City Plan, with accelerated growth in the Parkhurst area only. This scenario includes additional population and employment growth in the Parkhurst area in the north of the City.

For this purpose, Arup used the Capricornia Transport Model (CTM) to forecast the daily traffic flows on the road network for each scenario. The CTM was developed by the Department of Main Roads (DMR) for the Capricornia Transport Study.

1.1.2 Purpose of this Report

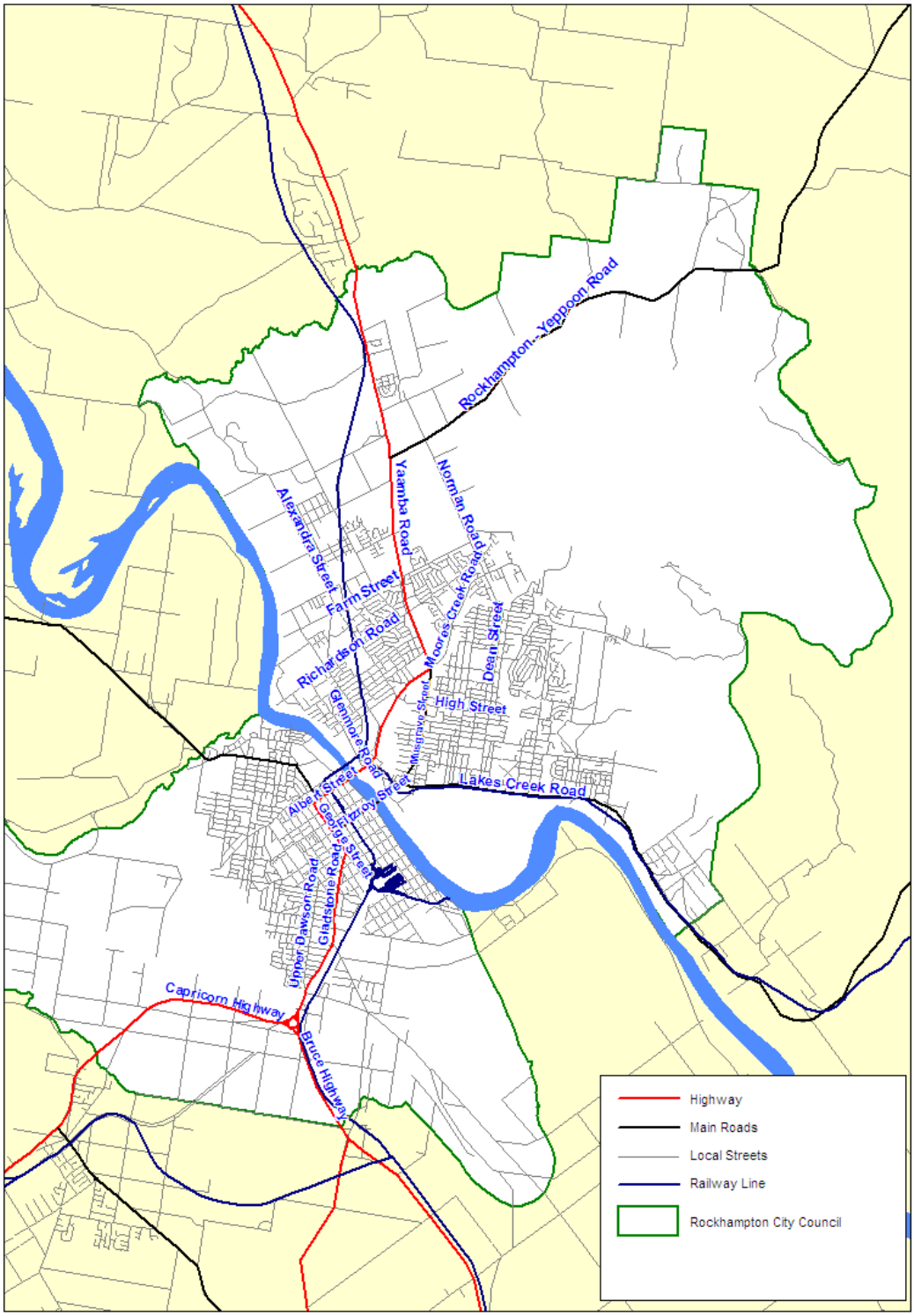
The purpose of this report is to discuss:

- the background and context to the traffic forecasting;
- the previous studies undertaken in Rockhampton;
- model validation;
- the two population and employment scenarios;
- the daily traffic forecasts for the two scenarios;
- identification and evaluation of future road network schemes;
- an assessment of the future road hierarchy for Rockhampton; and
- proposed changes, enhancements and additional road network to ensure the desired level of service is maintained on the City's streets.

1.1.3 Study Area

The study area specifically relates to Rockhampton City. Rockhampton is the economic and administrative centre of a wider region. For this reason, the analysis included the effects of the interaction between Rockhampton and the previous Livingstone, Fitzroy, and Mt Morgan Shires. **Figure 3** shows the study area and the key roads in the regional road network.

Figure 3 – Study Area



1.1.4 Structure of the Report

Following the introductory section, this report is set out as follows:

- **Section 2** provides a discussion on the previous work undertaken in Rockhampton;
- **Section 3** outlines the study approach including details of the modelling;
- **Section 4** discusses the base year demographics;
- **Section 5** outlines the calibration and validation of the base year model traffic model;
- **Section 6** describes the road network hierarchy and deficiency definitions;
- **Section 7** discusses the results of the analysis of the base year road network;
- **Section 8** outlines the forecasting methodology being used, and the demographic forecasts for the two land use scenarios;
- **Section 9** presents the results of the option testing for the base case scenario including the traffic impacts of the “do minimum” network option;
- **Section 10** presents the results of the future year network option testing analysis;
- **Section 11** considers and discusses the implications for a number of key intersections in the City that will be impacted on by the proposed growth in traffic and proposes changes to the layout to cater for these demands;
- **Section 12** discusses other transport issues; and
- **Section 13** provides the conclusions and recommendations of the study.

2 Previous Studies

Two previous studies conducted for Rockhampton in the past were:

- 1991 Rockhampton Transport Study and
- 2003 Capricornia Transport Study.

2.1.1 1991 Rockhampton Transport Study

Queensland Transport, on behalf the Queensland Government and Rockhampton City Council conducted this study with the final report published in 1991. The study objectives were:

- to gather information about travel patterns in Rockhampton during 1990 from which a road network traffic model was developed, calibrated and validated; and
- to use this traffic model to project travel patterns in the City for two forecast years 2001 and for an ultimate population of 75,000 people, which approximately equated to 2015.

The study area comprised Rockhampton City and parts of Livingstone Shire to the north along the Bruce Highway and the Gracemere area of Fitzroy Shire.

A number of recommendations were made by the study including:

- Proposed road hierarchy,
- Various network upgrades.

The major road network improvements recommended included:

- Prior to 2001
  - upgrading Lower Dawson Road to 4 lanes from Yeppen Roundabout to Jellicoe Street
  - intersection upgrades at both ends of the Fitzroy Bridge
  - intersection upgrades along High Street
- Prior to 2015
  - Upgrade Moores creek Road to 4 lanes between Yaamba Road and Kerrigan Street
  - Upgrade Bridge Street/ Lakes Creek Road to 4 lanes between Queen Elizabeth Drive and Berserker Street
  - Upgrade the Capricorn Highway to 4 lanes between Yeppen Roundabout and Gavial-Gracemere Road
  - Upgrade intersection on High Street at Musgrave Street and Moores Creek Road
  - Upgrade intersections at the ends of both bridges.

The study did not make a specific recommendation about future bridges across the Fitzroy River other than to say “if events in the future bring forward the implementation of a rail bridge then planning for the road bridge and its approaches should proceed to ensure adequate road corridor preservation”. The preferred alignment investigated in this work was along the Stanley Street alignment.

2.1.2 Capricornia Transport Study – 2003

Department of Main Roads and Queensland Transport completed an Integrated Regional Transport planning process for the Capricornia region in 2004. A Capricornia Transport Study (CTS) (2003) conducted by the Department of Main Roads provided the technical analysis underpinning the planning process. A component of this study was the development of a transport model. The study had a regional focus covering the previous four local government areas of Rockhampton, Livingstone, Fitzroy and Mount Morgan. It addressed the needs of all forms of transport without considering specific issues at a local level. The study had a longer term outlook with forecasts prepared for 2015 and 2030.

The study did not make specific recommendations on improvements to the road network. It did however draw the following conclusion “The river crossings in Rockhampton are unlikely to have much more reserve capacity for beyond 2015”.

3 Study Approach

The approach adopted for the study was broadly as follows:

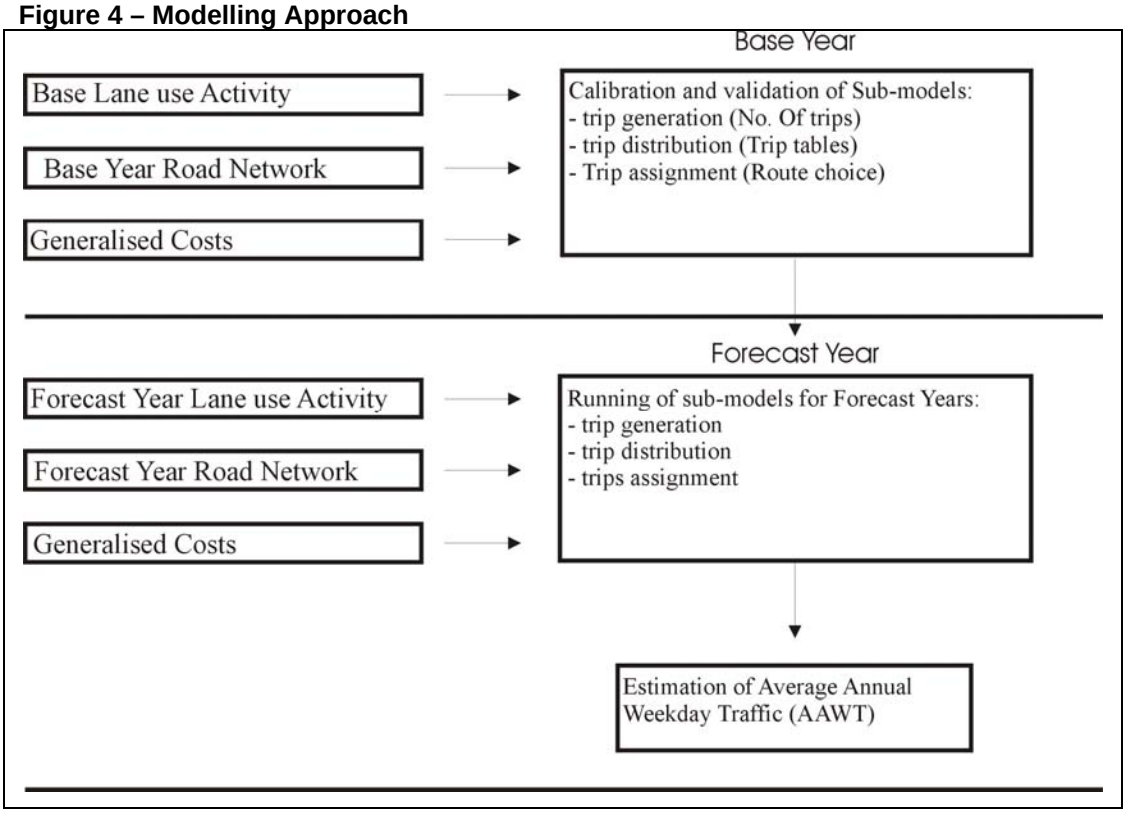
- gather existing data and information to be used to update the existing traffic model;
- utilise the existing CTS Cube traffic model re-calibrated and re-validated to a 2005 base year to provide forecast of future demand on the road network;
- develop a “do minimum” network by including the completed and committed road network projects into the base year road network;
- prepare demographic forecasts for two scenarios and three forecast years for input into the traffic model;
- agree with Rockhampton Council and DMR the method for assessing the performance of the road network;
- identify the network deficiencies for each of the forecast years;
- together with Council and DMR identify a range of road network options to address the network deficiencies; and
- provide advice on the future direction of the road network strategy.

3.1.1 Model Specification

The CTS model was updated to a 2005 base year for this study. The model supplied by DMR for the study was a three step model which is a well established and accepted modelling technique. The model was built within the Cube Voyager software which is a well tried and tested modelling software.

The overall modelling process is summarised in Figure 4.

Figure 4 – Modelling Approach



The three components of a three step model are:

- Trip generation – estimating how many trips the people of Rockhampton will make daily;
- Trip distribution – estimating where those trips will start and end; and
- Trip assignment – identifying which roads the trips are likely to use to get from their origin to their destination.

Public transport was not considered as part of this study as its share of daily trips is very low. It was also not part of the brief to considered public transport in any detail.

The traffic model is a link based only model and does not explicitly model the effects of intersections nor can it provide any analysis of intersections.

For the purposes of this study a number of modifications were made to improve the model base year which will be discussed in the following sections.

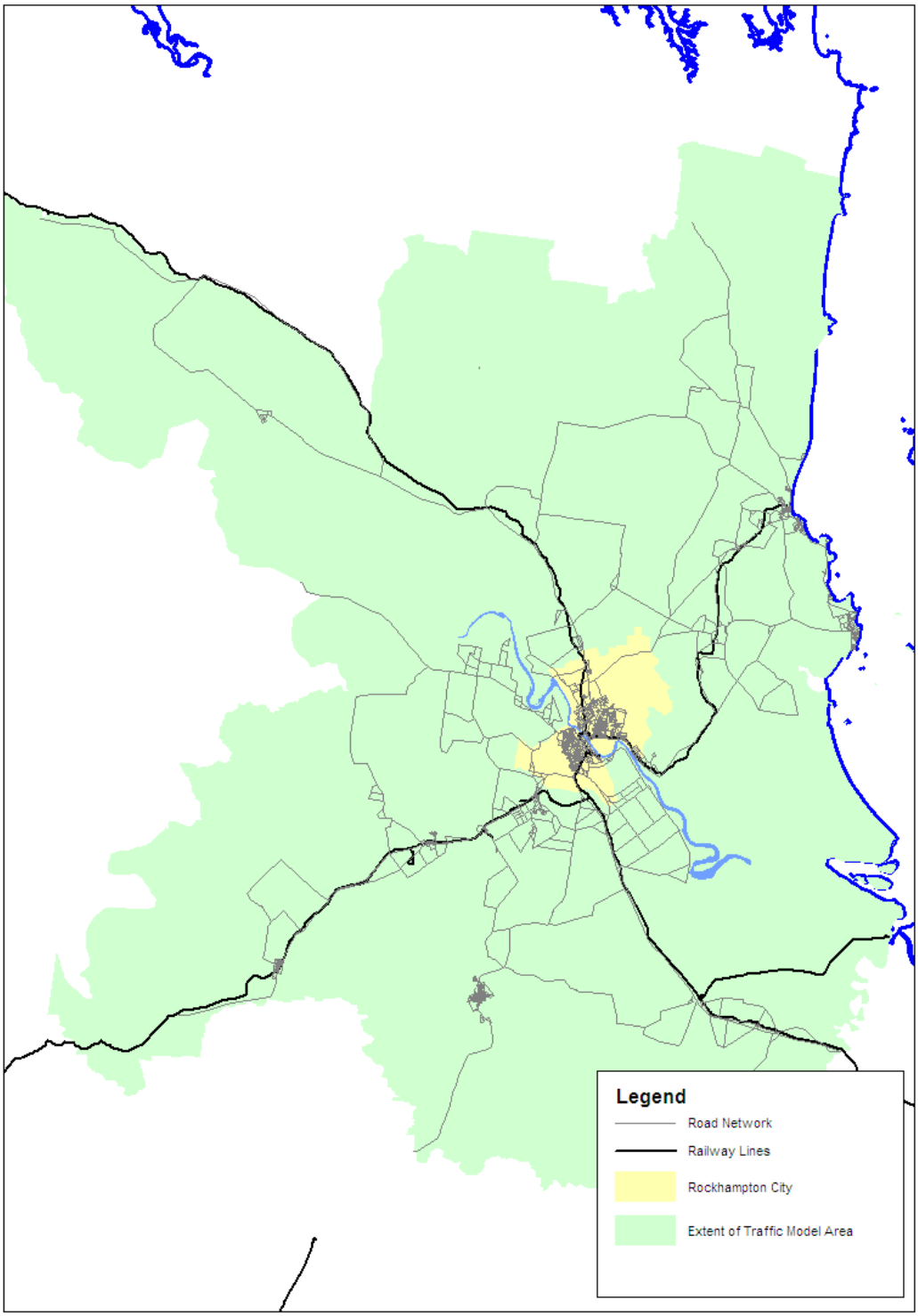
3.1.2 Time period modelled

The model was a daily weekday model.

3.1.3 Study area and zone system

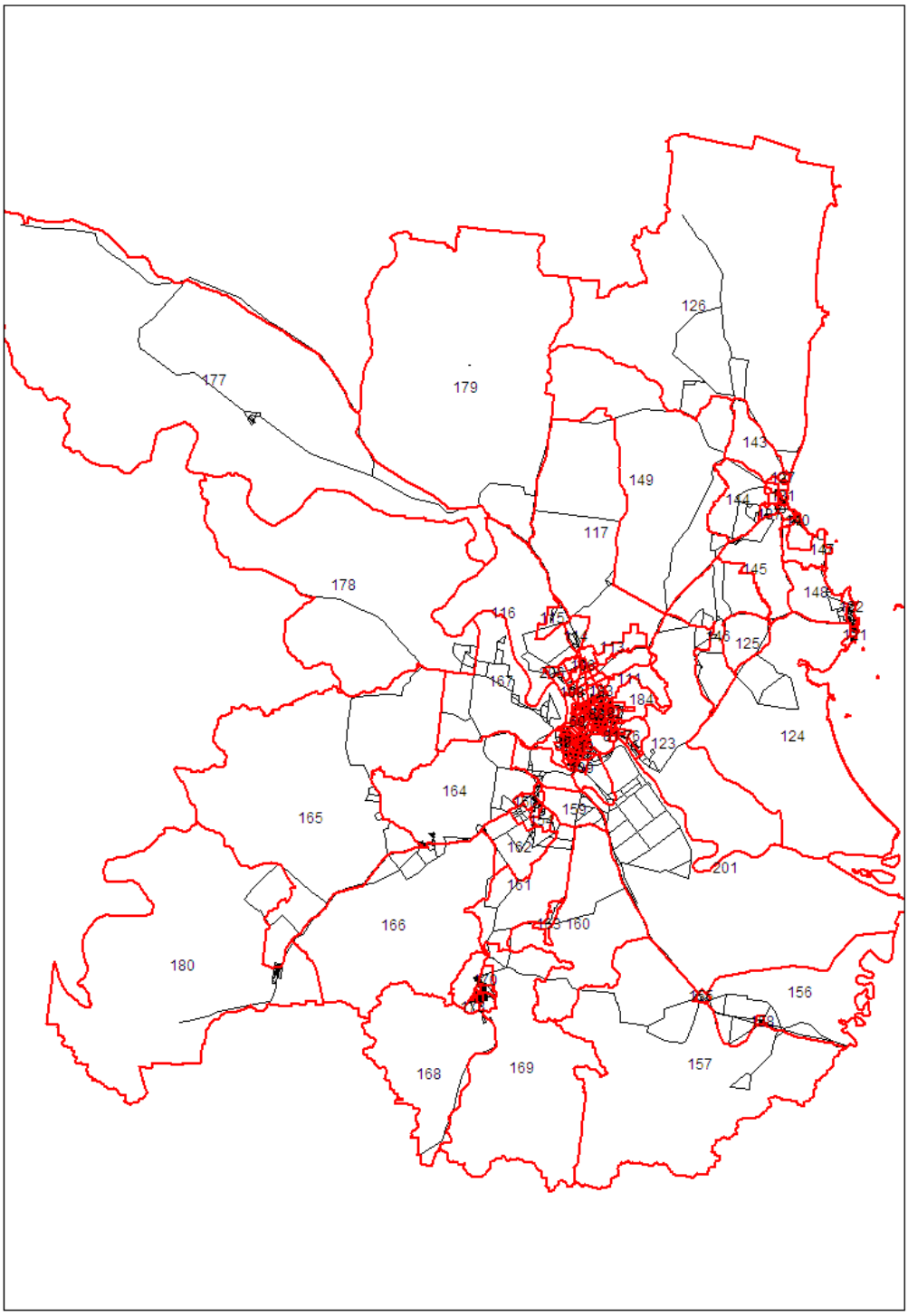
The area covered by the traffic model is the previous four local government areas of Rockhampton City, Livingstone Shire, Fitzroy Shire, and Mt Morgan Shire and is illustrated in Figure 5. The green area shows the extent of the traffic model while the study area is the yellow area at the centre of the figure.

Figure 5 – Extent of Traffic Model



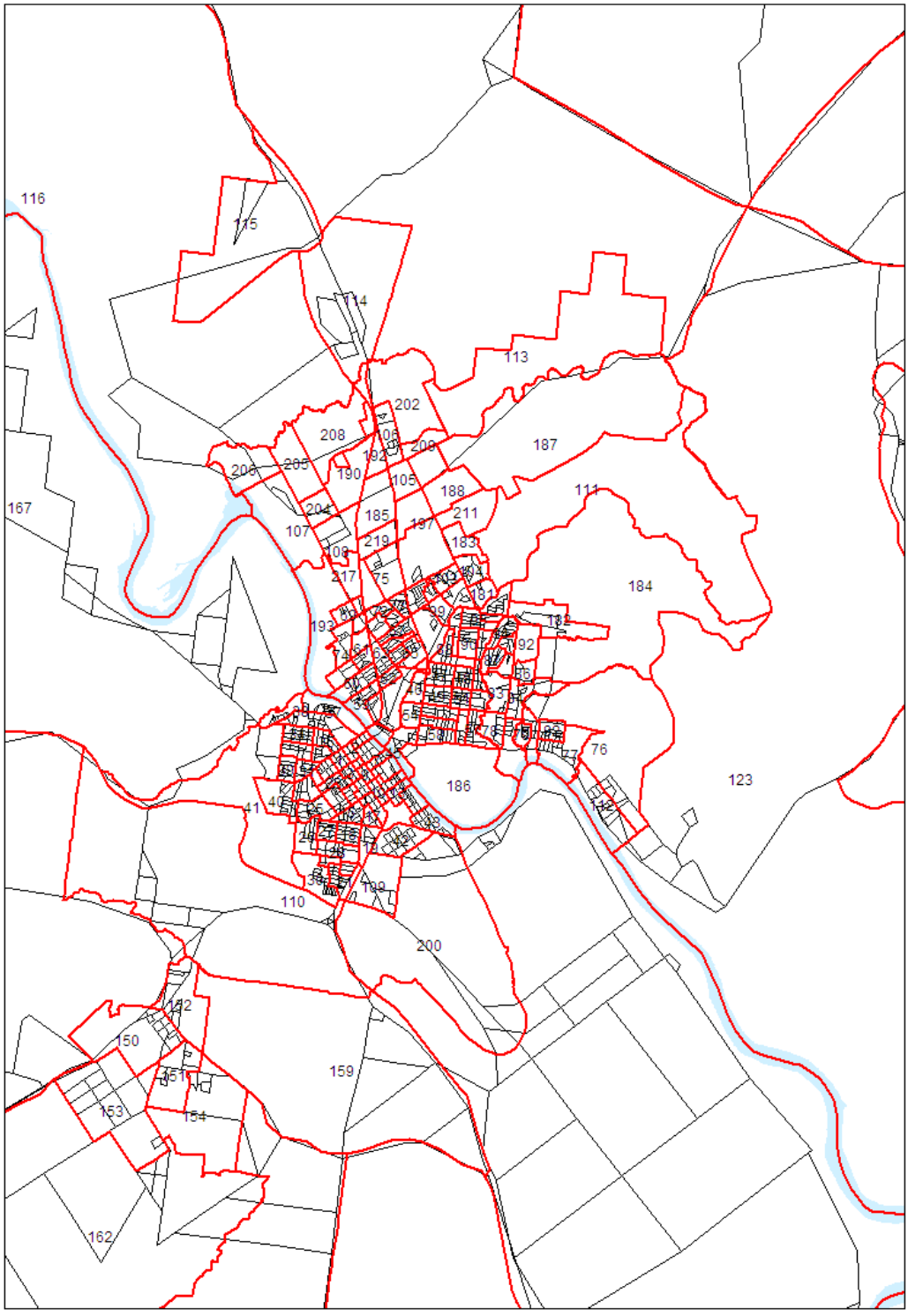
Study areas are divided into small homogenous areas known as traffic zones. This is assists in the estimation of demographic and travel characteristics across the city. The traffic zone system is shown in Figure 6 and Figure 7. There are a total of 219 internal zones in the model, with 5 external zones, which represents a change to the original Capricornia transport Model (CTM) and is discussed in Section 3.2. In general the zoning system was based on the Australian Bureau of Statistics (ABS) Census Collector Districts (2001), although further disaggregation was necessary to enable better representation of the effects of various land use types on the road network.

Figure 6 – Traffic Model Zones



The traffic originating or destined for a zone must load onto the network at a point. A centroid connector is the link between the land use and the road network. It is where traffic is loaded onto the network. A centroid connector may and usually does represent a number of local streets.

Figure 7 – Traffic Model Zones (Rockhampton)



In summary, the characteristics of the model are:

- A 2005 base year
- Covers the 2001 ABS Rockhampton Statistical Division (RSD), with the Rockhampton Council local government area as the primary study area
- A total of 219 internal and 5 external zones
- Is a traditional three-step model (mode choice is not specifically modelled).

Components of the model that have been updated to 2005 conditions were:

- The road network – to reflect the disaggregated zoning and
- The population and employment.

3.1.4 Trip purpose and user classes

Two user classes were included in the model, which was a change to the original model. They were:

- Cars, and
- Commercial vehicles.

Travel demands for all daily trips were estimated in the trip generation and distribution sub-models.

3.1.5 Updating the Capricornia Transport Model

The development of the base year sub-models and their calibration and validation to accepted standards is of fundamental importance in the production of robust forecasts. The following sub-models were included in model:

- Trip generation equations (discussed in Appendix A)
- Trip distribution parameters

An equilibrium assignment technique was adopted for the trip assignment phase.

3.1.6 Network details

The base network was taken from the existing model. A geographic information system (GIS) environment was used to update the network details to suit the revised zone system and to reflect changes in network details. A review of model details was undertaken using the following methods:

- GIS mapping
- Knowledge from previous studies
- Site visits
- Aerial photography
- Local knowledge of various areas.

The combination of all the above methods resulted in a model network that was an accurate representation of the 2005 road network.

3.1.7 Link parameters

Each link was coded with a number of parameters that relate to attributes used in the traffic assignment process. These include:

- Link type,
- Free flow speed,
- Capacity, and

- Number of lanes.

3.1.8 Special generators

Special Generators were defined for those larger specific land uses that that are atypical with respect to trip generation characteristics. The model included a relatively large number of special generator zones.

The special generators included in the model were:

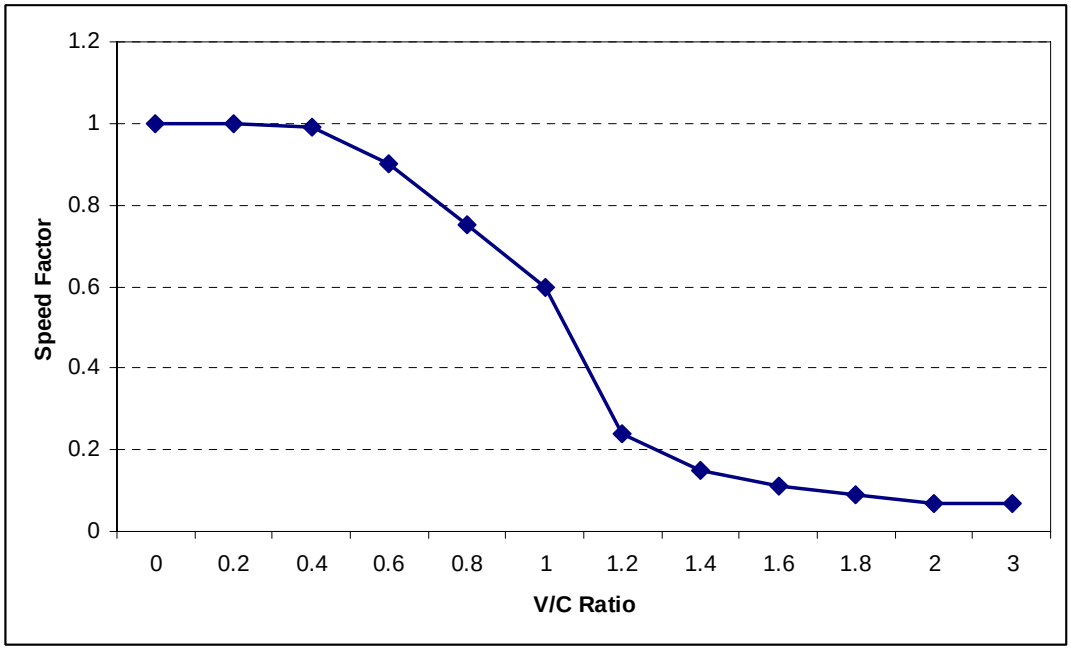
- Rockhampton General Hospital
- Rockhampton Airport
- University of Central Queensland
- Major Boarding Schools
- Large motels and hotels
- Large retirement homes, and
- Major shopping centres, including K Mart, Northside Plaza, Aquatic Place, and Stocklands Rockhampton.

The special generator approach was not altered from the original CTM, except that the number of trips generated by the Central Queensland university was found to be to high and was factored down in line with observed traffic count data.

3.1.9 Speed – flow curves

Speed flow curves are the mathematical description of the way in which link travel time is related to the traffic flow on the link and the capacity of the link. As traffic volumes increase on a link the travel time increases, reflecting the influence of traffic congestion. The general shape of the curve is shown in Figure 8.

Figure 8 – Speed Flow Curve



A series of speed flow curves were defined for each road class and were unchanged from the original CTM.

3.1.10 Trip distribution

A gravity model approach was adopted for the trip distribution stage. A single function was used for all trip purposed. The form of the gravity model is shown in the following equation.

$$T_{ij} = a_i b_j P_i A_j f(C_{ij})$$

Where:

- Tij is the forecast trips between any two zones
- a and b are balancing factors
- Pi is the number of productions in zone i
- Aj is the number of attraction in zone j
- f(Cij) is a function of generalised cost defined as:

$$f(C_{ij}) = c_{ij}^{\alpha} * \exp(\beta c_{ij})$$

Where:

- cij is the generalised cost of travel by zones i and j
- alpha is -0.59496
- beta is -0.0812412.

No changes were made to the trip distribution component of the CTM.

3.1.11 External model

Trips to or from the external zones are controlled to vehicle flow totals at the external cordon points. The control totals to be adopted for the modelling are shown in Table 11. the daily flow by direction was assumed to be equivalent in both directions.

Table 11 – Base Year (2005) External Daily Traffic Flows

Location	Zone Number	Daily Two Way Flow (Cars)	Daily Two Way Flow (CV)
Bruce Highway (at Raglan Creek)	220	1598	622
Burnett Highway (south of Mt Morgan)	221	264	66
Capricorn Highway (west of Grantleigh)	222	1176	297
Bruce Highway (at Churchill Creek)	223	770	330
Byfield Road	224	352	23

3.1.12 Data Collection

Traffic count data was made available by both Rockhampton Council and DMR for this study. Traffic growth rates obtained from the permanent count sites was used to adjust any count data to the base year of 2005.

Traffic count data was used to validate the base year traffic model.

4 Base Year Demographic Data

Estimates of demographic characteristics for each zone for the base year 2005 were made with the assistance of a number of inputs, including:

- 2001 census information ;
- Forecasts from Planning Information and Forecasting Unit (PIFU);
- Advice from Rockhampton City; and
- Other mapping information.

For each traffic model zone, estimates for the following variables were made:

- Households,
- Persons,
- Workers,
- Dependents,
- Cars,
- Retail jobs,
- Non-retail jobs, and
- Enrolments.

Table 12 shows the base year data aggregated to sectors. Figure 9 shows the location of the sectors.

Table 12 – Base Year (2005) Demographic Data

Sector	House-holds	Persons	Workers	Depend-ents	Cars	Retail	Non-retail	Enrol-ments
1	3,720	10,274	4,372	5,902	5,915	157	3,049	1,099
2	1,337	2,961	653	2,308	1,477	106	396	462
3	10,108	26,627	10,225	16,404	14,844	1,408	3,810	4,879
4	4,069	10,235	4,541	5,692	5,444	917	2,445	2,579
5	6,999	17,590	7,574	10,015	9,797	1,429	2,433	3,693
6	2,984	7,497	3,449	4,048	3,868	172	1,781	18,960
7	1,016	2,555	910	1,644	941	2,487	4,514	141
8	6,665	16,752	6,552	10,201	8,180	1,339	3,647	7,723
9	127	318	191	128	194	11	13	57
10	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-
13	674	1,694	711	982	794	32	77	296
14	1,294	3,254	1,331	1,922	1,740	193	1,307	210
15	119	299	112	187	125	22	454	-
RCC	23,947	60,194	25,371	34,819	31,083	6,602	16,671	33,659
Totals	39,112	100,056	40,621	59,433	53,319	8,273	23,926	40,099

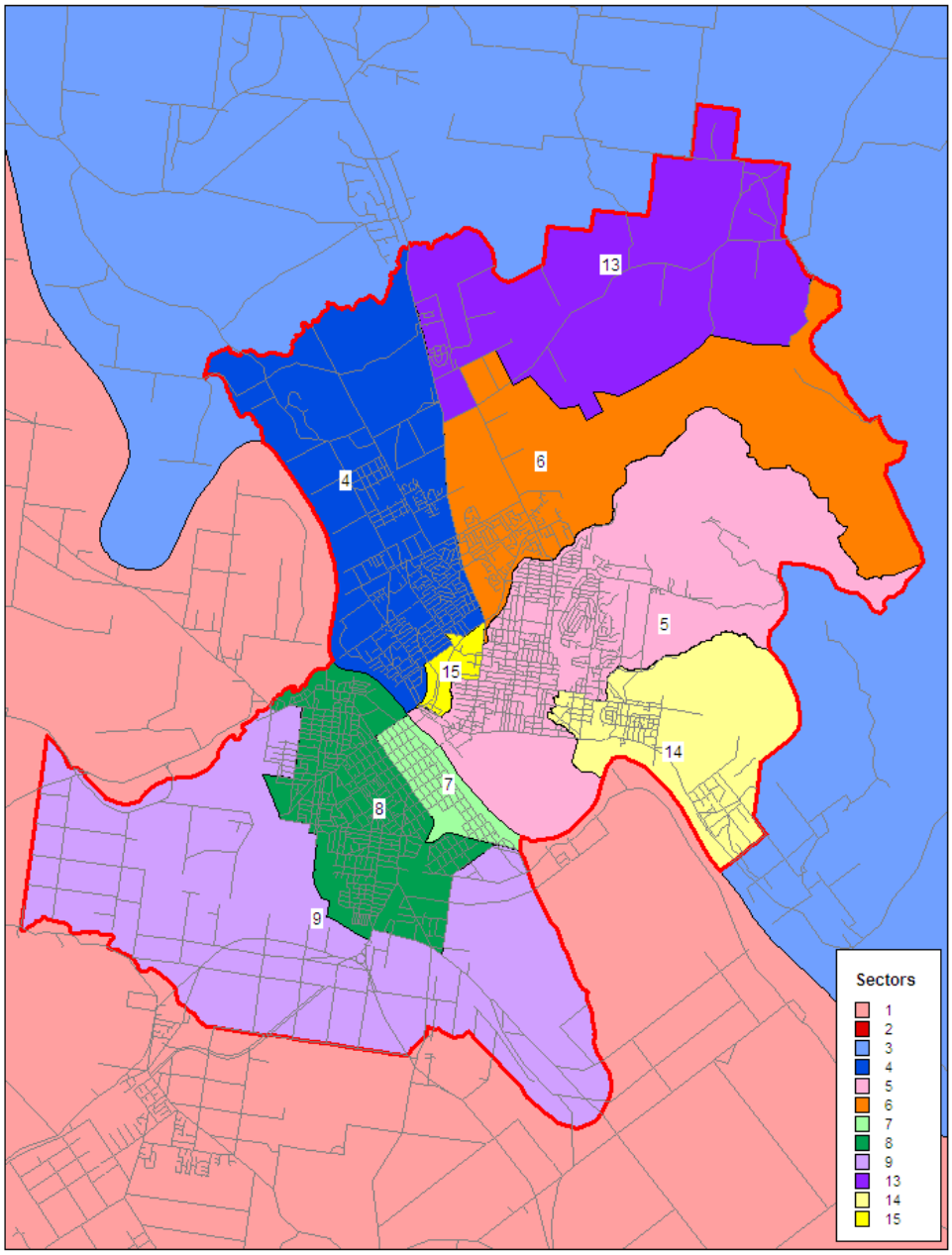
Note: Sectors 10 – 12 relate to the external zones and as such do not have demographic estimates.

In 2005 the population of the region was approximately 100,000 people of which 60% were resident within Rockhampton City. However 80% of retail jobs and 70% of other jobs were located within Rockhampton City.

Travel characteristics are a function of the demographic characteristics of an area. The number of trips a person makes is dependent on such things as whether they work or are retired, whether they are at school. Accurate estimates of the demographic characteristics are essential to estimate reliance of traffic forecasts.

The demographic characteristics are inputs to the trip generation component of the model.

Figure 9 – Study Area Sector System



Note: Sectors 10,11,12 cover the external cordon point while sector 2 covers the former Mt Morgan Shire area.

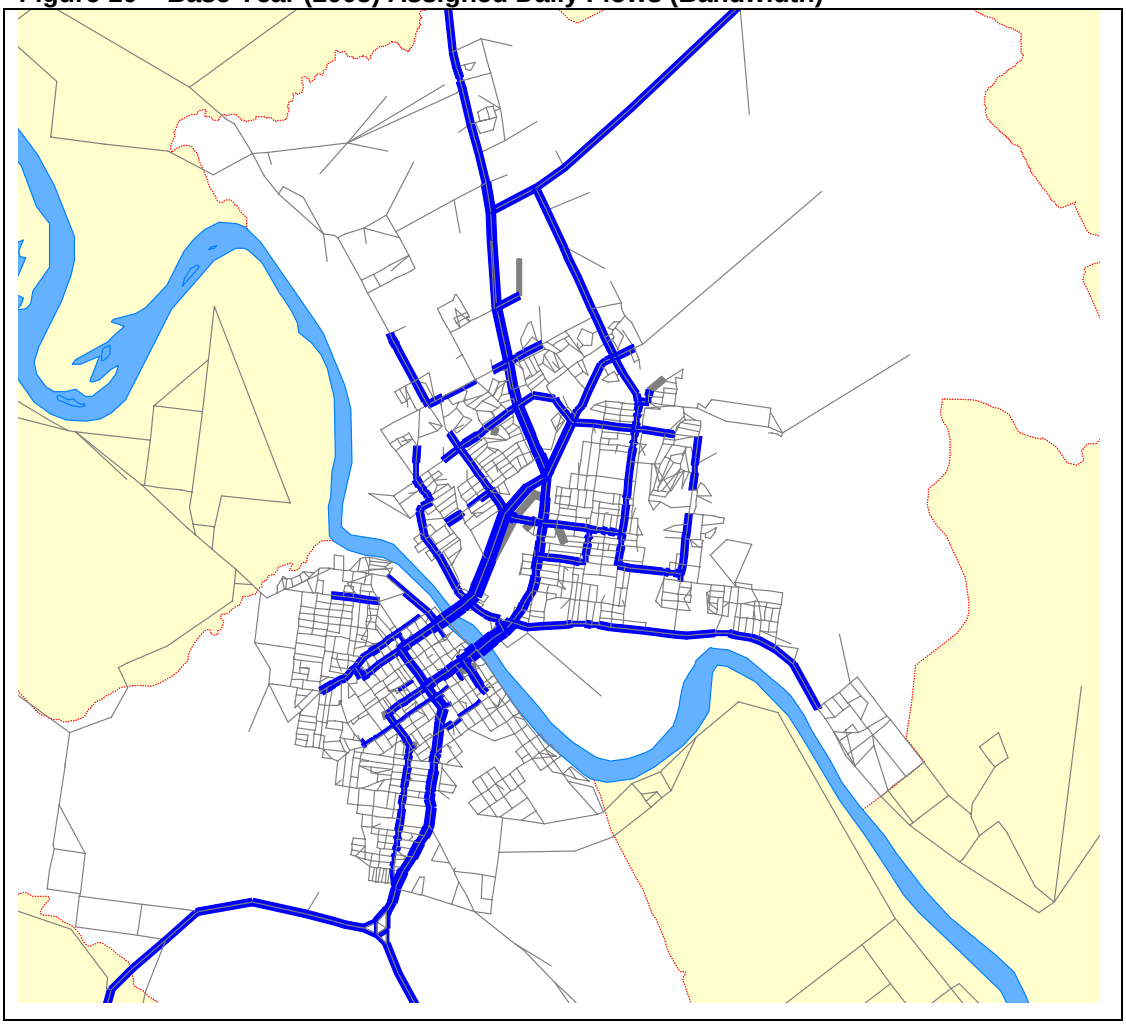
5 Model Calibration and Validation

The traffic model is an all day model. Further work was required to improve the level of validation of the model for which a number of approaches were adopted, including improving the trip matrix, through a combination of:

- Corrections to the trip generation rates, particularly in the surrounding shires,
- Sector to sector factoring, and
- Using select link matrices to identify origin and destinations for particular links and screenlines.

The result was a calibrated matrix that contained approximately 286,000 daily trips. The calibrated base year trip matrix is tabulated at a sector level in Table 13.

Figure 10 – Base Year (2005) Assigned Daily Flows (Bandwidth)



Note:

- The width of the bar represents the volume of daily flow on a link. The thicker the band the higher the daily volume.
- Figure 1 or Figure 10 show the road names for the key links in the Rockhampton network.

Figure 10 shows the daily traffic flows for the validated base year on the network in bandwidth format. The figure highlights a number of key points:

- the role the Bruce Highway, comprising Yaamba Road, Moores Creek Road, Albert Street, George Street and Gladstone Road performs in the Rockhampton road network

- the importance of the two river crossings, the only connections between north and south Rockhampton.
- The level of daily demand between Rockhampton and the Capricorn Coast (Yeppoon and Emu Park) via either Rockhampton – Yeppoon road or Lakes Creek Road
- the Capricorn Highway between Rockhampton and Gracemere to the west.

Other key corridors include Glenmore Road, Alexandra Street, Norman Road, Dean Street and Upper Dawson Road. Figure 10 shows the location of these corridors.

An element of the model validation was to review the traffic crossing the Fitzroy River. A select link method, which captures only those trips on a particular link in the network, was used and the results are shown in Figure 9. The purple band shows where traffic using the Neville Hewitt Bridge originate from or is destined to, while the orange bands show the similar information for the Fitzroy Bridge.

The Neville Hewitt Bridge (highlighted in purple) provides primarily a longer distance cross city role with a small local role while the Fitzroy Bridge provides access to the city centre but most notably due to network connectivity it caters for cross river trips from the Glenmore Road and Lakes Creek Road corridors and longer distance traffic from these two corridors must pass through the city centre. The importance of both bridges in the road network dictates the need to ensure the validation is good across the Fitzroy River.

Figure 11 – Travel Demand on Fitzroy River Bridges

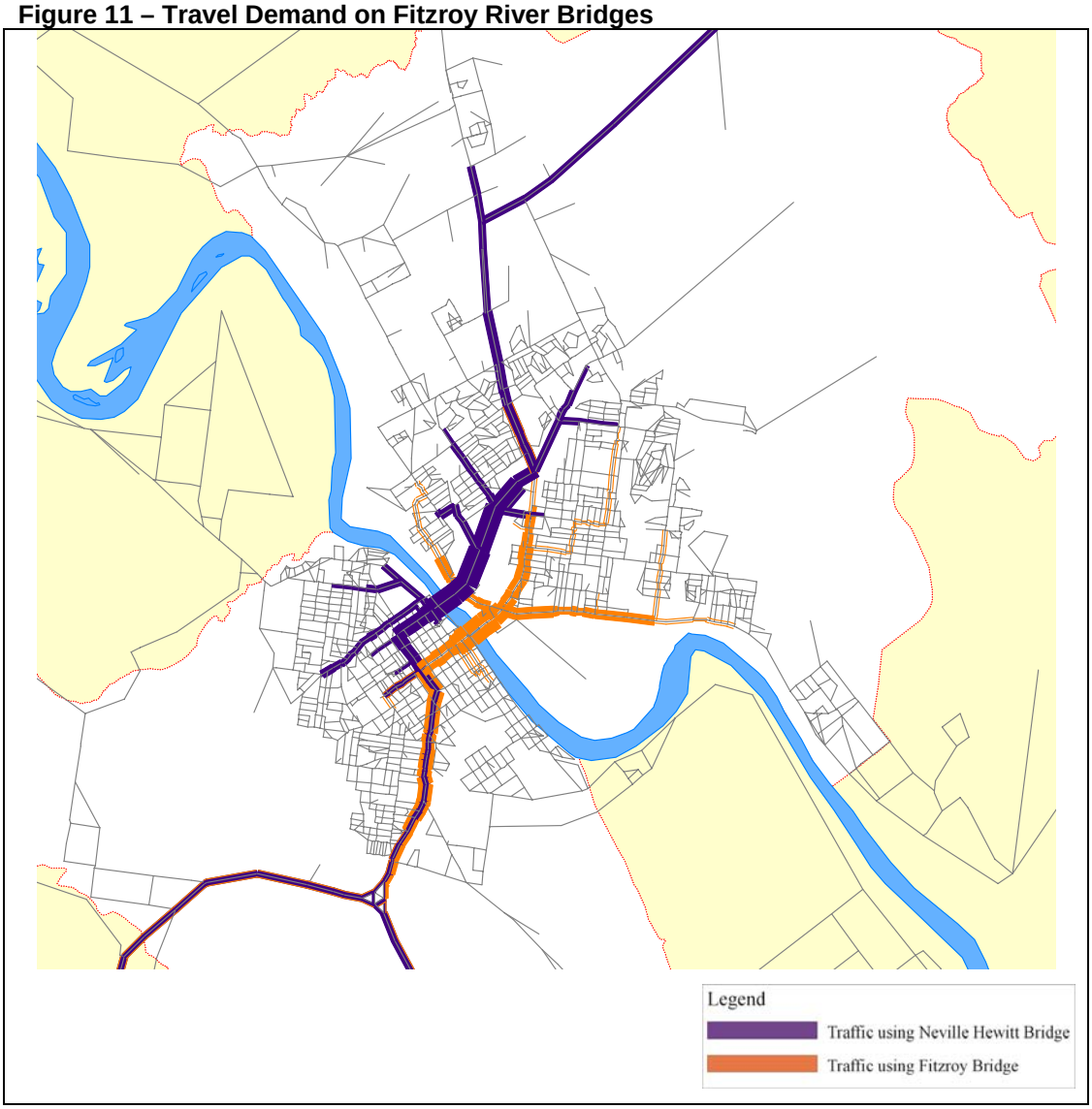


Table 13 – Base Year Travel Demand

Sector	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
1	5765	205	540	1284	1358	451	1200	2994	134	121	213	17	90	189	646	**15206**
2	204	824	37	74	78	26	72	158	6	6	27	13	5	11	36	**1579**
3	583	41	31055	1878	2410	1130	574	1224	53	220	150	250	435	355	953	**41311**
4	1427	83	1881	8512	7656	4308	3006	4833	193	389	285	145	698	719	3922	**38056**
5	1400	80	2931	7714	12918	4429	4693	4651	182	414	306	236	655	1520	5833	**47963**
6	498	29	1146	4266	4410	2243	1409	1698	64	169	125	92	355	394	1780	**18678**
7	1210	72	582	3137	4734	1439	2370	13056	192	61	46	15	217	501	1813	**29444**
8	2876	120	1190	4652	4707	1654	13439	18413	662	297	291	70	325	615	2702	**52014**
9	133	6	48	168	167	57	201	689	74	8	7	2	12	25	94	**1691**
10	65	3	195	272	282	286	230	350	4	1	433	200	14	33	8	**2375**
11	132	14	140	208	218	222	176	268	4	430	50	64	12	26	6	**1968**
12	10	13	248	114	137	210	53	64	1	202	61	19	13	11	2	**1158**
13	99	6	436	698	655	354	214	323	13	30	23	31	329	56	264	**3531**
14	189	11	394	723	1520	394	501	595	23	53	39	19	56	719	484	**5721**
15	698	39	953	3922	5833	1780	1775	2653	97	7	6	3	264	484	6760	**25273**
Total	**15289**	**1545**	**41777**	**37619**	**47082**	**18984**	**29913**	**51970**	**1701**	**2407**	**2061**	**1175**	**3481**	**5659**	**25304**	**285967**

5.1.1 Model Validation

The validation criteria adopted for this study focused on link volumes. They are designed to measure the model 'goodness of fit' between modelled and observed models.

The criteria adopted for the study were:

- 85% of screenlines are within ±4%
- The majority of daily link flows within 10%.

Table 14 – Screenline Validation Summary

Screenline	Direction	Observed	Estimated	Percent Difference
A – Northern Cordon	Eastbound	14,189	14,239	0.3%
	Westbound	14,189	13,797	-2.8%
B – Frenchman's Creek	Eastbound	16,859	17,010	0.9%
	Westbound	16,836	17,625	4.7%
C – Moores Creek	Eastbound	37,393	37,835	1.2%
	Westbound	37,393	38,707	3.5%
D – Bruce Highway (North)	Eastbound	27,472	27,813	1.2%
	Westbound	27,472	27,626	0.6%
E – Bruce Highway (South)	Eastbound	43,012	45,123	4.9%
	Westbound	43,412	44,115	1.6%
F – Fitzroy River	Northbound	36,278	35,965	-0.9%
	Southbound	36,462	36,576	0.3%
G – Southern Cordon	Eastbound	13,063	13,229	1.3%
	Westbound	13,258	13,403	1.1%
Total		334,275	337,939	1.1%

The results of the screenline level validation are shown in Table 14. The results show all screenlines validate to within approximately 5% and 85% of screenlines validate to within 4%; thereby meeting the validation criteria. At a screenline level the model validates very well. The location of each screenline is shown on Figure 10.

Figure 12 – Traffic Model Validation Screenlines

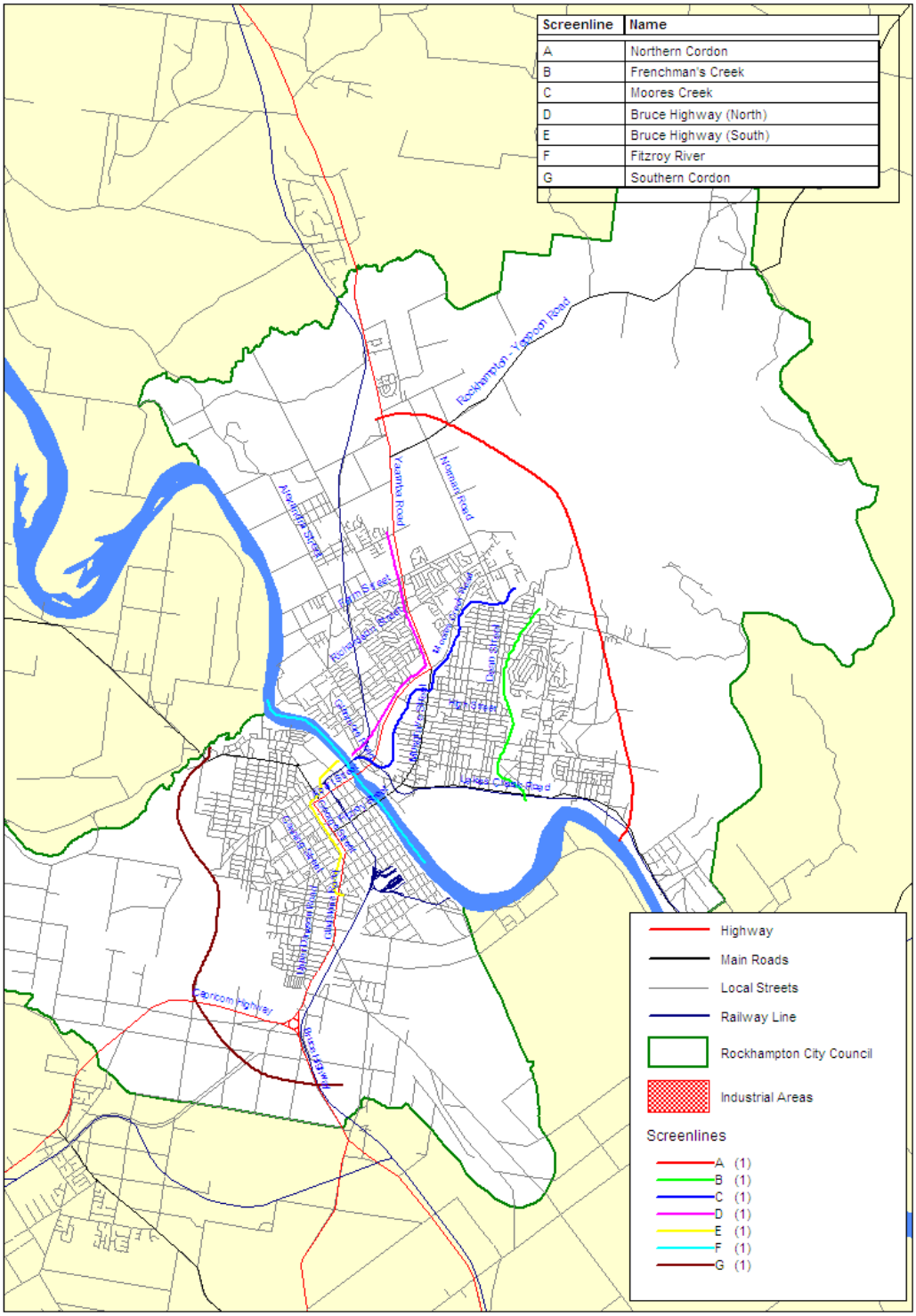


Table 15 – Key Locations – Fitzroy River Bridges

Bridge	Direction	Observed	Estimated	Percent Difference
Neville Hewitt Bridge	Northbound	16,757	17,034	1.7%
	Southbound	16,739	17,303	3.4%
	Total	33,496	34,337	2.5%
Fitzroy Bridge	Northbound	19,521	18,931	-3.0%
	Southbound	19,723	19,273	-2.3%
	Total	39,244	38,204	-2.7%

Table 16 – Key Locations – State Controlled Roads

Road Link	Direction	Observed	Estimated	Percent Difference
Bruce Highway (North of Rockhampton – Yeppoon Road)	Northbound	6,491	6,438	-0.8%
	Southbound	6,491	6,363	-2.0%
	Total	12,982	12,801	-1.4%
Yaamba Road (Boland Street Loops)	Northbound	13337	11364	-14.8%
	Southbound	11543	11367	-1.5%
	Total	24880	22732	-8.6%
Bruce Highway (South of Capricorn Highway)	Northbound	4,644	4,589	-1.2%
	Southbound	6,639	6,520	-1.8%
	Total	11,283	11,109	-1.5%
Lakes Creek Road (West of Dee Street)	Eastbound	4535	3937.45	-13.2%
	Westbound	4395	3964.53	-9.8%
	Total	8930	7901.98	-11.5%
Lakes creek Road (Shire Boundary)	Eastbound	2321	2128.85	-8.3%
	Westbound	2269	2131.73	-6.0%
	Total	4590	4260.58	-7.2%

Capricorn Highway (West of Bruce Highway	Eastbound	6,444	6,625	2.8%
	Westbound	6,639	6,520	-1.8%
	Total	13,083	13,145	0.5%

Table 17 – Key Locations – Rockhampton City Roads

Road Link	Direction	Observed	Estimated	Percent Difference
Norman Road	Northbound	5435	5682	4.5%
	Southbound	5435	5079	-6.5%
	Total	10870	10761	-1.0%
Kerrigan Street	Eastbound	5,772	6,809	18.0%
	Westbound	5,772	6,666	15.5%
	Total	11,543	13,475	16.7%
High Street	Eastbound	11,229	9,992	-11.0%
	Westbound	11,229	10,468	-6.8%
	Total	22,457	20,460	-8.9%
Glenmore Road	Eastbound	4,656	4,807	3.2%
	Westbound	4,656	4,736	1.7%
	Total	9,311	9,543	2.5%
Farm Street	Eastbound	3,771	3,629	-3.8%
	Westbound	3,771	3,794	0.6%
	Total	7,543	7,422	-1.6%
Richardson Road	Eastbound	5,223	5,304	1.5%
	Westbound	5,223	5,356	2.5%
	Total	10,447	10,661	2.0%
Alexandra Street	Eastbound	7,714	8,344	8.2%
	Westbound	7,714	8,035	4.2%
	Total	15,428	16,379	6.2%
Lion Creek Road	Eastbound	4,000	4,459	11.5%
	Westbound	4,000	4,005	0.1%
	Total	8,000	8,465	5.7%

A detailed summary of the model link validation is contained in Appendix C

5.1.2 Summary of Model Validation

At a screenline level the model validates very well. This indicates that in broad terms the number of trips being generated is reasonable and that the distribution of these trips is also reasonable. Only two screenlines are outside the criteria but not significantly.

The two bridges are also well validated. Given the close proximity of both bridges it was not unexpected that some route choice issues would be seen. This is reflected in the result that the Fitzroy Bridge validation is slightly negative while the Neville Hewitt Bridge validation is slightly positive.

For the other key locations the validation is acceptable. There was a small bias in that the validated flows are less than the observed however in the majority of cases the differences are small. For the directional results it was noticeable with some of the counts a directional bias exists at the all day level. In the majority of cases it was not possible to replicate this outcome in the model.

In summary the model provides a good tool from which to forecast future year travel demands.

6 Road Network Hierarchy and Deficiency Definitions

Evaluation of the performance of the road network will be done in two ways.

- An operational deficiency assessment where the forecast daily flow is compared to desired maximum daily flow based on the physical capacity of the road; and
- A hierarchic deficiency assessment where the desired maximum daily flow is based on the function of road in the network.

The desired maximum daily flows for operational and hierarchic deficiency are discussed below.

