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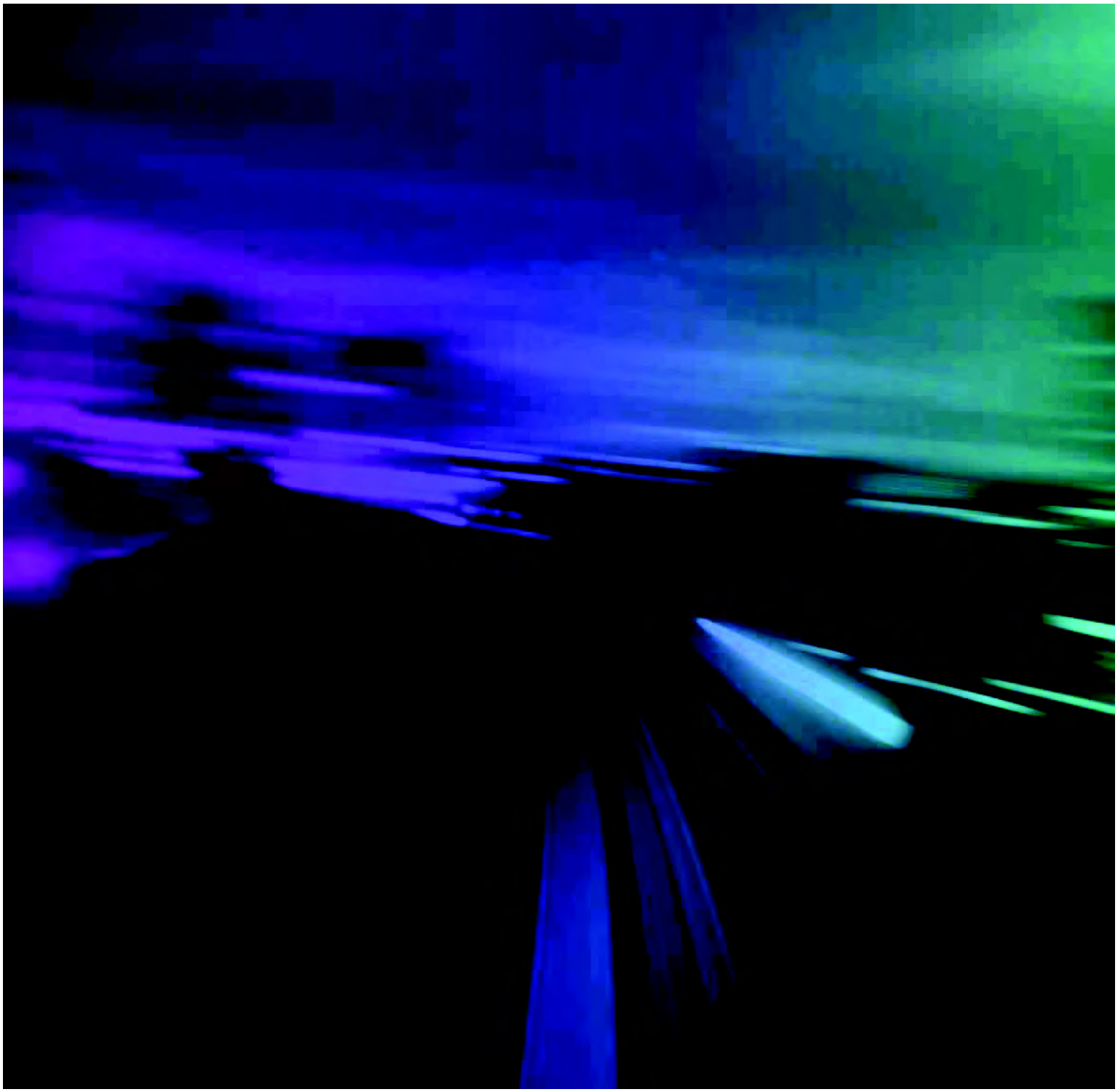
Scenic Rim Regional Council

05-Sep-2014

Rate Build-up for Council Standards Road Sections



Rate Build-up for Council Standards Road Sections

Client: Scenic Rim Regional Council

ABN: 45 596 234 931

Prepared by

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Quality Information

Document Rate Build-up for Council Standards Road Sections

Ref 60326949

Date 05-Sep-2014

Prepared by Wei Ming Loy

Reviewed by Vandana Bissessur

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	
1	01 July 2014	Rate build-up council standards road sections	Brad Jackson Technical Director	
2	22-Aug-2014	Rate build-up council standards road sections - Revised Draft	Simon Foley Associate Director	
3	04-Sep-2014	Rate build-up council standards road sections - Final	Simon Foley Associate Director	

Table of Contents

Introduction

The purpose of this report is to prepare linear metre rates for the following Council Standards Road Sections for both Greenfield and Brownfield developments in the Scenic Rim Regional Council (SRRC) area:

A full list of information used in the preparation of this report is included under Section 5.0

No allowance has been made for GST. Please also note the exclusions under Section 4.0 and inclusions and assumptions made in preparing the report under Section 3.0.

