lismore city council

Strategic Road Review 2013

Lismore Strategic Road Review

Prepared for Lismore Council

Ref : 34494Rep2

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1. Background

TTM Consulting (GC) Pty Ltd was engaged by Lismore Council to undertake a review and investigations of future road requirements for the Lismore urban and rural areas.

The purpose of the review was to assist Council in respect to the preparation of an Urban and Rural Road Infrastructure Contribution Plans commonly termed a “Section 94 Plans”. Consequently, the methodology applied by TTM was specifically designed to satisfy Section 94 Contribution Plan principles.

The overall objectives of the TTM investigations were ;

- To recommend the basis for a Lismore Urban Road Infrastructure Contributions Plan.
- To recommend a framework for a Rural Road Infrastructure Contributions Plan.

The review was primarily focused on investigating future road requirements for the Lismore urban area about which TTM was required to undertake investigations and report the following.

- Section 94 Plan principles
- Key technical assumptions
- Existing traffic volumes
- Review relevant past studies and associated recommendations
- Anticipated future development for 2018, 2023, 2028 and 2033
- Future road network options
- Future development traffic generation and road network traffic volumes
- The effectiveness of future road network options
- Future road network option costs and benefit cost ratios
- A desirable long term road network and associated road network stages
- The extent to which future developments contribute to each future road network element

This report is structured in two parts.

A. Section 94 Plan Principles and Key Assumptions

B. Lismore Urban Roads - Future Requirements, Costs and Contributing Factors

C. Lismore Rural Roads – Apportioning Future Costs

PART A

Section 94 Plan Principles, Key Assumptions and Investigation Methodology

1. Section 94 Plan Principles

The ability of Councils in New South Wales to require developers to make contributions towards future road construction is provided via Part 4, Division 6 of the ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979.

The NSW state government document Local Development Contributions Practice Note, Nov 2010 describes the following key principles and guidelines (*shown in italics*) in respect to the preparation of Section 94 plans.

2.1.1 General Requirements

If councils wish to seek a contribution under section 94 they are required under section 94B of the EP&A Act to prepare contributions plan. The aim of that plan is to establish the relationship between the expected types of development in the area to which the plan applies and the demand for public amenities and services to meet that development.

Section 94 contributions are imposed by way of condition of consent (or complying development). The requirement for a contribution can be satisfied either by paying a monetary contribution or dedicating land free of cost. The requirement for a contribution can also be satisfied by the provision of a material public benefit (works-in-kind).

Councils as consent authorities may impose conditions under section 94 and section 94A of the EP&A Act only if it is of a kind allowed by, and that is determined in accordance with, a contributions plan.

The contribution must be towards "public amenities or services" (s 94 of the EP& A Act). What are public amenities and public services is not defined. Public amenities and public services are however expressly defined to not include water supply or sewerage services (s 93C of the EP&A Act).

Generally, contributions can only be sought for:

- *Capital costs, including land acquisition costs*
- *Public facilities that a council reasonably has to provide*
- *Public facilities that are needed as a consequence or to facilitate new development*

The condition must only be imposed for the provision, extension or augmentation of public amenities and public services (s 94(2) of the EP&A Act). That is, generally, contributions cannot be sought for recurrent funding such as maintenance.

A contributions plan can require the payment of a monetary contribution towards recoupment of the cost of providing the public amenities or public services (being the cost as indexed in accordance with the regulations) (s 94(3) of the EP&A Act).

2.1.2 Reasonableness and Accountability

*Section 94 contributions are based on the key concepts of **reasonableness** and **accountability**.*

***Reasonableness** relates to nexus and apportionment.*

> *Nexus refers to the connection between the development and the demand created. The requirement to satisfy nexus is based on ensuring that there is a link between the development and increased demand for facilities. In addition, the infrastructure needs to be provided within a timeframe that meets the demand.*
>
> *Apportionment refers to the share borne by the future development. The concept of apportionment is based on ensuring that developers are only paying for the portion of demand that results from their development.*

***Accountability** relates to both public and financial accountability.*

> *Accountability is a basic requirement of section 94. Public accountability may be sought through open decision making, maintenance of appropriate financial records and community involvement, while financial accountability may be sought through the works schedule to the contributions plan, annual reports and a contributions register.*
>
> *A key issue with accountability in relation to reasonableness relates to the completion of the works program within the contributions plan and that the infrastructure is provided within a timeframe that meets the need of the development.*

2.2 Ministerial direction under section 94E of the EP&A Act

A Direction has been issued by the Minister for Planning under section 94E of the EP&A Act that limits local development contributions.

The Direction applies to councils as consent authorities when they impose conditions of development consent requiring a monetary contribution under section 94 of the EP&A Act. Specifically, the Direction provides:

> *a cap of $30,000 per residential lot or dwelling for greenfield areas,*
>
> *an exemption to areas where development applications have been lodged (including determined applications) and remain valid, as of 31 August 2010, for more than 25% of the expected yield from the development area or contributions plan, and*
>
> *a cap of $20,000 per residential lot or dwelling for all other areas.*

This Direction will be updated periodically, as it is intended to allow councils to apply for areas to be considered for inclusion in Schedule 3 to the Direction when an area is rezoned or a contributions plan is made, if councils can demonstrate that the area is a greenfield release area. The most recent Direction issued under section 94E and relevant Planning Circular is available at www.planning.nsw.gov.au.

It is important to note that the section 94E Direction applies to conditions imposed on development consents. A contributions plan may still be in place that contains contribution rates that exceed the relevant cap, but the cap will limit the contribution amount that can be levied.

The Practice Note describes the following examples of criteria which will be applied by state government into the assessment and approval of Section 94 Plans.

1. The public amenities and public services in the plan are on the "Essential Works List" as identified within this practice note (section 3.3.2)

2. There is nexus between the development in the area to which the plan applies and the kinds of public amenities and public services identified in the plan.

3. The proposed development contribution is based on a reasonable estimate of the cost of the proposed public amenities and public services.

- *How were the plan and cost estimates prepared?*
- *Are the costs up to date?*
- *Do the cost estimates include all of the costs required to bring the public amenities and public services into operation (eg, land, capital, fit out, borrowing, design and project management costs)?*
- *Have relevant professionals (eg, quantity surveyors, chartered surveyors, land valuers) been engaged to provide an independent assessment of the costs of providing the public amenities and public services?*
- *How has the council taken CPI into account? Are the assumptions and calculations robust?*
- *Has an NPV methodology been utilised? If so, has an appropriate discount rate been used?*

4. The proposed public amenities and public services can be provided within a reasonable timeframe.

- *Is the timeframe (year or threshold) for provision relevant for the specific kinds of public amenities and public services?*
- *Will the public amenities and public services be provided at a time that those demanding the infrastructure require it?*
- *Does the plan seek to recoup funds?*
- *Does the plan provide for pooling of funds?*

5. The proposed development contribution is based on a reasonable apportionment between existing demand and new demand for the public amenities and public services.

- *What are the kinds of public amenities and public services for which the proposed development will create demand?*
- *Are the public amenities and public services located in appropriate locations for the expected types of development in the area to which the plan applies?*
- *Are the estimates of population change arising from the expected types of development realistic?*

- *Has the council assessed the implications of the expected types of development catered for by the contributions plan on the demographic structure?*
- *On what basis have the estimates of demand for kinds of public amenities and public services been established?*
- *Have infrastructure demand or needs assessments been prepared to support the conclusions about demand for the kinds of public amenities and public services identified in the plan?*
- *Is the information on demand both reliable and up to date?*
- *Are the public amenities and public services only required to meet the need of the new development or will it also serve the existing community?*
- *Can the new demand be accommodated, in whole or in part, within existing public amenities and public services?*
- *How is the existing community accounted for in the apportionment of costs?*
- *If the expected development did not occur, would the public amenities and public services still be required?*
- *On what basis have the estimates of demand for public infrastructure been established?*
- *Is the information on demand both reliable and up to date?*

6. Where the plan is an existing plan, the council has conducted appropriate community liaison and publicity in preparing the contributions plan.

7. The plan complies with other matters IPART considers relevant.

- *When did the contributions plan come into effect? When was the plan last reviewed? When was the plan last amended without the need to review the plan?*
- *What is the relationship with local environmental plans (LEP) and development control plans (DCP), and is there any programmed review of these instruments which may affect the underlying assumptions within the plan?*
- *Does the plan comply with any other matter IPART considers relevant?*

Three key principles arise from a reading of the Act and the Practice Note. These are :

- Council can seek contributions towards road infrastructure from developments in respect to past or planned future road infrastructure improvements provided that a development can reasonably be shown to benefit from the improvement/s.
- The Council is able to accept a contribution towards the cost of road infrastructure in the form of land, monetary contribution, works in kind or via combination of all these options.
- Contributions can generally not be levied for the cost of maintenance.
- There is a limit to the amount of contribution which Council can seek from residential developments.

The investigations and conclusions reported in this document have been conducted with proper regard to the NSW government guidelines and assessment criteria for preparing Section 94 Contribution Plans.

2. Other Principles Applied to Lismore Investigations

In the case of Lismore urban area the following factors have been significant in affecting the nature and extent of investigations.

- The urban area of Lismore is of such limited extent that it is unlikely that trip generation and distribution within Lismore is significantly affected by the distances between origins and destinations or other factors such as traffic congestion and travel time etc.
- Public transport and other non-car transport modes are limited in terms of services provided and the extent to which transport demands are capable of being satisfied by these modes in the short and medium term.
- In order to equitably 'spread' the burden of Section 94 Plan contributions, all categories of development and associated trip making were included. For example, for a trip between a dwelling and a shop the estimated contribution associated with one trip end is effectively allocated to the dwelling and the other to the shop.

The above factors give support to funding road infrastructure requirements generated by new development from the following three sources.

a. A Section 94 Plan which distributes the cost of 'Urban Network' infrastructure as a generalised cost or cost rate across all developments in the urban area for that infrastructure which forms an integral part of the entire future urban infrastructure network, in combination with

b. Voluntary Planning Agreements which distribute the cost of 'Specific Network' infrastructure only to those developments which clearly generate the need for the infrastructure and without which development should not or could not reasonably occur, and

c. Development Consent Conditions which relate to 'Direct Works', which do not contribute to 'Network' connectivity and the need for which is clearly generated by a development. These works are typically located at or in close proximity to a development.

The allocation of cost to future development can then be estimated based on the proportion to which future development contributes to overall urban trip making at the long term planning horizon.

This approach to developing a Section 94 Plan for the 'Urban Network' effectively treats the entire Lismore urban area as a single transport 'catchment' and is conceptually similar to a Section 94A Plan in which road infrastructure costs would be levied as a single rate across the entire urban area based on a prescribed percentage of the value of each future development. However, Section 94A Plans can potentially be criticised for not satisfying the "Reasonableness" principle because the value of development does not necessarily reflect the transport demand character of a development. In the recommended approach the apportioning of contributions contribution based on the trip generating character of development is more consistent with the "Reasonableness" principle.

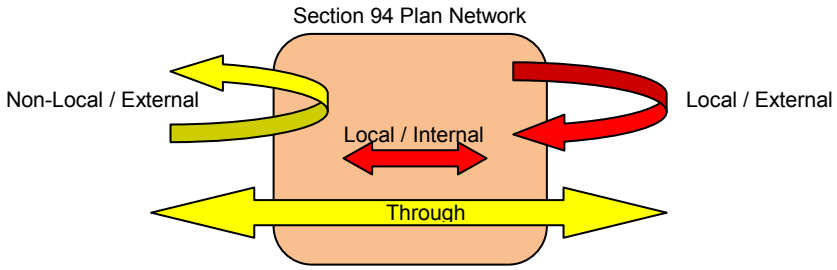
3. Road Network Elements Subject to the Section 94 Plan

It was assumed that future road requirements and associated capital expenditures associated with roads which are managed by the state via the Department for Roads and Marine Services will not be the subject of a Section 94 Plan.

Whilst the network function of RMS roads has been included in all road network analysis and associated estimates of future road traffic volumes, only funding requirements for roads which are the responsibility of Council will potentially attract contributions described in a Section 94 Plan.

4. Apportioning Infrastructure Costs Amongst Network Trips

"Nexus" and "Reasonableness" principles require that the cost of new road infrastructure for a Section 94 Plan is calculated and levied only against those trips and road network requirements which new development within the Section 94 Plan network will generate and not against trips or road requirements associated with existing development and developments outside the Section 94 network. This requires future traffic estimates supporting a Section 94 Plan to be based on a differentiation of trips types and sources shown below.

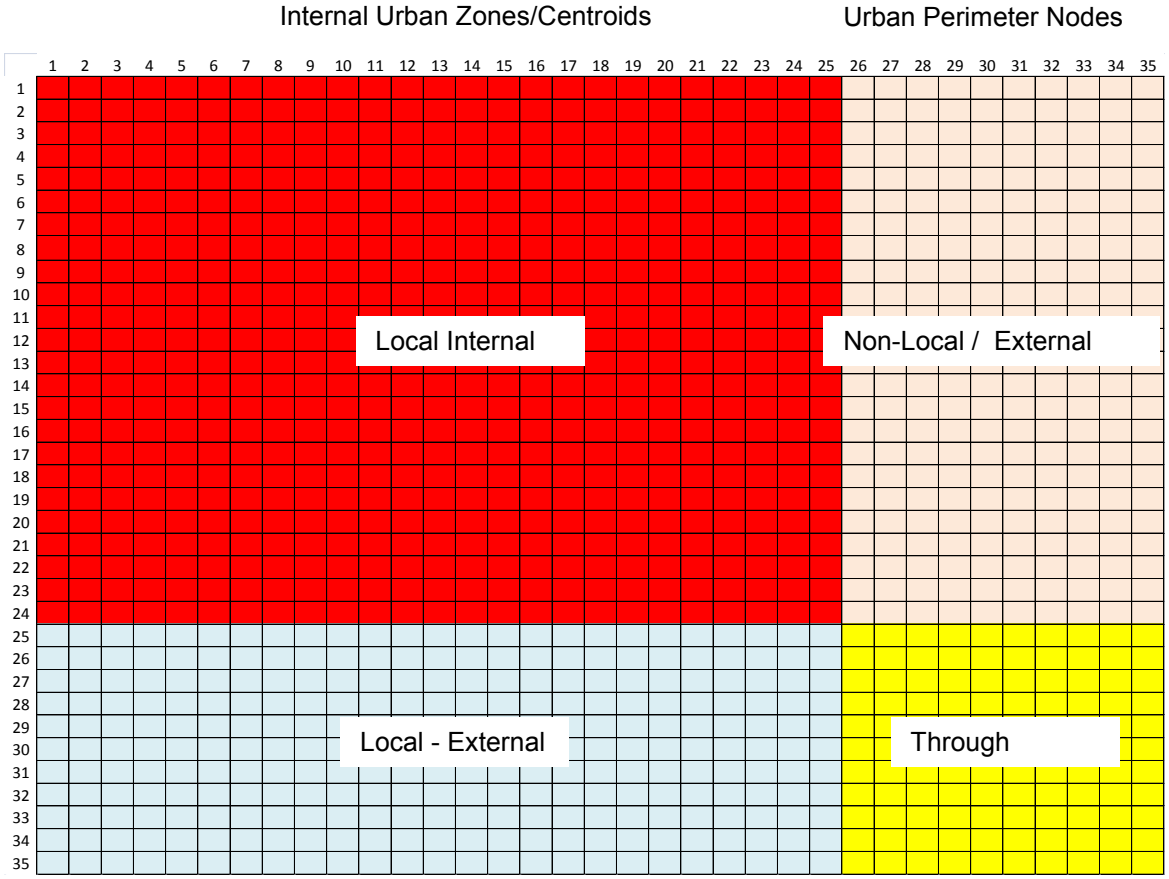


Note : Only those trip types shown in RED are capable of being 'captured' in a Section 94 Infrastructure Contributions Plan.

Trip Type	Definition	Trip Sub-Type	Description
Local Internal	Both trip ends are within the Section 94 Plan network.	Base (Existing)	These are existing trips which can reasonably be expected to continue to occur.
		Base Growth	These are new trips associated with improved socio-economic conditions which lead to increased mobility and trip making.
		Development	These are new trips generated by new development.
Local / External	These trips are generated by and originate from development within the Section 94 Plan network, extend to outside the network and then return.	Base (Existing)	These are existing trips which can reasonably be expected to continue to occur.
		Base Growth	These are new trips associated with improved socio-economic conditions which lead to increased mobility and trip making.
		Development	These are new trips generated by new development.
Non-Local / External	These trips are generated by and originate from development outside the Section 94 Plan network, extend into the network and then return to outside the network.	Base (Existing)	These are existing trips which can reasonably be expected to continue to occur.
		Base Growth	These are new trips associated with improved socio-economic conditions which lead to increased mobility and trip making.
		Development	These are new trips generated by new development.
Through	These trips have both tip ends associated with development outside the Section 94 Plan network and generally pass through the network without stopping.	Base (Existing)	These are existing trips which can reasonably be expected to continue to occur.
		Base Growth	These are new trips associated with improved socio-economic conditions which lead to increased mobility and trip making.
		Development	These are new trips generated by new development.

Note : Only trips shown with a RED bar at right are able to be the subject of a Section 94 Plan contribution requirement.

These various trip types are represented in the following way in trip matrices which were developed in the study for the existing and future planning horizons.



Trip Matrix Format

The following assumptions were applied to the estimates of future trip matrices.

- There will be little or no growth in Local Internal, Local-External and Non-Local External Trips associated with existing development solely due to socio-economic changes and improvements.
- Trip generation rates (eg. vpd/100sq.m. gfa) associated with various types of development will remain unchanged throughout the periods leading up to each of the planning horizons.
- Local Internal, Local-External and Non-Local External Trips will grow at rates which reflect the rate of growth of trips generated by development within the Lismore urban area at each planning horizon.
- Through trips will grow at an average annual rate of 2% over the period leading up to each planning horizon.

5. Investigation Methodology – Lismore Urban Area

The following methodology was applied into the investigations for the urban area road network.

The following planning horizons were adopted.

- 2013 – Existing (based on the S94 Plan coming into effect in the 2012/2013 financial year)
- 2018 – Short Term Horizon
- 2023 – Medium Term Horizon
- 2028 – Long Term Section 94 Plan Horizon
- 2033 – Ultimate Development Horizon

The above planning horizons were based on the following expectation.

- The ability to reasonably anticipate the form of future development and associated road network requirements is limited to a period of approximately 20 years or through to approximately 2033. This represents the "Utlimate" planning horizon.

- Funds collected from the Section 94 Plan will be applied into constructing road network requirements in the period to 2028. This represents the period of time over which Council is able to reasonably anticipate, plan, design and implement road network improvements.

- The Section 94 Plan will be reviewed at 5 yearly intervals, resulting in the term of the Plan at any time varying between 10 and 15 years.

The methodology was then as follows.

- Council provided TTM with estimates of future development across the entire Lismore urban area at each of the above planning horizons.

- Daily trip generation estimates for each planning horizon were then made for Lismore development in each planning horizon. Weekday daily vehicle trip distribution matrices were then prepared for each planning horizon based in part on a calibrated matrix for existing development generated in an AIMSUN traffic assignment model 'seeded' with existing daily traffic volumes.

- A desirable 'Ultimate' road network plan was prepared in consultation with Council having regard to expected future development in the period to 2033. An estimate was made of the probable costs of each element of the desirable long term road network plan.

- The AIMSUN model was applied into making estimates of the cost effectiveness of each road network link within the 'Ultimate' road network plan having regard to the expected development in 2018, 2023 and 2028.

- The 'Ultimate' road network plan was then revised having regard to the estimated cost effectiveness of each element of the plan based on AIMSUN model traffic and network performance estimates.

- The cost of desirable additional future road elements was then distributed across all development in the Lismore urban area. The distribution of cost to future development was then estimated based on the proportion which future development which will contribute to total urban trip generation.

6. Investigation Methodology – Rural Area

The following methodology was applied into the investigations for the rural area road network.

The following planning horizons were adopted.

- 2013 – Existing
- 2028 – Long Term Section 94 Plan Horizon

Traffic estimates for the 2028 planning horizon were based on an expectation that trip making within the rural road network would increase at an average annual rate of 2% per annum through to 2028. This is understood to be consistent with average rural and urban area traffic growth over the past decade. These increases will arise from the combination of population growth in rural centres and outlying areas and miscellaneous non-residential development.

Non-Local / External trips and Through Trips as defined in Section 4 of this report were not included in the estimates based on an assumption that these trips primarily occur on state highways and other roads under the control and management of RMS.

The apportionment of future road costs to trips associated with future development was estimated from a 'gravity model' estimate of rural trip making derived from the relative population of each rural centre.

PART B

Lismore Urban Roads

Future Requirements, Costs and Contributing Factors

1. Existing Road Network and Traffic Volumes

1.1 The Classification of Roads

The Short and Long Term classifications of urban roads as currently adopted by Council are shown in Attachments 1 and 2.

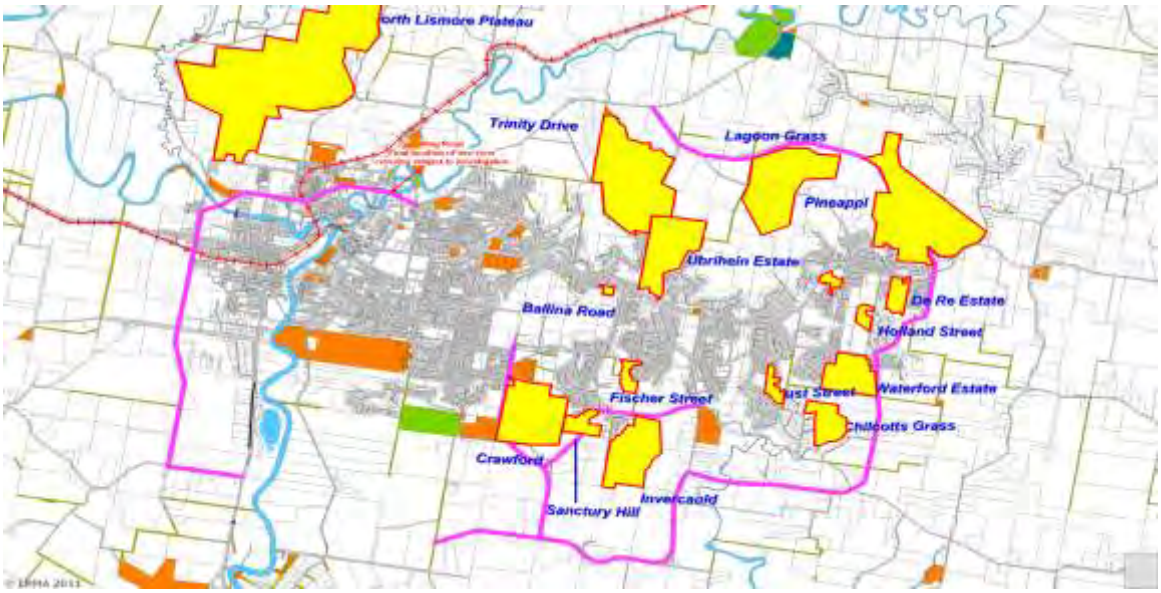
The scope of the investigations undertaken by TTM was primarily limited to roads which are currently classified as “Arterial”, “Sub-Arterial” and “Collector” roads and to future roads which will attract these classifications.

1.2 Existing Traffic Volumes

Existing urban daily traffic volumes were available from Council records are shown in Attachment 3.

2. Anticipated Future Development

The location and nature of anticipated future residential development within the Lismore urban area as advised by Council is shown in Figs 2.1.

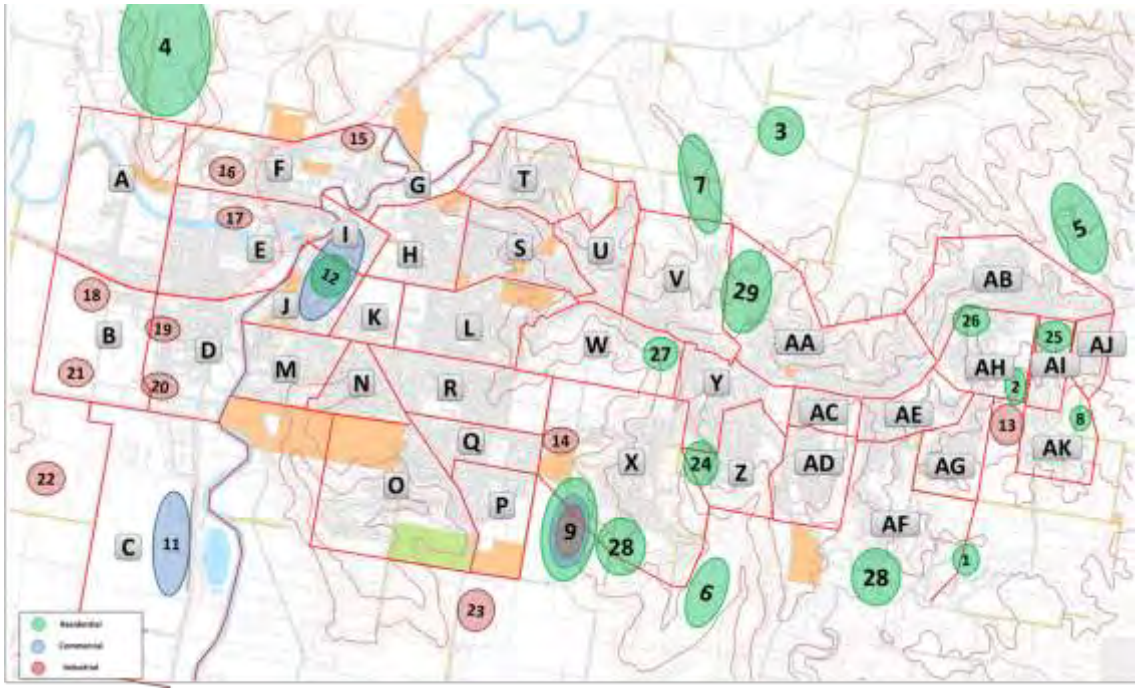


Anticipated Residential Development

			2013 - 2018		2019 - 2023		2024 - 2028		2029 - 2033	
Development Area	Zone	Capacity (Dwellings)	5 Year Total	Percent Complete	5 Year Total	Percent Complete	5 Year Total	Percent Complete	5 Year Total	Percent Complete
Chilcotts Grass	1	163	20	12%	60	49%	40	74%	43	100%
Holland Street	2	43	43	100%		100%		100%		100%
Lagoons Grass	3	185			60	32%	90	81%	35	100%
North Lismore Plateau	4	1500	250	17%	150	27%	150	37%	150	47%
Pineapple	5	332	40	12%	40	24%	60	42%	40	54%
Invercauld	6	263	80	30%	90	65%	60	87%	33	100%
Trinity Drive	7	438	40	9%	60	23%	40	32%	60	46%
Waterford	8	66	40	61%	26	100%		100%		100%
Crawford	9	269	60	22%	40	37%	120	82%	49	100%
Fischer Street	24	130	130	100%		100%		100%		100%
De Re	25	58	58	100%		100%		100%		100%
Lismore Lifestyle	26	76	76	100%		100%		100%		100%
Ballina Road	27	45	45	100%		100%		100%		100%
Sanctuary Hill	28	71	71	100%		100%		100%		100%
Ubrihein Estate	29	74	35	47%	39	100%		100%		100%
Just Street										
Total		**3713**	**988**	**27%**	**565**	**42%**	**560**	**57%**	**410**	**68%**

Fig 2.1 Assumed Major Residential Development Capacity and Development Rate

Fig 2.2 shows a summary of the assumed location and capacity of residential, commercial, industrial and retail development for each of the adopted development zones through to 2033 based on advice from Council.



			Development Potential								
Zone	Primary Development Type	Name	Developable Area (ha)	GFA (sq.m.) Office	GFA (sq.m.) Other Commercial	GFA (sq.m.) Industrial	GFA (sq.m.) Retail	Residential Lots	Detached Dwellings	Attached Dwellings (Medium	Apartments (High Density)
1	Residential	Chilcotts Grass (Tucki Creek)	22					116	68	95	
2	Residential	Holland Street	4					26	15	28	
3	Residential	Lagoons Grass	90						79	106	
4	Residential	North Lismore	110					1500	900	600	
5	Residential	Pineapple Road	150					332	199	266	
6	Residential	Invercauld Road	60					265	157	301	
7	Residential	Trinity Drive	89					-	178	260	
8	Residential	Waterford	-					-	24	42	
9	Residential	Crawford Land	74					213	128	170	
9	Commercial	Crawford Land	-		2000						
9	Recreation	Crawford Land	12								
10	Residential	Monaltrie	140								
11	Commercial	South Lismore Airport Industrial Estate	14		56000						
12	Commercial	CBD	-	15699			28301				16
13	Industrial	Gonnellabah	6			25840					
14	Industrial	East Lismore	6			1592			-1		
15	Industrial	North Lismore	0			2800					
16	Industrial	North Lismore Industrial Area	5			18040			-24		
17	Industrial	Rezoned Land	5			18800					
18	Industrial	Caniaba Street	13			52000					
19	Industrial	South Lismore Industrial (Wyrain Estate)	11			44000					
20	Industrial	Rezoned Land	5			21600					
21	Industrial	South Lismore Industrial North Hollingsworth Ck	8			32120			-86		
22	Industrial	South Lismore Industrial South Hollingsworth Ck	13			51576			-3		
23	Industrial	Wyrallah Road	12			49600					
24	Residential	Fishcer Street	-					-	130		
25	Residential	De Re	-					-	58		
26	Residential	Lismore Lifestyle	-					-	76		
27	Residential	Ballina Road	-					-	45		
28	Residential	Sanctuary Hills	-					93	93		
29	Residential	Urbihein Estate	-					-	74		
Total				15699		317968	28301	2545	2110	1868	16

Fig 2.2 Assumed Capacity for Major Residential, Industrial and Commercial Development

Table 2.1 shows the rate at which development in each of the developments zones is assumed to occur at which planning horizon through to 2033. These estimates were supplied by Council officers and are understood to be based in part on discussions between Council officers and key participants within the development industry.

Table 2.1 Assumed Percent Development Completed at Each Planning Horizon

			Percent Developed By Year			
Zone	Primary Development Type	Name	2016	2021	2026	2031
1	Residential	Chilcotts Grass (Tucki Creek)	12.27%	49.08%	73.62%	100.00%
2	Residential	Holland Street	100.00%	100.00%	100.00%	100.00%
3	Residential	Lagoons Grass		32.43%	81.08%	100.00%
4	Residential	North Lismore	35.71%	57.14%	78.57%	100.00%
5	Residential	Pineapple Road	22.22%	44.44%	77.78%	100.00%
6	Residential	Invercauld Road	30.42%	64.64%	87.45%	100.00%
7	Residential	Trinity Drive	20.00%	50.00%	70.00%	100.00%
8	Residential	Waterford	60.61%	100.00%	100.00%	100.00%
9	Residential	Crawford Land	22.30%	37.18%	81.78%	100.00%
9	Commercial	Crawford Land	22.30%	37.18%	81.78%	100.00%
9	Recreation	Crawford Land	100.00%	100.00%	100.00%	100.00%
10	Residential	Monaltrie				
11	Commercial	South Lismore Airport Industrial Estate	18.75%	37.50%	56.25%	75.00%
12	Commercial	CBD	18.75%	37.50%	56.25%	75.00%
13	Industrial	Gonnellabah	18.75%	37.50%	56.25%	75.00%
14	Industrial	East Lismore	18.75%	37.50%	56.25%	75.00%
15	Industrial	North Lismore	18.75%	37.50%	56.25%	80.00%
16	Industrial	North Lismore Industrial Area	18.75%	37.50%	56.25%	75.00%
17	Industrial	Rezoned Land	20.00%	40.00%	60.00%	80.00%
18	Industrial	Caniaba Street	20.00%	40.00%	60.00%	80.00%
19	Industrial	South Lismore Industrial (Wyrain Estate)	20.00%	40.00%	60.00%	80.00%
20	Industrial	Rezoned Land	20.00%	40.00%	60.00%	80.00%
21	Industrial	South Lismore Industrial North Hollingsworth Ck	18.75%	37.50%	56.25%	75.00%
22	Industrial	South Lismore Industrial South Hollingsworth Ck	18.75%	37.50%	56.25%	75.00%
23	Industrial	Wyrallah Road	18.75%	37.50%	37.50%	75.00%
24	Residential	Fishcer Street	100.00%	100.00%	100.00%	100.00%
25	Residential	De Re	100.00%	100.00%	100.00%	100.00%
26	Residential	Lismore Lifestyle	100.00%	100.00%	100.00%	100.00%
27	Residential	Ballina Road	100.00%	100.00%	100.00%	100.00%
28	Residential	Sanctuary Hills	100.00%	100.00%	100.00%	100.00%
29	Residential	Urbihein Estate	47.30%	100.00%	100.00%	100.00%

3. Estimated Daily Traffic Generation

3.1 Traffic Generation Rates

Table 3.1 shows traffic generation rates were assumed in all traffic generation estimates. It should be noted that these traffic generation rates refer only to trips made across or having one trips end in close proximity to the boundary of each of the zones numbered A through to AK in Fig 2.2. For example it was nominally assumed that approximately 10% of trips generated by residential development remained within or in close proximity to each development zone.

The adopted rates taken from the Gold Coast City Council Transport Infrastructure Contributions Scheme and have been found by TTM to be reasonably representative of average trip generation for each category of urban development.

Table 3.1 Assumed Traffic Generation Rates

Development Type	Unit	Vehs / Day / Unit
Dethatched Dwelling	Dwelling	6.50
Attached Dwelling (Medium	Dwelling	4.00
Apartments (High Density)	Dwelling	2.00
Office	100 sq.m. Gfa	16.00
Retail	100 sq.m. Gfa	40.00
Retail/Commercial Mix	100 sq.m. Gfa	30.00
Industrial	100 sq.m. Gfa	5.00

3.2 Estimated Current and Future Traffic Generation

Tables 3.2 and 3.3 show estimated 2013 and planning horizon traffic generation based on the above traffic generation rates, existing development estimates based partly on aerial photography, known traffic volumes and estimates made in the AIMSUN model during model calibration.