6.1.1 Operational Deficiency Volumes

Operational deficiency volumes are derived from a Level of Service (LOS) method. Six categories are defined ranging LOS A down to LOS F. In broad terms LOS A means that cars are able to drive on the road unencumbered by other vehicles. LOS A equates to free flow conditions. Conversely LOS F represents the most congested situation. Traffic flow has broken down and it is characterised by long traffic queues and substantial delay.

To maintain acceptable operating conditions, Rockhampton Council adopted a desired LOS C for their road network. This represents approximately 65% of the capacity of the road. While the road can carry higher volumes it is desirable that operating conditions not deteriorate to the levels of major urban centres.

Each road type will have a different deficiency volume because the deficiency volume is a function of the capacity of the link. The capacity is defined by elements such as:

- lane width
- geometry and alignment
- intersections, both type and spacing along a road
- abutting development

The deficiency volumes adopted for this study are shown in Table 18.

Table 18 – Road Network Deficiency Volumes

Road Type	Deficiency Capacity (AADT)	Deficiency Capacity (AAWT)	Indicative LOS
Two lane urban road (Rockhampton Council)	12,200 vpd	13,000 vpd	C
Two lane urban road (DMR)	16,000 vpd	17,000 vpd	D/E
Four Lane urban road – Lower Standard	25,400 vpd	27,000 vpd	C
Four Lane urban road – Medium Standard	28,200 vpd	30,000 vpd	C
Four Lane urban road – Higher Standard	37,600 vpd	40,000 vpd	D/E
Six Lane urban road	56,500 vpd	60,000 vpd	D/E

Note: AAWT is Annual average weekday traffic.

Typically the higher standard road has higher design standards characterised by a central median and limited vehicular access while the lower standard is characterised by the lack of a median, parking and access to fronting development.

6.1.2 Road Hierarchy Definition

The hierarchy definition is set out in the Rockhampton City Plan and has been summarised in Table 19.

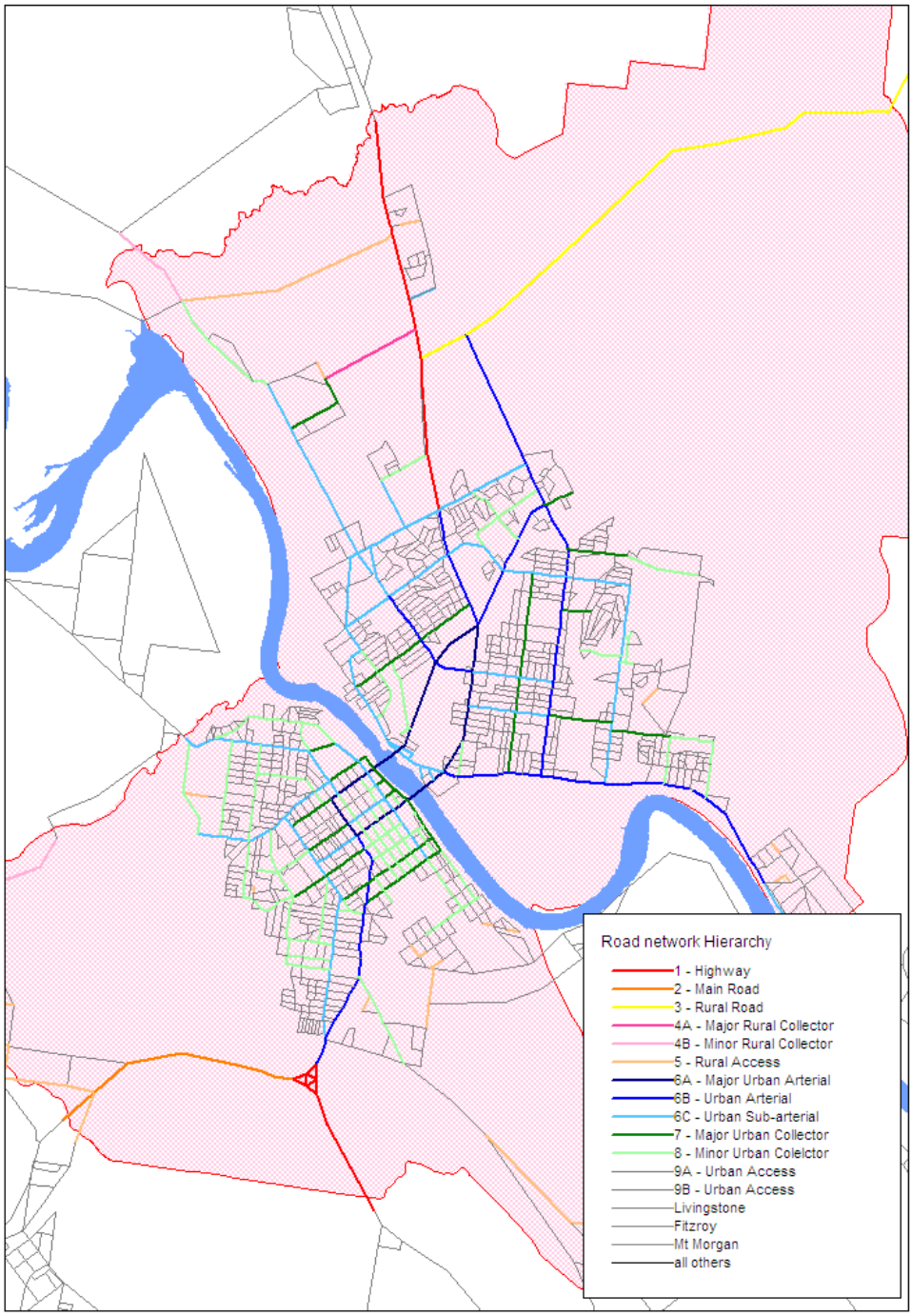
Table 19 – Road Network Hierarchy Classification

Class	Description	Functional Description	Guide to Traffic Volume
1	Highway	Those roads that form the principal avenue of communication between and through, major regions of Australia	High speed, high volume routes – volume equivalent to the deficiency volume
2	Main Road	Those roads, not being Class 1, whose main function is to form the principal or alternative avenue of communication for movements between a state capital and key towns which have a state or national significance or which have a significant national or state economic/ social interaction or between a state capital and adjoining states and their capital cities or between key towns which have significant regional economic/ social interaction	volume equivalent to the deficiency volume
3	Rural Arterial	Those roads not being class 1 or 2 whose main function is to form an avenue of communication for movements between important centres and the Class 1 and Class2 roads and/ or key towns or between important centres which have a significant economic, social, tourism, or recreational role.	volume equivalent to the deficiency volume
4	Rural Collector A Major Rural Collector B Minor Rural Collector	Those roads not Class 1,2 or 3 roads whose main function serves the purpose of collecting and distributing traffic from local areas to the wider road network including access to abutting properties	 1,000 – 8,000 AADT < 1,000 AADT
5	Rural Access A primary Rural Access B Secondary Rural Access C Minor Rural Access unformed or rough track	Those roads which connect to Class 1,2,3 or 4 roads and whose main function is to provide access to rural residences and properties ; or provide exclusivity for one activity or function	 10 – 100 AADT < 100 AADT
6	Urban Arterial A Major Urban Arterial B Urban Arterial	Those roads whose main function is to perform as the principal arteries for through traffic and freight movements access urban areas, provide	 > 30,000 AADT 10 – 30,000

Class	Description	Functional Description	Guide to Traffic Volume
	C Urban Sub Arterial	access to major freight terminals freight movement and access to major transport terminal, or which are extensions into urban areas of Class 2 or Class 3 roads.	AADT < 10,000 AADT
7	Major Urban Collector	Those roads not being Class 6 whose main function is to complete the major road network across the metropolitan area and carry intra-urban traffic and/ or commercial and industrial traffic; or serve as supplementary public transport corridors; or form part of a regularly spaced road network supplementary to the principal urban road network	3000 – 6000 AADT
8	Minor Urban Collector	Those roads which are neither Class 6 or 7 roads whose main function serves the purpose of collecting and distributing traffic from local areas to the wider road network including access to abutting properties.	< 3,000 AADT
9	Urban Access A Urban Access Street B Urban Access Place	Those roads which are neither Class 6,7, or 8 roads and whose main function is to provide access tor residence and properties; or provide exclusivity for one activity or function	 < 750 AADT < 400 AADT

Figure 13 depicts the current road hierarchy for Rockhampton.

Figure 13 – Existing Road Network Hierarchy



7 Existing Road Network

7.1.1 Local Context

The major road network in Rockhampton was dictated historically by the topology of the region. The Fitzroy River is a significant natural feature due to its size and its flood plain renders large tracts of land unfit for intensive urban development. As with many regional centres the Bruce Highway performed the dual role of catering for intra-state movement as well as local movement within the city.

The Bruce Highway forms the spine of the road network linking north and south Rockhampton via the Neville Hewitt Bridge. The Fitzroy Bridge undertakes a slightly different function. It provides direct access to the city centre from the north and caters for other movements not possible via the Neville Hewitt Bridge such as access to Lakes Creek Road and Glenmore Road.

Two key issues currently emerging in Rockhampton are congestion on the approaches to both bridges during peak periods and congestion in the vicinity of the Stocklands Shopping Centre. The majority of Rockhampton residents are located north of the river. The location of major employment and business is in Central Rockhampton immediately south of the Fitzroy River. Key regional facilities such as the hospital, airport, and train station are also located south of the river. A strong desire for cross river movement results from the location of population, employment and key regional facilities. The close proximity of bridges to each other focuses travel in a narrow region of the city, on Moores Creek Road and Musgrave Street north of the river and Albert Street and Fitzroy Street south of the river. Moores Creek Road and Musgrave Street provide access to the Stocklands development. Increased congestion on the Neville Hewitt Bridge has wider implications for the efficient movement of goods and freight.

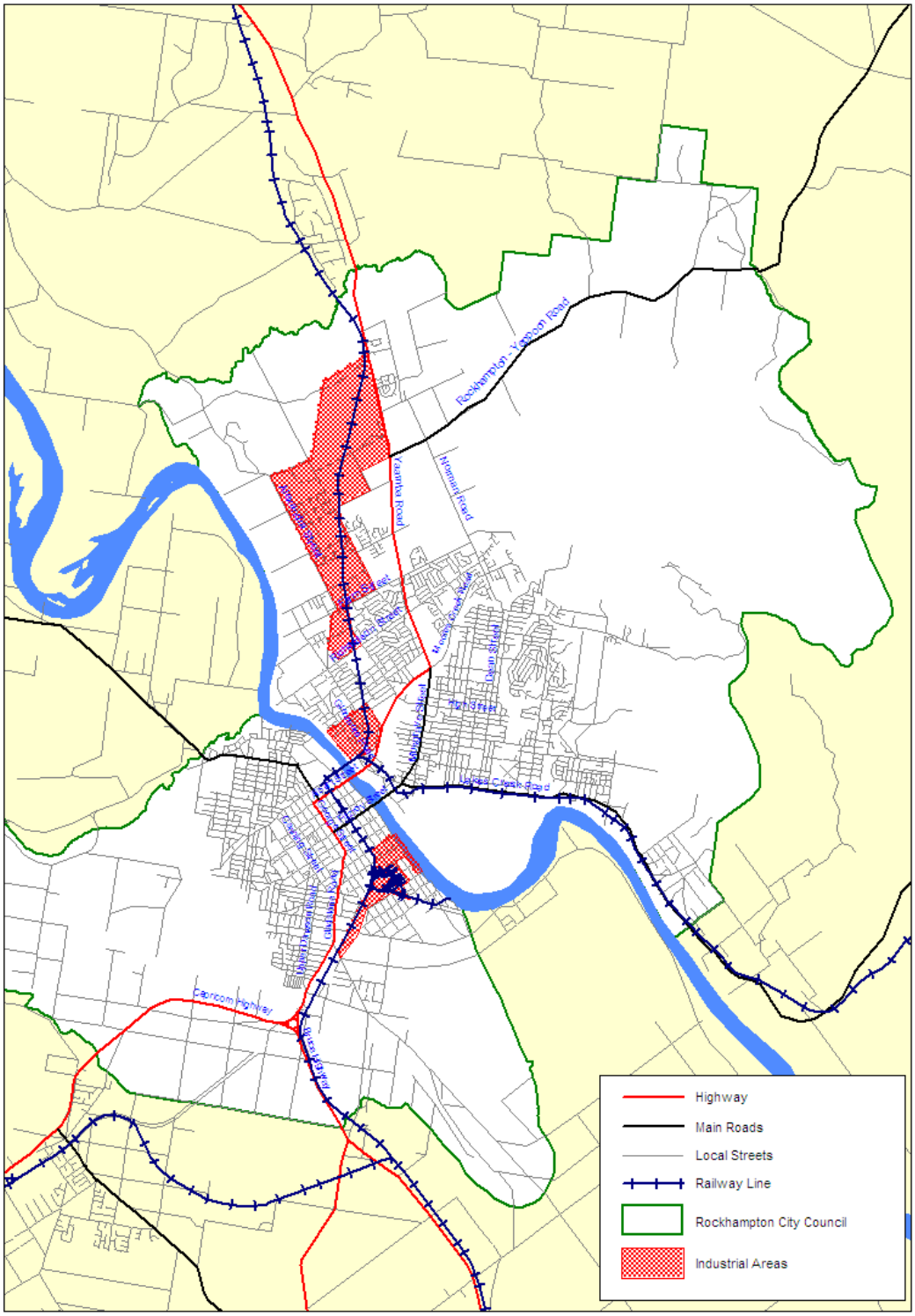
A number of other issues are emerging also:

- Glenmore Road/Haynes Street/Hollingsworth St – where increased development in the north of the city will continue to increase traffic (some of which is industrial in nature) passing through a primarily residential community;
- Alexandra Street – which intersects with High Street and Moores Creek Road at its southern end in the vicinity of Stocklands;
- Wandal Road – local amenity associated with increased traffic through the retail area; and
- Norman Road – where a growth in population is forecast to occur.

Another major impediment within the road network is the main North Coast railway line. The rail line passes through Rockhampton with a number of controlled open level crossings (OLC) where significant localised congestion occurs during times of closures for train movements.

The location of the major industrial areas in north Rockhampton are generally in close proximity to the rail corridor. The access to or from these areas from the strategic road network is through residential areas. Figure 14 shows the major road network and the location of the major industrial areas. One of the challenges for the future will be to ensure efficient heavy vehicle access into the industrial areas while maintaining the integrity of the residential area. Reducing the traffic intrusion into the residential areas will assist in reducing the impact on the residential areas.

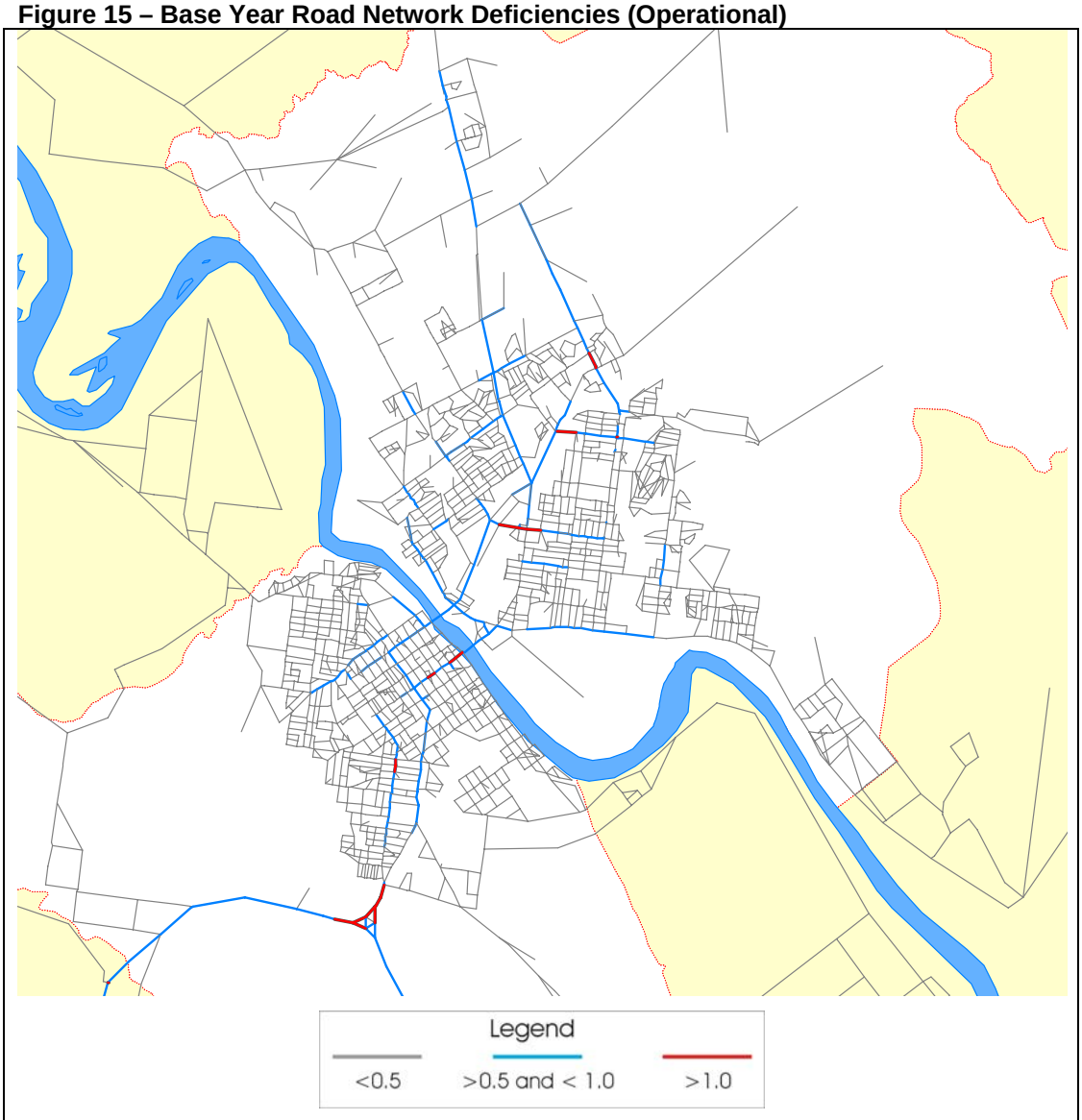
Figure 14 – Major Industrial Areas



7.1.2 Existing Road Network Performance

An operational evaluation based on deficiency volumes and an hierarchical evaluation based on hierarchy volumes was undertaken for the base year. Figure 12 highlights those links where the estimated daily flow is approaching the operational deficiency volume (blue) or exceeds the operational deficiency volume (red). Figure 13 highlights those links where the daily flow is in excess of the desired volume based on the hierarchy classification of the road.

Figure 15 – Base Year Road Network Deficiencies (Operational)



Operationally a number of links within the network were deficient in 2005. Those links identified as being deficient are shown in Table 20.

Table 20 – Base Year Road Network Deficiencies

Road Section	Hierarchy Classification	Operational Desired Maximum Daily Flow (vpd)	Daily Flow (vpd)
Fitzroy St between southern abutment and Bolsover St	Urban Arterial	32,500	32,100 – 37,600
High St between Aquatic Pl and Ford St	Urban Arterial	13,000	11,900 – 14,100
Norman Rd between Richardson Rd and Moores Creek Rd	Urban arterial	13,000	12,900
Kerrigan St between Berserker St and Moores Creek Rd	Urban Sub-arterial	13,000	13,600
Upper Dawson Rd between Caroline St and	Urban Sub-arterial	13,000	13,200
Bruce Highway – Yeppen Roundabout to Jellicoe Street including the Yeppen Roundabout	Highway	17,000	22,000

The section of High Street between Victoria Place and Musgrave Street has a daily traffic flow above the operational desired daily flow. The mid-block capacity will be governed by the intersections along High Street at the K Mart Entrance, Victoria Place, and Musgrave Street. The close proximity of these intersections will reduce the mid-block capacity because of queuing traffic at the intersections.

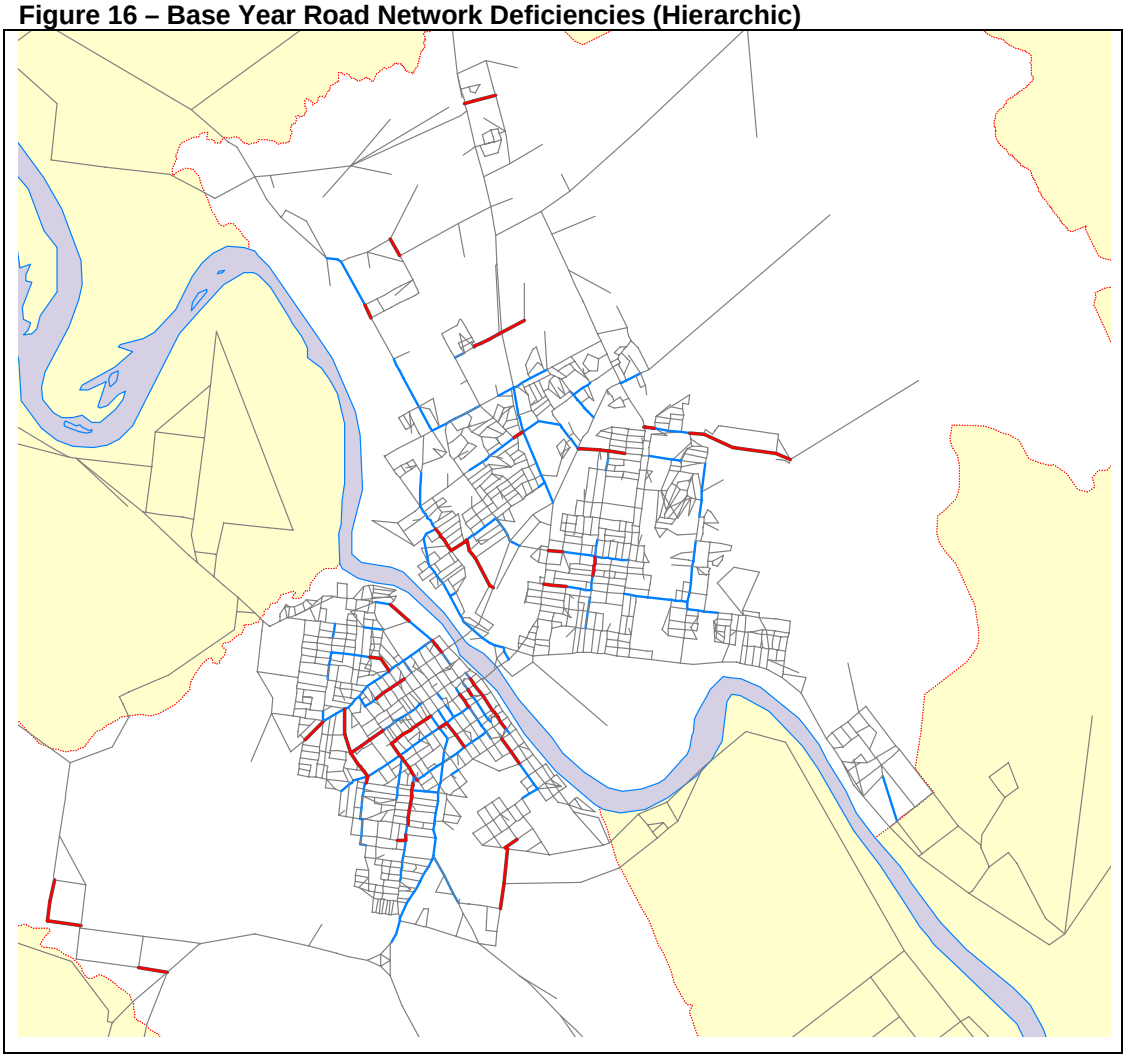
Norman Road has been included in Table 20 as the northbound daily flow is above the desired maximum flow of 6,500 vpd (which is half the two way flow).

The model does not highlight intersections that will be deficient but if a link is showing a deficiency the intersections at either end are likely to be suffering substantial delay and long queues are likely to be present during the peak periods. Intersections likely to be operating below a desired level of service are:

- Norman Road/ Moores Creek Road
- Kerrigan Street/ Moores Creek Road/ Feez Street
- Musgrave Street/ High Street
- Fitzroy Street/ East Street
- Fitzroy Street/ Bolsover Street.

Figure 13 shows the existing road network hierarchy for Rockhampton. Each road is classified into a category based on the desired role that road will play. A road classified as an arterial road is expected to carry high traffic volumes where as a collector road carries low volumes and performs a role of distributing traffic to the higher order roads. The roles of the roads in the network can change as the city grows. Identifying whether a road is not performing the role designated is as important as establishing whether the operational maximum daily flow was exceeded. A number of roads while not operationally deficient do have daily flows in excess of a desired maximum daily flow based on their role (hierarchy) in the road network. The roads identified by this analysis are discussed in Table 21 and shown in Figure 16.

Figure 16 – Base Year Road Network Deficiencies (Hierarchic)



It should be noted though that the analysis can be distorted by the location of centroid connectors. A centroid connector often can represent a number of local streets or access points and as such will load traffic at a point which in reality would be spread over a number of links. In reviewing the outcomes of this analysis this has been considered.

Table 21 – Base Year Network Hierarchic Deficiencies

Road Section	Hierarchy Classification	Hierarchic Desired Maximum Daily Flow	Daily Flow
High Street between Musgrave St and Ford St	Urban Sub-arterial	< 10,000 vpd	14,100 vpd
Kerrigan Street between Moores Creek Rd and Dean St	Urban sub-arterial	< 10,000 vpd	11,000 – 13,600 vpd
Elphinstone Street between Musgrave St and Nobbs St	Urban sub-arterial	< 10,000 vpd	11,100 – 11,300 vpd
Fitzroy Street between George St and Canning St	Urban sub-arterial	< 10,000 vpd	11,700 – 13,000 vpd
Canning Street between Fitzroy St and Upper Dawson Rd	Urban sub-arterial	< 10,000 vpd	10,500 – 11,700 vpd
Upper Dawson Road between Caroline St and Church St	Urban sub-arterial	< 10,000 vpd	10,100 – 13,200 vpd
Lion Creek Road between North St and Albert St	Urban sub-arterial	< 10,000 vpd	10,400 vpd
Albert Street between George St and Talford St	Major urban collector	< 6,000 vpd	6,000 – 6,300 vpd
Main Street between Knight St and Haynes St	Major Urban Collector	< 6,000 vpd	7,200 vpd
Bolsover St between Stanley St and Francis St	Minor urban collector	< 3,000 vpd	3800 – 4,200 vpd
Lion Creek Road between Hall St and Exhibition St	Minor urban collector	< 3,000 vpd	4,800 vpd
Carlton Street between Hammond St and Yaamba Rd	Minor urban collector	< 3,000 vpd	3,600 vpd
Haynes Street between Glenmore Rd and Main St	Minor urban collector	< 3,000 vpd	3,600 – 8,900 vpd
Knight Street between Main St and Moores Creek Rd	Minor urban collector	< 3,000 vpd	3,400 – 4,400 vpd
East Street between Archer St and Derby St	Minor urban collector	< 3,000 vpd	3,300 – 3,900 vpd
Agnes Street between North St and Denham St	Minor urban collector	< 3,000 vpd	3,600 – 4,900 vpd
Archer Street between Agnes St and Canning St	Minor urban collector	< 3,000 vpd	3,600 vpd
Murray Street between North St and Baden Powell St	Minor urban collector.	< 3,000 vpd	3,400 vpd

8 Future Year Traffic Modelling

The impacts of population growth on the Rockhampton Road network was assessed under two forecast scenarios. The two scenarios were:

- Scenario 1 – City Plan Scenario based on PIFU High Series forecasts released in 2007 and has development in line with the current land use zoning of the City Plan;
- Scenario 2 – Parkhurst Accelerated Growth Scenario (PAG) which is based on Scenario 1 but with significantly higher population and employment in Parkhurst

For each scenario, forecasts for three future years were prepared. The future years investigated were:

- 2011
- 2016
- 2021

The future year model follows similar steps to the base year model. How the various assumptions and model inputs may have changed between the base year and forecast year are discussed in this Section.

8.1.1 Land Use and Demographic Forecasts

8.1.2 City Plan Scenario

Population for the City Plan scenario was controlled to the PIFU high series forecasts released in 2007. This predicted the population in Rockhampton would approach 65,850 persons by 2021 or 0.6% pa growth between 2005 and 2021. The distribution of population to sector for each forecast year is shown in Table 22.

Table 22 – Future Year Population Forecasts (City Plan)

Sector	2011		2016		2021	
	Persons	Jobs	Persons	Jobs	Persons	Jobs
1	11,167	3,423	12,141	3,678	13,622	4,127
2	2,980	506	2,995	508	3,016	512
3	31,692	6,259	37,031	7,511	43,172	9,012
4	11,169	3,681	11,598	3,749	12,107	3,820
5	17,938	4,133	17,718	4,211	17,605	4,291
6	7,965	1,998	8,120	2,036	8,330	2,074
7	2,766	7,160	2,853	7,295	2,956	7,433
8	17,183	5,103	17,056	5,200	17,031	5,298
9	323	25	317	26	313	26
10	-	-	-	-	-	-
11	-	-	-	-	-	-
12	-	-	-	-	-	-
13	2,639	112	3,307	114	3,876	116
14	3,330	1,536	3,301	1,566	3,289	1,595
15	320	1,620	329	1,651	339	1,682
RCC	**63,633**	**25,367**	**64,599**	**25,846**	**65,845**	**26,333**

Total	**109,472**	**35,555**	**116,765**	**37,543**	**125,655**	**39,984**

Note: The sector system used for this table is shown in Figure 9.

8.1.3 Parkhurst Accelerated Growth Scenario

During the study Council became aware of the potential development of two large areas in Parkhurst. The scale of these developments was significant and an alternative land use scenario was prepared that included the possibility of development in these locations. The scenario is the Parkhurst Accelerated Growth (PAG) scenario. Three key areas identified were:

- A major parcel of land near the intersection of Belmont Road and William Palfrey Drive – known as Edenbrook
- A major landholding in Parkhurst between Edenbrook and the rail line extending up to the previous City boundary and straddling William Palfrey Drive.

With the Parkhurst assumptions included the population and employment numbers for this scenario at sector level are shown in Table 23.

Table 23 – Future Year Population Forecasts (Parkhurst Accelerated Growth Scenario)

Sector	2011		2016		2021	
	Persons	**Jobs**	**Persons**	**Jobs**	**Persons**	**Jobs**
1	11,167	3,423	12,141	3,678	13,622	4,127
2	2,980	506	2,995	508	3,016	512
3	31,692	6,259	37,031	7,511	43,172	9,012
4	11,169	3,681	14,894	5,453	19,948	6,337
5	17,938	4,133	17,718	4,211	17,605	4,291
6	7,965	1,998	8,120	2,036	8,330	2,074
7	2,766	7,160	2,853	7,295	2,956	7,433
8	17,183	5,103	17,223	5,088	17,031	5,298
9	323	25	317	26	313	26
10	-	-	-	-	-	-
11	-	-	-	-	-	-
12	-	-	-	-	-	-
13	2,639	112	3,307	114	3,876	116
14	3,330	1,536	3,301	1,566	3,289	1,595
15	320	1,620	329	1,651	339	1,682
RCC	63,633	25,367	68,062	27,438	73,687	28,851
Total	109,472	35,555	120,229	39,135	133,497	42,501

Note: The sector system used for this table is shown in Figure 9.

Under this scenario, the population increased to 73,690 persons. The majority of the additional population was expected after 2011. The population and employment forecasts for 2011 are similar for the two scenarios. Under the City Plan scenario the population in the area encompassing North Parkhurst and Edenbrook was 11,169 persons which was similar to the Parkhurst Accelerated Growth scenario. The difference in assumptions for population

and employment between the City Plan scenario and Parkhurst Accelerated Growth scenario for Edenbrook and North Parkhurst is outlined in Table 24.

Table 24 – Additional Development in Parkhurst

Location	2011		2016		2021	
	Persons	Jobs	Persons	Jobs	Persons	Jobs
Parkhurst	0	0	3886	1706	7841	2518

8.1.4 Overview of the Forecasting Methodology

8.1.5 General

Forecasts in future year travel demand were undertaken in a similar manner as outlined for the base year in Section 3. In short the steps were:

- Future year demographic forecasts for each traffic zone (discussed above in Section 8.1) were input into the trip generation sub-model to provide an initial estimate of overall daily trips;
- Trips were distributed between origins and destinations through the gravity model; and
- Build the future year trip matrix, incorporating the matrix calibration changes.

8.1.6 External Trips

External trip totals were estimated by applying observed growth rates to the base year totals. The external daily flows input to the model are outlined in Table 25.

Table 25 – Future Year External Daily Volumes

Location	2011	2016	2021
Bruce Highway (south)	2,430	2,620	2,820
Burnett Highway (south of Mt Morgan)	360	390	420
Capricorn Highway (west of	1,610	1,740	1,880
Bruce Highway (Fitzroy Shire bdy)	1,180	1,250	1,330
Byfield Road	420	460	500

8.1.7 Future Year Daily Trips

The forecast future growth in population and employment was estimated to increase the number of daily trips in the modelled area by 20% (or at 1.2% per annum) between 2005 and 2021 (City Plan) and by 32% (or at 1.7% per annum) between 2005 and 2021 (Parkhurst Accelerated Growth). The forecast growth in vehicular traffic within the modelled area is shown in Table 26. The forecast growth in traffic will result in further deterioration of peak period travel in Rockhampton and is likely to result in increased delay in the inter-peak period.

Table 26 – Forecast Future Year Travel Demand

Year	City Plan Scenario		Parkhurst Accelerated Growth Scenario	
	Demand	Per Annum Growth from 2005	Demand	Per Annum Growth from 2005
2005	285,967	-	285,967	-
2011	312,708	1.5%	312,375	1.5%
2016	327,046	1.2%	338,002	1.5%
2021	343,885	1.2%	377,120	1.7%

9 Do Minimum Network Analysis

Road network upgrades and changes have occurred since 2005 or are planned before 2011. These changes and upgrades were made to the base year road network in the model to create a future year "do minimum" road network. Analysis of the impacts of population growth using the "do minimum" network was undertaken for each scenario year for the three forecast years. The reason for the analysis is to identify:

- the future year road network deficiencies if further upgrades to the network were not made; and
- as a basis from which to assess road network options.

The road network changes included in the "do minimum" network are discussed in Table 27.

9.1.1 Do Minimum Future Year Road Networks

A number of road network improvements have been constructed or are committed between 2005 and 2011. These works are outlined in Table 27.

Table 27 – Do Minimum Network Assumptions

Item	Location	Description
1	Victoria Parade/ Quay Street	Local area traffic management measures were introduced on Victoria Parade and Quay Street between Albert Street and William Street.
2	George Street	The intersection of George Street and Cambridge Street was reconfigured to restrict access to Cambridge Street. Cambridge Street was restricted to left in/ left out.
3	Dean Street	RCC has committed works to install traffic signals at the intersection of Dean Street and Kerrigan Street.
4	Lakes Creek Road	Traffic signals were installed at the intersections of Berserker Street, Dean Street, and Thozet Street.
5	Moores Creek Road	Moores Creek Road between Yamba Road and Feez Street was upgraded from 2 lanes to 4 lanes.
6	Musgrave Street	Traffic signals were installed at Charles Street, Elphinstone Street and Eddington Street with other streets restricted to left in/ left out arrangements between Macaree Street and High Street.
7	Norman Road	Signals were installed at the intersection of Norman Road and Farm Street.
8	Richardson Road	RCC has committed works to install traffic signals at the intersection Richardson Road/ Haynes Street/ Hollingsworth Street.
9	Fitzroy Street	Traffic signals were installed at the intersections of Fitzroy Street/ Campbell Street and Fitzroy Street/ Kent Street.
10	North Street	Local improvements to North Street with the inclusion of turning bays have been carried out between Canning Street and Quarry Street.
11	Richardson Street	The roundabout at the intersection of Richardson Street and Alexandra Street will be replaced by a

Item	Location	Description
		signal controlled intersection.
12	Norman Road	Traffic signals will be installed at Norman Road/ River Rose Drive as part of a development approval.
13	Springfield Drive	As part of the development of Norman Gardens Springfield Drive will be extended to Foulkes Street.

To enable the modelling of the Parkhurst Accelerated Growth scenario additional road network was assumed to be delivered as part of the development. This additional network is currently not known but assumptions were developed based on the planning applications and discussions with Council.

The road network added to the model included:

- Realignment of William Palfrey Road and connection to the Bruce Highway at Olive Street
- A new road link connecting Alexandra Street to William Palfrey Road. A corridor extension of this road north towards Ramsay Creek would also be protected for future development but would not be required for the Parkhurst Accelerated Growth scenario analysis.

Only one access point to the Bruce Highway from Parkhurst was assumed in the analysis.

9.1.2 City Plan Scenario with Do Minimum Works

The future year model was run for each of the forecast years with the results outlined in the following sections.

9.1.3 Traffic Forecasts

Overall traffic is forecast to increase by approximately 8% between 2005 and 2011 with an additional 6% of traffic between 2011 and 2021 within Rockhampton. Traffic growth in the Capricornia region is marginally higher at 9% between 2005 and 2011. The growth in traffic within Rockhampton is slightly higher than the increase in population which was forecast to be approximately 5.7%.

Traffic across the Fitzroy River traffic was forecast to grow by approximately 8% between 2005 and 2011 which is line with the wider growth across Rockhampton and results in approximately 78,000 daily trips across the river. The results are shown in Table 28. The Fitzroy River Bridge was forecast to carry approximately 40,000 vpd in 2011 rising to 42,000 vpd by 2021. At these flows the peak period operating conditions would be heavily congested given that both ends of the bridge are controlled by signal controlled intersections and long delays are likely. Traffic growth on Neville Hewitt Bridge is expected to be greater and was estimated to be carrying 41,000 vpd by 2021.

Table 28 – Traffic growth Across Fitzroy River City Plan Scenario (Do Minimum)

Location	2005	2011		2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005	Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	38,210	11%	39,360	15%	40,700	19%
Fitzroy River Bridge	38,200	39,830	4%	40,870	7%	42,140	10%
Total	**72,540**	**78,040**	**8%**	**80,230**	**11%**	**82,840**	**14%**

Across Moores Creek screenline approximately 82,000 vpd were forecast representing a 7% increase over 2005 rising to 85,000 vpd by 2021 both marginally lower than the wider traffic growth. A number of links across Moores Creek will have poor peak period operating conditions in particular Kerrigan Street and High Street. High Street was identified in the base year analysis as being deficient and traffic operating conditions are forecast to substantially deteriorate further. Traffic growth on Musgrave Street was predicted to be strong reflecting the continued expansion of Rockhampton Plaza.

At other key locations in Rockhampton traffic growth is in line with the citywide figure. There has been some re-routing, in the model, of traffic away from Carlton Street and Campbell Street. The reduction on Carlton Street is reflected in the increases on Sheehy Street and Richardson Street. This has resulted in traffic using Scott Street which is undesirable given the residential nature of the street.

Traffic is forecast to increase by 12% between 2005 and 2011 along Gladstone Road.

The changes in daily traffic flow on key roads in the network are shown in Table 29.

Table 29 – Traffic Growth Across Key Screenlines City Plan Scenario (Do Minimum)

Location	2005	2011		2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005	Forecast	% Change from 2005
Moores Creek Screenline							
Norman Road	10,760	11,120	3%	11,370	6%	11,640	8%
Kerrigan Street	13,480	13,980	4%	14,010	4%	14,160	5%
Musgrave Street	21,590	24,110	12%	24,780	15%	25,560	18%
High Street	20,460	22,130	8%	22,460	10%	22,660	11%
Glenmore Road	10,260	10,440	2%	10,850	6%	11,410	11%
Total	**76,550**	**81,780**	**7%**	**83,470**	**9%**	**85,430**	**12%**
Bruce Highway (North) Screenline							
Carlton Street	3,120	1,500	-52%	1,580	-49%	1,660	-47%
Farm Street	7,420	7,610	3%	8,110	9%	8,280	12%
Richardson Road	10,660	12,840	20%	12,030	13%	11,700	10%
Sheehy Street	–	1,180	–	1,010	–	1,020	–
Main Street	3,960	5,820	47%	5,660	43%	5,690	44%
Alexandra Street	16,380	16,920	3%	17,320	6%	17,540	7%
Knight St Street	4,350	4,460	3%	4,450	2%	4,860	12%
Glenmore Road	9,540	9,700	2%	10,190	7%	10,760	13%
Total	**55,430**	**60,030**	**8%**	**60,350**	**9%**	**61,510**	**11%**
Bruce Highway (South) Screenline							
Lion Creek Road	8,460	9,090	7%	9,410	11%	9,980	18%
North Street	4,970	6,440	30%	6,570	32%	6,980	40%
Campbell Street	4,940	3,870	-22%	3,950	-20%	3,840	-22%
George Street	2,360	2,400	2%	2,360	0%	2,320	-2%
Albert Street	6,100	6,490	6%	6,160	1%	6,000	-2%

Cambridge Street	1,770	2,420	37%	2,470	40%	2,420	37%
Archer Street	6,580	7,010	7%	7,270	10%	7,580	15%
Fitzroy Street	10,470	10,480	0%	10,630	2%	11,110	6%
Denham Street	4,740	4,750	0%	4,710	-1%	4,720	0%
Murray Street	2,240	2,760	23%	3,010	34%	2,980	33%
Derby Street	4,070	4,090	0%	4,010	-1%	3,740	-8%
Caroline Street	2,520	2,530	0%	2,510	0%	2,490	-1%
Gladstone Road	22,070	24,820	12%	26,010	18%	27,370	24%
Total	**81,290**	**87,150**	**7%**	**89,070**	**10%**	**91,530**	**13%**

9.1.4 Do Minimum Operational Road Network Deficiencies

Figure 17 shows the predicted network deficiencies in 2011. Key sections of the road network that will be operating above the desired level of service by 2011 are shown in Table 30.

Figure 19 shows the predicted network deficiencies in 2021. It shows that some key elements of the road network will be operating above the desired level of service by 2021. Of particular importance is that the Neville Hewitt Bridge is predicted to be deficient by 2021. Much of the Capricorn Highway west of the roundabout will also be deficient. Further sections of Norman Road also become deficient.

Table 30 – Do Minimum Operational Road Network Deficiencies (City Plan Scenario)

Road Section	Hierarchy Classification	Operational Desired Maximum Daily Flow (vpd)	Daily Flow (vpd)
2011			
Fitzroy River Bridge	Major Urban Arterial	32,500 vpd	39,830 vpd
Bruce Highway north of the Rockhampton Yeppoon Road	Highway	17,000 vpd	20,400 vpd
High Street	Urban Arterial	13,000 vpd	14,900 – 16,000 vpd
Norman Road	Urban arterial	13,000 vpd	13,800 vpd
Kerrigan Street	Urban Sub-arterial	13,000 vpd	14,000 vpd
Upper Dawson Road	Urban Sub-arterial	13,000 vpd	13,800 vpd
2016			
No additional deficiencies			
2021			
Capricorn Highway	Main Road	17,000 vpd	16,100 – 16,500 vpd
Neville Hewitt Bridge	Major Urban Arterial	40,000 vpd	40,700 vpd
Moores Creek Road	Major Urban Arterial	40,000 vpd	40,700 vpd
Norman Road	Urban Arterial	13,000 vpd	13,000 vpd
Fitzroy Street	Major Urban Arterial	26,000 vpd	25,100 – 27,900 vpd
Elphinstone Street		13,000 vpd	12,600 12,800 vpd

A number of key intersections under the base case scenario will also be deficient, which includes:

- Richardson Street and Yaamba Road
- Norman Road and Moores Creek Road
- Kerrigan Street, Feez Street and Moores Creek Road
- Elphinestone Street and Musgrave Street
- Capricorn Highway/ Bruce Highway roundabout.

Figure 17 – Network Operational Deficiency 2011 (City Plan)

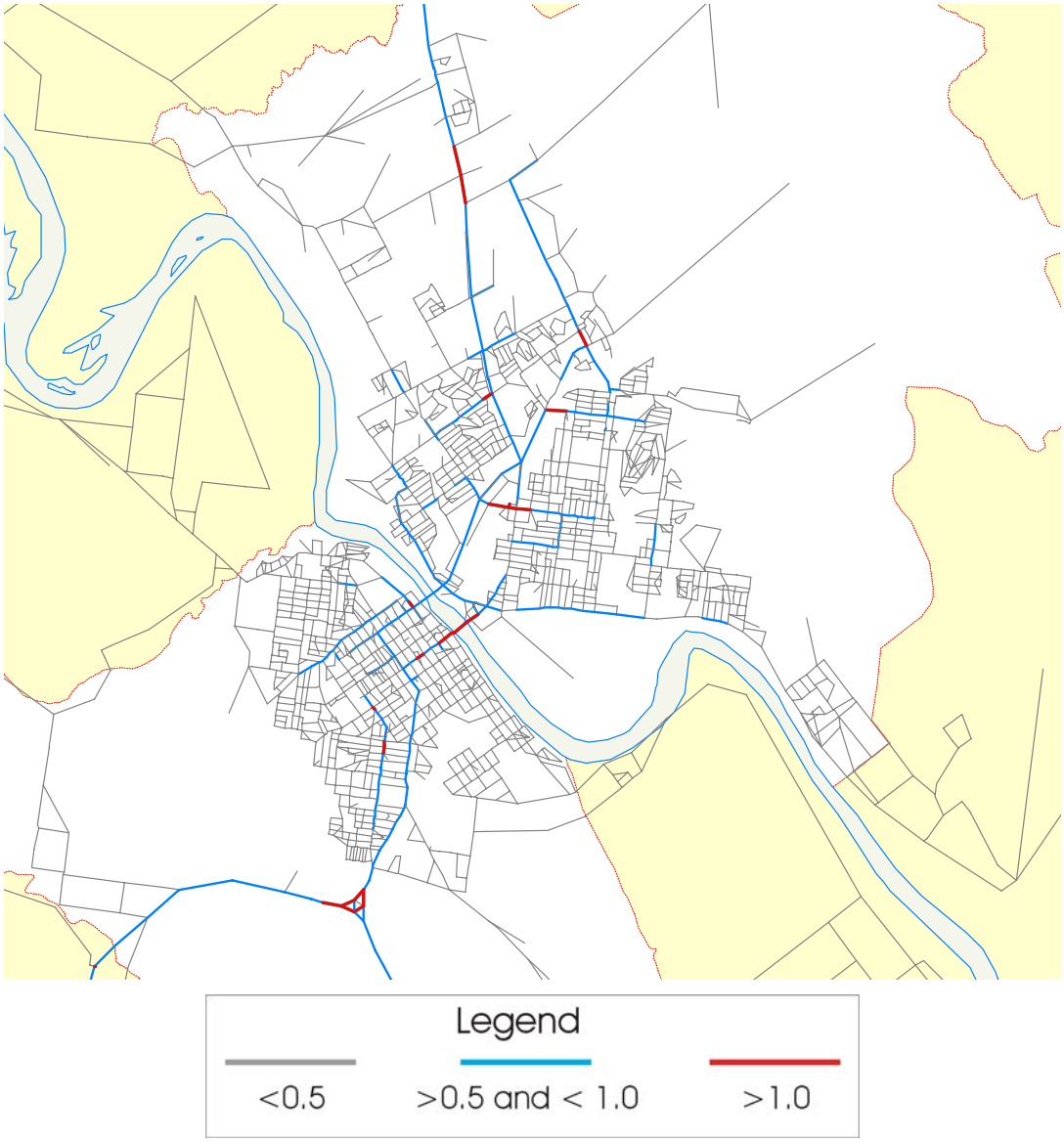

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Figure 18 – Network Operational Deficiency 2016 (City Plan)

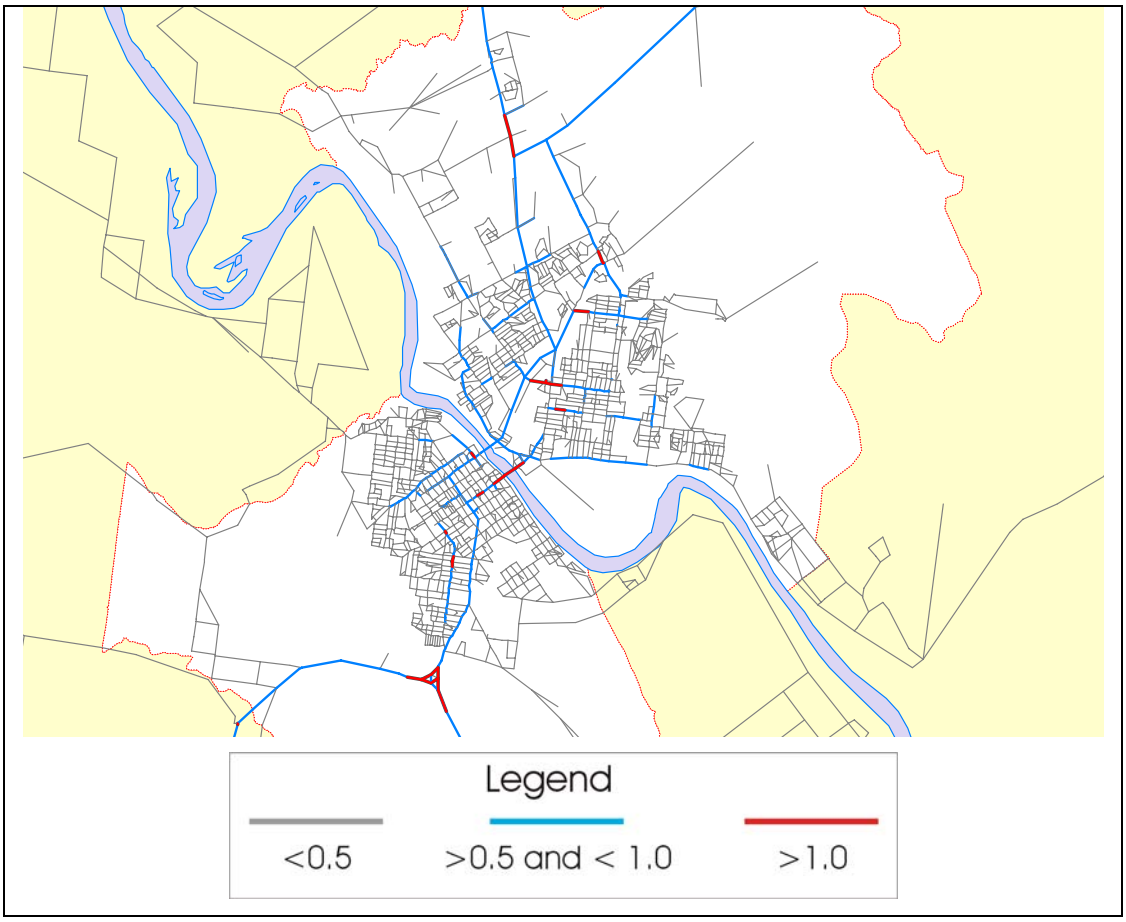
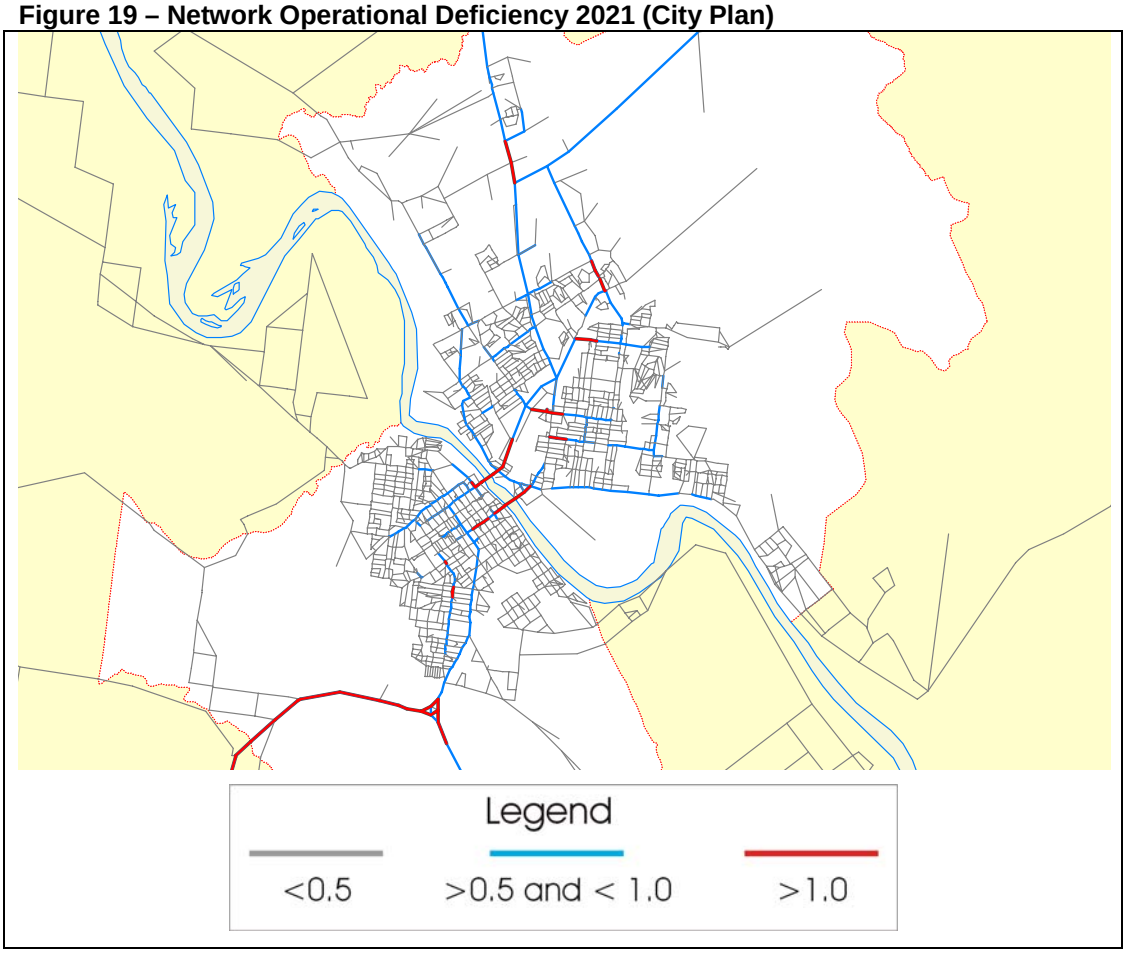


Figure 19 – Network Operational Deficiency 2021 (City Plan)



9.1.5 Do Minimum Hierarchic Road Network Deficiencies

The hierarchic deficiencies identified through the traffic modelling work are shown on Figure 20 (2011), Figure 21 (2016) and Figure 22 (2021). The elements of the road network that were forecast to have daily flows above the desired maximum flow are detailed in Table 31.