1.0 RATE BUILD-UPS

The following table schedules out the rate per m for various Council Standards Sections for both Greenfield and Brownfield developments:

Table 1: Rate Schedule

Item	Typical Road Section	Greenfield $/m (Excl. GST)	Brownfield $/m (Excl. GST)
1.0	Drawing R-09 Typical Cross Section Residential St.		
1.1	Trunk collector, connector street (with footpath)	3,760	3,730
1.2	Access street, collector street (with footpath)	2,370	2,310
1.3	Access place (without footpath)	1,660	1,600
2.0	Drawing R-10 Typical Cross Section Rural Rd – Class 4		
2.1	Class 4A, rural connector (without footpath)	1,480	1,390
2.2	Class 4B, rural collector (without footpath)	1,370	1,230
3.0	Drawing R-11 Typical Cross Section Rural Rd – Class 5		
3.1	Class 5A, rural access (without footpath)	1,270	1,170
3.2	Class 5B, rural access (without footpath)	1,270	1,170
3.3	Class 5C, rural access (without footpath)	1,170	1,060
3.4	Class 5D, rural access (without footpath)	1,030	920
4.0	Drawing R-13 Concrete Path Residential Areas		
4.1	2500 Shared path	480	470
4.2	1500 Footpath	410	390

Note:

1. Above brownfield rates exclude for traffic management / side tracks that is necessary for sites of this nature. Refer to Appendix A for a range of traffic management costs to be added to above rate for a more realistic opinion of cost. The extra amount to be added has to be assessed on a site by site basis.
2. Other site specific requirements like bulk earthworks, major / high density site clearance requirements etc. and exclusions listed in Section No.4.0 of the report need to be taken into consideration when using above rates to derive estimate for specific developments
3. Above rates exclude GST, include Preliminaries, Contingency and Consultant Fees
4. See Section 3.0 for inclusions and assumptions made in deriving the rate build-up and Section No.4.0 for the exclusions

Breakdown of each of the above rates is included in Appendix A

2.0 SITE SPECIFIC REQUIREMENTS

Depending on the site specific requirements, the following have been given as a range of cost in individual rate build-ups (refer to Appendix A) to give guidance on extra cost to be added to the linear m rate in Table 1 above to derive a more complete opinion of cost per m (percentage in bracket are based on overall project cost and advised by SRRC Engineers benchmarking on previous projects)

- Relocation and/ or protection of existing services [5% – 20%]
- Traffic management work / side track (for Brownfield sites) [15% - 25%]
- Earthwork and retaining walls [0% - 100%]
- Removal of high density shrubs and large trees or extensive hardscape [0% - 10%]
- Allowance for subgrade replacement [20% - 40%]
- Excavation in rock, culverts, etc. [0% - 20%]
- Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines [5% - 10% rural road, 40% - 50% trunk collector, access street, access place]
- Guardrails [0% - 20%]
- Electrical (trenching for & including conduits, pits, light poles, light fittings) [Davis Langdon's allowance of $200 - $400 per linear m]

3.0 INCLUSIONS AND ASSUMPTIONS IN PREPARING RATE BUILD-UPS

- It has been assumed that a brownfield site is an existing road reserve within an existing residential/rural area and greenfield is within an undeveloped parcel of land with medium density bush/trees
- Contingency allowance of 20% for brownfield and 15% for greenfield site as there are more risks constructing within a developed area (e.g. dealing with existing underground services, co-ordinating with existing infrastructure etc.) compared to construction in a greenfield / undeveloped parcel of land. Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions
- Preliminaries and margin at 10%
- All rates including preliminaries & margin are based on current market conditions (September 2014), rates could vary in different market conditions
- Consultant fees allowance of 15%
- Ground conditions assumed medium sand / clay / soft rock
- Excavated material suitable for re-use as trench backfill
- Bulk earthworks limited to forming road box works
- Clearance of greenfield sites allows for clearing site of medium bush & trees

4.0 EXCLUSIONS FROM THE RATE BUILD-UPS

Below is a list of costs which are excluded from the rates listed in Table 1.
Please note that below listed costs have not been assessed by Davis Langdon due to lack of information.