Table 3.2 Estimated Future Development Traffic Generation Increases (Veh Trips / Day)

			2018		2023		2028		2033	
Zone	Primary Development Type	Name	Percentage Developed by 2018	Daily Trips	Percentage Developed by 2023	Daily Trips	Percentage Developed by 2028	Daily Trips	Percentage Developed by 2033	Daily Trips
1	Residential	Chilcotts Grass (Tucki Creek)	12.27%	101	49.08%	403	73.62%	605	100.00%	822
2	Residential	Holland Street	100.00%	210	100.00%	210	100.00%	210	100.00%	210
3	Residential	Lagoons Grass			32.43%	304	81.08%	760	100.00%	938
4	Residential	North Lismore	35.71%	2946	57.14%	4714	78.57%	6482	100.00%	8250
5	Residential	Pineapple Road	22.22%	524	44.44%	1048	77.78%	1833	100.00%	2357
6	Residential	Invercauld Road	30.42%	677	64.64%	1438	87.45%	1945	100.00%	2225
7	Residential	Trinity Drive	20.00%	439	50.00%	1099	70.00%	1538	100.00%	2197
8	Residential	Waterford	60.61%	196	100.00%	324	100.00%	324	100.00%	324
9	Residential	Crawford Land	22.30%	337	37.18%	562	81.78%	1237	100.00%	1512
9	Commercial	Crawford Land	22.30%	134	37.18%	223	81.78%	491	100.00%	600
9	Recreation	Crawford Land	100.00%	490	100.00%	490	100.00%	490	100.00%	490
10	Residential	Monaltrie								
11	Commercial	South Lismore Airport Industrial Estate	18.75%	3150	37.50%	6300	56.25%	9450	75.00%	12600
12	Commercial	CBD	18.75%	2594	37.50%	5187	56.25%	7781	75.00%	10374
13	Industrial	Gonnellabah	18.75%	242	37.50%	485	56.25%	727	75.00%	969
14	Industrial	East Lismore	18.75%	14	37.50%	27	56.25%	41	75.00%	55
15	Industrial	North Lismore	18.75%	26	37.50%	53	56.25%	79	80.00%	112
16	Industrial	North Lismore Industrial Area	18.75%	140	37.50%	280	56.25%	420	75.00%	560
17	Industrial	Rezoned Land	20.00%	188	40.00%	376	60.00%	564	80.00%	752
18	Industrial	Caniaba Street	20.00%	520	40.00%	1040	60.00%	1560	80.00%	2080
19	Industrial	South Lismore Industrial (Wyrain Estate)	20.00%	440	40.00%	880	60.00%	1320	80.00%	1760
20	Industrial	Rezoned Land	20.00%	216	40.00%	432	60.00%	648	80.00%	864
21	Industrial	South Lismore Industrial North Hollingsworth Ck	18.75%	196	37.50%	393	56.25%	589	75.00%	785
22	Industrial	South Lismore Industrial South Hollingsworth Ck	18.75%	480	37.50%	960	56.25%	1440	75.00%	1919
23	Industrial	Wyrallah Road	18.75%	465	37.50%	930	37.50%	930	75.00%	1860
24	Residential	Fishcer Street	100.00%	845	100.00%	845	100.00%	845	100.00%	845
25	Residential	De Re	100.00%	377	100.00%	377	100.00%	377	100.00%	377
26	Residential	Lismore Lifestyle	100.00%	494	100.00%	494	100.00%	494	100.00%	494
27	Residential	Ballina Road	100.00%	293	100.00%	293	100.00%	293	100.00%	293
28	Residential	Sanctuary Hills	100.00%	605	100.00%	605	100.00%	605	100.00%	605
29	Residential	Urbihein Estate	47.30%	227	100.00%	481	100.00%	481	100.00%	481
Total				17566		31250		44557		57708

Table 3.3 Estimated Vehicle Trips Per Day (Weekday) Lismore Urban Area

Summary of Estimated Traffic Generation					
Source	**2013**	**2018**	**2023**	**2028**	**2033**
Lismore Development	89709	107275	120959	134266	147417
% p.a Growth Relative to 2013		3.64%	3.03%	2.72%	2.51%
Through	17147	18932	20902	23078	25480
Total	**106856**	**126206**	**141861**	**157343**	**172897**

Note : Through traffic is based on average growth at 2% p.a.

The estimates indicate that traffic over the next 15 years will grow at an average annual rate of approximately 3% based on the expected development over the period. Over the next 20 years the increase in traffic generation due to development within Lismore is likely to be in the order of 65%.

The above estimates formed the basis of traffic assignments and road network assessments performed within the AIMSUN model for each of planning horizons.

4. Past Studies

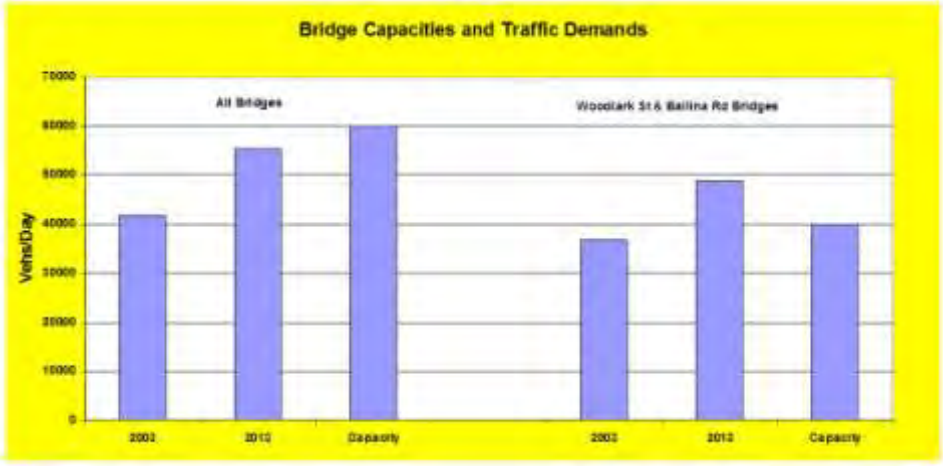
4.1 Lismore CBD Traffic Study (2004)

This study was conducted by TTM Consulting Pty Ltd for Lismore Council.

The objective of the study was primarily to identify future road, traffic and parking management actions which would make a positive contribution towards CBD amenity.

The primary finding of the study in respect to future CBD and wider road network requirements was that traffic demands would approach the combined capacity of the Wilson River bridges at Ballina Road, Woodlark Street and Winterton Road (Simes Bge) shortly after 2013. This conclusion is represented in Fig 4.1 which is an extract from the study.

Fig 4.1 Estimated Future Traffic Demands and Bridge Capacities
Wilson River Bridge Crossings Traffic Demands and Capacities



A summary of the primary recommendations from the study are shown in Fig 4.2.

Fig 4.2

Lismore CBD Traffic Study
Summary of Recommendations

The study particularly considered the potential benefits of constructing new bridges over the River to the immediate north of the CBD and to the south of Ballina Road, generally in locations shown in Fig 4.3.

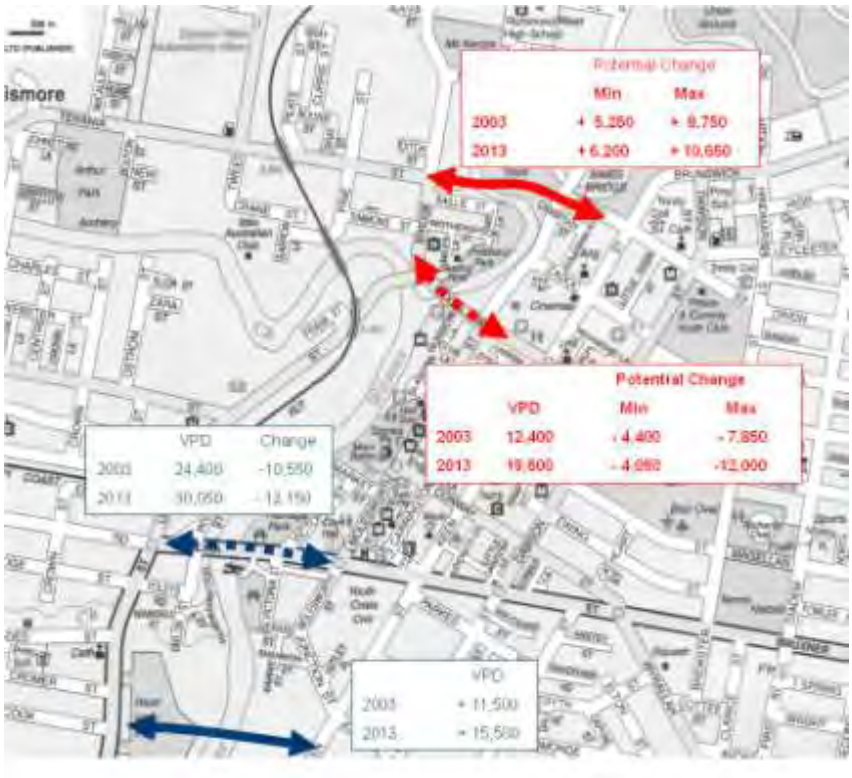


Fig 4.3 The Potential Benefits of New River Crossings on CBD Amenity

The study also concluded that the potential benefit to the CBD of a new river crossing to the north of the CBD reduces considerably for more northerly bridge locations than shown in Fig 4.3.

Recent traffic counts and road network experience and observations suggest that the 2004 study findings remain relevant insofar as they support the need to continue to plan and provide for future river crossings, generally as described in the 2004 study. This relevance particularly applies to the need to plan and provide for a new river crossing to the immediate north of the CBD.

4.2 Bruxner Highway Corridor Study (2009)

This study was conducted by TTM Consulting Pty Ltd for Lismore Council.

The objective of the study was primarily to identify future road and traffic managememt requirements necessary to maintain the long term function of the Lismore road network within the Bruxner Highway corridor.

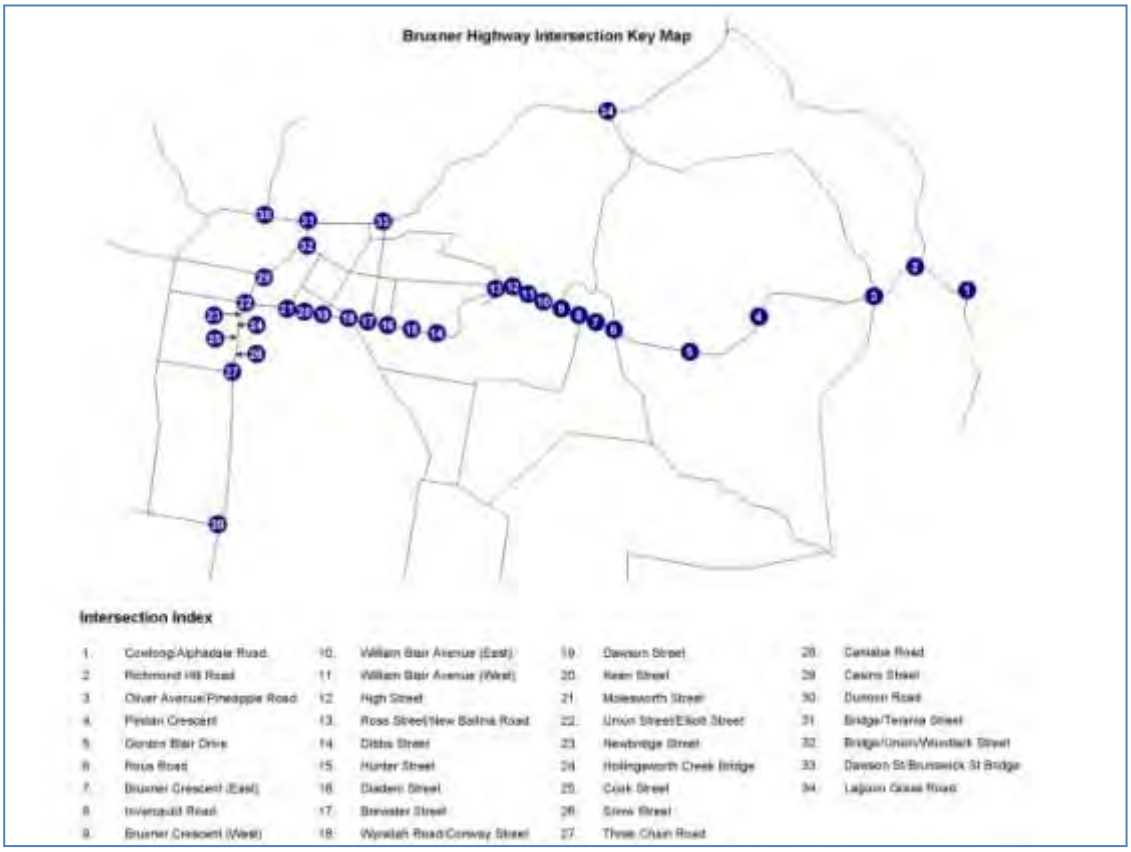
The study included the preparation of an AIMSUN traffic assignment road network model based on peak hour traffic demands. This differs from the current study which was based on assessing road network requirements based on daily traffic demands. The advantages of a model based on hourly traffic demands is that it facilitates assessments of intersection performance whereas a model based on daily flows only facilitates overall road network link assessments.

The 2009 study described the following conclusions regarding network deficiencies.

> *Assessment of the model for the existing network identified a number of deficiencies, most significantly:*
>
> - *high percentage of local traffic utilising Bruxner Highway*
> - *limited alternative routes within and throughout Lismore*
> - *ongoing development and background traffic growth will further exacerbate existing congestion along Bruxner Highway*

An assessment of the future operation of intersections along Bruxner Highway and other selected locations was also made in order to establish the need for intersection upgrades. This assessment is shown in Fig 4.4.

The study ultimately identified future road network requirements required to accommodate background and development traffic growth at the end of 30-year period. These are shown in Fig 4.5.



		Degree of Saturation		
Intersection No.	Approach	2018	2028	2038
1	East	86%	89%	95%
	South	12%	12%	13%
	West	67%	71%	78%
	North	14%	14%	12%
2	East	106%	110%	115%
	West	67%	71%	78%
	North	0%	0%	0%
3	East	106%	110%	115%
	South	5%	5%	5%
	West	37%	40%	44%
	North	35%	74%	41%
4	East	92%	92%	93%
	West	46%	49%	54%
13	East	58%	61%	67%
	West	21%	23%	25%
	North	15%	15%	16%
18	East	51%	53%	57%
	South	66%	71%	76%
	West	38%	42%	46%
	North	46%	48%	46%
21	East	34%	38%	42%
	South	14%	16%	17%
	West	84%	93%	102%
	North	27%	30%	33%
22	East	84%	93%	105%
	South	65%	69%	73%
	West	13%	17%	15%
	North	51%	54%	63%

		Degree of Saturation		
Intersection No.	Approach	2018	2028	2038
24	South	82%	87%	92%
	North	78%	85%	92%
27	South	73%	77%	82%
	North	28%	30%	32%
29	South	30%	31%	36%
	West	47%	50%	59%
	North	26%	28%	27%
30	East	23%	27%	34%
	West	10%	11%	13%
	North	28%	39%	59%
31	East	39%	42%	47%
	South	23%	23%	24%
	West	45%	60%	71%
32	East	15%	18%	20%
	West	63%	66%	69%
	North	64%	68%	75%
33	East	85%	85%	85%
	South	16%	16%	19%
	West	37%	40%	44%
34	East	61%	62%	64%
	South	17%	17%	17%
	West	46%	49%	55%

Fig 4.4 Future Intersection Deficiencies

Fig 4.4 Future Road Network Requirements (2037)

The 2009 study concluded the following with respect to each of the 10, 20 and 30 year development planning horizons adopted in that study.

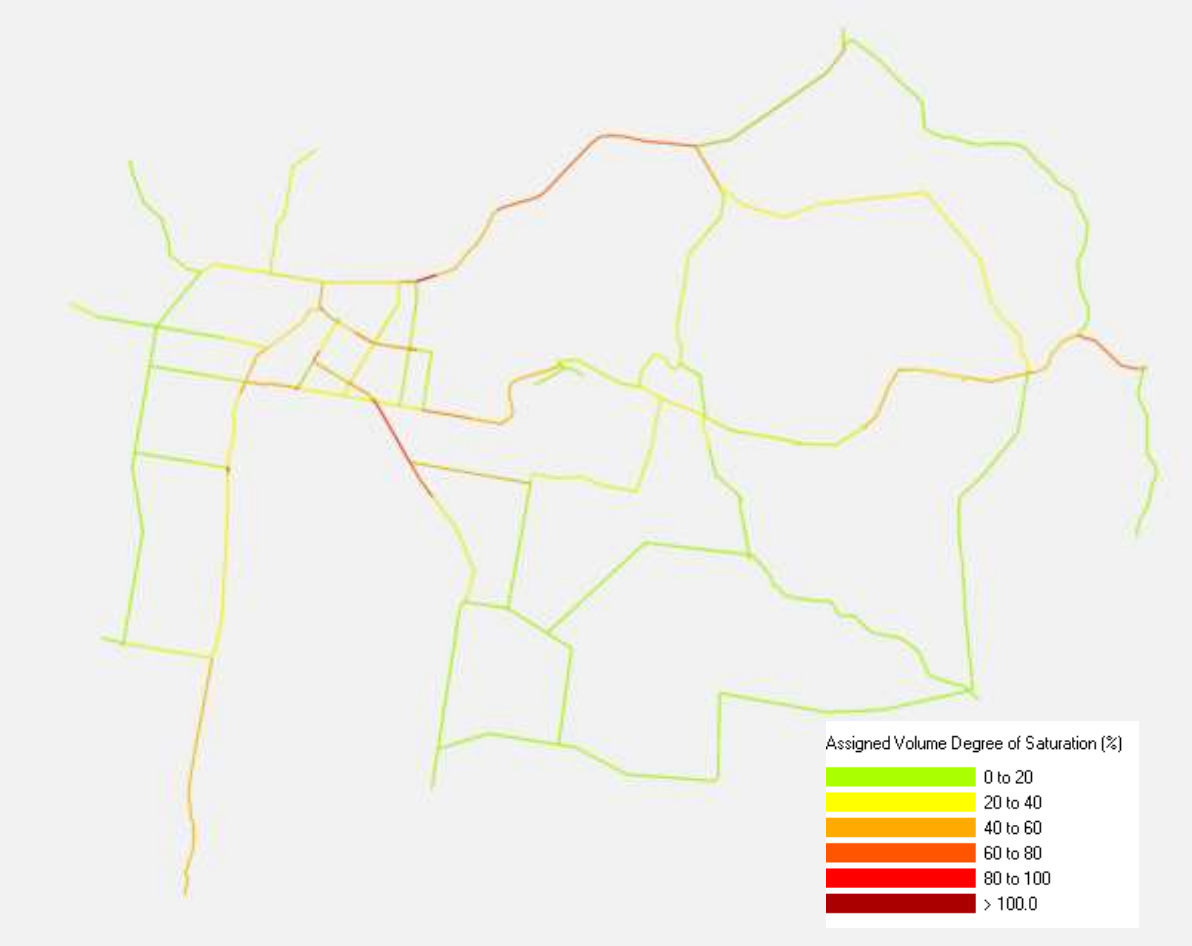
Network Operation - 10-Year Forecast

Network operation of the future road network for the 10-year forecast scenario shows there is a high level of congestion within the wider Lismore road network at the following locations:

- *Wyrallah Road approach to Bruxner Highway roundabout*
- *Bruxner Highway between Alphadale Road and Richmond Hill Road*
- *Bangalow Road approach to Lagoon Grass Rd*
- *Brunswick Street approach to Dawson Street*

Note: The CBD area has not been considered for the purposes of this analysis.

Estimated network operation for the 10-year forecast scenario is shown below.



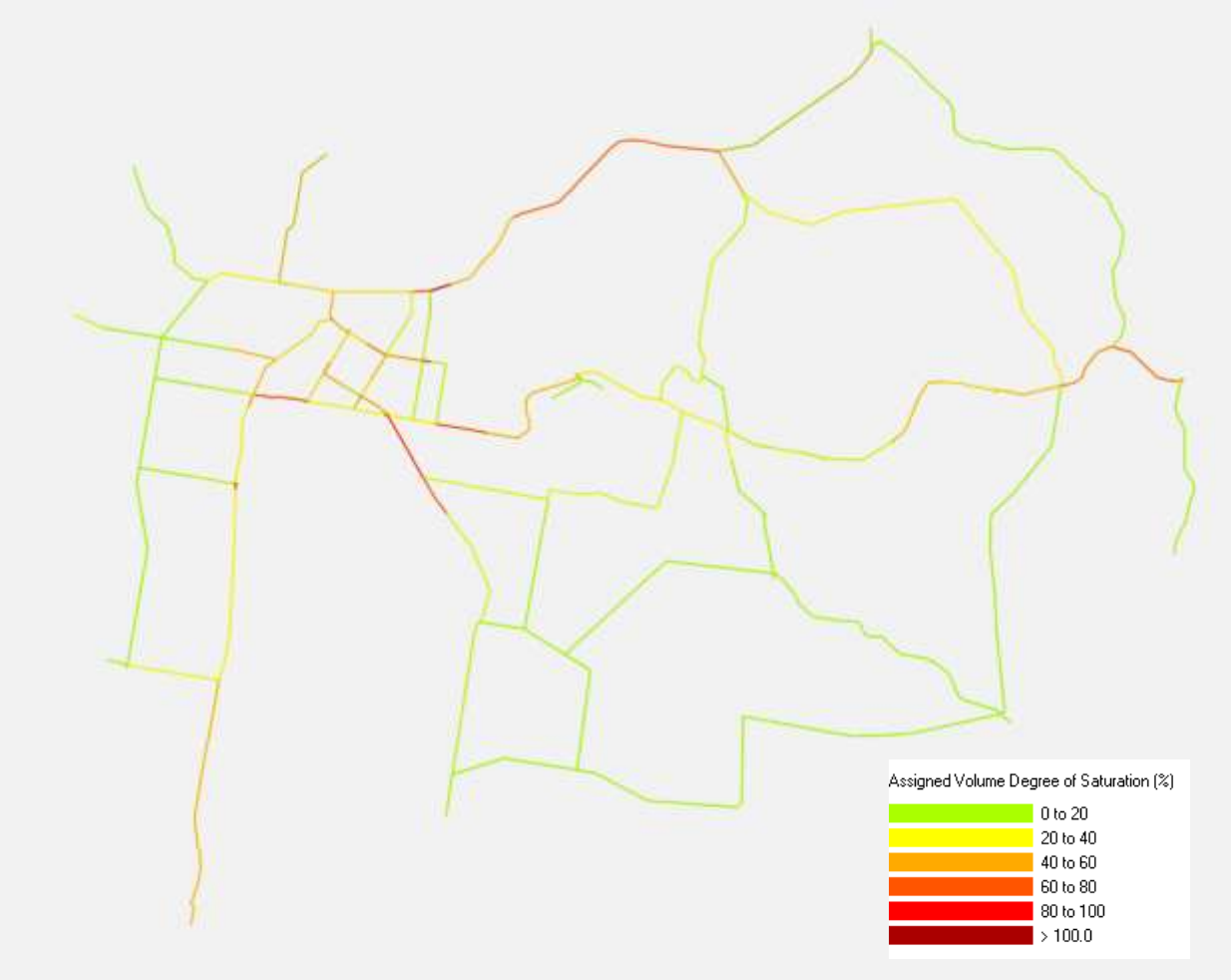
Degree of Saturation – 10-Year Forecast

Network Operation - 20-Year Forecast

The 20-year forecast identified congestion at the following locations, in addition to those identified in the 10-year forecast:

- *Ballina Street Bridge*
- *Bruxner Highway approach to Diadem Street signals*
- *Bruxner Highway between Richmond Hill Road and proposed strategic link*
- *Bruxner Highway southern approach to Ballina St Bridge west*
- *Brunswick Street between Dawson Street and proposed river crossing*

Estimated network operation for the 20-year forecast scenario is shown below.



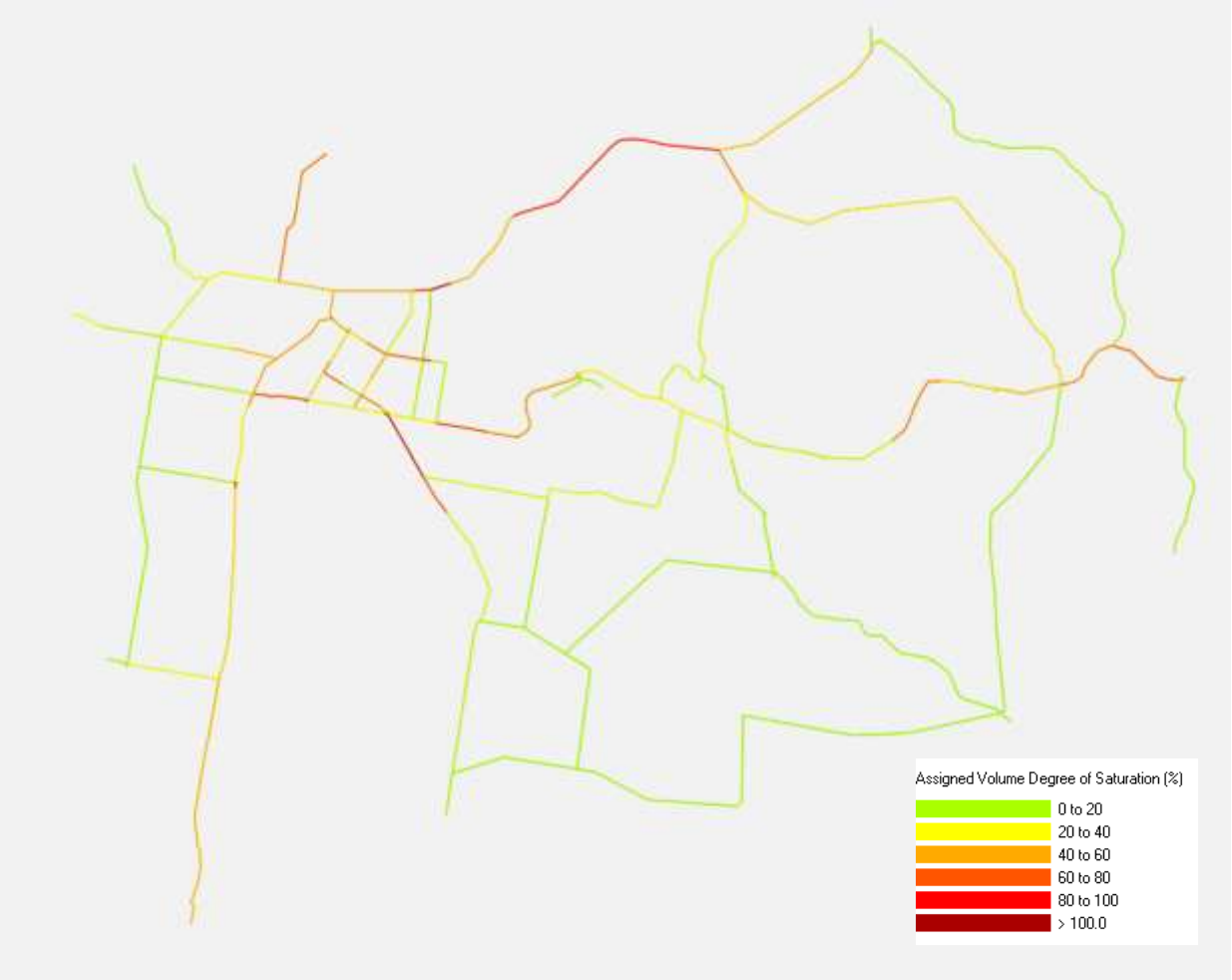
Degree of Saturation – 20-Year Forecast

Network Operation - 30-Year Forecast

The 30-year forecast identified additional congestion points at the following locations:

- *Bruxner Highway Eastern approach to Kadina St roundabout*
- *Bruxner Highway Westbound down the hill from University Roundabout*
- *Dunnoon Road between Terania Street and Proposed development*

Estimated network operation for the 30-year forecast scenario is shown below.



Degree of Saturation – 30-Year Forecast

The 2009 study recommended the following works within the 30 year planning horizon adopted for the study.

Recommended Upgrade Works

Timeframe for works	Location	Recommended Upgrade
10 years	Intersection 2. Richmond Hill Rd	Intersection upgrade required, requires detailed analysis
10 years	Intersection 3. Oliver Avenue/Pineapple Rd	Intersection upgrade required, requires detailed analysis
20 years	Intersection 4. Pindari Crescent	Intersection upgrade required, requires detailed analysis
20 years	Intersection 21. Molesworth St	Upgrade to signals as per CBD Study WP4
20 years	Intersection 22. Union/Elliott St	Intersection upgrade required, requires detailed analysis
30 years	Intersection 1. Cowlong/Alphadale Rd	Intersection upgrade required, requires detailed analysis
30 years	Section 24. Hollingsworth Ck Bridge	Lane duplication to be maintained at creek crossing
30 years	Intersection 27. Three Chain Rd	Intersection upgrade required, requires detailed analysis
30 years	Intersection 33. Dawson St/Brunswick St bridge	Upgrade to signals as per CBD Study WP4

The 2009 report referred to a previous TTM study in 2007 involving the assessment of future operation of the intersection of Ballina Road (Bruxner Hwy) and Rous Road. This assessment was prompted by the requirement for a future road link to the north to facilitate proposed residential subdivisions. The analysis of the intersection showed that under projected traffic growth the existing roundabout would reach full operating capacity in 2012.

The inclusion of a northern approach to the intersection and subsequent traffic generated by the proposed 275 residential allotments up to 2017 resulted in the capacity of a roundabout being exceeded. A recommendation was made to signalise the intersection.

Key recommendations of the 2009 study were :

- *Existing non-compliant median treatments in vicinity of Dibbs Street and east of High Street should be replaced with concrete median as per Section 3.5 of the RTA Road Design Guide.*

- *A concrete median should be installed to limit property access to left in left out from Wyrallah Road to Kadina Street.*

- *Analysis of crash data indicates curve alignment in the vicinity of Sunrise Crescent may be a contributing factor. TTM recommended installation of chevron alignment markers (D4-68) and curve warning signs (W1-3B) to highlight curve.*

- *The following intersections with Ballina Road (Bruxner Highway) require modification in the short term:*

  A. *William Blair Avenue – West: Prohibit right turn from William Blair Avenue. Right turn from Ballina Road maintained due to additional travel distance exceeding 2000m.*

  B. *William Blair Avenue – East: New median to limit access to left in left out.*

- *The following intersections require further investigation, inclusive of microsimulation, road reserve limitations, budgetry constraints, etc, to confirm upgrade requirements:*

  A. *Union Street (Bruxner Highway) / Newbridge Street / Foley Road*

     Requires upgrade to include right turn lanes as part of future project to widen the bridge over Hollingsworth Creek.

  B. *Ballina Road (Bruxner Highway) / High Street: does not meet design standards.*

     TTM recommended widening and lengthening of right turn lane and increasing width of median to improve protection for right turn movements from High Street.

  C. *Ballina Road (Bruxner Highway) / Invercauld Road*

     TTM recommended that further investigation be undertaken to determine the requirement for signalisation of this intersection with reference made to RTA Warrants for Signalised Intersections.

  D. *Ballina Road (Bruxner Highway) / Rous Road*

     Based on a previous assessment of this intersection in 2007, TTM recommended an upgrade to signals in the event that a northern approach be required to facilitate access to future residential development.

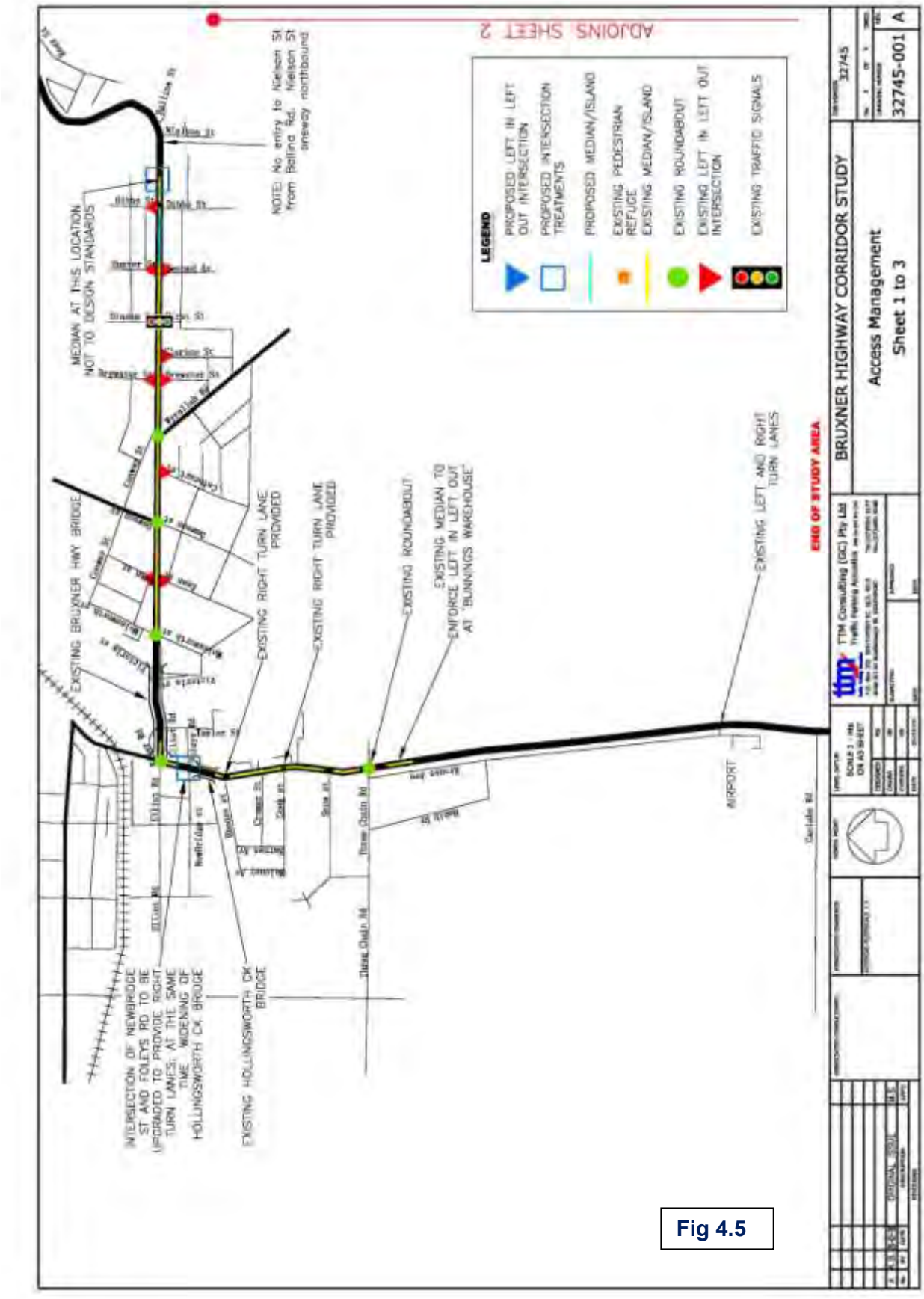
TTM also recommended Bruxner Highway access management plans shown in Figs 4.5, 4.6 and 4.7.