Table 31 – Hierarchic Network Deficiencies (City Plan Scenario)

Road Section	Hierarchy Classification	Hierarchic Desired Maximum Daily Flow	Daily Flow
2011			
High Street between Berserker St and Dean St	Urban Sub-arterial	< 10,000 vpd	10,100 – 10,300 vpd
Berserker St between Elphinstone St and High St	Major urban collector	< 6,000 vpd	6200 – 6400 vpd
Elphinstone St between Craig St and Shephard St	Major urban collector	< 6,000 vpd	6400 vpd
North St between Campbell St and Alma St	Major urban collector	< 6,000 vpd	6100 – 6400 vpd
Denham St between Canning St and Murray St	Major urban collector	< 6,000 vpd	5600 – 5700 vpd
Bolsover St between Francis St and Wood St	Minor urban collector	< 3,000 vpd	3200 – 3300 vpd
2016			
Glenmore Road between Dooley St and Moores Creek	Urban Sub-arterial	< 10,000 vpd	10200 – 10900 vpd
Bridge St between Moores Creek and Ashney St	Urban Sub-arterial	< 10,000 vpd	10,300 – 10,900 vpd
Elphinstone St between Craig St and Thozet St	Major urban collector	< 6000 vpd	6500 – 6600 vpd
Archer St between George St and Talford Sr	Major urban collector	< 6000 vpd	7,200 – 8,600 vpd
Alexandra St between Birbeck Dr and Johnson St	Minor urban collector	< 3000 vpd	3,200 vpd
2021			
Yaamba Road between Main St and Moores creek rd	Urban Arterial	< 30,000 vpd	33,000 vpd
Denham St between Murray St and Canning St	Major urban collector	< 6000 vpd	6,100 – 6,600 vpd

Figure 20 – Network Hierarchial Deficiency 2011 (City Plan)

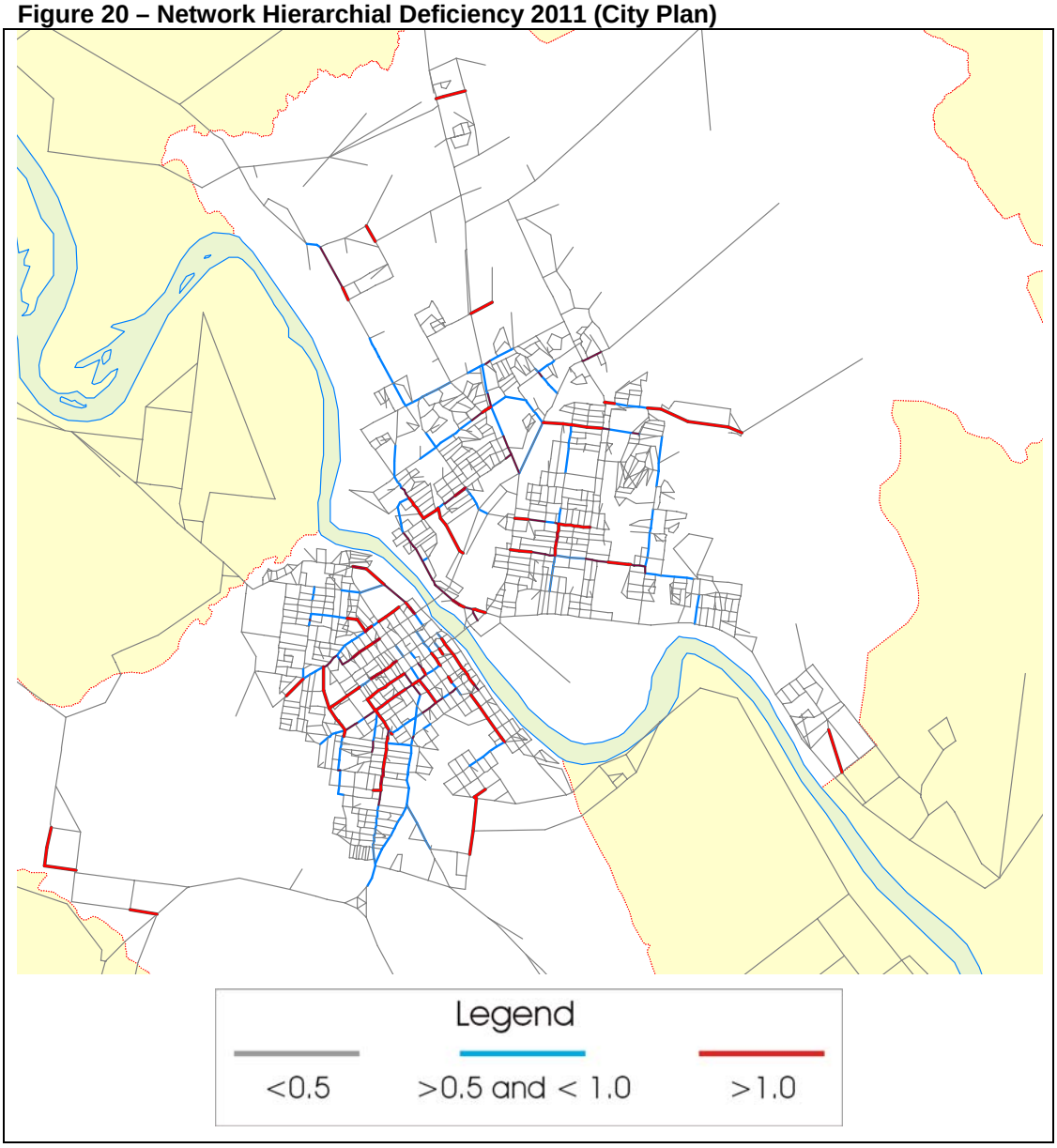


Figure 21 – Network Hierarchial Deficiency 2016 (City Plan)

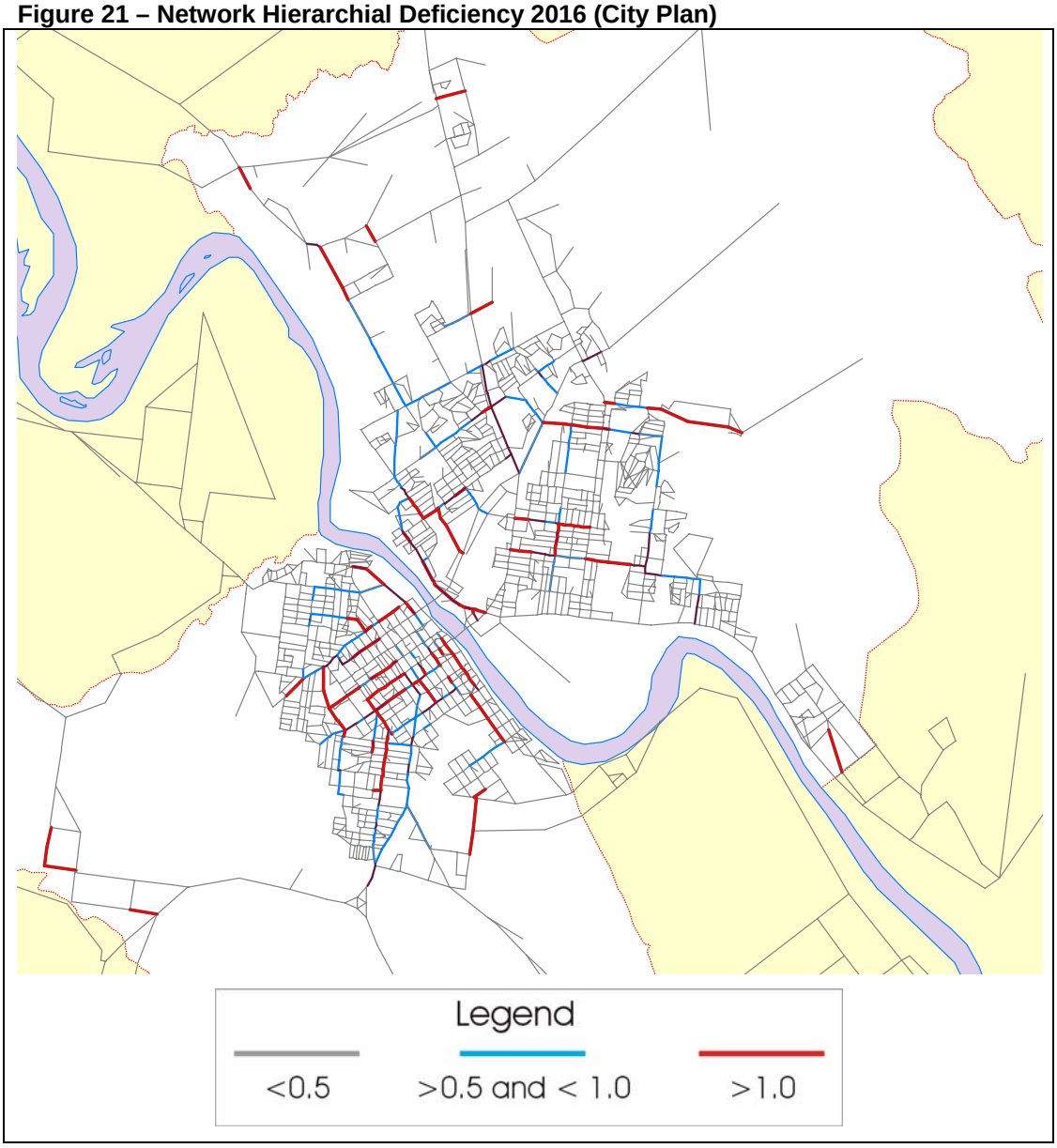
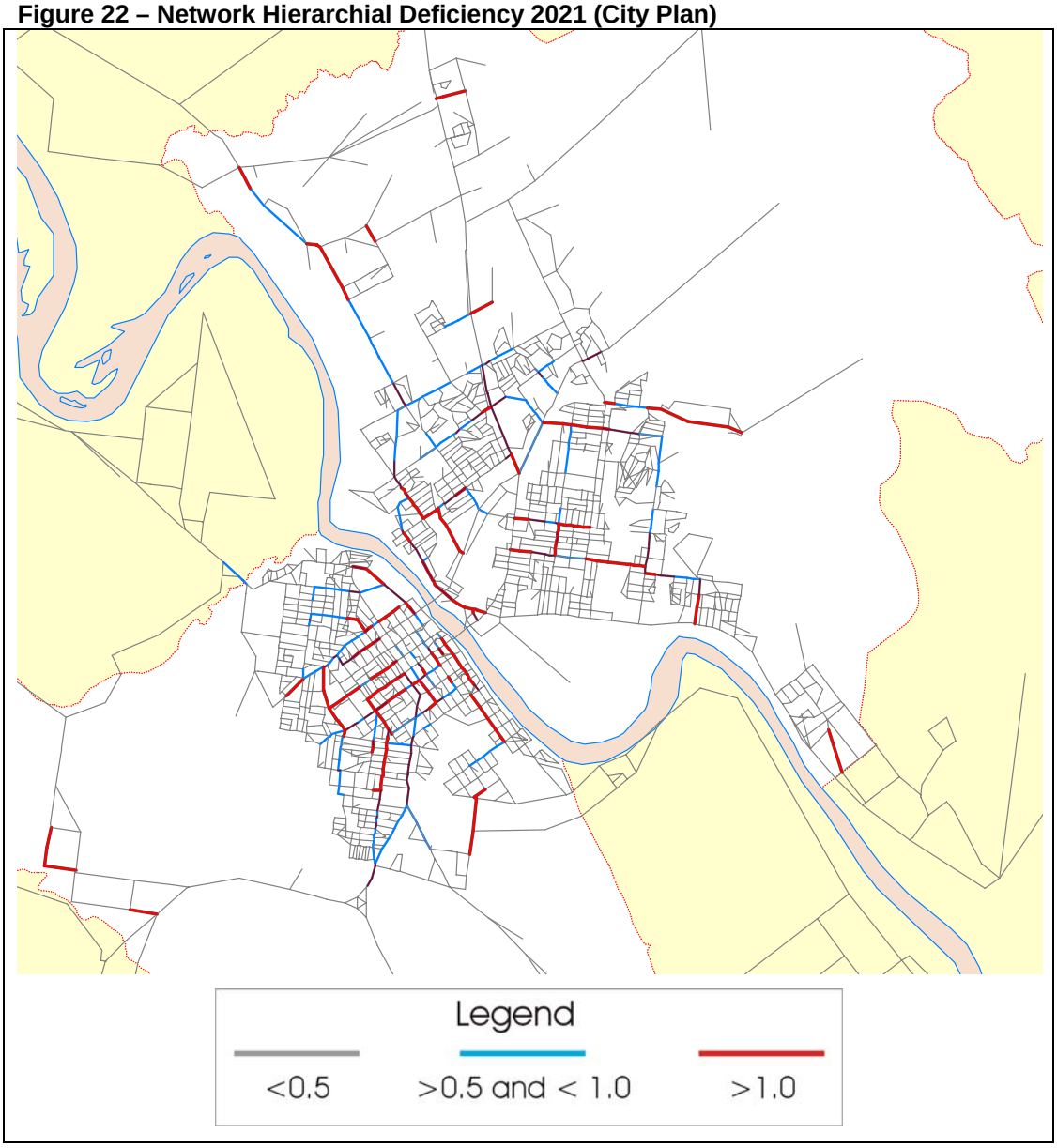


Figure 22 – Network Hierarchial Deficiency 2021 (City Plan)



9.1.6 Parkhurst Accelerated Growth Scenario

9.1.7 Traffic Forecasts

Overall traffic was forecast to increase by approximately 9% between 2005 and 2011 with an additional 22% of traffic between 2011 and 2021 within Rockhampton. The growth in traffic is slightly higher than the increase in population which was forecast to be approximately 16% within Rockhampton.

Traffic across the Fitzroy River was forecast to grow by approximately 7% (or approximately 1.2% per annum) between 2005 and 2011 which is line with the wider growth across Rockhampton and results in approximately 78,000 daily trips across the river. The forecast daily flows on the Fitzroy River bridges are shown in Table 32 under the Parkhurst Accelerated Growth scenario. The analysis indicated that the Fitzroy River Bridge was forecast to carry approximately 40,000 vpd in 2011 rising to 46,000 vpd by 2021. At these flows the peak period operating conditions would be heavily congested given that both ends of the bridge are controlled by signal controlled intersections. Traffic growth on Neville

Hewitt Bridge was estimated to be lower. A daily traffic flow of 40,500 in 2021 was forecast on the Neville Hewitt Bridge for the Parkhurst Accelerated Growth scenario.

Table 32 – Traffic Growth Across Fitzroy River PAG Scenario (Do Minimum)

Location	2005	2011		2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005	Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	38,020	11%	39,570	15%	40,530	18%
Fitzroy River Bridge	38,200	39,830	4%	41,210	8%	45,780	20%
Total	72,540	77,850	7%	80,780	11%	86,310	19%

Table 33 shows the daily forecast traffic flows on the roads across a number of key screenlines (Figure 10) in Rockhampton. In 2011 approximately 82,000 vpd were forecast to cross the Moores Creek screenline which equates to an 8% increase between 2005 and 2021. Daily traffic flows were forecast to rise to approximately 96,000 vpd by 2021. A number of the road links across Moores Creek were forecast to have poor peak period operating conditions. The key roads were:

- Kerrigan Street
- High Street, and
- Bridge Street.

Table 33 highlights the following:

- Traffic growth on Musgrave Street at 2.3% is above the city wide increase of 1.7% (Table 26) and results in approximately 31,000 vpd across Moores Creek;
- Alexandra Street (approaching Moores Creek Rd) was forecast to have a daily flow of approximately 28,000 vpd in 2021 which reflects an annual growth rate of 3.4% between 2005 and 2021; and
- Gladstone Road (south of Caroline Street) was forecast to experience 1.4% per annum growth between 2005 an 2021 resulting in a daily traffic of 27,600 vpd by 2021.

Table 33 – Traffic Growth Across Key Screenlines PAG Scenario (Do Minimum)

Location	2005	2011		2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005	Forecast	% Change from 2005
Moores Creek Screenline							
Norman Road	10,760	10,970	0.3%	11,580	0.7%	11,130	0.2%
Kerrigan Street	13,480	14,110	0.8%	14,290	0.5%	15,920	1.0%
Musgrave Street	21,590	23,600	1.5%	24,660	1.2%	30,920	2.3%
High Street	20,460	22,750	1.8%	23,490	1.3%	26,300	1.6%
Glenmore Road	10,260	11,040	1.2%	12,470	1.8%	12,220	1.1%
Total	76,550	82,470	1.2%	86,490	1.1%	96,490	1.5%
Bruce Highway (North) Screenline							
Carlton Street	3,120	1,740	-9.3%	1,550	-6.2%	3,440	0.6%
Farm Street	7,420	7,770	0.8%	7,840	0.5%	8,810	1.1%

Location	2005	2011		2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005	Forecast	% Change from 2005
Richardson Road	10,660	12,730	3.0%	12,960	1.8%	7,450	-2.2%
Sheehy Street	–	1,170	-	1,140	-	1,470	-
Main Street	3,960	5,860	6.7%	5,620	3.2%	3,660	-0.5%
Alexandra Street	16,380	17,530	1.1%	18,470	1.1%	27,970	3.4%
Knight St Street	4,350	4,830	1.8%	6,260	3.4%	4,260	-0.1%
Glenmore Road	9,540	10,310	1.3%	11,770	1.9%	11,520	1.2%
Total	55,430	61,940	1.9%	65,610	1.5%	69,220	1.4%
Bruce Highway (South) Screenline							
Lion Creek Road	8,460	9,080	1.2%	9,670	1.2%	10,760	1.5%
North Street	4,970	5,790	2.6%	6,100	1.9%	1,850	-6.0%
Campbell Street	4,940	4,670	-0.9%	4,620	-0.6%	1,230	-8.3%
George Street	2,360	2,760	2.6%	2,760	1.4%	6,970	7.0%
Albert Street	6,100	6,010	-0.2%	3,190	-5.7%	6,540	0.4%
Cambridge Street	1,770	2,410	5.3%	2,500	3.2%	4,880	6.5%
Archer Street	6,580	7,080	1.2%	7,730	1.5%	8,250	1.4%
Fitzroy Street	10,470	10,470	0.0%	11,000	0.4%	12,220	1.0%
Denham Street	4,740	4,740	0.0%	4,690	-0.1%	4,660	-0.1%
Murray Street	2,240	2,740	3.4%	2,780	2.0%	2,590	0.9%
Derby Street	4,070	4,030	-0.2%	3,870	-0.5%	3,440	-1.0%
Caroline Street	2,520	2,520	0.0%	2,420	-0.4%	2,420	-0.3%
Gladstone Road	22,070	24,810	2.0%	26,160	1.6%	27,570	1.4%
Total	81,290	87,110	1.2%	87,490	0.7%	93,380	0.9%

9.1.8 Do Minimum Operational Road Network Deficiencies

Figure 23,Figure 24 and Figure 25 shows the predicted operational network deficiencies forecast on the Rockhampton Road network between 2011 and 2021 under the Parkhurst Accelerated growth scenario. Those elements of the road network forecast to be operating above the desired maximum daily traffic volume are listed in Table 34.

Table 34 – Operational Road Network Deficiencies PAG Scenario (Do Minimum)

Road Section	Hierarchy Classification	Operational Desired Maximum Daily Flow (vpd)	Daily Flow (vpd)
2011			
Fitzroy River Bridge	Major Urban Arterial	32,500	39,830
Yaamba Road between Rockhampton – Yeppoon rd and Boundary St (West)	Highway	17,000	18,600
2016			
Yaamba Road between Boundary St (West) and Boundary St (East)	Highway	17,000	22,100
Alexandra Street between Belmont Road and Farm Street	Urban arterial	13,000	13,300 – 16,700
2021			
Neville Hewitt Bridge	Major Urban Arterial	40,000	40,532
Yaamba Rd between Boundary St (East) and Olive St	Highway	17,000	22,600 – 23,000
Capricorn Highway between Bruce Highway and Gracemere	Main Road	17,000	16,200 – 16,500
Moores Creek Rd between Knight St and Neville Hewitt Bridge	Major Urban Arterial	40,000	40,500
Norman Rd between Farm St and Rockhampton – Yeppoon Rd	Urban Arterial	13,000	14,100 – 15,000
Alexandra St between Moores Creek Rd and Main St	Urban Arterial	26,000	27,600 – 28,000
Alexandra St between Richardson St and Hinchliff St	Urban Sub-arterial	13,000	14,700 – 16,000
Hinchliff St between Alexandra St and Farm St	Urban Sub-arterial	13,000	13,700 – 14,700
Farm St between Hinchliff St and Alexandra St	Urban Sub-arterial	13,000	16,400 – 18,700
Fitzroy St between Bolsover St and George St	Major Urban Arterial	26,000	26,400 – 30,000

The Capricorn highway has been included in the above table as although the two-way volume is less than the desired maximum two way volume the road is deficient in the west bound direction. With the increased growth in Parkhurst more sections of the road network will be at or approaching the deficiency thresholds than for the base case.

A number of key intersections under this scenario will also be deficient, which includes:

- Alexandra Street and Farm Street
- Alexandra Street, Moores Creek Road and High Street
- Farm Street and Hincliffe Street
- Richardson Street and Yaamba Road
- Norman Road and Moores Creek Road
- High Street and Musgrave Street,
- Kerrigan Street, Feez Street and Moores Creek Road
- Elphinestone Street and Musgrave Street
- Capricorn Highway/ Bruce Highway roundabout.

Figure 23 – Network Operational Deficiency 2011 (Parkhurst Accelerated)

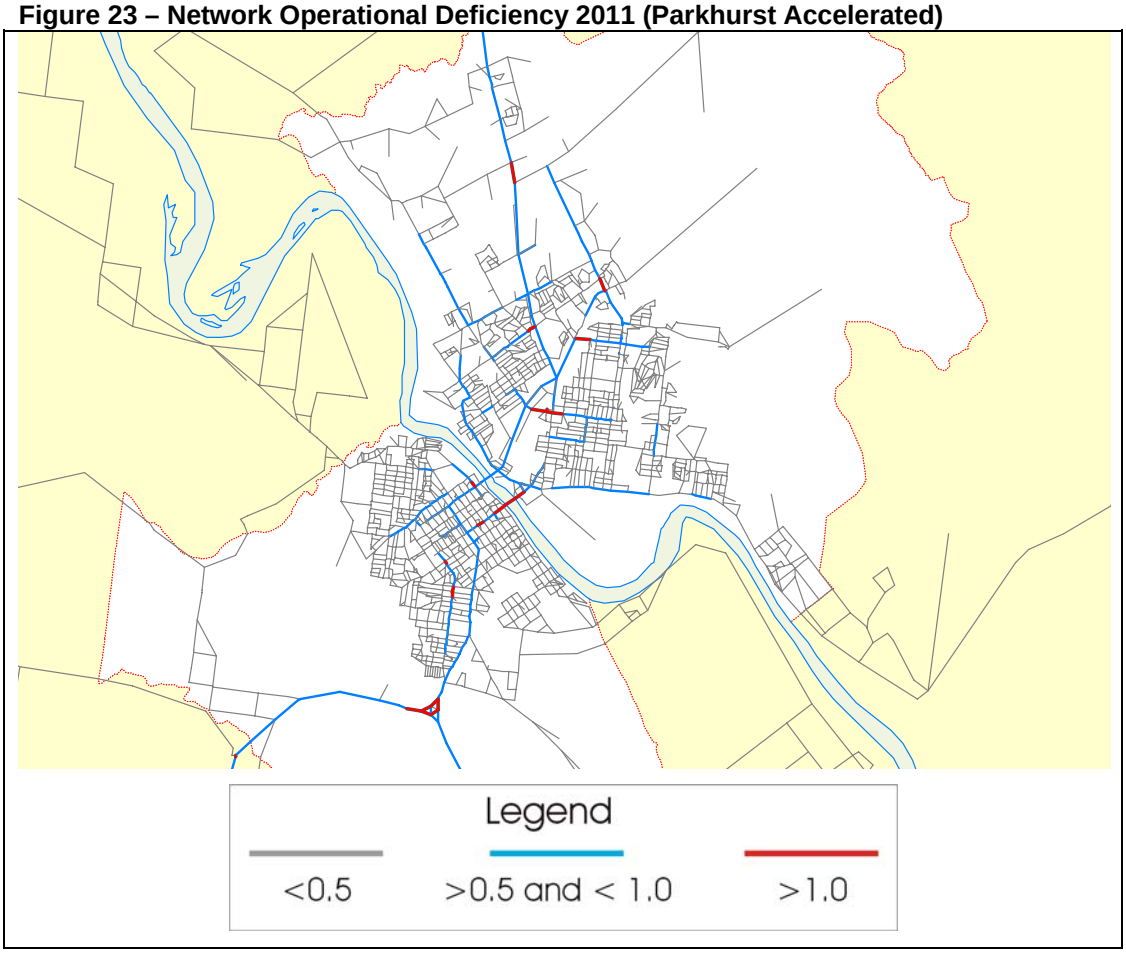


Figure 24 – Network Operational Deficiency 2016 (Parkhurst Accelerated)

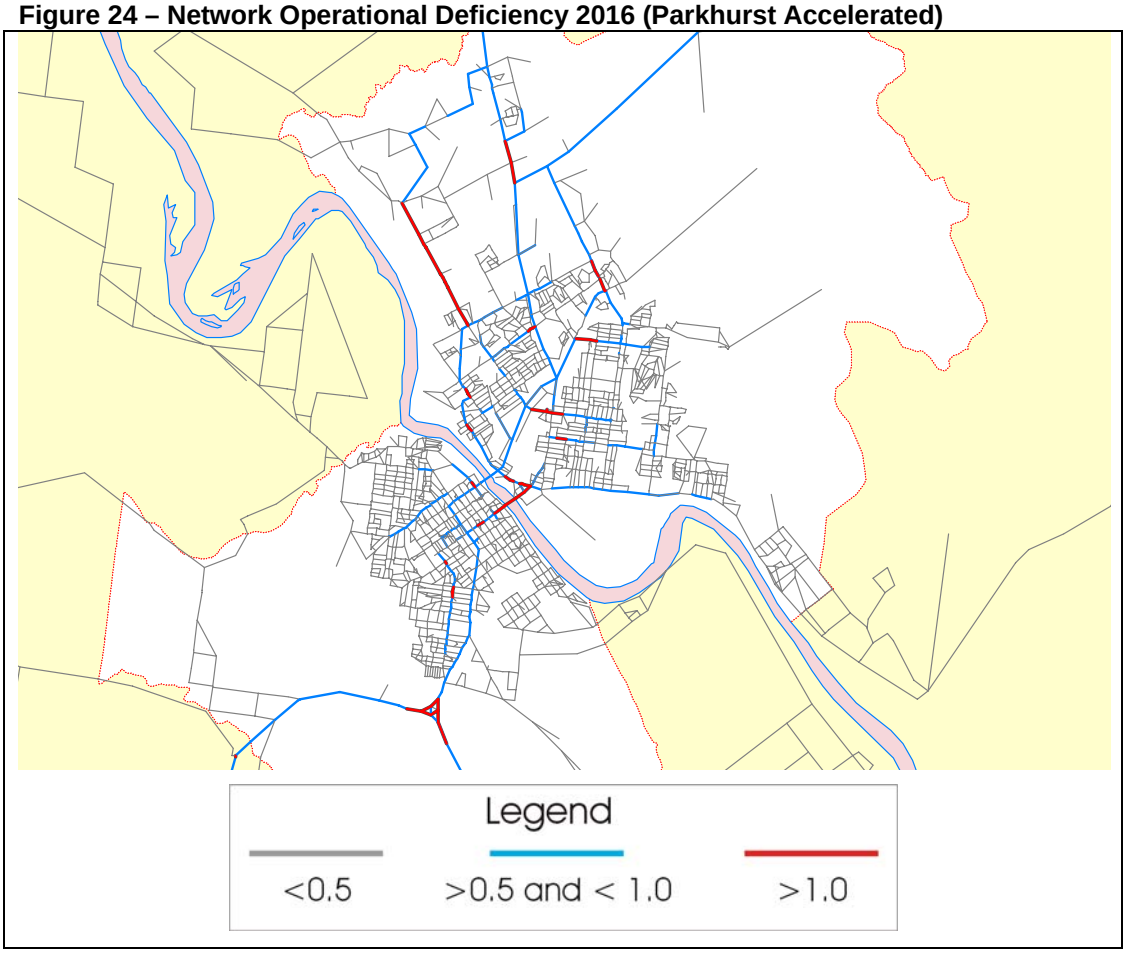
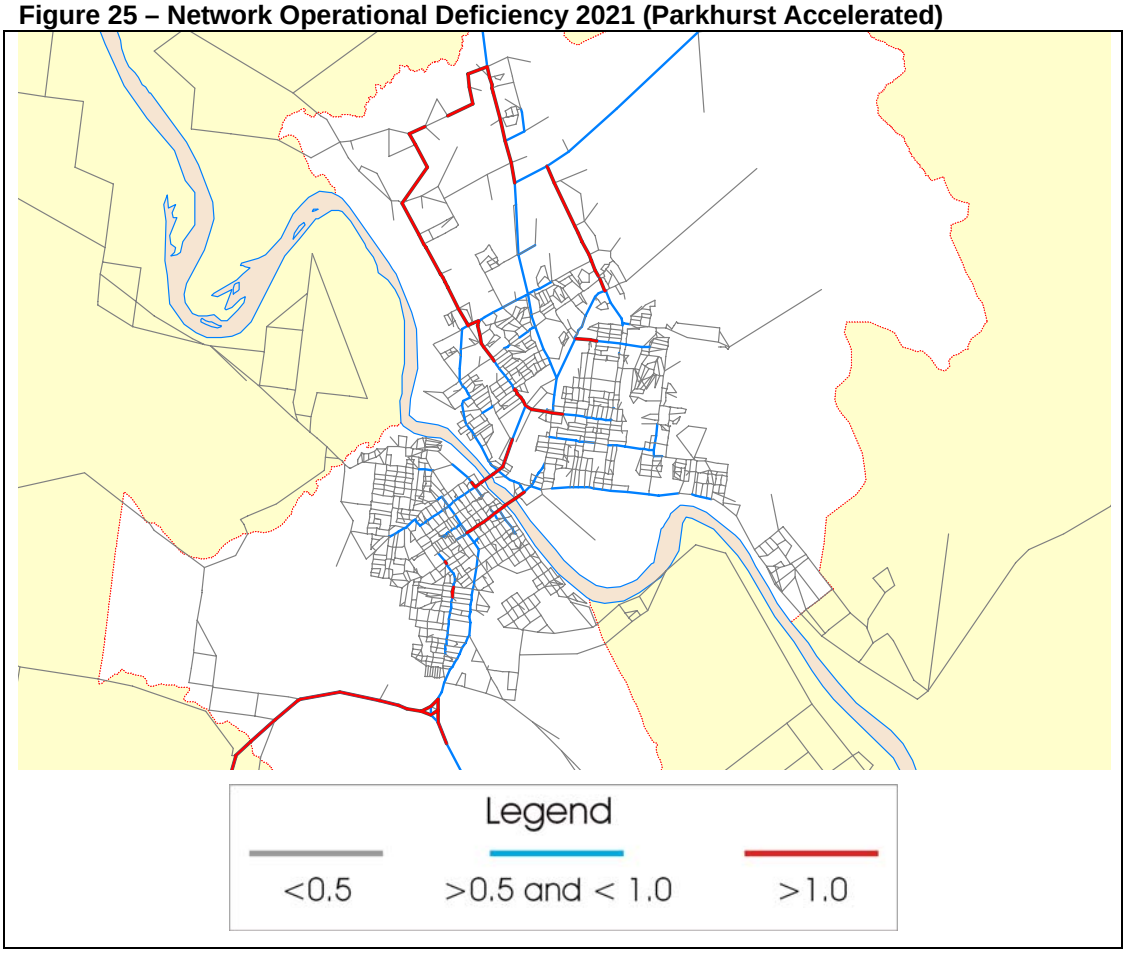


Figure 25 – Network Operational Deficiency 2021 (Parkhurst Accelerated)



9.1.9 Do Minimum Hierarchic Road Network Deficiencies

A number of roads while not operationally deficient were forecast to have daily flows in excess of a desired maximum daily flow based on their role (hierarchy) in the road network. The roads identified by this analysis are discussed in Table 35 and shown in Figure 26, Figure 27, and Figure 28. Those links identified in the base year as having daily flows in excess of the desired maximum flow have not been re-mentioned in Table 35.

- Bridge Street and Glenmore Road, which are currently designated as urban sub-arterial, however this route provides a more direct route to south Rockhampton as opposed to Alexandra Street and Moores Creek Road;
- Knight street
- Other streets in South Rockhampton including Archer Street and Denham Street
- Sections of Berserker Street; and
- Sections of Alexandra Street.

Table 35 – Network Hierarchic Deficiencies PAG Scenario

Road Section	Hierarchy Classification	Hierarchic Desired Maximum Daily Flow	Daily Flow
2011			
Belmont Rd between William Palfrey Rd and Birbeck Dve	Minor Urban Collector	< 3,000 vpd	4,100 vpd
Belmont Rd between Birbeck Dve and Johnson St	Minor Urban Collector	< 3,000 vpd	5,800 – 7,900 vpd
2016			
Glenmore Rd between Main St and Moores Creek	Urban sub-arterial	< 10,000 vpd	11,800 – 12,400 vpd
Farm Street between Alexandra St and Hinchliff St	Urban Sub-arterial	< 10,000 vpd	10,500 vpd
Bridge St between Moores Creek and Ashney St	Urban sub-arterial	< 10,000 vpd	11,900 -12,500 vpd
Hollingsworth St between Power St and Haynes St	Urban sub-arterial	< 10,000 vpd	10,900 vpd
Haynes St between Hollingsworth St and Glenmore Rd	Urban sub-arterial	< 10,000 vpd	11,900 – 13,500 vpd
Alexandra St between Johnson St and Farm St	Urban sub-arterial	< 10,000 vpd	14,700 – 16,700 vpd
2021			
Hinchliff St between Farm St and Alexandra St	Urban sub-arterial	< 10,000 vpd	13,600 – 14,700 vpd
Alexandra St between between Hinchliff St and Richardson St	Urban sub-arterial	< 10,000 vpd	14,700 – 16,100 vpd

Figure 26 – Network Hierarchic Deficiency 2011 (Parkhurst Accelerated)

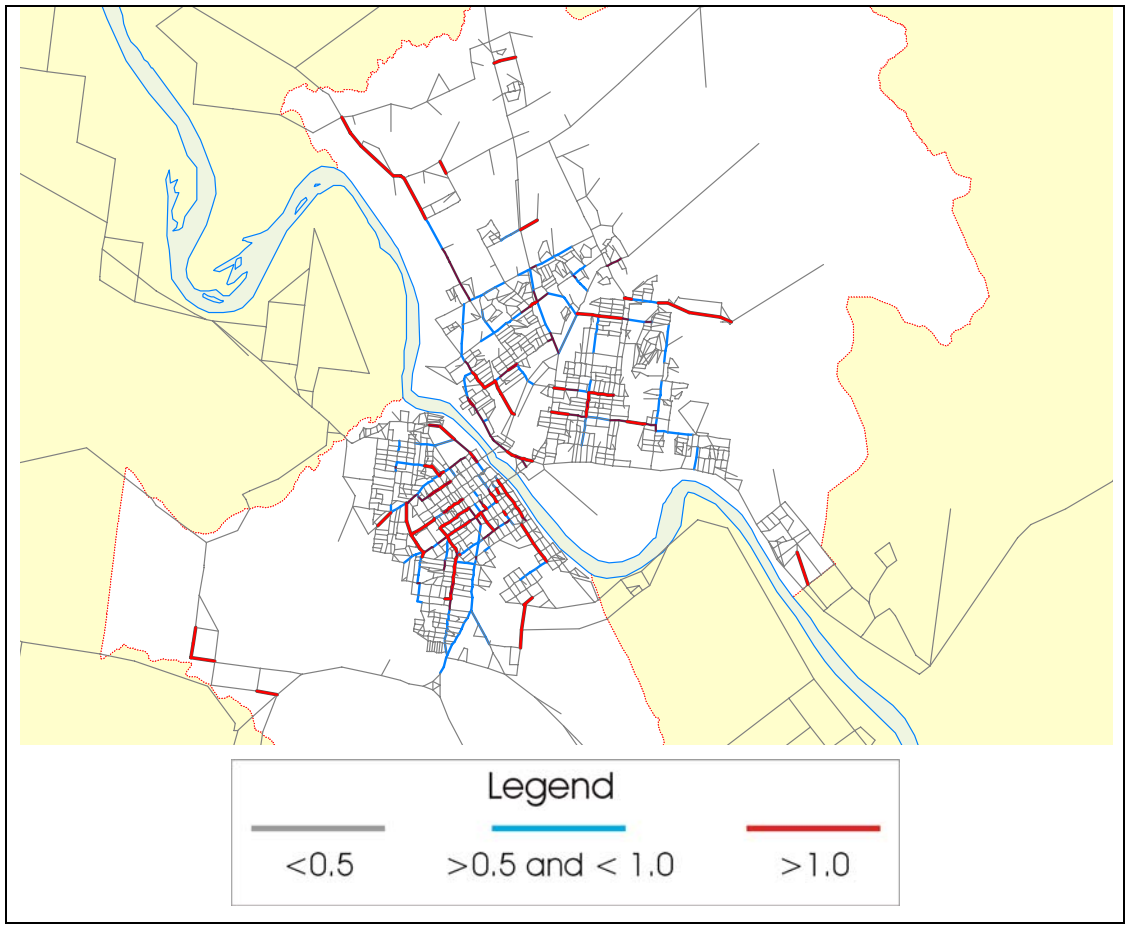


Figure 27 – Network Hierarchic Deficiency 2016 (Parkhurst Accelerated)

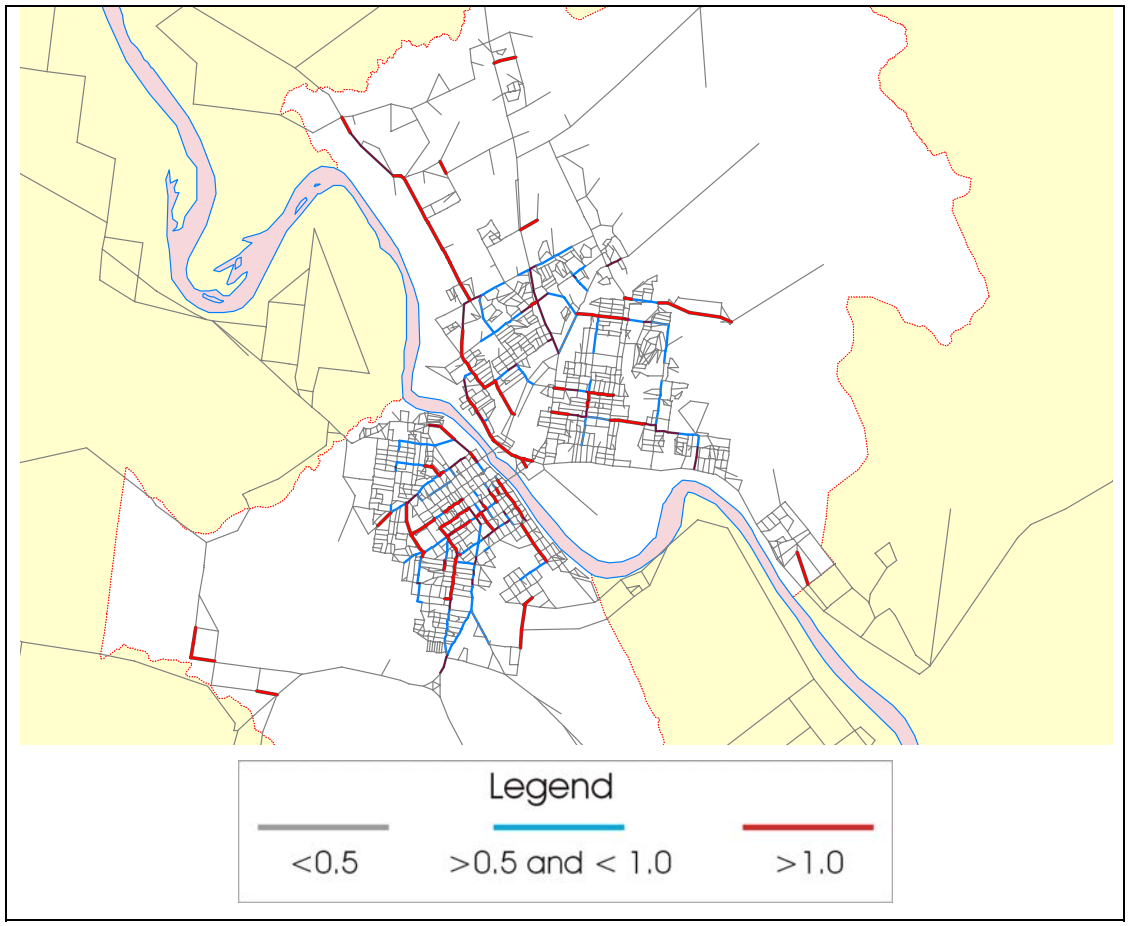
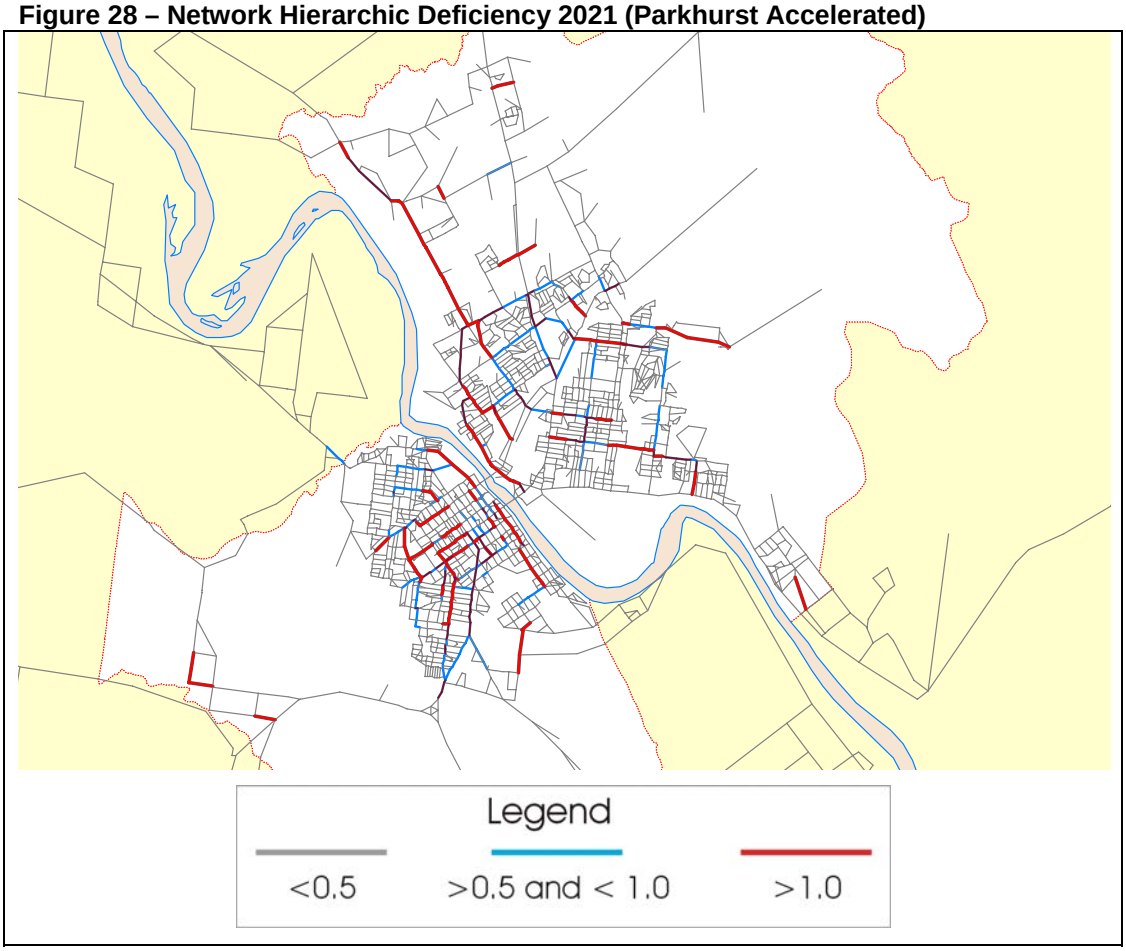


Figure 28 – Network Hierarchic Deficiency 2021 (Parkhurst Accelerated)



10 Future Year Network Option Analysis

10.1.1 Future Road Network Options

Section 9 discussed the road network deficiencies that are that forecast to occur in Rockhampton should further upgrades to the network over the "do minimum" not occur. The analysis showed that unacceptable traffic conditions would exist on a number of key elements of the road network.

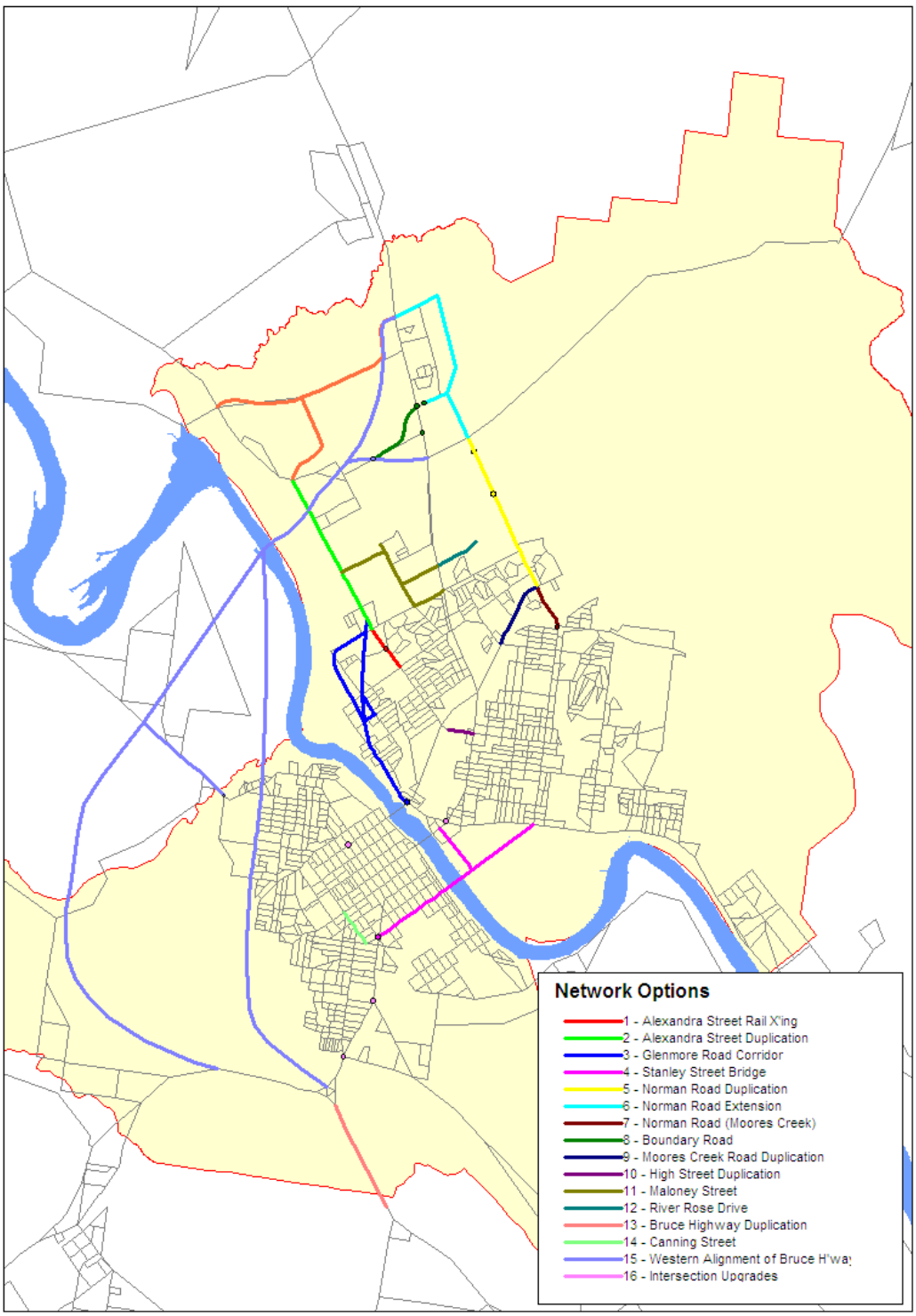
Figure 29 shows the future year network options consider while Table 36 provides a brief discussion on each option. The future year road network options were developed from a range of sources including RCC, DMR, and Arup in order to address network deficiencies.

Table 36 – Future Network Options

No	Option Location	Option Description
1	Alexandra Street	Construct railway overpass. Alexandra St is currently disconnected at the north coast railway near Farm St consequently traffic travelling along Alexandra St is required to use Hinchcliff Street and Farm St before rejoining Alexandra Street. The analysis has shown that intersections at Farm Street/ Alexandra St and Farm St/ Hinchcliff St will be deficient.
2	Alexandra Street	Upgrade to 4 lanes north of Farm Street
3	Glenmore Road/ Haynes St/ Hollingsworth St	The analysis has shown that sections of Haynes Street and Glenmore Road will be deficient in the future. While not all the corridor will be deficient Haynes St and Hollingsworth Street are primarily residential and as such the forecast volumes are higher than desired. A range of options have been consider including: • duplication of sections of Glenmore Road, • developing a bypass of the Haynes St and Hollingsworth St sections of the corridor to the west. • A connections to Moores Creek Road from Glenmore Rd • Duplication of Hollingsworth Street.
4	Stanley Street Bridge	Construct a new bridge across the Fitzroy River from Stanley Street to Dean Street.
5	Norman Road (Moores Creek Road to Rockhampton – Yeppoon Road)	Duplication of Norman Road together with intersection upgrades at Foulkes Street and Nagle Drive
6	Extension of Norman Road	Extend Norman Road north of Rockhampton – Yeppoon Road to support the new development north of Limestone Creek including an extension of Boundary Road across Limestone Creek to Norman Road.
7	Norman Road (Moores Creek Road to Dean Street)	Duplication of Norman Road including a new crossing of Moores Creek, which would also necessitate intersection upgades at Norman Road/Frenchville

No	Option Location	Option Description
		Road and Norman Road/ Dean Street intersections.
8	Boundary Road	Re-alignment of Boundary Road (West) to Boundary Road (North) creating a four leg signal controlled intersection at Yaamba Road/ Boundary Road.
9	Moores Creek Road	Duplication of Moores Creek Road between Feez St and Norman Road
10	High Street	Duplication of High Street between Aquatic Place and the K Mart entrance including widening of the Moores Creek Bridge.
11	Maloney Street	Construct a new connection road between Yaamba Road and McLaughlin Street linking to a new crossing of the rail line and connecting to Alexandra Street in the vicinity of Werribee Street. This option would also enable a downgrading of Farm Street between McLaughlin Street and Yaamba Road.
12	River Rose Drive	Extend River Rose Drive to Yaamba Rd at a 4 leg signal controlled intersection with the Maloney Street option.
13	Bruce Highway	Duplication of the Bruce Highway south of the Capricorn Highway.
14	Canning Street between Caroline Street and Denham Street.	Local area improvements to support retail and entertainment nature of the precinct.
15	Western alignment of the Bruce Highway	Construct a new alignment for the Bruce Highway to the west of the city between the Bruce Highway at Olive Street and the Capricorn Highway including connections to Rockhampton – Yeppoon Road, Alexandra Street and Lions Creek Road. Two alignments are possible, which are: • To the east of the Airport, and • To the west of the Airport.
16	Intersection Upgrades	Norman Road and Moores Creek Road Realigned William Palfrey Road/ Yaamba Road, Olive Street Lakes Creek Road/ East Street and Bridge Street Port Curtis Road and Lower Dawson Road Jellicoe Street and Lower Dawson Road Albert Street and George Street

Figure 29 – Future Network Options



10.1.2 Analysis of Future Network Options – City Plan Scenario

10.1.3 Fitzroy River Crossings

The "do minimum" analysis indicated levels of service on the Fitzroy River bridges will continue to deteriorate such that by 2021 both bridges will be deficient. As such an alternative crossing of the Fitzroy River will be required within that period. Two alternatives were considered:

- Extending Stanley Street (Scheme 4) and connecting to Lakes Creek Road in the vicinity of Dean Street. This option could also include a realignment of the rail line with the bridge carrying both rail and traffic, which would remove the rail from central Rockhampton.
- Developing a new corridor to the west of the city (Scheme 34) connecting to the Capricorn Highway in the south to the Bruce Highway at a new interchange at Olive Street in the north. Two alignments could be suitable one to the east of the Airport using Western Street and to the west of the airport with a connection to Lions Creek Road.

  Other intermediate connections would be provided at Alexandra Street and a link to Rockhampton – Yeppoon Road which would also include a connection to Boundary Road. The Alexandra Street connection would enable some cross city traffic originating and destined for the Kawana and Parkhurst areas to access the corridor.

These two alternatives were considered for addressing the identified deficiency of the Fitzroy and Neville Hewitt bridges.

10.1.3.1 Stanley Street Bridge

The Stanley Street Bridge would necessitate works in Stanley Street including four lanes between the new bridge and Gladstone Road coupled with intersection improvements to facilitate access to the bridge. In particular the intersection of Gladstone Road and Stanley Street would require major works. The bridge would also impact on the open space on the north bank of the Fitzroy River. Depending on the alignment this may include the football fields and racecourse. The close proximity of the rail line to Lakes Creek Road also poses a number of problems in connecting into the Dean Street/ Lakes Creek Road intersection.

The benefit of the Stanley Street bridge option is best understood from analysis of traffic flows on the other two bridges. Table 37 sets out the estimated daily flows on the three bridges for this option.

Table 37 – Daily Flows for Stanley Street Bridge Option (City Plan Scenario) – Fitzroy River Screenline

Location	2005 Estimated	2011 Forecast	**% Change from 2005**	2016 Forecast	**% Change from 2005**	2021 Forecast	**% Change from 2005**
Neville Hewitt Bridge	34,340	32,180	-6%	33,180	-3%	34,450	0.0%
Fitzroy River Bridge	38,200	32,210	-16%	32,890	-14%	33,560	-12%
Stanley Street Bridge	-	13,480	-%	13,980	-%	14,650	-%
Total	**72,540**	**77,870**	**7%**	**80,050**	**10%**	**82,660**	**14%**

The analysis indicates that:

- in 2011 13,500 vpd was forecast to use the Stanley Street Bridge rising to 14,600 by 2021
- Fitzroy Bridge daily traffic was forecast to be 16% lower than 2005 levels if the bridge was built before 2011 with flows remaining below current levels beyond 2021

- Neville Hewitt Bridge daily traffic was forecast to be back at current daily flows by 2021.
- Reduced traffic through the Queen Elizabeth Drive/ Lakes Creek Road/ Bridge Street intersection is likely to result in improved operations and reduced delay at this location

This option does not provide substantial long term relief to the Neville Hewitt Bridge where daily flows were forecast to be at current levels by 2021. Figure 30 shows the impact on road network operational deficiency. The key outcomes being:

- Four lanes would be required on Stanley Street to support this option
- Four lane upgrading of Norman Road would be required between Frenchville Road and Nagle Drive by 2021 with the section between Frenchville Road and Richardson Street required at the same time as the bridge;
- Intersection upgrade would most likely be required along Dean Street at Elphinestone Street, High Street, Kerrigan Street, Frenchville Road and Moores Creek Road
- The additional traffic on Dean Street would see a deterioration in the amenity to those residents along Dean Street from increased noise, reduced ease of access to driveways, and reduced ease of movement for pedestrians.
- Intersection works at East Street/ Fitzroy Street and Bolsover Street/ Fitzroy Street would still be required irrespective of the Stanley Street bridge option
- Other network deficiencies identified in the “do minimum” analysis are not addressed by this option.

Figure 30 – Network Operational Deficiency 2021 (City Plan Scenario) – Stanley Street Bridge

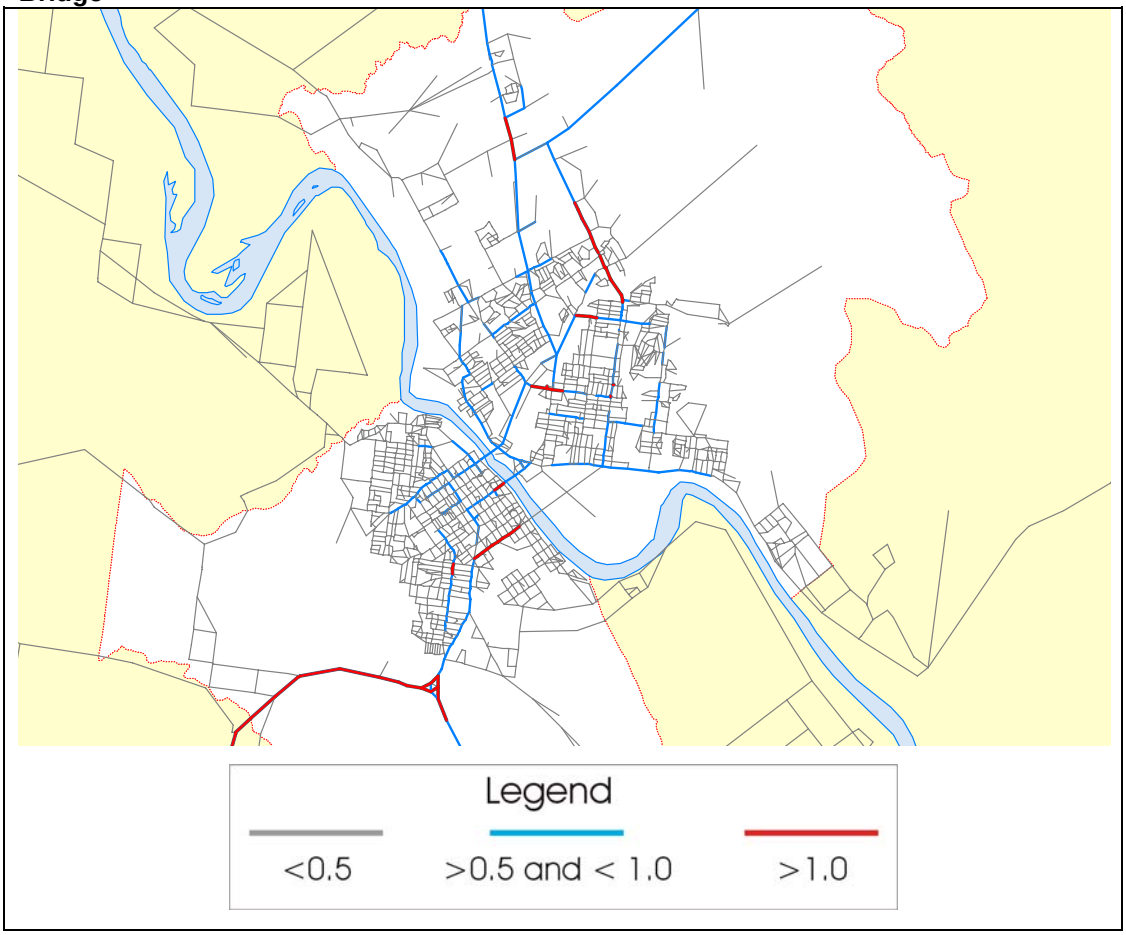
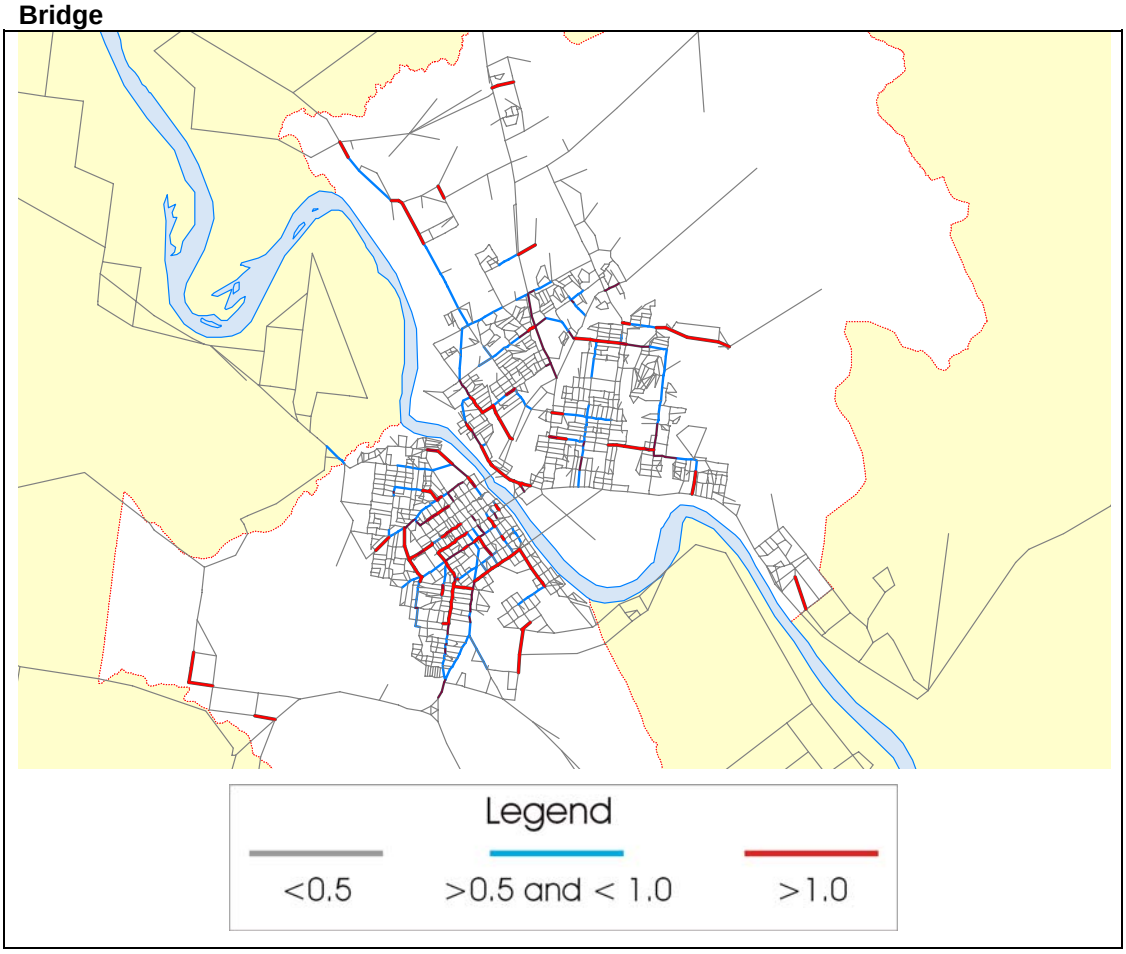


Figure 31 – Network Hierarchic Deficiency 2021 (City Plan Scenario) – Stanley Street Bridge



In reviewing whether this option addressed the various network hierarchic deficiencies identified in the "do minimum" analysis it was found that they were not addressed by this option.