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc.
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST
- Please refer to Section 2.0 for site specific requirement which are excluded from the rates listed in Table 1 but given as a range of cost in individual rate build-ups (refer to Appendix A) to give guidance on extra cost to be added

5.0 INFORMATION USED IN PREPARING THE RATE BUILD-UPS

- Scenic Rim Regional Council, Design and Construction Manual dated May 2013
- Drawing R-09, Typical Cross Section Residential Street, Rev. B
- Drawing R-10 Typical Cross Section Rural Rd – Class 4, Rev. C
- Drawing R-11 Typical Cross Section Rural Rd – Class 5, Rev. B
- Drawing R-13 Concrete Path Residential Areas, Rev. B
- Comments from SRRC engineers on initial estimate received 14 August 2014 and 30 July 2014
- Comments from SRRC engineers on revised draft received 3 September 2014

Appendix A

Standard Sections - Rate Breakdown

BROWNFIELD - TRUNK COLLECTOR, CONNECTOR STREET

Rate per m for 12m Wide carriageway with parking, 25m road reserve (with footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	25	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**25m road reserve, 12m wide road (with footpath)**	Road Width:	12.2	m
		Footpath Width:	2.5	m
Ref Drwg:	R-09 Rev.B	Footpath No:	2	no
Date:	5-Sep-14	Footpath thickness:	0.125	m
		Seal width:	11.3	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation & minimal trees)	25	m2	5	125.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2.5	m3	13	32.50	
3	Pavement excavation (Assume 600mm) including removal of excess from site	7.32	m3	24	175.68	
4	Trim road box and bed	12.2	m2	3	36.60	
5	Pavement					
	Base: (Assume 125mm)	1.525	m3	120	183.00	
	Sub-base: (Assume 125mm)	1.525	m3	110	167.75	
	General CBR: (Assume 300mm)	3.66	m3	70	256.20	
6	Asphalt wearing surface	12.2	m2	35	427.00	
7	Primer seal	11.3	m2	5	56.50	
8	Subsoil drainage	2	m	40	80.00	
9	Kerb and channel	2	m	105	210.00	
10	Footpath					
	Sand blinding layer	5	m2	5	25.00	
	Compaction	5	m2	4	20.00	
	Concrete	0.625	m3	270	168.75	
	Mesh Reinforcement	5	m2	15	75.00	
	Formwork	4	m	30	120.00	
	Non-slip finish	5	m2	25	125.00	
	Allowance for joints	2	m	75	150.00	
11	Topsoil respread (assume 100mm) to receive turf (turf costed below)	1.28	m3	6	7.68	
12	Turfing	7.8	m2	4	31.20	
13	Pavement Marking	3	m	1.5	4.50	
14	Electrical / allowance per m	1	m	excl.		
15	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**2,492.36**	**$/m**
16	Prelims & Margin (10%)				249.24	$/m
17	Contingency (20%)				498.47	$/m
			Subtotal:		**3,240.07**	**$/m**
18	Consultant Fees (15%)				486.01	$/m
			Total:		**3,726.08**	**$/m**
				Say,	**3,730.00**	**$/m**

		$/m
	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	
i.	Relocation and/ or protection of existing services	187 to 746
ii.	Traffic management work / side track for Brownfield sites	560 to 933
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above linear metre rate)	up to 3,730
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 373
v.	Allowance for subgrade replacement	746 to 1,492
vi.	Excavation in rock, culverts, etc	up to 746
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	1,492 to 1,865
viii.	Guardrails	up to 746
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

BROWNFIELD - ACCESS STREET, COLLECTOR STREET

Rate per m for 7.5m Wide carriageway, 20m road reserve (with footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 7.5m wide road (with footpath)**	Road Width:	7.5	m
		Footpath Width:	1.5	m
Ref Drwg:	R-09 Rev.B	Footpath No:	1	no
Date:	5-Sep-14	Footpath thickness	0.125	m
		Seal width:	6.95	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation & minimal trees)	20	m2	5	100.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from site	4.5	m3	24	108.00	
4	Trim road box and bed	7.5	m2	3	22.50	
5	Pavement					
	Base: (Assume 125mm)	0.9375	m3	120	112.50	
	Sub-base: (Assume 125mm)	0.9375	m3	110	103.13	
	General CBR: (Assume 300mm)	2.25	m3	70	157.50	
6	Asphalt wearing surface	7.5	m2	35	262.50	
7	Primer seal	6.95	m2	5	34.75	
8	Subsoil drainage	2	m	40	80.00	
9	Kerb and channel	2	m	105	210.00	
10	Footpath					
	Sand blinding layer	1.5	m2	5	7.50	
	Compaction	1.5	m2	4	6.00	
	Concrete	0.1875	m3	270	50.63	
	Reinforcement	1.5	m2	15	22.50	
	Formwork	2	m	30	60.00	
	Non-slip finish	1.5	m2	25	37.50	
	Allowance for joints	1	m	75	75.00	
11	Topsoil respread (assume 100mm) to receive turf (turf costed below)	1.25	m3	6	7.50	
12	Turfing	11	m2	4	44.00	
13	Pavement Marking	3	m	1.5	4.50	
14	Electrical / allowance per m	1	m	excl.		
15	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**1,547.01**	**$/m**
16	Prelims & Margin (10%)				154.70	$/m
17	Contingency (20%)				309.40	$/m
			Subtotal:		**2,011.11**	**$/m**
18	Consultant Fees (15%)				301.67	$/m
			Total:		**2,312.78**	**$/m**
				Say,	**2,310.00**	**$/m**

Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i. Relocation and/ or protection of existing services	116 to 462
ii. Traffic management work / side track for Brownfield sites	347 to 578
iii. Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 2,310
iv. Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 231
v. Allowance for subgrade replacement	462 to 924
vi. Excavation in rock, culverts, etc	up to 462
vii. Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note:	924 to 1,155
viii. Guardrails	up to 462
ix. Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

BROWNFIELD - ACCESS PLACE

Rate per m for 5.5m Wide carriageway, 18m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	18	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**18m road reserve, 5.5m wide road (without footpath)**	Road Width:	5.5	m
		Footpath Width:	0	m
Ref Drwg:	R-09 Rev.B	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness	0	m
		Seal width:	4.95	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation & minimal trees)	18	m2	5	90.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	1.8	m3	13	23.40	
3	Pavement excavation (Assume 600mm) including removal of excess from site	3.3	m3	24	79.20	
4	Trim road box and bed	5.5	m2	3	16.50	
5	Pavement					
	Base: (Assume 125mm)	0.6875	m3	120	82.50	
	Sub-base: (Assume 125mm)	0.6875	m3	110	75.63	
	General CBR: (Assume 300mm)	1.65	m3	70	115.50	
6	Asphalt wearing surface	5.5	m2	35	192.50	
7	Primer seal	4.95	m2	5	24.75	
8	Subsoil drainage	2	m	40	80.00	
9	Kerb and channel	2	m	105	210.00	
10	Topsoil respread (assume 100mm) to receive turf (turf costed below)	1.25	m3	6	7.50	
11	Turfing	12.5	m2	4	50.00	
12	Pavement Marking	3	m	1.5	4.50	
13	Electrical / allowance per m	1	m	excl.		
14	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**1,066.98**	**$/m**
15	Prelims & Margin (10%)				106.70	$/m
16	Contingency (20%)				213.40	$/m
			Subtotal:		**1,387.07**	**$/m**
17	Consultant Fees (15%)				208.06	$/m
			Total:		**1,595.14**	**$/m**
				Say,	**1,600.00**	**$/m**

Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m		**$/m**
i.	Relocation and/ or protection of existing services	80 to 320
ii.	Traffic management work / side track for Brownfield sites	240 to 400
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,600
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 160
v.	Allowance for subgrade replacement	320 to 640
vi.	Excavation in rock, culverts, etc	up to 320
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	640 to 800
viii.	Guardrails	up to 320
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

BROWNFIELD - CLASS 4A RURAL ACCESS

Rate per m for 9m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20 m
Client:	Scenic Rim Regional Council	Total length:	1 m
Rate for:	**20m road reserve, 9m wide road (without footpath)**	Road Width:	9 m
		Footpath Width:	0 m
Ref Drwg:	R-10 Rev.C	Footpath No:	0 no
Date:	5-Sep-14	Footpath thickness	0 m
		Seal width:	9 m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation & minimal trees)	20	m2	5	100.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from sit	5.4	m3	24	129.60	
4	Trim road box and bed	9	m2	3	27.00	
5	Pavement					
	Base: (Assume 125mm)	1.125	m3	120	135.00	
	Sub-base: (Assume 125mm)	1.125	m3	110	123.75	
	General CBR: (Assume 300mm)	2.7	m3	70	189.00	
6	Double-double seal	9	m2	10	90.00	
7	Hydromulching on respread topsoil	11	m2	3.5	38.50	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**928.35**	**$/m**
12	Prelims & Margin (10%)				92.84	$/m
13	Contingency (20%)				185.67	$/m
			Subtotal:		**1,206.86**	**$/m**
14	Consultant Fees (15%)				181.03	$/m
			Total:		**1,387.88**	**$/m**
				Say,	**1,390.00**	**$/m**

Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m		**$/m**
i.	Relocation and/ or protection of existing services	70 to 278
ii.	Traffic management work / side track for Brownfield sites	209 to 347
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,390
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 139
v.	Allowance for subgrade replacement	278 to 556
vi.	Excavation in rock, culverts, etc	up to 278
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rat	70 to 139
viii.	Guardrails	up to 278
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