4.3 Comment

The translation of the findings of past studies into matters addressed in this report should have regard to the fact that development in and about Lismore (and the region in general) and associated traffic growth has not occurred at rates assumed in these past studies.

Also, it is important to appreciate that these past studies were based on peak hour traffic estimates, whereas estimates made in this study refer to daily traffic movements. These two approaches to making future traffic demand estimates can potentially yield considerably different conclusions regarding the capacity of the road network to accommodate future traffic demands. For example, peak hour traffic demands generally represent approximately 10% of total daily traffic movement and approximately 12.5% of traffic occurring in the weekday period between 7am and 7pm. Consequently, a road or intersection which has considerable capacity to satisfy daily traffic demands may be inadequate to satisfy peak hour traffic demands.

Daily traffic demand estimates are typically suited to developing macro-level or strategic road network plans of the type generated from this study whereas peak hour traffic estimates are suited to making decisions regarding micro-network planning related to intersection management localised points of traffic congestion.


ADJOINS SHEET 2
LEGEND
PROPOSED LEFT IN LEFT OUT INTERSECTION
PROPOSED INTERSECTION TREATMENTS
PROPOSED MEDIAN/ISLAND
EXISTING PEDESTRIAN REFUGE
EXISTING MEDIAN/ISLAND
EXISTING ROUNDABOUT
EXISTING LEFT IN LEFT OUT INTERSECTION
EXISTING TRAFFIC SIGNALS
NOTE: No entry to Nielson St from Rolling Rd. Nielson St one-way northbound
MEDIAN AT THIS LOCATION NOT TO DESIGN STANDARDS
EXISTING BRUXNER HWY BRIDGE
EXISTING RIGHT TURN LANE PROVIDED
EXISTING RIGHT TURN LANE PROVIDED
EXISTING ROUNDABOUT
EXISTING MEDIAN TO ENFORCE LEFT IN LEFT OUT AT BUNNINGS WAREHOUSE
EXISTING LEFT AND RIGHT TURN LANES
END OF STUDY AREA
AIRPORT
INTERSECTION OF NEWBRIDGE ST AND FOLEYS RD TO BE UPGRADED TO PROVIDE RIGHT TURN LANES AT THE SAME TIME WIDENING OF HOLLINGSWORTH CK BRIDGE
EXISTING HOLLINGSWORTH CK BRIDGE
BRUXNER HIGHWAY CORRIDOR STUDY
Access Management
Sheet 1 to 3
32745-001
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TTM Consulting (GC) Pty Ltd

Fig 4.5

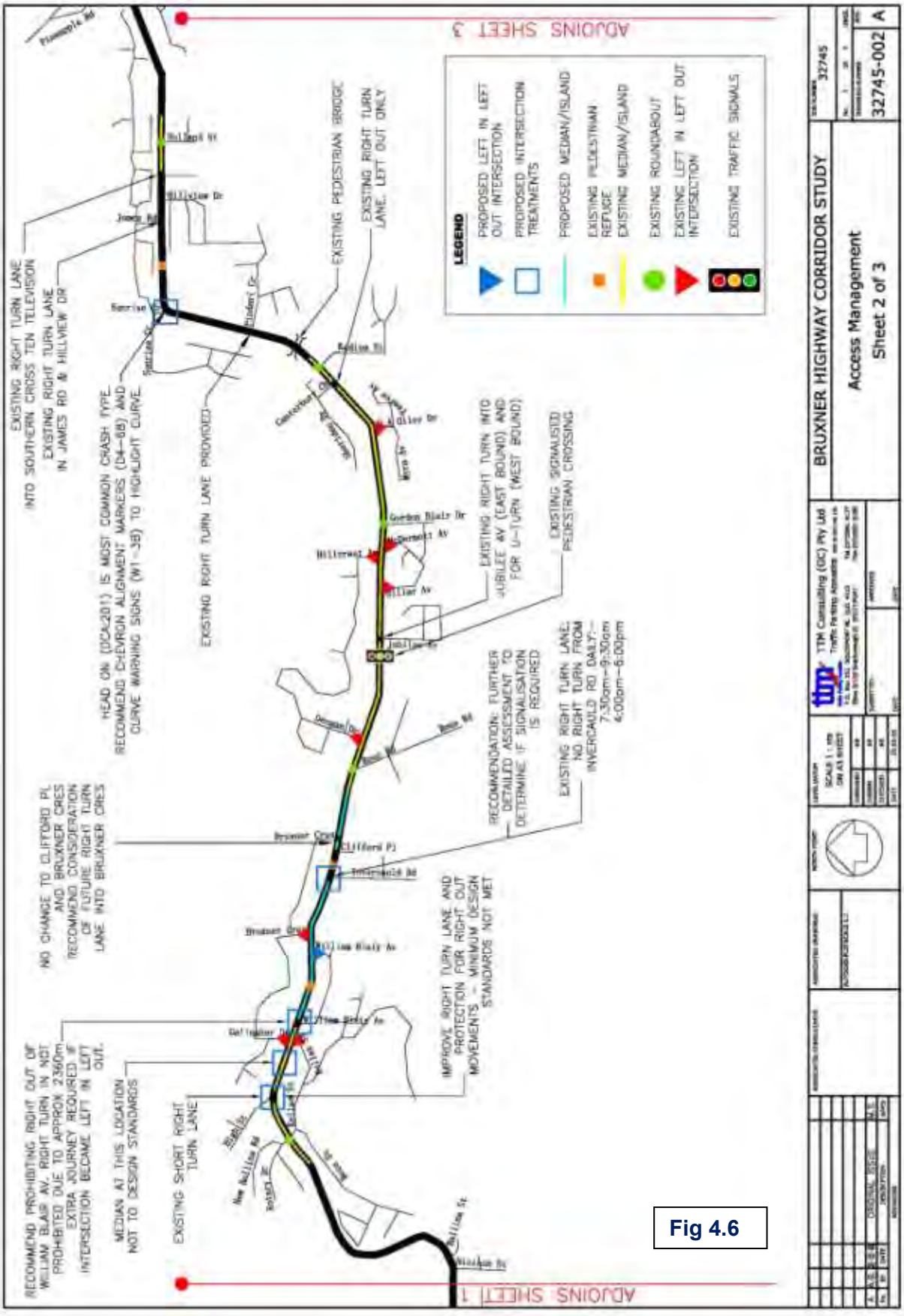
BRUXNER HIGHWAY CORRIDOR STUDY
Access Management
Sheet 2 of 3
32745-002 A
TTM Consulting (GC) Pty Ltd
LEGEND
PROPOSED LEFT IN LEFT OUT INTERSECTION
PROPOSED INTERSECTION TREATMENTS
PROPOSED MEDIAN/ISLAND
EXISTING PEDESTRIAN REFUGE
EXISTING MEDIAN/ISLAND
EXISTING ROUNDABOUT
EXISTING LEFT IN LEFT OUT INTERSECTION
EXISTING TRAFFIC SIGNALS
ADJOINS SHEET 3
ADJOINS SHEET 1
EXISTING RIGHT TURN LANE INTO SOUTHERN CROSS TEN TELEVISION
EXISTING RIGHT TURN LANE IN JAMES RD & HILLVIEW DR
HEAD ON (DCA-201) IS MOST COMMON CRASH TYPE. RECOMMEND CHEVRON ALIGNMENT MARKERS (D4-6B) AND CURVE WARNING SIGNS (W1-3B) TO HIGHLIGHT CURVE.
EXISTING RIGHT TURN LANE PROVIDED
EXISTING PEDESTRIAN BRIDGE
EXISTING RIGHT TURN LANE. LEFT OUT ONLY
EXISTING RIGHT TURN INTO JUBILEE AV (EAST BOUND) AND FOR U-TURN (WEST BOUND)
EXISTING SIGNALISED PEDESTRIAN CROSSING
EXISTING RIGHT TURN LANE: NO RIGHT TURN FROM INVERCAULD RD DAILY:- 7:30am-9:30am 4:00pm-6:00pm
RECOMMENDATION: FURTHER DETAILED ASSESSMENT TO DETERMINE IF SIGNALISATION IS REQUIRED
NO CHANGE TO CLIFFORD PL AND BRUXNER CRES
RECOMMEND CONSIDERATION OF FUTURE RIGHT TURN LANE INTO BRUXNER CRES
IMPROVE RIGHT TURN LANE AND PROTECTION FOR RIGHT OUT MOVEMENTS - MINIMUM DESIGN STANDARDS NOT MET
RECOMMEND PROHIBITING RIGHT OUT OF WILLIAM BLAIR AV. RIGHT TURN IN NOT PROHIBITED DUE TO APPROX 2360m EXTRA JOURNEY REQUIRED IF INTERSECTION BECAME LEFT IN LEFT OUT.
MEDIAN AT THIS LOCATION NOT TO DESIGN STANDARDS
EXISTING SHORT RIGHT TURN LANE

Fig 4.6

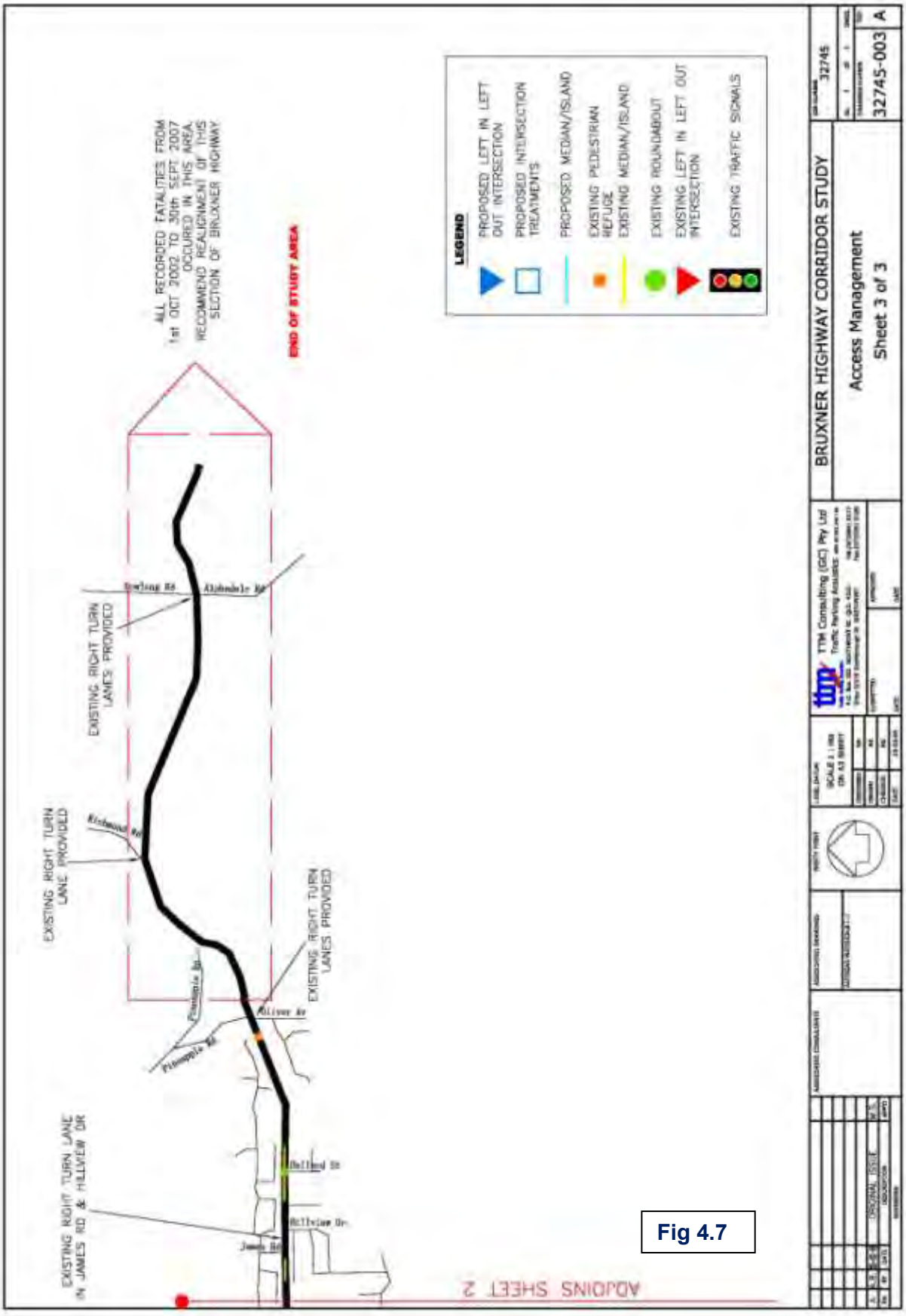
LEGEND
PROPOSED LEFT IN LEFT OUT INTERSECTION
PROPOSED INTERSECTION TREATMENTS
PROPOSED MEDIAN/ISLAND
EXISTING PEDESTRIAN REFUGE
EXISTING MEDIAN/ISLAND
EXISTING ROUNDABOUT
EXISTING LEFT IN LEFT OUT INTERSECTION
EXISTING TRAFFIC SIGNALS
ALL RECORDED FATALITIES FROM 1st OCT 2002 TO 30th SEPT 2007 OCCURED IN THIS AREA. RECOMMEND REALIGNMENT OF THIS SECTION OF BRUXNER HIGHWAY
END OF STUDY AREA
EXISTING RIGHT TURN LANES PROVIDED
EXISTING RIGHT TURN LANE PROVIDED
EXISTING RIGHT TURN LANES PROVIDED
EXISTING RIGHT TURN LANE IN JAMES RD & HILLVIEW DR
ADJOINS SHEET 2
BRUXNER HIGHWAY CORRIDOR STUDY
Access Management
Sheet 3 of 3
32745-003 A
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Fig 4.7

5. The Investigated Urban Road Network Extent

This study commenced with identifying all potential future road links and improvements which had been the subject of past proposals and/or investigations or which in the view of the consultant and Council officers may become desirable depending on the rate and distribution of future development and construction costs. All identified potential future links and improvements were then inserted into what was termed the "Ultimate Road Network", defined as that network which would be desirable without regard to cost. This network provided the basis for undertaking a study into likely construction costs, feasibilities and justifications for each future road link and improvement over each of the planning horizons.

The form and extent of the "Ultimate Road Network" is shown in Fig 5.1.

Table 5.1 provides a brief description of the nature of each potential future road link and improvement contained within the "Ultimate Road Network".

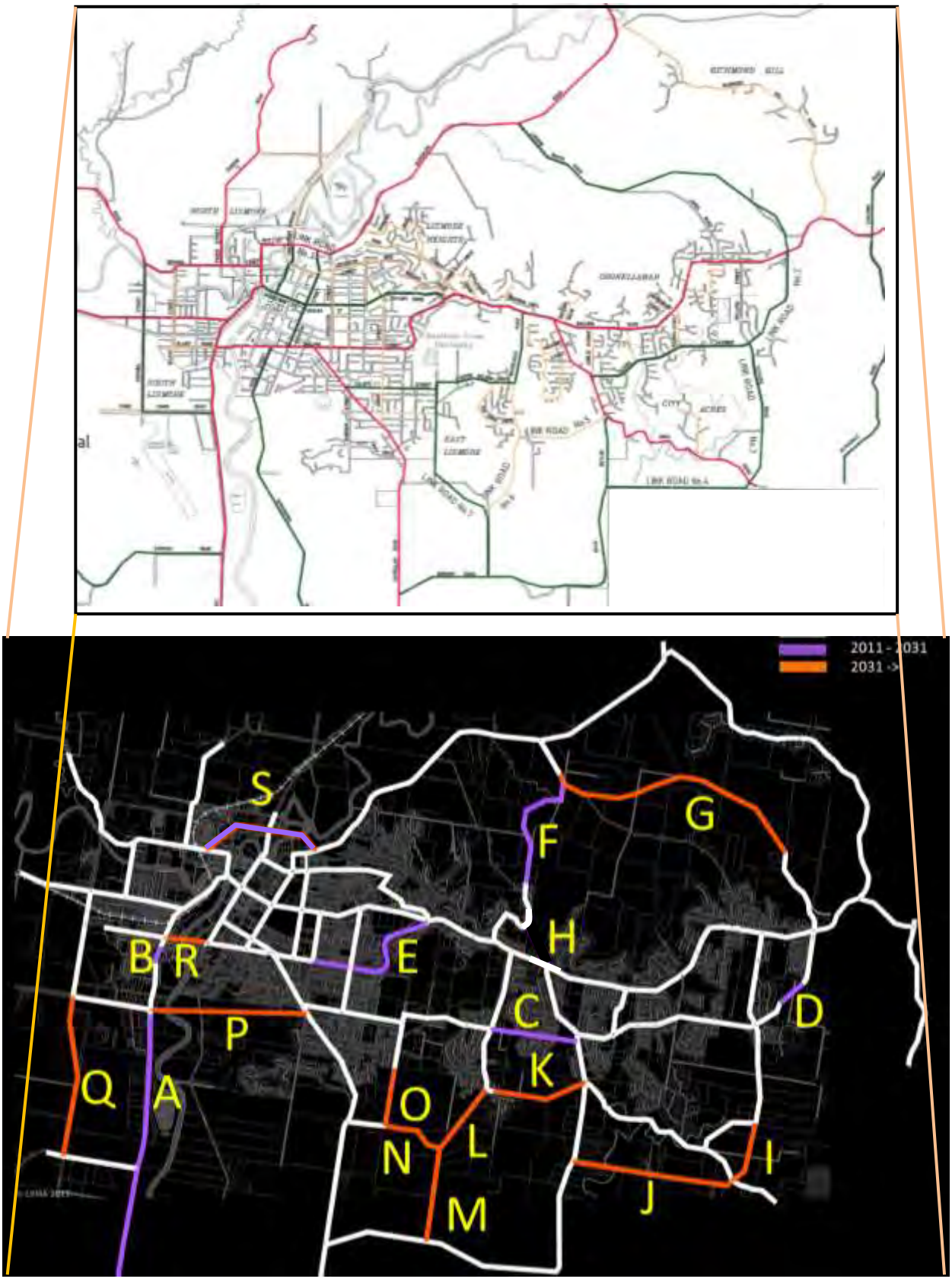


Fig 5.1 The Form and Extent of the Investigated Urban Road Network

Table 5.1 Description of Potential New Links and Road Improvements Contained in "Ultimate Road Network"

Ref Fig 5.1	Link	Type	Nature of Work
A	Bruxner Highway (South of Three Chain Road)	Road	Duplication of Road
B	Bruxner Highway (Across Hollingsworth Creek)	Bridge	Duplication of Bridge
C	Cynthia Wilson Drive to Rous Road	Road	New Road with Kerbs
D	Eastern Bypass (Oliver Avenue)	Road	Resurfacing etc
D	Eastern Bypass (Oliver Avenue Bridge)	Road	New Road with Kerbs and Bridge
E	Bruxner Highway (Rotary Drive to Diadem Street)	Road	Duplication of Road
F	Trinity Drive (Bruxner Highway to Lagoon Grass Road)	Road	Resurface etc
F	Trinity Drive (Bruxner Highway to Lagoon Grass Road)	Road	New Road with Kerbs
G	Eastern Bypass (Lagoon Grass Road to Pineapple Road)	Road	Widening Existing Road
G	Eastern Bypass (Lagoon Grass Road to Pineapple Road)	Road	New Road with Kerbs
H	N/A	Road	New Road with Kerbs
I	Southern Bypass (Taylor Road to Rous Road)	Road	New Road with Kerbs
J	Southern Bypass (Rous Road to Skyline Road)	Road	Widening Existing Road
J	Southern Bypass (Rous Road to Skyline Road)	Road	New Road with Kerbs
K	Other Link Roads (Invercauld Road to Rous Road)	Road	New Road with Kerbs
L	Other Link Roads (Skyline Drive to Invercauld Road)	Road	New Road with Kerbs
MNO	Other Link Roads (Military Drive to Skyline Road)	Road	Widening Existing Road
MNO	Other Link Roads (Military Drive to Skyline Road)	Road	New Road with Kerbs
P	New link + Bridge (Three Chain Road to Wyrallah Road)	Road	New Road with Kerbs and Bridge
Q	Western Bypass (Three Chain Road to Caniaba Road)	Road	New Road with Kerbs
R	Duplicate Bruxner Highway RTA Bridge	Bridge	New Bridge
S	River Crossing (Brunswick Street to Lake Street)	Bridge	New Bridge
S	Northern Bypass (Terania Street to Brunswick Street)	Road	Resurfacing etc
S	Northern Bypass (Terania Street to Brunswick Street)	Road	New Road with Kerbs

6. Estimated Construction Costs

Table 6.1 shows the estimated cost of new roads and other works represented in the Ultimate Road Network shown in Fig 5.1.

Estimated Road and Intersection Construction Costs							
Ref (Fig 5.1)	**Item**	**Upgrade**	**Length (m)**	**Width (m)**	**Area m2**	**m2 rate**	**LCC Estimated Cost**
A	Bruxner Highway - (South of Three Chain Road)	Duplication of Road	2000	13	26000	160	$4,160,000
B	Bruxner Highway - (Across Hollinsworth Creek)	Duplication of Bridge					$6,000,000
C	Cynthia Wilson Drive to Rous Road	New Road with Kerbs	1200	13	15600	180	$6,600,000
D	Eastern ByPass (Oliver Avenue)	Resurfacing	500	13	6500	160	$1,040,000
D	Eastern ByPass (Oliver Avenue - Bridge)	New Road with Kerbs	600	13	7800	180	$6,005,000
E	Bruxner Highway (Rotary Drive to Diadem Street)	Duplication of Road	2200	12	26400	180	$4,752,000
F	Trinity Drive (Bruxner Highway to Lagoons Grass Road)	Resurfacing	1300	11	14300	160	$2,288,000
F	Trinity Drive (Bruxner Highway to Lagoons Grass Road)	New Road with Kerbs	1700	13	22100	180	$3,978,000
G	Eastern Bypass (Lagoons Grass Road to Pineapple Road)	Widening Existing Road	2100	13	27300	160	$4,368,000
G	Eastern Bypass (Lagoons Grass Road to Pineapple Road)	New Road with Kerbs	3700	13	48100	180	$8,658,000
I	Southern Bypass (Taylor Road to Rous Rous)	New Road with Kerbs	900	13	11700	180	$2,106,000
J	Southern Bypass (Rous Road to Skyline Road)	Widening Existing Road	1000	13	13000	160	$2,080,000
J	Southern Bypass (Rous Road to Skyline Road)	New Road with Kerbs	1200	13	15600	180	$2,808,000
K	Other Link Roads (Invercauld Road to Rous Road)	New Road with Kerbs	1300	13	16900	180	$3,042,000
L	Other Link Roads (Skyline Road to Invercauld Road)	New Road with Kerbs	1300	13	16900	180	$3,042,000
MNO	Other Link Roads (Military Drive to Skyline Road)	Widening Existing Road	600	11	6600	160	$1,056,000
MNO	Other Link Roads (Military Drive to Skyline Road)	New Road with Kerbs	2400	11	26400	180	$4,752,000
P	New Link + Bridge (Three Chain Road to Wyrallah)	New Road with Kerbs	1500	13	19500	180	$30,000,000
Q	Western Bypass (Three Chain Road to Caniaba Road)	New Road with Kerbs	2200	13	28600	180	$5,148,000
R	Duplicate Bruxner Highway RTA Bridge	New Bridge			0		$42,000,000
S	River Crossing (Brunswick Street to Lake Street)	New Bridge			0		$11,000,000
S	Northern Bypass (Terania Street to Brunswick Street)	Resurfacing	1500	13	19500	160	$3,120,000
S	Northern Bypass (Terania Street to Brunswick Street)	New Road with Kerbs	500	13	6500	180	$1,170,000
						Sub-Total	**$159,173,000**

Intersections		**Upgrade**					**LCC Estimate $**
1	Richmond Hill/Bruxner Highway	Upgrade					$750,000
2	Invercauld Road/Bruxner Highway	Roundabout					$3,200,000
3	Oliver Avenue/Pineapple Road	Upgrade					$1,000,000
4	Pindari Crescant/Bruxner Highway	Upgrade					$750,000
5	Molesworth Street/Bruxner Highway	Traffic Signals					$1,500,000
6	Union Street / Elliott Street	Traffic Signals					$1,500,000
7	Rous Road and Oliver Avenue Intersection	Roundabout					$800,000
8	Cynthia Wilson and Invercauld Road Intersection	Mini Roundabout					$200,000
9	Elizabeth Ave and Rous Road Intersection	Mini Roundabout					$200,000
10	Bruxner Highway and Mountainview Drive	Traffic Signals					$1,500,000
11	Bruxner Highway and Holland Street	Roundabout					$1,000,000
12	Holland Street and Oliver Avenue	Roundabout					$1,000,000
						Sub-Total	**$13,400,000**
						TOTAL	**$172,573,000**

Table 6.1

7. The Estimated Effectiveness of Desirable Future Road Links

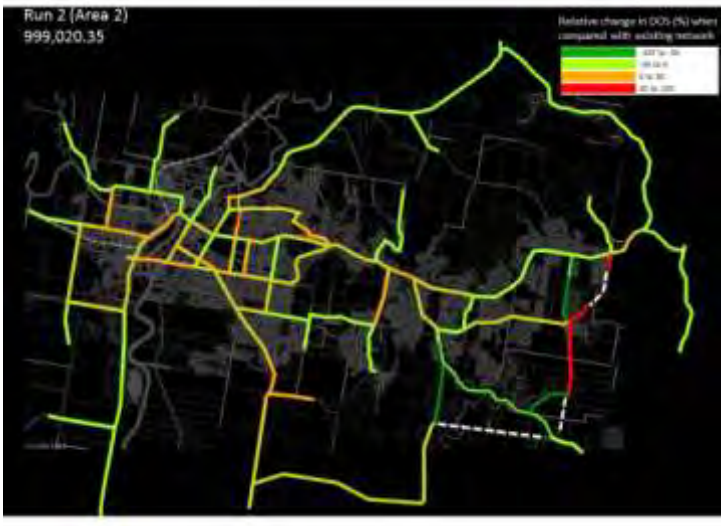
The effectiveness of road network link improvements was estimated from the AIMSUN model for trip making within the 2033 development planning horizon. The purpose of this testing was to enable a comparison of the cost effectiveness of new road links having regard to a logical combination of links within each urban sector.

Vehicle-hours of travel in the existing road network were estimated at 621,080 for 2013 demand and 1,010,613 for 2033 demand.

Testing provided the following 2033 estimates of the comparative effectiveness of road network improvements relative to conditions if road network improvements were not to occur.

Vehicle Hours Reduction = 26,430
Estimated Cost of Works ($M) = $27.20
(Veh-Hrs Reduction / $Cost) Ratio = 972

Vehicle Hours Reduction = 11,593
Estimated Cost of Works ($M) = $15.18
(Veh-Hrs Reduction / $Cost) Ratio = 764



Vehicle Hours Reduction = 22,113
Estimated Cost of Works ($M) = $15.35
(Veh-Hrs Reduction / $Cost) Ratio = 1441

Vehicle Hours Reduction = 23,383
Estimated Cost of Works ($M) = $16.50
(Veh-Hrs Reduction / $Cost) Ratio = 1417

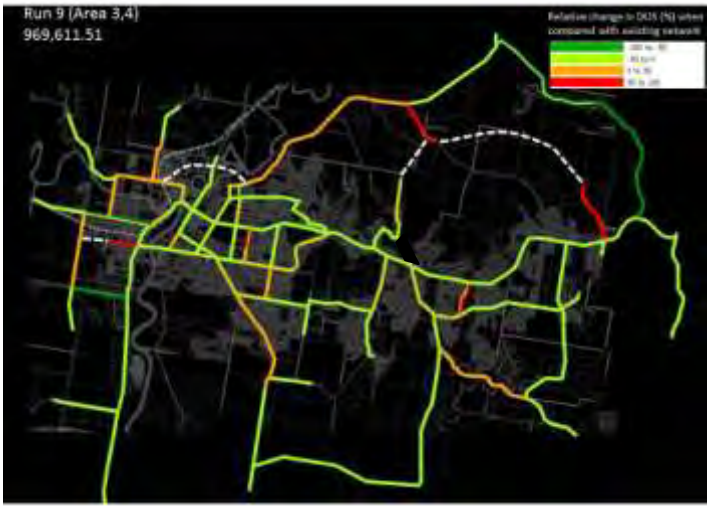
Vehicle Hours Reduction = 29,719
Estimated Cost of Works ($M) = $14.12
(Veh-Hrs Reduction / $Cost) Ratio = 2105

Vehicle Hours Reduction = 34,152
Estimated Cost of Works ($M) = $42.38
(Veh-Hrs Reduction / $Cost) Ratio = 806

Vehicle Hours Reduction = 48,371
Estimated Cost of Works ($M) = $57.73
(Veh-Hrs Reduction / $Cost) Ratio = 838

Vehicle Hours Reduction = 53,387
Estimated Cost of Works ($M) = $30.62
(Veh-Hrs Reduction / $Cost) Ratio = 1744

Vehicle Hours Reduction = 41,002
Estimated Cost of Works ($M) = $31.85
(Veh-Hrs Reduction / $Cost) Ratio = 1287



Vehicle Hours Reduction = 63,353
Estimated Cost of Works ($M) = $45.97
(Veh-Hrs Reduction / $Cost) Ratio = 1378

Vehicle Hours Reduction = 94,678
Estimated Cost of Works ($M) = $88.35
(Veh-Hrs Reduction / $Cost) Ratio = 1072

Table 7.1 shows a summary of the Veh-Km Reduction / Cost ratio for each of the tested network ordered in ranking of cost effectiveness (highest to lowest).

Table 7.1 Network Cost Effectiveness Ranking (2033 Traffic Demands)

Network Run	Veh-Hr	Veh-Hr Reduction	Cost	Reduction/Cost
5	980894	29719	14.12	2105
8	957226	53387	30.62	1744
3	988500	22113	15.35	1441
4	987230	23383	16.5	1417
10	947260	63353	45.97	1378
9	969611	41002	31.85	1287
11	915935	94678	88.35	1072
1	984183	26430	27.2	972
7	962242	48371	57.73	838
6	976461	34152	42.38	806
2	999020	11593	15.18	764

The network assessments identify the need to address the following three road network planning issues in a short, medium and long term road network plan.

- Expansion of the capacity of Bruxner Highway
- Provision of alternative routes to the Bruxner Highway, particularly to the immediate south of Highway to the east of the CBD.
- Provision of additional river crossing capacity to the north of the CBD.

Based in on the cost effectiveness of network options and elements and having regard to the objective to progressively develop a connective road network, TTM identified road network projects which appeared to be justified or not justified within the a 20 year planning horizon (ie. before 2033). These are shown in Fig 7.1.

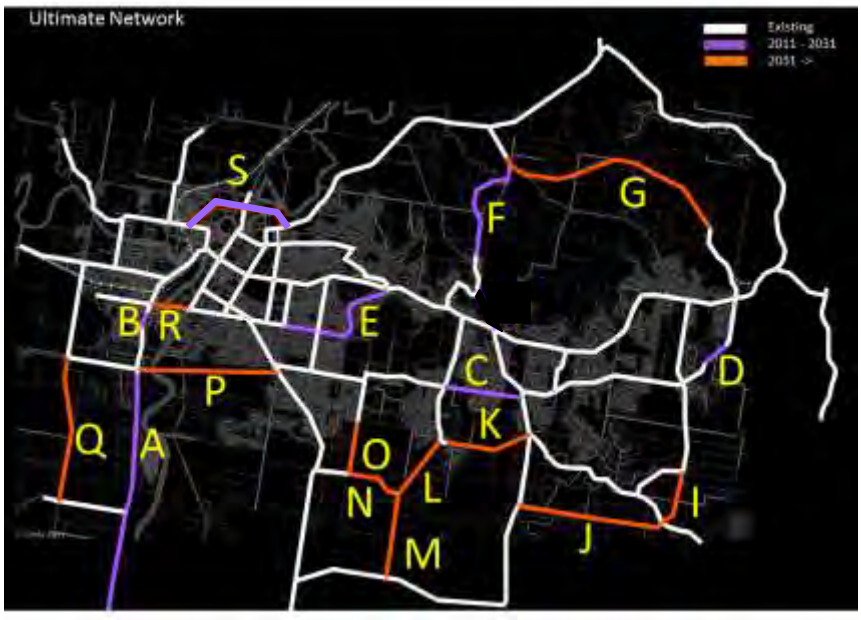


Fig 7.1

Justifiable Project Timing

8. Recommended Road Network Staging

Based on discussion with Council officers road network stages were derived from an objective to maintain operating conditions within major road network links at no worse than generally prevailed in 2013 in Bruxner Highway at approximately the location marked in Fig 8.1.

The AIMSUN assignment model was used to 'test' road network improvements and generate staging plans based on the above objective. Estimated traffic volumes and link saturations for each derived road network stage coinciding with 5 year planning horizons are shown in Figs 8.1 to 8.5.

The reader should be aware that the AIMSUN model defines daily link capacity in terms of 24 hour operation. Consequently, the saturation estimates and cost effectiveness ratios should only be used for comparing the relative cost effectiveness of network stages.