The Stanley Street Bridge provides good long term relief to the Fitzroy River Bridge under this scenario but provides limited benefit to the overall road network. It does not provide long term relief to the Neville Hewitt Bridge and current operating conditions will have returned within the timeframe of this study necessitating planning for a another river crossing prior to 2021. The Stanley Street bridge should be considered as a possible fourth river crossing in the future.

10.1.3.2 Western River Crossing – Western Street Alternative

A new corridor would be built to the west of the city. The option assumed a high standard road is built between the Bruce Highway at Olive Street and the Capricorn Highway to the east of the Airport along the Western Street alignment. A connection point to the Capricorn Highway was not certain, for this option the corridor was connected into the Bruce Highway/ Capricorn Highway roundabout. For modelling purposes a two lane cross-section was assumed. It was assumed that a connection would be provided to Rockhampton-Yeppoon Road which would necessitate a crossing the north coast rail line. Interchanges would also be provided at Alexandra Street and with a new road linking to Lion Creek Road. Providing a link to Lion Creek Road creates a connection to the city further enhancing the benefits of the corridor as a relief to both current bridges.

This option would provide for efficient movement of long distance travel free from the stop/ start nature of the existing Bruce Highway through Rockhampton.

The Western River Crossing (Western St alternative) provides long term relief to both the existing river crossings with the Neville Hewitt Bridge forecast to be 9% lower than 2005 traffic flows in 2021 and the Fitzroy Bridge was forecast to have traffic flows 6% lower in 2021 than in 2005.. Table 38 outlines the effects of an additional river crossing on a western alignment on the other two Fitzroy River bridges.

Other benefits of this option are:

- Daily traffic flows on Glenmore Road were forecast to be lower with this option with 2021 daily flows on Glenmore Road being 12% lower than current levels and 21% lower than estimated 2021 flows under the “do minimum” scenario (City Plan scenario).
- Traffic across the existing Fitzroy River bridges in 2021 was forecast to be approximately 67,500 vpd or a 19% reduction compared to the 2021 “do minimum” option (City Plan scenario).
- Daily traffic flows on Knight Street were forecast to lower by 17% over current levels would be 26% lower than the 2021 “do minimum” flow (City Plan scenario).
- Access to the Airport is substantially improved for those travelling from North Rockhampton.

The drawbacks to this option are:

- The impact on Western Street, as some resumptions maybe necessary, and the residential amenity of the street will be severely reduced with access and egress to fronting development severely affected, which would raise a number of safety issues. Intersections along Western Street would most likely require works to improve access and maintain safe operating conditions.
- Increased traffic on Lion Creek Road will impact on the residential amenity to fronting development making access and egress from local streets more difficult which may necessitate improvement works at some intersections for safety. The location of these upgrades would be the subject of a more local investigation should this option be pursued further.

Figure 32 shows the impact on road network operational deficiency. The key outcomes being:

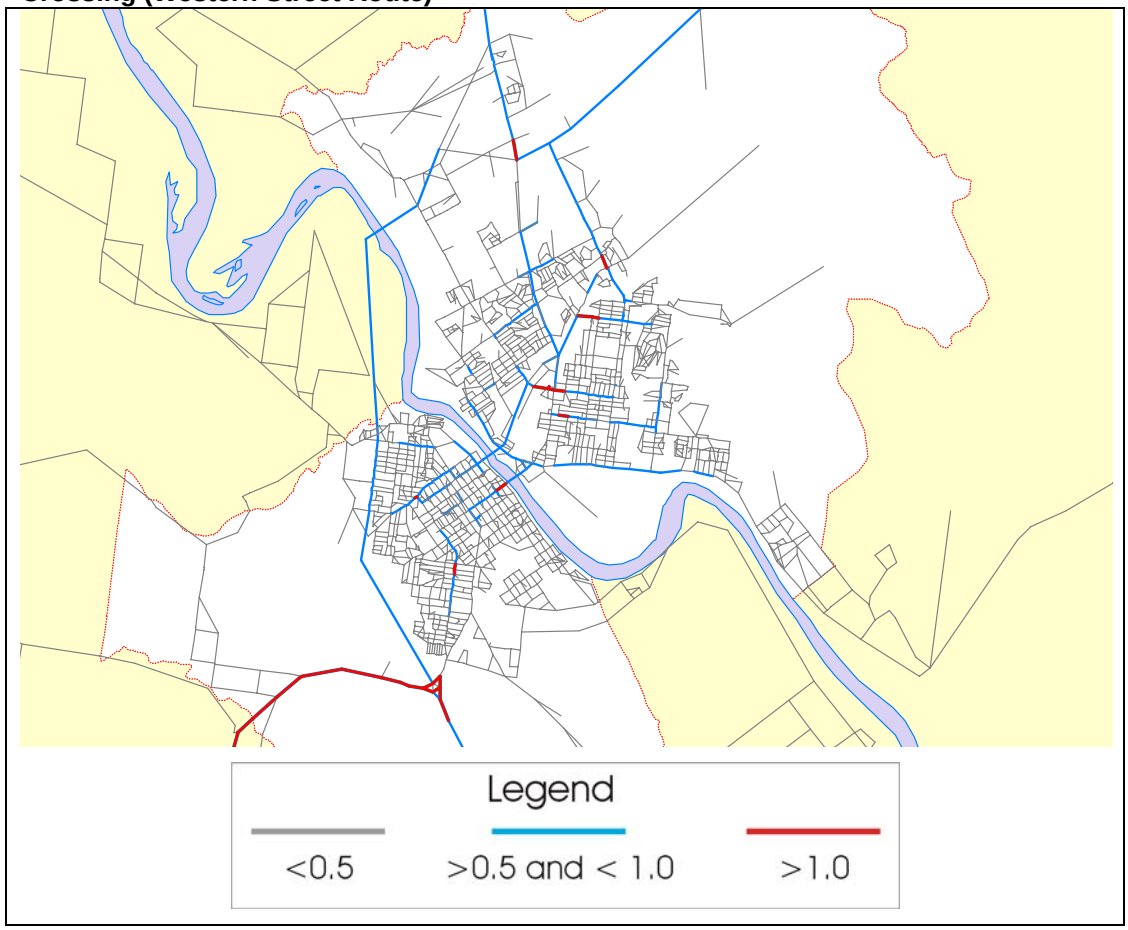
- Intersection works at East Street/ Fitzroy Street and Bolsover Street/ Fitzroy Street would still be required irrespective of the Stanley Street bridge option
- Four lane upgrading of Yaamba Road between the Rockhampton – Yeppoon Road and Boundary Road (west) would be required;
- Intersection works are likely to be required at Lion Creek road and Exhibition St, Lion Creek Road and North Street and Lion Creek Road/ Albert St and Bolsover St

Other network deficiencies identified in the “do minimum” analysis are not addressed by this option.

Table 38 – Daily Flows for Western Alignment Bridge Eastern Route Option (City Plan Scenario) – Fitzroy River Screenline

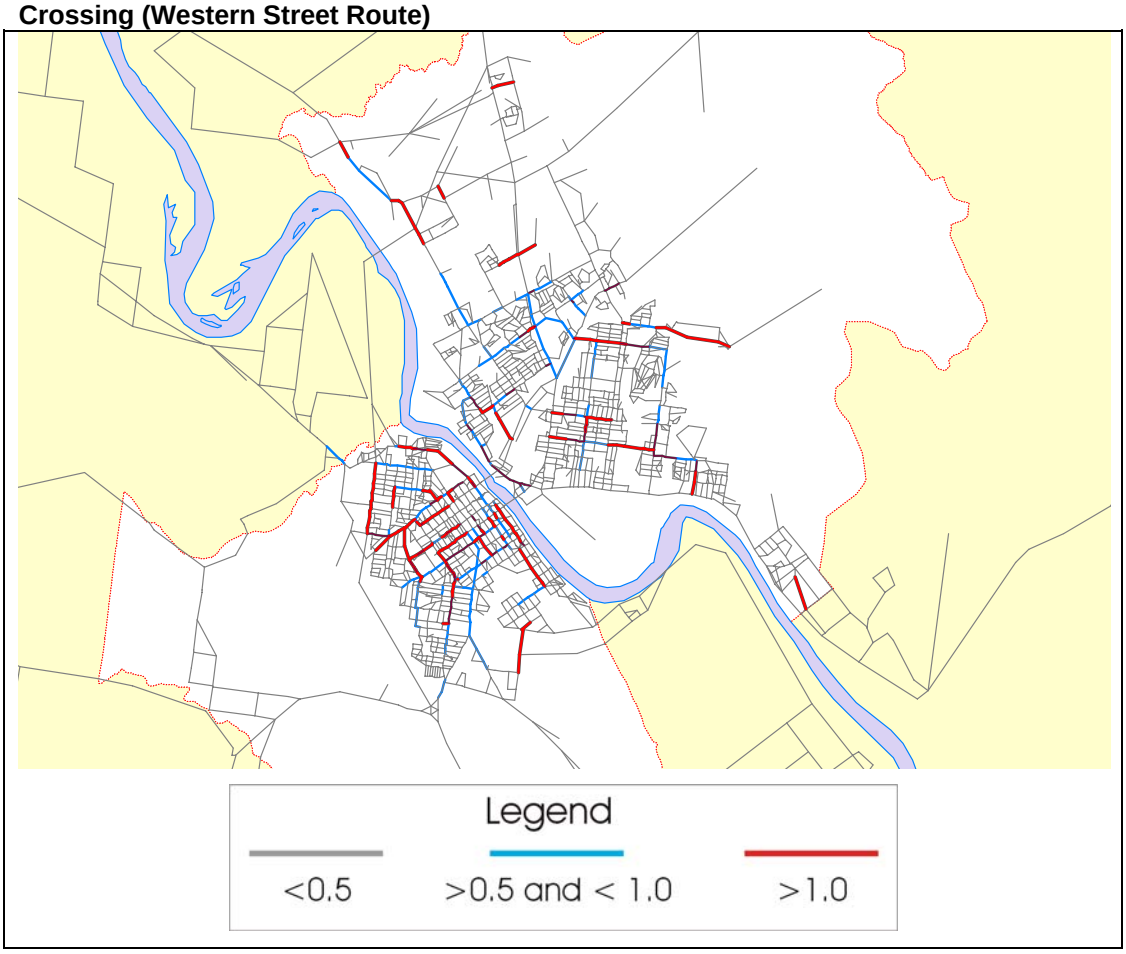
Location	2005 Estimated	2011 Forecast	% Change from 2005	2016 Forecast	% Change from 2005	2021 Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	30,670	-11%	30,950	-10%	31,400	-9%
Fitzroy River Bridge	38,200	34,960	-8%	35,450	-7%	36,080	-6%
Western Crossing – East Alignment	-	12,230	-%	13,650	-%	15,180	-%
Total	**72,540**	**77,860**	**7%**	**80,050**	**10%**	**82,660**	**14%**

Figure 32 – Network Operational Deficiency 2021 (City Plan Scenario) – Western River Crossing (Western Street Route)



The majority of hierarchic deficiencies identified in the “do minimum” analysis are not addressed by this option. A reclassification of Lion Creek Road and Western Street would be required under this option.

Figure 33 – Network Hierarchic Deficiency 2021 (City Plan Scenario) – Western River Crossing (Western Street Route)



The option provides good long term relief to the existing Bruce Highway including the Neville Hewitt and Fitzroy River Bridge. However the option has a large detrimental impact residential community along Western Street. A western alignment has many advantages and should be considered further although an alternative alignment would be preferable in minimising impacts on Rockhampton residents.

10.1.3.3 Western River Crossing – West of Airport Alternative

A new corridor would be built to the west of the city. The option assumed a high standard road is built between the Bruce Highway at Olive Street and the Capricorn Highway to the west of the Airport along the new alignment. An interchange with the Capricorn Highway was assumed to the west of the Bruce Highway. For modelling purposes a two lane cross-section was assumed. It was assumed that a connection would be provided to Rockhampton-Yeppoon Road which would necessitate a crossing of the north coast rail line. Interchanges would also be provided at Alexandra Street and with a new road linking to Lion Creek Road. Providing a link to Lion Creek Road creates a connection to the city further enhancing the benefits of the corridor as a relief to both current bridges.

The Western River Crossing (western alternative) provides long term relief to both the existing river crossings with the Neville Hewitt Bridge forecast to be 10% lower than existing levels in 2021 and the Fitzroy Bridge 6%. Table 39 outlines the effects of an additional river crossing on a western alignment on the other two Fitzroy River bridges.

Other benefits of this option are:

- Daily traffic flows on Glenmore Road are forecast to be lower with this option with 2021 daily flows on Glenmore Road being 12% lower than current levels and 21% lower than estimated 2021 flows under the "do minimum" scenario (City Plan scenario).
- Traffic within Central Rockhampton in 2021 was forecast to be approximately 67,500 vpd or a 19% reduction compared to the 2021 "do minimum" option (City Plan scenario).
- Daily traffic flows on Knight Street are forecast to lower by 17% over current levels would be 26% lower than the 2021 "do minimum" flow (City Plan scenario).
- Access to the Airport is substantially improved for those travelling from North Rockhampton.

The drawbacks to this option are:

- Upgrade works would be required on the Capricorn Highway and at the intersection of the Capricorn Highway/ Bruce Highway to maintain good operating conditions.
- Increased traffic on Lion Creek Road will impact on the residential amenity to fronting development making access and egress from local streets more difficult which may necessitate improvement works at some intersections for safety. The location of these upgrades would be the subject of a more local investigation should this option be pursued further.

Figure 34 shows the impact on road network operational deficiency. The key outcomes being:

- Intersection works at East Street/ Fitzroy Street and Bolsover Street/ Fitzroy Street would still be required irrespective of the western alignment bridge option
- Four lane upgrading of Yaamba Road between the Rockhampton – Yeppoon Road and Boundary Road (west) would be required;
- Intersection works are likely to be required at Lion Creek road and Exhibition St, Lion Creek Road and North Street and Lion Creek Road/ Albert St and Bolsover St

Other network deficiencies identified in the "do minimum" analysis are not addressed by this option.

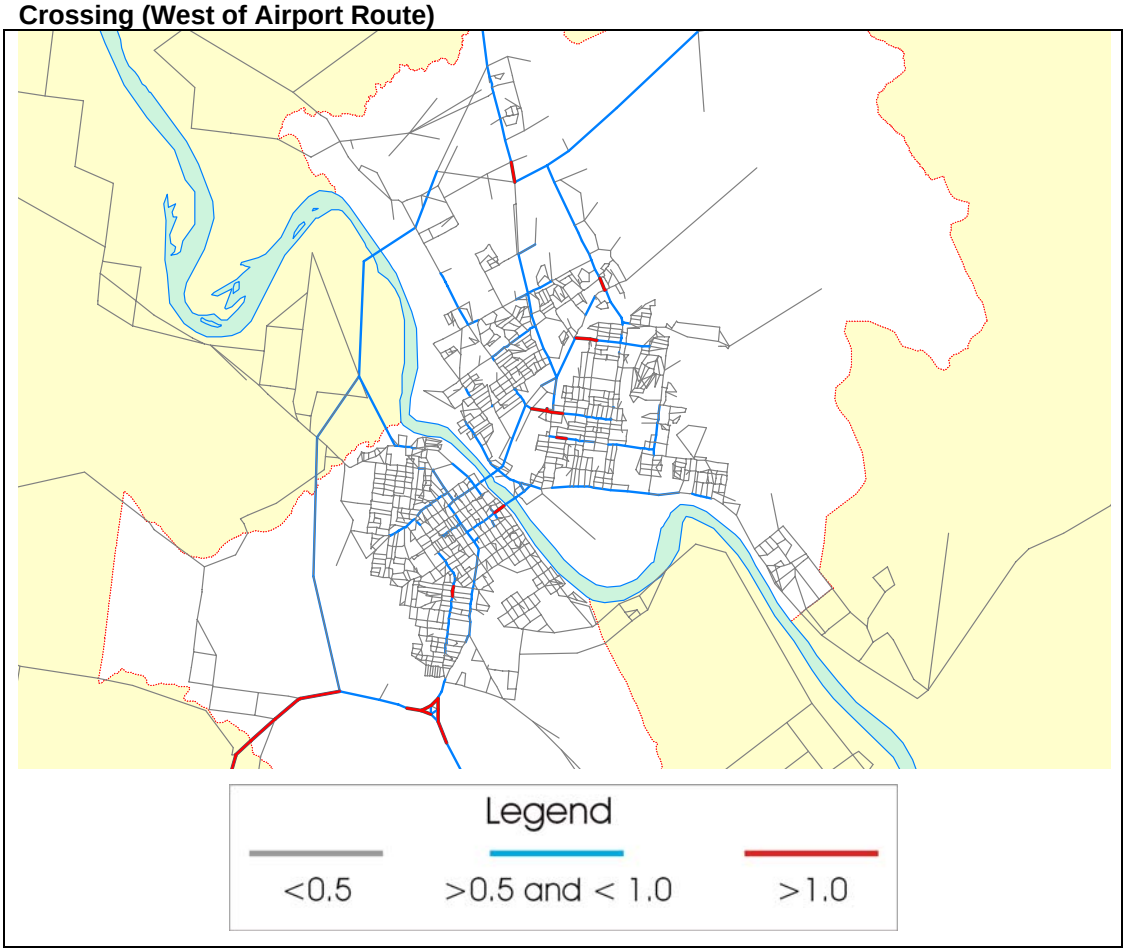
Table 39 – Daily Flows for Western Alignment Bridge Western Route Option (City Plan Scenario) – Fitzroy River Screenline

Location	2005 Estimated	2011 Forecast	% Change from 2005	2016 Forecast	% Change from 2005	2021 Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	30,380	-12%	30,620	-11%	31,070	-10%
Fitzroy River Bridge	38,200	34,820	-9%	35,330	-8%	35,970	-6%
Western Crossing – West Alignment	-	12,670	0%	14,100	0%	15,630	0%
Total	**72,540**	**77,870**	**7%**	**80,050**	**10%**	**82,670**	**14%**

This remains a better outcome than the "do minimum" scenario as traffic across the central bridges in 2021 was forecast to be approximately 83,000 vpd which reduces to 67,500 vpd or a 19% reduction in forecast traffic through central Rockhampton by 2021.

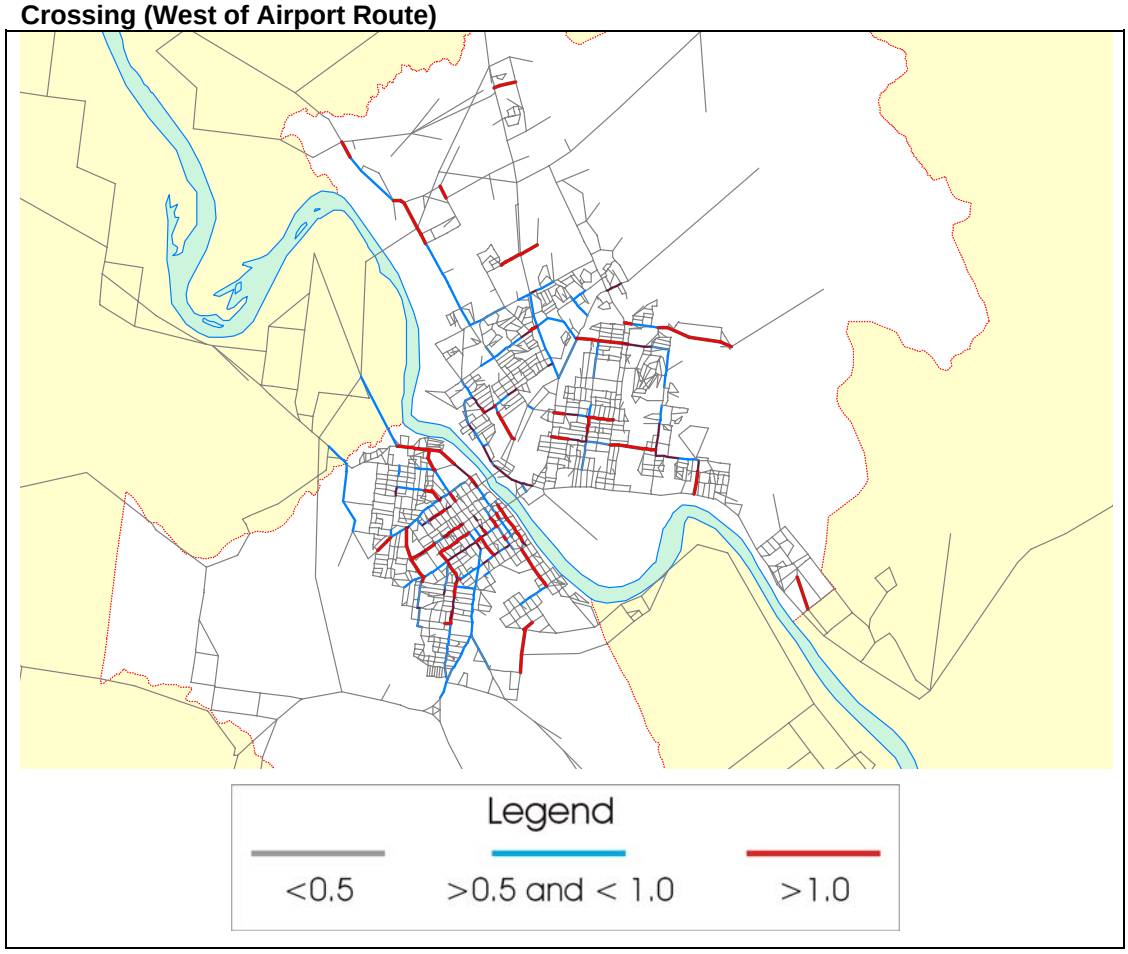
This option negates the forecast deficiencies on both bridges but does not address the more local deficiencies previously identified in the “do minimum” analysis (Section 9.2.2).

Figure 34 – Network Operational Deficiency 2021 (City Plan Scenario) – Western River Crossing (West of Airport Route)



The majority of hierarchic deficiencies identified in the “do minimum” analysis are not addressed by this option. A reclassification of Lion Creek Road and Western Street would be required as a result of this option as the role in the network has substantially changed.

Figure 35 – Network Hierarchic Deficiency 2021 (City Plan Scenario) – Western River Crossing (West of Airport Route)



The option provides long term relief to the existing Fitzroy River bridges. Traffic flows are lower along Glenmore Road and Knight Street. The route is slightly longer and access to the Airport is not as good as than the Western Street alternative. However the option is beneficial and should be considered further.

10.1.4 Other Fitzroy River Bridge Options

A further three options were considered in the analysis, which were:

- Duplication of the Neville Hewitt Bridge
- Extension of Richardson St across Splitters Creek, a bridge across the Fitzroy River connecting into Harman Street on the southern side and eventually to Lion Creek Road.
- A bridge on a new alignment connecting into Alexandra St at Maloney Street on the northern side and continuing to the west of Airport on the same alignment as the Western River Crossing (west of Airport) option discussed in Section 10.2.1.3. The option also had a connection to Lion Creek Road.

10.1.4.1 Duplication of the Neville Hewitt Bridge

The option assumed that a second bridge of four lanes would be built adjacent to the existing bridge creating four lanes in each direction across the Fitzroy River. Four lanes would continue south until the Albert Street/ Bolsover Street intersection where lanes were dropped and the existing arrangement of two lanes in each direction continued south. To the north the four lanes in each direction would continue until approximately Dowling Street where the corridor was reduced to three lanes in each direction until the Knight Street/ Moores Creek intersection where lanes were dropped and the existing corridor maintained

north of Knight Street. Substantial property acquisition would be required on the southern side of the Fitzroy River to enable this option.

The western Bruce Highway corridor alignment options are both expensive and difficult because of the flooding and terrain issues. A duplication of the existing Neville Hewitt Bridge may offer similar benefits as the western alignment option.

Table 40 shows the results of the option test on traffic across the Fitzroy River.

Table 40 – Daily Flows for duplication of the Neville Hewitt Bridge Option (City Plan Scenario) – Fitzroy River Screenline

Location	2005	2011		2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005	Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	41,570	21%	42,800	25%	44,420	29%
Fitzroy River Bridge	38,200	36,300	-5%	37,250	-2%	38,250	0%
Total	**72,540**	**77,870**	**7%**	**80,050**	**10%**	**82,670**	**14%**

The benefits of the options are:

- Reduces traffic on the Fitzroy River Bridge such that by 2021 daily traffic levels are similar to 2005 traffic levels;
- Provides long term capacity at this location; and
- May provide the opportunity to provide connections to Glenmore Road.

Drawbacks of the option are:

- Substantial property acquisition required, particularly on the southern side of the river;
- Does not remove through traffic from the centre of Rockhampton
- Reinforces the Bruce Highway as a physical barrier to ease of movement between South Rockhampton and the city centre;
- Upgrades to intersections on Albert Street and George Street will be required as traffic increases by 3 – 6% over the “do minimum” in 2021, which will necessitate property acquisition.

The option mitigates the deficiencies on the Neville Hewitt Bridge and Fitzroy River Bridge until after 2021. A full cost benefit analysis of the option compared to the western Bruce Highway alignment would be required to determine the value of the scheme.

10.1.4.2 Other Bridge Options

Both the other bridge options considered were not taken further as their benefits were limited and provide a more local function rather than a more strategic role. Neither option provided long term relief to the existing bridges. It was likely both existing bridges would be approaching their deficiency levels by 2021.

10.1.5 Alexandra Street (Rail Overpass)

Alexandra Street is currently disconnected at the North Coast Rail Line south of Farm Street. The option involves a grade separation of the rail line on the existing Alexandra St alignment. The option would involve:

- Severing Hinchliff Street north of Mungarra Drive
- Likely property impacts on Alexandra Street south of the rail line
- Intersection works at Farm Street and Alexandra Street

- Reducing access to the industrial area on Power Street and Alexandra Street north of the rail line.

The approaches to the bridge would need to be set at a maximum grade such that heavy commercial vehicles are able to travel along the Alexandra Street rail overpass.

The option will have a number of benefits:

- Negates the close spacing of the Alexandra Street/ Farm Street intersection, open level crossing, and Farm Street/ Hinchliff Street intersection, which has the potential in peak periods for traffic to queue on the open level crossing;
- Reduce the demand for the right turn from Farm Street into Hinchliff Street; and
- Improve the residential amenity of Hinchliff Street south of Farm Street.

Queensland Rail is also considering introducing longer freight trains which would result in greater impacts at the open level crossings in Rockhampton resulting from the longer closure periods. At Farm Street this has the potential for greater impact as there would be a strong likelihood of traffic being forced through residential areas in order to avoid delay at the OLC.

Daily traffic on the Neville Hewitt Bridge is forecast to increase by 20% compared to 2005 flows. The daily flow on both bridges for each of the forecast years is shown in Table 41.

The road network traffic benefits of the option are outlined in Table 42. The major outcomes from the analysis were:

- daily traffic flows on Knight Street were forecast to be up to 25% lower than 2005 flows by 2021,
- daily traffic traffic on Glenmore Road were forecast to be 10% lower than 2005 levels in 2021.
- Daily traffic flows on Hollingsworth Street were forecast to be 4600 vpd which compares to 5800 vpd in the base year and 8200 vpd in 2021 “do minimum” under the City Plan scenario;
- Daily traffic flows on Haynes Street were forecast to 7000 vpd in 2021 which compares to 8900 vpd in the base year and would be approximately 35% to 40% lower than the forecast 2021 flows under a “do minimum” under the City Plan scenario.

Table 41 – Daily Flows for the Alexandra Street Rail Overpass Option (City Plan Scenario) – Fitzroy River Screenline

Location	2005 Estimated	2011 Forecast	% Change from 2005	2016 Forecast	% Change from 2005	2021 Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	38,460	12%	39,690	16%	41,200	20%
Fitzroy River Bridge	38,200	39,410	3%	40,360	6%	41,460	9%
Total	72,540	77,870	7%	80,050	10%	82,660	14%

Table 42 – Daily Traffic Flows for the Alexandra Street Rail Overpass Option (City Plan Scenario) – Bruce Highway (North) Screenline

Location	2005	2011		2016		2021	
	Estimated	Forecast	**% Change from 2005**	Forecast	**% Change from 2005**	Forecast	**% Change from 2005**
Carlton Street	3,120	1,620	-48%	1,590	-49%	1,660	-47%
Farm Street	7,420	7,490	1%	8,000	8%	8,170	10%
Richardson Road	10,660	12,920	21%	12,570	18%	12,240	15%
Sheehy Street	–	1,200	–	1,180	–	1,020	–
Main Street	3,960	5,820	47%	5,770	46%	5,670	43%
Alexandra Street	16,380	19,860	21%	20,350	24%	21,120	29%
Knight St	4,350	3,300	-24%	3,270	-25%	3,260	-25%
Glenmore Road	9,540	8,140	-15%	8,340	-13%	8,590	-10%
Total	55,430	60,350	9%	61,070	10%	61,730	11%

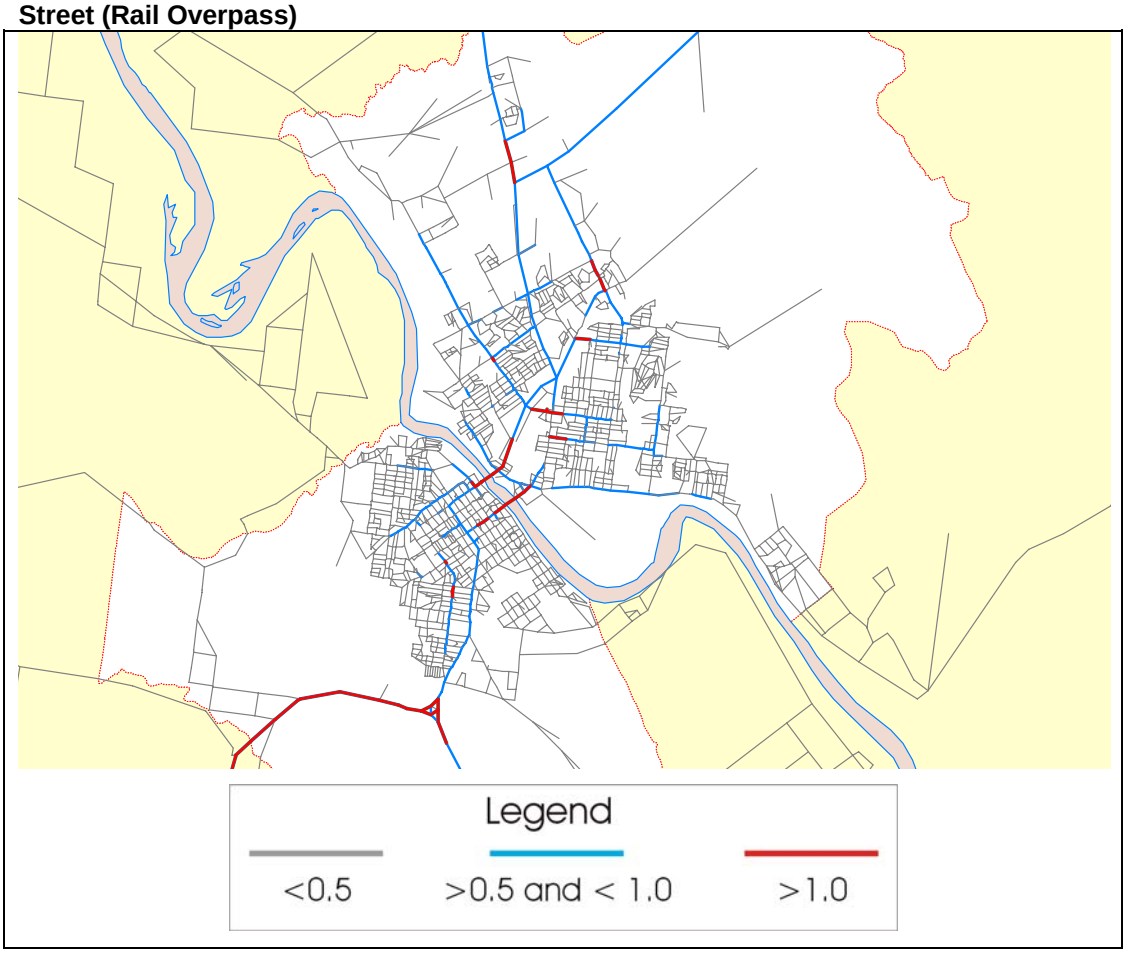
Table 42 shows that for this option daily traffic flows on Alexandra Street would be 29% higher in 2021 than 2005. Daily traffic flows on Alexandra Street in 2021 under the City Plan scenario “do minimum” option were estimated at 17540 vpd. The Alexandra Street rail overpass option increases traffic on Alexandra Street by 20% compared to the City Plan scenario ‘do minimum”. Higher traffic flows on Alexandra Street will necessitate intersection upgrades at:

- Alexandra Street and Richardson Street,
- Alexandra Street and Main Street,
- Alexandra Street and Sheehy Street, and
- Alexandra Street and Moores Creek Road.

The option has a number of other drawbacks:

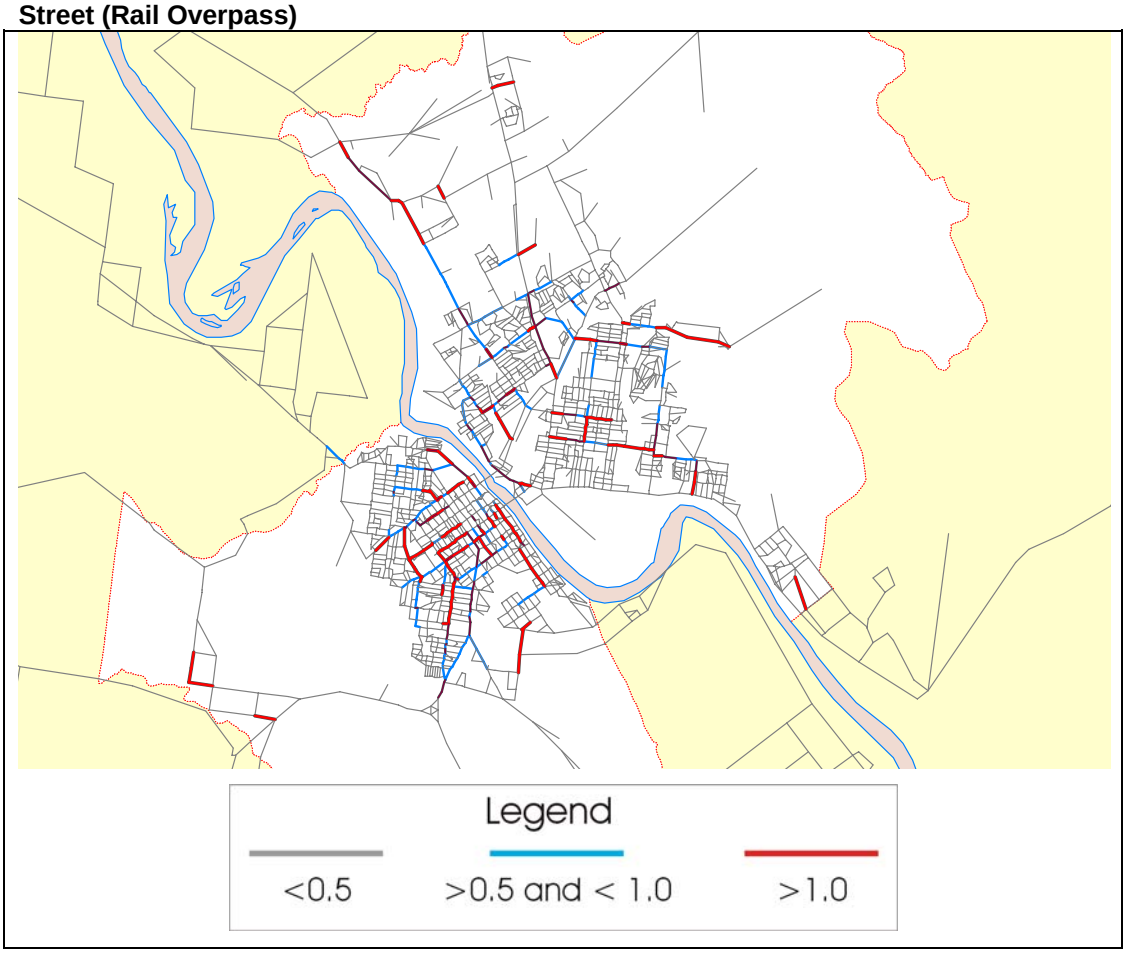
- Intersection upgrades may necessitate some land resumptions, but this would be determined at the time of detailed design,
- Reduced amenity for those properties fronting Alexandra Street as a result of the increase in daily traffic flows, noise, and reduced driveway access/ egress.

Figure 36 – Network Operational Deficiency 2021 (City Plan Scenario) – Alexandra Street (Rail Overpass)



The option, as shown in Figure 36, does not address the network operational deficiencies identified in the “do minimum” analysis for the City plan scenario.

Figure 37 – Network Hierarchic Deficiency 2021 (City Plan Scenario) – Alexandra Street (Rail Overpass)



The option does not address the hierarchic network deficiencies identified in the "do minimum analysis. Daily traffic flows on Knight Street were reduced with this option but daily flows in 2021 would be above the desired maximum daily flow for a minor urban collector.

An advantage of this option is to strengthen the road hierarchy in North Rockhampton. Alexandra Street is currently designated as urban arterial between Moores Creek Road and Richardson Road after which it is downgrade to urban sub-arterial. By building the rail overpass Alexandra Street would be designated as urban arterial between Moores Creek Road and Belmont Road, which establishes the role for the road and improves the over all hierarchy in the north of city by establishing a series of parallel arterial roads at a suitable separation.

Queensland Rail has a policy of where possible of seeking to have open level crossings removed to improve safety. Grade separation of Alexandra Street over the rail line may be seen as an opportunity to remove an OLC in Rockhampton.

The advantages of this option are clear, which are:

- Reduced traffic on sensitive areas of the road network, such as Glenmore Road, Haynes Street and Hollingsworth Street, and
- Establishes a clear hierarchy of arterial roads in the northern part of the city.

The Alexandra Street rail overpass options should be considered further.

10.1.6 Maloney Street Connection

The Maloney Street Connection option would provide an alternative grade separated crossing of the rail line into the industrial areas south of Limestone Creek. The option would include a new link road be built between McLaughlin Street and Yaamba Road to the north of the Glenmore Primary and Secondary Schools and include a new signal controlled intersection at Yaamba Road. A further new road would be built between McLaughlin Street and Alexandra Street across the rail line in to Werribee Street. Once the connection between Yaamba Road and Alexandra Street is completed Farm Street between McLaughlin Street and Yaamba Road would be downgraded to improve the amenity and safety at the entrances to the primary and secondary schools on Farm Street. Measures for downgrading Farm Street may include a permanent lower speed zone in front of the schools and other physical changes to present Farm Street as local area for the safe drop off and collection of students.

The intention is to provide a more direct route to the Bruce Highway for traffic west of the rail line without traffic having to cross the rail line along Farm Street and travel past a number of schools.

Table 43 – Daily Flows for Maloney Street Option (City Plan Scenario) – Bruce Highway (North) Screenline

Location	2005	2011		2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005	Forecast	% Change from 2005
Carlton Street	3,120	3,910	25%	3,770	21%	3,710	19%
Maloney Street Connection	–	2,510	–	2,600	–	2,520	–
Farm Street	7,420	5,250	-29%	5,240	-29%	5,260	-29%
Richardson Road	10,660	10,410	-2%	10,480	-2%	10,340	-3%
Sheehy Street	–	1,180	–	1,010	–	1,020	–
Main Street	3,960	5,820	47%	5,780	46%	5,740	45%
Alexandra Street	16,380	17,000	4%	17,240	5%	17,550	7%
Knight St	4,350	4,460	3%	4,440	2%	4,940	14%
Glenmore Road	9,540	9,680	1%	10,220	7%	10,720	12%
Total	**55,430**	**60,220**	**9%**	**60,780**	**10%**	**61,800**	**11%**

Table 43 shows the forecast daily traffic flows on the Bruce Highway (North) screenline for the Maloney Street option. The Maloney Street connection was forecast to carry approximately 2500 vpd by 2021. A daily flow of this magnitude is unlikely support the case for a rail line crossing at this location. However the option has a number of potential advantages:

- By providing a rail crossing it may be possible to close the Farm Street OLC as a safer and more viable alternative exists; and
- Together with the River Rose Drive option a sub arterial road corridor would be established between Alexandra Street and Norman Road providing high quality connectivity. Maloney Street and River Rose Drive would offer the opportunity to take traffic away from sensitive land uses. River Rose Drive will be constructed as development occurs. The Maloney Street option does not rely on River Rose Drive.

The closure of Farm Street at the OLC would has a major advantages as the option would significantly reduce daily traffic flows adjacent to Glenmore Primary and Glenmore secondary Schools.

A drawback to the closure of Farm Street it is likely additional traffic would be attracted to Richardson Road and the Richardson Road/ Yaamba Road intersection. Additional traffic flowing through the Richardson/ Yaamba Road intersection is likely to necessitate improvement works.

The Maloney Street option provides a number of advantages which outweigh the drawbacks and in the context of developing a good road network hierarchy the option should be considered further.

10.1.7 Glenmore Road Corridor

A number of options along the Glenmore Road corridor were considered, including on-line widening and localised bypasses of residential areas.

10.1.7.1 Online Upgrade Glenmore Road to Hollingsworth Street (No Connection to Moores Creek Road)

The option assumes widening of:

- Glenmore Road between Moores Creek and Haynes Street from one traffic lane to two traffic lanes in each direction
- Haynes Street from one lane to two lanes in each direction between Glenmore Road and Hollingsworth Street, and
- Hollingsworth Street from one lane to two lanes in each direction between Haynes Street and Farm Street.

The option would necessitate intersection upgrades at:

- Glenmore Road and Dooley Street
- Glenmore Road and Main Street
- Glenmore Road and Haynes Street
- Haynes Street/ Hollingsworth St and Richardson Street
- Hollingsworth Street and Farm Street.

The exact form of the intersections would be determined at the time of detailed design but most likely the intersections may need to be signal controlled to enable safe traffic movement into and from the lower order roads and to facilitate safe pedestrian crossing points.

The results of on-line upgrading are shown in Table 44 and show only a marginal increase in traffic volumes along Glenmore Road compared to the “do minimum” under the City Plan scenario, which is not unexpected as the “do minimum” analysis indicated the corridor was not approaching operational capacity. Other changes in traffic volumes were:

- Daily traffic volumes on Hollingsworth Street were forecast to be 8,300 vpd in 2021 which is a small increase over the 2021 “do minimum” volume of 8200vpd
- Daily traffic volumes on Haynes Street increase marginally from the “do minimum” case of 10,700 vps in 2021 to 10,800vpd in 2021 under this option.
- Daily traffic volumes on the Fitzroy River Bridge was forecast to be 42,000 vpd in 2021 which was similar to the 2021 “do minimum” daily flow; and
- Neville Hewitt Bridge daily flow for 2021 of 40,600 was similar to the “do minimum” daily flow in 2021.

Table 44 – Daily Flows for Online Upgrade of Glenmore Road (City Plan Scenario) – Bruce Highway (North) Screenline

Location	2005	2011		2016		2021	
	Estimated	Forecast	**% Change from 2005**	Forecast	**% Change from 2005**	Forecast	**% Change from 2005**
Carlton Street	3,120	1,500	-52%	1,590	-49%	1,660	-47%
Farm Street	7,420	7,660	3%	8,150	10%	8,270	11%
Richardson Road	10,660	12,830	20%	12,030	13%	11,700	10%
Sheehy Street	–	1,180	–	1,010	–	1,020	–
Main Street	3,960	5,820	47%	5,670	43%	5,690	44%
Alexandra Street	16,380	16,880	3%	17,240	5%	17,510	7%
Knight St	4,350	4,450	2%	4,440	2%	4,890	12%
Glenmore Road	9,540	9,810	3%	10,280	8%	10,810	13%
Total	55,430	60,130	8%	60,410	9%	61,550	11%

Table 45 – Daily Flows for Online Upgrade of Glenmore Road (City Plan Scenario) – Fitzroy River Screenline

Location	**2005**	**2011**		**2016**		**2021**	
	Estimated	**Forecast**	**% Change from 2005**	**Forecast**	**% Change from 2005**	**Forecast**	**% Change from 2005**
Neville Hewitt Bridge	34,340	38,070	11%	39,220	14%	40,590	18%
Fitzroy River Bridge	38,200	39,800	4%	40,830	7%	42,070	10%
Total	72,540	77,870	7%	80,050	10%	82,660	14%

The main advantage of this option is that operational deficiencies along Glenmore Road, Haynes Street and Hollingsworth Street are mitigated by the widening of the roads. However the option has a number of drawbacks, including:

- Reinforcing the role of the corridor as an urban arterial where as it is classified as urban sub-arterial;
- Further reducing the amenity of land owners adjacent to the corridor, in particular the residential areas at the northern end of Glenmore Road, Haynes Street, and the southern end of Hollingsworth Street;
- Continuing to direct traffic to the Fitzroy River Bridge where the intersections at either end have limited capacity to cater for any additional traffic;
- The rail line crosses Glenmore Road to the west of Moores Creek Road at an OLC. Higher traffic flows on Glenmore Road increases the risks associated with the OLC. The possibility of increased train lengths will result in greater delay to traffic.
- Requiring the need to upgrade a number of intersections along Glenmore Road to cater for the mix of through traffic, local traffic and pedestrians;
- Haynes Street and Hollingsworth Street (part) are primarily residential in nature and the road reserve is not wide enough to cater for a modern four lane cross section road.
- The likely requirement to acquire land to deliver the option particularly along Haynes Street and Hollingsworth Street where the existing road reserve is not wide enough to

allow a high standard four lane road or a substantially lower class four lane cross section would need to be built. A lower class road may prevent the opportunity to provide protected turning bays for access to side streets.

The option does not deliver sufficient benefits to be considered further.

10.1.7.2 Upgrade Glenmore Road with Connection to Moores Creek Road

A direct connection between Glenmore Road and Moores Creek Road currently does not exist. The options considered the impacts of building a full movement interchange between Glenmore Road and Moores Creek Road. A number of challenges would need to be overcome before this option could be delivered including:

- the heights differences between the two roads,
- the close proximity to the river,
- the close proximity of the rail line, and
- the close proximity of the abutments to the Neville Hewitt Bridge.

Table 46 – Daily Flows for Upgrade of Glenmore Road and Connection to Moores Creek Rd (City Plan Scenario) – Bruce Highway (North) Screenline

Location	2005	2011		2016		2021	
	Estimated	Forecast	**% Change from 2005**	Forecast	**% Change from 2005**	Forecast	**% Change from 2005**
Carlton Street	3,120	1,540	-51%	1,590	-49%	1,660	-47%
Farm Street	7,420	7,560	2%	7,770	5%	7,770	5%
Richardson Road	10,660	12,410	16%	12,370	16%	11,970	12%
Sheehy Street	–	1,180	–	1,190	–	1,020	–
Main Street	3,960	5,810	47%	5,820	47%	5,680	43%
Alexandra Street	16,380	16,160	-1%	16,050	-2%	16,320	0%
Knight St	4,350	490	-89%	480	-89%	480	-89%
Glenmore Road	9,540	15,490	62%	15,980	68%	16,640	74%
Total	55,430	60,640	9%	61,250	10%	61,540	11%

The results of on-line upgrading and full access to Moores Creek Road are shown in Table 46 and shows that

- Daily traffic volumes on Knight Street were forecast to be significantly lower by 2021 with approximately 4000 vpd removed from Knight Street by the option;.
- Daily traffic flows on Glenmore Road by 2021 would be 16,600 vpd, which represent a 74%increase from 2005.
- Daily traffic volumes on Alexandra Street were forecast to be similar to 2005.
- Daily traffic volumes on the Fitzroy River Bridge were estimated to be up to 12% lower in 2021 than in 2005.
- Daily flows along Haynes Street were forecast to rise significantly to 12,600 vpd in 2021, which equates to volumes being 42% higher than 2005;
- Daily flows along Hollingsworth Street were forecast to rise significantly to 9,100 vpd in 2021, which equates to daily flows being 57% higher than 2005;

- Daily traffic flows on the Neville Hewitt Bridge increase significantly and were forecast to be approximately 38% higher than the 2005 volumes. The traffic volumes of this magnitude would result in the Neville Hewitt Bridge being operationally deficient;
- Significant peak period congestion would occur at the Albert Street/ Bolsover intersection, Albert Street/ Campbell Street and Albert Street/ George St as traffic along Albert Street increases by between 10% and 17% over the "do minimum" daily volumes for the City Plan scenario.

Table 47 – Daily Traffic Flows for Upgrade of Glenmore Road with Connection to Moores Creek Rd (City Plan Scenario) – Fitzroy River Screenline

Location	2005 Estimated	2011 Forecast	% Change from 2005	2016 Forecast	% Change from 2005	2021 Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	44,370	29%	45,760	33%	47,380	38%
Fitzroy River Bridge	38,200	33,500	-12%	34,300	-10%	35,280	-8%
Total	**72,540**	**77,870**	**7%**	**80,060**	**10%**	**82,660**	**14%**

The major benefits of the option were:

- the large reduction in traffic on Knight Street,
- the medium to long term relief provided to the Fitzroy River Bridge.

However there are a number of drawbacks to the option including:

- the increase in daily traffic volumes along Haynes Street and Hollingsworth Street would significantly reduce the local amenity;
- Duplication of the Neville Hewitt Bridge would be required in conjunction with this option.

Figure 38 – Network Operational Deficiency 2021 (City Plan Scenario) – Upgrade Glenmore Road with Connection to Moores Creek Road

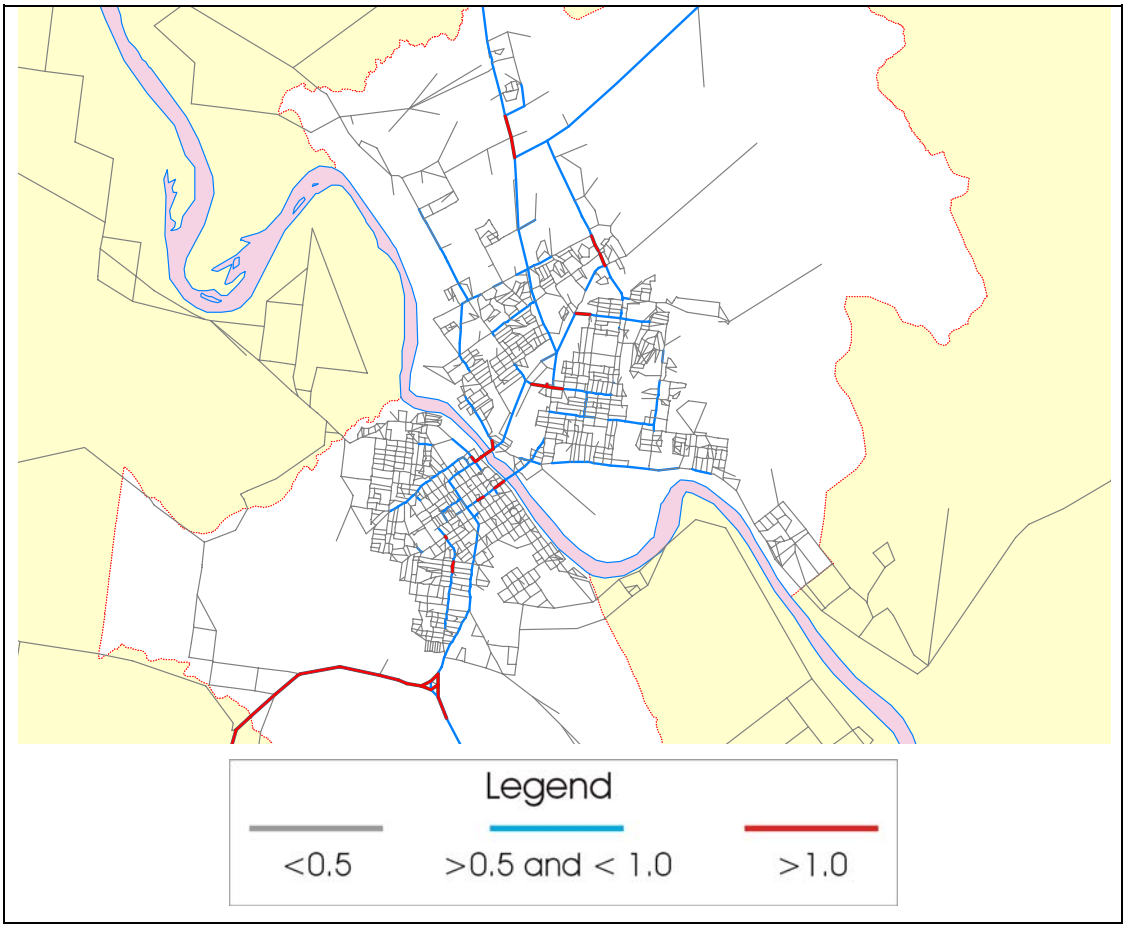


Figure 38 shows that this option does not address the operational network deficiencies identified during the “do minimum” analysis.

Figure 39 – Network Hierarchic Deficiency 2021 (City Plan Scenario) – Upgrade Glenmore Road with Connection to Moores Creek Road

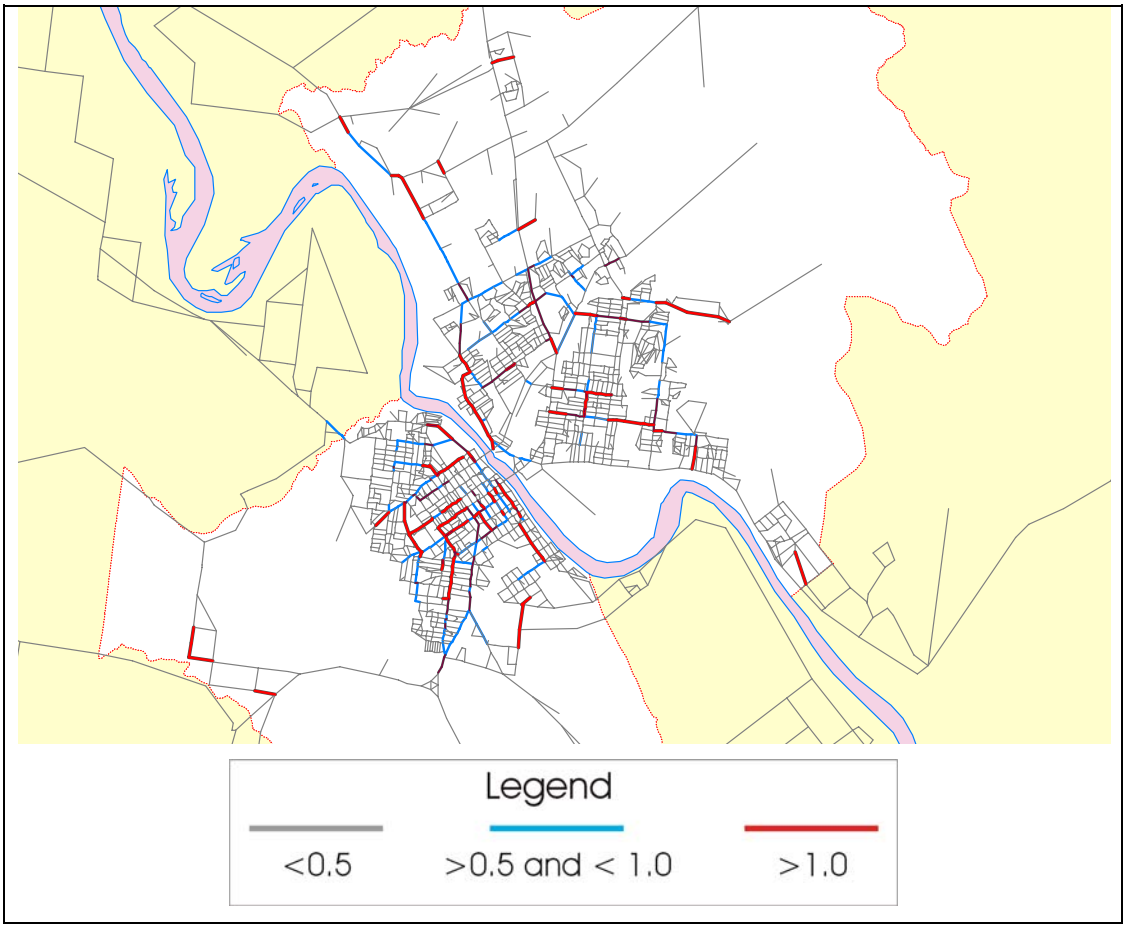


Figure 39 shows Glenmore Road, Haynes Street and Hollingsworth Street were forecast to have daily flows in excess of the maximum daily flow associated with their hierarchic classification. The other hierarchic deficiencies identified during the "do minimum" analysis have not been addressed by this option.

The option does not deliver sufficient benefits to be considered further.

10.1.7.3 Upgrade Glenmore Road, Connect to Moores Creek Rd and Local Area Bypass

The negative impact of the on-line upgrade with a connection to Moores Creek Rd (Section 10.2.5.2) was the impact predominantly residential development fronting Haynes Street and Hollingsworth Street. The Upgrade Glenmore Road and local area bypass option assumes:

- Widening of Glenmore Road between Moores Creek and McAllister Street from one lane to two lanes in each direction
- Provide a full movement interchange between Moores Creek Road and Glenmore Road;
- A controlled intersection would be required on Glenmore Road at the point where the bypass road intersects Glenmore Road to facilitate local movements safely; and
- A new road corridor that bypasses, to the west, the residential areas along Haynes Street and Hollingsworth Street following an alignment parallel to Thompson Street and connecting into Farm Street in the vicinity of intersection of Farm Street and Haynes Street.

The option will require property acquisition; in particular the route would impact on the Capricorn Country Club. Depending on alignment there may be a need to provide a bridge across Splitter Creek as part of this option.

The route is slightly longer than the existing corridor and some local area works would most likely be required in order to both protect the local community from traffic intrusion as well as encourage through traffic to use the alternative route.