BROWNFIELD - CLASS 4B RURAL ACCESS

Rate per m for 8m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 8m wide road (without footpath)**	Road Width:	8	m
		Footpath Width:	0	m
Ref Drwg:	R-10 Rev.C	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness	0	m
		Seal width:	8	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation & minimal trees)	20	m2	5	100.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from sit	4.8	m3	24	115.20	
4	Trim road box and bed	8	m2	3	24.00	
5	Pavement					
	Base: (Assume 125mm)	1	m3	120	120.00	
	Sub-base: (Assume 125mm)	1	m3	110	110.00	
	General CBR: (Assume 300mm)	2.4	m3	70	168.00	
6	Double-double seal	8	m2	10	80.00	
7	Hydromulching on respread topsoil	12	m2	3.5	42.00	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**854.70**	**$/m**
12	Prelims & Margin (10%)				85.47	$/m
13	Contingency (20%)				128.21	$/m
			Subtotal:		**1,068.38**	**$/m**
14	Consultant Fees (15%)				160.26	$/m
			Total:		**1,228.63**	**$/m**
				Say,	**1,230.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	62 to 246
ii.	Traffic management work / side track for Brownfield sites	185 to 308
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,230
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 123
v.	Allowance for subgrade replacement	246 to 492
vi.	Excavation in rock, culverts, etc	up to 246
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	62 to 123
viii.	Guardrails	up to 246
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

BROWNFIELD - CLASS 5A RURAL ACCESS

Rate per m for 7m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 7m wide road (without footpath)**	Road Width:	7	m
		Footpath Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness	0	m
		Seal width:	7	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation & minimal trees)	20	m2	5	100.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from sit	4.2	m3	24	100.80	
4	Trim road box and bed	7	m2	3	21.00	
5	Pavement					
	Base: (Assume 125mm)	0.875	m3	120	105.00	
	Sub-base: (Assume 125mm)	0.875	m3	110	96.25	
	General CBR: (Assume 300mm)	2.1	m3	70	147.00	
6	Double-double seal	7	m2	10	70.00	
7	Hydromulching on respread topsoil	13	m2	3.5	45.50	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**781.05**	**$/m**
12	Prelims & Margin (10%)				78.11	$/m
13	Contingency (20%)				156.21	$/m
			Subtotal:		**1,015.37**	**$/m**
14	Consultant Fees (15%)				152.30	$/m
			Total:		**1,167.67**	**$/m**
				Say,	**1,170.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	59 to 234
ii.	Traffic management work / side track for Brownfield sites	176 to 293
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,170
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 117
v.	Allowance for subgrade replacement	234 to 468
vi.	Excavation in rock, culverts, etc	up to 234
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	59 to 117
viii.	Guardrails	up to 234
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

BROWNFIELD - CLASS 5B RURAL ACCESS

Rate per m for 7m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 7m wide road (without footpath)**	Road Width:	7	m
		Footpath Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness:	0	m
		Seal width:	6	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation & minimal trees)	20	m2	5	100.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from site	4.2	m3	24	100.80	
4	Trim road box and bed	7	m2	3	21.00	
5	Pavement					
	Base: (Assume 125mm)	0.875	m3	120	105.00	
	Sub-base: (Assume 125mm)	0.875	m3	110	96.25	
	General CBR: (Assume 300mm)	2.1	m3	70	147.00	
6	Double-double seal	7	m2	10	70.00	
7	Hydromulching on respread topsoil	13	m2	3.5	45.50	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**781.05**	**$/m**
12	Prelims & Margin (10%)				78.11	$/m
13	Contingency (20%)				156.21	$/m
			Subtotal:		**1,015.37**	**$/m**
14	Consultant Fees (15%)				152.30	$/m
			Total:		**1,167.67**	**$/m**
				Say,	**1,170.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	59 to 234
ii.	Traffic management work / side track for Brownfield sites	176 to 293
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,170
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 117
v.	Allowance for subgrade replacement	234 to 468
vi.	Excavation in rock, culverts, etc	up to 234
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	59 to 117
viii.	Guardrails	up to 234
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

BROWNFIELD - CLASS 5C RURAL ACCESS

Rate per m for 7m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 7m wide road (without footpath)**	Road Width:	7	m
		Footpath Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness:	0	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation & minimal trees)	20	m2	5	100.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from site	4.2	m3	24	100.80	
4	Trim road box and bed	7	m2	3	21.00	
5	Pavement					
6	Pavement Base: (Assume 125mm)	0.875	m3	120	105.00	
	Sub-base: (Assume 125mm)	0.875	m3	110	96.25	
	General CBR: (Assume 300mm)	2.1	m3	70	147.00	
7	Hydromulching on respread topsoil	13	m2	3.5	45.50	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**711.05**	**$/m**
12	Prelims & Margin (10%)				71.11	$/m
13	Contingency (20%)				142.21	$/m
			Subtotal:		**924.37**	**$/m**
14	Consultant Fees (15%)				138.65	$/m
			Total:		**1,063.02**	**$/m**
				Say,	**1,060.00**	**$/m**