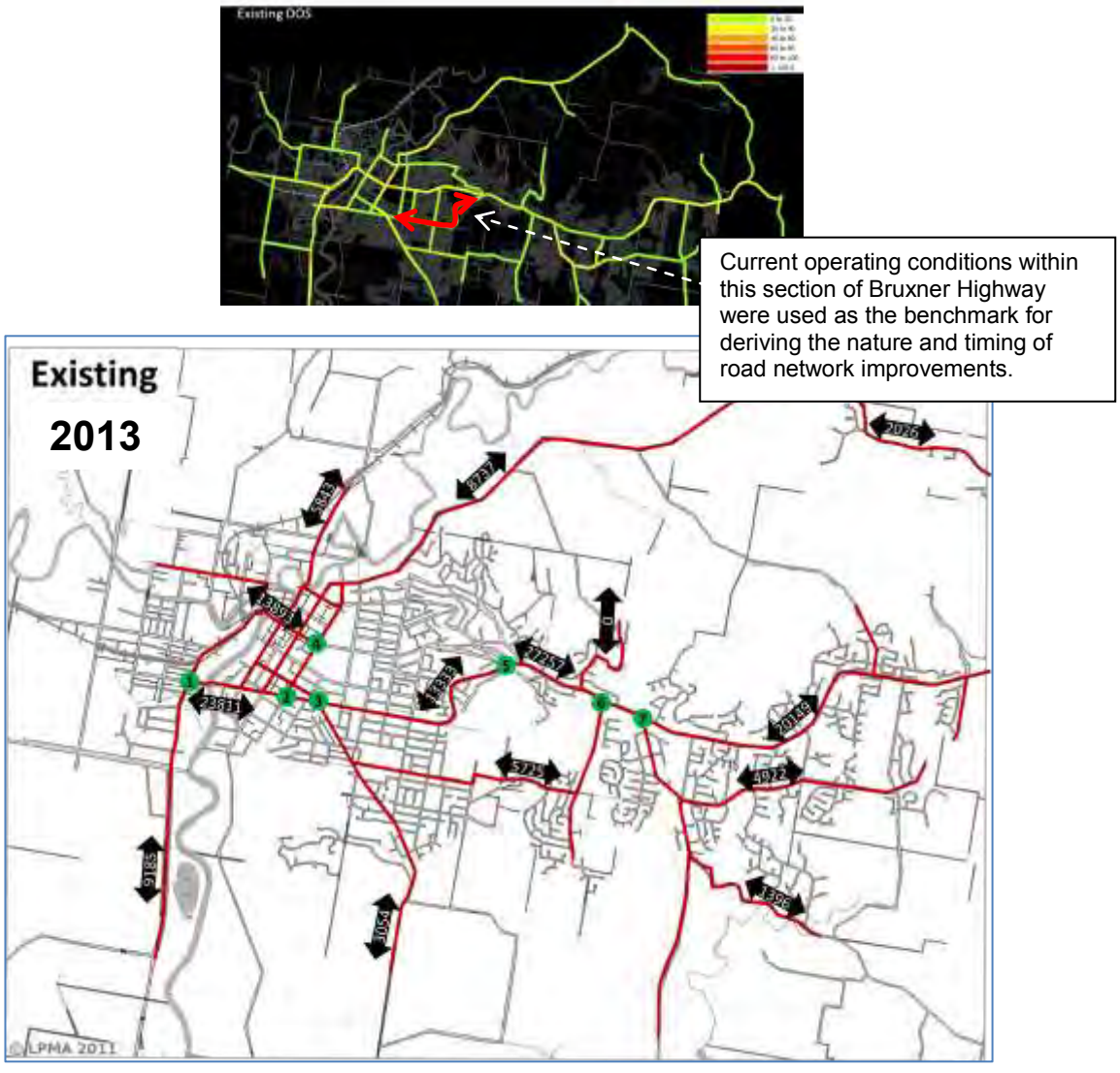


Fig 8.1 Estimated Daily Traffic Volumes and Link Saturation Existing Demands and Network

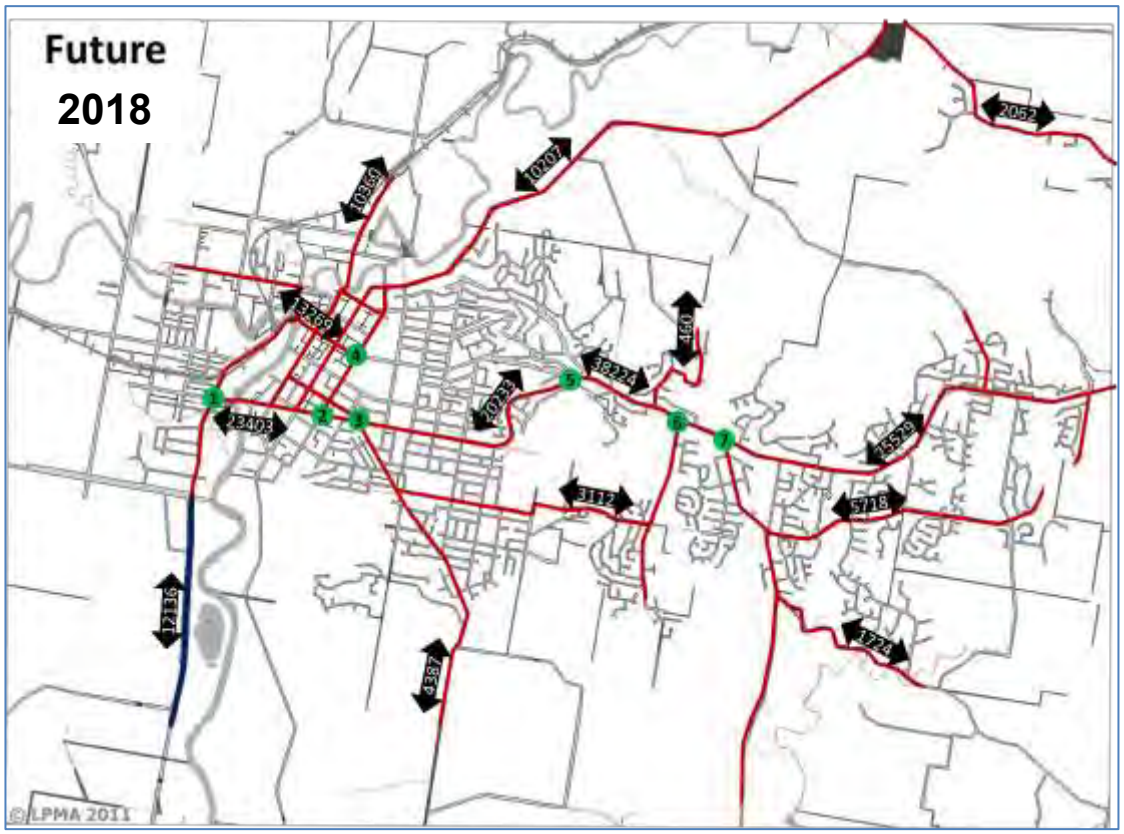


Fig 8.2 Estimated Daily Traffic Volumes and Link Saturation 2018 Demands and Network Stage

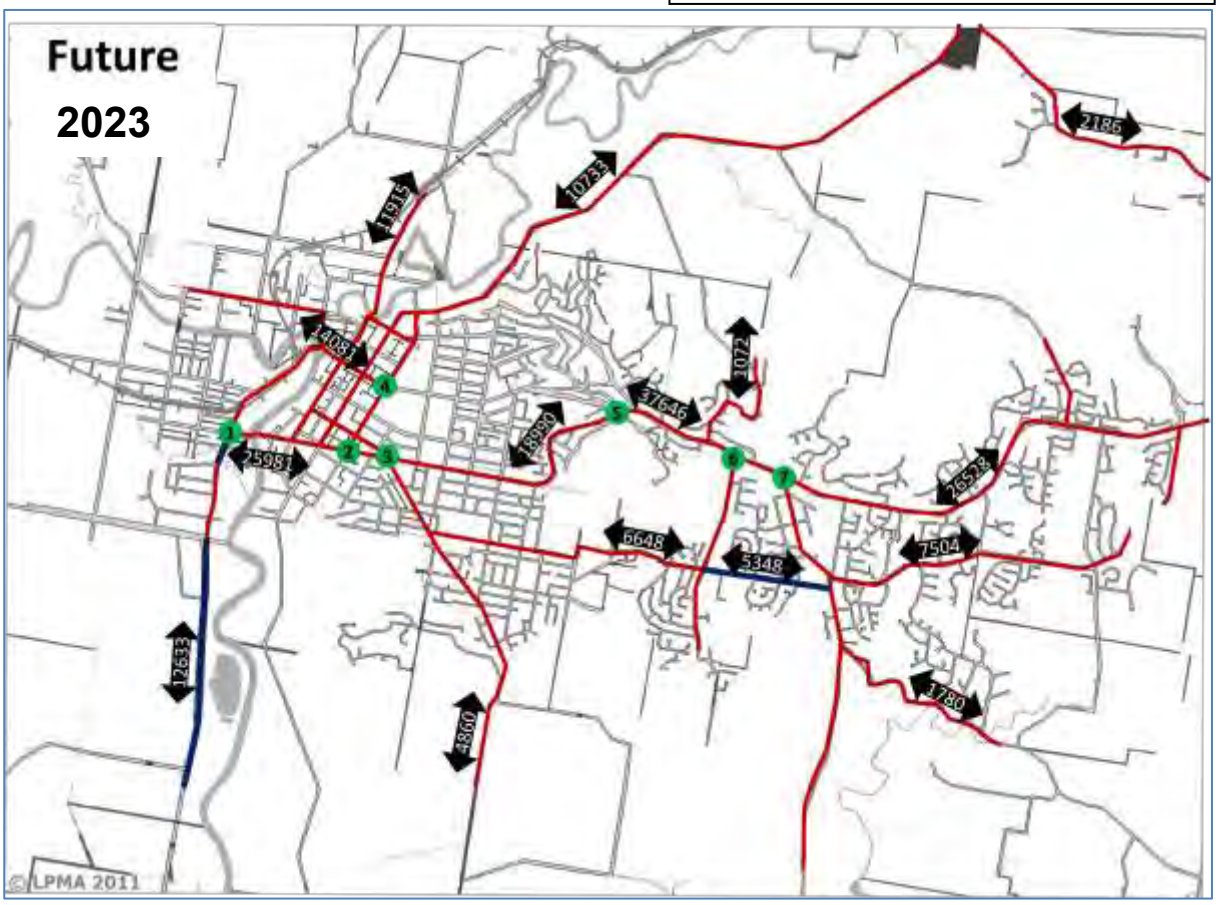


Fig 8.3 Estimated Daily Traffic Volumes and Link Saturation 2023 Demands and Network Stage

Vehicle Hours Reduction = 140,713
Estimated Cost of Works ($M) = $29.34
(Veh-Hrs Reduction / $Cost) Ratio = 4,796

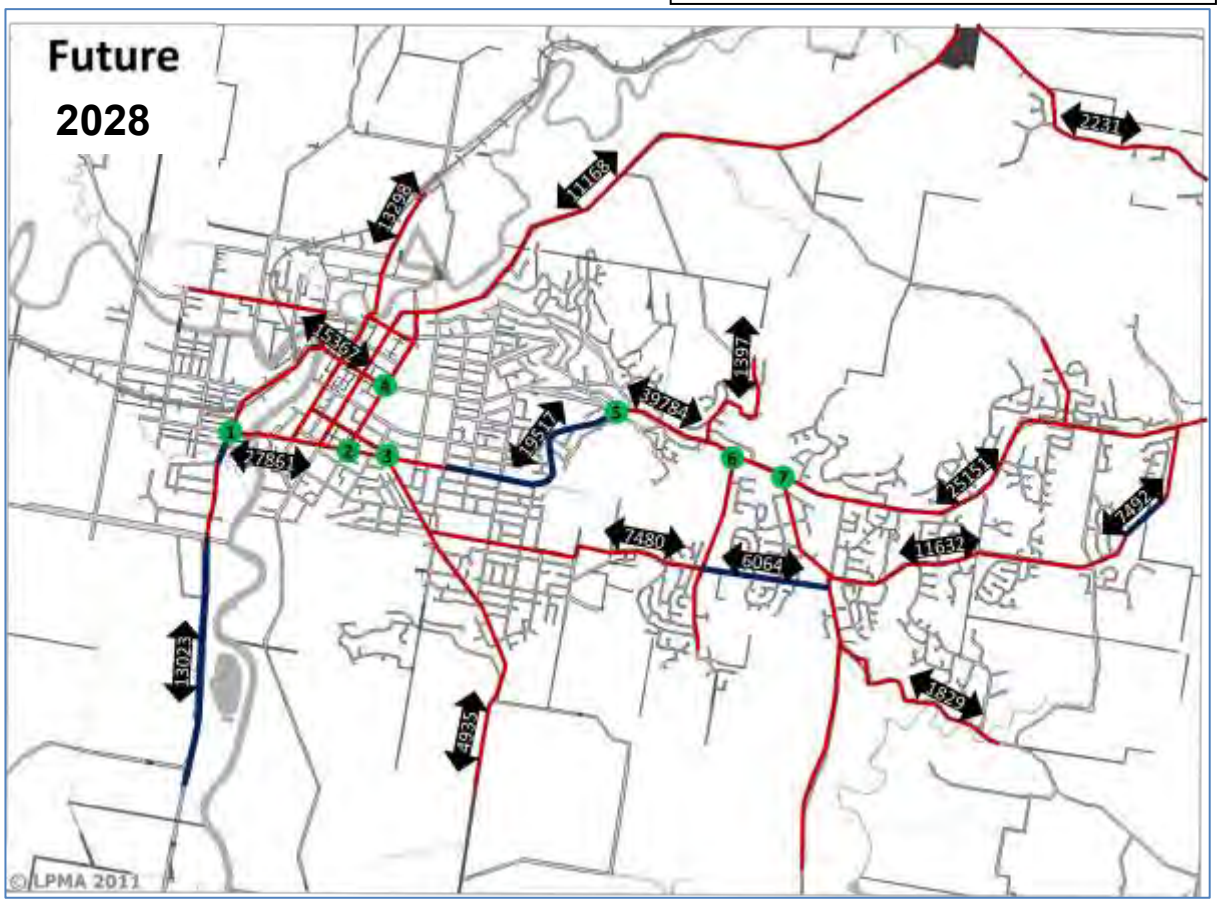


Fig 8.4 Estimated Daily Traffic Volumes and Link Saturation 2028 Demands and Network Stage

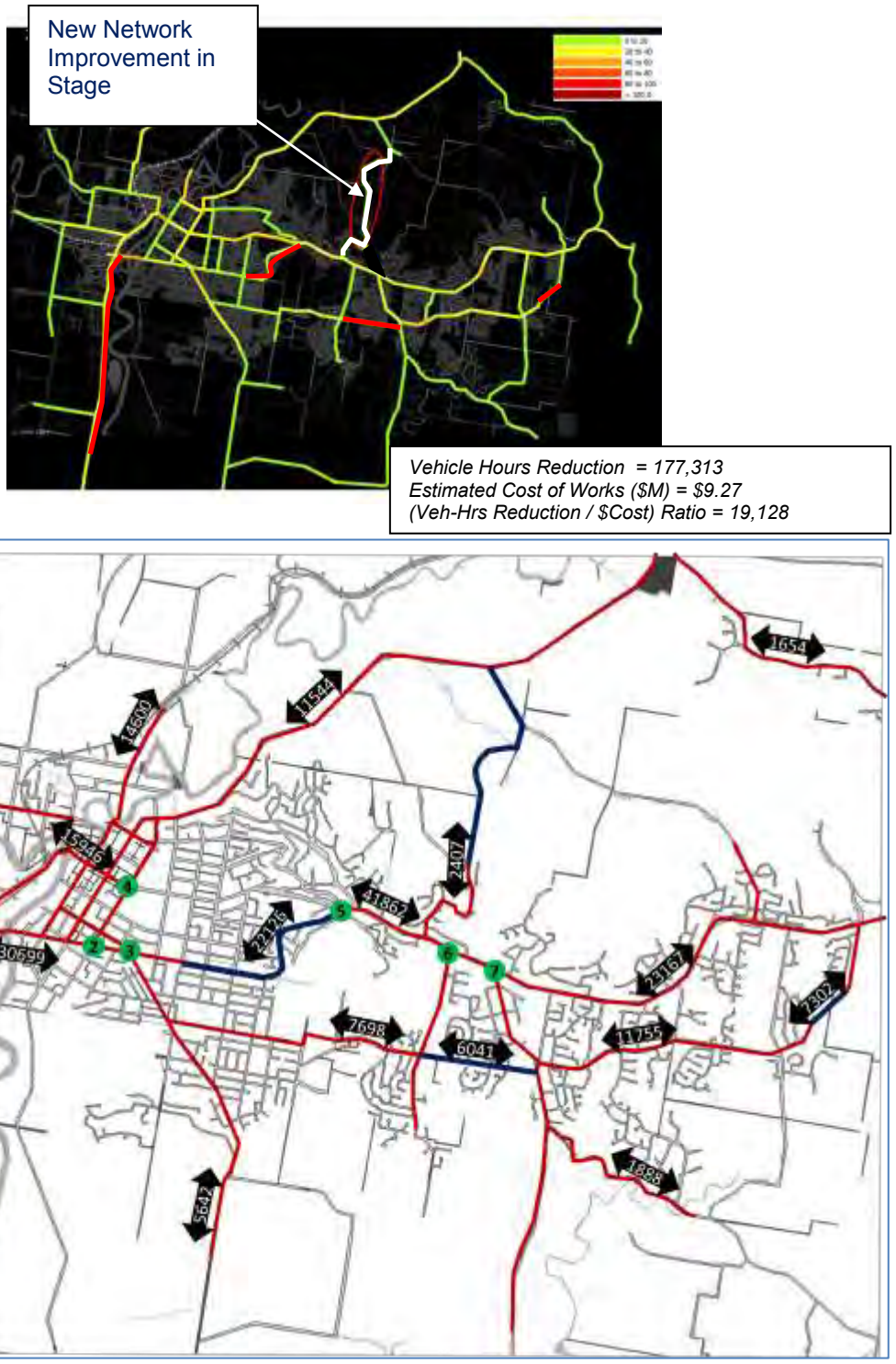


Fig 8.5 Estimated Daily Traffic Volumes and Link Saturation 2033 Demands and Network Stage

9. Schedule of Recommended Network Staging

Table 9.1 generally reflects works contained in each of the network stages described in Section 8 and estimated cost/generated trip end associated with each of the network stages. The estimates are separated into costs which will be the responsibility of Council and those which will be the responsibility of the state.

Notwithstanding the results of network 'testing' shown in Figs 8.2 to 8.5, the Bruxner Hwy duplication (South of Three Chain Road) and the duplication of Bruxner Hghway bridge at Hollingsworth Creek have been interchanged in Table 9.1. This reversal in the desirable timing of projects is based on the following.

- If the Hollingsworth Creek bridge duplication was to occur in advance of the duplication of the highway to the south (as indicated as technically justified in modeling), the value of the new bridge investment would be limited by the lack of highway capacity to the south.

- If the rate at which developers wish to develop industrial development in the area to the west and south west of the Hollingsworth Creek Bridge location is significantly higher than that presumed in the modeling, accelerated traffic demands and resultant traffic congestion on the Hollingsworth Creek Bridge may discourage development which Council wishes to facilitate.

- Model traffic estimates for 2018 indicate that duplication of the highway to the south of Three Chain Road is only necessary at that date or soon thereafter in order to satisfy the objective to maintain operating conditions within major road network links at no worse than generally prevailed in 2013 in Bruxner Highway at the location marked in Fig 8.1. However, model estimates indicate that the existing highway capacity to the south of Three Chain Road is likely to be less than that normally justifying rural highway duplication (approx 15,000 vpd) until at least 2023.

The estimates shown in Table 9.1 indicate that the overall cost to Council of constructing the desirable road network through to 2028 and 2033 to a standard necessary to satisfy future development will be approximately $27.50 and $35.00 million, equivalent to approximately $600 per additional locally generated trip respectively in the Lismore urban area relative to trips in 2013. This figure would reduce to approximately $500/trip if the bridge crossing to the immediate north of the CBD was to be excluded from the estimates.

Table 9.1 Estimated Network Stage Costs and Cost Distributions

									Cost ($M)		
2018	Ref (Fig 5.1)	Item	Type	Upgrade	Length (m)	Width (m)	Area m2	m2 rate	Council	State	Total
	B	Bruxner Highway - (Across Hollinsworth Creek)	Road	Duplication of Bridge						$ 6.00	$ 6.00
	1	Richmond Hill/Bruxner Highway	Intersection	Upgrade					$ 0.38	$ 0.38	$ 0.75
	2	Invercauld Road/Bruxner Highway	Intersection	Roundabout					$ 1.60	$ 1.60	$ 3.20
								5 Year Cost	$ 1.98	$ 7.98	$ 9.95
								Increased Trips Per Day vs 2013	17,566		
								Cost/Trip	$ 112.43	$ 454.00	$ 566.44

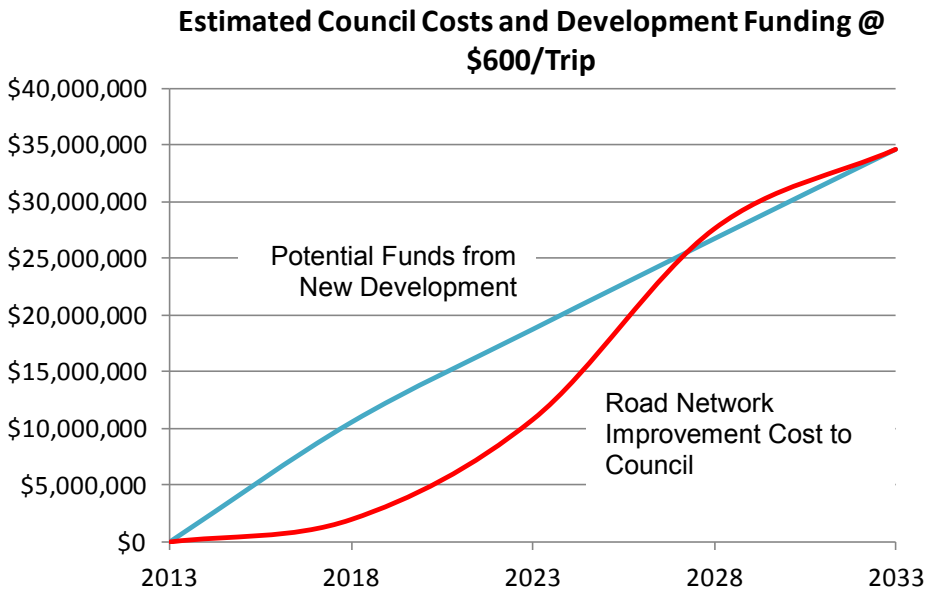
									Cost ($M)		
2023	Ref (Fig 5.1)	Item	Type	Upgrade	Length (m)	Width (m)	Area m2	m2 rate	Council	State	Total
	A	Bruxner Highway - (South of Three Chain Road)	Road	Duplication of Road	2000	13	26000	160		$ 4.16	$ 4.16
	C	Cynthia Wilson Drive to Rous Road	Road	New Road with Kerbs	1200	13	15600	180	$ 6.60		$ 6.60
	3	Oliver Avenue/Pineapple Road	Intersection	Upgrade					$ 1.00		$ 1.00
	7	Rous Road and Oliver Avenue Intersection	Intersection	Roundabout					$ 0.80		$ 0.80
	8	Cynthia Wilson and Invercauld Road Intersection	Intersection	Mini Roundabout					$ 0.20		$ 0.20
	9	Elizabeth Ave and Rous Road Intersection	Intersection	Mini Roundabout					$ 0.20		$ 0.20
								5 Year Cost	$ 8.80	$ 4.16	$ 12.96
								Increased Trips Per Day vs 2018	13,684		
								Cost/Trip	$ 643.09	$ 304.00	$ 947.09
								10 Year Cost	$ 10.78	$ 12.14	$ 22.91
								Increased Trips Per Day vs 2013	31,250		
								Cost/Trip	$ 344.80	$ 388.32	$ 733.12

									Cost ($M)		
2028	Ref (Fig 5.1)	Item	Type	Upgrade	Length (m)	Width (m)	Area m2	m2 rate	Council	State	Total
	D	Eastern ByPass (Oliver Avenue)	Road	Resurfacing	500	13	6500	160	$ 1.04		$ 1.04
	D	Eastern ByPass (Oliver Avenue - Bridge)	Road	New Road with Kerbs	600	13	7800	180	$ 6.01		$ 6.01
	E	Oliver Avenue / Holland Road intersection	Intersection	Roundabout					$ 1.00		
	E	Bruxner Highway (Rotary Drive to Diadem Street)	Road	Duplication of Road	2200	12	26400	180		$ 4.75	$ 4.75
	S	River Crossing (Brunswick Street to Lake Street)	Bridge	New Bridge					$ 5.50	$ 5.50	$ 11.00
	S	Northern Bypass (Terania Street to Brunswick Street)	Road	Resurfacing	1500	13	19500	160	$ 1.56	$ 1.56	$ 3.12
	S	Northern Bypass (Terania Street to Brunswick Street)	Road	New Road with Kerbs	500	13	6500	180	$ 0.59	$ 0.59	$ 1.17
	4	Pindari Crescant/Bruxner Highway	Intersection	Upgrade					$ 0.38	$ 0.38	$ 0.75
	10	Bruxner Highway and Mountainview Drive	Intersection	Traffic Signals					$ 0.75	$ 0.75	$ 1.50
								5 Year Cost	$ 16.82	$ 13.52	$ 29.34
								Increased Trips Per Day vs 2023	13,307		
								Cost/Trip	$ 1,263.62	$ 1,016.16	$ 2,204.63
								15 Year Cost	$ 27.59	$ 25.66	$ 52.25
								Increased Trips Per Day vs 2013	44,557		
								Cost/Trip	$ 619.21	$ 575.82	$ 1,172.59

									Cost ($M)		
2033	Ref (Fig 5.1)	Item	Type	Upgrade	Length (m)	Width (m)	Area m2	m2 rate	Council	State	Total
	F	Trinity Drive (Bruxner Highway to Lagoons Grass Road)	Road	Resurfacing	1300	11	14300	160	$ 2.29		$ 2.29
	F	Trinity Drive (Bruxner Highway to Lagoons Grass Road)	Road	New Road with Kerbs	1700	13	22100	180	$ 3.98		$ 3.98
	5	Molesworth Street/Bruxner Highway	Intersection	Traffic Signals					$ 0.75	$ 0.75	$ 1.50
	6	Union Street / Elliott Street	Intersection	Traffic Signals						$ 1.50	$ 1.50
								5 Year Cost	$ 7.02	$ 2.25	$ 9.27
								Increased Trips Per Day vs 2028	13,151		
								Cost/Trip	$ 533.50	$ 171.09	$ 704.59
								20 Year Cost	$ 34.61	$ 27.91	$ 61.51
								Increased Trips Per Day vs 2013	57,708		
								Cost/Trip	$ 599.67	$ 483.59	$ 1,065.94

Fig 9.1 shows the rate at which Council would collect funds from development if the $600 / development generated trip was to be applied into road infrastructure charge on new development, assuming development occurs at the rate assumed in this study.

Fig 9.1



Having regard to Councils limited access to other funding to accommodate the effects of new development, the estimated cost and development funding profiles over time give support to adopting a Section 94 Plan which extends to 15 years with reviews at 5 yearly intervals. That is, at no time would the Plan horizon exceed 15 years or be less than 10 years.

For example, in the period prior to 2028 there is potential for new development to fund considerable road network improvements based on the rate of $600/trip derived from the 2033 planning horizon network cost. Consequently, Council could proceed with network staging plans which have provided the basis for the estimates with the confidence that Plan reviews will provide an opportunity to reassess the contribution rate and the network staging plan costs on two occasions before funding shortfalls may potentially occur.

Another view is that the funding and contributions profiles shown in Fig 9.1 indicate an opportunity to bring forward projects which are contained in 2028 and 2033 network staging described in this report.

10. Summary and Recommendations

In the period to 2033 vehicle trip generation in the Lismore urban area will increase by nearly 60,000 trips per day representing approximately a 65% increase on 2013 trip generation and an average annual growth of approximately 2.5% per annum. Over the next 15 years the growth rate will be approximately 2.0% per annum.

The network estimates and analyses performed in this study indicate that the following road network improvements will be fundamental to providing adequately for traffic increases in the period to 2028 and beyond.

- Expansion of the corridor capacity of Bruxner Highway
- Provision of alternative routes to the Bruxner Highway, particularly to the immediate south of Highway to the east of the CBD.
- Provision of additional river crossing capacity to the north of the CBD.

Estimates and analyses indicate that it would be desirable to adopt road improvement staging plans as described in Table 9.1 of this report. These plans would generally have the effect to maintain levels of service in the road network consistent with being no worse than the level of service which is currently provided by Bruxner Highway to the immediate east of the CBD.

The estimated cost of a desirable road network to accommodate urban development related traffic growth over the next 20 years is approximately 35 million dollars which if funded solely from contributions levied via a Section 94 Plan would amount to a rate of $600/daily trip ($2012) based on the cost of both the 2028 and 2033 desirable road networks and the estimated total trips in those networks.

For the purposes of estimating development trips and associated contributions, it is recommended that the trip rates shown in Table 10.1 be adopted. These rates have been based on rates applying in the Gold Coast City Transport Infrastructure Contributions Plan and are considered to represent a reasonable estimate of the average rate at which various development types generate traffic movements. The effect of inaccuracies which inevitably exist in any choice of trip generation rates is minimised by adopting the same set of rates to estimate development contributions as developments occur. In that respect Council should resist submissions from developers which claim that a particular development rate or rates are not accurate.

The expected cash and cost flows associated with new development and desirable network stages supports adopting a Section 94 Plan horizon of 15 years with the rate of development contribution being based on the cost of improvements over that time-frame. That is, at the rate of $600/trip.

At the rate of $600/trip, contributions from new development will provide the opportunity to bring forward works which this study has assumed to occur in the period between 2018 and 2023. In that respect Council could justifiably vary the work stages from that assumed in this study.

It should be noted that the contribution rate of $600/trip is significantly below the limit which the NSW state government specifies as a maximum contribution on new residential development.

The application of a single contribution rate to all development within the Lismore urban area is desirable insofar as it provides simplicity and certainty to the development sector whilst satisfying the 'nexus' principle. In that respect the road improvements represented in the recommended road staging plans distribute benefits to all development across the Lismore urban area, either directly or through relieving other network components utilised by new development. The nexus principle is also satisfied through basing the contribution on development trip generation. The 'apportionment' principle is satisfied through the levying of a contribution rate which is based on all trips generated in the Lismore urban area with the underlying principle that existing development has effectively already paid a contribution in proportion to trips generated by existing development.