The results of the on-line upgrading and local area bypass are shown in Table 48 and Table 49 and show that:

- Daily traffic volumes on Knight Street were forecast to be significantly lower by 2021 with approximately 3800 vpd removed from Knight Street by the option;
- Daily traffic flows on Glenmore Road by 2021 would be 17,300 vpd, which represent a 81% increase from 2005
- Daily traffic volumes on Alexandra Street were forecast to be marginally lower than 2005, with 2021 daily flows being 3% lower than 2005.
- Daily traffic volumes on the Fitzroy River Bridge were estimated to be up to 8% lower in 2021 than in 2005
- Daily flows along Haynes Street were forecast to drop significantly to 3,800 vpd in 2021, which equates to volumes being 60% lower than 2005;
- Daily flows along Hollingsworth Street were forecast to drop significantly to 2,300 vpd in 2021, which equates to daily flows being 60% lower than 2005;
- Daily traffic flows on the Neville Hewitt Bridge increase significantly and were forecast to be approximately 38% higher than the 2005 volumes. The traffic volumes of this magnitude would result in the Neville Hewitt Bridge being operationally deficient;
- Significant peak period congestion would occur at the Albert Street/ Bolsover intersection, Albert Street/ Campbell Street and Albert Street/ George St as traffic along Albert Street increases by between 4% and 9% over the “do minimum” daily volumes for the City Plan scenario.

Table 48 – Daily Flows for Upgrade of Glenmore Road and Local Area Bypass (City Plan Scenario) – Bruce Highway (North) Screenline

Location	2005	2011		2016		2021	
	Estimated	Forecast	**% Change from 2005**	Forecast	**% Change from 2005**	Forecast	**% Change from 2005**
Carlton Street	3,120	1,530	-51%	1,590	-49%	1,660	-47%
Farm Street	7,420	7,170	-3%	7,760	5%	8,170	10%
Richardson Road	10,660	12,330	16%	11,940	12%	11,390	7%
Sheehy Street	–	1,180	–	1,190	–	1,030	–
Main Street	3,960	5,810	47%	5,820	47%	5,680	43%
Alexandra Street	16,380	15,950	-3%	15,840	-3%	15,900	-3%
Knight St	4,350	500	-89%	490	-89%	500	-89%
Glenmore Road	9,540	16,060	68%	16,560	74%	17,300	81%
Total	**55,430**	**60,530**	**9%**	**61,190**	**10%**	**61,630**	**11%**

Table 49 – Daily Flows for Upgrade of Glenmore Road and Local Area Bypass (City Plan Scenario) – Fitzroy River Screenline

Location	2005 Estimated	2011 Forecast	% Change from 2005	2016 Forecast	% Change from 2005	2021 Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	44,470	29%	45,870	34%	47,510	38%
Fitzroy River Bridge	38,200	33,400	-13%	34,190	-10%	35,150	-8%
Total	**72,540**	**77,870**	**7%**	**80,060**	**10%**	**82,660**	**14%**

The major benefits of the option were:

- the large reduction in traffic on Knight Street,
- reduces traffic volumes on Yaamba Road,
- the medium to long term relief provided to the Fitzroy River Bridge; and
- significantly lower daily traffic volumes on Haynes Street and Hollingsworth Street; and
- improvement to local amenity resulting from the reduced traffic flows.

However there are a number of drawbacks to the option including:

- property acquisition would be required
- impact on the golf club and possibly the open space of Church park
- a number of residential properties would be faced with increased traffic flows and reduce the local amenity a long sections of Glenmore Road;
- the option would necessitate the widening of the Neville Hewitt Bridge; and
- upgrades to intersections at Albert Street/ Bolsover Street, Albert Street/ Campbell Street and Albert Street/ George Street.

Figure 40 shows the network operational deficiency for 2021. The option does not address the deficiencies identified during the “do minimum” analysis.

Figure 40 – Network Operational Deficiency 2021 (City Plan Scenario) – Upgrade Glenmore Road with Connection to Moores Creek Road

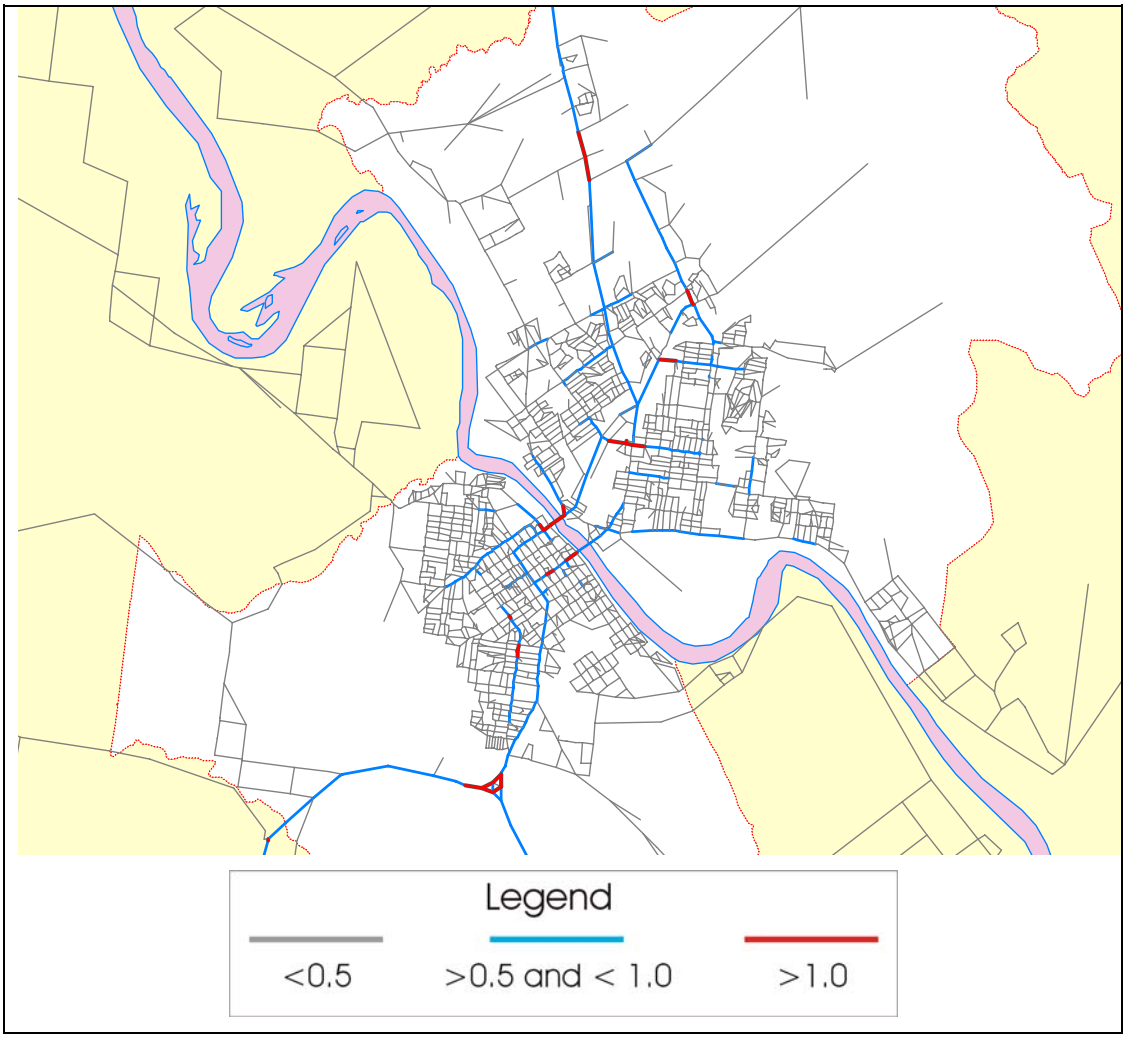
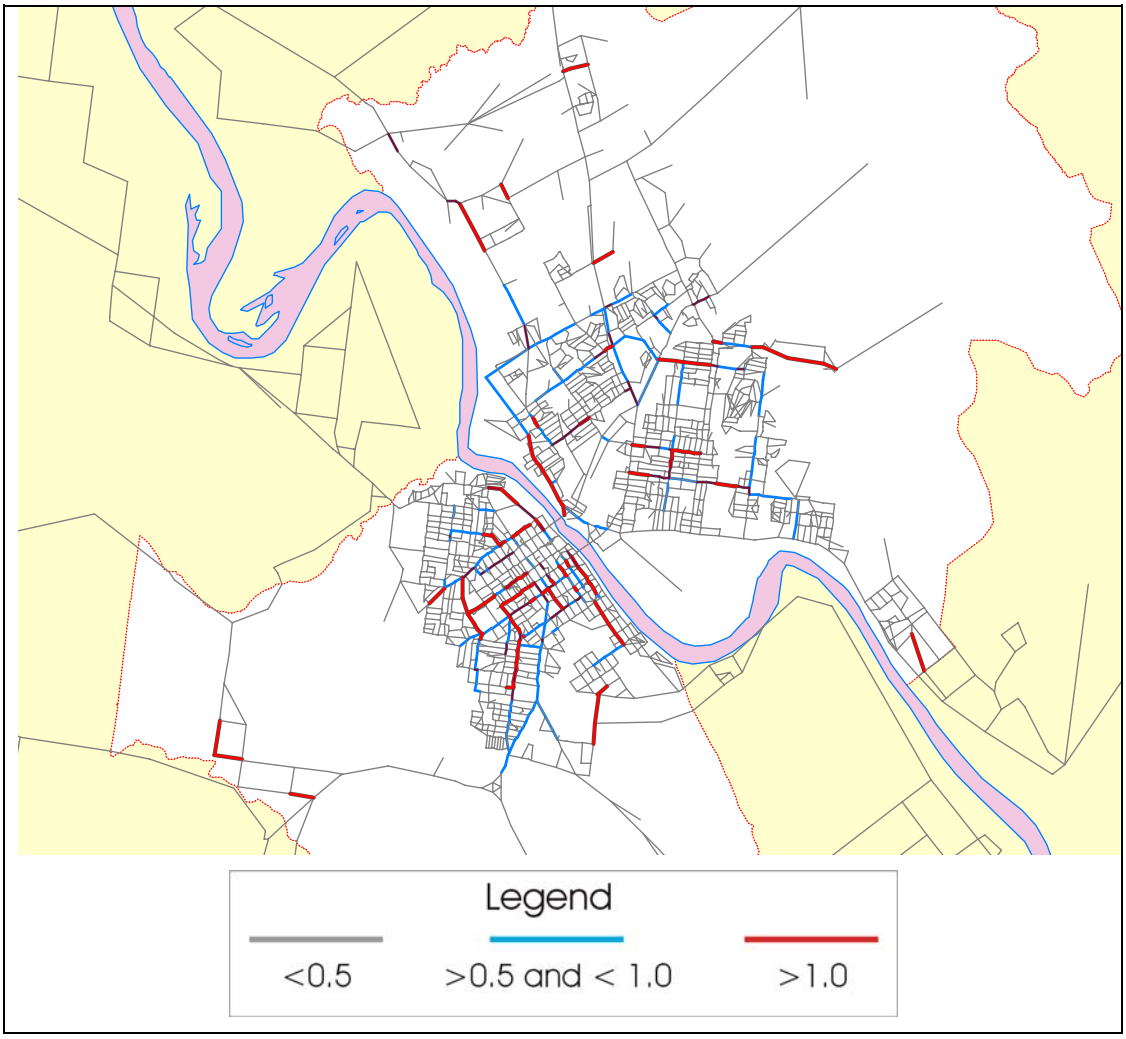


Figure 41 – Network Operational Deficiency 2021 (City Plan Scenario) – Upgrade Glenmore Road with Connection to Moores Creek Road



The reduction of daily traffic volumes on Haynes Street and Hollingsworth Street brings these streets back into line their desired function in the road network hierarchy. The network hierarchical deficiency for this option is shown in Figure 41.

The option has a number of benefits and it may be possible to mitigate a number of negative impacts. The largest drawback is the impact on the Neville Hewitt Bridge and the intersections mention above. The option should be considered in combination with other options for example the western alignment options that reduce traffic on the Neville Hewitt Bridge.

10.1.8 Norman Road

10.1.8.1 Norman Road Widening (Moores Creek Rd to Rockhampton – Yeppoon Rd)

The Norman Gardens area of the city is an identified residential growth area in North Rockhampton. Access to the area is from Norman Road. Progressive widening of Norman Road to two lanes in each direction between Moores Creek Road and Rockhampton – Yeppoon Road will be necessary as settlement in the area expands. Signal controlled intersections will be provided at Nagle Drive and Foulkes Street. This option seeks to understand whether any network benefits are derived through the widening of Norman Road.

The analysis indicates that progressive upgrading of Norman Road will be required.

- By 2011 the section between Moores Creek Road and Richardson Road will need to be widened require upgrading and
- by 2021 the widening would need to extend to Nagle Drive.

The analysis indicates that the estimated operational deficiency ratio on the remaining section is greater than 0.9. Full widening of Norman Road north of Nagle Drive is likely to be required soon after 2021. However if development occurs at a faster rate then expected then other sections of Norman Road would require widening prior to 2021.

In 2021 approximately 14,300 vpd would be using Norman Road north of Farm Street, which compares to 12,200 vpd for the "do minimum" and 8,700 vpd in 2005. Widening the road to two lanes in each direction was forecast to increase daily traffic volumes along Norman Road by 17% above 2005 levels.

Figure 42 shows no operational deficiency along Norman Road in 2021. Widening Norman Road north of Moores Creek Road does not result in operational deficiencies on Norman Road south Moores Creek Road.

Figure 42 – Network Operational Deficiency 2021 (City Plan Scenario) – Upgrade Norman Road

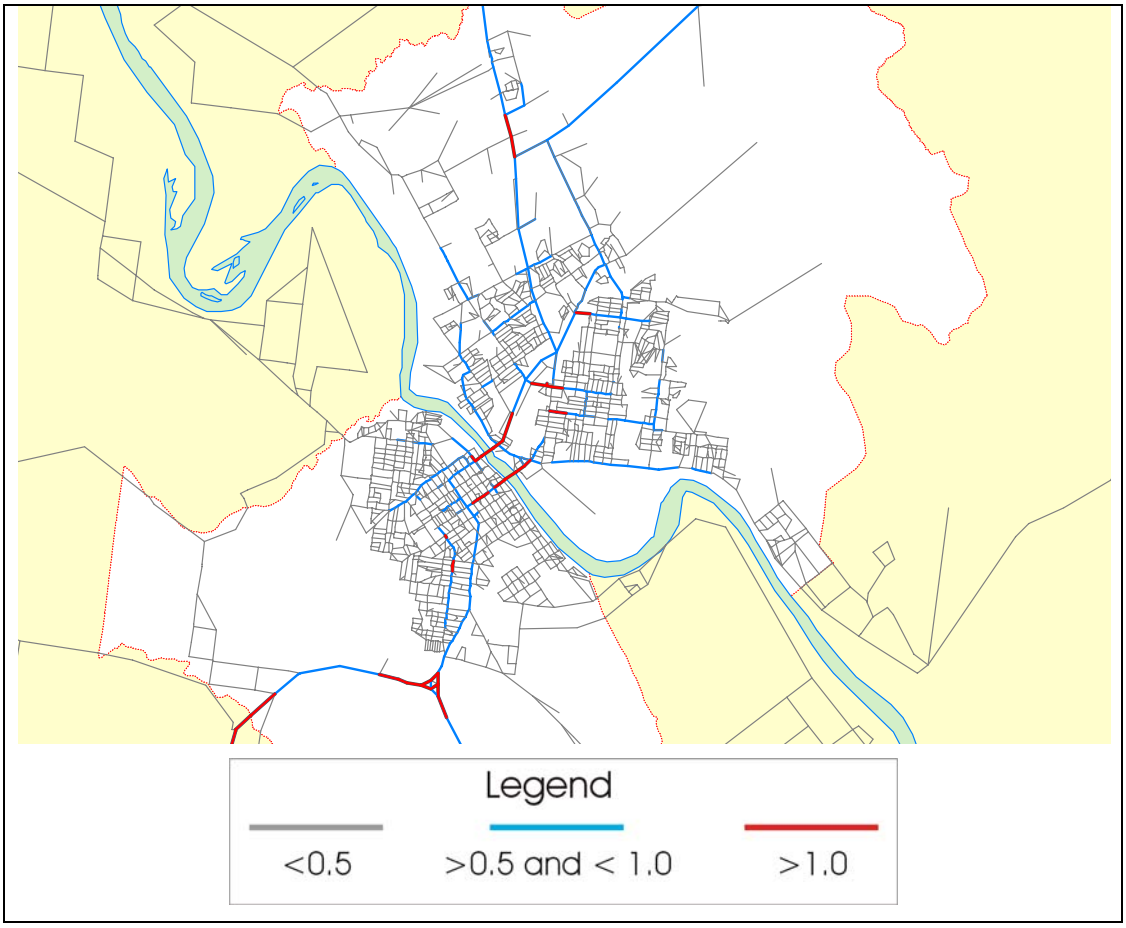


Figure 43 – Network Hierarchic Deficiency 2021 (City Plan Scenario) – Upgrade Norman Road

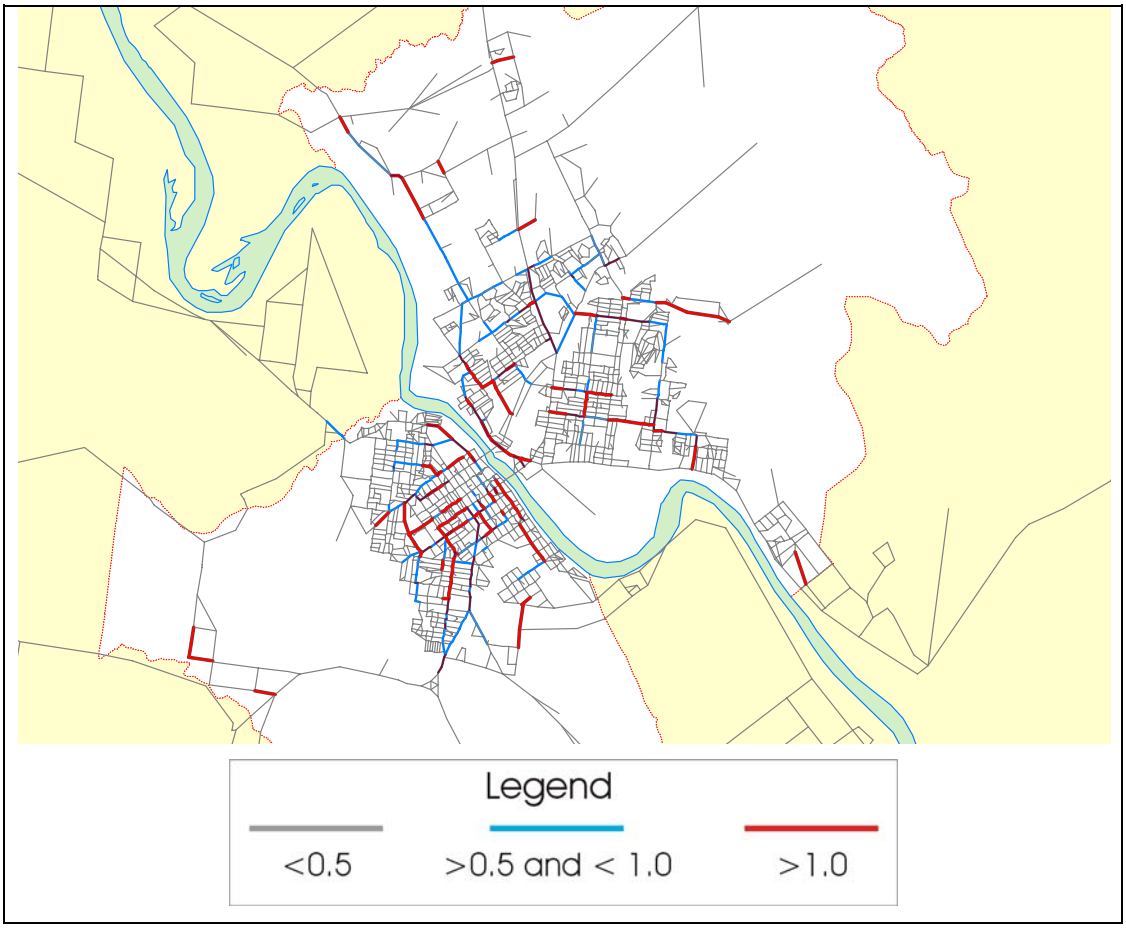


Figure 43 shows the hierarchic deficiencies in the network at 2021 for the option.

The option has a number of benefits which were:

- the network operational deficiency on Norman Road is alleviated by the upgrading; and
- the option mitigates the hierarchic deficiencies that were forecast on Yaamba Road north of Moores Creek Road.

Other hierarchic deficiencies identified in the “do minimum” analysis remain.

Widening of Norman Road is an essential element of the future road network in Rockhampton and will act to reinforce its role as an urban arterial. Together with Yaamba Road and Alexandra Street, Norman Road forms the third element of the arterial road network.

10.1.8.2 Norman Road Widening Including Extension North of Limestone Creek

The Parkhurst area to the north of Limestone Creek and east of the Bruce Highway is an identified area for residential expansion. The current access points to the area are via Olive Street in the north, Mason Street adjacent to the Parkhurst primary School and Boundary Road at the southern end. Limestone Creek forms a natural barrier to the area and alternative accesses would need to bridge the creek. The modelling of this option has assumed a two lane road extending from Norman Road at Rockhampton – Yeppoon Road to Boundary Road and eventually connecting to the section of Norman Road north of Boundary Road. The option would require a high level bridge across Limestone Creek. Intersection works would be required at Norman Road/ Boundary road.

An assessment of this option was undertaken

- with the widening of Norman Road south of Rockhampton – Yeppoon Road as discussed in section 10.2.6.1; and
- without the widening of Norman Road south of Rockhampton – Yeppoon Road as discussed in section 10.2.6.1.

Table 50 tabulates the daily traffic forecasts for section of Norman Road. The results show:

- without the widening of Norman Road (south of Rockhampton – Yeppoon Road) Norman Road (north of Rockhampton – Yeppoon Road) was forecast to carry approximately 6,900 vpd in 2021.
- With the widening of Norman Road the northern extension was forecast to carry 7,300 vpd or approximately 6% additional traffic in 2021 than without the widening south of Rockhampton – Yeppoon Road.
- Daily traffic flows on Norman Road south of Rockhampton – Yeppoon Road increased with the inclusion of the northern extension of Norman Road with increases forecast to be between 20% and 50% higher by 2021 than the 2005 daily flows on Norman Road
- The option does not provide significant relief to the Bruce Highway, the section between Rockhampton – Yeppoon Road and Boudnary Roads remains operationally deficient.

Table 50 – Daily Flows on Norman Road in 2021 (City Plan Scenario)

Option	Estimated Daily Flow		
	North of Rockhampton – Yeppoon Road	North of Foulkes Street	North of Moores Creek Road
Base Year	-	7,000 vpd	12,900 vpd
Do Minimum	-	9,700 vpd	15,300 vpd
No Upgrade to Norman Road (2021)	6,900 vpd	10,500 vpd	15,400 vpd
Norman Road Upgraded (2021)	7,300 vpd	13,500 vpd	19,200 vpd

Figure 44 shows the network operational deficiencies in 2021 for the option without widening of Norman Road (south) while Figure 45 shows the network operational deficiencies in 2021 for the option with Norman Road south widened.

The majority of the increase in traffic along Norman Road would appear to be traffic on Rockhampton – Yeppoon Road choosing Norman Road over Yaamba Road as the upgrade to Norman Road removes some of the capacity constraints along Norman Road.

Figure 44 – Network Operational Deficiency 2021 (City Plan Scenario) – Norman Road Extension with No Widening of Norman Road (South)

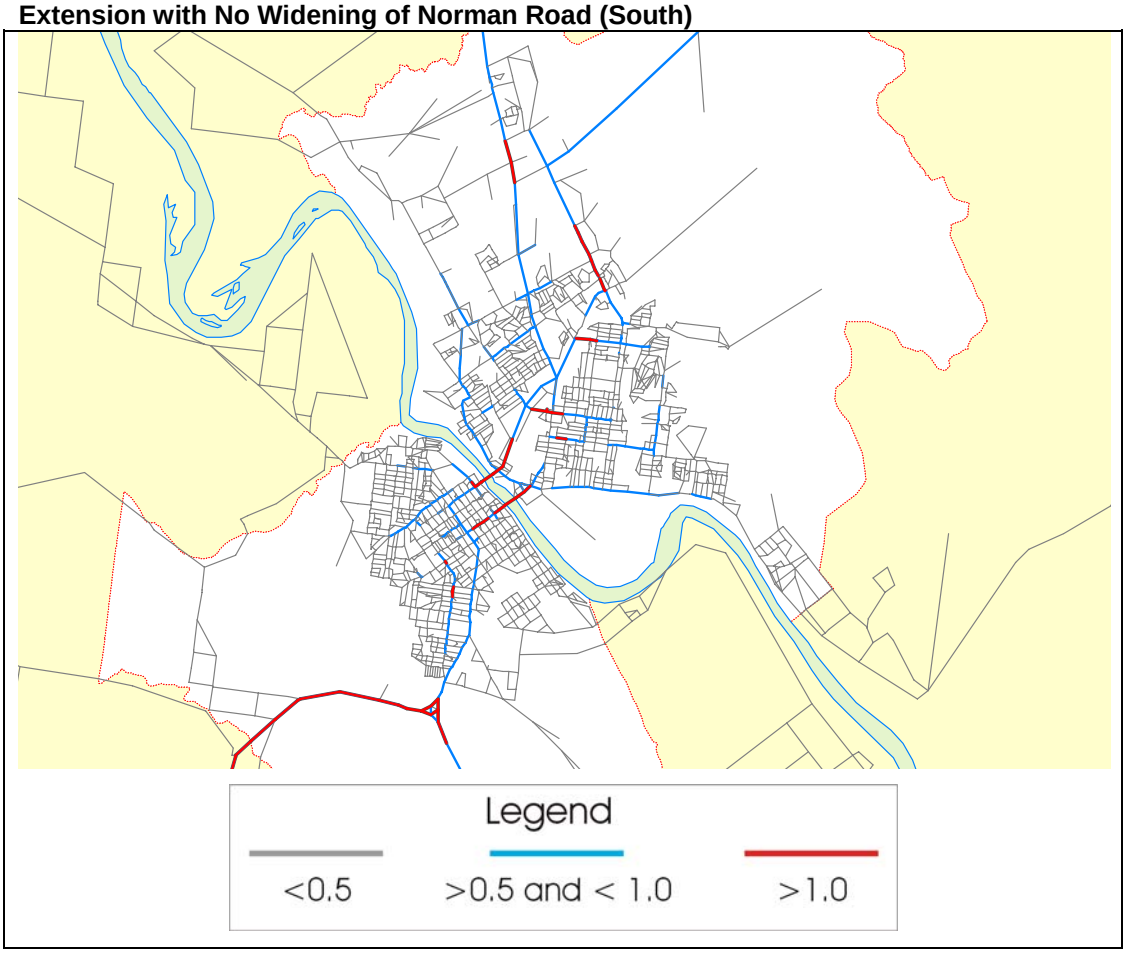


Figure 45 – Network Operational Deficiency 2021 (City Plan Scenario) – Norman Road Extension with Widening of Norman Road (South)

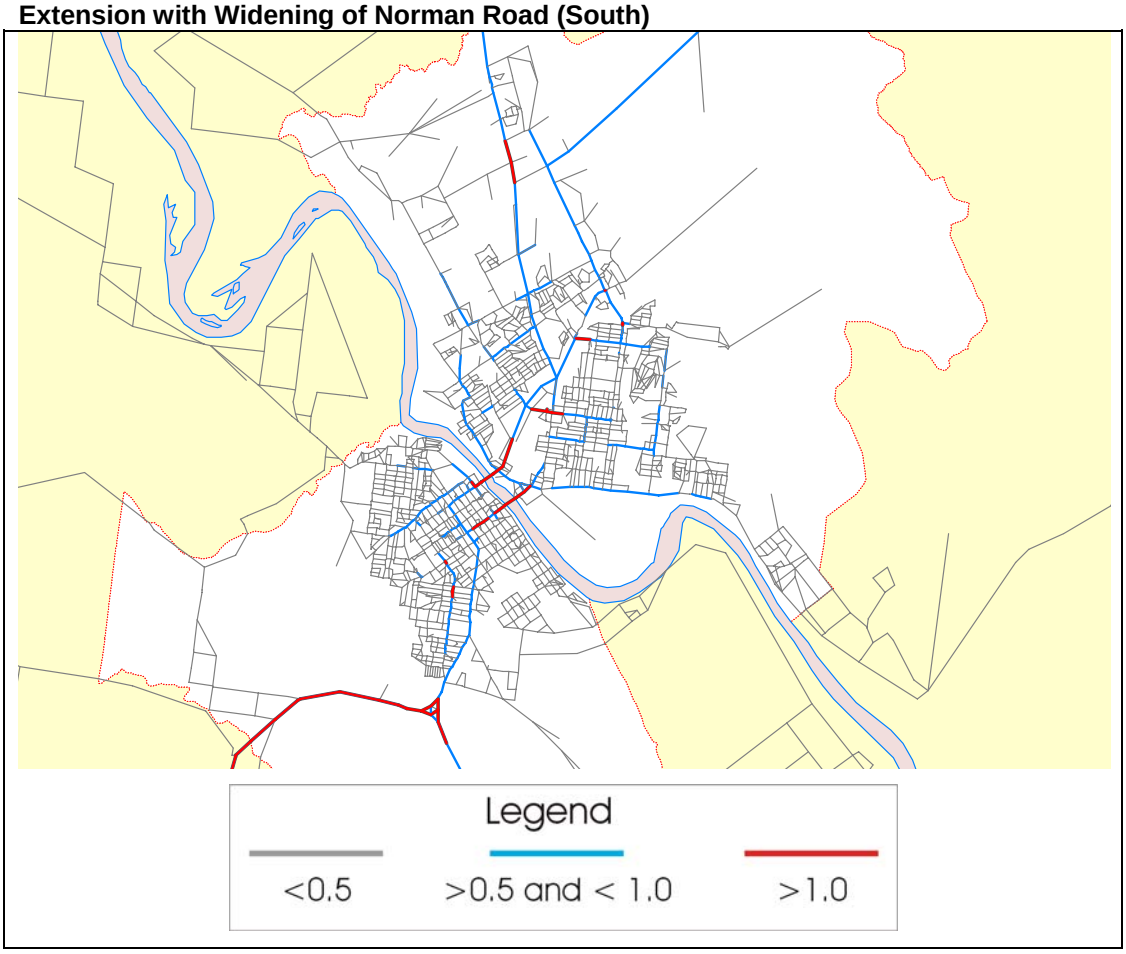


Figure 46 – Network Hierarchic Deficiency 2021 (City Plan Scenario) – Norman Road Extension with Widening of Norman Road (South)

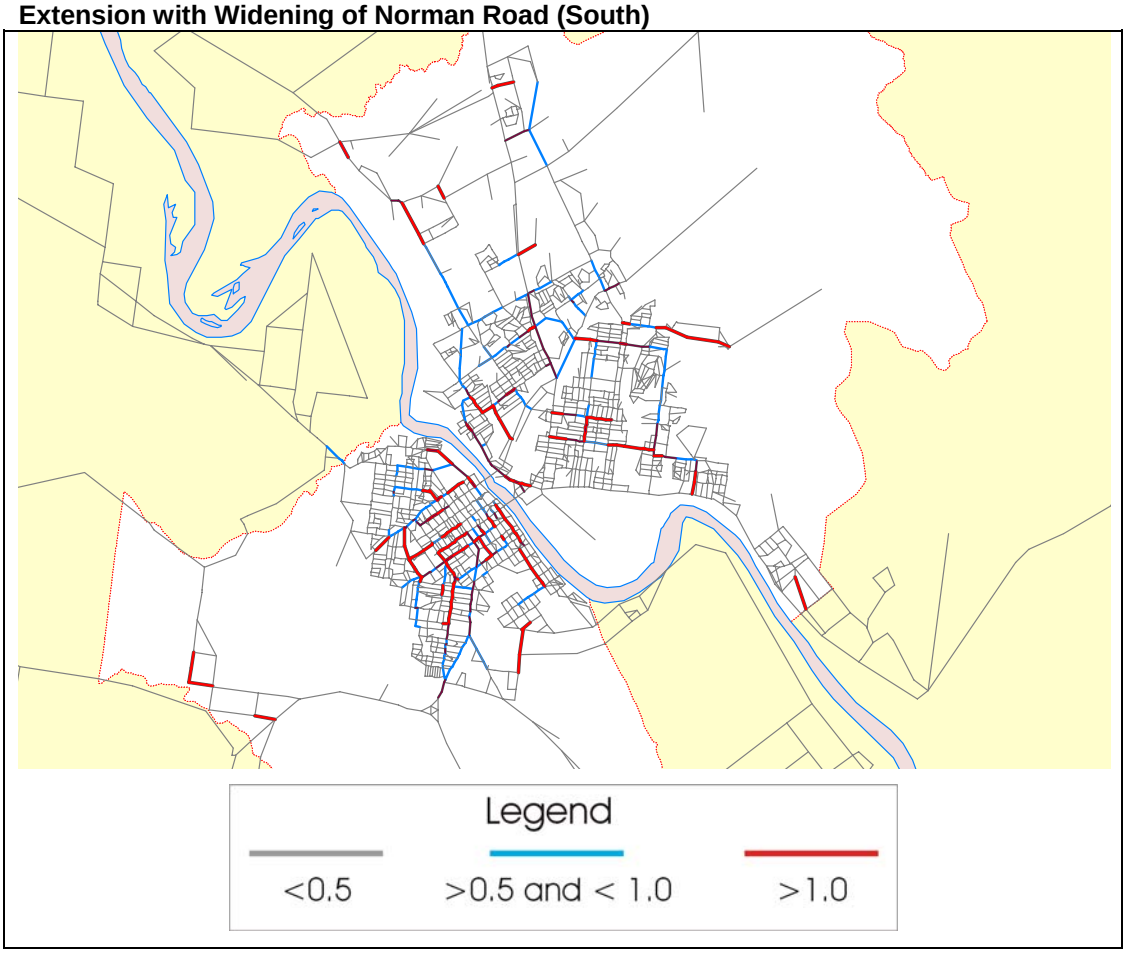


Figure 46 shows the network hierarchic deficiencies for the option with Norman Road south widened, the deficiencies identified in the "do minimum" analysis have not been addressed by this option except for that the traffic flows on Yaamba Road were forecast to be to approximately the daily maximum traffic volume just north of Moores Creek Road.

For other sections of the road network this option does not address the environmental deficiencies discussed earlier.

The Norman Road Extension has a number of benefits including:

- Providing an alternative access point to the North East Parkhurst area and together with Norman Road south creates a strong arterial road corridor between Olive Street and Moores Creek Road; and
- Providing relief to sections of Yaamba Road.

The need for the corridor will be dictated by development in the area most likely between 2016 and 2021. Under the City Plan scenario traffic flows on Norman Road between Moores Creek Road and Dean Street, as a results of the widening of Norman Road between Moores Creek Rd and Rockhampton – Yeppoon Road, are not sufficiently high enough to necessitate the need for upgrading of Norman Road between Moores Creek Rd and Dean St.

10.1.9 Other Network Options

A number of other network improves were proposed that are intended to overcome localised constraints or traffic problems. They were:

- Duplicate Moore Creek Road between Feez Street and Norman Road
- Duplicate High Street between Musgrave Street and Moores Creek Road
- Duplicate the Bruce Highway south of the Capricorn Highway
- Boundary Street re-alignment
- Develop a new road corridor extending from River Rose drive to Yaamba Road; and
- Traffic calming measures in Canning Street.

The analysis of the "do minimum" results highlighted a number of additional network improvements that will be necessary:

- Widening Kerrigan Street to two lanes in each direction
- Duplicate the Bruce Highway between Rockhampton – Yeppoon Rd and Boundary Street
- Duplicate the Capricorn Highway between the Bruce Highway and Gracemere and
- Widening of Upper Dawson Road between Caroline Street and Larnach Street.

10.1.9.1 Moores Creek Road

The analysis has shown no deficiency on Moores Creek Road north of Kerrigan Street before 2021. Two key intersections along this route are the Moores Creek Road/ Kerrigan Street/ Feez Street and Moores Creek Road/ Norman Road German Street. Congestion along the route is likely to be the result of the delays associated with these intersections rather than the mid-block capacity being exceeded.

Daily traffic flows in 2021 along Moore Creek Road were estimated to be approximately 7,300 vpd under the City Plan scenario "do minimum" option. Widening of Norman road was forecast to increase daily traffic flows on Moores Creek Rd to approximately 9,500 vpd.

These intersections are investigated further later in the report.

10.1.9.2 High Street

In all the analysis High Street between Aquatic Place and Ford Street daily traffic flows were estimated to be in excess of the desired operational deficiency flow. High Street provides direct access to the one of the major retail and commercial precincts in Rockhampton. The corridor is heavily constrained by Moores Creek where at present a two lane bridge spans the creek. The scope for widening the bridge is limited by the proximity to a number key intersections providing access to the various retail outlets and the limited corridor width in which to widen the road and bridge without significant resumption costs or impacts on open space.

Traffic along High Street is characterised by both local traffic which wants access to the retail outlets and through traffic as High Street provides one of the few connections across Moores Creek for traffic travelling east to west across North Rockhampton. A bridge across Moores Creek between Elphinstone Street and Knight Street was analysed. The option did not provide any relief to High Street.

Duplication of the bridge on High Street and widening of High Street between Musgrave Street and Ford Street are required to address network operational deficiencies along High Street. Duplication and widening of High Street will have significant drawbacks including:

- Land resumptions to provide adequate room for the expansion
- Impact on the High Street/ Alexandra Street/ Moores Creek Road intersection and the Musgrave Street/ high Street intersection where large scale intersection improvements would be required

- Upgrade the Aquatic Place/ High Street intersection as the current roundabout is unlikely to be able to cater for the forecast traffic through the intersection.

The major benefit of the option will be to improve traffic operations along High Street which is likely to benefit movements within North Rockhmapton.

10.1.9.3 Bruce Highway – south of the Capricorn Highway

The Bruce Highway south of the Capricorn Highway was forecast to become operationally deficient prior to 2021. Upgrading of the Bruce Highway will be required between the Capricorn Highway and Burnett Highway.

10.1.9.4 Bruce Highway – north of Rockhampton – Yeppoon Road

The section of Bruce Highway between Rockhampton – Yeppoon Road and Boundary Road (north) was identified as operationally deficient between 2011 and 2016. Widening of the highway to Boundary road will be required.

10.1.9.5 Capricorn Highway

The Capricorn highway west of the Bruce Highway was forecast to be operationally deficient between 2016 and 2021. A western third river crossing reduces the traffic on some section of the highway but duplication will be required between the Yeppen Roundabout and Gracemere.

10.1.9.6 River Rose Drive

River Rose Drive will be completed as part of the residential development and eventually create a connection between Yaamba Road and Norman Road. This link would traverse primarily residential areas. River Rose Drive would perform an important role in the road network hierarchy classification as an urban sub-arterial road. The timing of the link is also dependent on the development of the land. It has been assumed that although not a “do minimum” scheme that the link will exist by 2016 and as such has been included in the final network analysis.

10.1.9.7 Canning Street

Canning Street between Caroline Street and William Street is an emerging retail and entertainment precinct in South Rockhampton. As such traffic intrusion into this area is undesirable. For such a localised network change it was beyond the capability of the traffic model to estimate the impacts of the local area traffic management proposed. This would need to be done in a more detailed investigation.

10.1.9.8 Kerrigan Street

Kerrigan Street between Moores Creek Road and Berserker Street was identified as operationally deficient at 2005. Widening of Kerrigan Street would necessitate duplication of the bridge across Moores Creek. Widening of Kerrigan Street is required if the desired levels of service are to be maintained.

10.1.9.9 Upper Dawson Road

The analysis has shown that at 2005 the section of Upper Dawson Road between Caroline Street and Larnach Street was operationally deficient. Works will be required to improve the operation of traffic along Upper Dawson Road to including widening the corridor and intersections improvements at Upper Dwason Road/ Caroline Street.

10.1.10 Various Intersection Upgrades

A number of intersections were identified to be improved, which included:

- Norman Road and Moores Creek Road
- Realigned William Palfrey Drive, Yaamba Road and Olive Street
- Boundary Street and Yaamba Road
- Lakes Creek Road, East Street and Bridge Street

- Port Curtis Road and Lower Dawson Road
- Jellicoe Street and Lower Dawson Road
- Albert Street and George Street

The traffic model does not explicitly model the impacts of intersections and as such it is not possible to discuss the impacts of changes to these intersections. Department of Main Roads is currently conducting a study into the Bruce Highway through Rockhampton where a number of the intersection listed above will be further investigated. As such this report will not comment on those intersections.

Norman Road and Moores Creek Road is the subject of further investigation which is discussed later in the report.

10.1.11 Analysis of Future Network Options – Parkhurst Accelerated Growth Scenario

10.1.12 Fitzroy River Crossings

The "do minimum" analysis indicated levels of service on the Fitzroy River bridges will continue to deteriorate such that by 2021 both bridges will be deficient. As such an alternative crossing of the Fitzroy River will be required within that period. Two alternatives were considered:

- Extending Stanley Street (Scheme 4) and connecting to Lakes Creek Road in the vicinity of Dean Street. This option could also include a realignment of the rail line with the bridge carrying both rail and traffic, which would remove the rail from central Rockhampton.
- Developing a new corridor to the west of the city (Scheme 34) connecting to the Capricorn Highway in the south to the Bruce Highway at a new interchange at Olive Street in the north. Two alignments could be suitable one to the east of the Airport using Western Street and to the west of the airport with a connection to Lions Creek Road.

Other intermediate connections would be provided at Alexandra Street and a link to Rockhampton – Yeppoon Road which would also include a connection to Boundary Road.

These two alternatives were considered for addressing the identified deficiency of the Fitzroy and Neville Hewitt bridges.

10.1.12.1 Stanley Street Bridge

The Stanley Street Bridge would necessitate works in Stanley Street including four lanes between the new bridge and Gladstone Road coupled with intersection improvements to facilitate access to the bridge. In particular the intersection of Gladstone Road and Stanley Street would require major works. The bridge would also impact on the open space on the north bank of the Fitzroy River. Depending on the alignment this may include the football fields and racecourse. The close proximity of the rail line to Lakes Creek Road also poses a number of problems in connecting into the Dean Street/ Lakes Creek Road intersection.

The benefit of the Stanley Street bridge option is best understood from analysis of traffic flows on the other two bridges. Table 51 sets out the estimated daily flows on the three bridges for this option.

Table 51 – Daily Flows for Stanley Street Bridge Option (PAG Scenario) – Fitzroy River Screenline

Location	2005	2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	33,710	-2%	37,030	8%
Fitzroy River Bridge	38,200	33,150	-13%	34,600	-9%
Stanley Street Bridge	-	13,760	-	14,500	-
Total	**72,540**	**80,620**	**11%**	**86,130**	**19%**

The analysis indicates that:

- in 2011 13,800 vpd was forecast to use the Stanley Street Bridge rising to 14,500 by 2021

- Fitzroy Bridge daily traffic was forecast to be 13% lower than 2005 levels in 2016 and daily traffic flows 9% lower than 2005 flows in 2021
- Neville Hewitt Bridge daily traffic was forecast to be 8% higher than 2005 flows by 2021, which is a result of the accelerated growth in Parkhurst.
- Reduced traffic through the Queen Elizabeth Drive/ Lakes Creek Road/ Bridge Street intersection would result in improved operations and reduced delay at this location

This option does not provide substantial long term relief to the Neville Hewitt Bridge where daily flows were forecast to be above 2005 flows before 2021 under the PAG scenario. Figure 47 shows the impact on road network operational deficiency. The key outcomes being:

- Four lanes would be required on Stanley Street to support this option
- Four lane upgrading of Norman Road would be required between Frenchville Road and Nagle Drive by 2021 with the section between Frenchville Road and Richardson Street required at the same time as the bridge;
- Intersection upgrade would most likely be required along Dean Street at Elphinestone Street, High Street, Kerrigan Street, Frenchville Road and Moores Creek Road
- The additional traffic on Dean Street would result in deterioration of the local amenity for those residents along Dean Street from increased noise, reduced ease of access to driveways, and reduced ease of movement for pedestrians.
- Intersection works at East Street/ Fitzroy Street and Bolsover Street/ Fitzroy Street would still be required irrespective of the Stanley Street bridge option
- Other network deficiencies identified in the “do minimum” analysis are not addressed by this option.

Figure 47 – Network Operational Deficiency 2021 (PAG Scenario) – Stanley Street Bridge

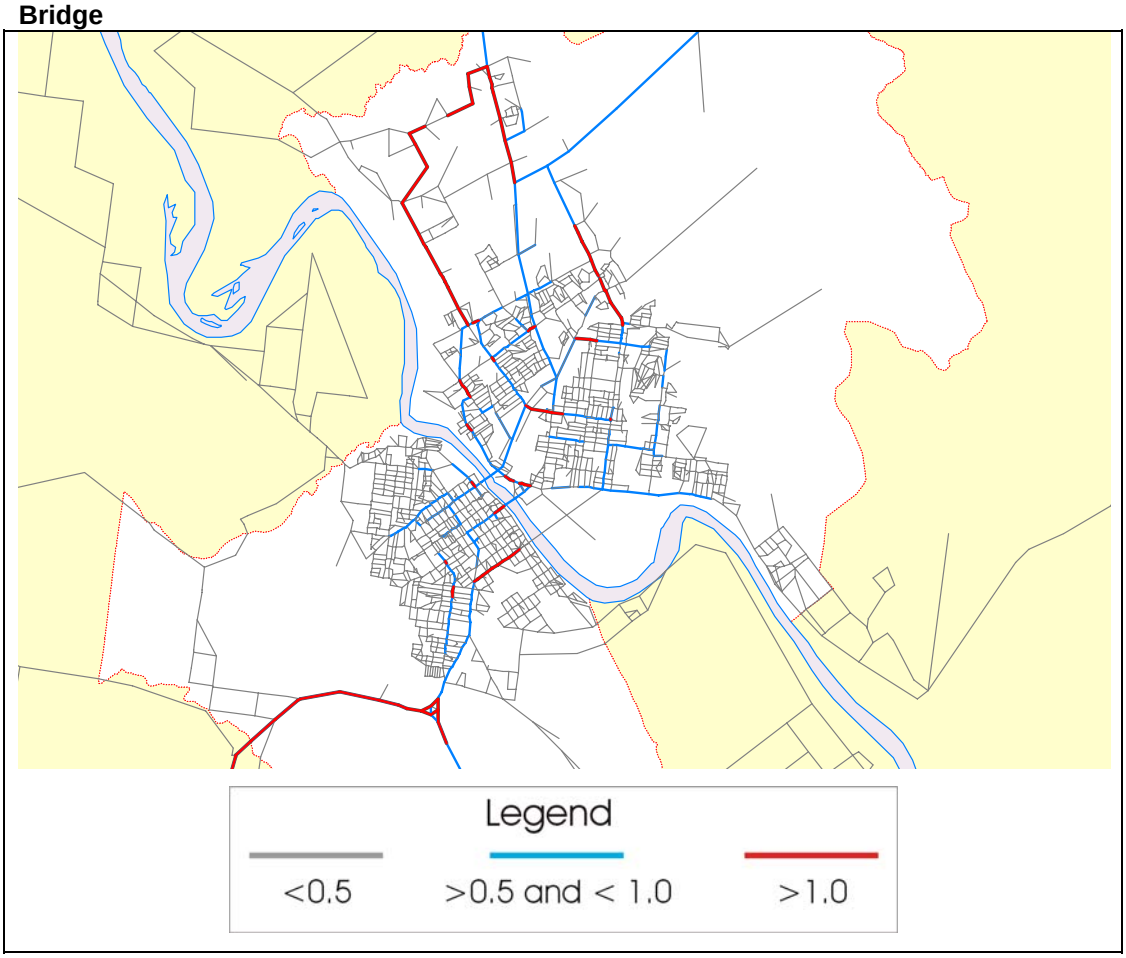
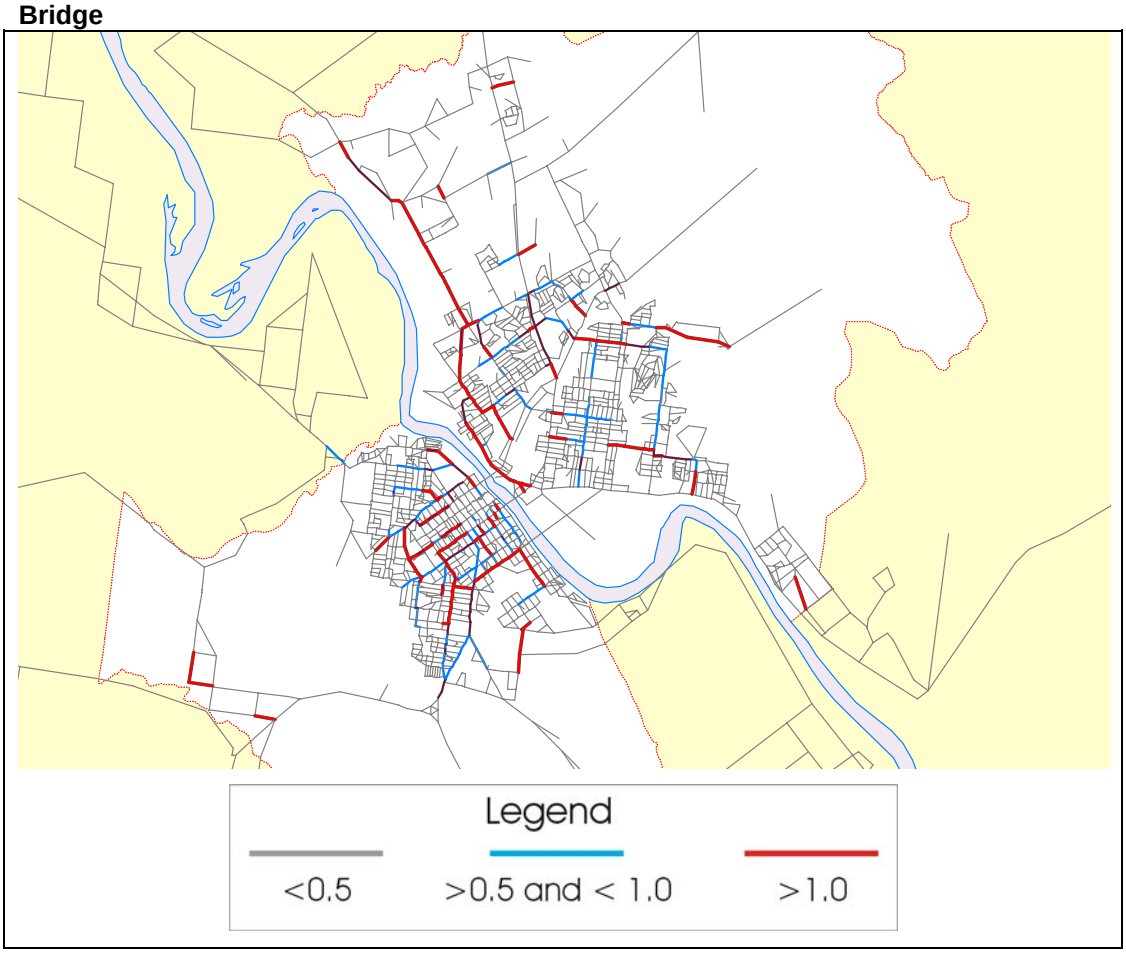


Figure 48 – Network Hierarchic Deficiency 2021 (PAG Scenario) – Stanley Street Bridge



In reviewing whether this option addressed the various network hierarchic deficiencies identified in the "do minimum" analysis it was found that they were not addressed by this option. Figure 48 shows the network hierarchic deficiencies in 2021 for the Stanley Street bridge option under the PAG scenario.

The Stanley Street Bridge provides good long term relief to the Fitzroy River Bridge under this scenario but provides limited benefit to the overall road network. It does not provide long term relief to the Neville Hewitt Bridge and current operating conditions will have returned within the timeframe of this study necessitating planning for a another river crossing prior to 2021. The Stanley Street bridge should be considered as a possible fourth river crossing in the future.

10.1.12.2 Western River Crossing – Western Street Alternative

A new corridor would be built to the west of the city. The option assumed a high standard road is built between the Bruce Highway at Olive Street and the Capricorn Highway to the east of the Airport along the Western Street alignment. A connection point to the Capricorn Highway was not certain, for the option the corridor was connected into the Bruce Highway/ Capricorn Highway roundabout. For modelling purposes a two lane cross-section was assumed. It was assumed that a connection would be provided to Rockhampton-Yeppoon Road which would necessitate a crossing the north coast rail line. Interchanges would also be provided at Alexandra Street and with a new road linking to Lion Creek Road. Providing a link to Lion Creek Road creates a connection to the city further enhancing the benefits of the corridor as a relief to both current bridges.

This option would provide for efficient movement of long distance travel free from the stop/ start nature of the existing Bruce Highway through Rockhampton.

The Western River Crossing (eastern alternative) provides long term relief to both the existing river crossings with the Neville Hewitt Bridge traffic flows forecast to be 8% lower than 2005 flows in 2021 and the Fitzroy Bridge 7% lower by 2021 than compared to 2005 flows. Table 52 outlines the effects of an additional river crossing on a western alignment on the other two Fitzroy River bridges.

Other benefits of this option are:

- Daily traffic flows on Glenmore Road were forecast to be lower with this option with 2021 daily flows on Glenmore Road being 8% lower than current levels and 24% lower than estimated 2021 flows under the “do minimum” scenario (PAG scenario).
- Traffic within Central Rockhampton in 2021 was forecast to be approximately 67,200 vpd or a 22% reduction compared to the 2021 “do minimum” option (PAG scenario).
- Daily traffic flows on Knight Street were forecast to lower by 23% over current levels would be 21% lower than the 2021 “do minimum” flow (PAG).
- Access to the Airport is substantially improved for those travelling from North Rockhampton
- mitigates the forecast deficiencies on both bridges.

The drawbacks to this option are:

- The impact on Western Street, as some resumptions maybe necessary, and the residential amenity of the street will be severely reduced with access and egress to fronting development severely affected, which would raise a number of safety issues. Intersections along Western Street would most likely require works to improve access and maintain safe operating conditions.
- Increased traffic on Lion Creek Road will impact on the residential amenity to land uses fronting the road making access and egress from local streets more difficult which may necessitate improvement works at some intersections for safety. The location of these upgrades would be the subject of a more local investigation should this option be pursued further.
- does not address the more local operational deficiencies previously identified in “do minimum analysis” for the PAG scenario.

Figure 49 shows the impact on road network operational deficiency. The key outcomes being:

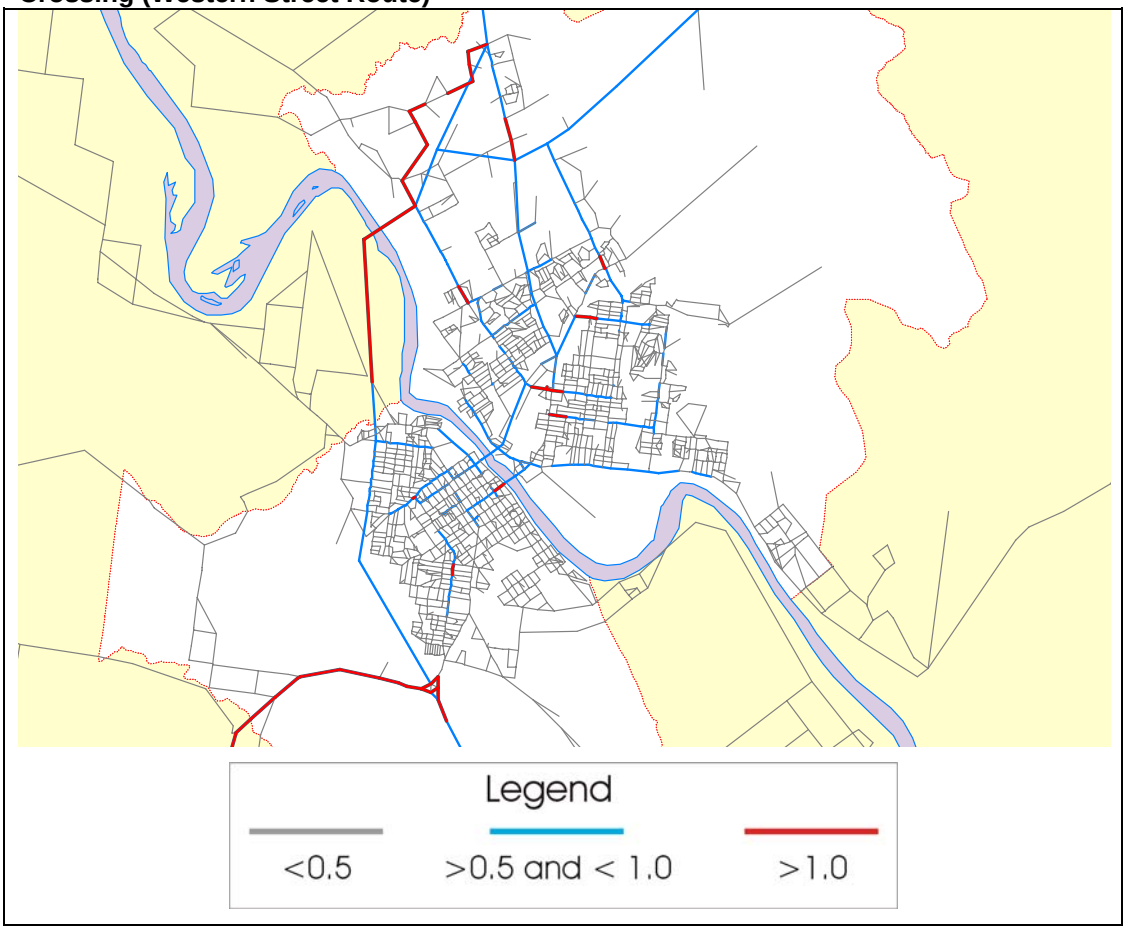
- Intersection works at East Street/ Fitzroy Street and Bolsover Street/ Fitzroy Street would still be required irrespective of the western bridge option
- Four lane upgrading of Yaamba Road between the Rockhampton – Yeppoon Road and Boundary Road (west) would be required;
- The western alignment bridge would need to be upgraded to two lanes in each direction prior to 2021;
- Intersection works are likely to be required at Lion Creek road and Exhibition St, Lion Creek Road and North Street and Lion Creek Road/ Albert St and Bolsover St

Other network deficiencies identified in the “do minimum” analysis are not addressed by this option.