Note: Grades greater than 10% to be two coats sealed

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	53 to 212
ii.	Traffic management work / side track for Brownfield sites	159 to 265
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,060
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 106
v.	Allowance for subgrade replacement	212 to 424
vi.	Excavation in rock, culverts, etc	up to 212
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	53 to 106
viii.	Guardrails	up to 212
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

BROWNFIELD - CLASS 5D RURAL ACCESS

Rate per m for 5.5m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 5.5m wide road (without footpath)**	Road Width:	5.5	m
		Footpath Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness:	0	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation & minimal trees)	20	m2	5	100.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from site	3.3	m3	24	79.20	
4	Trim road box and bed	5.5	m2	3	16.50	
5	Pavement					
6	Pavement Base: (Assume 125mm)	0.6875	m3	120	82.50	
	Sub-base: (Assume 125mm)	0.6875	m3	110	75.63	
	General CBR: (Assume 300mm)	1.65	m3	70	115.50	
7	Hydromulching on respread topsoil	14.5	m2	3.5	50.75	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**615.58**	**$/m**
12	Prelims & Margin (10%)				61.56	$/m
13	Contingency (20%)				123.12	$/m
			Subtotal:		**800.25**	**$/m**
14	Consultant Fees (15%)				120.04	$/m
			Total:		**920.29**	**$/m**
				Say,	**920.00**	**$/m**

Note: Grades greater than 10% to be two coats sealed

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	46 to 184
ii.	Traffic management work / side track for Brownfield sites	138 to 230
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 920
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 92
v.	Allowance for subgrade replacement	184 to 368
vi.	Excavation in rock, culverts, etc	up to 184
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	46 to 92
viii.	Guardrails	up to 184
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

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BROWNFIELD - 2500 SHARED PATH

Rate per m for 2.5m Wide shared path, 4m reserve

Project Name:	Rate Build up for council std rd sec	Total Width:	4	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**2.5m wide shared path, 4m reserve**	Road Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath Width:	2.5	m
Date:	5-Sep-14	Footpath No:	1	no
		Footpath thickness	0.125	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation & minimal trees)	4	m2	5	20.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	0.4	m3	13	5.20	
3	Pavement excavation (Assume 600mm) including removal of excess from sit	0.375	m3	24	9.00	
4	Footpath					
	Sand blinding layer	2.5	m2	5	12.50	
	Compaction	2.5	m2	4	10.00	
	Concrete	0.3125	m3	270	1.56	
	Reinforcement	2.5	m2	15	37.50	
	Formwork	2	m	30	60.00	
	Non-slip finish	2.5	m2	25	62.50	
	Allowance for joints	1	m	75	75.00	
5	Topsoil respread (assume 100mm) to receive turf (turf costed below)	0.4	m3	6	2.40	
6	Turfing	1.5	m2	4	6.00	
7	Electrical / allowance per m	1	m	excl.		
8	Signage / allowance per m , standard single post road signs	1	m	10	10.00	
			Subtotal:		**311.66**	**$/m**
9	Prelims & Margin (10%)				31.17	$/m
10	Contingency (20%)				62.33	$/m
			Subtotal:		**405.16**	**$/m**
11	Consultant Fees (15%)				60.77	$/m
			Total:		**465.93**	**$/m**
				Say,	**470.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	24 to 94
ii.	Traffic management work / side track for Brownfield sites	71 to 118
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 470
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 47
v.	Allowance for subgrade replacement	94 to 188
vi.	Excavation in rock, culverts, etc	up to 94
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	24 to 47
viii.	Guardrails	up to 94
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Multiple contractors set up facilities (contractor camps / accommodation)
- Costs for extra requirements at intersections e.g. extra signage etc
- Traffic lights
- GST

Note:

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- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