Table 10.1a Recommended Trip Generation Rates for Assessing New Development Contributions

DEVELOPMENT TYPE	VEHICLE TRIPS / DAY	PER ASSESSMENT UNIT	COMMENT
Aged Persons Accommodation, Self-contained Dwelling	2.0	Dwelling	
Hostel Units	1.0	Room	
Nursing Home Beds	0.5	Bed	
Amusement Parlour	0.4	per m² Total Use Area	As Retail-Commercial
Apartments	2.0	Bedroom	As Hotel/Motel Room
Attached Dwelling	4.0	Dwelling	As Attached Dwelling
Bed and Breakfast	1.5	Lettable Room	
Bulk Garden Supplies	0.1	per m² Total Use Area	
Cafe	0.4	per m² Total Use Area	As Retail-Commercial
Caravan Park	2.0	Site	
Caretakers Residence	6.5	Dwelling	As Detached Dwelling
Child Care Centre	3.7	Enrolment	
Cinema	2.5	Seat	As Cinema
Commercial Services	0.4	per m² Total Use Area	As Retail-Commercial
Community Care Centre	As agreed by Council		
Community Purposes	As agreed by Council		
Convenience Shop	0.4	per m² Total Use Area	As Retail-Commercial
Detached Dwelling	6.5	Dwelling	As Detached Dwelling
Display Home	6.5	Dwelling	As Detached Dwelling
Ecotourism Facility	As agreed by Council		
Educational Establishment-Primary	2.4	Enrolment	
Educational Establishment-Secondary	2.4	Enrolment	
Educational Establishment-Tertiary/Further	1.8	Equiv Full Time Enrolment	
Estate Sales Office	0.4	per m² Total Use Area	As Retail-Commercial
Family Accommodation	2.0	Added Unit	
Family Day Care Home	As agreed by Council		
Farm stay	1.5	Lettable Room	
Fast Food Premises	0.4	per m² Total Use Area	As Retail-Commercial
Freight Depot	0.01	per m² Site Area	
Fuel Depot	0.01	per m² Site Area	
Funeral Parlour	4.0	Employee	
Gaming Premises	0.4	per m² Total Use Area	As Retail-Commercial
Home Occupation-additional to Dwelling	0.4	per m² Total Use Area	As Retail-Commercial
Home Office-additional to Dwelling	0.16	per m² GLA	As Office
Hospital	As agreed by Council		
Indoor Sport and Recreation			
Squash or other court	40.0	Court	
Meeting place/Public hall	As agreed by Council		
Pinball parlour	0.4	per m² Total Use Area	As Retail-Commercial
Amusement Arcade	0.4	per m² Total Use Area	As Retail-Commercial
Theatre/Cinema	2.5	Seat	As Cinema
Gymnasium	0.5	per m² Total Use Area	
Poker Machine Areas	0.4	per m² Total Use Area	As Retail-Commercial
Gaming Machine Areas	0.4	per m² Total Use Area	As Retail-Commercial
Library, Art Gallery etc.	As agreed by Council		
Industry (Heavy/Manufacturing)	0.05	per m² Total Use Area	As Industry
Integrated Housing-Attached	4.0	Dwelling	As Attached Dwelling
Integrated Housing-Detached	6.5	Dwelling	As Detached Dwelling
Kennel	4.0	Employee	
Laundromat	0.4	per m² Total Use Area	As Retail-Commercial
Manufacturer's Shop-Retail Area	0.4	per m² Total Use Area	As Retail-Commercial
Manufacturer's Shop-Manufacturing Area	0.05	per m² Total Use Area	As Industry
Marina-Wet Berths for boats<10m	1.0	Berth	
Marina-Wet Berths for boats 10-15m	1.5	Berth	
Marina-Wet Berths for boats>15m	2.0	Berth	

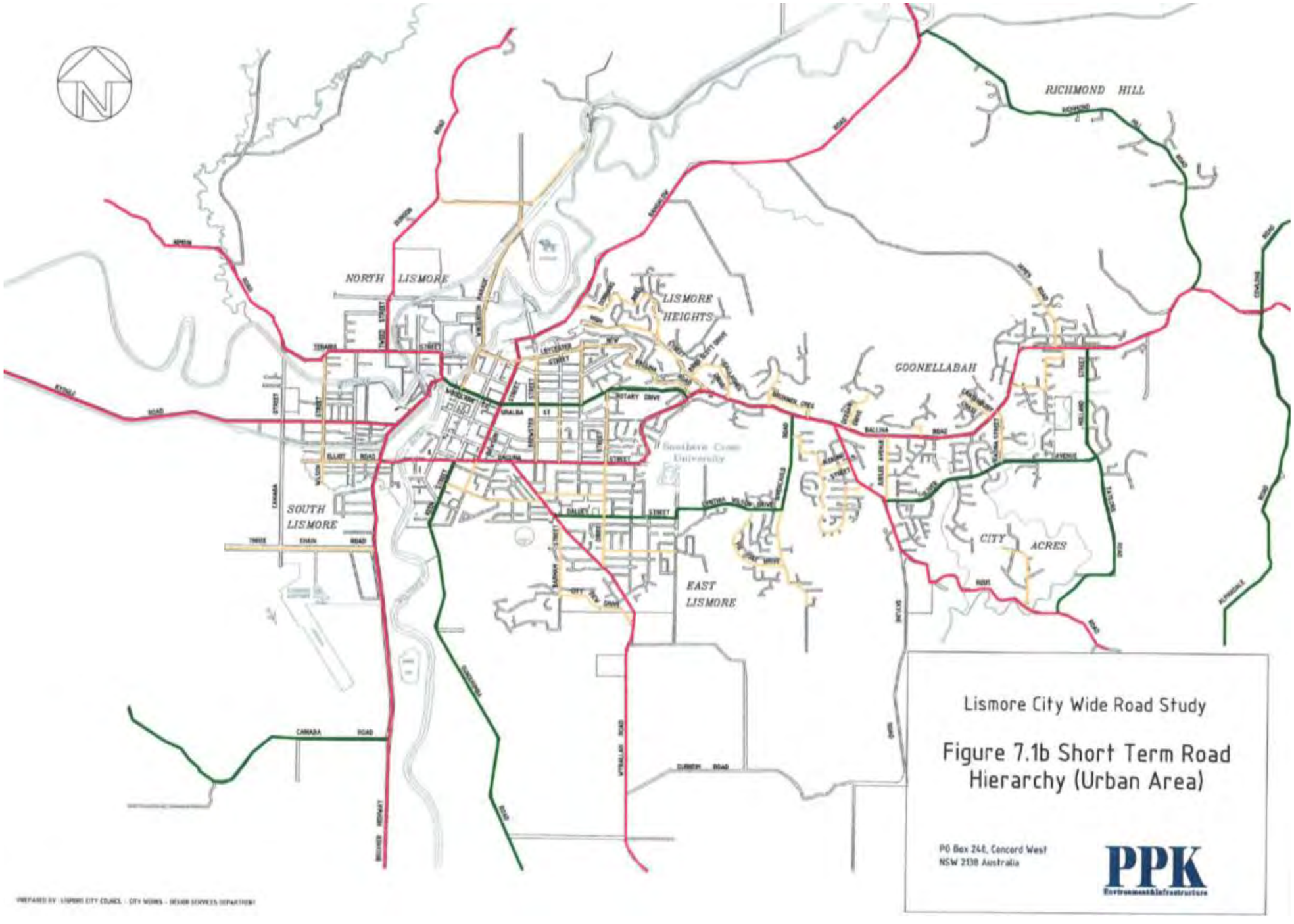
Table 10.1b Recommended Trip Generation Rates for Assessing New Development Contributions

DEVELOPMENT TYPE	VEHICLE TRIPS / DAY	PER ASSESSMENT UNIT	COMMENT
Marina-Dry Berth or Swing Mooring	0.5	Berth/Mooring	
Marina-Ancillary Activities	0.05	per m² Total Use Area	As Industry
Marina-Shop	0.4	per m² Total Use Area	As Retail-Commercial
Market	As agreed by Council		
Medical Centre	0.4	per m² Total Use Area	As Retail-Commercial
Mini Warehouse or Self Storage Facility	As agreed by Council		
Minor Tourist Facility	As agreed by Council		
Motel-Manager's Unit	4.0	Dwelling	As Attached Dwelling
Motel-Motel Rooms	2.0	Bedroom	As Hotel/Motel Room
Motel-Restaurant	0.4	per m² Total Use Area	As Retail-Commercial
Night Club	0.4	per m² Total Use Area	As Retail-Commercial
Office	0.16	per m² GLA	As Office
Outdoor Sport and Recreation			
Tennis or other Court	40.0	Court	
Lawn Bowls	40.0	Green	
Skating Rinks	0.1	per m² Total Use Area	
Swimming Pools	0.1	per m² Total Use Area	
Golf Course	10.0	Hole	
Golf Course Clubhouse	0.4	per m² Total Use Area	As Retail-Commercial
Racecourse	As agreed by Council		
Sporting Arena	As agreed by Council		
Clubhouse	0.4	per m² Total Use Area	As Retail-Commercial
Place of Worship	0.04	per m² GLA	
Reception Room	0.4	per m² Total Use Area	As Retail-Commercial
Relocatable Home Park	3.0	Site	
Residential Hotel-Bedroom	2.0	Bedroom	As Hotel/Motel Room
Residential Hotel-Ancillary Uses	0.4	per m² Total Use Area	As Retail-Commercial
Resort Hotel-Bedroom	2.0	Bedroom	As Hotel/Motel Room
Resort Hotel-Ancillary Uses	0.4	per m² Total Use Area	As Retail-Commercial
Restricted Club	0.4	per m² Total Use Area	As Retail-Commercial
Restaurant	0.4	per m² Total Use Area	As Retail-Commercial
Retail-Commercial Development	0.4	per m² Total Use Area	As Retail-Commercial
Retail Plant Nursery	0.1	per m² Total Use Area	
Rural Industry	4.0	Employee housed off-site	
Salvage Yard	0.05	per m² Total Use Area	As Industry
Serviced Apartment	2.5	Bedroom	
Service Industry	0.2	per m² Total Use Area	As Service Industry
Service Station-Fuel Pumps	60.0	Pump	
Service Station-Service Bays	0.2	per m² Total Use Area	As Service Industry
Service Station-Shop, Restaurant, etc.	0.4	per m² Total Use Area	As Retail-Commercial, but with extra Linked trips
Shop	0.4	per m² Total Use Area	As Retail-Commercial
Shopping Centre Development	0.4	per m² Total Use Area	As Retail-Commercial
Showroom	0.2	per m² Total Use Area	
Special Accommodation	6.5	Dwelling	As Detached Dwelling
Stall	As agreed by Council		
Surgery-additional to Dwelling	0.4	per m² Total Use Area	As Retail-Commercial
Take Away Food Premises	0.4	per m² Total Use Area	As Retail-Commercial
Tavern-Lounge, Bar, Beer Garden, etc.	0.4	per m² Total Use Area	As Retail-Commercial

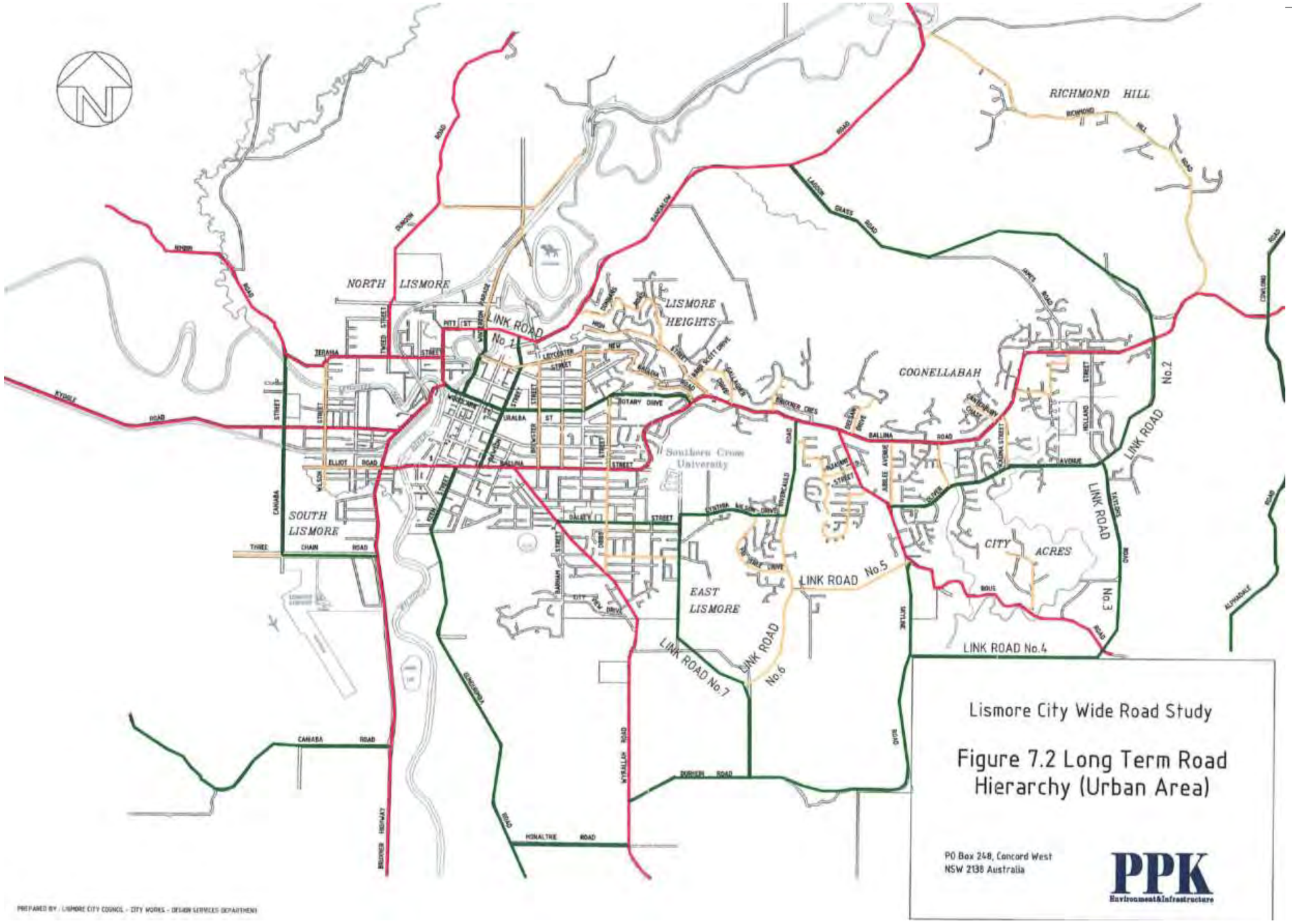
Table 10.1c Recommended Trip Generation Rates for Assessing New Development Contributions

DEVELOPMENT TYPE	VEHICLE TRIPS / DAY	PER ASSESSMENT UNIT	COMMENT
Tavern-Liquor Retail Sales Areas	0.4	per m² Total Use Area	As Retail Commercial
Tourist Cabins	As agreed by Council		
Tourist Facilities	As agreed by Council		
Tourist Shop	0.4	per m² Total Use Area	As Retail Commercial
Toxic or Dangerous Goods Store	As agreed by Council		
Transit Centre	As agreed by Council		
Transport Terminal	As agreed by Council		
Vehicle Hire Premises	0.16	per m² GLA	As Office
Vehicle Sales Premises Office Areas	0.16	per m² Total Use Area	As Office
Vehicle Sales Premises Display Areas	0.04	per m² Total Use Area	
Veterinary Clinic/Hospital	0.4	per m² Total Use Area	As Retail Commercial
Warehouse	0.05	per m² Total Use Area	
Waterfront (or Marine) Industry	0.05	per m² Total Use Area	As Industry
Any Other Use	As agreed by Council		

Attachments



Attachment No. 1



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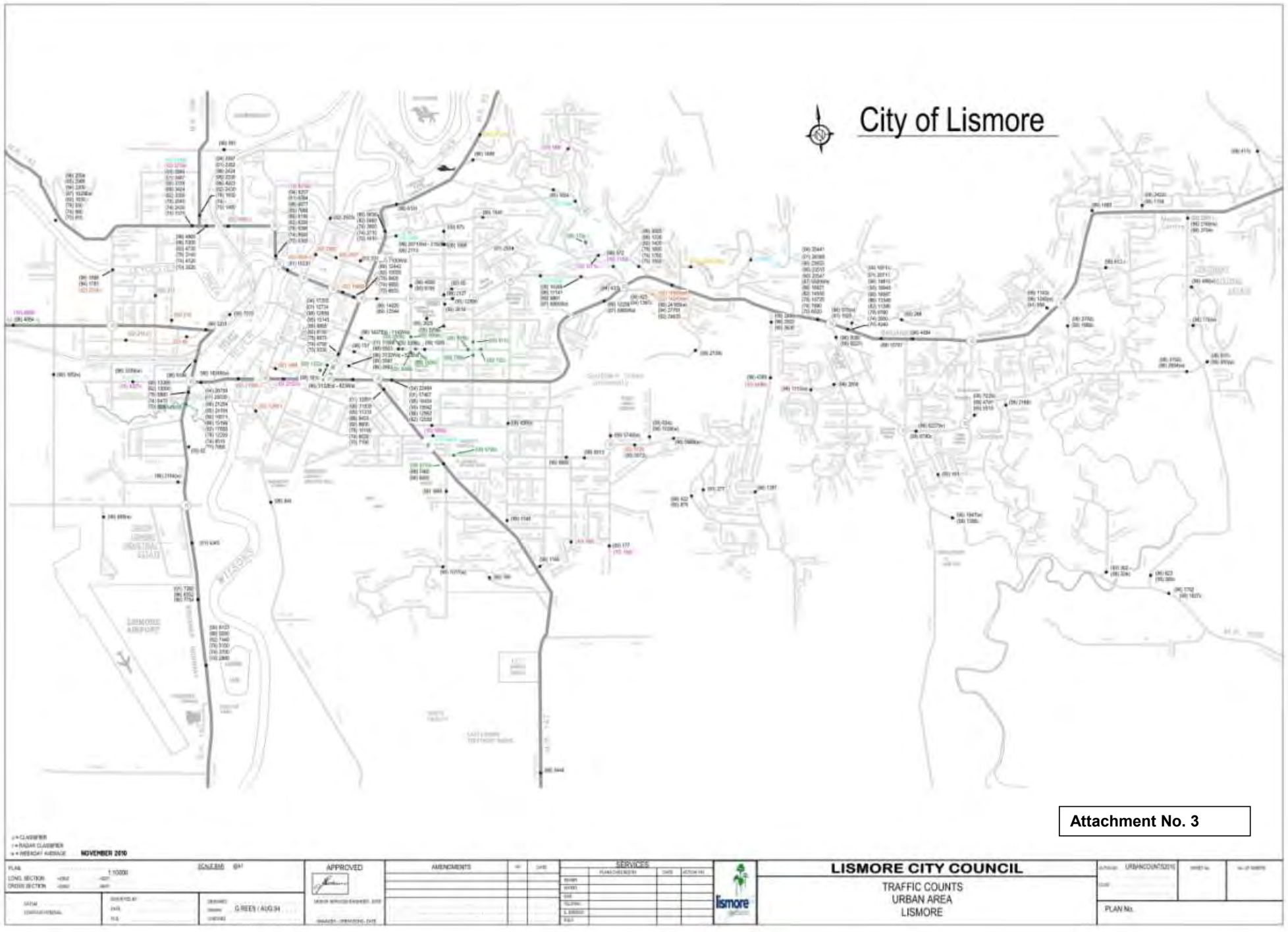

Attachment No. 3

PART C

Lismore Strategic Road Review
Framework for Section 94 Trunk Road Infrastructure Contributions Plan
RURAL Areas

Prepared for Lismore Council

Ref : 34494Rural1

15th October 2012

1. Existing Road Network and Traffic Volumes

1.1 The Classification of Roads

State Highways and the Short and Long Term classification of other rural roads as currently adopted by Council are shown in Attachment 1 and 2.

The scope of this "Framework for Section 94 Trunk Road Infrastructure Contributions Plan – Rural Areas" is related only to roads which are currently classified as "Arterial", "Sub-Arterial" and "Collector" roads, not including roads such as state highways which are funded entirely by the state..

1.2 Existing Traffic Volumes

Existing urban daily traffic volumes available from Council records are shown in Attachments 3, 4 & 5.
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2. Rural Area Definition

Fig 2.1 shows the area defined as the "Rural Area" for the purposes of this report and associated investigations.

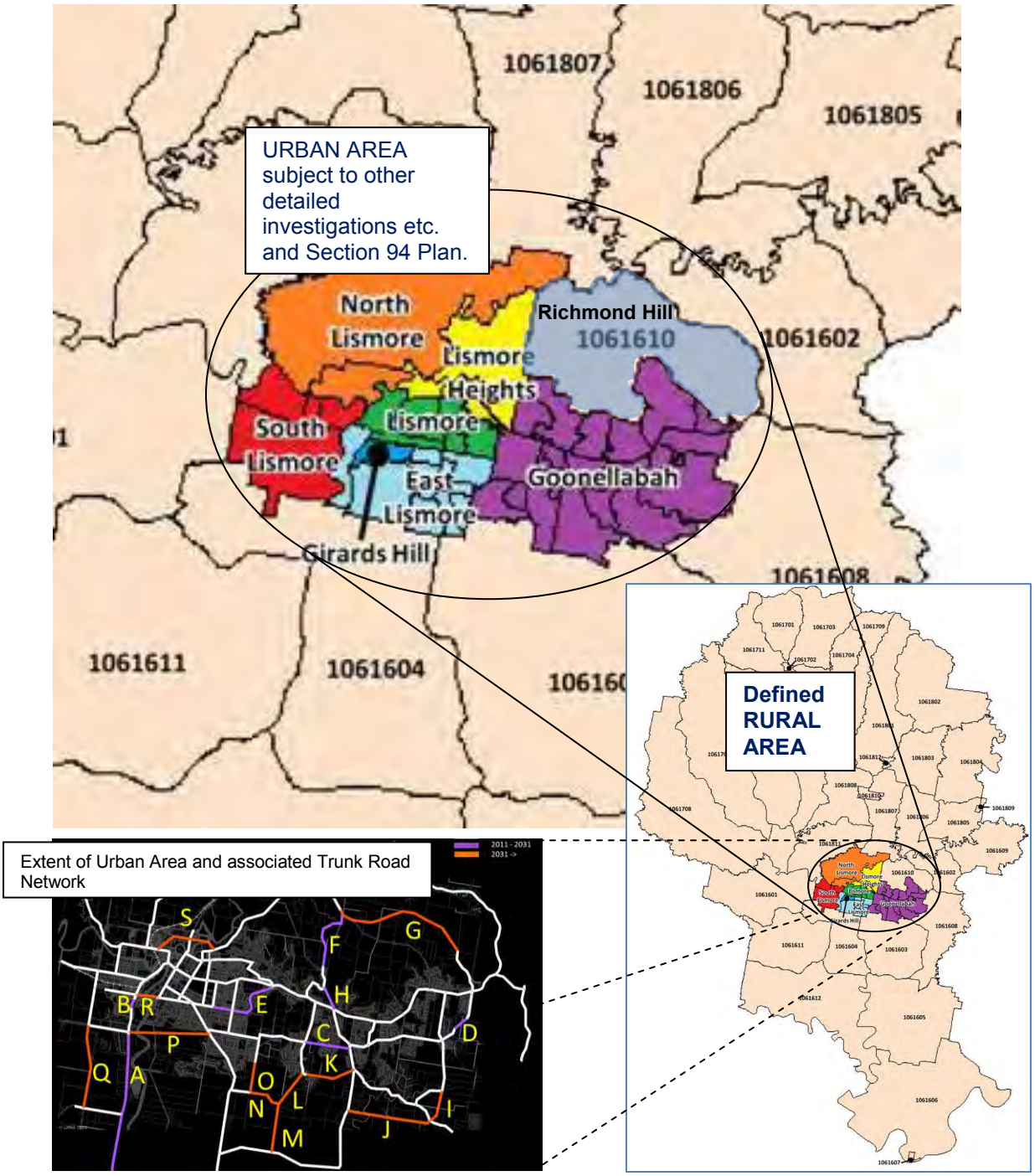


Fig 2.1 Definitions of URBAN and RURAL Areas

3. Current and Anticipated Future Development

The following description of past and anticipated population growth in the Lismore Urban and Rural areas has been extracted from the "Lismore Housing Analysis – Part B (October 2011)",

Projected population and average annual growth rate estimates are predicted to vary between the Lismore urban area (Lismore Part A Statistical Divisions) and the Lismore village/rural area (Lismore Part B Statistical Division). It is anticipated that the majority of population growth till 2036 will occur in the village/rural area with 2300 people (55% of expected population growth) compared to 1900 people (45% of expected population growth) in the Lismore urban area (see Table 2.1.2 and 2.1.3).

Table 2.1.2. Projected population for the Lismore urban area and village/rural area

Area	2011	2016	2021	2026	2031	2036
Lismore urban area[1]	31,900	32,300	32,700	33,200	33,500	33,800
Lismore village/rural Area[2]	13,100	13,600	14,000	14,500	15,000	15,400

Source: Department of Planning (2008)

Table 2.1.3. Average annual growth rate (over five periods) for the Lismore urban area and village/rural Area

Area	2006-11	2011-16	2016-21	2021-26	2026-31	2031-36
Lismore urban area[1]	0.25 %	0.25 %	0.25 %	0.30 %	0.18 %	0.18 %
Lismore village/rural Area[2]	0.62 %	0.75 %	0.58 %	0.70 %	0.68 %	0.53 %

Source: Department of Planning (2008)

2.1.2 Migration

Between 2001 and 2006, Lismore LGA experienced a positive net migration of 884 persons. The Lismore urban area experienced a positive net migration of 965 persons, while the village/rural area experienced a negative net migration of 81 persons leaving the area.

For the Lismore Urban Area, the largest source of in-migration was from neighbouring LGA's within the Far North Coast region followed by the Lismore village/rural area then regional NSW and Sydney Metro. For the Lismore village/rural area the largest sources were neighbouring LGA's within the Far North Coast region, followed by the Lismore urban area and then Interstate.

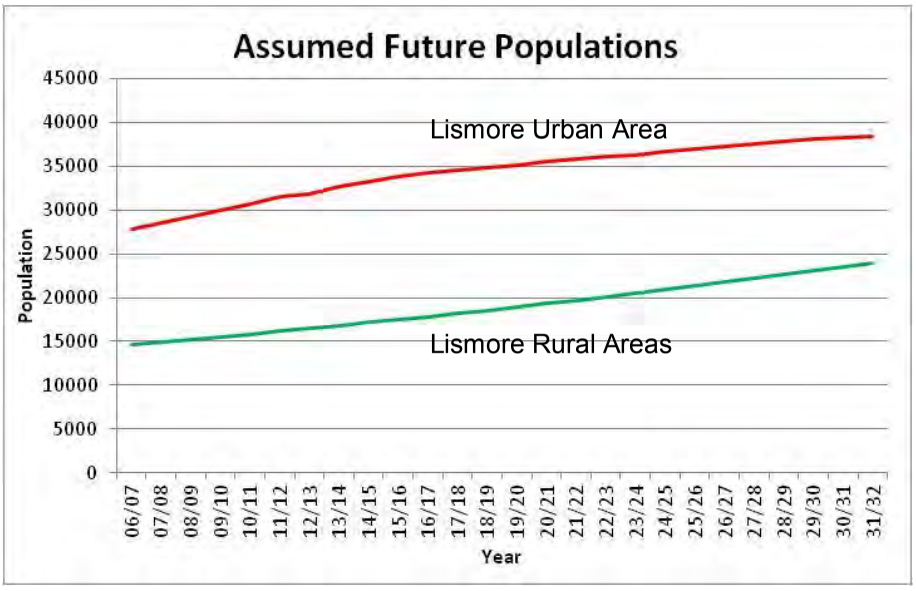
The above tabulated estimates represent average annual growth rates of approximately 0.25% and 0.65% for the urban and rural areas of Lismore respectively in the period between 2006 and 2031. However, in the period between 2006 and 2011 population growth for the Lismore urban area as defined in Fig 2.1 was approximately 2.5% per annum.

Estimates of future development described in this report (Urban Areas) represent an average annual growth rate in population for the entire Council area of approximately 1.3% in the period to 2031.

Table 3.1 and Fig 3.1 show assumed future population estimates for the Lismore urban and rural areas through to 2031. The estimates are based on average annual growth rates of 1.0% for the urban area and 2.0% per annum for the rural area.

Figs 3.2 and 3.3 show names, locations and Census District Collector Numbers for each of the Districts described in Table 3.1.

Fig 3.1



Note : Urban and Rural areas are defined in Fig 2.1.

Table 3.1

Assumed Future Populations

Location / District	Census District	2006	2013	2018	2023	2028	2033
Northern Districts							
Blue Knob	701	190	218	241	266	294	324
Nimbin	702	352	404	446	493	544	601
Nimbin	703	310	356	393	434	479	529
Nimbin	706	463	532	587	648	716	790
Nimbin	711	239	275	303	335	369	408
Larnook	707	862	990	1093	1207	1333	1471
Larnook	708	545	626	691	763	843	930
Koonorigan	705	449	516	569	629	694	766
Koonorigan	710	432	496	548	605	668	737
Tuntable Creek	704	324	372	411	454	501	553
Terania Creek	709	199	229	252	279	308	340
Dunoon	801	837	961	1062	1172	1294	1429
Dunoon	812	372	427	472	521	575	635
Rosebank	902	256	294	325	358	396	437
Rosebank	804	526	604	667	737	813	898
Corndale	803	393	451	498	550	608	671
Keerrong	808	346	397	439	484	535	591
Modanville	810	517	594	656	724	799	882
Numulgi	807	338	388	429	473	523	577
Bexhill	806	471	541	597	660	728	804
Clunes	805	392	450	497	549	606	669
Clunes	809	522	600	662	731	807	891
Eltham	609	590	678	748	826	912	1007
Blakebrook	811	349	401	443	489	540	596
Richmond Hill	602	729	837	925	1021	1127	1244
Sub-Total		**11003**	**12639**	**13954**	**15407**	**17010**	**18781**
Southern Districts							
Caniaba	601	519	596	658	727	802	886
Lindendale	608	573	658	727	802	886	978
Loftville	604	298	342	378	417	461	509
Tregeagle	603	652	749	827	913	1008	1113
South Gundurimba	611	480	551	609	672	742	819
South Gundurimba	612	354	407	449	496	547	604
Tucki Tucki	605	402	462	510	563	621	686
East Coraki	606	356	409	451	498	550	608
Sub-Total		**3634**	**4174**	**4609**	**5088**	**5618**	**6203**
Total RURAL AREA		**14637**	**16813**	**18563**	**20495**	**22629**	**24984**
LISMORE URBAN AREA		**27845**	**30480**	**32513**	**34682**	**36996**	**39464**
Total POPULATION		**42482**	**47293**	**51077**	**55178**	**59625**	**64448**

Note : Urban and Rural areas are defined in Fig 2.1.

Fig 3.2 District Names

Fig 3.3 Census District Numbers

4. Estimated Daily Traffic Generation

4.1 Estimated Current and Future Traffic Generation

TTM did not have sufficient data to enable an accurate estimate to be made of traffic generation associated with current and future development in rural districts. Therefore the following trip generation estimates were made for the purpose of making investigations, recognising the relatively inaccurate nature of the estimates.

The estimates have been made in respect to grouping districts to the north and south of Lismore Urban area as indicated in Fig 4.1. The purpose of this grouping was to reflect and investigate the differences in contribution which may arise from apparent differences in the special distribution of populations and the extent of road networks,

The estimates of current and future traffic generation shown in Table 4.1 are based on the following assumptions.

Persons/ Dwelling	2.75
Trips/Dwelling/Day	4.00
Percent of Total Trips Generated by Dwellings	65%
Percent Trips Extending outside Census District	25.00%

Table 4.1
Estimated Current and Future Traffic Generation – Rural Areas
(Approximate Only)

	2006	2013	2018	2023	2028	2033
Population						
Northern Districts	11003	12639	13954	15407	17010	18781
Southern Districts	3634	4174	4609	5088	5618	6203
Total	**14637**	**16813**	**18563**	**20495**	**22629**	**24984**
Dwellings						
Northern Districts	4001	4596	5074	5602	6186	6829
Southern Districts	1321	1518	1676	1850	2043	2256
Total	**5323**	**6114**	**6750**	**7453**	**8229**	**9085**
Daily Trips (All Trips)						
Northern Districts	24622	28283	31227	34477	38065	42027
Southern Districts	8132	9341	10313	11387	12572	13880
Total	**32754**	**37624**	**41540**	**45864**	**50637**	**55908**
Daily Trips (Crossing Boundary of Generating District)						
Northern Districts	6156	7071	7807	8619	9516	10507
Southern Districts	2033	2335	2578	2847	3143	3470
Total	**8189**	**9406**	**10385**	**11466**	**12659**	**13977**

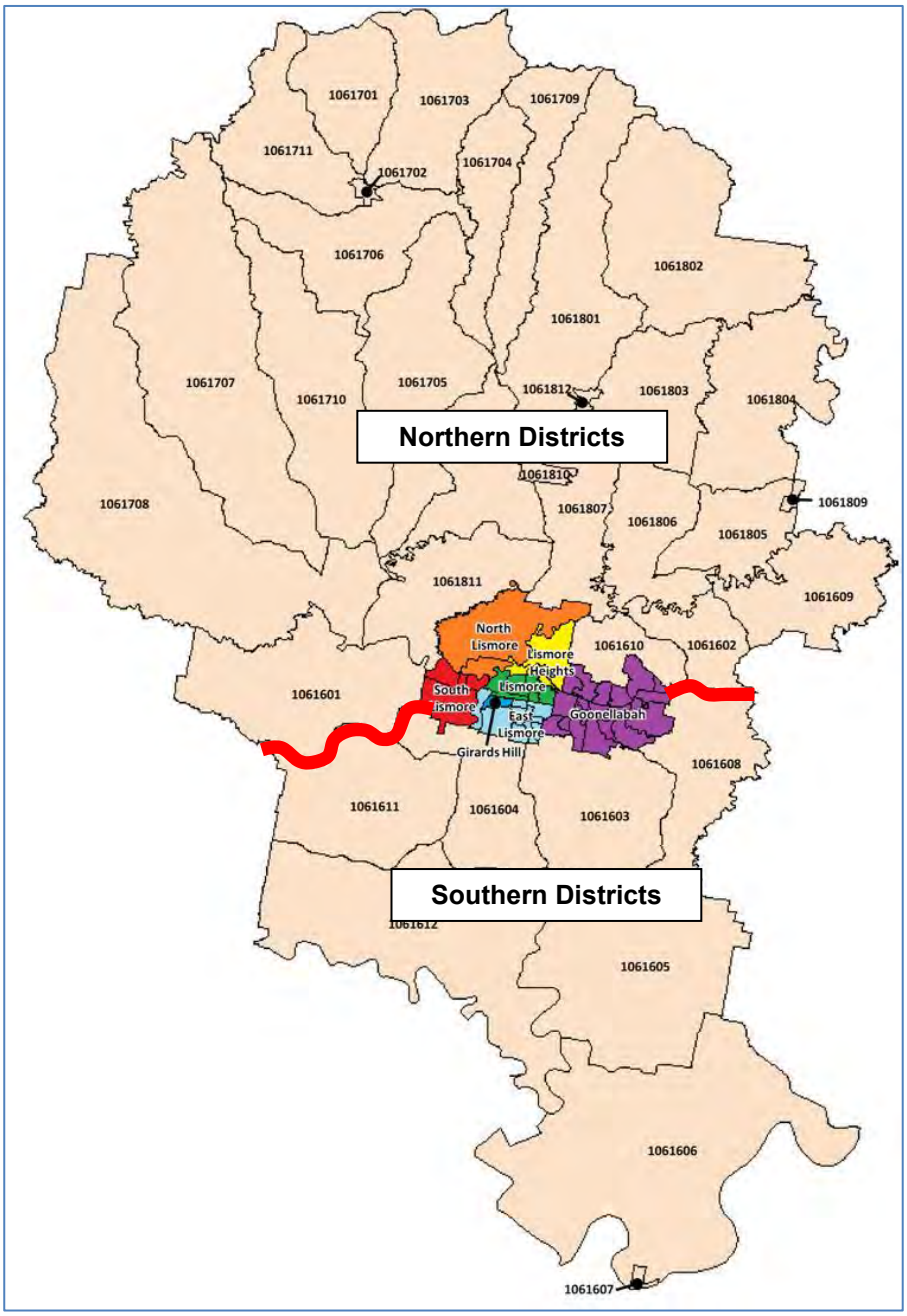


Fig 4.1 Northern and Southern District Definition

5. Relative Traffic Generation Potential of Districts

The lack of detailed data to allow current and future road traffic volumes required an alternative methodology to establish the relative degree to which future development in various rural districts would introduce the need for trunk road network improvements. A simplified "gravity model" technique was adopted for this purpose.

5.1 The Gravity Model

The use of a 'gravity model' to establish the relative probability of vehicle trips between pairs of origin/destinations zones has been common in transport and traffic engineering for many years in instances where specific survey data is not available.

The following explanation has been taken from the web site www.about.com.

> *For decades, social scientists have been using a modified version of Isaac Newton's Law of Gravitation to predict movement of people, information, and commodities between cities and even continents.*
>
> *The gravity model, as social scientists refer to the modified law of gravitation, takes into account the population size of two places and their distance. Since larger places attract people, ideas, and commodities more than smaller places and places closer together have a greater attraction, the gravity model incorporates these two features.*
>
> *The relative strength of a bond between two places is determined by multiplying the population of city A by the population of city B and then dividing the product by the distance between the two cities squared.*

$$\frac{\text{population}_1 \times \text{population}_2}{\text{distance}^2}$$

> *While the gravity model was created to anticipate migration between cities it can also be used to anticipate the traffic between two places, the number of telephone calls, the transportation of goods and mail, and other types of movement between places. The gravity model can also be used to compare the gravitational attraction between two continents, two countries, two states, two counties, or even two neighbourhoods within the same city.*

Whilst the above explanation is a vastly simplified description of gravity models which are employed into transportation and road planning, it represents an appropriate simple form of gravity model for the purposes of making estimates of the relative probability of trip making throughout Lismore's rural districts and the consequential relative impost which development in each rural district will potentially make in the rural road network.

5.2 Relative Traffic Generation Potential and Road Network Impact

A detailed presentation of the relative attractiveness of rural district origin/destination pairs in 2028 based on a gravity model is shown in Attachment 8.

The estimated nature and extent of rural trip generation for 2013 and 2028 is shown in Tables 5.1 and 5.2 based on population and other assumptions described in Section 4.1.