Table 52 – Fitzroy River Daily Demand – Eastern Alignment

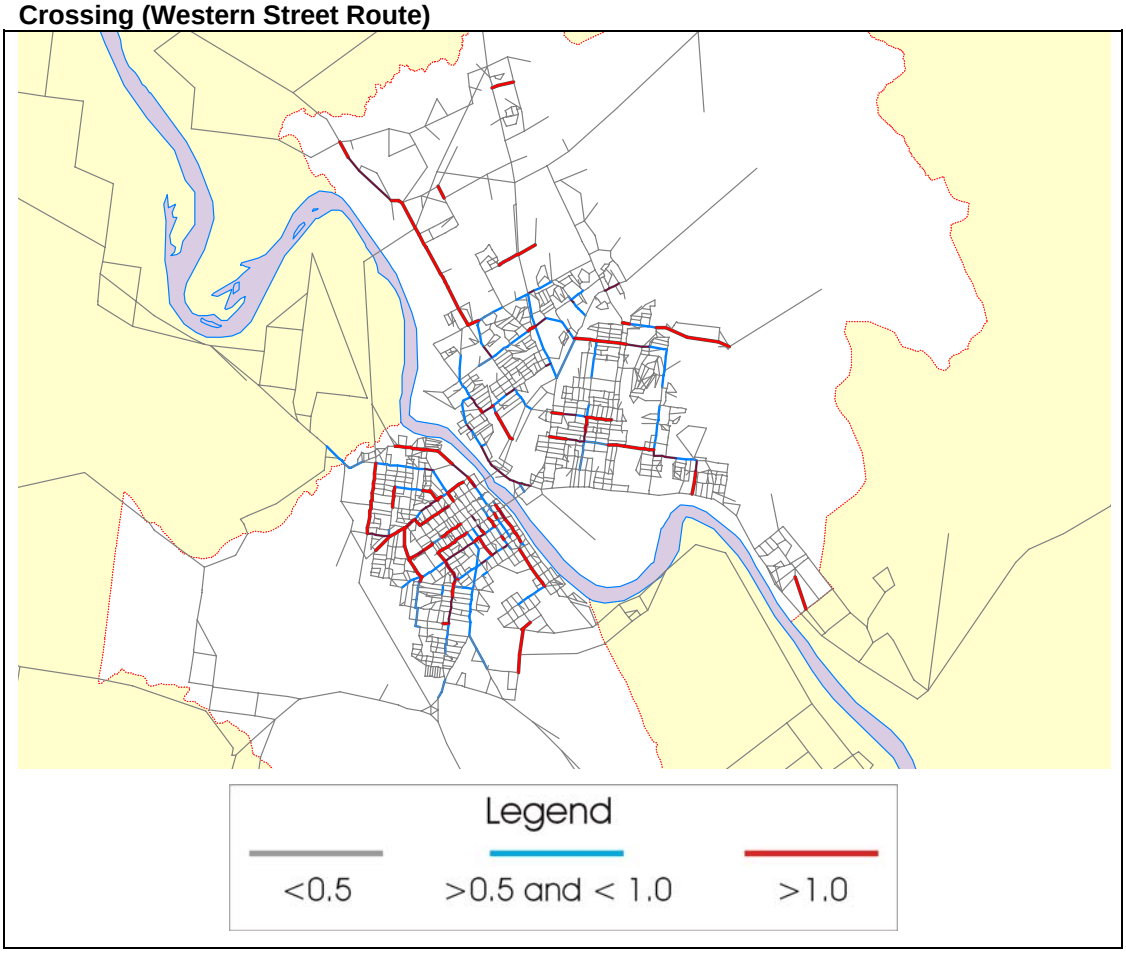
Location	2005 Estimated	2016 Forecast	% Change from 2005	2021 Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	29,750	-13%	31,580	-8%
Fitzroy River Bridge	38,200	34,650	-9%	35,490	-7%
Western Crossing – East Alignment		16,210	0%	19,070	0%
Total	**72,540**	**80,610**	**11%**	**86,140**	**19%**

Figure 49 – Network Operational Deficiency 2021 (PAG Scenario) – Western River Crossing (Western Street Route)



The majority of environmental deficiencies identified in the "do minimum" analysis are not addressed by this option. A reclassification of Lion Creek Road and Western Street to higher order roads would be required. Figure 50 shows the hierarchic deficiencies in 2021 for the western river crossing option.

Figure 50 – Network Hierarchic Deficiency 2021 (PAG Scenario) – Western River Crossing (Western Street Route)



The option provides good long term relief to the existing Bruce Highway including the Neville Hewitt and Fitzroy River Bridge. However the option has a large detrimental impact residential community along Western Street. A western alignment has many advantages and should be considered further although an alternative alignment would be preferable in minimising impacts on Rockhampton residents.

10.1.12.3 Western River Crossing – West of Airport Alternative

A new corridor would be built to the west of the city. The option assumed a high standard road is built between the Bruce Highway at Olive Street and the Capricorn Highway to the west of the Airport along the new alignment. An interchange with the Capricorn Highway was assumed to the west of the Bruce Highway. For modelling purposes a two lane cross-section was assumed. It was assumed that a connection would be provided to Rockhampton-Yeppoon Road which would necessitate a crossing of the north coast rail line. Interchanges would also be provided at Alexandra Street and with a new road linking to Lion Creek Road. Providing a link to Lion Creek Road creates a connection to the city further enhancing the benefits of the corridor as a relief to both current bridges.

The Western River Crossing (western alternative) provides long term relief to both the existing river crossings with the Neville Hewitt Bridge forecast to be 9% lower than 2005 flows in 2021 and the Fitzroy Bridge 9% lower in 2021 compared to 2005. Table 56 outlines the effects of an additional river crossing on a western alignment on the other two Fitzroy River bridges.

Other benefits of this option are:

- Daily traffic flows on Glenmore Road are forecast to be lower with this option with 2021 daily flows on Glenmore Road being 8% lower than current levels and 24% lower than estimated 2021 flows under the "do minimum" option for the PAG scenario.
- Traffic within Central Rockhampton in 2021 was forecast to be approximately 66,500 vpd or a 23% reduction compared to the 2021 "do minimum" option for the PAG scenario.
- Daily traffic flows on Knight Street are forecast to lower by 24% compared to 2005 flows and forecast to be 22% lower than the 2021 "do minimum" option flow for the PAG scenario.
- Access to the Airport is substantially improved for those travelling from North Rockhampton.
- Mitigates the operational deficiencies of the existing two Fitzroy River bridges

The drawbacks to this option are:

- Upgrade works would be required on the Capricorn Highway and at the intersection of the Capricorn Highway/ Bruce Highway to maintain good operating conditions.
- Increased traffic on Lion Creek Road will impact on the residential amenity to fronting development making access and egress from local streets more difficult which may necessitate improvement works at some intersections for safety. The location of these upgrades would be the subject of a more local investigation should this option be pursued further.

Figure 51 shows the impact on road network operational deficiency. The key outcomes being:

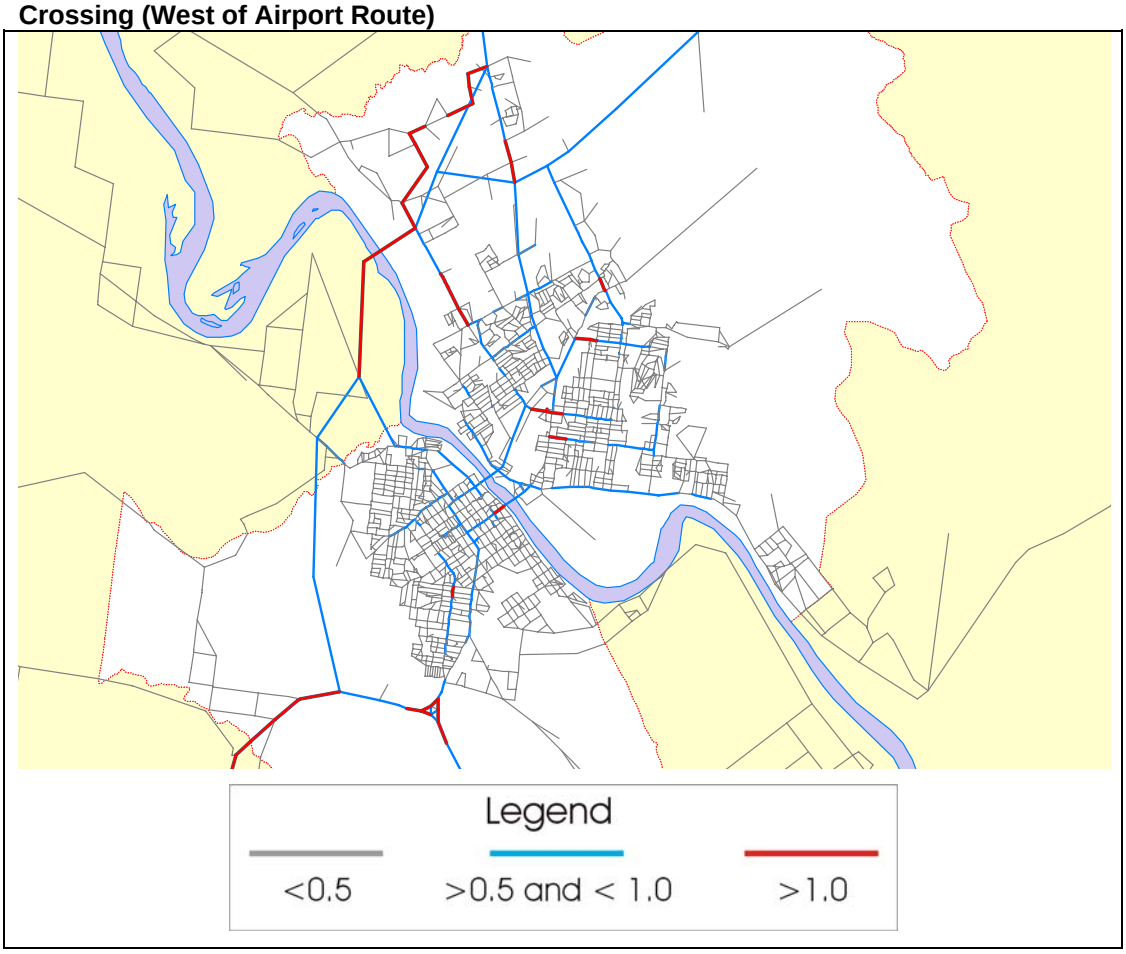
- Intersection works at East Street/ Fitzroy Street and Bolsover Street/ Fitzroy Street would still be required irrespective of the western bridge option
- Four lane upgrading of Yaamba Road between the Rockhampton – Yeppoon Road and Boundary Road (west) would be required;
- The western alignment bridge would need to be two lanes in each direction before 2021;
- Intersection works are likely to be required at Lion Creek road and Exhibition St, Lion Creek Road and North Street and Lion Creek Road/ Albert St and Bolsover St

Other network deficiencies identified in the "do minimum" analysis are not addressed by this option.

Table 53 – Daily Flows for Western Alignment Bridge Western Route Option (PAG Scenario) – Fitzroy River Screenline

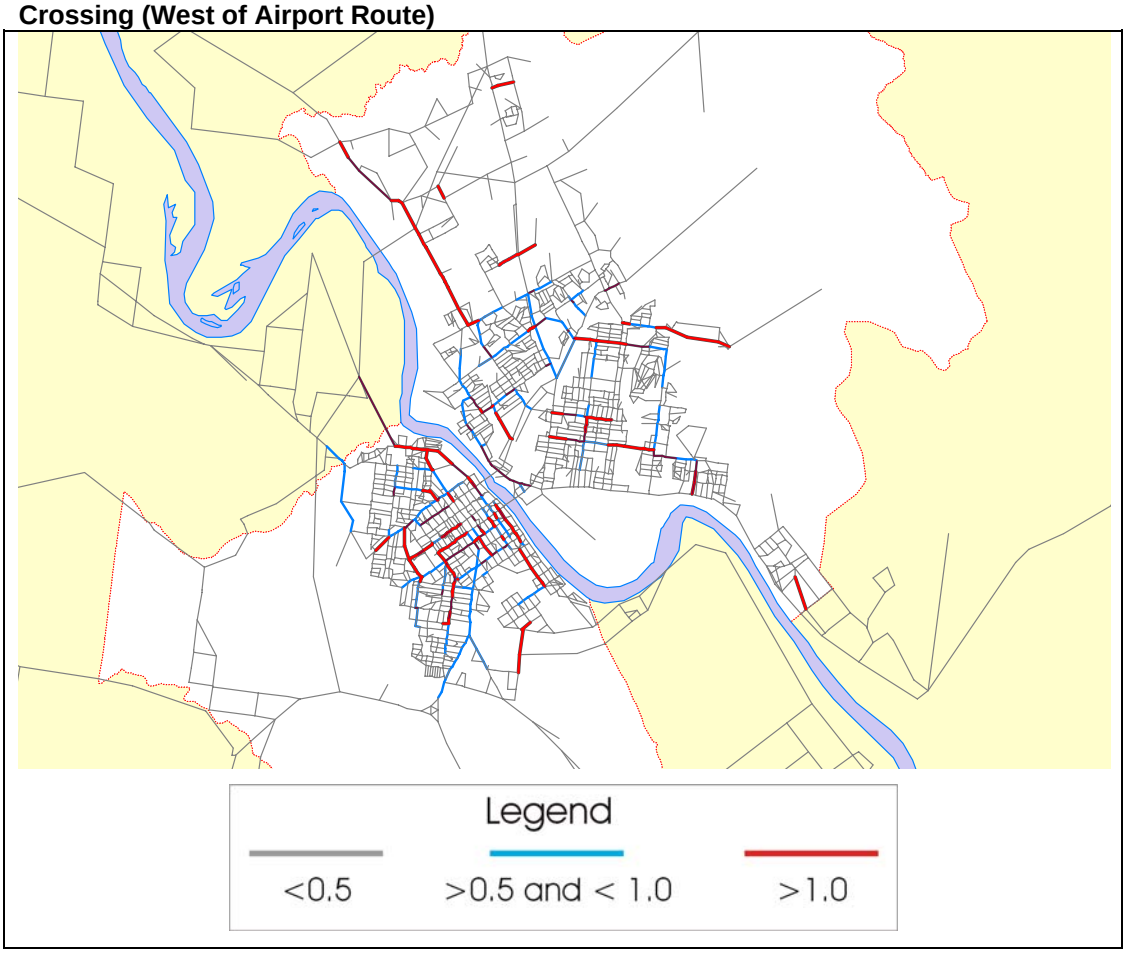
Location	2005	2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	29,870	-13%	31,080	-9%
Fitzroy River Bridge	38,200	34,790	-9%	35,370	-7%
Western Crossing – West Alignment	-	15,960	-	19,680	-
Total	**72,540**	**80,620**	**11%**	**86,130**	**19%**

Figure 51 – Network Operational Deficiency 2021 (PAG Scenario) – Western River Crossing (West of Airport Route)



The majority of environmental deficiencies identified in the “do minimum” analysis are not addressed by this option. A reclassification of Lion Creek Road and Campbell Street would be required as a result of this option as there role in the network has substantially changed. Figure 52 shows the hierarchic deficiencies in 2021 for the western river crossing option.

Figure 52 – Network Hierarchic Deficiency 2021 (PAG Scenario) – Western River Crossing (West of Airport Route)



10.1.13 Other Fitzroy River bridge Options

A further three options were considered in the analysis, which were:

- Duplication of the Neville Hewitt Bridge
- Extension of Richardson St across Splitters Creek, a bridge across the Fitzroy River connecting into Harman Street on the southern side and eventually to Lion Creek Road.
- A bridge on a new alignment connecting into Alexandra St at Maloney Street on the northern side and continuing to the west of Airport on the same alignment as the Western River Crossing (west of Airport) option discussed in Section 10.2.1.3. The option also had a connection to Lion Creek Road.

10.1.13.1 Duplication of the Neville Hewitt Bridge

The option assumed that a second bridge of four lanes would be built adjacent to the existing bridge creating four lanes in each direction across the Fitzroy River. Four lanes would continue south until the Albert Street/ Bolsover Street intersection where lanes were dropped and the existing arrangement of two lanes in each direction continued south. To the north the four lanes in each direction would continue until the end of the viaduct where the corridor was reduced to three lanes in each direction until the Knight Street/ Moores Creek intersection where lanes were dropped and the existing corridor maintained north of Knight Street. Substantial property acquisition would be required on the southern side of the Fitzroy River to enable this option.

The western Bruce Highway corridor alignment options are both expensive and difficult because of the flooding and terrain issues. A duplication of the existing Neville Hewitt Bridge may offer similar benefits as the western alignment option.

Table 54 shows the results of the option test under the PAG scenario on traffic across the Fitzroy River.

Table 54 – Daily Flows for duplication of the Neville Hewitt Bridge Option (PAG Scenario) – Fitzroy River Screenline

Location	2005	2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	43,250	26%	46,570	36%
Fitzroy River Bridge	38,200	37,370	-2%	39,560	4%
Total	**72,540**	**80,620**	**11%**	**86,130**	**19%**

The benefits of the options are:

- Reduces traffic on the Fitzroy River Bridge such that by 2021 daily traffic levels are similar to 2005 traffic levels;
- Provides long term capacity at this location; and
- May provide the opportunity to provide connections to Glenmore Road.

Drawbacks of the option are:

- The Fitzroy River Bridge will be approaching deficient levels by 2021 under the PAG scenario
- Substantial property acquisition required, particularly on the southern side of the river;
- Does not remove through traffic from the centre of Rockhampton
- Reinforces the Bruce Highway as a physical barrier to ease of movement between South Rockhampton and the city centre;
- Upgrades to intersections on Albert Street and George Street will be required as traffic increases by 3 – 6% over the "do minimum" in 2021, which will necessitate property acquisition.

The option mitigates the deficiencies on the Neville Hewitt Bridge and Fitzroy River Bridge identified in the PAG scenario "do minimum" network option analysis until after 2021. A full cost benefit analysis of the option compared to the western Bruce Highway alignment would be required to determine the value of the scheme.

10.1.13.2 Other Bridge Options

Both the other bridge options considered were not taken further as there benefits were limited and provide a more local function rather than a more strategic role. Neither option provided long term relief to the existing bridges. It was likely both existing bridges would be approaching their deficiency levels by 2021.

10.1.14 Alexandra Street (Rail Overpass)

Alexandra Street is currently disconnected at the North Coast Rail Line south of Farm Street. The option involves a grade separation of the rail line on the existing Alexandra St alignment. The option would involve:

- Severing Hinchliff Street north of Mungarra Drive

- Likely property impacts on Alexandra Street south of the rail line
- Intersection works at Farm Street and Alexandra Street
- Reducing access to the industrial area on Power Street and Alexandra Street north of the rail line.

The approaches to the bridge would need to be designed to a maximum grade (5%) so that heavy commercial vehicles are able to travel along the Alexandra Street rail overpass.

The option will have a number of benefits:

- Negates the close spacing of the Alexandra Street/ Farm Street intersection, open level crossing, and Farm Street/ Hinchcliffe Street intersection, which has the potential in peak periods for traffic to queue on the open level crossing;
- Reduce the demand for the right turn from Farm Street into Hinchliff Street; and
- Improve the residential amenity of Hinchliff Street south of Farm Street.

Queensland Rail is also considering introducing longer freight trains which would result in greater impacts as the open level crossings in Rockhampton resulting in longer periods of closure. At Farm Street this has the potential for greater impact as there would be a strong likelihood of traffic being forced through residential areas in order to avoid delay at the OLC.

Daily traffic on the Neville Hewitt Bridge is forecast to increase by 26% compared to 2005 flows. The daily flow on both bridges for each of the forecast years is shown in Table 55.

The road network traffic benefits of the option are outlined in Table 56. The major outcomes from the analysis were:

- daily traffic flows on Knight Street were forecast to be up to 22% lower than 2005 flows by 2021,
- daily traffic flows on Glenmore Road were forecast to be 10% higher by 2021 than 2005 daily flows.
- Daily traffic flows on Hollingsworth Street were forecast to be 7800 vpd which compares to 5800 vpd in 2005 and 10,100 vpd in 2021 “do minimum” under the PAG scenario;
- Daily traffic flows on Haynes Street were forecast to 10,000 vpd in 2021 which compares to 8900 vpd in 2005 and would be approximately 12% to 23% lower than the forecast 2021 flows under the “do minimum” option for the PAG scenario; but daily flows on Haynes Street will remain above 2005 current flows.

Table 55 – Daily Flows for Alexandra Street Rail overpass Option (PAG Scenario) – Fitzroy River Screenline

Location	2005 Estimated	2016 Forecast	% Change from 2005	2021 Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	39,850	16%	43,190	26%
Fitzroy River Bridge	38,200	40,760	7%	42,940	12%
Western Crossing – East Alignment		80,610	11%	86,130	19%
Total	**72,540**	**39,850**	**16%**	**43,190**	**26%**

Table 56 – Daily Traffic Flows Bruce Highway (North) Screenline – PAG Scenario

Location	2005	2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005
Carlton Street	3,120	1,670	-46%	1,890	-39%
Farm Street	7,420	8,220	11%	8,710	17%
Richardson Road	10,660	12,960	22%	12,490	17%
Sheehy Street	–	1,430	–	1,420	–
Main Street	3,960	5,710	44%	5,500	39%
Alexandra Street	16,380	24,190	48%	25,870	58%
Knight St	4,350	3,070	-29%	3,380	-22%
Glenmore Road	9,540	9,480	-1%	10,470	10%
Total	**55,430**	**66,730**	**20%**	**69,730**	**26%**

Table 56 shows that for this option daily traffic flows on Alexandra Street would be 58% higher in 2021 than 2005. Higher traffic flows on Alexandra Street will necessitate intersection upgrades at:

- Alexandra Street and Richardson Street,
- Alexandra Street and Main Street,
- Alexandra Street and Sheehy Street, and
- Alexandra Street and Moores Creek Road.

The impact on the Alexandra Street and Moores Creek Road intersection is significant. Major works are likely to be required without a third crossing of the Fitzroy River.

The option has a number of other drawbacks:

- Intersection upgrades may necessitate some land resumptions, but this would be determined at the time of detailed design,
- Reduced amenity for those properties fronting Alexandra Street as a result of the increase in daily traffic flows, noise, and reduced driveway access/ egress.

Figure 53 – Network Operational Deficiency 2021 (PAG Scenario) – Alexandra Street (Rail Overpass)

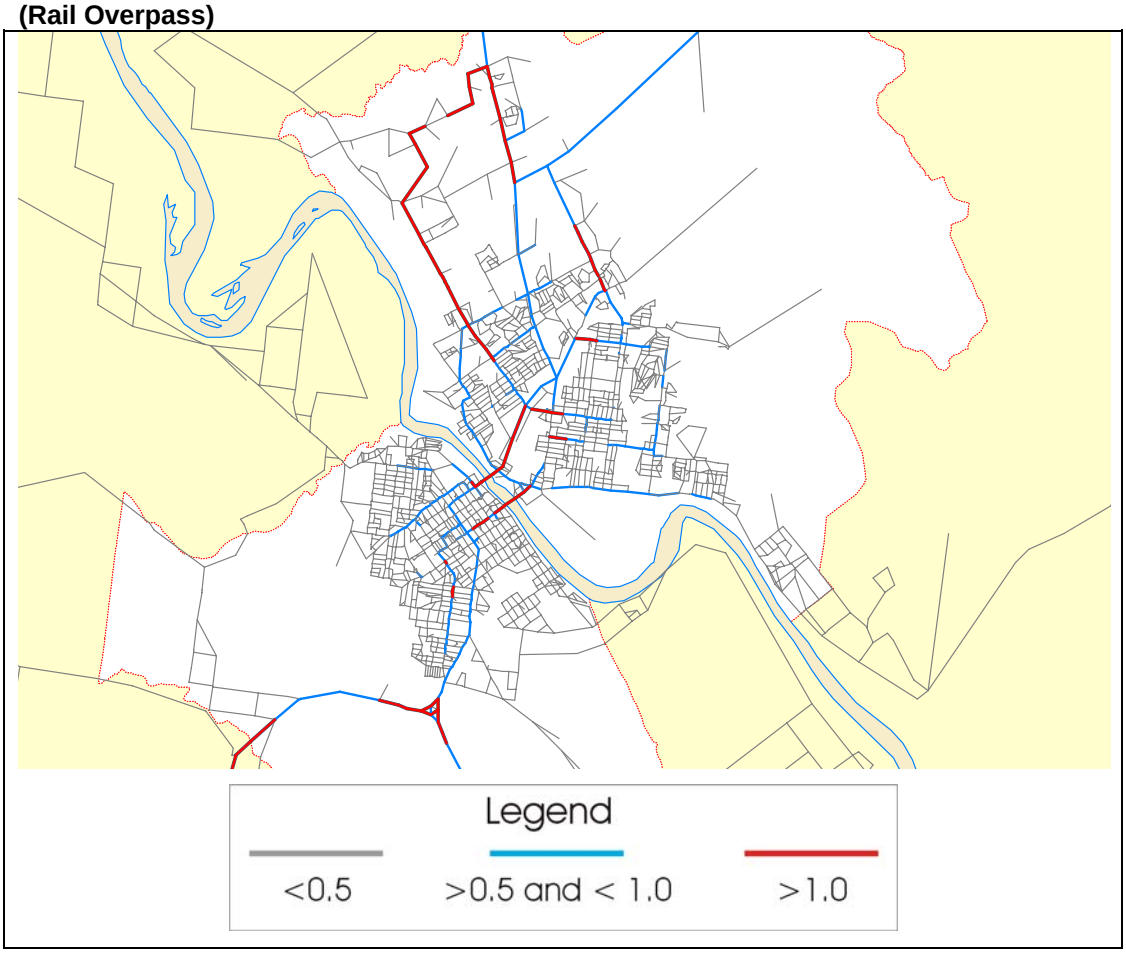


Figure 53 shows the network operational deficiencies.

- The rail overpass would need to be two lanes in each direction prior to 2021 as the crossing was forecast to be operational deficient by 2021 at one lane in each direction.
- Widening of Alexandra Street would be necessary from Farm Street to William Palfrey Road
- The option does not address the network operational deficiencies identified in the “do minimum” analysis for the PAG scenario

Figure 54 – Network Hierarchic Deficiency 2021 (PAG Scenario) – Alexandra Street (Rail Overpass)

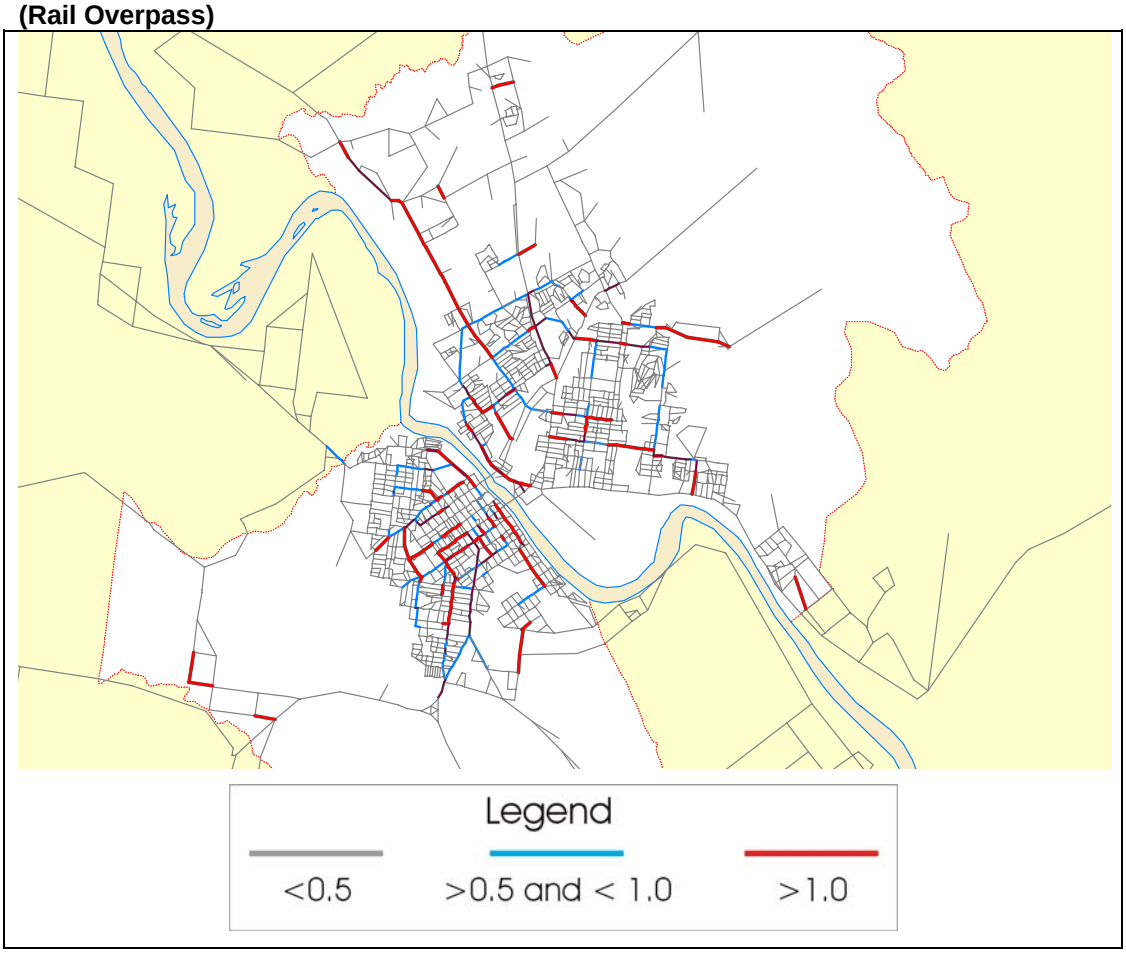


Figure 54 shows the hierarchic network deficiencies at 2021 for this option and the option does not address the hierarchic network deficiencies identified in the "do minimum analysis. Daily traffic flows on Knight Street were reduced with this option but daily flows in 2021 would be above the desired maximum daily flow for a minor urban collector.

An advantage of this option is to strengthen the road hierarchy in North Rockhampton. Alexandra Street is currently urban arterial between Moores Creek Road and Richardson Street after which it is downgrade to urban sub-arterial. By building the rail overpass Alexandra Street would be designated as urban arterial between Moores Creek Road and Belmont Road, which establishes the role for the road and improves the over all hierarchy in the north of city by establishing a series of parallel arterial roads at a suitable separation.

Queensland Rail has a policy of where possible of seeking to have open level crossings removed to improve safety. Grade separation of Alexandra Street over the rail line may be seen as an opportunity to remove an OLC in Rockhampton. This option would not enable the closure of Farm Street street at the OLC.

The main advantages of this option is that establishes a clear hierarchy of arterial roads in the northern part of the city.

The Alexandra Street rail overpass options should be considered further.

10.1.15 Maloney Street Connection

The Maloney Street Connection option would provide an alternative grade separated crossing of the rail line into the industrial areas south of Limestone Creek. The option would include a new link road be built between McLaughlin Street and Yaamba Road to the north

of the Glenmore Primary and Secondary Schools and include a new signal controlled intersection at Yaamba Road. A further new road would be built between McLaughlin Street and Alexandra Street across the rail line in to Werribee Street. Once the connection between Yaamba Road and Alexandra Street is completed Farm Street between McLaughlin Street and Yaamba Road would be downgraded to improve the amenity and safety at the entrances to the primary and secondary schools on Farm Street. Measures for downgrading Farm Street may include a permanent lower speed zone in front of the schools and other physical changes to present Farm Street as local area for the safe drop off and collection of students.

The intention is to provide a more direct route to the Bruce Highway for traffic west of the rail line without traffic having to cross the rail line along Farm Street and travel past a number of schools.

Table 57 – Daily Flows for Maloney Street Option (PAG Scenario) – Bruce Highway (North) Screenline

Location	2005	2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005
Carlton Street	3,120	3,900	25%	3,400	9%
Maloney Street Connection	–	2,690	–	2,970	–
Farm Street	7,420	5,000	-33%	5,090	-31%
Richardson Road	10,660	11,430	7%	13,820	30%
Sheehy Street	–	1,140	–	980	–
Main Street	3,960	5,830	47%	5,680	43%
Alexandra Street	16,380	18,610	14%	21,820	33%
Knight St	4,350	6,270	44%	5,160	19%
Glenmore Road	9,540	11,780	23%	12,060	26%
Total	**55,430**	**66,650**	**20%**	**70,980**	**28%**

Table 57 shows the forecast daily traffic flows on the Bruce Highway (North) screenline for the Maloney Street option. The Maloney Street connection was forecast to carry approximately 3,000 vpd by 2021. A daily flow of this magnitude is unlikely to support the case for a rail line crossing at this location. However the option has a number of potential advantages:

- by providing a rail crossing it may be possible to close the Farm Street OLC as a safer and more viable alternative exists; and
- together with the River Rose Drive option a sub arterial road corridor would be established between Alexandra Street and Norman Road providing high quality connectivity. Maloney Street and River Rose Drive would offer the opportunity to take traffic away from sensitive land uses

The closure of Farm Street at the OLC would have a number of advantages as well including:

- the significant reduction in traffic adjacent to Glenmore Primary and Glenmore secondary Schools
- removing the need for a controlled intersection at Farm Street and Hinchliff Street.

A drawback to the closure of Farm Street it is likely additional traffic would be attracted to Richardson Street and the Richardson Street/ Yaamba Road intersection. Additional traffic flowing through the Richardson/ Yaamba Road intersection is likely to necessitate improvement works.

The Maloney Street option provides a number of advantages which outweigh the drawbacks and in the context of developing a good road network hierarchy the option should be considered further.

10.1.16 Glenmore Road Corridor

As discussed in the previous section grade separation of the rail line along the Alexandra Street corridor is likely to significantly lower traffic flows along the Glenmore Road corridor over the longer term. The Alexandra Street rail grade separation would be an expensive solution. Therefore a number of options along the Glenmore Road corridor were considered in order to establish whether more cost effective solutions were possible. Option for Glenmore included on-line widening and a number of localised bypasses of residential areas to cater for the additional demand.

10.1.16.1 Online Upgrade Glenmore Road to Hollingsworth Street (No Connection to Moores Creek Road)

The option assumes widening of:

- Glenmore Road between Moores Creek and Haynes Street from one traffic lane to two traffic lanes in each direction
- Haynes Street from one lane to two lanes in each direction between Glenmore Road and Hollingsworth Street, and
- Hollingsworth Street from one lane to two lanes in each direction between Haynes Street and Farm Street.

The option would necessitate intersection upgrades at:

- Glenmore Road and Dooley Street
- Glenmore Road and Main Street
- Glenmore Road and Haynes Street
- Haynes Street/ Hollingsworth St and Richardson Street
- Hollingsworth Street and Farm Street.

The exact form of the intersections would be determined at the time of detailed design but most likely the intersections may need to be signal controlled to enable safe traffic movement into and from the lower order roads and to facilitate safe pedestrian crossing points.

The results of on-line upgrading are shown in Table 58 and Table 59. The results show:

- Daily traffic volumes along Glenmore Road were forecast to be 13,500 vpd which compares to the “do minimum” daily flow under the PAG scenario of 11,500 an increase of 17%.
- Daily traffic volumes on Hollingsworth Street were forecast to 14,400 vpd in 2021 which is a substantial increase over the 2021 “do minimum” volume of 10,100 vpd
- Daily traffic volumes on Haynes Street increase from the “do minimum” case of 11,400 vpd in 2021 to 16,100 vpd in 2021 under this PAG scenario for this option.
- Daily traffic volumes on the Fitzroy River Bridge was forecast to be 43,400 vpd in 2021 which was lower than the 2021 “do minimum” daily flow of 45,800 vpd under the PAG scenario; and

- Neville Hewitt Bridge daily flow for 2021 of 42,700 was forecast to be higher than the "do minimum" daily flow of 40,500 vpd in 2021 under the PAG scenario..

Table 58 – Daily Flows for Online Upgrade of Glenmore Road (PAG Scenario) – Bruce Highway (North) Screenline

Location	2005	2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005
Carlton Street	3,120	1,700	-46%	1,800	-42%
Farm Street	7,420	8,380	13%	8,960	21%
Richardson Road	10,660	12,110	14%	11,680	10%
Sheehy Street	–	1,000	–	990	–
Main Street	3,960	5,610	42%	5,750	45%
Alexandra Street	16,380	18,600	14%	19,150	17%
Knight St	4,350	4,990	15%	6,940	60%
Glenmore Road	9,540	11,710	23%	13,470	41%
Total	**55,430**	**64,100**	**16%**	**68,740**	**24%**

Table 59 – Daily Flows for Online Upgrade of Glenmore Road (PAG Scenario) – Fitzroy River Screenline

Location	2005	2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	39,370	15%	42,700	24%
Fitzroy River Bridge	38,200	41,250	8%	43,440	14%
Total	**72,540**	**80,620**	**11%**	**86,140**	**19%**

The main advantage of this option is that operational deficiencies along Glenmore Road, Haynes Street and Hollingsworth Street are mitigated by the widening of the roads. However the option has a number of drawbacks, including:

- Reinforcing the role of the corridor as an urban arterial where as it is classified as urban sub-arterial;
- Further reducing the amenity of land owners adjacent to the corridor, in particular the residential areas at the northern end of Glenmore Road, Haynes Street, and the southern end of Hollingsworth Street;
- The rail line crosses Glenmore Road to the west of Moores Creek Road at an OLC. Higher traffic flows on Glenmore Road increases the risks associated with the OLC. The possibility of increased train lengths will result in greater delay to traffic.
- Requiring the need to upgrade a number of intersections along Glenmore Road to cater for the mix of through traffic, local traffic and pedestrians;
- Haynes Street and Hollingsworth Street (part) are primarily residential in nature and the road reserve is not wide enough to cater for a modern four lane cross section road.

- The likely requirement to acquire land to deliver the option particularly along Haynes Street and Hollingsworth Street where the existing road reserve is not wide enough to allow a high standard four lane road or a substantially lower class four lane cross section would need to be built. A lower class road may prevent the opportunity to provide protected turning bays for access to side streets.

The option does not deliver sufficient benefits to be considered further.

10.1.16.2 Upgrade Glenmore Road with Connection to Moores Creek Road

A direct connection between Glenmore Road and Moores Creek Road currently does not exist. The options considered the impacts of building a full movement interchange between Glenmore Road and Moores Creek Road. A number of challenges would need to be overcome before this option could be delivered including:

- the heights differences between the two roads and the ability to construct ramps within the available space
- the close proximity to the river,
- the close proximity of the rail line, and
- the close proximity of the abutments to the Neville Hewitt Bridge.

Table 60 – Daily Flows for Upgrade of Glenmore Road and Connection to Moores Creek Rd (PAG Scenario) – Bruce Highway (North) Screenline

Location	2005	2016		2021	
	Estimated	Forecast	**% Change from 2005**	Forecast	**% Change from 2005**
Carlton Street	3,120	1,700	-46%	1,820	-42%
Farm Street	7,420	7,520	1%	8,060	9%
Richardson Road	10,660	12,640	19%	12,460	17%
Sheehy Street	–	1,170	–	980	–
Main Street	3,960	5,650	43%	5,730	45%
Alexandra Street	16,380	17,560	7%	18,490	13%
Knight St	4,350	870	-80%	910	-79%
Glenmore Road	9,540	17,760	86%	20,180	112%
Total	55,430	64,870	17%	68,630	24%

The results of on-line upgrading of Glenmore Road and connections to Moore Creek Rd are shown in Table 60 and Table 61 and shows that

- daily traffic volumes on Knight Street were forecast to be significantly lower by 2021 with approximately 3400 vpd removed from Knight Street by the option compared to 2005 flows;
- Daily traffic flows on Glenmore Road by 2021 would be 20,200 vpd by 2021, which represent a 112%increase from 2005.
- Daily traffic volumes on Alexandra Street were forecast to approximately 13% higher than in 2005.
- daily traffic volumes on the Fitzroy River Bridge were estimated to be up to 7% lower by 2021 than in 2005.

- daily flows along Haynes Street were forecast to rise significantly to 17,300 vpd by 2021, which equates to daily flows being more than 100 % higher than 2005;
- daily flows along Hollingsworth Street were forecast to rise significantly to 13,900 vpd in 2021, which equates to daily flows being more than 100% higher than 2005;
- Daily traffic flows on the Neville Hewitt Bridge increase significantly and were forecast to be approximately 47% higher than the 2005 volumes. The traffic volumes of this magnitude would result in the Neville Hewitt Bridge being operationally deficient;
- Significant peak period congestion would occur at the Albert Street/ Bolsover intersection, Albert Street/ Campbell Street and Albert Street/ George St as traffic along Albert Street increases by up to 12% over the "do minimum" daily volumes for the PAG scenario.

Table 61 – Daily Flows for Ugraded Glenmore Road with Connections to Moores Creek RdOption (PAG Scenario) – Fitzroy River Screenline

Location	2005 Estimated	2016 Forecast	% Change from 2005	2021 Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	46,470	35%	50,440	47%
Fitzroy River Bridge	38,200	34,150	-11%	35,690	-7%
Total	**72,540**	**80,620**	**11%**	**86,130**	**19%**

The major benefits of the option were:

- the large reduction in traffic on Knight Street,
- the medium to long term relief provided to the Fitzroy River Bridge.

However there are a number of drawbacks to the option including:

- the increase in daily traffic volumes along Haynes Street and Hollingsworth Street would significantly reduce the local amenity;
- Duplication of the Neville Hewitt Bridge would be required in conjunction with this option.

Figure 55 – Network Operational Deficiency 2021 (PAG Scenario) – Upgrade Glenmore Road with Connection to Moores Creek Road

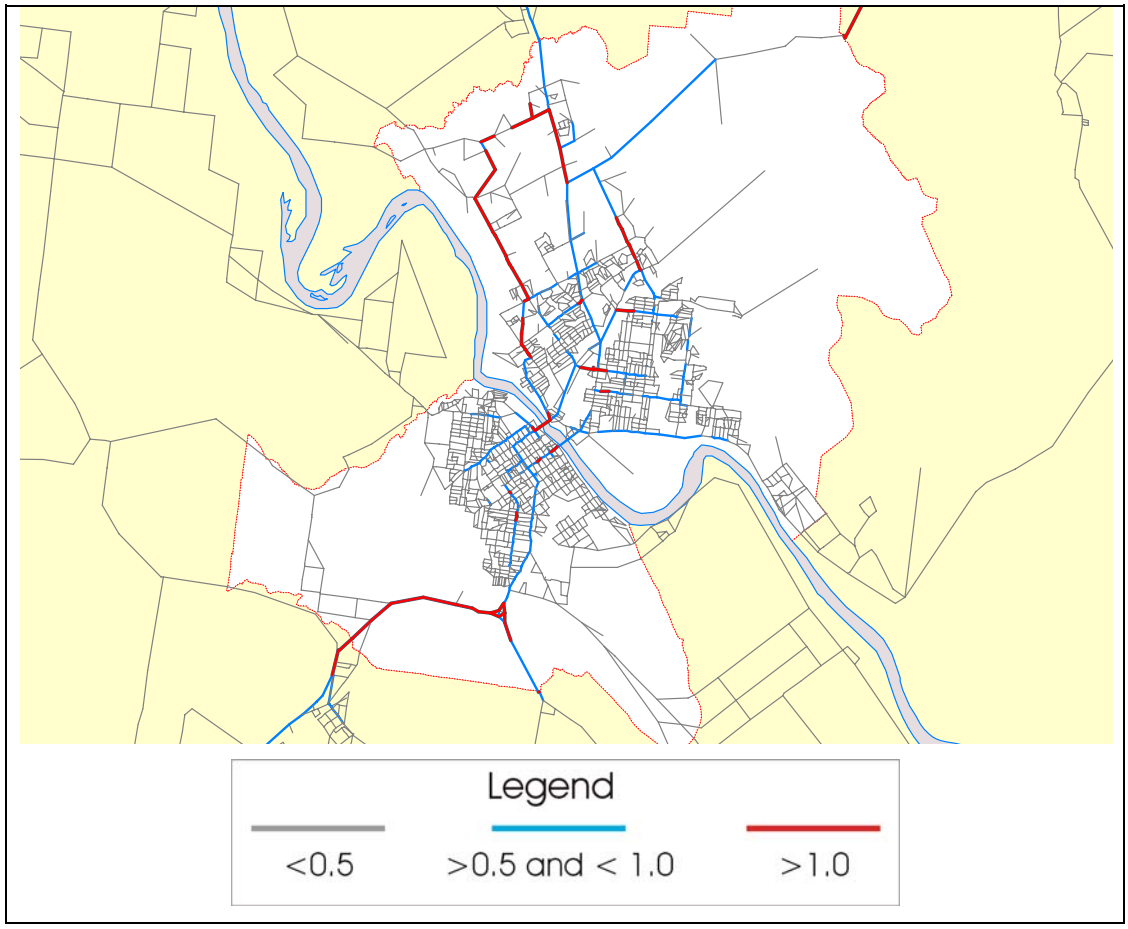


Figure 55 shows that this option does not address the operational network deficiencies identified during the “do minimum” analysis.

Figure 56 – Network Hierarchic Deficiency 2021 (PAG Scenario) – Upgrade Glenmore Road with Connection to Moores Creek Road

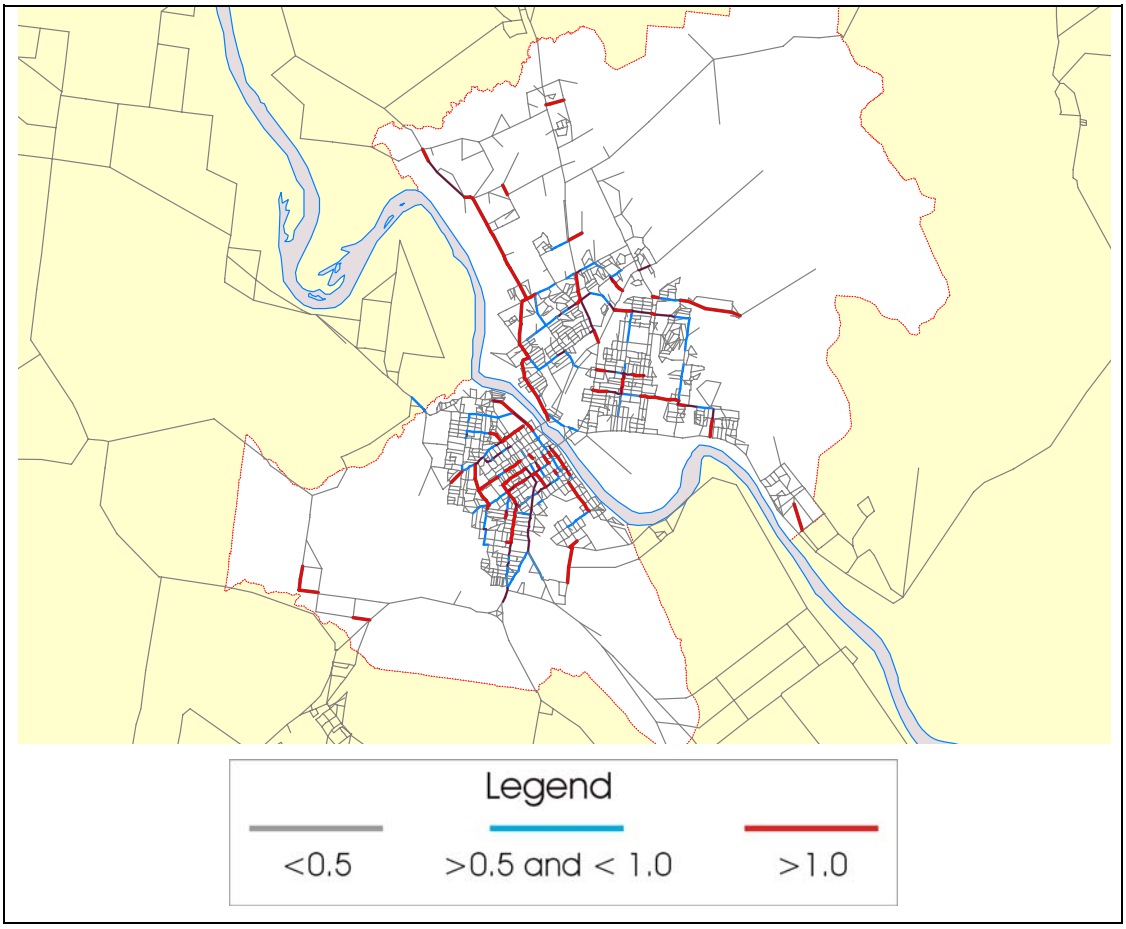


Figure 56 shows Glenmore Road, Haynes Street and Hollingsworth Street were forecast to have daily flows in excess of the maximum daily flow associated with their hierarchic classification. The other hierarchic deficiencies identified during the "do minimum" analysis have not been addressed by this option.

The option does not deliver sufficient benefits to be considered further.

10.1.16.3 Upgrade Glenmore Road, Connect to Moores Creek Rd and Local Area Bypass

The negative impact of the on-line upgrade with a connection to Moores Creek Rd (Section 10.2.5.2) was predominantly to the residential development fronting Haynes Street and Hollingsworth Street. The Upgrade Glenmore Road and local area bypass option assumes:

- Widening of Glenmore Road between Moores Creek and McAllister Street from one lane to two lanes in each direction
- Provide a full movement interchange between Moores Creek Road and Glenmore Road;
- A controlled intersection would be required on Glenmore Road at the point where the bypass road intersects Glenmore Road to facilitate local movements safely; and
- A new road corridor that bypasses, to the west, the residential areas along Haynes Street and Hollingsworth Street following an alignment parallel to Thompson Street and connecting into Farm Street in the vicinity of intersection of Farm Street and Haynes Street.

The option will require property acquisition; in particular the route would impact on the Capricorn Country Club. Depending on alignment there may be a need to provide a bridge across Splitter Creek as part of this option.

The route is slightly longer than the existing corridor and some local area works would most likely be required in order to both protect the local community from traffic intrusion as well as encourage through traffic to use the alternative route.

The results of the on-line upgrading and local area bypass are shown in Table 62 and Table 63 show that:

- daily traffic volumes on Knight Street were forecast to be significantly lower by 2021 with approximately 3400 vpd removed from Knight Street by the option;
- Daily traffic flows on Glenmore Road by 2021 would be 21,500 vpd, which represent a 125% increase from 2005
- Daily traffic volumes on Alexandra Street were forecast to be 16% higher than 2005, by 2021.
- daily traffic volumes on the Fitzroy River Bridge were estimated to be up to 6% lower by 2021 than in 2005
- daily flows along Haynes Street were forecast to drop significantly to 3,800 vpd by 2021, which equates to volumes being 57% lower than 2005;
- daily flows along Hollingsworth Street were forecast to drop significantly to 2,700 vpd by 2021, which equates to daily flows being 53% lower than 2005;
- Daily traffic flows on the Neville Hewitt Bridge increase significantly and were forecast to be approximately 47% higher than the 2005 volumes. The traffic volumes of this magnitude would result in the Neville Hewitt Bridge being operationally deficient;
- Significant peak period congestion would occur at the Albert Street/ Bolsover intersection, Albert Street/ Campbell Street and Albert Street/ George St as traffic along Albert Street increases by up to 11% over the “do minimum” daily volumes for the PAG scenario.

Table 62 – Daily Flows for Upgrade of Glenmore Road and Local Area Bypass (PAG Scenario) – Bruce Highway (North) Screenline

Location	2005	2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005
Carlton Street	3,120	1,570	-50%	1,880	-40%
Farm Street	7,420	7,720	4%	7,380	-1%
Richardson Road	10,660	12,660	19%	12,750	20%
Sheehy Street	–	1,150	–	1,150	–
Main Street	3,960	5,820	47%	5,650	43%
Alexandra Street	16,380	17,310	6%	19,070	16%
Knight St	4,350	910	-79%	910	-79%
Glenmore Road	9,540	19,180	101%	21,500	125%
Total	55,430	66,320	20%	70,290	27%

Table 63 – Daily Flows for Upgrade of Glenmore Road and Local Area Bypass (PAG Scenario) – Fitzroy River Screenline

Location	2005	2016		2021	
	Estimated	Forecast	% Change from 2005	Forecast	% Change from 2005
Neville Hewitt Bridge	34,340	46,690	36%	50,380	47%
Fitzroy River Bridge	38,200	33,930	-11%	35,750	-6%
Total	**72,540**	80,620	11%	86,130	19%

The major benefits of the option were:

- the large reduction in traffic on Knight Street,
- reduces traffic volumes on Yaamba Road,
- the medium to long term relief provided to the Fitzroy River Bridge; and
- significantly lower daily traffic volumes on Haynes Street and Hollingsworth Street; and
- improvement to local amenity resulting from the reduced traffic flows.

However there are a number of drawbacks to the option including:

- property acquisition would be required
- impact on the golf club and possibly the open space of Church park
- a number of residential properties would be faced with increased traffic flows and reduce the local amenity;
- the option would necessitate the widening of the Neville Hewitt Bridge; and
- upgrades to intersections at Albert Street/ Bolsover Street, Albert Street/ Campbell Street and Albert Street/ George Street.

Figure 57 shows the network operational deficiency for 2021. The option does not address the deficiencies identified during the “do minimum” analysis.

Figure 57 – Network Operational Deficiency 2021 (PAG Scenario) – Upgrade Glenmore Road with Connection to Moores Creek Road

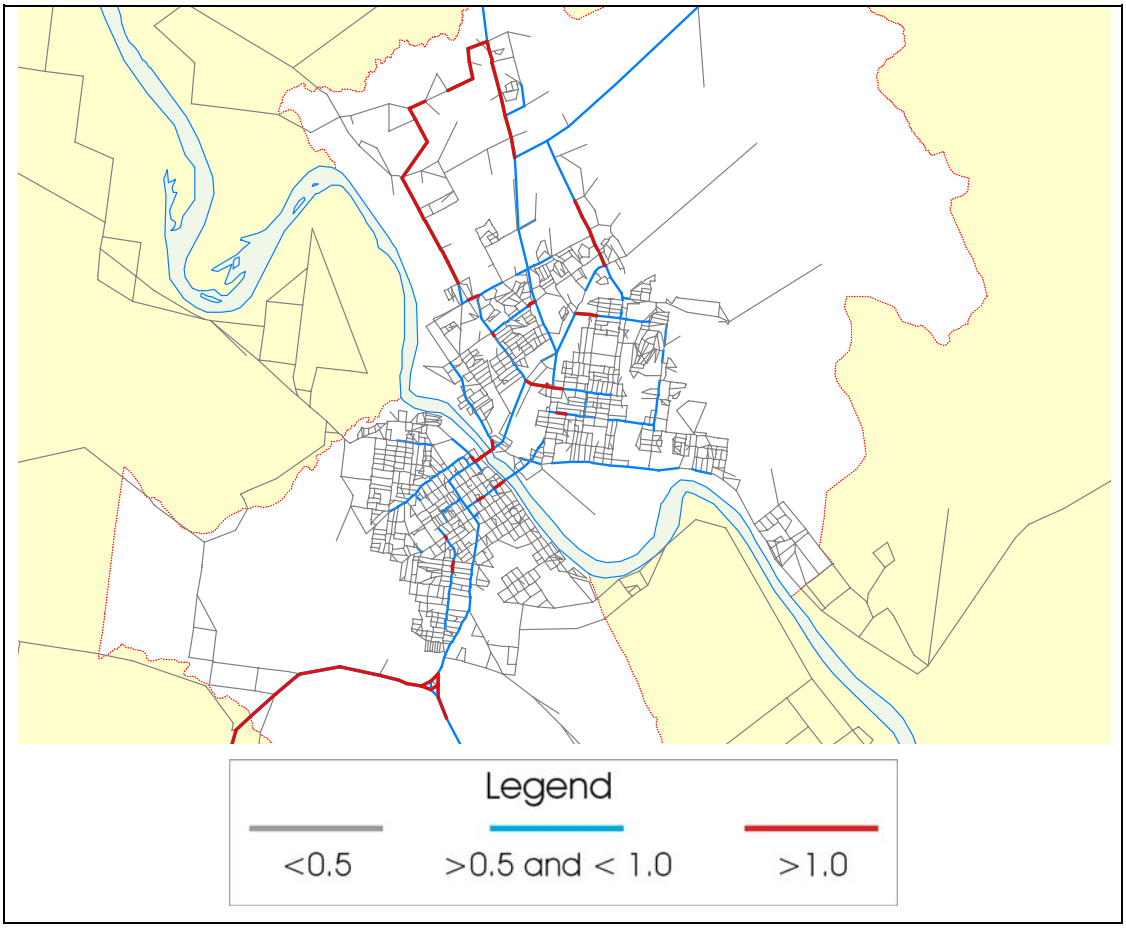
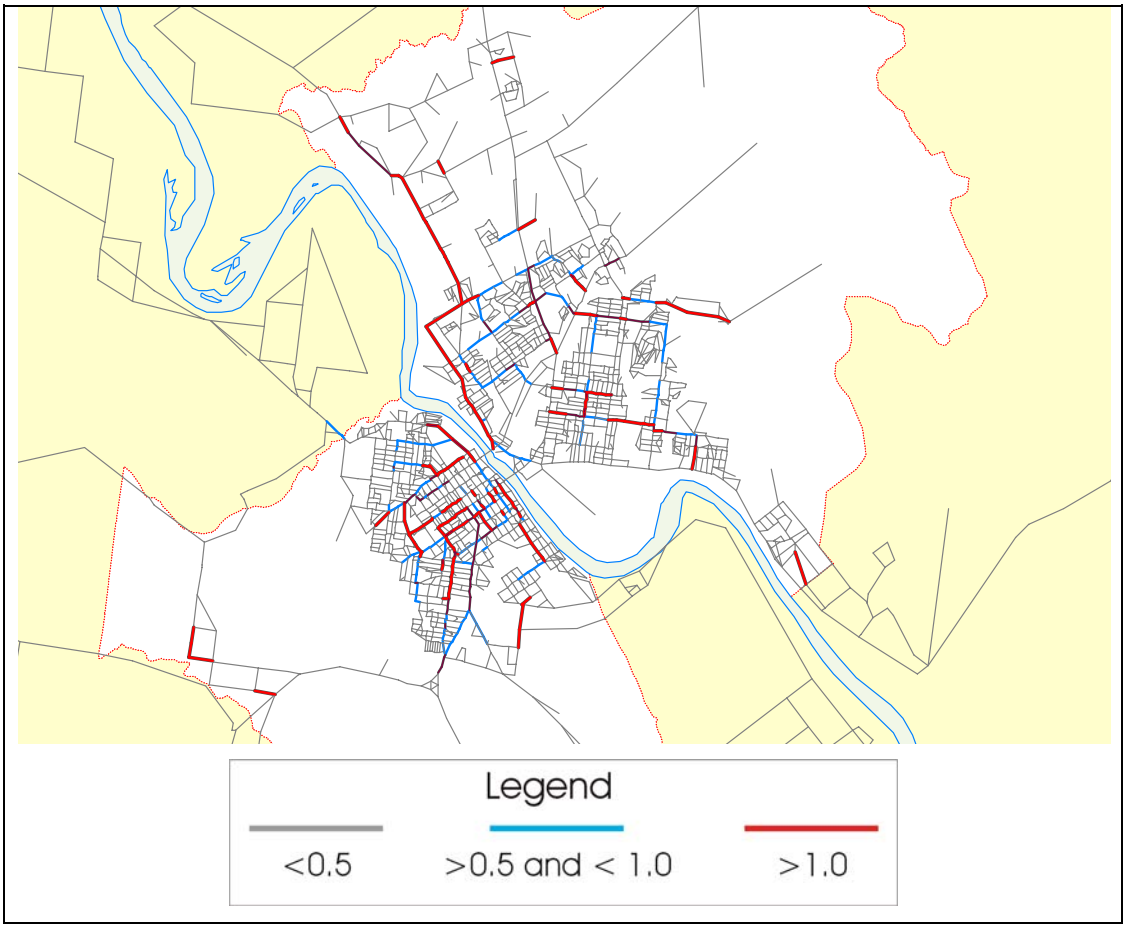


Figure 58 – Network Hierarchic Deficiency 2021 (PAG Scenario) – Upgrade Glenmore Road with Connection to Moores Creek Road



The reduction of daily traffic volumes on Haynes Street and Hollingsworth Street brings these streets back into line their desired function in the road network hierarchy. The network hierarchical deficiency for this option is shown in Figure 58.