BROWNFIELD - 1500 FOOTPATH

Rate per m for 1.5m Wide footpath, 4m reserve

Project Name:	Rate Build up for council std rd sec	Total Width:	4	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**1.5m wide shared path, 4m reserve**	Road Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath Width:	1.5	m
Date:	5-Sep-14	Footpath No:	1	no
		Footpath thickness	0.125	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with light density vegetation &	4	m2	5	20.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	0.4	m3	13	5.20	
3	Pavement excavation (Assume 600mm) including removal of excess from sit	0.225	m3	24	5.40	
4	Footpath					
	Sand blinding layer	1.5	m2	5	7.50	
	Compaction	1.5	m2	4	6.00	
	Concrete	0.1875	m3	270	0.94	
	Reinforcement	1.5	m2	15	22.50	
	Formwork	2	m	30	60.00	
	Non-slip finish	1.5	m2	25	37.50	
	Allowance for joints	1	m	75	75.00	
5	Topsoil respread (assume 100mm) to receive turf (turf costed below)	0.4	m3	6	2.40	
6	Turfing	2.5	m2	4	10.00	
7	Electrical / allowance per m	1	m	excl.		
8	Signage / allowance per m , standard single post road signs	1	m	10	10.00	
			Subtotal:		**262.44**	**$/m**
9	Prelims & Margin (10%)				26.24	$/m
10	Contingency (20%)				52.49	$/m
			Subtotal:		**341.17**	**$/m**
11	Consultant Fees (15%)				51.18	$/m
			Total:		**392.35**	**$/m**
				Say,	**390.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	20 to 78
ii.	Traffic management work / side track for Brownfield sites	59 to 98
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 390
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for light density shrubs)	up to 39
v.	Allowance for subgrade replacement	78 to 156
vi.	Excavation in rock, culverts, etc	up to 78
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	20 to 39
viii.	Guardrails	up to 78
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - TRUNK COLLECTOR, CONNECTOR STREET

Rate per m for 12m Wide carriageway with parking, 25m road reserve (with footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	25	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**25m road reserve, 12m wide road (with footpath)**	Road Width:	12.2	m
		Footpath Width:	2.5	m
Ref Drwg:	R-09 Rev.B	Footpath No:	2	no
Date:	5-Sep-14	Footpath thickness:	0.125	m
		Seal width:	11.3	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	25	m2	10	250.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2.5	m3	13	32.50	
3	Pavement excavation (Assume 600mm) including removal of excess from site	7.32	m3	24	175.68	
4	Trim road box and bed	12.2	m2	3	36.60	
5	Pavement					
	Base: (Assume 125mm)	1.525	m3	120	183.00	
	Sub-base: (Assume 125mm)	1.525	m3	110	167.75	
	General CBR: (Assume 300mm)	3.66	m3	70	256.20	
6	Asphalt wearing surface	12.2	m2	35	427.00	
7	Primer seal	11.3	m2	5	56.50	
8	Subsoil drainage	2	m	40	80.00	
9	Kerb and channel	2	m	105	210.00	
10	Footpath					
	Sand blinding layer	5	m2	5	25.00	
	Compaction	5	m2	4	20.00	
	Concrete	0.625	m3	270	168.75	
	Mesh Reinforcement	5	m2	15	75.00	
	Formwork	4	m	30	120.00	
	Non-slip finish	5	m2	25	125.00	
	Allowance for joints	2	m	75	150.00	
11	Topsoil respread (assume 100mm) to receive turf (turf costed below)	1.28	m3	6	7.68	
12	Turfing	7.8	m2	4	31.20	
13	Pavement Marking	3	m	1.5	4.50	
14	Electrical / allowance per m	1	m	excl.		
15	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**2,617.36**	**$/m**
16	Prelims & Margin (10%)				261.74	$/m
17	Contingency (15%)				392.60	$/m
			Subtotal:		**3,271.70**	**$/m**
18	Consultant Fees (15%)				490.76	$/m
			Total:		**3,762.46**	**$/m**
				Say,	**3,760.00**	**$/m**

		$/m
	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	
i.	Relocation and/ or protection of existing services	188 to 752
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above linear metre rate)	up to 3,760
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 376
v.	Allowance for subgrade replacement	752 to 1,504
vi.	Excavation in rock, culverts, etc	up to 752
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	1,504 to 1,880
viii.	Guardrails	up to 752
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

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- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - ACCESS STREET, COLLECTOR STREET

Rate per m for 7.5m Wide carriageway, 20m road reserve (with footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 7.5m wide road (with footpath)**	Road Width:	7.5	m
		Footpath Width:	1.5	m
Ref Drwg:	R-09 Rev.B	Footpath No:	1	no
Date:	5-Sep-14	Footpath thickness	0.125	m
		Seal width:	6.95	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	20	m2	10	200.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from site	4.5	m3	24	108.00	
4	Trim road box and bed	7.5	m2	3	22.50	
5	Pavement					
	Base: (Assume 125mm)	0.9375	m3	120	112.50	
	Sub-base: (Assume 125mm)	0.9375	m3	110	103.13	
	General CBR: (Assume 300mm)	2.25	m3	70	157.50	
6	Asphalt wearing surface	7.5	m2	35	262.50	
7	Primer seal	6.95	m2	5	34.75	
8	Subsoil drainage	2	m	40	80.00	
9	Kerb and channel	2	m	105	210.00	
10	Footpath					
	Sand blinding layer	1.5	m2	5	7.50	
	Compaction	1.5	m2	4	6.00	
	Concrete	0.1875	m3	270	50.63	
	Reinforcement	1.5	m2	15	22.50	
	Formwork	2	m	30	60.00	
	Non-slip finish	1.5	m2	25	37.50	
	Allowance for joints	1	m	75	75.00	
11	Topsoil respread (assume 100mm) to receive turf (turf costed below)	1.25	m3	6	7.50	
12	Turfing	11	m2	4	44.00	
13	Pavement Marking	3	m	1.5	4.50	
14	Electrical / allowance per m	1	m	excl.		
15	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**1,647.01**	**$/m**
16	Prelims & Margin (10%)				164.70	$/m
17	Contingency (15%)				247.05	$/m
			Subtotal:		**2,058.76**	**$/m**
18	Consultant Fees (15%)				308.81	$/m
			Total:		**2,367.58**	**$/m**
				Say,	**2,370.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	119 to 474
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 2,370
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 237
v.	Allowance for subgrade replacement	474 to 948
vi.	Excavation in rock, culverts, etc	up to 474
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note:	948 to 1,185
viii.	Guardrails	up to 474
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditi
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - ACCESS PLACE