Table 5.1
Estimated Rural Area Trips and Inter-District Veh-Km of Travel (2013)

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District	CCD	District Population	Total Trip Generation	Relative Inter-District Trip Generating Potential	Inter-District Trips/Day (in+out)	Inter-DistrictVeh-Km	Relative Impost on Inter-District Rural Road Network
Blue Knob	701	218	487	0.30%	28	598	0.70%
Nimbin	702	404	903	1.15%	108	1422	1.66%
Nimbin	703	355	795	0.43%	41	999	1.17%
Nimbin	706	531	1188	1.48%	139	1941	2.27%
Nimbin	711	274	613	0.36%	34	751	0.88%
Larnook	707	988	2211	1.78%	167	3229	3.78%
Larnook	708	625	1398	0.89%	84	1857	2.17%
Koonorigan	705	515	1152	1.62%	152	2254	2.64%
Koonorigan	710	495	1108	1.20%	113	1937	2.27%
Tuntable Creek	704	371	831	1.33%	125	1705	1.99%
Terania Creek	709	228	510	0.50%	47	840	0.98%
Dunoon	801	959	2147	2.47%	232	3920	4.59%
Dunoon	812	426	954	1.70%	160	2209	2.58%
Rosebank	902	293	657	0.77%	72	1201	1.40%
Rosebank	804	603	1349	1.73%	162	2663	3.12%
Corndale	803	451	1008	1.91%	179	2424	2.84%
Keerrong	808	397	888	1.68%	157	2119	2.48%
Modanville	810	593	1326	3.02%	284	3511	4.11%
Numulgi	807	387	867	3.10%	291	2926	3.42%
Bexhill	806	540	1208	6.06%	569	4943	5.78%
Clunes	805	449	1006	2.78%	261	2760	3.23%
Clunes	809	598	1339	2.79%	262	3216	3.76%
Eltham	609	676	1513	3.62%	340	4365	5.11%
Blakebrook	811	400	895	2.26%	212	2498	2.92%
Richmond Hill	602	836	1870	15.48%	1453	11457	13.40%
		12613	28225	60.42%	5672	67746	79.26%
Caniaba	601	595	1331	3.47%	326	1760	2.06%
Lindendale	608	657	1470	6.70%	629	2602	3.04%
Loftville	604	342	764	12.23%	1148	6493	7.60%
Tregeagle	603	747	1673	10.36%	973	3458	4.05%
South Gundurimba	611	550	1231	2.80%	263	1223	1.43%
South Gundurimba	612	406	908	2.15%	202	878	1.03%
Tucki Tucki	605	461	1031	1.41%	133	783	0.92%
East Coraki	606	408	913	0.46%	43	531	0.62%
		4166	9322	39.58%	3715	17726	20.74%
		16779	**37547**	**100.00%**	**9387**	**85472**	**100.00%**

Average	2.88%
Median	2.48%
StDev	2.37%

Table 5.2
Estimated Rural Area Trips and Inter-District Veh-Km of Travel (2028)

District	CCD	District Population	Total Trip Generation	Relative Inter-District Trip Generating Potential	Inter-District Trips/Day (in+out)	Inter-DistrictVeh-Km	Relative Impost on Inter-District Rural Road Network
Blue Knob	701	294	657	0.30%	38	808	0.70%
Nimbin	702	544	1218	1.15%	146	1922	1.66%
Nimbin	703	479	1072	0.43%	55	1351	1.17%
Nimbin	706	716	1602	1.48%	187	2623	2.27%
Nimbin	711	369	827	0.36%	46	1015	0.88%
Larnook	707	1333	2982	1.78%	225	4364	3.78%
Larnook	708	843	1885	0.89%	113	2510	2.17%
Koonorigan	705	694	1553	1.62%	205	3046	2.64%
Koonorigan	710	668	1495	1.20%	152	2618	2.27%
Tuntable Creek	704	501	1121	1.33%	169	2304	1.99%
Terania Creek	709	308	688	0.50%	64	1136	0.98%
Dunoon	801	1294	2896	2.47%	313	5298	4.59%
Dunoon	812	575	1287	1.70%	215	2986	2.58%
Rosebank	902	396	886	0.77%	97	1623	1.40%
Rosebank	804	813	1820	1.73%	219	3599	3.12%
Corndale	803	608	1360	1.91%	242	3276	2.84%
Keerrong	808	535	1197	1.68%	212	2864	2.48%
Modanville	810	799	1789	3.02%	382	4746	4.11%
Numulgi	807	523	1169	3.10%	393	3955	3.42%
Bexhill	806	728	1629	6.06%	768	6680	5.78%
Clunes	805	606	1356	2.78%	351	3730	3.23%
Clunes	809	807	1806	2.79%	354	4347	3.76%
Eltham	609	912	2041	3.62%	458	5899	5.11%
Blakebrook	811	540	1207	2.26%	286	3376	2.92%
Richmond Hill	602	1127	2522	15.48%	1959	15484	13.40%
		17010	38065	60.42%	7649	91557	79.26%
Caniaba	601	802	1795	3.47%	439	2378	2.06%
Lindendale	608	886	1982	6.70%	848	3516	3.04%
Loftville	604	461	1031	12.23%	1548	8775	7.60%
Tregeagle	603	1008	2256	10.36%	1312	4673	4.05%
South Gundurimba	611	742	1661	2.80%	354	1653	1.43%
South Gundurimba	612	547	1225	2.15%	272	1186	1.03%
Tucki Tucki	605	621	1391	1.41%	179	1059	0.92%
East Coraki	606	550	1232	0.46%	58	717	0.62%
		5618	12572	39.58%	5010	23957	20.74%
		22629	**50637**	**100.00%**	**12659**	**115513**	**100.00%**

Average	2.88%
Median	2.48%
StDev	2.37%

As shown in Table 5.3, estimates indicate that in 2028 the Lismore urban area will continue to attract approximately 40% of all trips generated across boundaries of the various rural districts shown at left in the table. When considered in terms of vehicle-kilometres of travel across District boundaries, trips between rural districts and the Lismore urban area will contribute approximately 60% towards rural road network requirements. Testing of the above estimates indicated that the relative contribution to road network requirements which will be made by trips to and from Lismore urban area is relatively insensitive to the degree to which inter-district distances are weighted in the gravity model. For example, if the "distance" exponent in the gravity model is increased from 2 to 3, the relative contribution made by trips between rural districts and the Lismore urban area only increases from approximately 40% to 45%.

Table 5.3
Estimated Rural District Trip Distribution (2028)
As Proportion of Total Generated Trips

		Destination		
		North	South	Lismore
Origin	North	14%	1%	21%
	South	1%	2%	20%
	Lismore	20%	20%	0%

Table 5.2
Estimated Rural District Veh-Km Travel Distribution (2028)
As Proportion of Total Generated Veh-Km of Travel

		Destination		
		North	South	Lismore
Origin	North	15%	2%	31%
	South	2%	1%	9%
	Lismore	30%	9%	0%

Vehicle-kilometre of travel estimates based on the gravity model indicate that only 7 out of the 33 rural districts make a demand on the rural road network outside a range of one standard deviation each side of the median demand. Only two districts (Richmond Hill (602) and Loftville) are situated significantly outside the standard deviation.

Having regard to the approximate nature of the above estimates, the outcome gives weight to a proposition that all rural districts could reasonably be treated as making similar contribution to rural road network requirements in respect to the calculation of Rural Area Section 94 road infrastructure contributions. Alternatively, the estimates indicate that there may be some justification in excluding Loftville and Richmond Hill (602) Census Districts from that proposition given that the estimates indicate that these districts will contribute road network requirements in excess of 3 times the median rate of other districts. In those cases it may be more appropriate to make the Districts subject to the requirements of the Lismore Urban Area Section 94 Plan.

6. Future Road Infrastructure Costs

Council was not able to provide a schedule of future road infrastructure works for rural roads to the degree required to establish the basis for a Section 94 Contribution Plan. Current Council budgets provide one indication as to the potential magnitude of expenditures which may be associated with a Section 94 Plan.

Table 6.1 shows expenditures which Council has budgeted for the urban and rural road networks in the 2011/2012 financial year.

Table 6.1
Budgeted Council Expenditures 2011/2012

Roads Funding 2011/12

	Budget ($)
Rural Roads Maintenance	
Rural Roads Sealed	$1,828,500
Rural Roads Unsealed	$1,070,800
Rural Roads Reseals	$657,700
Total	**$3,557,000.00**
Urban Roads Maintenance	
Urban Roads Sealed/Unsealed	$1,146,200
Urban Roads Reseals	$272,700
Total	**$1,418,900**
Roads Capital Works	
Rural	$2,676,100
Urban	$2,884,400
Total	**$5,560,500**

Table 6.2 shows the rates at which capital expenditures into new works are being budgeted by Council in the 2011/2012 year. These tables are produced with the objective to place current expenditures into a trip rate perspective.

Table 6.2

Current Rates of Capital Expenditure - Rural Areas

	2013	2028	Increase
Daily Trips - All Trips			
All Districts	37624	50637	13013
Not including Richmond Hill & Loftville	23679	36608	12928
Daily Trips - Inter-District Trips			
All Districts	9406	12659	3253
Not including Richmond Hill & Loftville	5920	9152	3232
Vehicle-Kilometres of Travel - Inter-District Trips			
All Districts	74488	115513	41026
After Deducting Richmond Hill & Loftville	58845	91255	32410
2011/2012 New Capital Works Expenditure			
Annual Expenditure	$2,676,100	$2,676,100	
Equivalent 15 Yr Expenditure	$40,141,500	$40,141,500	
Current 15Yr Expenditure Rates			
Per Veh-Km - Inter-District Trips			
All Districts	$539	$348	
After Deducting Richmond Hill & Loftville	$682	$440	
Per Trip - All Trips			
All Districts	$1,067	$793	
After Deducting Richmond Hill & Loftville	$1,695	$1,097	
Per Trip - Inter-District Trips			
All Districts	$4,268	$3,171	
After Deducting Richmond Hill & Loftville	$6,781	$4,386	

Expenditures into new capital works in rural areas budgeted for the 2011/12 year amount to approximately $1,100 per current vehicle trip over a 15 year period based on total trip estimates described in Table 4.1. This compares with an equivalent current capital expenditure rate of approximately $485/trip for the Lismore urban area. If expenditures are not increased in real terms the rural rate will reduce to approximately $800/trip by 2028 due to a 13,000 trip/day trip generation increase over the period. These current rural expenditure rates are equivalent to approximately $4,400 and $3,200 per rural dwelling for 2013 and 2028 respectively based on a rural residential trip rate of 4.0 trips/dwelling/day. These rates are higher if Richmond Hill and Loftville are excluded from the rural estimates.

The estimates indicate if an additional $1.0M dollars per annum was to be expended into the road network over 15 years in direct response to new development, this would equate to a rate of approximately $1,150/trip or $4,600/dwelling if only levied against the 13,000 veh/day increase over the period. This rate approaches twice the contribution rate estimated for the Lismore urban area (ie. $600/trip).

Lismore City Council estimates that the depreciated and replacement values of existing rural roads is approximately $315 and $375 million dollars respectively, representing a rate equivalent to approximately $560 and $665 per current trip generated in the rural area over a 15 year period at current population levels. Whilst this estimate does not directly translate into determining an appropriate infrastructure contribution rate for new development, it provides an additional traffic generation perspective for considering an appropriate contribution rate.

Comments

In the absence of a program of future works and associated costs relating to new road infrastructure requirements likely to be generated by rural development, the following estimates provide a basis for deciding an appropriate rate.

- Even at modest rates of additional investment into rural road infrastructure, the technical rate at which new development should reasonably contribute to increased investment is in the order of that rate estimated for the Lismore urban area. That is, $600/trip. This logic is in part supported by the considerably greater lengths of rural road per head of population necessary to sustain rural development compared with urban development.

- If the current replacement capital value of the rural road network was to be increased through new capital expenditures in proportion to total rural trip generation, each additional trip would be associated with an increased capital value of approximately $665/trip over a 15 year time period to 2028.

- Current rates of capital expenditure into the rural road network will equate to approximately $1,100/trip over a 15 year time period to 2028 based on current trip generation.

Taken in combination the above factors provide a sound case for adopting a trip contribution rate for rural areas identical to, if not greater than that rate estimated for the Lismore urban area. That is, a rate of at least $600/trip/day.

Notwithstanding a case for applying a contribution rate to rural development which is at least that adopted for the Lismore urban area, the rate for the rural area should be applied to a trip generation schedule which represents characteristically lower rural trip generation rates in addition to representing generation rates used to derive the estimates in this report. That is, trip generation rates which are approximately 65% of that adopted for the Lismore urban area. With respect to contribution from residential development, this would yield a contribution of at least 6.5 x $600 x 0.65 = $2,535/dwelling for rural areas compared with $3,900/dwelling for the Lismore urban area.

7. Truck Generating Developments

Urban Area traffic estimates implicitly assume that truck movements (vehicles exceeding 12 tonne gross weight) will represent no greater than approximately 2% of daily traffic movement on trunk roads throughout the Lismore Urban Area. However, this may not necessarily be an appropriate assumption to apply into traffic movements in rural areas where specific developments and business activities such as quarrying may result in significantly higher proportions of truck traffic. This is of considerable significance given the substantially higher impact which truck traffic has on the operating life of rural road pavements.

All rural and urban development and associated contributions towards road infrastructure requirements need to be assessed in terms of ;

Direct Impacts and Associated Road Requirements

That is, those road requirements which are directly generated by a development and without which the development could not or should reasonably occur. These requirements are normally based on traffic engineering assessments extending to a 10 year planning horizon. They are usually described in Conditions of Development and are funded directly by a development. An example might be the need to construct a right turn lane at a rural intersection or the need to reconstruct a road pavement to ensure that the pavement has adequate strength to accommodate truck movements which exceed that for which the road pavement was originally designed and constructed.

Indirect Impacts and Associated Road Requirements

That is, those road requirements which are generated by a development and which are not necessarily required immediately to accommodate a development. These requirements are normally based on traffic engineering and other assessments such as estimates of the effect which a development may have on bringing forward in time the need for road improvements or increased road maintenance costs. These requirements are often negotiated between a developer and a Council and documented in Voluntary Planning Agreements but can potentially be the subject of a S94 contribution.

In respect to the latter of the above development impacts, the NSW state government document Local Development Contributions Practice Note, Nov 2010 describes the following key principles and guidelines (*shown in italics*).

Generally, contributions can only be sought for:

- *Capital costs, including land acquisition costs*
- *Public facilities that a council reasonably has to provide*
- *Public facilities that are needed as a consequence or to facilitate new development*

The condition must only be imposed for the provision, extension or augmentation of public amenities and public services (s 94(2) of the EP&A Act). That is, generally, contributions cannot be sought for recurrent funding such as maintenance.

Can the new demand be accommodated, in whole or in part, within existing public amenities and public services?

Are the public amenities and public services only required to meet the need of the new development or will it also serve the existing community?

If the expected development did not occur, would the public amenities and public services still be required?

The proposed public amenities and public services must be provided within a reasonable timeframe.

Will the public amenities and public services be provided at a time that those demanding the infrastructure require it?

The proposed development contribution must be based on a reasonable apportionment between existing demand and new demand for the public amenities and public services.

In our view a development which generates unusually high truck movements or truck movements which have the effect to significantly reduce the life of the road construction and/or increase the cost of maintaining a road would reasonably be required to contribute an amount based on the cost to Council of bringing forward the need for works or based on the increased cost to Council of maintaining the road. However, this would only be reasonable if the works were not already represented in Council's capital works or maintenance program and would not otherwise be required if the development was not to proceed.

7.1 The Ballina Shire Heavy Haulage Contribution Plan (2011)

The following extract (*in italics*) from the Ballina Heavy Haulage Contributions Plan provides an explanation regarding the logic for requiring contributions from relatively high truck generating developments in rural areas and the potential mechanisms for administering a Contributions Plan.

Roads have a design life after which they need reconstruction. Heavy vehicles can significantly reduce the life of a road. The heavy vehicles have a disproportionally greater impact on the life of roads compared to other light vehicles, notwithstanding there greater numbers.

Highways are generally designed and constructed to accommodate heavy vehicles and the damage associated with heavy trucks is recouped through registration and general taxation. Roads within the local road network conversely often have a lower design standard and are more susceptible to wear and tear associated with heavy vehicles resulting in the need for more frequent reconstruction work.

The majority of heavy haulage vehicles that impact on the local road network are associated with the haulage of materials that are quarried and/or processed for road and building construction, such as sand, road base, crushed aggregate and asphalt. Some of these products are used for the production of concrete, which has a secondary trip component from concrete batching plants to development sites, albeit in smaller trucks.

It is evident that not all quarried products are for use within Ballina Shire with some transported via local roads and then via Highways to external destinations beyond the Shire. This applies in particular to major highway upgrading that continues to be undertaken by the NSW Government in this region.

The use of this road network by heavy haulage vehicles contributes to a decline in the serviceable life of roads, thereby bringing forward the cost for renewal.

The location of quarries is determined by the location of the underlying resource, which is inevitably located in the hinterland some distance from the major highways, which requires quarried materials to be transported via parts of the local area network.

The impact of heavy haulage of quarried materials on the local road network is by its nature difficult to ascertain with any precision. The destination and travel routes of heavy haulage vehicles varies widely depending on the major projects being serviced, price competition, substitution, product quality, processing capacities, fuel prices, end use of products etc. The impact of heavy haulage associated with the non-extractive industries will also vary depending on the nature of the business.

Notwithstanding these uncertainties, it is clear that heavy vehicles have a significant impact on the life on parts of the local road network, which imposes significant costs by requiring more frequent reconstruction works to ensure road safety and satisfactory levels of service for all users.

This contribution plan seeks to identify a reasonable level of contribution for developments that generate heavy haulage traffic should pay to Council towards road reconstruction works. Where the consent authority is a council, a development contribution may only be imposed on a development if it is of a kind allowed by and determined in accordance with a contributions plan, such as this plan.

Council could as a condition of consent require the travel routes for every heavy haulage truck movement to be logged and for this information to be used to calculate the precise cost of the pavement damage and associated need for road reconstruction attributable to those movements. For accuracy this would need to be accompanied by a requirement that each development provides a weighbridge to determine the precise weight carried by each loaded truck. This is considered an unnecessarily onerous approach that would require considerable resources to administer by both operators and Council.

This plan sets out a reasonable estimate of the cost per tonne of extractive material hauled that should be paid to Council for the cost of road reconstruction necessary as a result of the pavement damage to the local road network. This approach is based on:

- *The average cost of road reconstruction due to typical heavy haulage vehicles on a tonne per kilometre rate.*

- *An estimated average travel distance per tonne of weight associated with the transport by typical heavy haulage vehicles on the local road network based on existing quarries and various assumptions about the heavy haulage destinations.*

The reasonable contribution rate for non-extractive industry heavy haulage traffic movements will need to have regard to the nature of each development. While the assumed cost per tonne per kilometre for extractive industries may well apply to non-extractive industries, there will be a need to make an assessment of the typical travel distance per tonne on the local road network.

This plan has been prepared in accordance with the requirements of the Environmental Planning and Assessment Act 1979 (EP&A Act) and Environmental Planning and Assessment Regulation 2000 (EP&A Regulation). In preparing the plan Council has had regard to the latest practice notes issued by the NSW Department of Planning in accordance with clause 26(1) of the EP&A Regulation.

The Ballina Plan requires contributions for Extractive Industry to be paid at the rate of $0.6455 ($AUD 2009) per tonne of extracted material based on an assumed haulage distance of 12 kilometres. The rate for non-extractive industry is stated in the Plan "to be determined by a traffic assessment".

The Ballina Plan also goes on to state ;

> *Council will collect monetary contributions from heavy haulage developments and apply the contributions toward the replacement of the local road network.*
>
> *Potential roads that will be the subject of works partly or fully funded under this plan are the roads that the Council has responsibility for. The locations of these roads are shown in Figure 1.*
>
> *Development that is likely to occasion significant heavy vehicle movements may be approved in any location throughout the Shire. As a result it is not possible for Council to specify in this plan which sections of the roads shown in Figure 1 will be upgraded or maintained using contributions collected under this plan. It is intended that works programs and application of funds collected under this plan to those works will be determined as part of Council's annual Integrated Planning & Reporting process.*
>
> *A contribution shall be paid on a quarterly basis at the applicable indexed rate based on the tonnage hauled for that period. Payments shall be made with a "haulage return" that discloses information including information including applicable quarter, quantities of material, tonnage rate, contribution payment and the like and be certified by a company officer. Where there has been no heavy haulage a nil return is required to be submitted.*

The Ballina Heavy Haulage Contribution Plan contains a comprehensive description of the background to the rate applied by Ballina Shire to Extractive Industry and the incremental cost of truck movements on the cost of maintaining roads. Contributions rates adopted in the Ballina Plan are also adopted in the equivalent Tweed Shire Plan.

7.2 Comments

It was beyond the scope and resources of this study to comprehensively review the cost impacts of truck movements on rural road design life and maintenance. However, we are of the view that the Ballina Heavy Haulage Contribution Plan represents a researched and reasonable approach to determining an appropriate and fair contribution.

However, we are of the view that it is not reasonable for funds collected under the Plan to be placed into a consolidated fund which would be expended at Council's discretion. In our view this has the potential to offend the key primary principles of nexus and accountability described in the NSW state government document Local Development Contributions Practice Note, Nov 2010, extracts of which are provided below in italics.

> ***Reasonableness*** *relates to nexus and apportionment.*
>
> *Nexus refers to the connection between the development and the demand created. The requirement to satisfy nexus is based on ensuring that there is a link between the development and increased demand for facilities. In addition, the infrastructure needs to be provided within a timeframe that meets the demand.*

Apportionment refers to the share borne by the future development. The concept of apportionment is based on ensuring that developers are only paying for the portion of demand that results from their development.
***Accountability** relates to both public and financial accountability.*

Accountability is a basic requirement of section 94. Public accountability may be sought through open decision making, maintenance of appropriate financial records and community involvement, while financial accountability may be sought through the works schedule to the contributions plan, annual reports and a contributions register.

A key issue with accountability in relation to reasonableness relates to the completion of the works program within the contributions plan and that the infrastructure is provided within a timeframe that meets the need of the development.

Particularly in the case of extractive industries, these principles are best served through a contribution being calculated from actual inventories of truck movement and tonnage with funds being allocated specifically in time to defined maintenance or other works.

The Ballina Plan provides the following guidance (*in italics*) in respect to how a contribution could more reasonably be calculated having regard to maintaining the principles of nexus and accountability.

The report "Estimated Pavement Damage from Haulage of Quarry Products" prepared by Council indicates that the typical cost of the pavement damage by a typical truck used to transport quarried products on the local road network ranges from between $0.046 to $0.072 per tonne per kilometre depending on the road type, traffic flow and surface treatment.

Assuming the typical road in the Shire is a medium traffic volume road with spray seal pavement, the pavement damage by a standard heavy haulage truck used by extractive industries is assumed to be $0.053 per tonne per kilometre.

Ballina Shire levies an additional 1.5% to the assessed contribution to provide for Council's administrative costs. This gives an overall rate of $0.054 ($AUD 2009)/tonne/kilometre of extracted material for extractive industry.

Based on a review of the Ballina Shire Plan and with consideration to the principles which apply to Section 94 Plans, it is our view that Lismore Council should adopt the following in relation to requiring contributions to be made by developments which generate unusually high truck movements on rural roads.

- Trucks should be defined as vehicles with more than 4 tyres and having a gross weight exceeding 12 tonne.
- Contributions should be assessed for developments which are estimated to generate truck movements which exceed 3% of the estimated daily traffic generation associated with the development or in excess of 5% of daily traffic on roads which provide access for the development.
- In the event that the above limits are exceeded, contributions should only be applied to truck movements which exceed the 3% level.
- The development should also be required to make contributions at the general rate applying to rural development as described in Section 6 of this report, regardless as to whether a contribution is required in respect to truck traffic generation.

- A development should be subject to both the general rate applying to rural development and the rate specifically associated with truck movements.

- A contribution rate of $0.054 ($AUD 2009)/tonne/kilometre should be applied to extractive industry. This rate should be indexed to reflect the time at which the contribution is calculated.

- Extractive industry should be required to pay quarterly contributions based on a quarterly log of material extracted.

- Non-extractive industry should be required to make contribution at the same rate as that applying to extractive industry. However, contributions should generally be made as a single payment prior to commencement of the development based on estimates of tonnage over a 10 year planning horizon, discounted at the relevant discount rate adopted by state treasury for the purposes of financial analysis. For example, at a discount rate of 6% per annum this would equate to approximately $0.40 ($AUD 2009)/tonne/kilometre applied against the average tonnes/annum over 10 years.

- The kilometers of travel applying to the calculation of the contribution for extractive and non-extractive industry should be based on an assessment of the actual distance over which haulage will occur on the Council funded network or an average haulage distance as adopted by Council, whichever the greater.

8. Summary and Recommendations

Based on approximate estimates of population and trip making in rural districts and simple gravity model estimates in respect to traffic demands and vehicle-kilometres of travel we draw the following conclusions and make the following recommendations.

Contributions from General Development

- The population of rural areas will increase from approximately 17,000 in 2013 to 23,000 in 2028.
- Rural areas in 2028 will generate approximately 50,000 vehicle trips/day of which approximately 12,500 will be across rural district boundaries defined by Census Collector District boundaries.
- Approximately 40% of all trips (4,400 trips/day) generated across the boundaries of the defined rural census districts in 2028 will be in and out of the Lismore urban area. The effect of an increase in these trips on road infrastructure requirements within the Lismore urban area will be captured under the Lismore Urban Area S94 Plan.
- Gravity model analysis indicates that principles of equity and fairness would be substantially satisfied if new developments in all rural districts were to be charged at a single rate per generated trip. However, equity and fairness would be best served if the western areas of Richmond Hill (District 602) and northern area of Loftville (District 604) were subject to the requirements of the Lismore Urban Area Section 94 Plan.
- Having regard to the current investment in the rural road network and current rates of expenditures into new capital works the appropriate contribution rate for new development in rural areas should be at least that which Council adopts for the Lismore Urban area. This is underlined by the considerably higher lengths of rural road per head of population necessary to sustain rural development compared with urban development.
- Notwithstanding which trip contribution rate is adopted for the rural area, the rural contribution rate should be based to a trip generation schedule of rates which represents 65% of schedule of rates applying to the urban area. This would reflect the lower trip generating character of rural development.
- It follows from the above that traffic generation rates for the purposes of estimating contributions from new rural development should be based on a rate of 65% of that shown in Table 8.1 or otherwise as can be supported through surveys of similar rural developments.

In summary, the rate at which contributions from new rural development should be calculated is $600 ($AUD 2012)/trip. This rate should be applied to trip generation rates which are 65% of the rate prescribed for the urban area.

Contributions From Truck Generating Development

For developments which generate significant amounts of truck traffic we recommend that contributions towards new road infrastructure, reduced road life and increased maintenance should be based on the following approach.

- Trucks should be defined as vehicles with more than 4 tyres and having a gross weight exceeding 12 tonne.
- Contributions should be assessed for developments which are estimated to generate truck movements which exceed 3% of the estimated daily traffic generation associated with the development or in excess of 3% of daily traffic on roads which provide access for the development.
- In the event that the above limits are exceeded, contributions should only be applied to truck movements which exceed the 3% level.
- The development should also be required to make contributions at the general rate applying to rural development as described in Section 6 of this report, regardless as to whether a contribution is required in respect to truck traffic generation.
- A contribution rate of $0.054 ($AUD 2009)/tonne/kilometre should be applied to extractive industry. This rate should be indexed to reflect the time at which the contribution is to be paid.
- Extractive industry should be required to pay quarterly contributions based on a quarterly log of material extracted.
- Non-extractive industry should be required to make contribution at the same rate as that applying to extractive industry. However, contributions should generally be made as a single payment prior to commencement of the development based on estimates of tonnage over a 10 year planning horizon, discounted at the relevant discount rate adopted by state treasury for the purposes of financial analysis. For example, at a discount rate of 6% per annum this would equate to approximately $0.40 ($AUD 2009)/tonne/kilometre applied against the average tonnes/annum over 10 years.
- The kilometers of travel applying to the calculation of the contribution for extractive and non-extractive industry should be based on an assessment of the actual distance over which haulage will occur on the Council funded network or an average haulage distance as adopted by Council, whichever the greater.

These recommendations should be applied into formulating a Rural Areas Section 94 Road Infrastructure Contributions Plan in the period to 2028. All aspects of this Plan should be the subject of review at 5 year intervals.

Table 8.1a Recommended Trip Generation Rates for Assessing New Development Contributions

DEVELOPMENT TYPE	VEHICLE TRIPS / DAY	PER ASSESSMENT UNIT	COMMENT
Aged Persons Accommodation, Self-contained Dwelling	2.0	Dwelling	
Hostel Units	1.0	Room	
Nursing Home Beds	0.5	Bed	
Amusement Parlour	0.4	per m² Total Use Area	As Retail-Commercial
Apartments	2.0	Bedroom	As Hotel/Motel Room
Attached Dwelling	4.0	Dwelling	As Attached Dwelling
Bed and Breakfast	1.5	Lettable Room	
Bulk Garden Supplies	0.1	per m² Total Use Area	
Café	0.4	per m² Total Use Area	As Retail-Commercial
Caravan Park	2.0	Site	
Caretakers Residence	6.5	Dwelling	As Detached Dwelling
Child Care Centre	3.7	Enrolment	
Cinema	2.5	Seat	As Cinema
Commercial Services	0.4	per m² Total Use Area	As Retail-Commercial
Community Care Centre	As agreed by Council		
Community Purposes	As agreed by Council		
Convenience Shop	0.4	per m² Total Use Area	As Retail-Commercial
Detached Dwelling	6.5	Dwelling	As Detached Dwelling
Display Home	6.5	Dwelling	As Detached Dwelling
Ecotourism Facility	As agreed by Council		
Educational Establishment-Primary	2.4	Enrolment	
Educational Establishment-Secondary	2.4	Enrolment	
Educational Establishment-Tertiary/Further	1.8	Equiv Full Time Enrolment	
Estate Sales Office	0.4	per m² Total Use Area	As Retail-Commercial
Family Accommodation	2.0	Added Unit	
Family Day Care Home	As agreed by Council		
Farm stay	1.5	Lettable Room	
Fast Food Premises	0.4	per m² Total Use Area	As Retail-Commercial
Freight Depot	0.01	per m² Site Area	
Fuel Depot	0.01	per m² Site Area	
Funeral Parlour	4.0	Employee	
Gaming Premises	0.4	per m² Total Use Area	As Retail-Commercial
Home Occupation-additional to Dwelling	0.4	per m² Total Use Area	As Retail-Commercial
Home Office-additional to Dwelling	0.16	per m² GLA	As Office
Hospital	As agreed by Council		
Indoor Sport and Recreation			
Squash or other court	40.0	Court	
Meeting place/Public hall	As agreed by Council		
Pinball parlour	0.4	per m² Total Use Area	As Retail-Commercial
Amusement Arcade	0.4	per m² Total Use Area	As Retail-Commercial
Theatre/Cinema	2.5	Seat	As Cinema
Gymnasium	0.5	per m² Total Use Area	
Poker Machine Areas	0.4	per m² Total Use Area	As Retail-Commercial
Gaming Machine Areas	0.4	per m² Total Use Area	As Retail-Commercial
Library, Art Gallery etc.	As agreed by Council		
Industry (Heavy/Manufacturing)	0.05	per m² Total Use Area	As Industry
Integrated Housing-Attached	4.0	Dwelling	As Attached Dwelling
Integrated Housing-Detached	6.5	Dwelling	As Detached Dwelling
Kennel	4.0	Employee	
Laundromat	0.4	per m² Total Use Area	As Retail-Commercial
Manufacturer's-Shop-Retail Area	0.4	per m² Total Use Area	As Retail-Commercial
Manufacturer's-Shop-Manufacturing Area	0.05	per m² Total Use Area	As Industry
Marina-Wet Berths for boats<10m	1.0	Berth	
Marina-Wet Berths for boats 10-15m	1.5	Berth	
Marina-Wet Berths for boats>15m	2.0	Berth	

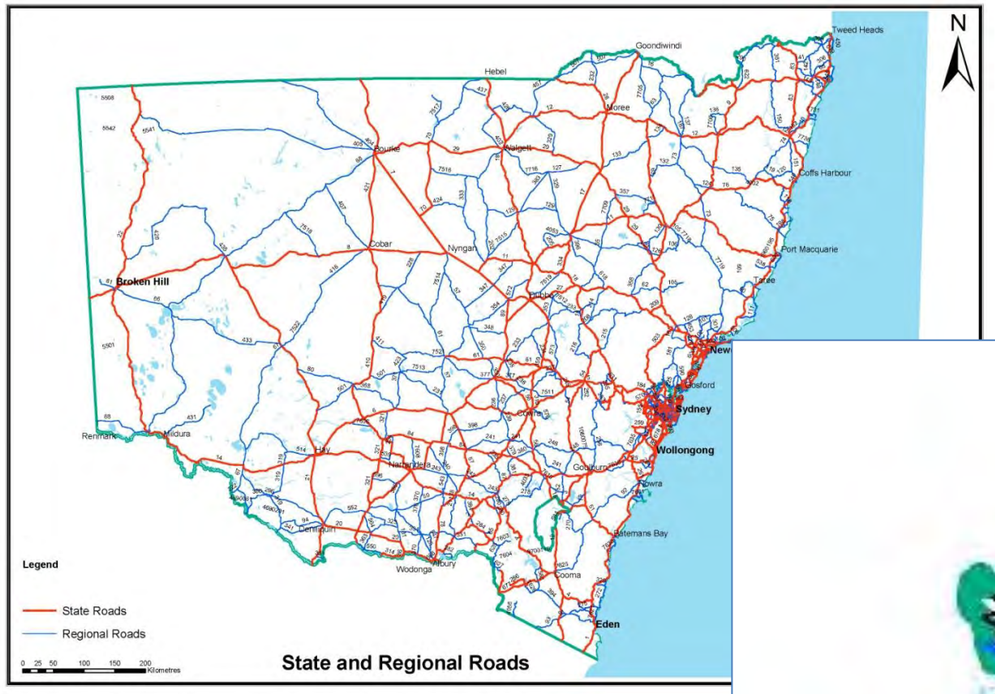
Table 8.1b Recommended Trip Generation Rates for Assessing New Development Contributions