The option has a number of benefits and it may be possible to mitigate a number of negative impacts. The largest drawback is the impact on the Neville Hewitt Bridge and the intersections mention above. The option should be considered in combination with other options for example the western alignment options that reduce traffic on the Neville Hewitt Bridge.

10.1.17 Norman Road

10.1.17.1 Norman Road Widening (Moores Creek Rd to Rockhampton – Yeppoon Rd)

The Norman Gardens area of the city is an identified residential growth area in North Rockhampton. Access to the area is from Norman Road. Progressive widening of Norman Road to two lanes in each direction between Moores Creek Road and Rockhampton – Yeppoon Road will be necessary as settlement in the area expands. Signal controlled intersections will be provided at Nagle Drive and Foulkes Street.

The analysis indicates that progressive upgrading of Norman Road will be required.

- By 2011 the section between Moores Creek Road and Richardson Road will need to be widened and
- by 2021 the widening would need to extend to Rockhampton – Yeppoon Road.

- The option triggers the need by 2021 to widen Norman Road between Moores Creek Road and Dean Street under the PAG scenario.

By 2021 approximately 17,400 vpd would be using Norman Road north of Farm Street, which compares to 15,000 vpd for the “do minimum” option under the PAG scenario and 8,700 vpd in 2005. Widening the road to two lanes in each direction was forecast to increase daily traffic volumes along Norman Road by 16% from the “do minimum” option under the PAG scenario.

Figure 59 shows no operational deficiency along Norman Road in 2021. The additional traffic attracted to the Norman Road corridor following the widening of Norman Road north of Moores Creek Road will result in operational deficiencies on Norman Road between Moores Creek Road and Dean Street. This upgrade would require duplication of the bridge across Moores Creek.

Figure 59 – Network Operational Deficiency 2021 (PAG Scenario) – Upgrade Norman Road

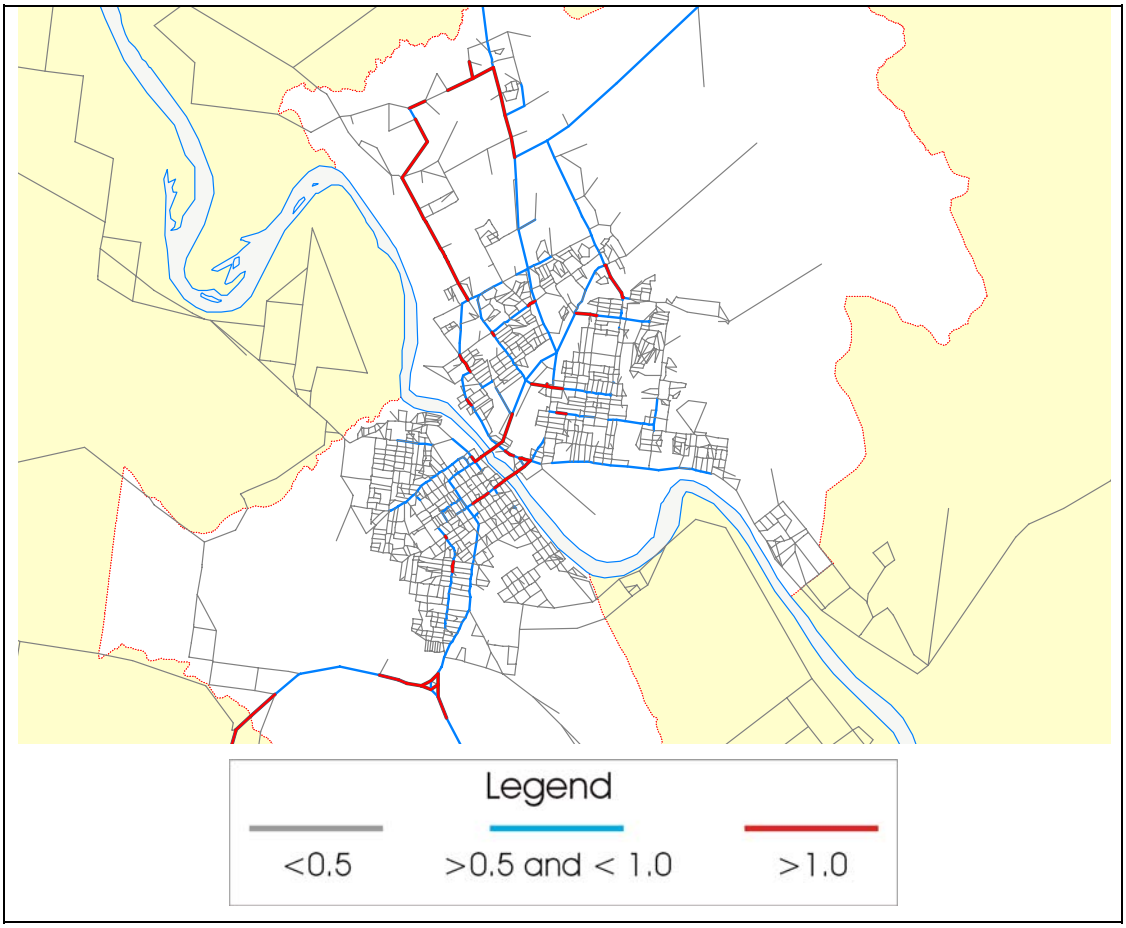


Figure 60 – Network Hierarchic Deficiency 2021 (PAG Scenario) – Upgrade Norman Road

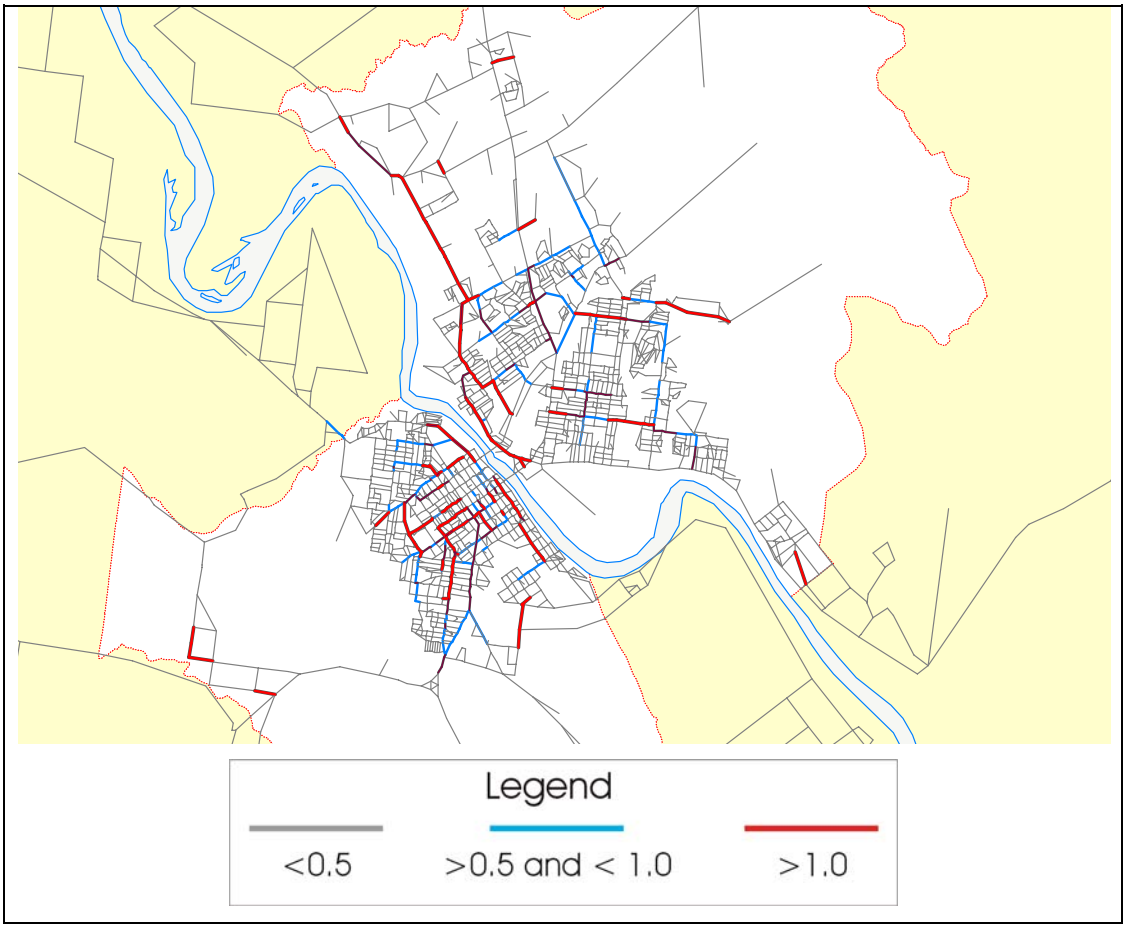


Figure 60 shows the hierarchic deficiencies in the network at 2021 for the option.

The option has a number of benefits which were:

- the network operational deficiency on Norman Road between Moores Creek rd and Rockhampton – Yeppoon Road is alleviated by the upgrading; and
- the option mitigates the hierarchic deficiencies that were forecast on Yaamba Road north of Moores Creek Road.

Other hierarchic deficiencies identified in the “do minimum” analysis remain.

Widening of Norman Road is an essential element of the future road network in Rockhampton and will act to reinforce its role as an urban arterial. Together with Yaamba Road and Alexandra Street, Norman Road forms the third element of the arterial road network.

10.1.17.2 Norman Road Widening Including Extension North of Limestone Creek

The Parkhurst area to the north of Limestone Creek and east of the Bruce Highway is an identified area for residential expansion. The primary access points to the area are via Olive Street in the north, Mason Street adjacent to the Parkhurst primary School and Boundary Road at the southern end. Limestone Creek forms a natural barrier to the area and alternative accesses would need to bridge the creek. The modelling of the option has initially assumed a two lane road extending from Norman Road at Rockhampton – Yeppoon Road to Boundary Road and eventually connecting to the section of Norman Road north of

Boundary Road. The option would require a high level bridge across Limestone Creek. Intersection works would be required at Norman Road/ Boundary road.

An assessment of this option was undertaken

- with the widening of Norman Road south of Rockhampton – Yeppoon Road as discussed in section 10.2.6.1; and
- without the widening of Norman Road south of Rockhampton – Yeppoon Road as discussed in section 10.2.6.1.

Table 64 tabulates the daily traffic forecasts for section of Norman Road. The results show:

- without the widening of Norman Road (south of Rockhampton – Yeppoon Road) Norman Road (north of Rockhampton – Yeppoon Road) was forecast to carry approximately 10,900 vpd in 2021 under the PAG scenario.
- With the widening of Norman Road the northern extension was forecast to carry 11,500 vpd or approximately 5% additional traffic in 2021 than without the widening south of Rockhampton – Yeppoon Road.
- Daily traffic flows on Norman Road south of Rockhampton – Yeppoon Road increased with the inclusion of the northern extension of Norman Road with increases forecast to be between 26% and 80% higher by 2021 under the PAG scenario than the 2005 daily flows on Norman Road
- The option does not provide significant relief to the Bruce Highway, the section between Rockhampton – Yeppoon Road and Boudnary Roads remains operationally deficient.

Table 64 – Daily Flows on Norman Road in 2021 (PAG Scenario)

Option	**Estimated Daily Flow**		
	North of Rockhampton – Yeppoon Road	**North of Foulkes Street**	**North of Moores Creek Road**
Base Year	-	7,000 vpd	12,900 vpd
Do Minimum	-	13,100 vpd	17,900 vpd
No Upgrade to Norman Road (2021)	10,900 vpd	12,500 vpd	16,300 vpd
Norman Road Upgraded (2021)	11,500 vpd	18,000 vpd	22,600 vpd

The majority of the increase in traffic along Norman Road would appear to be traffic on Rockhampton – Yeppoon Road choosing Norman Road over Yaamba Road as the upgrade to Norman Road removes some of the capacity constraints along Norman Road.

Figure 60 highlights deficiencies on Norman Road are addressed by the upgrade between Rockhampton – Yeppoon Road and Moores Creek Road. However the option does not address the deficiency on the Bruce Highway south of Boundary Road.

Figure 61 – Network Operational Deficiency 2021 (PAG Scenario) – Norman Road Extension with No Widening of Norman Road (South)

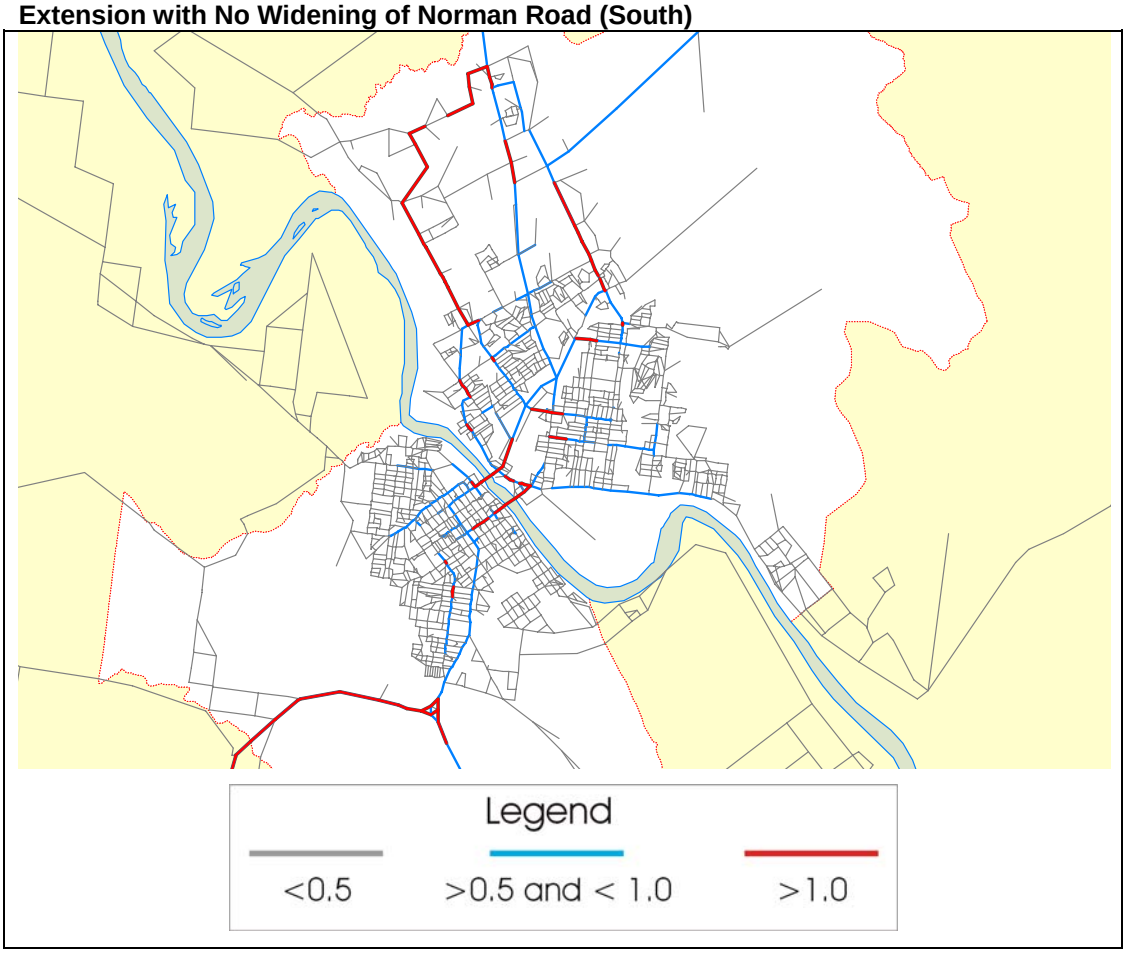


Figure 62 – Network Operational Deficiency 2021 (PAG Scenario) – Norman Road Extension with Widening of Norman Road (South)

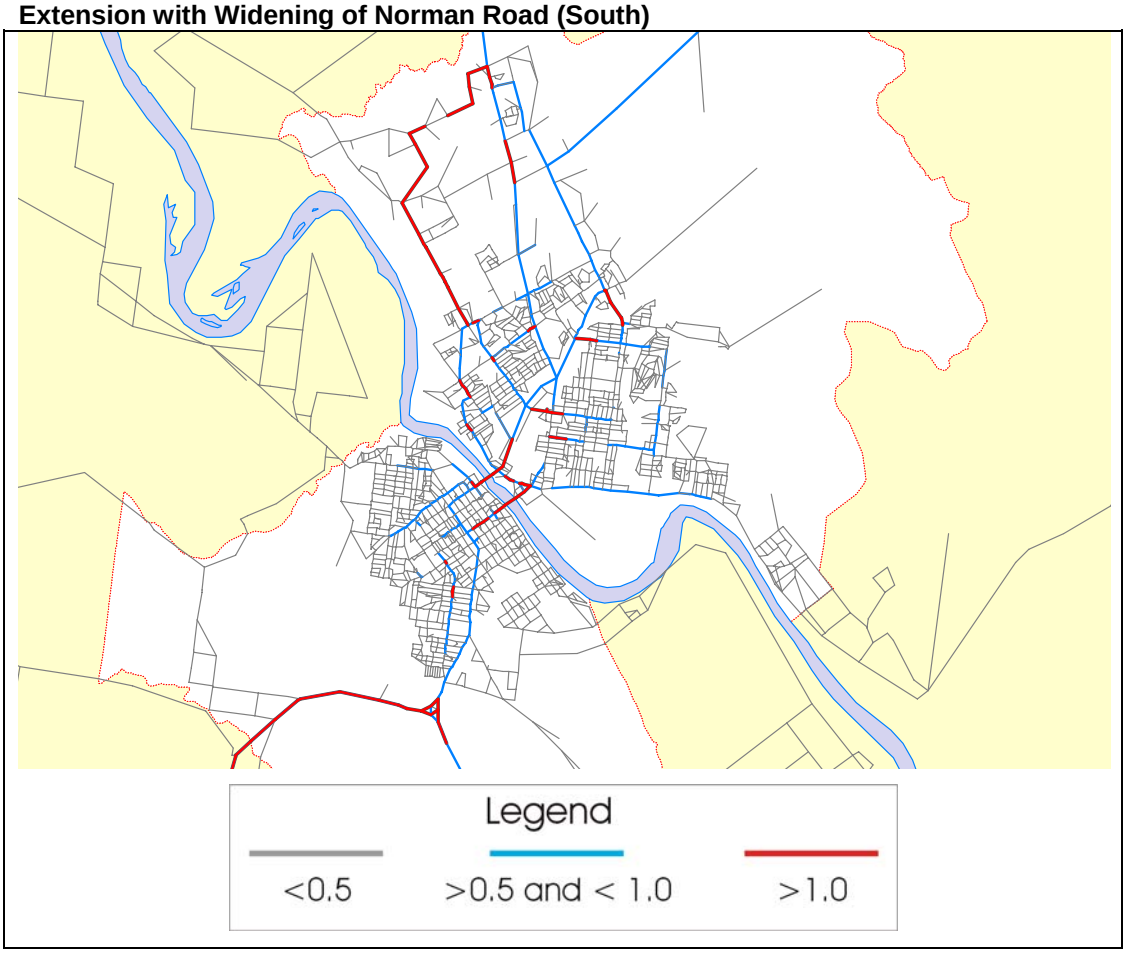


Figure 63 – Network Hierarchic Deficiency 2021 (PAG Scenario) – Norman Road Extension with Widening of Norman Road (South)

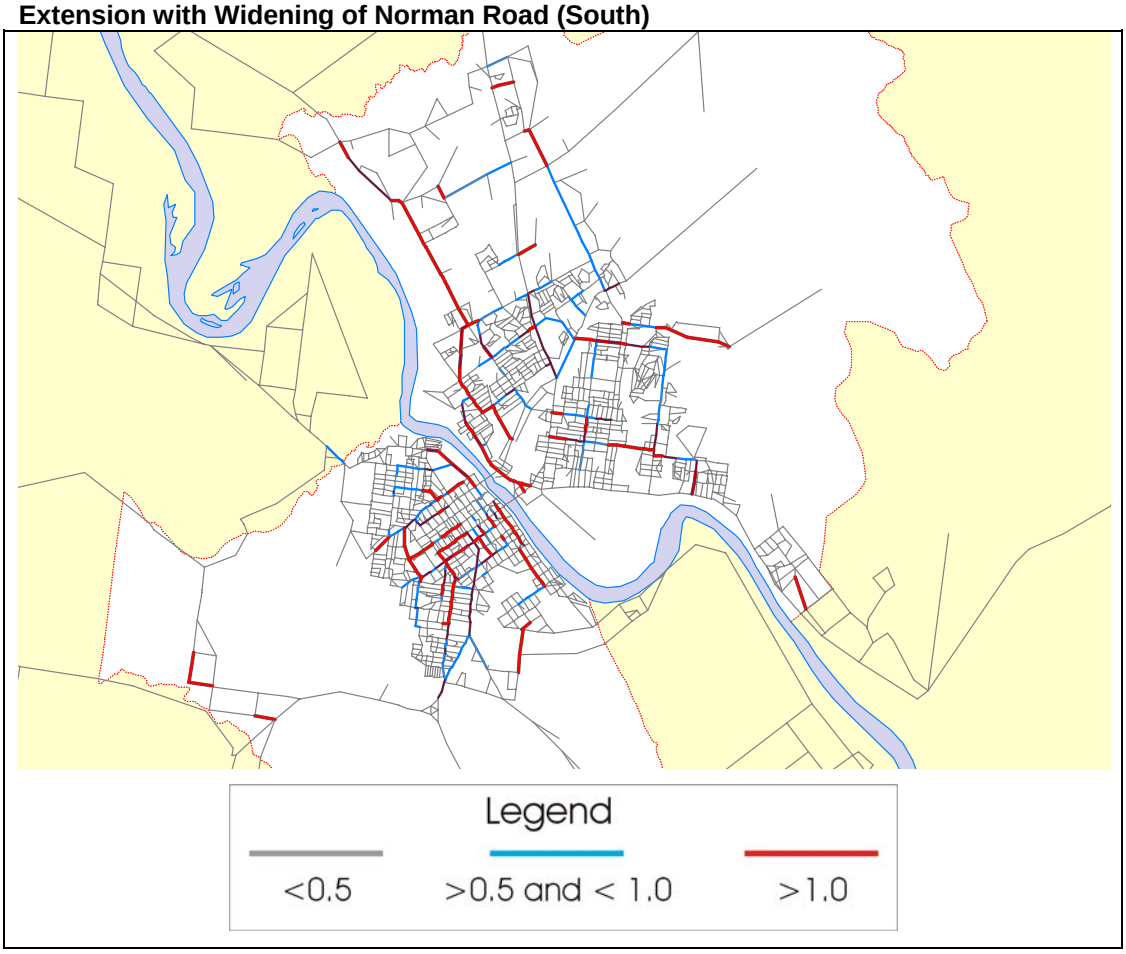


Figure 63 shows the network hierarchic deficiencies for the option with Norman Road south widened, the deficiencies identified in the "do minimum" analysis have not been addressed by this option except for that the traffic flows on Yaamba Road were forecast to be to approximately the daily maximum traffic volume just north of Moores Creek Road.

For other sections of the road network this option does not address the environmental deficiencies discussed earlier.

The Norman Road Extension has a number of benefits including:

- Providing an alternative access point to the North East Parkhurst area and together with Norman Road south creates a strong arterial road corridor between Olive Street and Moores Creek Road; and
- Providing relief to sections of Yaamba Road.

The need for the corridor will be dictated by development in the area most likely between 2016 and 2021.

10.1.18 Other Network Options

A number of other network improves were proposed that are intended to overcome localised constraints or traffic problems. They were:

- Duplicate Moore Creek Road between Feez Street and Norman Road
- Duplicate High Street between Musgrave Street and Moores Creek Road
- Duplicate the Bruce Highway south of the Capricorn Highway

- Boundary Road re-alignment
- Develop a new road corridor extending from River Rose drive to Yaamba Road; and
- Traffic calming measures in Canning Street.

The analysis of the "do minimum" results highlighted a number of additional network improvements that will be necessary:

- Widening Kerrigan Street to two lanes in each direction
- Duplicate the Bruce Highway between Rockhampton – Yeppoon Rd and Boundary Street
- Duplicate the Capricorn Highway between the Bruce Highway and Gracemere and
- Widening of Upper Dawson Road between Caroline Street and Larnach Street.

10.1.18.1 Moores Creek Road

The analysis has shown no deficiency on Moores Creek Road north of Kerrigan Street before 2021. Two key intersections along this route are the Moores Creek Road/ Kerrigan Street/ Feez Street and Moores Creek Road/ Norman Road. Congestion along the route is likely to be the result of the delays associated with these intersections rather than the mid-block capacity being exceeded.

Daily traffic flows in 2021 along Moore Creek Road were estimated to be approximately 11,100 vpd under the PAG scenario "do minimum" option. Widening of Norman road was forecast to increase daily traffic flows on Moores Creek Rd to approximately 11,300 vpd.

These intersections are investigated further later in the report.

10.1.18.2 High Street

In all the analysis High Street between Aquatic Place and Ford Street has been had daily traffic flows in excess of the desired deficiency flow. High Street provides direct access to the one of the major retail and commercial precincts in Rockhampton. The corridor is heavily constrained by Moores Creek where at present a two lane bridge spans the creek. The scope for widening the bridge is limited by the proximity to a number key intersections providing access to the various retail outlets and the limited corridor width in which to widen the road and bridge without significant resumption costs or impacts on open space.

Traffic along High Street is characterised by both local traffic which wants access to the retail outlets and through traffic as High Street provides one of the few connections across Moores Creek for traffic travelling east to west across North Rockhampton. A bridge across Moores Creek between Elphinstone Street and Knight Street was analysed. The option did not provide any relief to High Street.

Duplication of the bridge on High Street and widening of High Street between Musgrave Street and Ford Street are required to address network operational deficiencies along High Street. Duplication and widening of High Street will have significant drawbacks including:

- Land resumptions to provide adequate room for the expansion
- Impact on the High Street/ Alexandra Street/ Moores Creek Road intersection and the Musgrave Street/ high Street intersection where large scale intersection improvements would be required
- Upgrade the Aquatic Place/ High Street intersection as a roundabout is unlikely to be able to cater for the forecast traffic through the intersection.

10.1.18.3 Bruce Highway – South of the Capricorn Highway

The Bruce Highway south of the Capricorn Highway was forecast to become operationally deficient prior to 2021. Upgrading of the Bruce Highway will be required between the Capricorn Highway and Burnett Highway.

10.1.18.4 Bruce Highway – north of Rockhampton – Yeppoon Road

The section of Bruce Highway between Rockhampton – Yeppoon Road and Boundary Road (north) was identified as operationally deficient between 2011 and 2016. Widening of the highway to Boundary road will be required.

10.1.18.5 Capricorn Highway

The Capricorn highway west of the Bruce Highway was forecast to be operationally deficient between 2016 and 2021. A western third river crossing reduces the traffic on some section of the highway but duplication will be required close to Gracemere.

10.1.18.6 River Rose Drive

River Rose Drive will be delivered as part of the residential development. Eventually another connection between Yaamba Road and Norman Road would exist, however this link would traverse primarily residential areas. The issue is not one of capacity but rather the role in the road network hierarchy. The timing of the link is also dependent on the development of the land. It has been assumed that although not a “do minimum” scheme that the link will exist by 2016 and as such has been included in the final network analysis.

10.1.18.7 Canning Street

Canning Street between Caroline Street and William Street is an emerging retail and entertainment precinct in South Rockhampton. As such traffic intrusion into this area is undesirable. For such a localised network change it was beyond the capability of the traffic model to estimate the impacts of the local area traffic management proposed. This would need to be done in a more detailed investigation.

10.1.18.8 Kerrigan Street

Kerrigan Street between Moores Creek Road and Berserker Street was identified as operationally deficient at 2005. Widening of Kerrigan Street would necessitate widening duplication of the bridge across Moores Creek. Widening of Kerrigan Street is required if the desired levels of service are to be maintained.

10.1.18.9 Upper Dawson Road

The analysis has shown that at 2005 the section of Upper Dawson Road between Caroline Street and Larnach Street was operationally deficient. Works will be required to improve the operation of traffic along Upper Dawson Road to including widening the corridor and intersections improvements at Upper Dawson Road/ Caroline Street.

11 Evaluation of Key Intersections

As has been identified through out the report a number of key intersections throughout the city require works to cater for the anticipated growth. A number of these are along the Bruce Highway corridor but the Department of Main Roads is currently investigating these in a separate study. The intersections under consideration in the study are:

- Alexandra Street and Main Street,
- Alexandra Street and Richardson Street,
- Farm Street and Hinchcliffe Street,
- Farm Street, Scott Street and Mclaughlin Street,
- High Street and Aquatic Place,
- Lion Creek Road and Exhibition Street,
- Moores Creek Road, Feez Street and Kerrigan Street, and
- Moores Creek Road, Norman Road and German Street.

The intersection performance for the “do minimum” options for both land use scenarios is presented below for each of the intersections. The assessment of the intersection performance was undertaken using aaSidra. The results of the analysis are presented in the following sections.

The desired level of service at which an intersection can operate before an upgrade is required is set out in Table 65.

Table 65 – Intersections Desired Level of Service

Intersection Type	Indicative LOS
Signals	D
Roundabout	C
Give way	B

Turning movements for each intersection were extracted from the traffic model. The traffic model provides average weekday turning movements from which AM and PM peak hour turning flows were determined. Peak hour turning flows were estimated using the growth rate estimated by the traffic model and where available turning movement count data. Each intersection has been assessed under the City Plan scenario and the Parkhurst Accelerated Growth scenario. On some occasions there was little variation between the 2016 City Plan scenario traffic turning flows and the Parkhurst Accelerated Growth scenario. Where this has resulted only one set of results has been tabulated. This outcome occurred at the following intersections:

- Lion Creek Road and Exhibition Street
- Moores Creek Road, Feez Street and Kerrigan Street
- Moores Creek Road, Norman Road and German Street

11.1.1 Do Minimum Network Option

11.1.2 AM Peak Period

The results of the intersection analysis for the AM peak hour are presented in Table 66.

Table 66 – AM Peak Hour Intersection Performance (Do Minimum)

Intersection	Base	City Plan Scenario						Parkhurst Accelerated Growth Scenario			
	2005	2011		2016		2021		2016[1]		2021	
	LOS	Max DOS (x)	LOS	Max DOS (x)	LOS	Max DOS (x)	LOS	Max DOS (x)	LOS	Max DOS (x)	LOS
Alexandra Street and Main Street	C	0.87	C	0.85	C	0.87	D	0.83	C	1.6	F
Alexandra Street and Richardson Street	B	0.53	B	0.61	B	0.73	B	0.61	B	0.91	C
Farm Street and Hinchliff Street	C	0.73	E	0.93	F	1.2	F	1.98	F	30.0	F
High Street and Aquatic Place	A	0.67	A	0.71	A	1.00	B	0.73	A	1.00	B
Lion Creek Road and Exhibition Street	C	0.68	C	0.80	D	0.95	F	-	-	0.98	F
Moores Creek Road, Feez Street and Kerrigan Street	A	0.73	B	0.83	B	1.11	C	-	-	1.32	E
Moores Creek Road, Norman Road and German Street	B	1.45	F	1.62	F	1.85	F	-	-	2.53	F

Note: (1) For intersections where the 2016 City plan scenario and 2016 Parkhurst Accelerated Growth scenario had similar traffic flows only the results for the one scenario have been presented.

The key findings of this analysis were:

- The Alexandra Street/ Main Street intersection was forecast to operate at or nearly the desired level of service during the AM peak hour under the City Plan scenario but was estimated to become operationally deficient between 2016 and 2021 under the Parkhurst Accelerated Growth. A 120s cycle time would be required by 2021, in order to provide sufficient capacity in the intersection.
- The Alexandra Street/ Richardson Street intersection was forecast to operate below the desired level of service during the AM peak hour under the City Plan scenario but was estimated to become operationally deficient between 2016 and 2021 under the Parkhurst Accelerated Growth.
- The Farm Street/ Hinchliff Street intersection was forecast to be operating above desired level of service during the 2005 AM Peak hour and the operating conditions were forecast to significantly deteriorate if the an intersection upgrade was not undertaken.

- The High Street/ Aquatic Place intersection, while operating within the desired level of service for an intersection as a whole, was forecast to have unacceptable queue lengths and congestion on the Aquatic place arm to the roundabout between 2016 and 2021 under the City Plan scenario and Parkhurst Accelerated growth scenario.
- Lion Creek/ Exhibition Street intersection was forecast to be operating above the desired level of service during the 2005 AM peak hour with operating conditions expected to deteriorate further under both land use scenarios.
- The Moores Creek Road/ Feez Street/ Kerrigan Street intersection was forecast to operate within acceptable levels of service in the base year; however under the City Plan scenario the intersection was forecast to operate above a desired level of service between 2016 and 2021, primarily associated with the Kerrigan Street approach. Operating conditions under the Parkhurst Accelerated Scenario were forecast to be substantially worse in 2021 compared to the City Plan scenario. An upgrade to the intersection would be required between 2016 and 2021 irrespective of forecast scenario adopted.
- Moores Creek Road/ Norman Road/ German Street operates within acceptable levels of service during the base year AM peak hour; however operating conditions were forecast to substantially deteriorate in the future under both the City Plan and Parkhurst Accelerated growth scenarios. Intersection upgrades would be required prior to 2011.

11.1.3 PM Peak Period

The results of the intersection analysis for the AM peak hour are presented in Table 67.

The key findings of this analysis were:

- The Alexandra Street/ Main Street intersection was forecast to operate at or nearly the desired level of service during the PM peak hour under the City Plan scenario but was estimated to become operationally deficient between 2016 and 2021 under the Parkhurst Accelerated Growth. A 120s cycle time would be required by 2021, in order to provide sufficient capacity in the intersection.
- The Alexandra Street/ Richardson Street intersection was forecast to operate below the desired level of service during the PM peak hour under the City Plan scenario but was estimated to become operationally deficient between 2016 and 2021 under the Parkhurst Accelerated Growth.
- The Farm Street/ Hinchliff Street intersection was forecast to be operating above desired level of service during the 2011 PM Peak hour and the operating conditions were forecast to deteriorate further if the an intersection upgrade was not undertaken.
- The High Street/ Aquatic Place intersection, while operating within the desired level of service for an intersection as a whole, was forecast to have unacceptable queue lengths and congestion on the Aquatic Place arm to the roundabout between 2011 and 2016 under the City Plan scenario and Parkhurst Accelerated growth scenario.
- Lion Creek/ Exhibition Street intersection was forecast to be operating above the desired level of service during the 2005 AM peak hour with operating conditions expected to deteriorate further under both land use scenarios.
- The Moores Creek Road/ Feez Street/ Kerrigan Street intersection was forecast to operate within acceptable levels of service under both the City Plan scenario and Parkhurst Accelerated Growth scenario during the PM peak hour.
- Moores Creek Road/ Norman Road/ German Street operates above an acceptable levels of service during the base year PM peak hour and operating conditions were forecast to substantially deteriorate in the future under both the City Plan and Parkhurst Accelerated growth scenarios. An Intersection upgrade would be required immediately.

Table 67 – PM Peak Hour Intersection Performance (Do Minimum)

Intersection	City Plan Scenario								Parkhurst Accelerated Growth Scenario			
	2005	2011		2016		2021		2016[1]		2021		
	LOS	Max DOS (x)	LOS	Max DOS (x)	LOS	Max DOS (x)	LOS	Max DOS (x)	LOS	Max DOS (x)	LOS	
Alexandra Street and Main Street	C	0.71	C	0.86	C	0.87	C	0.85	C	1.0	E	
Alexandra Street and Richardson Street	B	0.58	B	0.73	B	0.79	B	0.74	B	1.0	C	
Farm Street and Hinchliff Street	B	0.44	C	0.53	C	0.64	D	0.92	F	6.8	F	
High Street and Aquatic Place	A	0.74	A	1.00	B	1.02	C	1.00	B	1.10	D	
Lion Creek Road and Exhibition Street	C	0.69	C	0.84	E	1.02	F	-	-	1.07	F	
Moores Creek Road, Feez Street and Kerrigan Street	A	0.49	A	0.61	A	0.77	B	-	-	0.79	B	
Moores Creek Road, Norman Road and German Street	E	1.42	F	1.60	F	1.74	F	-		1.92	F	

Note: (1) For intersections where the 2016 City plan scenario and 2016 Parkhurst Accelerated Growth scenario had similar traffic flows only the results for the one scenario have been presented.

The analysis shows that the intersection improvements would be required at a number of the locations. The likely timing of the upgrade and proposed intersection type are discussed in Table 68.

Table 68 – Proposed Intersection Upgrade Options

Location	Proposed Upgrade	Required Between
Alexandra Street and Main Street	Additional capacity and signal improvements	2011 and 2016
Alexandra Street and Richardson Street	Additional capacity and signal changes	2016 and 2021 (Parkhurst)
Farm Street and Hinchliff Street	Signal controlled intersection	2008 and 2011
High Street and Aquatic Place	Signal controlled intersection	2011 and 2016
Lion Creek Road and Exhibition Street	Signal controlled intersection	2008 and 2011
Moores Creek Road, Feez Street and Kerrigan Street	Additional capacity	2008 and 2011
Moores Creek Road, Norman Road and German Street	Signal controlled intersection	2008 and 2011

Along with the proposed intersection upgrades required it has been identified that the not only are a number of phasing arrangement inefficient but that a significant improvement in traffic flow could be achieved with improved co-ordination of traffic signals in Rockhampton City.

12 Other Transport Considerations

12.1.1 Public Transport – Buses

Bus based public transport has not been addressed in this report as it was outside the scope of the project brief. Bus based public transport makes up a small number of daily trips in Rockhampton compared to private vehicle travel. In considering the options and the benefits of such options public transport has been a consideration.

12.1.2 Rail

The rail corridor is significant impediment to travel within Rockhampton. The North Coast line passes through the City at grade and crosses a number of significant roads in the City centre and north Rockhampton. Queensland Rail has proposed to increase trains lengths from 650m to 1300 – 1500m. This change will result in further delay and congestion on those streets with OLC and particularly by 2021 when traffic volumes are forecast to increase by 11% to 25% by 2021.

It is neither practical nor affordable to grade separate the various open level crossings within Rockhampton. One alternative option was to build a new bridge on the Stanley Street alignment and co-locate vehicular traffic and rail on the same bridge. This option certainly addresses the impacts of the rail closing the streets in the central area but does not address the various crossings in the north of the City.

Another option would be to co-locate the rail with a realigned Bruce Highway. This would remove the rail from the City completely and would also provide the opportunity to create a modal interchange outside the City which has the benefits of reducing the number of heavy trucks travelling into and through Rockhampton. It would also be beneficial if the main rail station was located in close proximity to the Airport to also enable both efficient and fast freight and passenger interchange between rail and air.

The opportunities to relocate the rail out of Rockhampton is beyond the scope of this project but should be considered in the context of possible alternative Bruce Highway alignments.

12.1.3 Airport

Rockhampton Airport has experienced strong growth recently and handled approximately 650,000 passengers in 2006/07. It performs a vital civil and military role due to the proximity to the Shoalwater Bay Military training facility north of Rockhampton. Currently Qantas, Virgin Blue and Jetstar operate regular daily passenger flights between Rockhampton and Brisbane.

Road access to the airport is via North Street. It is beyond the scope of this study to assess the airside demand of the Airport, except that the forecast growth has been used to estimate trips to and from the Airport. The focus has been on ensuring reliable land side access to the airport is maintained under the various scenarios and network options.

13 Summary and Recommendations

13.1.1 Summary

The last road network review for Rockhampton was completed in 1991. Rockhampton faces a number of challenges in the future associated with the predicted growth of the City and as such a need was identified for a road network study. The purpose of the study was to outline a direction for the road network in Rockhampton into the future.

A previous traffic model, built for the Capricornia Transport Study in 2003, was updated as part of this study. The model was used to assist in assessing the impacts of population growth on the Rockhampton road network. A base year of 2005 was adopted and the model was re-calibrated and validated against 2005 count data. Where 2005 count data was not available, long term growth rates from the Department of Main Roads' permanent count sites were used to correct all counts to 2005. The traffic model was developed in the Cube Voyager software suite and is a link based only model.

In 2005, approximately 60,000 people were resident in Rockhampton. PIFU prepared population forecasts for Rockhampton in 2007. Rockhampton Council decided that the high series forecasts were most relevant for Rockhampton and for this study (City Plan scenario). It was predicted that the population would increase to approximately 66,000 people by 2021 – an increase of 10% from 2005. An alternative land use scenario, the Parkhurst Accelerated Growth (PAG) scenario, was also investigated. Under the PAG scenario, the population increased to approximately 74,000 people by 2021 – a 23% increase from 2005. The size of the increase in population will place significant pressure on the road network in Rockhampton and potentially have detrimental effects on many urban areas as a result of traffic intrusion.

Daily traffic is forecast to grow from approximately 286,000 trips per day in 2005 to nearly 344,000 trips per day – a 20% increase from 2005 under the City Plan scenario. Under the PAG scenario, 377,000 trips per day were predicted to occur. The majority of the increase in traffic was forecast to occur within Rockhampton. Three forecast years 2011, 2016 and 2021 were assessed.

A "do minimum" network, which included known works and upgrades between 2005 and 2011, was developed. An initial assessment of the impacts of future growth for each scenario was undertaken using the "do minimum" road network. This analysis identified a number of deficiencies. The assessment of network deficiency was made against two measures:

- Whether the mid-block link flow exceeded a threshold that would trigger the need for an upgrade; or
- Whether the mid-block link flow exceeded a desired flow threshold based on the road hierarchy classification that may necessitate remedial work or a re-classification.

A level of service criteria approach was adopted to identify operational deficiency. Level of service C was adopted on Rockhampton Council roads while a level of service D/E was adopted for the Department of Main Roads road network. A two lane road for Rockhampton Council had a deficiency flow of 13,000 vpd (AADT) and for the Department of Main Roads a deficiency flow of 17000 vpd (AADT). These two values are the thresholds at which upgrades to the road network would be triggered.

The "do minimum" analysis revealed a number of network operational deficiencies under each of the two land use scenarios. The results have been tabulated in Table 69.

Table 69 – "Do Minimum" Operational Road Network Deficiencies

Road Section	Hierarchy Classification	Year	Operational Desired Maximum Daily Flow (vpd)	Deficient in Base Year and City Plan Scenario	Deficient in Parkhurst Accelerated Growth Scenario
Fitzroy Street between southern abutment and Bolsover St	Urban Arterial	2005	32,500 vpd	✓	
High Street between Aquatic Pl and Musgrave St	Urban Arterial	2005	13,000 vpd	✓	
Norman Road between Richardson Rd and Moores Creek Road	Urban arterial	2005	13,000 vpd	✓	
Kerrigan Street between Berserker St and Moores Creek Rd	Urban Sub-arterial	2005	13,000 vpd	✓	
Upper Dawson Road between Caroline St and	Urban Sub-arterial	2005	13,000 vpd	✓	
Fitzroy River Bridge	Major Urban Arterial	2011	32,500 vpd	✓	✓
Yaamba Road between Rockhampton – Yeppoon rd and Boundary St (West)	Highway	2011	17,000 vpd	✓	✓
Yaamba Road between Boundary St (West) and Boundary St (East)	Highway	2011	17,000 vpd		✓
Alexandra Street between Belmont Road and Farm Street	Urban Sub-arterial	2011	13,000 vpd		✓
Neville Hewitt Bridge	Major Urban Arterial	2021	40000 vpd	✓	✓
Yaamba Rd between Boundary St (East) and Olive St	Highway	2021	17,000 vpd		✓
Capricorn Highway	Main Road	2021	17,000 vpd	✓	✓

Road Section	Hierarchy Classification	Year	Operational Desired Maximum Daily Flow (vpd)	Deficient in Base Year and City Plan Scenario	Deficient in Parkhurst Accelerated Growth Scenario
between Bruce Highway and Gracemere					
Moores Creek Rd between Knight St and Neville Hewitt Bridge	Major Urban Arterial	2021	40,000 vpd	✓	✓
Norman Rd between Farm St and Rockhampton – Yeppoon Rd	Urban Arterial	2021	13,000 vpd	✓	✓
Alexandra St between Moores Creek Rd and Main St	Urban Arterial	2021	26,000 vpd		✓
Alexandra St between Richardson St and Hinchliff St	Urban Sub-arterial	2021	13,000 vpd		✓
Hinchliff St between Alexandra St and Farm St	Urban Sub-arterial	2021	13,000 vpd		✓
Farm St between Hinchliff St and Alexandra St	Urban Sub-arterial	2021	13,000 vpd		✓
Fitzroy St between Bolsover St and George St	Major Urban Arterial	2021	26,000 vpd	✓	✓

The “do minimum” analysis revealed a number of network hierarchic deficiencies under each of the two land use scenarios. The results have been tabulated in Table 696.

Table 70 – "Do Minimum" Hierarchic Road Network Deficiencies

Road Section	Hierarchy Classification	Year	Hierarchic Desired Maximum Daily Flow (vpd)	Deficient in Base Year and City Plan Scenario	Deficient in Parkhurst Accelerated Growth Scenario
High Street between Musgrave St and Ford St	Urban Sub-arterial	2005	< 10,000 vpd	✓	
Kerrigan Street between Moores Creek Rd and Dean St	Urban sub-arterial	2005	< 10,000 vpd	✓	
Elphinstone Street between Musgrave St and Nobbs St	Urban sub-arterial	2005	< 10,000 vpd	✓	
Fitzroy Street between George St and Canning St	Urban sub-arterial	2005	< 10,000 vpd	✓	
Canning Street between Fitzroy St and Upper Dawson Rd	Urban sub-arterial	2005	< 10,000 vpd	✓	
Upper Dawson Road between Caroline St and Church St	Urban sub-arterial	2005	< 10,000 vpd	✓	
Lion Creek Road between North St and Albert St	Urban sub-arterial	2005	< 10,000 vpd	✓	
Albert Street between George St and Talford St	Major urban collector	2005	< 6,000 vpd	✓	
Main Street between Knight St and Haynes St	Major Urban Collector	2005	< 6,000 vpd	✓	
Bolsover St between Stanley St and Francis St	Minor urban collector	2005	< 3,000 vpd	✓	
Lion Creek Road between Hall St and Exhibition St	Minor urban collector	2005	< 3,000 vpd	✓	
Carlton Street between Hammond St and Yaamba Rd	Minor urban collector	2005	< 3,000 vpd	✓	
Haynes Street between Glenmore Rd and Main St	Minor urban collector	2005	< 3,000 vpd	✓	
Knight Street between Main St and Moores Creek Rd	Minor urban collector	2005	< 3,000 vpd	✓	
East Street between Archer St and Derby St	Minor urban collector	2005	< 3,000 vpd	✓	
Agnes Street between North St and Denham St	Minor urban collector	2005	< 3,000 vpd	✓	

Road Section	Hierarchy Classification	Year	Hierarchic Desired Maximum Daily Flow (vpd)	Deficient in Base Year and City Plan Scenario	Deficient in Parkhurst Accelerated Growth Scenario
Archer Street between Agnes St and Canning St	Minor urban collector	2005	< 3,000 vpd	✓	
Murray Street between North St and Baden Powell St	Minor urban collector.	2005	< 3,000 vpd	✓	
High Street between Berserker St and Dean St	Urban Sub-arterial	2011	< 10,000 vpd	✓	✓
Berserker St between Elphinstone St and High St	Major urban collector	2011	< 6,000 vpd	✓	✓
Elphinstone St between Craig St and Shephard St	Major urban collector	2011	< 6,000 vpd	✓	✓
North St between Campbell St and Alma St	Major urban collector	2011	< 6,000 vpd	✓	✓
Denham St between Canning St and Murray St	Major urban collector	2011	< 6,000 vpd	✓	✓
Bolsover St between Francis St and Wood St	Minor urban collector	2011	< 3,000 vpd	✓	✓
Belmont Road between William Palfrey Dve and Birbeck Dve	Minor Urban Collector	2011	< 3,000 vpd		✓
Belmont Road between Birbeck Dve and Johnson Street	Minor Urban Collector	2011	< 3,000 vpd		✓
Glenmore Road between Dooley St and Moores Creek	Urban Sub-arterial	2016	< 10,000 vpd	✓	✓
Bridge St between Moores Creek and Ashney St	Urban Sub-arterial	2016	< 10,000 vpd	✓	✓
Elphinstone St between Craig St and Thozet St	Major urban collector	2016	< 6000 vpd	✓	✓
Archer St between George St and Talford Sr	Major urban collector	2016	< 6000 vpd	✓	✓
Alexandra St between Birbeck Dr and Johnson St	Minor urban collector	2016	< 3000 vpd	✓	✓
Glenmore Rd between Main St and Moores Creek	Urban sub-arterial	2016	< 10,000 vpd		✓
Bridge St between Moores Creek and Ashney St	Urban sub-arterial	2016	< 10,000 vpd		✓
Hollingsworth St	Urban sub-	2016	< 10,000 vpd		✓

Road Section	Hierarchy Classification	Year	Hierarchic Desired Maximum Daily Flow (vpd)	Deficient in Base Year and City Plan Scenario	Deficient in Parkhurst Accelerated Growth Scenario
between Power St and Haynes St	arterial				
Haynes St between Hollingsworth St and Glenmore Rd	Urban sub-arterial	2016	< 10,000 vpd		✓
Alexandra St between Johnson St and Farm St	Urban sub-arterial	2016	< 10,000 vpd		✓
Yaamba Road between Main St and Moores creek Rd	Urban Arterial	2021	< 30,000 vpd	✓	✓
Denham St between Murray St and Canning St	Major urban collector	2021	< 6000 vpd	✓	✓
Hinchliff St between Farm St and Alexandra St	Urban sub-arterial	2021	< 10,000 vpd		✓
Alexandra St between between Hinchliff St and Richardson St	Urban sub-arterial	2021	< 10,000 vpd		✓

A number of options were investigated to address the identified network deficiencies. A major deficiency identified was across the Fitzroy River Bridge. A number of alternatives were considered which included a variety of alternative bridge location options. A western alignment of the Bruce Highway between Olive Street in the north and the Capricorn Highway to either the east or the west of the Airport produced the best outcome. The option has a number of flooding and terrain issues that need to be addressed.

Other options looked to address deficiencies on the local street network, which included those deficiencies identified in Table 55 and are summarised as:

- Alexandra Street rail grade separation,
- Glenmore Road,
- High Street,
- Norman Road, and
- Maloney Street,

Alexandra Street rail grade separation has a number of advantages including reducing traffic on the Hollingsworth Street/ Haynes Street corridor, creates a better road network hierarchy, and improves safety at Farm Street open level crossing. The option will have some drawbacks including the need to acquire property, necessitates the closure of Hinchliff Street, and directs traffic into the Alexandra Street / Moores Creek Road intersection.

The Glenmore Road corridor is a desired route between the north-western area of the city and the central area. This corridor is unencumbered by major intersections and through traffic has right of way along most of the corridor. Parts of the route travel through residential areas, in particular Haynes Street. Any additional traffic along the corridor will further reduce the amenity for these residences. In particular the on-line upgrading increases demand in

the corridor as the capacity constraints are removed and additional traffic is drawn into the corridor. A connection to Moores Creek Road was investigated which attracts higher daily traffic flows to the corridor. This level of demand in the corridor would necessitate intersection improvements so as to allow safe access local streets.

An alternative was to provide a local bypass of the residential areas. This would be successful in re-routing traffic away from the sensitive areas. Local management measures would be required along the existing route to both improve local amenity and to prevent the existing corridor remaining an attractive rat run. The local bypass option has an impact on open space and would require property acquisition.

High Street between Ford Street and Aquatic Place was deficient throughout the analysis. Access to the major commercial and retail precinct between High Street, Musgrave Street and Moores Creek Road is provided off High Street. Traffic operating conditions on High Street will progressively deteriorate throughout the study period without upgrade works along High Street. On-line upgrading of High Street between Ford Street and Aquatic place including intersection works was found to address the deficiency problems on High Street.

Widening of Norman Road is an essential element of the future road network in Rockhampton and will act to reinforce its role as an urban arterial. Together with Yaamba Road and Alexandra Street, Norman Road forms the third element of the arterial road network. The extension of Norman Road across Limestone Creek adds to the value of Norman road corridor by strengthening its role in the road hierarchy. The extension also has the benefit of providing an alternative route to Yaamba Road.

A new corridor between Yaamba Road and Alexandra Street (Maloney Street Connection) provided an alternative rail crossing. Although the option did not attract high daily traffic volumes the option offers an opportunity to remove traffic from Farm Street and away from the schools on Farm Street. It also offers the opportunity to provide an alternative east-west corridor and remove heavy commercial vehicles from other parts of the network.

Other network upgrades will be required as the traffic volumes increase, and they include:

- Bruce Highway between Rockhampton – Yeppoon Road and Boundary Street (East) under the City Plan Scenario or to Olive Street for the parkhurst Accelerated growth scenario
- Bruce Highway between the Capricorn Highway and Burnett Highway; and
- Capricorn Highway between the Bruce Highway and Gracemere.

The advantage of considering an alternative Bruce Highway alignment out of the city is the opportunity to co-locate the highway and rail corridor. Removing the rail corridor from Rockhampton would have substantial benefits for the road network with the removal of the open level crossings resulting less delay for traffic.

13.1.2 Recommendations

The main recommendations of the study relating to the proposed network improvements are discussed below. There are a number of key recommendations worth noting:

- Commence investigation work into an alternative alignment for the Bruce Highway to provide long term traffic relief for the existing river crossings. An additional river crossing is required by 2016.
- Investigate the impact on the city of increased train lengths as well as investigate the advantages of relocating the rail line out of the city. This could be done in conjunction with the point above.
- Council should secure funding from a range of sources to deliver the needed infrastructure recommended by this study, in particular ensure that development related impacts are adequately funded by the proponent of the development.

- Review the outcomes of this work periodically to assess whether the assumptions for population and employment forecasts remain valid and as such the forecasts in traffic. This will then guide whether the recommendations need to be updated.
- Corridor management/ acquisition as an input to development assessment
- Implemented road hierarchy changes immediately to reflect the future requirements as forecast by this study.

13.1.3 Recommended Future Year Road Network Upgrades and Hierarchy

13.1.4 Network Changes for 2011

The network upgrades recommended for implementation prior to 2011 are outlined in Table 71. Indicative costs have been prepared to provide a means of considering the implications of the various network improvements. The costs exclude a number of elements that will not become clear until a more detailed investigation of the scheme is conducted. The elements excluded include:

- Land resumption costs,
- A number of key intersections predominately associated with DMR controlled roads
- Price indexation – all costs are in $2008,

Table 71 – Network Upgrades between 2008 and 2011

Recommended Action	City Plan Scenario Required	Parkhurst Accelerated Growth Scenario Required	Indicative Construction Cost
Construction of two lanes in each direction on the Bruce Highway between Rockhampton – Yeppoon Road and Boundary Road (West) with planning for the section from Boundary Road (West) to Boundary (East)	✓	✓	$9.3M
Construction of two lanes in each direction on Norman Road between Moores Creek Road and Farm Street	✓	✓	$4.8M
Intersection works to reduce delay on the Fitzroy River Bridge until an additional crossing of the river is built, at Fitzroy Street/ East Street, Fitzroy/ Bolsover Street and Bridge Street/ Lakes Creek Road/ Queen Elizabeth drive	✓	✓	$6.0M
Construction of two lanes in each direction between Ford Street and Moores Creek Road along High including a new bridge across Moores Creek and intersection works at Musgrave Street/ High Street, High Street/ Aquatic place and Moore Creek Road/ High Street.	✓	✓	$12.5M[1]
Construction of two lanes in each direction on Upper Dawson Road between Larnach Street and Derby Street.	✓	✓	$0.3M
Construction of two lanes in each direction on the Bruce Highway between the Yeppen Roundabout and Jellicoe Street including upgrade to the Yeppen Roundabout	✓	✓	Due to the need to address flooding constraints it was not possible to estimate an indicative cost
Construction of two lanes in each direction on Kerrigan Street between Moores Creek Rd and Berserker St including upgrades to intersections at Berserker St and Moores Creek Rd.	✓	✓	$7.2M
Plan and identify procurement of the Alexandra Street rail grade separation	✓	✓	-

(1) The cost excludes any work at the Moores Creek Rd/ High St/ Alexandra St intersection.