DEVELOPMENT TYPE	VEHICLE TRIPS / DAY	PER ASSESSMENT UNIT	COMMENT
Marina-Dry Berth or Swing Mooring	0.5	Berth/Mooring	
Marina-Ancillary Activities	0.05	per m² Total Use Area	As Industry
Marina-Shop	0.4	per m² Total Use Area	As Retail-Commercial
Market	As agreed by Council		
Medical Centre	0.4	per m² Total Use Area	As Retail-Commercial
Mini Warehouse or Self Storage Facility	As agreed by Council		
Minor Tourist Facility	As agreed by Council		
Motel-Manager's Unit	4.0	Dwelling	As Attached Dwelling
Motel-Motel Rooms	2.0	Bedroom	As Hotel/Motel Room
Motel-Restaurant	0.4	per m² Total Use Area	As Retail-Commercial
Night Club	0.4	per m² Total Use Area	As Retail-Commercial
Office	0.16	per m² GLA	As Office
Outdoor Sport and Recreation			
Tennis or other Court	40.0	Court	
Lawn Bowls	40.0	Green	
Skating Rinks	0.1	per m² Total Use Area	
Swimming Pools	0.1	per m² Total Use Area	
Golf Course	10.0	Hole	
Golf Course Clubhouse	0.4	per m² Total Use Area	As Retail-Commercial
Racecourse	As agreed by Council		
Sporting Arena	As agreed by Council		
Clubhouse	0.4	per m² Total Use Area	As Retail-Commercial
Place of Worship	0.04	per m² GLA	
Reception Room	0.4	per m² Total Use Area	As Retail-Commercial
Relocatable Home Park	3.0	Site	
Residential Hotel-Bedroom	2.0	Bedroom	As Hotel/Motel Room
Residential Hotel-Ancillary Uses	0.4	per m² Total Use Area	As Retail-Commercial
Resort Hotel-Bedroom	2.0	Bedroom	As Hotel/Motel Room
Resort Hotel-Ancillary Uses	0.4	per m² Total Use Area	As Retail-Commercial
Restricted Club	0.4	per m² Total Use Area	As Retail-Commercial
Restaurant	0.4	per m² Total Use Area	As Retail-Commercial
Retail-Commercial Development	0.4	per m² Total Use Area	As Retail-Commercial
Retail Plant Nursery	0.1	per m² Total Use Area	
Rural Industry	4.0	Employee housed off-site	
Salvage Yard	0.05	per m² Total Use Area	As Industry
Serviced Apartment	2.5	Bedroom	
Service Industry	0.2	per m² Total Use Area	As Service Industry
Service Station-Fuel Pumps	80.0	Pump	
Service Station-Service Bays	0.2	per m² Total Use Area	As Service Industry
Service Station-Shop, Restaurant, etc	0.4	per m² Total Use Area	As Retail-Commercial, but with extra Linked trips
Shop	0.4	per m² Total Use Area	As Retail-Commercial
Shopping Centre Development	0.4	per m² Total Use Area	As Retail-Commercial
Showroom	0.2	per m² Total Use Area	
Special Accommodation	6.5	Dwelling	As Detached Dwelling
Stall	As agreed by Council		
Surgery-additional to Dwelling	0.4	per m² Total Use Area	As Retail-Commercial
Take Away Food Premises	0.4	per m² Total Use Area	As Retail-Commercial
Tavern-Lounge, Bar, Beer Garden, etc.	0.4	per m² Total Use Area	As Retail-Commercial

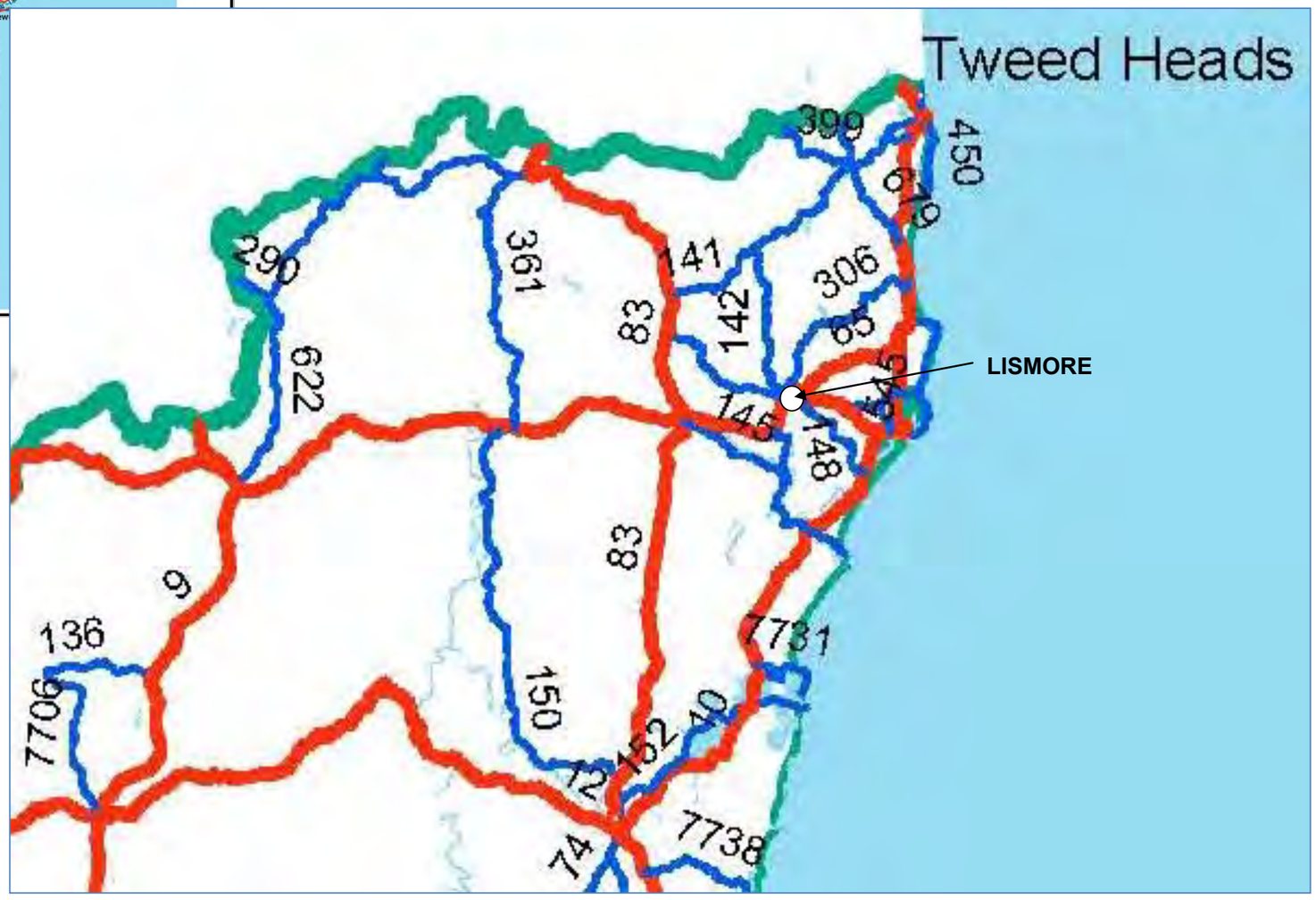
Table 8.1c Recommended Trip Generation Rates for Assessing New Development Contributions

DEVELOPMENT TYPE	VEHICLE TRIPS / DAY	PER ASSESSMENT UNIT	COMMENT
Tavern-Liquor Retail Sales Areas	0.4	per m² Total Use Area	As Retail-Commercial
Tourist Cabins	As agreed by Council		
Tourist Facilities	As agreed by Council		
Tourist Shop	0.4	per m² Total Use Area	As Retail-Commercial
Toxic or Dangerous Goods Store	As agreed by Council		
Transit Centre	As agreed by Council		
Transport Terminal	As agreed by Council		
Vehicle Hire Premises	0.16	per m² GLA	As Office
Vehicle Sales Premises-Office Areas	0.16	per m² Total Use Area	As Office
Vehicle Sales Premises-Display Areas	0.04	per m² Total Use Area	
Veterinary Clinic/Hospital	0.4	per m² Total Use Area	As Retail-Commercial
Warehouse	0.05	per m² Total Use Area	
Waterfront (or Marine) Industry	0.05	per m² Total Use Area	As Industry
Any Other Use	As agreed by Council		

Attachments

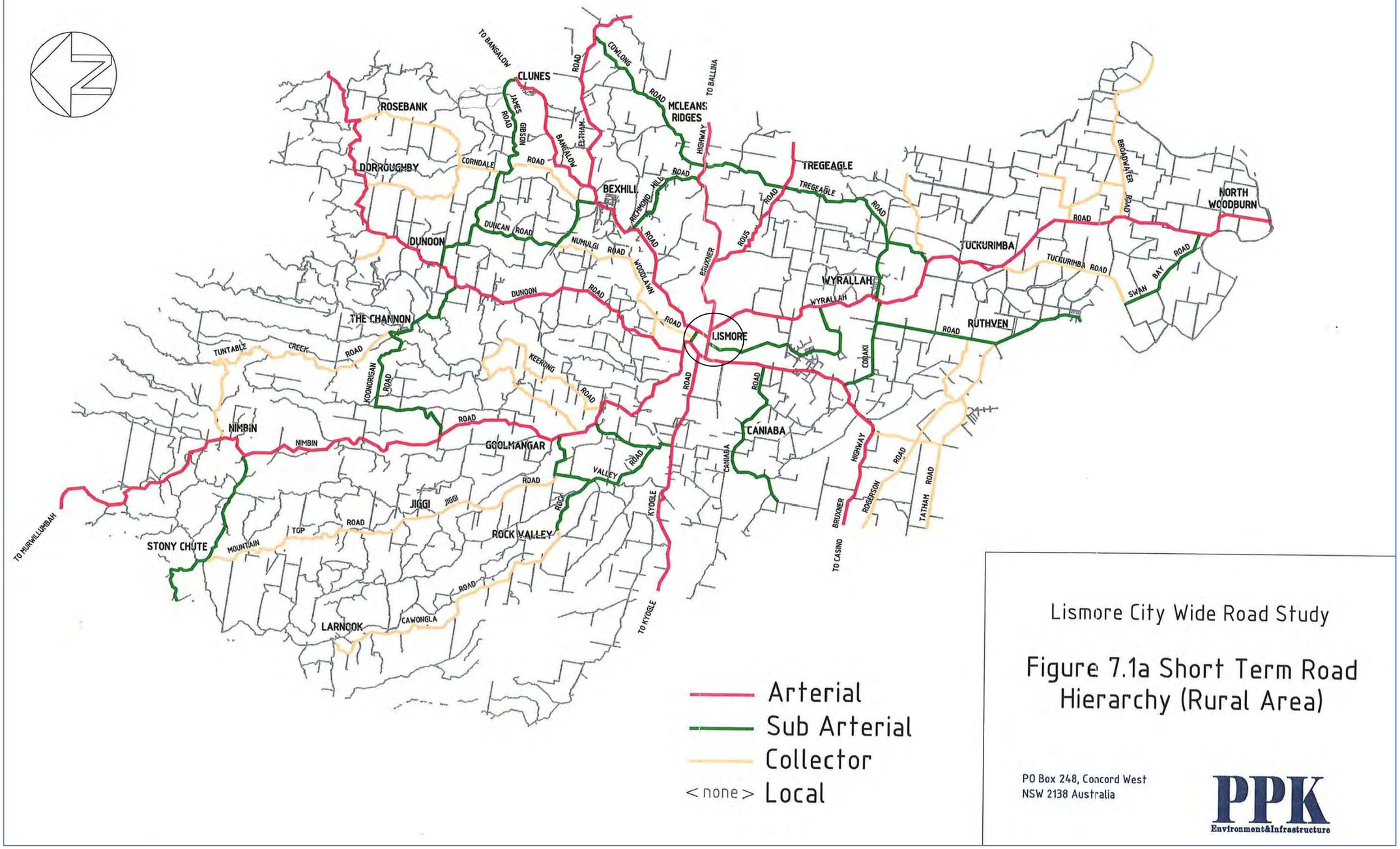


State and Regional Roads



State Highways and Regional Roads

Attachment No. 1



Lismore City Wide Road Study

Figure 7.1a Short Term Road Hierarchy (Rural Area)

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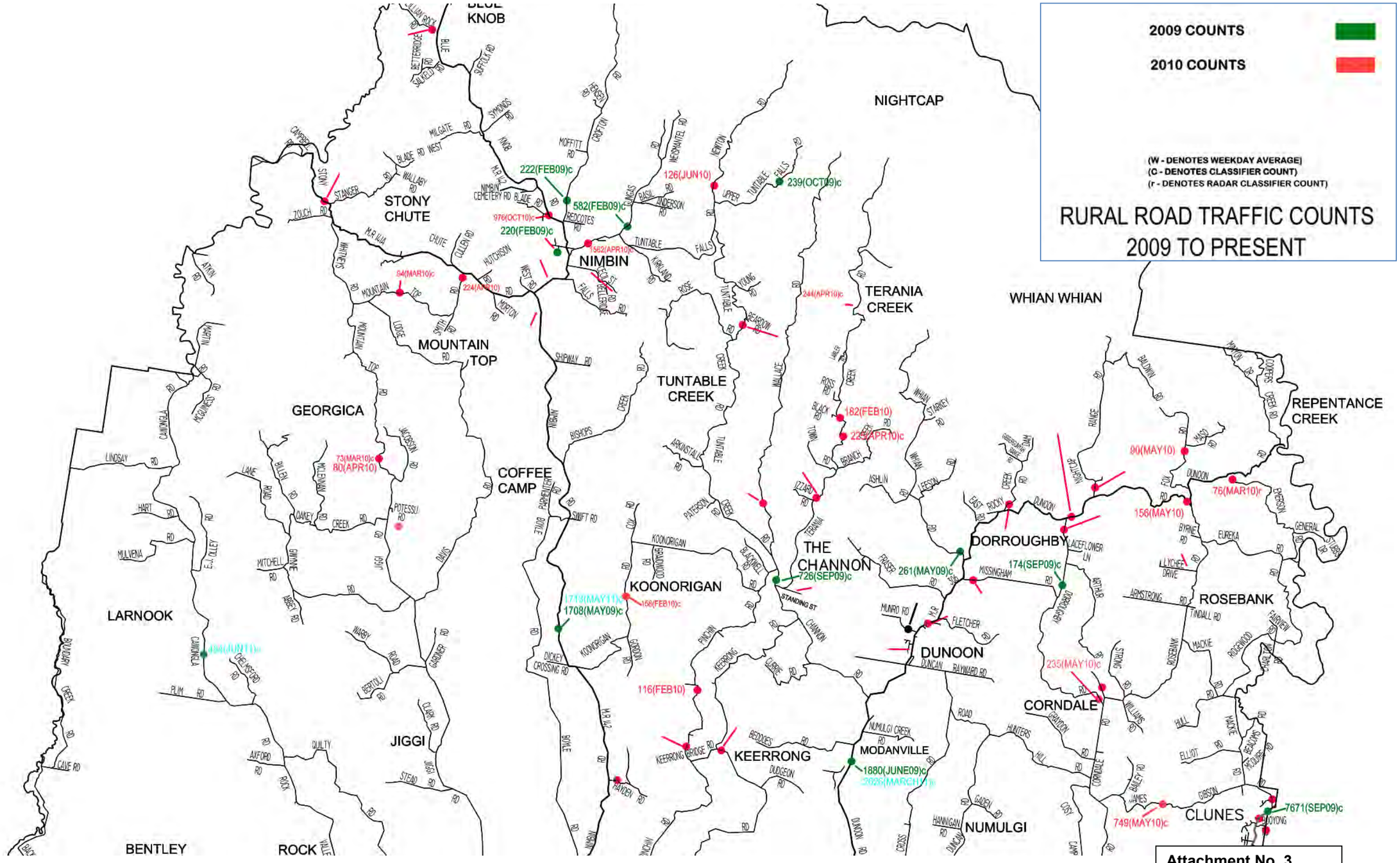
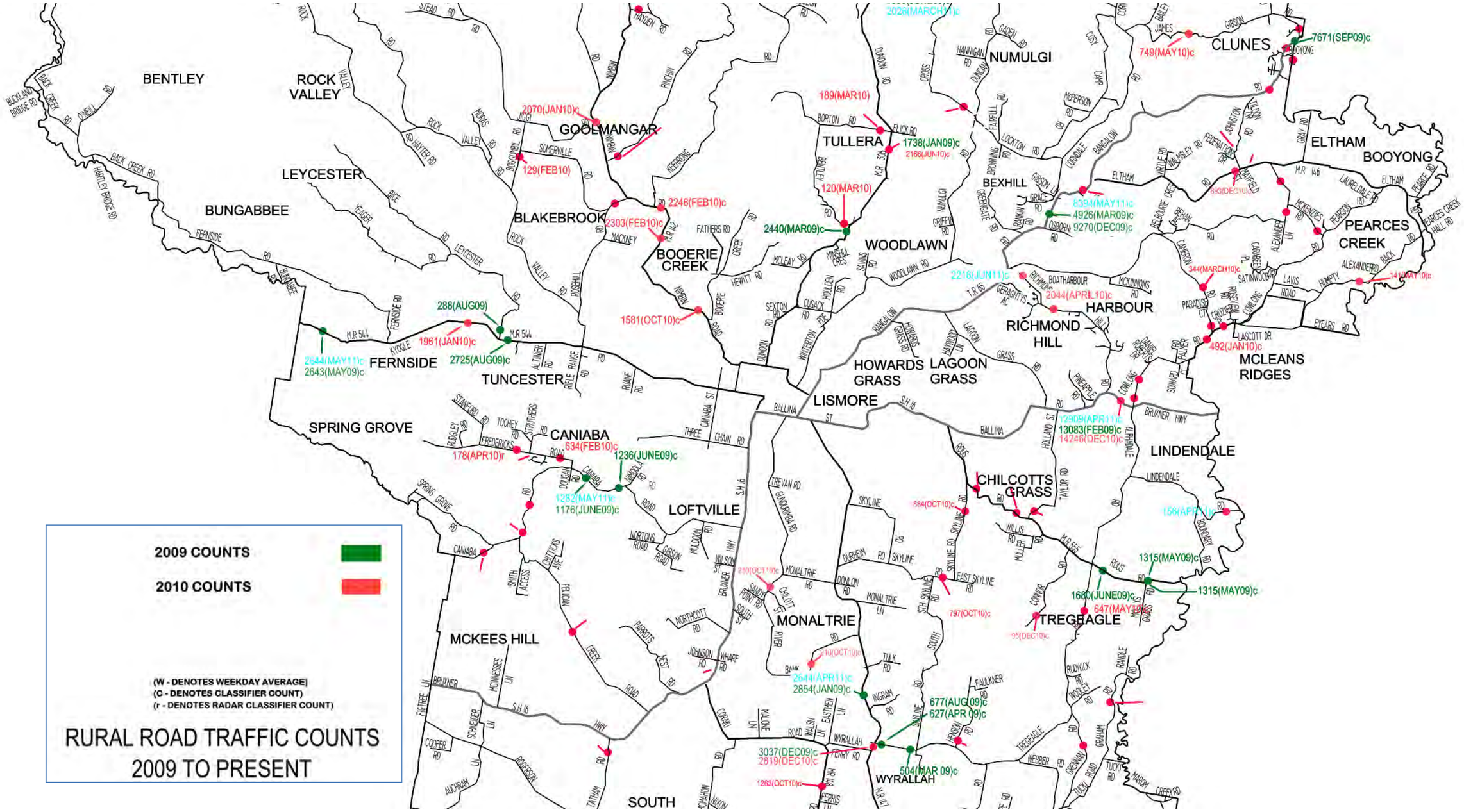
PPK
Environment&Infrastructure

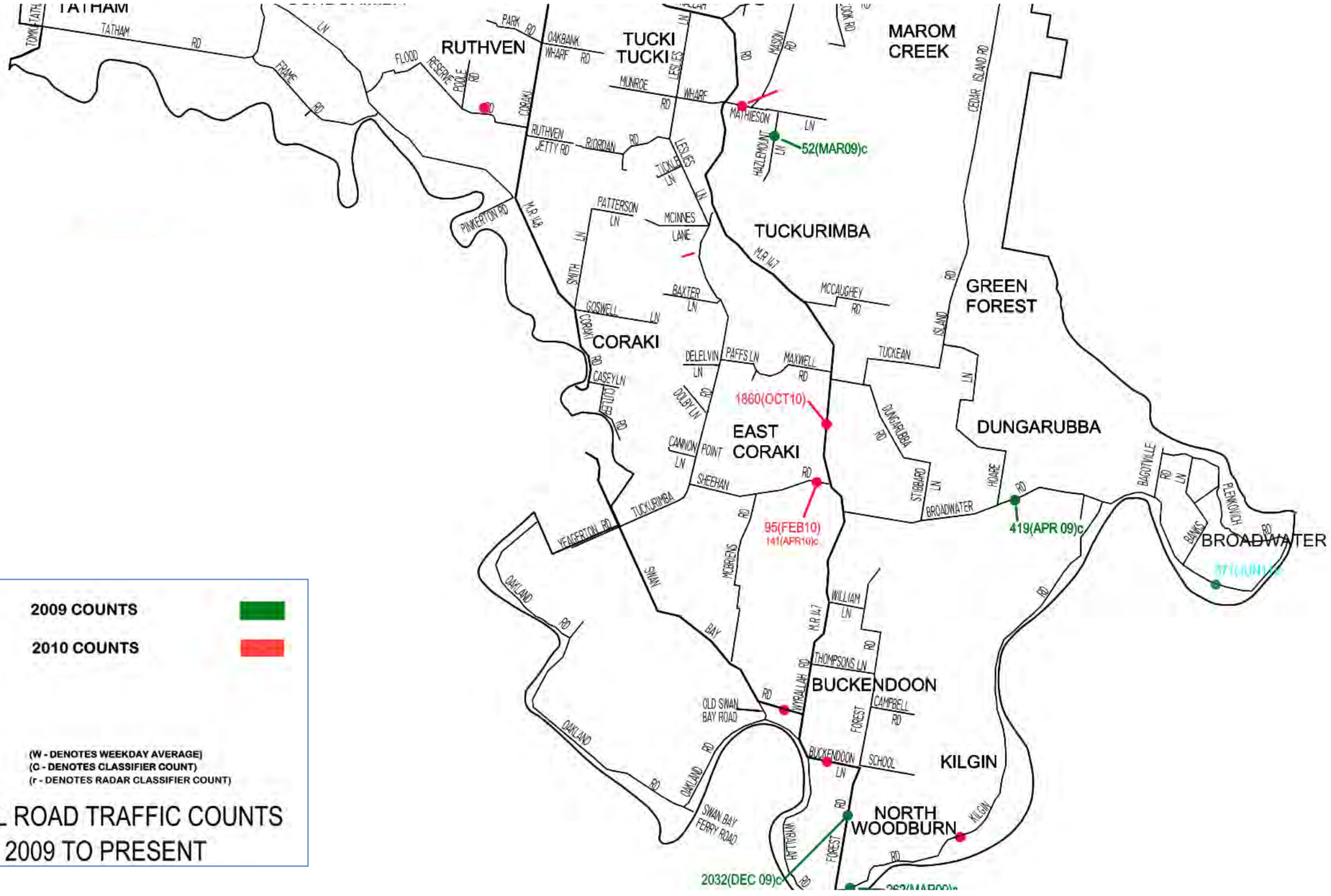
Attachment No. 2



Attachment No. 3



Attachment No. 4



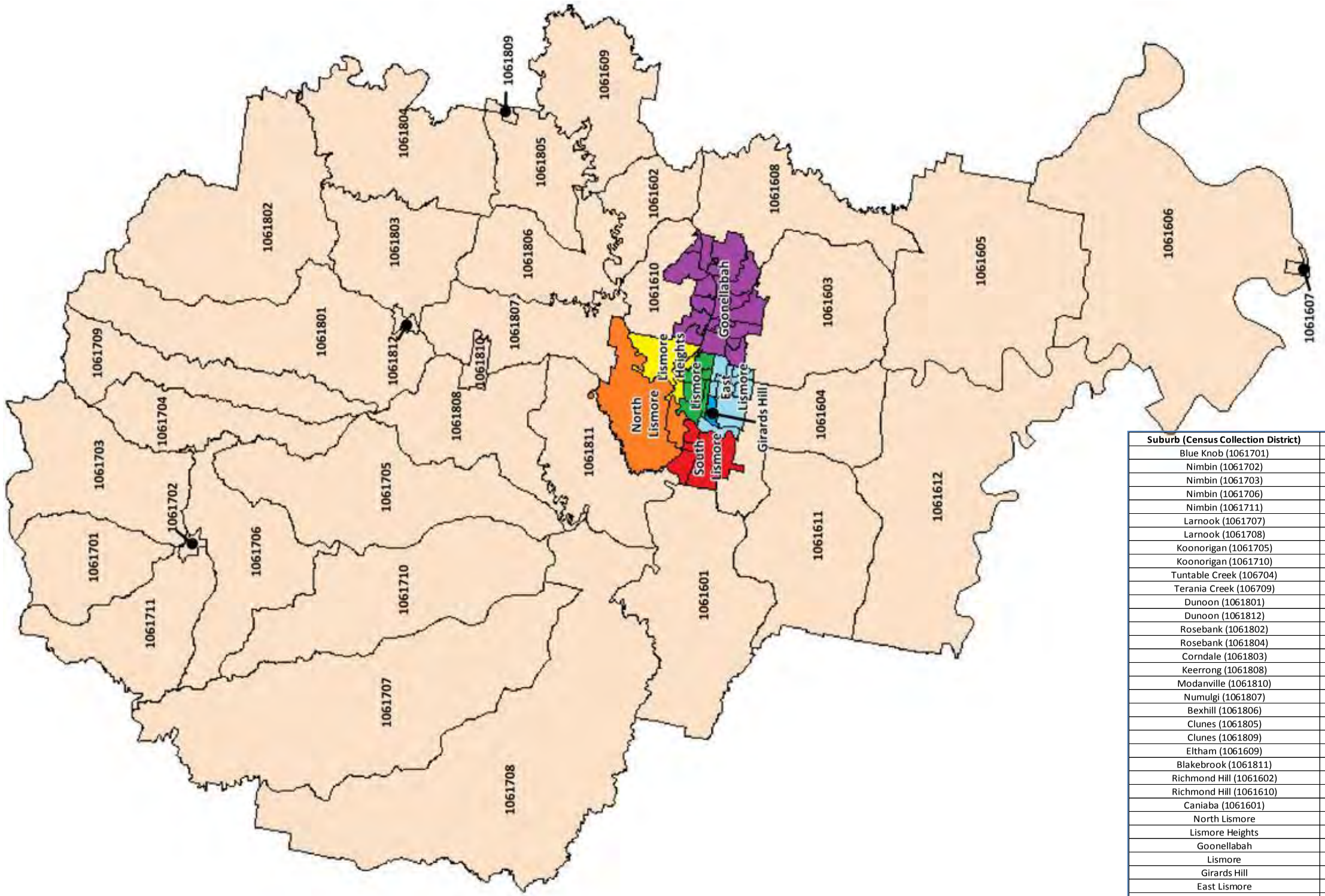
2009 COUNTS

2010 COUNTS

(W - DENOTES WEEKDAY AVERAGE)
(C - DENOTES CLASSIFIER COUNT)
(r - DENOTES RADAR CLASSIFIER COUNT)

RURAL ROAD TRAFFIC COUNTS
2009 TO PRESENT

Attachment No. 5



Suburb (Census Collection District)	ABS 2006 Population	Longitude	Latitude
Blue Knob (1061701)	190	-28.5507	153.1971
Nimbin (1061702)	352	-28.595836	153.22296
Nimbin (1061703)	310	-28.5538	153.257
Nimbin (1061706)	463	-28.6135	153.2183
Nimbin (1061711)	239	-28.5658	153.169
Larnook (1061707)	862	-28.6439	153.1578
Larnook (1061708)	545	-28.666181	153.111756
Koonorigan (1061705)	449	-28.662954	153.239754
Koonorigan (1061710)	432	-28.6769	153.1819
Tuntable Creek (106704)	324	-28.657609	153.266568
Terania Creek (106709)	199	-28.606843	153.30024
Dunoon (1061801)	837	-28.6421	153.3139
Dunoon (1061812)	372	-28.683752	153.316009
Rosebank (1061802)	256	-28.6413	153.3569
Rosebank (1061804)	526	-28.677745	153.387661
Corndale (1061803)	393	-28.700883	153.365356
Keerrong (1061808)	346	-28.704876	153.264693
Modanville (1061810)	517	-28.715697	153.297923
Numulgi (1061807)	338	-28.744234	153.324822
Bexhill (1061806)	471	-28.762736	153.346436
Clunes (1061805)	392	-28.7305	153.3873
Clunes (1061809)	522	-28.727484	153.407617
Eltham (1061609)	590	-28.755733	153.394726
Blakebrook (1061811)	349	-28.763544	153.231106
Richmond Hill (1061602)	729	-28.780571	153.342968
Richmond Hill (1061610)	469	-28.7894	153.3367
Caniaba (1061601)	519	-28.8132	153.2095
North Lismore	852	-28.801778	153.268673
Lismore Heights	2,494	-28.803776	153.299953
Goonellabah	12,138	-28.819988	153.328454
Lismore	3,568	-28.8091	153.292
Girards Hill	1,203	-28.817304	153.277015
East Lismore	5,211	-28.821116	153.289857
South Lismore	1,910	-28.816199	153.26138
Lindendale (1061608)	573	-28.826257	153.378035
Loftville (1061604)	298	-28.829646	153.264905
Tregeagle (1061603)	652	-28.847937	153.356285
South Gundurimba (1061611)	480	-28.848054	153.210153
South Gundurimba (1061612)	354	-28.888216	153.259508
Tucki Tucki (1061605)	402	-28.929442	153.314155
East Coraki (1061606)	356	-29.016435	153.304116
TOTAL 2006 POPULATION	**42482**		

Locations are taken from Census Collection Districts (smallest data unit) or State Suburbs from the 2006 Census
Populations shown are collected from a single source to ensure that each location and population are completely separate
All longtitude and latitudes are obtained from searching the surburb name in google maps unless yellow.
Yellow co-ordinates have been estimated based on the Census Collection District area