13.1.4.1 Network Hierarchy Amendments

The growth in traffic in Rockhampton will necessitate a number of modifications to road hierarchy definition such as:

- Alexandra Street – urban arterial between Richardson Street and Belmont Road. This will also hold for the Parkhurst Accelerated Growth Scenario.
- Haynes Street – major urban collector between Main Street and Farm Street
- Glenmore Road – major urban collector between Main Street and Haynes Street
- Lion Creek Road – urban arterial to cater for the future connection to western Bruce Highway alignment
- Exhibition Street – major urban collector
- Agnes Street – major urban collector
- Elphinstone Street – urban sub-arterial between Dean Street and Thozet Street.

The connection of Alexandra Street across the rail line will be defined as the major north south route and as such it is desired that it be preferred to the Glenmore Road corridor. There remains though the lack of connectivity to the central area either via the Fitzroy River Bridge or Bolsover Street.

13.1.5 Network Changes for 2016

The following network changes are recommended for implementation by 2016.

Table 72 – Network Upgrades between 2011 and 2016

Recommended Action	City Plan Scenario Required	Parkhurst Accelerated Growth Scenario Required	Indicative Construction Cost
Alexandra Street rail grade separation	✓	✓	$14.5M
Construct a western alignment of the Bruce Highway between Olive Street in the north and the Capricorn Highway in the south including a mid-pint access to Lion Creek Road, interchange with Alexandra Street and a connection to Rockhampton – Yeppoon Road. The ultimate alignment will be the subject of further investigation given the various geographical and flooding issues that will require resolution.	✓	✓	The extensive nature of the project with various significant constraints prevents an indicative price from being estimated.
Construct a new link road as one lane in each direction between the Bruce Highway and Alexandra Street including a grade separated crossing of the railway line. (Maloney Street connection), also including a downgrading of Farm Street.	✓	✓	$10.5M
Local area management works on Haynes Street and Hollingsworth Street areas to reinforce the residential nature. Required after the Alexandra Street rail grade separation.		✓	$1.2M

Construction of two lanes in each direction on Norman Road to between Farm Street and Nagle Drive	✓	✓	$4.5M
William Palfrey Road must be constructed as part of the urban growth in Parkhurst. Two lanes in each direction should be constructed.		✓	$12.5M
Alexandra Street extension to William Palfrey Road (McLaughlin Street re-alignment) constructed as part of the urban development in Parkhurst.		✓	$7.0M
Construct two lanes in each direction on Alexandra Street between Farm Street and Belmont Road.		✓	$18.2M

With both the Alexandra Street rail grade separation and Maloney Street link consideration should be given to closure of the Farm Street at rail level crossing. This would have a number of benefits including improved residential amenity along Farm Street, improved safety, and a structured road network when linked with River Rose Drive. The final connection of River Rose drive to Yaamba Road will depend on the rate of development.

13.1.5.1 Network Hierarchy Amendments

Changes to the network will necessitate a number of amendments to the road hierarchy.

- McLaughlin Street – major urban collector between Farm Street and Maloney Street connection
- William Palfrey Drive – urban sub-arterial between Alexandra Street extension and Bruce Highway
- Alexandra Street extension – urban sub-arterial between Belmont Road and William Palfrey Drive (extension northward to Ramsay Creek)
- Farm Street – urban major collector as the role is downgraded with the Maloney Street option and River Rose Drive providing the connectivity between Alexandra Street and Norman Road.
- Maloney Street – urban sub-arterial
- River Rose Drive – urban sub-arterial (if extended to Yaamba Road)
- Yaamba Road – major urban arterial between Farm Street and Olive Street.

13.1.6 Network Changes for 2021

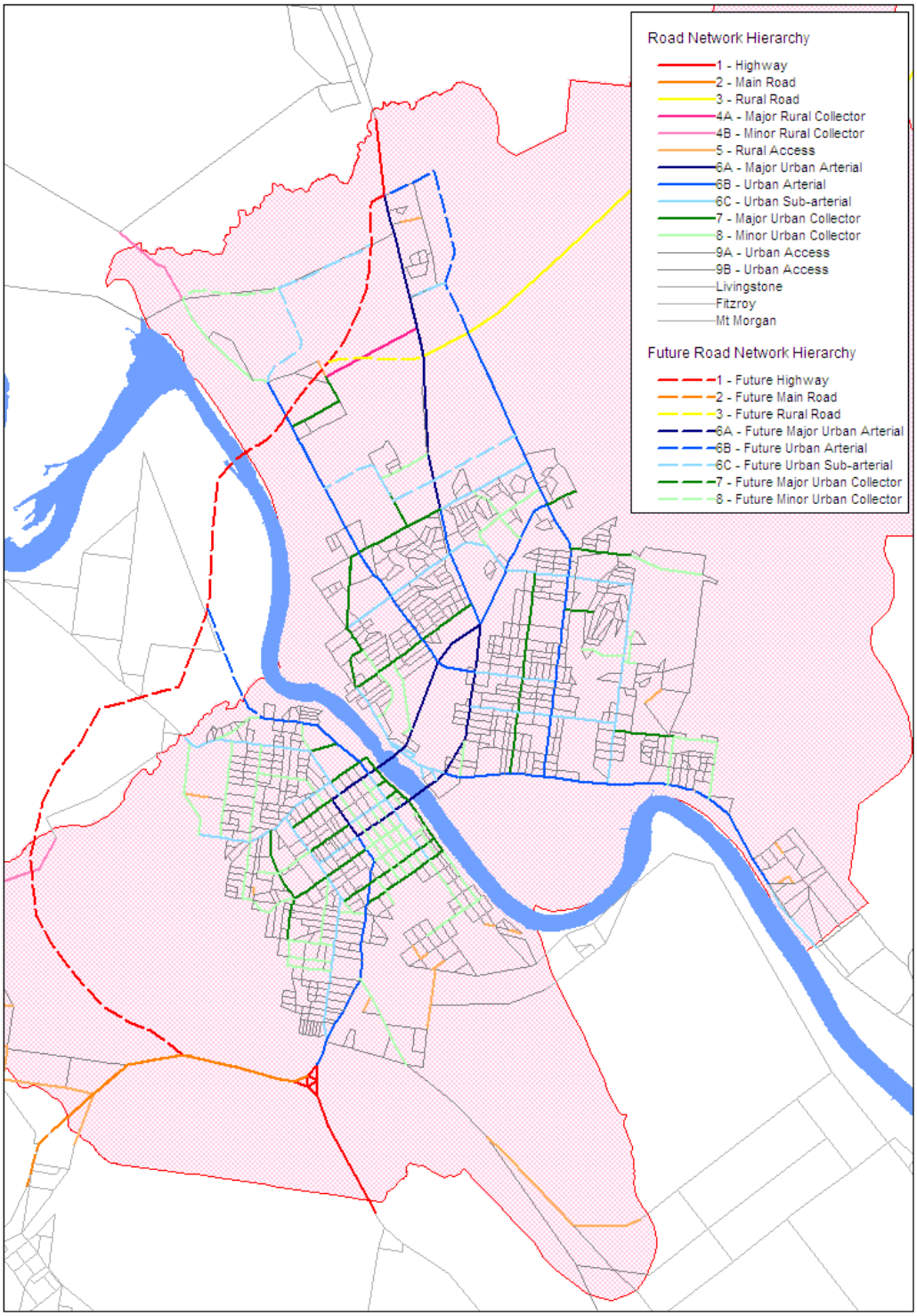
Table 73 – Network Upgrades between 2016 and 2021

Recommended Action	City Plan Scenario Required	Parkhurst Accelerated Growth Scenario Required	Indicative Construction Cost
Construct two lanes in each direction on the Capricorn Highway between the Bruce Highway and Gracemere		✓	$4.3M
Construct two lanes in each direction on Norman Road between Nagle Drive and Rockhampton Yeppoon Road.		✓	$4.9M
Construct one lane in each direction on Norman Road between Rockhampton – Yeppoon Road and Norman Road (North) including a bridge across Limestone Creek.	✓	✓	$20.1M
Construct an additional two lanes in each direction along the Bruce Highway western alignment (2016 network recommendation) between Alexandra Street and Lion Creek Road connection.		✓	The extensive nature of the project with various significant constraints prevents an indicative price from being estimated.
Construct and additional two lanes along Norman Road between Moores Creek Rd and Dean Street, including a new bridge over Moore Creek.		✓	$8.6M

13.1.7 Recommended Future Road Network Hierarchy

The recommended future road network hierarchy is shown on Figure 64.

Figure 64 – Recommended Future Year Road Network Hierarchy



A

Base Year Traffic Model

A1 Trip Generation

The trip generation equations in the model were:

- prod = 0.85*Persons + 1.5*Workers + 0.6*Dependents + 1.0*Cars + 1.3*HHolds
- attrs = 0.94*Persons + 12.57*Retail + 1.09*NonRetail + 2.69*Enrolments

Table A1 – Special Generator Factors

Special Generator	Zone Number	Factor
Hospital	22	3.0
Airport	41	2.0
Retirement Village	36	0.9
University	196	0.7
Motels & Hotels (Rockhampton)	4,6,8	0.9
Motels & Hotels (Other)	116,118,126,134	0.8
Boarding Schools (Rockhampton)	28	0.9
Boarding Schools (Other)	133	0.8
Retirement Village	151	0.9

A2 Trip Distribution

The trip distribution parameters were:

- alpha is -0.59496
- beta is -0.0812412.

B

Demographic Data

A3 Base Year – 2005

Zone Number	Persons	Workers	Dependent	Cars	Household	Retail Jobs	Non-retail Jobs	Enrolments
1	329	127	202	127	131	32	14	0
2	219	82	137	80	87	64	103	0
3	299	129	170	124	119	60	15	0
4	244	139	104	45	97	149	26	0
5	163	63	99	80	65	2	0	0
6	338	151	186	63	134	216	691	0
7	81	27	54	26	32	320	372	0
8	103	49	54	7	41	719	1117	93
9	193	74	120	59	77	228	34	0
10	258	53	205	59	103	108	145	48
11	145	64	81	79	58	487	700	0
12	262	88	174	121	104	54	607	0
13	148	43	105	53	59	123	434	0
14	333	134	199	172	132	30	22	0
15	484	183	301	265	193	52	321	2529
16	546	198	348	264	217	210	49	778
17	265	101	164	144	105	26	522	0
18	805	337	468	352	320	63	9	632
19	145	64	81	50	58	87	102	0
20	296	111	185	161	118	48	3	0
21	842	310	532	451	335	62	3	0
22	229	63	166	54	91	22	654	0
23	523	209	314	284	208	32	23	0
24	794	231	563	284	316	8	9	1122
25	680	239	441	317	270	80	37	273
26	618	288	331	355	246	9	6	0
27	664	273	391	339	264	4	40	0
28	799	274	525	304	318	12	638	309
29	253	121	132	162	101	0	3	0
30	638	351	287	429	254	9	4	0
31	469	210	259	256	187	21	1	0
32	340	147	192	170	135	3	3	312
33	577	239	339	303	230	16	17	192
34	651	280	371	362	259	5	1	0
35	685	307	378	357	272	85	12	0
36	747	256	491	323	297	55	233	1030
37	488	205	284	286	194	34	117	0
38	377	118	259	222	150	10	3	0
39	551	212	339	294	219	46	10	0
40	771	271	500	378	307	2	16	497
41	158	101	56	84	63	11	5	0
42	408	134	274	194	163	1	11	49
43	360	107	253	187	143	55	93	0
44	328	115	213	168	130	15	71	0
45	438	135	303	244	174	90	14	30
46	299	112	187	125	119	22	373	0
47	696	249	447	356	277	228	106	0
48	706	264	442	397	281	1	6	0
49	658	224	434	320	262	304	543	0
50	464	167	297	255	185	2	14	0
51	556	212	344	298	221	67	116	0

52	438	184	254	254	174	57	5	0
53	448	173	275	223	178	126	385	694
54	462	179	283	231	184	105	434	0
55	521	192	329	253	207	37	26	0
56	335	132	203	183	133	13	3	0
57	603	225	378	322	240	19	15	0
58	658	222	436	328	262	74	69	0
59	428	133	295	215	170	77	101	551
60	764	285	479	381	304	26	8	0
61	0	0	0	0	0	85	183	0
62	376	151	224	191	149	4	27	0
63	425	144	280	209	169	26	36	0
64	466	207	259	255	185	2	5	0
65	747	304	443	387	297	0	108	364
66	517	251	266	290	206	0	3	0
67	737	354	383	446	293	180	71	0
68	0	0	0	0	0	102	532	0
69	438	183	255	218	174	0	3	0
70	686	308	378	346	273	1	7	0
71	437	161	276	187	174	3	17	0
72	535	267	268	298	213	2	5	0
73	490	232	258	290	195	4	13	0
74	343	171	172	197	136	7	2	0
75	0	0	0	0	0	10	75	1214
76	162	78	84	107	64	9	3	0
77	513	212	301	256	204	12	1179	210
78	369	133	235	199	147	18	12	0
79	486	240	247	255	193	16	2	0
80	542	227	314	280	215	48	26	0
81	313	112	202	166	125	15	15	0
82	704	269	435	370	280	60	4	0
83	812	358	453	439	323	25	3	0
84	916	340	576	423	365	44	124	712
85	406	244	163	255	162	0	5	0
86	717	373	344	448	285	0	3	0
87	818	451	366	494	325	0	5	0
88	465	168	297	255	185	0	174	1089
89	551	241	310	291	219	14	7	0
90	545	211	334	291	217	63	60	60
91	409	216	193	266	163	87	14	0
92	618	324	294	379	246	0	3	0
93	521	244	277	291	207	0	3	0
94	790	389	401	473	314	4	182	0
95	901	405	495	546	358	6	9	0
96	303	145	158	181	121	19	11	0
97	623	301	322	383	248	1	0	1108
98	693	304	389	399	276	4	126	0
99	481	264	217	294	191	3	48	625
100	793	406	387	427	316	17	26	0
101	448	197	252	241	178	0	3	0
102	1058	501	558	555	421	2	6	0
103	831	371	461	453	331	1	5	0
104	826	374	452	450	329	1	9	0
105	240	79	162	58	96	20	31	0

106	1104	449	654	560	439	0	10	296
107	252	124	127	140	100	20	23	0
108	25	13	13	14	10	109	455	0
109	216	86	130	132	86	8	10	0
110	80	45	36	55	32	0	4	0
111	30	30	0	0	12	0	0	0
112	165	60	104	107	66	15	66	0
113	30	14	16	17	12	0	0	0
114	1488	786	702	930	565	9	214	0
115	579	280	299	338	220	0	293	17
116	837	229	607	322	318	5	125	0
117	752	382	370	507	285	22	220	154
118	283	189	95	17	108	48	21	0
119	705	221	484	390	268	86	113	0
120	633	236	397	397	240	3	3	0
121	363	113	250	216	138	0	3	0
122	823	242	581	451	313	7	252	273
123	614	253	362	368	233	0	22	23
124	586	223	363	376	222	18	72	41
125	499	205	294	332	190	0	81	0
126	951	373	578	439	361	16	372	273
127	654	270	384	417	248	4	5	0
128	191	70	120	131	72	0	1	0
129	595	261	334	379	226	7	8	0
130	495	149	346	220	188	30	14	0
131	824	299	525	433	313	221	110	0
132	1177	305	872	351	447	13	12	506
133	644	267	377	379	244	69	259	545
134	683	202	481	285	259	574	419	445
135	1070	366	704	539	406	14	179	0
136	175	41	135	75	67	69	251	0
137	1050	307	743	494	398	42	217	869
138	1346	544	802	745	511	38	60	733
139	459	161	298	257	174	7	13	0
140	700	277	423	418	266	13	3	0
141	976	389	587	541	371	20	23	722
142	169	65	104	93	64	2	1	0
143	969	415	554	650	368	2	47	0
144	946	434	512	599	359	9	8	0
145	699	312	387	464	265	16	11	0
146	749	292	457	430	284	0	65	217
147	717	235	483	429	272	11	35	0
148	954	287	666	581	362	23	3	0
149	774	318	457	501	294	5	116	0
150	1039	421	618	498	376	72	172	242
151	1206	448	758	545	437	5	1053	526
152	907	346	561	461	328	14	72	0
153	632	318	314	427	229	0	107	0
154	1215	478	736	611	440	2	40	0
155	146	63	83	78	53	5	76	49
156	99	44	55	79	36	5	44	0
157	253	123	131	172	92	2	112	0
158	53	20	34	30	19	2	90	11
159	12	5	7	7	4	0	27	0

160	309	118	191	178	112	9	73	0
161	270	131	139	176	98	1	2	0
162	450	195	255	289	163	0	63	0
163	711	302	409	437	257	22	71	124
164	431	200	231	269	156	5	83	30
165	563	255	308	360	204	2	183	28
166	228	96	132	155	83	5	322	0
167	721	335	386	464	261	0	193	0
168	173	50	123	94	78	0	26	0
169	231	77	155	150	104	0	60	0
170	532	116	416	277	240	15	95	0
171	293	65	228	149	132	36	31	0
172	250	46	204	106	113	4	31	0
173	224	60	164	118	101	4	31	0
174	672	128	544	315	304	36	80	292
175	350	59	291	162	158	4	26	0
176	236	52	183	106	107	7	16	170
177	231	107	124	167	88	5	69	25
178	566	286	281	386	205	4	182	76
179	267	120	147	183	101	0	90	36
180	236	93	142	158	85	2	57	13
181	472	214	258	270	188	5	5	107
182	942	478	464	553	375	5	5	0
183	623	325	298	339	248	5	5	0
184	78	47	31	62	31	0	0	0
185	317	186	131	160	126	5	5	0
186	0	0	0	0	0	0	0	0
187	30	30	0	0	12	0	0	0
188	8	3	4	4	3	0	0	0
189	0	0	0	0	0	13	4	0
190	0	0	0	0	0	13	4	0
191	0	0	0	0	0	13	14	0
192	0	0	0	0	0	13	4	0
193	252	124	127	140	100	13	82	0
194	0	0	0	0	0	0	81	0
195	192	81	112	103	77	38	89	0
196	0	0	0	0	0	93	1477	18228
197	721	236	485	173	287	20	31	0
198	0	0	0	0	0	86	651	0
199	219	82	137	80	87	64	103	0
200	80	45	36	55	32	0	4	57
201	227	95	131	135	82	0	27	0
202	262	126	136	144	104	12	36	0
203	0	0	0	0	0	0	0	0
204	0	0	0	0	0	60	89	0
205	0	0	0	0	0	0	0	0
206	0	0	0	0	0	0	0	0
207	0	0	0	0	0	0	0	0
208	0	0	0	0	0	0	0	0
209	28	13	14	15	11	0	0	0
210	3	1	1	1	1	0	0	0
211	510	223	286	262	203	21	40	0
212	424	117	307	99	169	4	106	0
213	592	295	297	340	235	1	2	0

214	0	0	0	0	0	20	182	0
215	0	0	0	0	0	12	104	0
216	420	209	211	241	167	6	2	0
217	25	13	13	14	10	42	177	0
218	13	6	7	6	5	38	92	0
219	950	420	530	479	378	10	10	450
220	0	0	0	0	0	0	0	0
221	0	0	0	0	0	0	0	0
222	0	0	0	0	0	0	0	0
223	0	0	0	0	0	0	0	0
224	0	0	0	0	0	0	0	0

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Zone Number	Persons	Workers	Dependent	Cars	Household	Retail Jobs	Non-retail Jobs	Enrolments
1	338	142	196	191	139	32	15	0
2	226	95	131	128	93	66	106	0
3	322	135	187	182	132	62	16	0
4	298	125	173	169	122	153	26	0
5	201	84	117	114	83	2	0	0
6	350	147	203	198	144	220	707	0
7	82	34	48	46	34	327	380	0
8	105	44	61	59	43	735	1143	95
9	203	85	118	115	84	233	35	0
10	327	137	190	185	134	111	148	48
11	155	65	90	87	64	498	716	0
12	266	111	154	150	109	55	620	0
13	150	63	87	85	62	125	444	0
14	347	145	201	196	142	30	23	0
15	498	209	289	282	205	53	328	2581
16	580	243	337	328	238	215	50	773
17	269	113	156	152	110	26	534	0
18	840	352	488	475	345	65	9	628
19	155	65	90	87	64	89	104	0
20	300	126	174	170	123	49	3	0
21	854	358	496	483	351	64	3	0
22	232	97	135	132	95	22	669	0
23	537	225	312	304	221	32	24	0
24	810	339	470	458	333	8	9	1115
25	689	289	400	390	283	82	38	271
26	629	264	365	356	258	9	6	0
27	673	282	391	381	277	4	41	0
28	822	345	478	465	338	13	653	307
29	256	107	149	145	105	0	3	0
30	646	271	375	365	265	9	4	0
31	475	199	276	269	195	22	1	0
32	344	144	200	195	141	3	3	310
33	585	245	340	331	240	17	18	191
34	669	281	389	379	275	5	1	0
35	694	291	403	392	285	87	13	0
36	769	323	447	435	316	56	238	1023
37	495	207	287	280	203	35	120	0
38	382	160	222	216	157	10	3	0
39	565	237	328	320	232	47	10	0
40	781	327	454	442	321	2	17	494
41	160	67	93	90	66	12	5	0
42	419	176	243	237	172	1	12	49
43	365	153	212	207	150	56	95	0
44	332	139	193	188	136	16	73	0
45	444	186	258	251	182	92	15	30
46	320	134	186	181	131	811	381	0
47	708	297	411	400	291	233	109	0
48	716	300	416	405	294	1	6	0
49	684	287	397	387	281	487	560	0
50	470	197	273	266	193	2	15	0
51	566	237	329	320	232	69	119	0

52	446	187	259	252	183	59	5	0
53	471	198	274	267	194	129	394	690
54	495	207	287	280	203	108	444	0
55	538	225	312	304	221	38	26	0
56	339	142	197	192	139	14	3	0
57	613	257	356	347	252	20	16	0
58	667	280	387	377	274	75	71	0
59	434	182	252	245	178	78	103	548
60	774	324	449	438	318	26	8	0
61	0	0	0	0	0	87	187	0
62	381	160	221	215	156	4	27	0
63	430	180	250	243	177	26	37	0
64	472	198	274	267	194	2	5	0
65	757	317	440	428	311	165	185	362
66	524	220	304	296	215	0	3	0
67	747	313	434	422	307	184	73	0
68	0	0	0	0	0	104	544	0
69	466	195	271	263	191	0	3	0
70	695	291	404	393	285	1	7	0
71	443	186	257	251	182	3	18	0
72	542	227	315	307	223	2	5	0
73	497	208	289	281	204	4	14	0
74	347	177	172	208	142	7	2	0
75	0	0	0	0	0	10	77	1206
76	164	69	95	93	67	9	3	0
77	524	220	305	297	215	13	1205	209
78	373	157	217	211	153	19	13	0
79	493	207	286	279	202	17	2	0
80	556	233	323	314	228	49	26	0
81	327	137	190	185	134	16	16	0
82	726	304	421	410	298	62	4	0
83	822	345	478	465	338	25	3	0
84	945	396	549	535	388	45	126	707
85	412	173	239	233	169	0	5	0
86	726	304	422	411	298	0	3	0
87	829	347	481	469	340	0	5	0
88	473	198	275	268	194	0	178	1082
89	558	234	324	316	229	15	7	0
90	554	232	322	313	228	65	62	60
91	417	175	242	236	171	89	15	0
92	631	265	367	357	259	0	3	0
93	528	221	307	299	217	0	3	0
94	801	336	465	453	329	4	186	0
95	915	384	531	518	376	6	9	0
96	307	129	178	174	126	20	12	0
97	632	265	367	357	259	1	0	1101
98	702	294	408	397	288	4	129	0
99	487	204	283	276	200	3	49	621
100	804	337	467	455	330	18	26	0
101	454	190	264	257	187	0	3	0
102	1072	450	623	607	441	2	6	0
103	842	353	489	476	346	1	5	0
104	837	351	486	473	344	1	9	0
105	244	102	141	138	100	21	31	0

106	1286	539	747	728	528	0	10	294
107	255	107	148	144	105	22	26	0
108	25	11	15	13	11	112	465	0
109	219	92	127	124	90	8	10	0
110	81	34	47	46	33	0	4	0
111	31	13	18	17	13	0	0	0
112	167	70	97	94	69	16	68	0
113	31	13	18	17	13	0	0	0
114	1588	911	677	1245	628	10	256	0
115	698	325	374	533	276	0	351	21
116	867	266	601	622	343	7	150	0
117	782	443	339	577	309	26	264	188
118	342	219	123	63	135	57	25	0
119	851	256	595	414	336	103	135	0
120	764	273	490	454	302	4	4	0
121	463	131	332	273	183	0	4	0
122	994	281	713	517	393	8	302	334
123	742	293	449	496	293	0	26	28
124	986	258	728	636	390	22	86	50
125	603	237	365	405	238	0	98	0
126	1147	432	715	700	454	20	446	334
127	729	313	416	439	288	5	7	0
128	230	82	148	144	91	0	1	0
129	645	302	343	366	255	8	9	0
130	598	173	425	254	236	36	17	0
131	857	347	511	421	339	266	132	0
132	1287	353	934	584	509	16	14	619
133	677	310	367	366	268	83	311	667
134	824	234	590	341	326	689	502	544
135	1203	424	779	582	476	17	215	0
136	212	47	164	71	84	83	301	0
137	1183	355	827	488	467	51	260	1063
138	2046	631	1415	1182	809	46	72	855
139	553	187	367	254	219	8	16	0
140	845	321	523	431	334	16	4	0
141	1176	451	725	713	465	23	27	883
142	204	76	129	98	81	3	1	0
143	994	481	513	719	393	3	56	0
144	1046	503	542	739	413	10	9	0
145	849	362	487	581	336	20	13	0
146	904	339	565	616	357	0	78	265
147	767	272	495	378	303	13	42	0
148	1504	333	1171	777	594	27	4	0
149	935	369	566	642	369	7	139	0
150	1049	448	600	576	405	73	174	263
151	1311	478	834	704	507	6	1145	571
152	1057	368	689	558	408	17	84	0
153	642	339	303	477	248	0	109	0
154	1515	510	1005	876	585	3	50	0
155	156	67	89	78	60	6	82	53
156	105	47	58	65	40	6	46	0
157	258	131	128	177	100	2	115	0
158	58	21	37	33	23	2	99	12
159	12	5	6	7	5	0	27	0

160	324	126	198	195	125	9	77	0
161	280	139	141	215	108	1	2	0
162	470	208	263	326	182	0	66	0
163	752	322	430	478	291	23	75	135
164	451	213	238	307	174	6	87	33
165	563	272	291	417	218	2	183	30
166	233	103	131	168	90	6	329	0
167	871	357	515	639	337	0	233	0
168	174	47	128	95	83	0	26	0
169	232	71	161	151	111	0	60	0
170	535	108	427	279	255	15	96	0
171	295	60	235	150	141	37	31	0
172	252	43	209	107	120	4	31	0
173	226	55	171	120	108	4	31	0
174	676	119	557	317	322	37	80	255
175	352	55	298	163	168	4	26	0
176	238	49	190	107	114	7	16	148
177	279	124	155	191	110	7	83	31
178	582	305	277	428	225	5	187	83
179	322	139	183	212	127	0	108	44
180	246	99	146	156	95	2	59	14
181	478	200	278	270	196	5	5	106
182	959	402	557	542	394	5	5	0
183	631	265	367	357	259	5	5	0
184	79	33	46	45	32	0	0	0
185	334	140	194	189	137	5	5	0
186	0	0	0	0	0	0	0	0
187	31	13	18	17	13	0	0	0
188	200	84	116	113	82	0	0	0
189	757	317	440	428	311	14	4	0
190	0	0	0	0	0	14	4	0
191	0	0	0	0	0	14	15	0
192	0	0	0	0	0	14	4	0
193	255	107	148	144	105	14	84	0
194	0	0	0	0	0	157	272	0
195	195	82	113	110	80	39	91	0
196	0	0	0	0	0	95	1510	18605
197	820	344	477	464	337	21	31	0
198	0	0	0	0	0	88	665	0
199	270	113	157	153	111	66	106	0
200	81	34	47	46	33	0	4	57
201	232	102	130	143	90	0	28	0
202	1021	428	593	578	420	13	37	0
203	0	0	0	0	0	0	0	0
204	0	0	0	0	0	60	89	0
205	0	0	0	0	0	0	0	0
206	0	0	0	0	0	0	0	0
207	0	0	0	0	0	0	0	0
208	0	0	0	0	0	0	0	0
209	27	11	16	15	11	0	0	0
210	7	3	4	4	3	0	0	0
211	599	251	348	339	246	22	41	0
212	430	180	249	242	177	4	108	0
213	599	251	348	339	246	1	2	0

214	0	0	0	0	0	20	186	0
215	0	0	0	0	0	12	106	0
216	425	216	211	254	174	6	2	0
217	25	11	15	13	11	43	181	0
218	13	6	8	7	5	39	94	0
219	972	407	565	551	400	10	10	447
220	0	0	0	0	0	0	0	0
221	0	0	0	0	0	0	0	0
222	0	0	0	0	0	0	0	0
223	0	0	0	0	0	0	0	0
224	0	0	0	0	0	0	0	0

A5 2016

Zone Number	Persons	Workers	Dependent	Cars	Household	Retail Jobs	Non-retail Jobs	Enrolments
1	337	141	196	194	141	33	15	0
2	227	95	132	131	95	67	108	0
3	334	140	194	192	139	63	16	0
4	331	139	192	191	138	155	27	0
5	222	93	129	128	93	2	0	0
6	351	147	204	202	147	225	720	0
7	81	34	47	46	34	333	387	0
8	103	43	60	59	43	749	1164	96
9	205	86	119	118	86	237	35	0
10	372	156	216	214	155	113	151	47
11	159	67	92	92	67	508	729	0
12	261	109	152	150	109	56	632	0
13	148	62	86	85	62	128	452	0
14	348	146	202	200	145	31	23	0
15	497	208	288	286	208	54	334	2626
16	589	247	342	339	246	219	51	769
17	264	111	153	152	110	27	544	0
18	844	354	490	486	353	66	10	624
19	157	66	91	90	66	91	106	0
20	295	124	171	170	123	50	3	0
21	839	352	487	483	351	65	3	0
22	228	95	133	132	95	23	681	0
23	535	224	311	308	224	33	25	0
24	801	336	465	461	335	9	10	1108
25	677	284	393	390	283	83	38	270
26	620	260	360	357	259	10	6	0
27	662	277	384	381	277	4	42	0
28	818	343	475	471	342	13	665	305
29	252	106	146	145	105	0	3	0
30	635	266	369	365	265	10	4	0
31	467	196	271	269	195	22	1	0
32	338	142	197	195	141	3	3	308
33	575	241	334	331	240	17	18	190
34	665	279	386	383	278	5	1	0
35	682	286	396	392	285	88	13	0
36	766	321	445	441	320	58	243	1017
37	486	204	282	280	203	35	122	0
38	375	157	218	216	157	11	3	0
39	560	235	325	323	234	48	11	0
40	768	322	446	442	321	2	17	491
41	157	66	91	90	66	12	5	0
42	416	175	242	240	174	1	12	48
43	359	150	208	207	150	58	97	0
44	326	137	189	188	136	16	75	0
45	436	183	253	251	182	94	15	30
46	329	138	191	189	137	826	388	0
47	698	293	405	402	292	237	111	0
48	703	295	408	405	294	1	6	0
49	684	287	397	394	286	496	570	0
50	462	194	268	266	193	2	15	0
51	556	233	323	320	232	70	121	0
52	441	185	256	254	184	60	5	0
53	475	199	276	273	199	131	401	686
54	505	212	293	291	211	110	452	0

55	538	226	312	310	225	38	27	0
56	333	140	194	192	139	14	3	0
57	605	254	351	348	253	20	16	0
58	655	275	381	377	274	77	72	0
59	426	179	247	245	178	80	105	544
60	760	319	442	438	318	27	9	0
61	0	0	0	0	0	88	191	0
62	374	157	217	215	156	4	28	0
63	423	177	246	243	177	27	37	0
64	464	194	269	267	194	2	5	0
65	744	312	432	428	311	168	188	360
66	515	216	299	296	215	0	3	0
67	734	308	426	422	307	187	75	0
68	0	0	0	0	0	106	554	0
69	475	199	276	273	198	0	3	0
70	683	286	397	393	285	1	7	0
71	435	183	253	251	182	3	18	0
72	533	224	310	307	223	2	5	0
73	488	205	284	281	204	4	14	0
74	341	174	169	208	142	7	2	0
75	0	0	0	0	0	11	78	1199
76	161	68	94	93	67	10	3	0
77	523	219	304	301	218	13	1228	207
78	367	154	213	211	153	19	13	0
79	484	203	281	279	202	17	2	0
80	551	231	320	317	230	50	27	0
81	331	139	192	191	138	16	16	0
82	720	302	418	415	301	63	4	0
83	808	339	469	465	338	26	3	0
84	939	394	545	540	392	46	129	703
85	405	170	235	233	169	0	5	0
86	714	299	414	411	298	0	3	0
87	814	341	473	469	340	0	5	0
88	468	196	272	269	195	0	181	1076
89	548	230	319	316	229	15	7	0
90	545	228	316	313	228	66	63	59
91	413	173	240	237	172	91	15	0
92	625	262	363	360	261	0	3	0
93	519	218	301	299	217	0	3	0
94	787	330	457	453	329	4	189	0
95	902	378	524	519	377	6	10	0
96	302	127	175	174	126	20	12	0
97	621	260	361	357	259	1	0	1095
98	690	289	401	397	288	4	131	0
99	479	201	278	276	200	3	50	617
100	790	331	459	455	330	18	27	0
101	446	187	259	257	187	0	3	0
102	1054	442	612	607	441	2	6	0
103	828	347	481	476	346	1	5	0
104	823	345	478	473	344	1	10	0
105	239	100	139	138	100	21	32	0
106	1393	584	809	802	582	0	11	292
107	251	105	146	144	105	23	26	0
108	25	11	15	13	11	114	474	0
109	215	90	125	124	90	9	11	0
110	80	34	47	46	33	0	4	0
111	30	13	17	17	13	0	0	0

112	164	69	95	94	69	16	69	0
113	30	13	17	17	13	0	0	0
114	1688	1030	658	1323	677	13	308	0
115	853	367	486	652	342	0	422	25
116	897	301	596	644	360	8	180	0
117	812	501	311	600	326	31	317	223
118	418	247	171	77	168	69	30	0
119	1040	290	750	506	417	123	162	0
120	933	309	624	554	374	5	5	0
121	503	148	355	296	202	0	5	0
122	1214	318	896	632	487	9	362	395
123	906	331	575	606	363	0	31	33
124	1146	292	854	739	460	27	103	59
125	736	269	468	495	295	0	117	0
126	1402	489	913	856	562	23	536	395
127	804	354	450	484	323	6	8	0
128	281	92	189	176	113	0	2	0
129	695	342	353	394	279	9	11	0
130	730	195	535	310	293	44	20	0
131	912	392	520	448	366	319	158	0
132	1474	400	1075	668	591	19	17	732
133	732	351	382	395	294	100	373	788
134	1007	265	742	416	404	826	603	644
135	1358	480	878	657	545	20	258	0
136	258	53	205	86	104	100	361	0
137	1403	402	1001	579	563	61	312	1257
138	2646	713	1933	1528	1061	55	86	977
139	676	211	465	311	271	9	19	0
140	1032	363	669	527	414	19	5	0
141	1376	510	866	835	552	28	33	1045
142	249	86	164	120	100	3	2	0
143	1019	544	475	737	409	3	67	0
144	1146	569	577	809	460	13	11	0
145	1049	409	640	718	421	23	16	0
146	1104	384	721	753	443	0	94	314
147	817	308	510	403	328	16	50	0
148	1838	377	1461	949	737	33	5	0
149	1142	417	725	784	458	8	167	0
150	1059	473	586	582	421	73	176	281
151	1458	503	955	783	580	7	1273	612
152	1228	388	840	649	488	19	97	0
153	652	357	295	484	260	0	110	0
154	1815	537	1278	1049	722	3	60	0
155	166	71	95	84	66	6	87	57
156	110	49	60	68	44	6	48	0
157	263	138	126	180	105	2	117	0
158	63	22	41	36	25	3	107	13
159	12	6	6	7	5	0	27	0
160	339	133	206	204	135	10	80	0
161	290	147	143	223	115	1	2	0
162	490	219	272	340	195	0	69	0
163	793	339	454	504	316	24	79	144
164	471	225	247	321	188	6	91	35
165	563	287	276	417	224	2	183	33
166	238	108	130	171	95	6	336	0
167	1041	376	665	764	414	0	279	0
168	175	44	131	95	87	0	26	0

169	233	67	166	151	116	0	61	0
170	538	101	437	280	267	15	96	0
171	297	57	240	151	147	37	32	0
172	254	40	214	108	126	4	32	0
173	228	52	176	121	113	4	32	0
174	677	112	565	317	336	37	80	227
175	353	51	302	164	175	4	26	0
176	240	46	194	108	119	7	16	132
177	341	140	201	233	137	8	100	36
178	597	321	276	439	237	5	192	88
179	394	158	236	259	158	0	130	52
180	256	105	151	162	102	2	62	15
181	470	197	273	270	196	5	5	106
182	950	398	552	547	397	5	5	0
183	620	260	360	357	259	5	5	0
184	78	33	45	45	32	0	0	0
185	338	142	196	194	141	5	5	0
186	0	0	0	0	0	0	0	0
187	30	13	17	17	13	0	0	0
188	419	176	243	241	175	1	1	0
189	1330	558	773	766	556	14	4	0
190	0	0	0	0	0	14	4	0
191	0	0	0	0	0	14	15	0
192	0	0	0	0	0	14	4	0
193	251	105	146	144	105	14	85	0
194	0	0	0	0	0	160	277	0
195	192	80	111	110	80	40	92	0
196	0	0	0	0	0	97	1539	18926
197	876	367	509	504	366	21	32	0
198	0	0	0	0	0	89	678	0
199	301	126	175	173	126	67	108	0
200	80	34	47	46	33	0	4	56
201	237	107	130	147	94	0	29	0
202	1588	666	922	914	664	13	37	0
203	0	0	0	0	0	0	0	0
204	0	0	0	0	0	60	91	0
205	0	0	0	0	0	0	0	0
206	0	0	0	0	0	0	0	0
207	0	0	0	0	0	0	0	0
208	0	0	0	0	0	0	0	0
209	26	11	15	15	11	0	0	0
210	7	3	4	4	3	0	0	0
211	589	247	342	339	246	21	41	0
212	422	177	245	242	177	4	110	0
213	589	247	342	339	246	1	2	0
214	0	0	0	0	0	21	190	0
215	0	0	0	0	0	12	108	0
216	418	213	207	254	174	6	2	0
217	25	11	15	13	11	44	185	0
218	13	6	7	7	5	40	96	0
219	963	403	559	555	403	11	10	445
220	0	0	0	0	0	0	0	0
221	0	0	0	0	0	0	0	0
222	0	0	0	0	0	0	0	0
223	0	0	0	0	0	0	0	0
224	0	0	0	0	0	0	0	0

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Zone Number	Persons	Workers	Dependent	Cars	Household	Retail Jobs	Non-retail Jobs	Enrolments
1	342	144	199	199	145	34	15	0
2	229	96	133	134	97	68	110	0
3	346	145	201	202	146	64	16	0
4	367	154	213	214	155	158	27	0
5	243	102	141	142	103	2	0	0
6	354	148	205	206	150	229	734	0
7	80	33	46	46	34	339	395	0
8	102	43	59	59	43	763	1186	98
9	209	88	122	122	89	242	36	0
10	419	176	244	244	177	115	154	47
11	164	69	95	96	70	517	743	0
12	258	108	150	150	109	58	644	0
13	146	61	85	85	62	130	461	0
14	351	147	204	204	148	31	24	0
15	498	209	289	290	211	55	340	2671
16	603	253	350	351	255	223	52	764
17	261	109	152	152	110	27	554	0
18	853	358	496	497	361	67	10	621
19	160	67	93	93	68	92	108	0
20	291	122	169	170	123	51	3	0
21	829	348	482	483	351	66	3	0
22	225	94	131	132	95	23	694	0
23	536	225	311	312	227	34	25	0
24	796	334	462	463	337	9	10	1102
25	669	280	388	390	283	85	39	268
26	616	258	358	358	260	10	7	0
27	654	274	380	381	277	4	42	0
28	817	343	475	476	346	13	678	304
29	249	104	145	145	105	0	3	0
30	628	263	365	365	265	10	4	0
31	461	193	268	269	195	23	1	0
32	334	140	194	195	141	3	3	307
33	568	238	330	331	240	17	18	189
34	664	279	386	387	281	5	1	0
35	674	283	391	392	285	90	13	0
36	766	321	445	446	324	59	247	1012
37	481	201	279	280	203	36	125	0
38	371	155	215	216	157	11	3	0
39	559	234	324	325	236	49	11	0
40	759	318	441	442	321	2	17	488
41	155	65	90	90	66	12	5	0
42	416	174	242	242	176	1	12	48
43	355	149	206	207	150	59	99	0
44	322	135	187	188	136	16	76	0
45	431	181	250	251	182	95	15	30
46	339	142	197	197	143	841	396	0
47	692	290	402	403	293	242	113	0
48	695	291	404	405	294	1	7	0
49	690	289	401	402	292	505	581	0
50	456	191	265	266	193	2	15	0
51	552	231	320	321	233	72	124	0

52	438	184	255	255	185	61	5	0
53	484	203	281	282	205	133	409	682
54	518	217	301	302	219	112	461	0
55	539	226	313	314	228	39	27	0
56	329	138	191	192	139	14	3	0
57	600	252	349	350	254	21	16	0
58	648	272	376	377	274	78	74	0
59	421	177	245	245	178	81	107	541
60	751	315	436	438	318	27	9	0
61	0	0	0	0	0	90	194	0
62	370	155	215	215	156	4	28	0
63	418	175	243	243	177	27	38	0
64	458	192	266	267	194	2	5	0
65	735	308	427	428	311	171	192	358
66	509	213	295	296	215	0	3	0
67	725	304	421	422	307	191	76	0
68	0	0	0	0	0	108	565	0
69	488	205	283	284	206	0	3	0
70	675	283	392	393	285	1	8	0
71	430	180	250	251	182	3	18	0
72	527	221	306	307	223	2	5	0
73	483	202	280	281	204	4	14	0
74	337	172	167	208	142	8	2	0
75	0	0	0	0	0	11	80	1193
76	159	67	92	93	67	10	3	0
77	524	220	304	305	221	13	1251	206
78	363	152	211	211	153	20	13	0
79	479	201	278	279	202	17	2	0
80	549	230	319	320	232	51	27	0
81	334	140	194	195	141	16	16	0
82	719	301	418	419	304	64	4	0
83	799	335	464	465	338	26	3	0
84	939	394	546	547	397	47	131	699
85	400	168	232	233	169	0	5	0
86	705	296	410	411	298	0	3	0
87	805	337	467	469	340	0	5	0
88	464	195	270	270	196	0	184	1070
89	542	227	315	316	229	15	8	0
90	541	227	314	315	229	67	64	59
91	410	172	238	239	173	92	15	0
92	623	261	362	363	263	0	3	0
93	513	215	298	299	217	0	3	0
94	778	326	452	453	329	4	193	0
95	891	374	518	519	377	7	10	0
96	298	125	173	174	126	21	12	0
97	613	257	356	357	259	1	0	1088
98	682	286	396	397	288	4	133	0
99	473	199	275	276	200	3	51	614
100	781	327	453	455	330	18	27	0
101	441	185	256	257	187	0	3	0
102	1042	437	605	607	441	2	7	0
103	818	343	475	476	346	1	5	0
104	813	341	472	473	344	1	10	0
105	237	99	137	138	100	22	33	0

106	1377	577	800	802	582	0	11	291
107	248	104	144	144	105	25	27	0
108	25	10	15	13	11	116	483	0
109	213	89	123	124	90	9	11	0
110	79	33	46	46	33	0	4	0
111	30	12	17	17	13	0	0	0
112	162	68	94	94	69	16	71	0
113	30	12	17	17	13	0	0	0
114	1788	1165	623	1402	716	15	369	0
115	1089	416	674	832	436	0	506	29
116	927	340	587	666	371	9	216	0
117	842	567	275	622	337	38	380	264
118	533	280	254	98	213	83	36	0
119	1327	328	999	646	531	148	195	0
120	1191	349	841	707	477	6	6	0
121	523	167	355	308	209	0	6	0
122	1549	359	1190	806	620	11	435	467
123	1156	375	781	773	463	0	38	39
124	1226	330	896	790	491	32	124	70
125	940	304	636	632	376	0	141	0
126	1789	553	1236	1092	716	28	643	467
127	879	401	479	529	352	8	9	0
128	359	104	254	225	144	0	2	0
129	745	387	358	423	298	11	13	0
130	932	221	711	396	373	53	24	0
131	967	444	524	475	387	382	189	0
132	1661	452	1209	753	665	23	21	866
133	787	396	391	425	315	120	448	933
134	1285	299	986	531	514	991	723	761
135	1458	543	915	705	584	24	309	0
136	330	60	269	110	132	120	433	0
137	1623	455	1168	669	650	73	375	1487
138	2996	807	2189	1730	1199	66	103	1119
139	863	239	624	397	345	11	23	0
140	1317	411	906	672	527	23	6	0
141	1626	577	1049	986	651	34	39	1235
142	318	97	222	153	127	4	2	0
143	1044	615	429	755	418	4	81	0
144	1246	644	602	880	499	15	13	0
145	1299	463	836	889	520	28	19	0
146	1409	434	976	961	564	0	112	371
147	867	348	519	428	347	19	60	0
148	1888	426	1461	975	756	39	6	0
149	1457	472	986	1001	583	9	201	0
150	1089	498	591	598	435	75	181	301
151	1758	531	1228	944	703	8	1535	655
152	1448	409	1039	765	579	23	115	0
153	682	377	306	506	273	0	115	0
154	2215	566	1648	1280	886	4	74	0
155	176	74	101	89	70	7	92	61
156	115	52	62	71	46	6	50	0
157	268	145	123	184	107	2	119	0
158	68	24	45	39	27	3	116	14
159	12	6	6	7	5	0	27	0

160	354	140	214	213	142	10	84	0
161	300	155	145	230	120	1	2	0
162	510	231	280	354	204	0	72	0
163	854	358	497	543	342	26	85	154
164	491	237	255	335	197	6	94	37
165	563	302	261	417	225	2	183	35
166	243	114	129	175	97	6	343	0
167	1341	397	945	984	536	0	359	0
168	176	41	135	96	90	0	26	0
169	236	63	173	153	121	0	61	0
170	541	95	446	282	278	15	97	0
171	299	53	246	152	153	37	32	0
172	256	38	218	108	131	4	32	0
173	230	49	181	122	118	4	32	0
174	681	105	576	319	349	37	81	203
175	355	48	307	165	182	4	26	0
176	242	43	199	108	124	7	16	118
177	435	159	277	298	174	9	120	43
178	627	338	288	461	251	5	201	95
179	502	178	324	330	201	0	156	62
180	266	110	155	169	106	3	64	16
181	464	195	270	270	196	5	5	105
182	946	396	549	551	400	5	5	0
183	613	257	356	357	259	5	5	0
184	77	32	45	45	32	0	0	0
185	343	144	199	200	145	5	5	0
186	0	0	0	0	0	0	0	0
187	30	12	17	17	13	0	0	0
188	530	222	308	308	224	2	2	0
189	1315	551	764	766	556	14	4	0
190	0	0	0	0	0	14	4	0
191	0	0	0	0	0	14	15	0
192	0	0	0	0	0	14	4	0
193	248	104	144	144	105	14	87	0
194	0	0	0	0	0	163	282	0
195	189	79	110	110	80	41	94	0
196	0	0	0	0	0	99	1568	19252
197	939	394	545	547	397	22	33	0
198	0	0	0	0	0	91	691	0
199	333	140	194	194	141	68	110	0
200	79	33	46	46	33	0	4	56
201	242	113	129	150	97	0	29	0
202	2177	913	1264	1268	921	13	38	0
203	0	0	0	0	0	0	0	0
204	0	0	0	0	0	60	92	0
205	0	0	0	0	0	0	0	0
206	0	0	0	0	0	0	0	0
207	0	0	0	0	0	0	0	0
208	610	256	354	355	258	0	0	0
209	26	11	15	15	11	0	0	0
210	123	52	71	72	52	0	0	0
211	582	244	338	339	246	21	41	0
212	417	175	242	242	177	4	113	0
213	582	244	338	339	246	1	2	0

214	0	0	0	0	0	21	193	0
215	0	0	0	0	0	13	110	0
216	413	210	205	254	174	7	2	0
217	25	10	15	13	11	45	188	0
218	13	6	7	7	5	41	98	0
219	958	402	557	559	405	11	11	442
220	0	0	0	0	0	0	0	0
221	0	0	0	0	0	0	0	0
222	0	0	0	0	0	0	0	0
223	0	0	0	0	0	0	0	0
224	0	0	0	0	0	0	0	0

C

Base Year Screenline Validation Results

A7 Base Year Screenline Results

Table C1 – Validation Screenlines

Screenline and Links	Direction	2005 Observed Daily Volume	2005 Estimated Daily Volume	Difference Volume	
Screenline A					
Bruce Highway, north of Boundary Road	Northbound	6,491	6,438	-53	-0.8%
Yeppoon Road, east of Norman Road	Eastbound	5,448	5,671	223	4.1%
Lakes Creek Road, south of Mackay Street	Eastbound	2,250	2,129	-121	-5.4%
Total Eastbound		***14,189***	***14,238***	***49***	***0.3%***
Bruce Highway, north of Boundary Road	Southbound	6,491	6,363	-128	-2.0%
Yeppoon Road, east of Norman Road	Westbound	5,448	5,302	-146	-2.7%
Lakes Creek Road, south of Mackay Street	Westbound	2,250	2,132	-118	-5.2%
Total Westbound		***14,189***	***13,797***	***-392***	***-2.8%***
Totals		***28,378***	***28,035***	***-343***	***-1.2%***
Screenline B					
Frenchville Road, east of Geordie Street	Eastbound	2,093	2,291	198	9.5%
Kerrigan Street, west of Frenchmans Creek	Eastbound	3,859	3,904	45	1.2%
Honour Street, west of Frenchmans Creek	Eastbound	2,233	1,986	-247	-11.1%
Elphinestone Street, west of Frenchmans Creek	Eastbound	2,934	2,824	-110	-3.7%
Lakes Creek Road, west of Frenchmans Creek	Eastbound	5,740	6,013	272	4.7%
Total Eastbound		***16,859***	***17,017***	***159***	***0.9%***
Frenchville Road, east of Geordie Street	Westbound	2,093	2,443	350	16.7%
Kerrigan Street, west of Frenchmans Creek	Westbound	3,859	4,094	235	6.1%
Honour Street, west of Frenchmans Creek	Westbound	2,233	2,122	-110	-4.9%
Elphinestone Street, west of Frenchmans Creek	Westbound	2,934	2,869	-64	-2.2%
Lakes Creek Road, west of Frenchmans Creek	Westbound	5,718	6,096	378	6.6%
Total Westbound		***16,836***	***17,625***	***788***	***4.7%***
Totals		***33,695***	***34,642***	***947***	***2.8%***
Screenline C					
Norman Road, north of Moores Creek	Southbound	5,435	5,079	-355	-6.5%
Kerrigan Street, west of Moores Creek	Eastbound	5,772	6,939	1,167	20.2%
Musgrave Street, north of Moores Creek	Southbound	10,302	10,411	109	1.1%
High Street, west of Moores Creek	Eastbound	11,229	10,102	-1,127	-10.0%
Glenmore Road, west of Moores Creek	Eastbound	4,656	5,160	505	10.8%

Screenline and Links	Direction	2005 Observed Daily Volume	2005 Estimated Daily Volume	Difference Volume	
Total Eastbound		***37,393***	***37,691***	***299***	***0.8%***
Norman Road, north of Moores Creek	Northbound	5,435	5,666	232	4.3%
Kerrigan Street, west of Moores Creek	Westbound	5,772	6,671	900	15.6%
Musgrave Street, north of Moores Creek	Westbound	10,302	10,671	369	3.6%
High Street, west of Moores Creek	Westbound	11,229	10,465	-763	-6.8%
Glenmore Road, west of Moores Creek	Westbound	4,656	5,089	434	9.3%
Total Westbound		***37,393***	***38,563***	***1,171***	***3.1%***
Totals		***74,785***	***76,255***	***1,469***	***2.0%***
Screenline D					
Carlton Street, west of Bruce Highway	Eastbound	1,306	1,571	265	20.3%
Farm Street, west of Bruce Highway	Eastbound	3,771	3,629	-142	-3.8%
Richardson Road, west of Bruce Highway	Eastbound	5,223	5,302	79	1.5%
Sheehy Street, west of Bruce Highway	Eastbound			0	0.0%
Boland Street, west of Yamba Road	Eastbound			0	0.0%
Main Street, west of Yamba Road	Eastbound	1,809	1,895	86	4.7%
Alexandra Street, west of Bruce Highway	Southbound	7,714	8,350	636	8.2%
Knight St, south of Park Street	Southbound	2,993	2,262	-731	-24.4%
Glenmore Road, north of Welch Street	Southbound	4,656	4,803	147	3.2%
Total Eastbound		***27,472***	***27,812***	***340***	***1.2%***
Carlton Street, west of Bruce Highway	Westbound	1,306	2,025	719	55.0%
Farm Street, west of Bruce Highway	Westbound	3,771	3,794	22	0.6%
Richardson Road, west of Bruce Highway	Westbound	5,223	4,885	-338	-6.5%
Sheehy Street, west of Bruce Highway	Westbound			0	0.0%
Boland Street, west of Yamba Road	Westbound			0	0.0%
Main Street, west of Yamba Road	Westbound	1,809	2,067	258	14.3%
Alexandra Street, west of Bruce Highway	Northbound	7,714	8,039	325	4.2%
Knight St, south of Park Street	Northbound	2,993	2,090	-903	-30.2%
Glenmore Road, north of Welch Street	Northbound	4,656	4,733	77	1.7%
Total Westbound		***27,472***	***27,632***	***160***	***0.6%***
Totals		***54,944***	***55,444***	***500***	***0.9%***
Screenline E					
Lion Creek Road, south of Exhibition Road	Eastbound	4,000	4,425	425	10.6%
North Street, north of Kent Street	Northbound	1,987	2,787	801	40.3%

Screenline and Links	Direction	2005 Observed Daily Volume	2005 Estimated Daily Volume	Difference Volume	
Campbell Street, north of Albert Street	Eastbound	1,784	1,777	-7	-0.4%
George Street, north of Albert Street	Eastbound	1,117	1,000	-118	-10.5%
Albert Street, west of George Street	Northbound	3,224	3,226	2	0.1%
Cambridge Street, west of George Street	Northbound	857	357	-500	-58.4%
Archer Street, west of George Street	Northbound	3,692	2,075	-1,617	-43.8%
Fitzroy Street, west of George Street	Northbound	3,902	6,468	2,566	65.8%
Denham Street, west of George Street	Northbound	2,758	2,578	-179	-6.5%
Murray Street, west of Bruce Highway	Southbound	1,263	1,084	-179	-14.2%
Derby Street, west of Bruce Highway	Northbound	2,317	2,119	-198	-8.6%
Caroline Street, west of Gladstone Road	Eastbound	1,318	1,199	-119	-9.1%
Gladstone Road, south of Caroline Street	Northbound	12,021	11,156	-866	-7.2%
Total Eastbound		***40,241***	***40,250***	***10***	***0.0%***
Lion Creek Road, south of Exhibition Road	Westbound	4,000	3,949	-51	-1.3%
North Street, north of Kent Street	Southbound	1,987	2,428	441	22.2%
Campbell Street, north of Albert Street	Westbound	3,524	2,963	-561	-15.9%
George Street, north of Albert Street	Westbound	1,295	1,339	44	3.4%
Albert Street, west of George Street	Southbound	3,191	2,767	-424	-13.3%
Cambridge Street, west of George Street	Southbound	1,227	1,108	-118	-9.7%
Archer Street, west of George Street	Southbound	3,326	2,306	-1,020	-30.7%
Fitzroy Street, west of George Street	Southbound	5,564	6,502	938	16.9%
Denham Street, west of George Street	Southbound	2,196	2,151	-46	-2.1%
Murray Street, west of Bruce Highway	Northbound	1,263	1,322	59	4.7%
Derby Street, west of Bruce Highway	Southbound	1,914	1,939	26	1.3%
Caroline Street, west of Gladstone Road	Westbound	1,318	1,317	-1	-0.1%
Gladstone Road, south of Caroline Street	Southbound	9,836	10,653	817	8.3%
Total Westbound		***40,640***	***40,744***	***104***	***0.3%***
Totals		***80,881***	***80,994***	***113***	***0.1%***
Screenline F					
Albert Street, Neville Hewitt Bridge	Northbound	16,757	17,294	537	3.2%

Screenline and Links	Direction	2005 Observed Daily Volume	2005 Estimated Daily Volume	Difference Volume	
Fitzroy Street, Fitzroy River Bridge	Northbound	19,521	18,671	-850	-4.4%
Total Northbound		***36,278***	***35,965***	***-313***	***-0.9%***
Albert Street, Neville Hewitt Bridge	Southbound	16,739	17,681	942	5.6%
Fitzroy Street, Fitzroy River Bridge	Southbound	19,723	18,894	-829	-4.2%
Total Southbound		***36,462***	***36,576***	***114***	***0.3%***
Totals		***72,740***	***72,541***	***-200***	***-0.3%***
Screenline G					
Lion Creek Road, east of Canoona Road	Eastbound	1,665	1,647	-18	-1.1%
Canoona Road, south of Lion Creek Road	Southbound	310	366	57	18.3%
Capricorn Highway, west of roundabout at Lower Dawson Road	Eastbound	6,444	6,625	181	2.8%
Bruce Highway, south of Roundabout at Lower Dawson Road	Northbound	4,644	4,589	-55	-1.2%
Total Eastbound		***13,063***	***13,228***	***165***	***1.3%***
Lion Creek Road, east of Canoona Road	Westbound	1,665	1,686	20	1.2%
Canoona Road, south of Lion Creek Road	Northbound	310	366	57	18.3%
Capricorn Highway, west of roundabout at Lower Dawson Road	Westbound	6,639	6,520	-119	-1.8%
Bruce Highway, south of Roundabout at Lower Dawson Road	Southbound	4,644	4,831	187	4.0%
Total Westbound		***13,258***	***13,402***	***145***	***1.1%***
Totals		***26,321***	***26,631***	***310***	***1.2%***
Global Totals		**334,275**	**337,518**	**3,243**	**1.0%**