Attachment No. 6

Estimated Distance Table	Blue Knob (1061701)	Nimbin (1061702)	Nimbin (1061703)	Nimbin (1061706)	Nimbin (1061711)	Larnook (1061707)	Larnook (1061708)	Koonorigan (1061705)	Koonorigan (1061710)	Tuntable Creek (106704)	Terania Creek (106709)	Dunoon (1061801)	Dunoon (1061812)	Rosebank (1061802)	Rosebank (1061804)	Corndale (1061803)	Keerrong (1061808)	Modanville (1061810)	Numulgi (1061807)	Bexhill (1061806)	Clunes (1061805)	Clunes (1061809)	Eltham (1061609)	Blakebrook (1061811)	Richmond Hill (1061602)	Richmond Hill (1061610)	North Lismore	Lismore Heights	Goonellabah	Lismore	Girards Hill	East Lismore	South Lismore	Caniaba (1061601)	Lindendale (1061608)	Loftville (1061604)	Tregeagle (1061604)	South Gundurimba (10616	South Gundurimba (10616	Tucki Tucki (1061605)	East Coraki (1061606)
Blue Knob (1061701)	0.0	8.3	8.5	10.9	4.7	16.5	22.7	19.6	21.1	20.3	17.3	22.4	27.8	27.1	34.2	34.5	27.4	30.9	36.9	41.1	40.2	41.8	44.0	35.7	43.4	44.3	36.7	38.3	42.0	38.7	39.1	40.2	38.5	37.1	46.0	40.4	47.2	42.0	48.4	55.7	67.3
Nimbin (1061702)	8.3	0.0	8.5	3.0	9.1	12.2	19.6	11.4	14.7	12.0	11.1	15.0	19.6	20.3	26.9	26.6	19.1	22.6	28.6	32.8	32.2	34.0	36.0	27.9	35.1	36.0	29.7	31.1	34.7	31.5	32.1	33.1	31.5	30.7	38.7	33.5	39.9	35.6	41.6	48.7	60.4
Nimbin (1061703)	8.5	8.5	0.0	11.3	12.6	20.5	27.7	18.3	23.1	17.3	10.7	16.7	23.2	20.3	27.7	28.8	25.2	27.5	33.1	37.0	34.7	35.9	38.8	35.1	39.6	40.8	35.0	35.7	38.8	36.3	37.3	38.0	37.0	37.2	41.8	38.9	43.6	42.0	47.2	53.6	65.6
Nimbin (1061706)	10.9	3.0	11.3	0.0	10.6	9.9	17.4	8.8	11.7	10.0	11.6	14.3	18.1	20.1	26.2	25.3	16.5	20.4	26.4	30.7	30.8	32.7	34.3	25.0	32.9	33.7	27.4	29.0	32.7	29.3	29.8	30.9	29.2	28.2	37.0	31.1	38.0	33.1	39.2	46.4	58.0
Nimbin (1061711)	4.7	9.1	12.6	10.6	0.0	13.1	18.5	19.0	18.6	20.6	19.7	24.1	28.5	29.3	36.0	35.7	26.8	30.9	36.9	41.2	41.2	43.1	44.9	34.0	43.3	44.1	35.9	38.0	41.9	38.2	38.4	39.6	37.5	35.3	46.4	39.4	47.2	40.2	47.1	54.9	66.2
Larnook (1061707)	16.5	12.2	20.5	9.9	13.1	0.0	7.5	12.0	6.5	15.5	21.0	22.0	23.3	28.1	32.9	30.8	18.2	23.1	28.9	33.1	35.4	37.9	38.2	22.4	34.6	35.0	26.9	29.7	33.9	29.6	29.3	30.7	28.1	24.9	39.4	30.0	39.4	29.7	37.1	45.5	56.2
Larnook (1061708)	22.7	19.6	27.7	17.4	18.5	7.5	0.0	18.1	10.1	21.9	28.4	28.8	29.0	34.8	39.0	36.2	22.5	27.5	32.7	36.8	40.3	43.0	42.6	23.4	37.8	37.8	28.6	32.0	36.5	31.7	30.9	32.5	29.3	24.6	42.5	31.0	41.9	28.9	37.2	46.2	55.9
Koonorigan (1061705)	19.6	11.4	18.3	8.8	19.0	12.0	18.1	0.0	8.5	3.9	12.6	11.0	11.3	16.9	21.0	18.8	7.8	12.0	18.1	22.4	23.6	26.0	26.8	16.8	24.4	25.1	20.0	21.5	25.2	21.8	22.4	23.3	21.8	21.6	29.7	23.8	30.5	26.4	31.9	38.9	50.6
Koonorigan (1061710)	21.1	14.7	23.1	11.7	18.6	6.5	10.1	8.5	0.0	12.4	20.4	19.5	18.9	25.4	29.0	26.2	12.6	17.6	23.1	27.2	30.3	32.9	32.8	16.0	28.5	28.8	21.2	24.0	28.3	23.9	23.6	25.1	22.4	19.6	33.9	24.3	33.8	24.5	31.6	39.9	50.7
Tuntable Creek (106704)	20.3	12.0	17.3	10.0	20.6	15.5	21.9	3.9	12.4	0.0	9.7	7.2	8.2	13.0	17.4	15.7	7.9	10.6	16.6	20.8	20.9	23.0	24.4	18.3	23.1	24.1	20.3	21.1	24.4	21.7	22.6	23.3	22.4	23.3	28.2	24.3	29.5	27.9	32.6	38.9	50.9
Terania Creek (106709)	17.3	11.1	10.7	11.6	19.7	21.0	28.4	12.6	20.4	9.7	0.0	6.2	13.0	9.8	17.1	18.1	17.1	18.1	23.1	26.7	24.0	25.1	28.1	27.8	29.5	30.8	27.8	27.8	30.3	28.6	29.9	30.3	30.0	31.6	32.7	31.8	34.9	36.2	40.1	45.6	57.8
Dunoon (1061801)	22.4	15.0	16.7	14.3	24.1	22.0	28.8	11.0	19.5	7.2	6.2	0.0	6.9	6.1	12.0	12.2	12.5	12.4	17.1	20.6	18.0	19.4	22.1	23.3	23.4	24.7	23.3	22.9	25.2	23.7	25.2	25.5	25.6	28.0	27.4	27.3	29.6	32.3	35.5	40.5	52.8
Dunoon (1061812)	27.8	19.6	23.2	18.1	28.5	23.3	29.0	11.3	18.9	8.2	13.0	6.9	0.0	9.1	10.2	7.5	8.0	5.9	10.1	13.8	12.7	14.8	16.3	17.9	16.5	17.8	17.8	17.1	19.3	18.0	19.6	19.7	20.1	23.3	21.8	21.7	23.8	27.3	29.8	34.7	47.0
Rosebank (1061802)	27.1	20.3	20.3	20.1	29.3	28.1	34.8	16.9	25.4	13.0	9.8	6.1	9.1	0.0	7.5	10.0	16.8	14.9	17.7	20.3	15.4	16.0	19.8	27.0	23.3	24.8	25.6	24.2	25.5	25.3	27.1	26.9	27.9	31.4	26.3	29.4	29.2	35.3	37.3	41.1	53.4
Rosebank (1061804)	34.2	26.9	27.7	26.2	36.0	32.9	39.0	21.0	29.0	17.4	17.1	12.0	10.2	7.5	0.0	5.0	17.9	14.1	14.2	15.3	8.8	8.7	13.0	26.3	18.2	19.9	23.8	21.4	21.6	22.6	24.7	24.2	26.0	30.8	21.0	27.1	24.4	34.0	34.4	36.9	49.1
Corndale (1061803)	34.5	26.6	28.8	25.3	35.7	30.8	36.2	18.8	26.2	15.7	18.1	12.2	7.5	10.0	5.0	0.0	14.2	9.8	9.2	10.6	5.8	7.4	10.0	21.6	13.6	15.3	19.3	17.0	17.5	18.2	20.3	19.8	21.5	26.4	17.8	22.7	20.8	29.5	30.1	33.0	45.3
Keerrong (1061808)	27.4	19.1	25.2	16.5	26.8	18.2	22.5	7.8	12.6	7.9	17.1	12.5	8.0	16.8	17.9	14.2	0.0	5.0	10.7	15.0	17.8	20.5	20.2	10.8	16.7	17.3	13.7	14.7	18.4	15.2	16.0	16.8	15.7	17.0	23.0	17.6	23.7	21.5	25.9	32.4	44.3
Modanville (1061810)	30.9	22.6	27.5	20.4	30.9	23.1	27.5	12.0	17.6	10.6	18.1	12.4	5.9	14.9	14.1	9.8	5.0	0.0	6.1	10.4	12.8	15.6	15.2	12.3	12.5	13.4	12.8	12.4	15.3	13.2	14.6	14.9	15.0	18.2	19.0	16.7	20.3	22.1	24.9	30.2	42.4
Numulgi (1061807)	36.9	28.6	33.1	26.4	36.9	28.9	32.7	18.1	23.1	16.6	23.1	17.1	10.1	17.7	14.2	9.2	10.7	6.1	0.0	4.3	9.1	12.0	10.0	13.6	6.6	7.7	11.1	9.1	10.7	10.2	12.2	11.8	13.3	18.4	13.6	14.5	15.2	21.3	22.2	26.2	38.5
Bexhill (1061806)	41.1	32.8	37.0	30.7	41.2	33.1	36.8	22.4	27.2	20.8	26.7	20.6	13.8	20.3	15.3	10.6	15.0	10.4	4.3	0.0	7.9	10.4	6.9	16.3	3.0	4.6	11.9	8.6	8.4	9.9	12.2	11.2	13.8	19.9	9.9	14.5	12.1	22.0	21.3	23.9	36.3
Clunes (1061805)	40.2	32.2	34.7	30.8	41.2	35.4	40.3	23.6	30.3	20.9	24.0	18.0	12.7	15.4	8.8	5.8	17.8	12.8	9.1	7.9	0.0	2.9	4.3	22.7	10.4	12.1	19.0	15.7	14.9	17.0	19.3	18.4	20.9	26.8	13.6	21.7	17.1	29.2	28.2	29.8	41.9
Clunes (1061809)	41.8	34.0	35.9	32.7	43.1	37.9	43.0	26.0	32.9	23.0	25.1	19.4	14.8	16.0	8.7	7.4	20.5	15.6	12.0	10.4	2.9	0.0	5.0	25.6	12.7	14.4	21.5	18.1	16.9	19.4	21.8	20.7	23.4	29.4	14.5	24.1	18.4	31.7	30.3	31.2	43.1
Eltham (1061609)	44.0	36.0	38.8	34.3	44.9	38.2	42.6	26.8	32.8	24.4	28.1	22.1	16.3	19.8	13.0	10.0	20.2	15.2	10.0	6.9	4.3	5.0	0.0	23.1	8.4	9.9	18.3	14.5	12.8	15.8	18.2	16.9	20.0	26.4	10.2	20.4	14.0	28.2	26.2	26.8	38.8
Blakebrook (1061811)	35.7	27.9	35.1	25.0	34.0	22.4	23.4	16.8	16.0	18.3	27.8	23.3	17.9	27.0	26.3	21.6	10.8	12.3	13.6	16.3	22.7	25.6	23.1	0.0	16.0	15.5	7.4	10.9	15.4	10.5	9.8	11.4	8.5	7.6	21.8	10.4	20.7	12.3	18.0	26.0	37.0
Richmond Hill (1061602)	43.4	35.1	39.6	32.9	43.3	34.6	37.8	24.4	28.5	23.1	29.5	23.4	16.5	23.3	18.2	13.6	16.7	12.5	6.6	3.0	10.4	12.7	8.4	16.0	0.0	1.7	10.5	6.7	5.9	8.0	10.3	9.2	12.1	18.6	8.0	12.6	9.7	20.3	18.9	21.4	33.7
Richmond Hill (1061610)	44.3	36.0	40.8	33.7	44.1	35.0	37.8	25.1	28.8	24.1	30.8	24.7	17.8	24.8	19.9	15.3	17.3	13.4	7.7	4.6	12.1	14.4	9.9	15.5	1.7	0.0	9.4	5.4	4.5	6.7	9.0	7.8	10.9	17.5	7.6	11.3	8.7	19.0	17.4	20.0	32.3
North Lismore	36.7	29.7	35.0	27.4	35.9	26.9	28.6	20.0	21.2	20.3	27.8	23.3	17.8	25.6	23.8	19.3	13.7	12.8	11.1	11.9	19.0	21.5	18.3	7.4	10.5	9.4	0.0	4.2	8.5	3.3	2.5	4.0	2.3	8.2	15.2	4.0	13.5	10.3	12.3	19.0	30.7
Lismore Heights	38.3	31.1	35.7	29.0	38.0	29.7	32.0	21.5	24.0	21.1	27.8	22.9	17.1	24.2	21.4	17.0	14.7	12.4	9.1	8.6	15.7	18.1	14.5	10.9	6.7	5.4	4.2	0.0	4.5	1.3	3.6	2.8	5.5	12.3	11.0	6.0	9.8	13.7	13.1	17.8	30.0
Goonellabah	42.0	34.7	38.8	32.7	41.9	33.9	36.5	25.2	28.3	24.4	30.3	25.2	19.3	25.5	21.6	17.5	18.4	15.3	10.7	8.4	14.9	16.9	12.8	15.4	5.9	4.5	8.5	4.5	0.0	5.2	7.0	5.2	9.1	16.1	6.8	8.7	5.5	16.5	13.4	15.6	27.9
Lismore	38.7	31.5	36.3	29.3	38.2	29.6	31.7	21.8	23.9	21.7	28.6	23.7	18.0	25.3	22.6	18.2	15.2	13.2	10.2	9.9	17.0	19.4	15.8	10.5	8.0	6.7	3.3	1.3	5.2	0.0	2.3	1.7	4.3	11.2	11.9	4.7	10.3	12.4	12.0	17.2	29.3
Girards Hill	39.1	32.1	37.3	29.8	38.4	29.3	30.9	22.4	23.6	22.6	29.9	25.2	19.6	27.1	24.7	20.3	16.0	14.6	12.2	12.2	19.3	21.8	18.2	9.8	10.3	9.0	2.5	3.6	7.0	2.3	0.0	1.8	2.1	9.2	13.7	2.4	11.6	10.0	10.3	16.6	28.3
East Lismore	40.2	33.1	38.0	30.9	39.6	30.7	32.5	23.3	25.1	23.3	30.3	25.5	19.7	26.9	24.2	19.8	16.8	14.9	11.8	11.2	18.4	20.7	16.9	11.4	9.2	7.8	4.0	2.8	5.2	1.7	1.8	0.0	3.9	10.9	12.0	3.6	9.8	11.4	10.3	15.6	27.6
South Lismore	38.5	31.5	37.0	29.2	37.5	28.1	29.3	21.8	22.4	22.4	30.0	25.6	20.1	27.9	26.0	21.5	15.7	15.0	13.3	13.8	20.9	23.4	20.0	8.5	12.1	10.9	2.3	5.5	9.1	4.3	2.1	3.9	0.0	7.0	15.9	2.0	13.6	8.3	10.2	17.5	28.8
Caniaba (1061601)	37.1	30.7	37.2	28.2	35.3	24.9	24.6	21.6	19.6	23.3	31.6	28.0	23.3	31.4	30.8	26.4	17.0	18.2	18.4	19.9	26.8	29.4	26.4	7.6	18.6	17.5	8.2	12.3	16.1	11.2	9.2	10.9	7.0	0.0	22.9	7.9	20.5	4.9	12.6	21.7	31.4
Lindendale (1061608)	46.0	38.7	41.8	37.0	46.4	39.4	42.5	29.7	33.9	28.2	32.7	27.4	21.8	26.3	21.0	17.8	23.0	19.0	13.6	9.9	13.6	14.5	10.2	21.8	8.0	7.6	15.2	11.0	6.8	11.9	13.7	12.0	15.9	22.9	0.0	15.3	4.2	22.9	18.3	16.9	28.6
Loftville (1061604)	40.4	33.5	38.9	31.1	39.4	30.0	31.0	23.8	24.3	24.3	31.8	27.3	21.7	29.4	27.1	22.7	17.6	16.7	14.5	14.5	21.7	24.1	20.4	10.4	12.6	11.3	4.0	6.0	8.7	4.7	2.4	3.6	2.0	7.9	15.3	0.0	12.0	7.4	6.8	13.2	22.2
Tregeagle (1061604)	47.2	39.9	43.6	38.0	47.2	39.4	41.9	30.5	33.8	29.5	34.9	29.6	23.8	29.2	24.4	20.8	23.7	20.3	15.2	12.1	17.1	18.4	14.0	20.7	9.7	8.7	13.5	9.8	5.5	10.3	11.6	9.8	13.6	20.5	4.2	12.0	0.0	19.0	13.4	10.9	20.7
South Gundurimba (1061611)	42.0	35.6	42.0	33.1	40.2	29.7	28.9	26.4	24.5	27.9	36.2	32.3	27.3	35.3	34.0	29.5	21.5	22.1	21.3	22.0	29.2	31.7	28.2	12.3	20.3	19.0	10.3	13.7	16.5	12.4	10.0	11.4	8.3	4.9	22.9	7.4	19.0	0.0	7.9	16.5	23.0
South Gundurimba (1061612)	48.4	41.6	47.2	39.2	47.1	37.1	37.2	31.9	31.6	32.6	40.1	35.5	29.8	37.3	34.4	30.1	25.9	24.9	22.2	21.3	28.2	30.3	26.2	18.0	18.9	17.4	12.3	13.1	13.4	12.0	10.3	10.3	10.2	12.6	18.3	6.8	13.4	7.9	0.0	8.6	15.9
Tucki Tucki (1061605)	55.7	48.7	53.6	46.4	54.9	45.5	46.2	38.9	39.9	38.9	45.6	40.5	34.7	41.1	36.9	33.0	32.4	30.2	26.2	23.9	29.8	31.2	26.8	26.0	21.4	20.0	19.0	17.8	15.6	17.2	16.6	15.6	17.5	21.7	16.9	13.2	10.9	16.5	8.6	0.0	10.2
East Coraki (1061606)	67.3	60.4	65.6	58.0	66.2	56.2	55.9	50.6	50.7	50.9	57.8	52.8	47.0	53.4	49.1	45.3	44.3	42.4	38.5	36.3	41.9	43.1	38.8	37.0	33.7	32.3	30.7	30.0	27.9	29.3	28.3	27.6	28.8	31.4	28.6	22.2	20.7	23.0	15.9	10.2	0.0

Estimated Distances (km) between District Centroids

Attachment No. 7

Estimated Trips 2028	CCD	Pop	Blue Knob	Nimbin	Nimbin	Nimbin	Nimbin	Larnook	Larnook	Koonorigan	Koonorigan	Tuntable Creek	Terania Creek	Dunoon	Dunoon	Rosebank	Rosebank	Corndale	Keerrong	Modanville	Numulgi	Bexhill	Clunes	Clunes	Eltham	Blakebrook	Richmond Hill	LISMORE	Caniaba	Lindendale	Loftville	Tregeagle	South Gundurimba	South Gundurimba	Tucki Tucki	East Coraki	Total
	CCD		701	702	703	706	711	707	708	705	710	704	709	801	812	902	804	803	808	810	807	806	805	809	609	811	602		601	608	604	603	611	612	605	606	
			282	523	461	688	355	1281	810	667	642	481	296	1244	553	380	782	584	514	768	502	700	582	776	877	519	1083	36053	771	851	443	969	713	526	597	529	
Blue Knob	701	294	0	2	2	2	5	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	23
Nimbin	702	544	2	0	3	39	2	4	1	3	2	2	1	3	1	0	1	0	1	1	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	87
Nimbin	703	479	2	3	0	2	1	1	0	1	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	33
Nimbin	706	716	2	39	2	0	2	9	2	6	3	3	1	4	1	1	1	1	1	1	0	1	0	0	1	1	1	26	1	0	0	0	0	0	0	0	112
Nimbin	711	369	5	2	1	2	0	3	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	27
Larnook	707	1333	1	4	1	9	3	0	18	6	19	3	1	3	1	1	1	1	2	2	1	1	1	1	1	1	1	46	2	1	1	1	1	0	0	0	134
Larnook	708	843	0	1	0	2	1	18	0	2	5	1	0	1	1	0	0	0	1	1	0	0	0	0	0	1	1	26	1	0	0	0	1	0	0	0	68
Koonorigan	705	694	0	3	1	6	1	6	2	0	6	21	1	7	3	1	1	1	6	4	1	1	1	1	1	1	1	43	1	1	1	1	1	0	0	0	122
Koonorigan	710	668	0	2	1	3	1	19	5	6	0	2	0	2	1	0	1	1	2	2	1	1	0	0	1	1	1	35	1	0	0	1	1	0	0	0	91
Tuntable Creek	704	501	0	2	1	3	0	3	1	21	2	0	1	12	4	1	1	1	4	3	1	1	1	1	1	1	1	32	1	1	0	1	0	0	0	0	101
Terania Creek	709	308	0	1	1	1	0	1	0	1	0	1	0	10	1	1	1	1	1	1	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	38
Dunoon	801	1294	1	3	2	4	1	3	1	7	2	12	10	0	14	13	7	5	4	6	2	2	2	3	2	1	2	72	1	1	1	1	1	1	0	0	187
Dunoon	812	575	0	1	0	1	0	1	1	3	1	4	1	14	0	2	4	6	4	12	3	2	2	2	2	1	2	55	1	1	1	1	1	0	0	0	129
Rosebank	902	396	0	0	0	1	0	1	0	1	0	1	1	13	2	0	5	2	1	1	1	1	1	1	1	0	1	20	0	0	0	0	0	0	0	0	58
Rosebank	804	813	0	1	0	1	0	1	0	1	1	1	1	7	4	5	0	18	1	3	2	2	6	8	4	1	3	55	1	1	0	1	0	0	0	0	131
Corndale	803	608	0	0	0	1	0	1	0	1	1	1	1	5	6	2	18	0	1	5	3	4	10	8	5	1	3	62	1	2	0	1	0	0	0	0	145
Keerrong	808	535	0	1	0	1	0	2	1	6	2	4	1	4	4	1	1	1	0	15	2	2	1	1	1	2	2	66	1	1	1	1	1	0	0	0	127
Modanville	810	799	0	1	0	1	0	2	1	4	2	3	1	6	12	1	3	5	15	0	10	5	3	2	3	3	5	131	2	2	1	2	1	1	0	0	228
Numulgi	807	523	0	0	0	0	0	1	0	1	1	1	0	2	3	1	2	3	2	10	0	18	3	3	4	1	12	155	1	2	1	2	1	1	0	0	235
Bexhill	806	728	0	0	0	1	0	1	0	1	1	1	0	2	2	1	2	4	2	5	18	0	6	5	13	1	83	294	1	6	1	5	1	1	1	0	459
Clunes	805	606	0	0	0	0	0	1	0	1	0	1	0	2	2	1	6	10	1	3	3	6	0	53	27	1	6	78	1	3	1	2	0	0	0	0	210
Clunes	809	807	0	0	0	0	0	1	0	1	0	1	0	3	2	1	8	8	1	2	3	5	53	0	26	1	5	81	1	3	1	2	1	0	0	0	211
Eltham	609	912	0	0	0	1	0	1	0	1	1	1	0	2	2	1	4	5	1	3	4	13	27	26	0	1	13	151	1	7	1	4	1	1	1	0	274
Blakebrook	811	540	0	0	0	1	0	1	1	1	1	1	0	1	1	0	1	1	2	3	1	1	1	1	1	0	2	134	7	1	2	1	2	1	0	0	171
Richmond Hill	602	1127	0	0	0	1	0	1	1	1	1	1	0	2	2	1	3	3	2	5	12	83	6	5	13	2	0	988	2	14	3	11	2	2	1	0	1171
LISMORE		36996	6	17	11	25	8	46	25	43	34	32	12	71	54	20	54	61	65	130	153	290	77	80	149	132	974	0	197	400	873	674	153	128	79	23	5096
Caniaba	601	802	0	0	0	1	0	2	1	1	1	1	0	1	1	0	1	1	1	2	1	1	1	1	1	7	2	199	0	1	5	2	22	3	1	0	262
Lindendale	608	886	0	0	0	0	0	1	0	1	0	1	0	1	1	0	1	2	1	2	2	6	3	3	7	1	14	405	1	0	2	45	1	1	2	1	507
Loftville	604	461	0	0	0	0	0	1	0	1	0	0	0	1	1	0	0	0	1	1	1	1	1	1	1	2	3	885	5	2	0	3	6	5	1	0	925
Tregeagle	603	1008	0	0	0	0	0	1	0	1	1	1	0	1	1	0	1	1	1	2	2	5	2	2	4	1	11	684	2	45	3	0	2	3	5	1	784
South Gundurimba	611	742	0	0	0	0	0	1	1	1	1	0	0	1	1	0	0	0	1	1	1	1	0	1	1	2	2	155	22	1	6	2	0	6	2	1	212
South Gundurimba	612	547	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	0	0	1	1	2	130	3	1	5	3	6	0	4	1	163
Tucki Tucki	605	621	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	80	1	2	1	5	2	4	0	3	107
East Coraki	606	550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	1	0	1	1	1	3	0	35
																																					12659

Estimated Inter-District Vehicle Movements/Day (2028)

Attachment No. 8

Estimated Veh-Km Travel 2028			Blue Knob	Nimbin	Nimbin	Nimbin	Nimbin	Larnook	Larnook	Koonorigan	Koonorigan	Tuntable Creek	Terania Creek	Dunoon	Dunoon	Rosebank	Rosebank	Corndale	Keerrong	Modanville	Numulgi	Bexhill	Clunes	Clunes	Eltham	Blakebrook	Richmond Hill	LISMORE	Caniaba	Lindendale	Loftville	Tregeagle	South Gundurimba	South Gundurimba	Tucki Tucki	East Coraki	Total
	CCD		701	702	703	706	711	707	708	705	710	704	709	801	812	902	804	803	808	810	807	806	805	809	609	811	602		601	608	604	603	611	612	605	606	
	CCD	Pop	282	523	461	688	355	1281	810	667	642	481	296	1244	553	380	782	584	514	768	502	700	582	776	877	519	1083	36053	771	851	443	969	713	526	597	529	
Blue Knob	701	294	0.0	17.5	15.2	17.6	21.1	21.7	10.0	9.5	8.5	6.6	4.8	15.5	5.5	3.9	6.4	4.7	5.2	6.9	3.8	4.7	4.0	5.2	5.5	4.0	6.9	245.8	5.7	4.3	3.2	4.7	4.4	2.5	2.1	1.2	489
Nimbin	702	544	17.5	0.0	28.0	117.9	20.1	54.3	21.4	30.2	22.6	20.7	13.8	42.9	14.5	9.6	15.0	11.3	13.9	17.6	9.1	11.0	9.3	11.8	12.6	9.6	15.9	551.6	12.5	9.1	7.1	9.9	9.3	5.2	4.1	2.3	1162
Nimbin	703	479	15.2	28.0	0.0	27.6	12.8	28.4	13.3	16.6	12.7	12.6	12.5	33.8	10.8	8.5	12.8	9.2	9.3	12.7	6.9	8.6	7.6	9.8	10.3	6.7	12.4	430.4	8.9	7.9	5.1	8.4	6.9	4.1	3.5	2.1	816
Nimbin	706	716	17.6	117.9	27.6	0.0	22.8	87.7	31.6	51.7	37.1	32.7	17.3	59.0	20.8	12.9	20.3	15.7	21.1	25.6	12.9	15.5	12.8	16.1	17.3	14.1	22.4	772.5	18.1	12.3	10.1	13.4	13.2	7.2	5.5	3.0	1585
Nimbin	711	369	21.1	20.1	12.8	22.8	0.0	34.3	15.3	12.3	12.1	8.2	5.3	18.1	6.8	4.5	7.6	5.7	6.7	8.7	4.8	5.9	5.0	6.3	6.8	5.3	8.8	311.3	7.8	5.3	4.2	5.8	5.9	3.3	2.6	1.5	613
Larnook	707	1333	21.7	54.3	28.4	87.7	34.3	0.0	136.9	70.4	125.6	39.2	17.8	71.4	30.0	17.1	30.0	24.0	35.8	42.0	22.0	26.7	20.8	25.9	29.0	29.2	39.5	1410.4	42.3	20.6	21.2	23.3	30.0	14.8	10.2	5.3	2638
Larnook	708	843	10.0	21.4	13.3	31.6	15.3	136.9	0.0	29.5	51.0	17.6	8.3	34.5	15.3	8.7	16.0	12.9	18.3	22.3	12.3	15.2	11.5	14.4	16.4	17.7	22.9	834.2	29.1	12.0	13.4	14.0	21.1	9.9	6.6	3.3	1517
Koonorigan	705	694	9.5	30.2	16.6	51.7	12.3	70.4	29.5	0.0	49.8	81.6	15.4	74.3	32.2	14.8	24.5	20.4	43.3	42.1	18.3	20.6	16.2	19.6	21.6	20.3	29.2	981.7	21.8	13.7	13.0	14.9	15.0	7.9	5.7	2.9	1841
Koonorigan	710	668	8.5	22.6	12.7	37.1	12.1	125.6	51.0	49.8	0.0	24.7	9.2	40.4	18.5	9.5	17.1	14.1	25.9	27.7	13.8	16.3	12.2	14.9	17.0	20.5	24.1	858.3	26.9	11.3	13.4	12.9	17.9	8.4	5.3	2.6	1582
Tuntable Creek	704	501	6.6	20.7	12.6	32.7	8.2	39.2	17.6	81.6	24.7	0.0	14.5	82.6	32.0	13.9	21.3	17.7	31.0	34.3	14.4	16.0	13.2	16.0	17.1	13.4	22.3	722.3	13.8	10.8	8.7	11.5	9.8	5.5	4.2	2.3	1392
Terania Creek	709	308	4.8	13.8	12.5	17.3	5.3	17.8	8.3	15.4	9.2	14.5	0.0	58.8	12.4	11.3	13.4	9.4	8.8	12.4	6.3	7.6	7.1	9.0	9.1	5.4	10.7	350.9	6.3	6.5	3.9	6.6	4.8	2.9	2.5	1.5	686
Dunoon	801	1294	15.5	42.9	33.8	59.0	18.1	71.4	34.5	74.3	40.4	82.6	58.8	0.0	97.8	77.0	80.1	58.8	50.3	75.7	36.1	41.7	39.7	49.1	48.7	27.3	56.8	1768.9	28.2	31.9	18.4	32.2	21.2	13.0	11.4	6.5	3202
Dunoon	812	575	5.5	14.5	10.8	20.8	6.8	30.0	15.3	32.2	18.5	32.0	12.4	97.8	0.0	22.8	42.0	42.4	34.9	71.1	27.0	27.6	25.0	28.5	29.3	15.8	35.7	1023.6	13.9	16.7	9.9	16.8	10.2	6.3	5.4	3.0	1804
Rosebank	902	396	3.9	9.6	8.5	12.9	4.5	17.1	8.7	14.8	9.5	13.9	11.3	77.0	22.8	0.0	39.3	22.0	11.5	19.3	10.6	13.0	14.2	18.2	16.6	7.2	17.5	526.9	7.5	11.2	4.9	10.8	5.8	3.8	3.7	2.2	981
Rosebank	804	813	6.4	15.0	12.8	20.3	7.6	30.0	16.0	24.5	17.1	21.3	13.4	80.1	42.0	39.3	0.0	90.6	22.1	41.9	27.3	35.3	51.2	68.4	52.0	15.2	45.8	1260.2	14.9	31.9	10.0	28.4	11.8	8.3	8.8	5.2	2175
Corndale	803	608	4.7	11.3	9.2	15.7	5.7	24.0	12.9	20.4	14.1	17.7	9.4	58.8	42.4	22.0	90.6	0.0	20.8	45.1	31.4	37.9	57.7	60.2	50.4	13.8	45.8	1159.8	12.3	26.4	8.7	23.5	9.6	6.6	6.8	3.9	1980
Keerrong	808	535	5.2	13.9	9.3	21.1	6.7	35.8	18.3	43.3	25.9	31.0	8.8	50.3	34.9	11.5	22.1	20.8	0.0	77.6	23.8	23.6	16.6	19.2	22.0	24.2	32.8	1048.8	18.5	12.0	13.3	13.3	12.5	6.7	4.5	2.3	1731
Modanville	810	799	6.9	17.6	12.7	25.6	8.7	42.0	22.3	42.1	27.7	34.3	12.4	75.7	71.1	19.3	41.9	45.1	77.6	0.0	62.6	51.0	34.4	37.7	43.7	31.9	65.6	1834.3	22.5	22.2	18.4	23.6	16.1	9.6	7.4	4.1	2868
Numulgi	807	523	3.8	9.1	6.9	12.9	4.8	22.0	12.3	18.3	13.8	14.4	6.3	36.1	27.0	10.6	27.3	31.4	23.8	62.6	0.0	80.1	31.7	32.0	43.3	18.9	81.8	1669.0	12.6	20.5	11.1	21.0	9.4	6.3	5.7	3.3	2390
Bexhill	806	728	4.7	11.0	8.6	15.5	5.9	26.7	15.2	20.6	16.3	16.0	7.6	41.7	27.6	13.0	35.3	37.9	23.6	51.0	80.1	0.0	51.1	51.3	87.6	22.0	248.7	2957.0	16.0	51.0	12.2	45.1	12.3	9.0	9.9	5.5	4037
Clunes	805	606	4.0	9.3	7.6	12.8	5.0	20.8	11.5	16.2	12.2	13.2	7.1	39.7	25.0	14.2	51.2	57.7	16.6	34.4	31.7	51.1	0.0	153.2	116.5	13.1	59.8	1347.2	11.7	41.7	8.1	32.4	9.3	7.0	8.1	4.6	2254
Clunes	809	807	5.2	11.8	9.8	16.1	6.3	25.9	14.4	19.6	14.9	16.0	9.0	49.1	28.5	18.2	68.4	60.2	19.2	37.7	32.0	51.3	153.2	0.0	133.2	15.5	65.3	1584.4	14.7	56.2	9.8	42.7	11.8	9.1	11.0	6.4	2627
Eltham	609	912	5.5	12.6	10.3	17.3	6.8	29.0	16.4	21.6	17.0	17.1	9.1	48.7	29.3	16.6	52.0	50.4	22.0	43.7	43.3	87.6	116.5	133.2	0.0	19.4	111.7	2380.8	17.5	102.6	11.7	67.5	14.1	11.3	14.3	8.0	3565
Blakebrook	811	540	4.0	9.6	6.7	14.1	5.3	29.2	17.7	20.3	20.5	13.4	5.4	27.3	15.8	7.2	15.2	13.8	24.2	31.9	18.9	22.0	13.1	15.5	19.4	0.0	34.6	1491.2	50.8	10.0	32.3	12.1	23.8	9.4	3.8	1.5	2040
Richmond Hill	602	1127	6.9	15.9	12.4	22.4	8.8	39.5	22.9	29.2	24.1	22.3	10.7	56.8	35.7	17.5	45.8	45.8	32.8	65.6	81.8	248.7	59.8	65.3	111.7	34.6	0.0	7956.1	24.9	94.9	17.5	88.4	19.0	14.4	17.0	9.3	9358
LISMORE		36996	242.4	544.1	424.5	761.9	307.0	1391.1	822.8	968.3	846.6	712.4	346.1	1744.7	1009.6	519.7	1243.0	1144.0	1034.4	1809.2	1646.2	2916.5	1328.7	1562.7	2348.3	1470.8	7847.3	0.0	838.5	1367.4	4792.0	2088.9	542.5	434.6	377.2	265.7	45699
Caniaba	601	802	5.7	12.5	8.9	18.1	7.8	42.3	29.1	21.8	26.9	13.8	6.3	28.2	13.9	7.5	14.9	12.3	18.5	22.5	12.6	16.0	11.7	14.7	17.5	50.8	24.9	850.1	0.0	5.2	46.4	5.8	55.3	10.0	2.2	3.3	1437
Lindendale	608	886	4.3	9.1	7.9	12.3	5.3	20.6	12.0	13.7	11.3	10.8	6.5	31.9	16.7	11.2	31.9	26.4	12.0	22.2	20.5	51.0	41.7	56.2	102.6	10.0	94.9	1386.4	5.2	0.0	7.1	59.3	4.2	3.7	9.6	6.7	2125
Loftville	604	461	3.2	7.1	5.1	10.1	4.2	21.2	13.4	13.0	13.4	8.7	3.9	18.4	9.9	4.9	10.0	8.7	13.3	18.4	11.1	12.2	8.1	9.8	11.7	32.3	17.5	4858.4	46.4	7.1	0.0	15.1	39.5	25.8	13.6	7.5	5303
Tregeagle	603	1008	4.7	9.9	8.4	13.4	5.8	23.3	14.0	14.9	12.9	11.5	6.6	32.2	16.8	10.8	28.4	23.5	13.3	23.6	21.0	45.1	32.4	42.7	67.5	12.1	88.4	2117.9	5.8	59.3	15.1	0.0	4.4	4.8	20.5	13.3	2824
South Gundurimba	611	742	4.4	9.3	6.9	13.2	5.9	30.0	21.1	15.0	17.9	9.8	4.8	21.2	10.2	5.8	11.8	9.6	12.5	16.1	9.4	12.3	9.3	11.8	14.1	23.8	19.0	550.0	55.3	4.2	39.5	4.4	0.0	10.8	3.3	6.4	999
South Gundurimba	612	547	2.5	5.2	4.1	7.2	3.3	14.8	9.9	7.9	8.4	5.5	2.9	13.0	6.3	3.8	8.3	6.6	6.7	9.6	6.3	9.0	7.0	9.1	11.3	9.4	14.4	440.6	10.0	3.7	25.8	4.8	10.8	0.0	16.6	11.8	717
Tucki Tucki	605	621	2.1	4.1	3.5	5.5	2.6	10.2	6.6	5.7	5.3	4.2	2.5	11.4	5.4	3.7	8.8	6.8	4.5	7.4	5.7	9.9	8.1	11.0	14.3	3.8	17.0	382.5	2.2	9.6	13.6	20.5	3.3	16.6	0.0	21.2	640
East Coraki	606	550	1.2	2.3	2.1	3.0	1.5	5.3	3.3	2.9	2.6	2.3	1.5	6.5	3.0	2.2	5.2	3.9	2.3	4.1	3.3	5.5	4.6	6.4	8.0	1.5	9.3	269.4	3.3	6.7	7.5	13.3	6.4	11.8	21.2	0.0	433
																																					115513

Estimated Inter-District Vehicle-Kilometres of Travel Demand/Day (2028)

Attachment No. 9