Rate per m for 5.5m Wide carriageway, 18m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	18	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**18m road reserve, 5.5m wide road (without footpath)**	Road Width:	5.5	m
		Footpath Width:	0	m
Ref Drwg:	R-09 Rev.B	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness	0	m
		Seal width:	4.95	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	18	m2	10	180.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	1.8	m3	13	23.40	
3	Pavement excavation (Assume 600mm) including removal of excess from sit	3.3	m3	24	79.20	
4	Trim road box and bed	5.5	m2	3	16.50	
5	Pavement					
	Base: (Assume 125mm)	0.6875	m3	120	82.50	
	Sub-base: (Assume 125mm)	0.6875	m3	110	75.63	
	General CBR: (Assume 300mm)	1.65	m3	70	115.50	
6	Asphalt wearing surface	5.5	m2	35	192.50	
7	Primer seal	4.95	m2	5	24.75	
8	Subsoil drainage	2	m	40	80.00	
9	Kerb and channel	2	m	105	210.00	
10	Topsoil respread (assume 100mm) to receive turf (turf costed below)	1.25	m3	6	7.50	
11	Turfing	12.5	m2	4	50.00	
12	Pavement Marking	3	m	1.5	4.50	
13	Electrical / allowance per m	1	m	excl.		
14	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**1,156.98**	**$/m**
15	Prelims & Margin (10%)				115.70	$/m
16	Contingency (15%)				173.55	$/m
			Subtotal:		**1,446.23**	**$/m**
17	Consultant Fees (15%)				216.93	$/m
			Total:		**1,663.16**	**$/m**
				Say,	**1,660.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	83 to 332
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,660
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 166
v.	Allowance for subgrade replacement	332 to 664
vi.	Excavation in rock, culverts, etc	up to 332
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	664 to 830
viii.	Guardrails	up to 332
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - CLASS 4A RURAL ACCESS

Rate per m for 9m Wide Pavement, 20m road reserve (without footpath)

Project Name	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 9m wide road (without footpath)**	Road Width:	9	m
		Footpath Width:	0	m
Ref Drwg:	R-10 Rev.C	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness	0	m
		Seal width:	9	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	20	m2	10	200.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from sil	5.4	m3	24	129.60	
4	Trim road box and bed	9	m2	3	27.00	
5	Pavement					
	Base: (Assume 125mm)	1.125	m3	120	135.00	
	Sub-base: (Assume 125mm)	1.125	m3	110	123.75	
	General CBR: (Assume 300mm)	2.7	m3	70	189.00	
6	Double-double seal	9	m2	10	90.00	
7	Hydromulching on respread topsoil	11	m2	3.5	38.50	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**1,028.35**	**$/m**
12	Prelims & Margin (10%)				102.84	$/m
13	Contingency (15%)				154.25	$/m
			Subtotal:		**1,285.44**	**$/m**
14	Consultant Fees (15%)				192.82	$/m
			Total:		**1,478.25**	**$/m**
				Say,	**1,480.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	74 to 296
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,480
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 148
v.	Allowance for subgrade replacement	296 to 592
vi.	Excavation in rock, culverts, etc	up to 296
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	74 to 148
viii.	Guardrails	up to 296
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - CLASS 4B RURAL ACCESS

Rate per m for 8m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 8m wide road (without footpath)**	Road Width:	8	m
		Footpath Width:	0	m
Ref Drwg:	R-10 Rev.C	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness:	0	m
		Seal width:	8	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	20	m2	10	200.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from site	4.8	m3	24	115.20	
4	Trim road box and bed	8	m2	3	24.00	
5	Pavement					
	Base: (Assume 125mm)	1	m3	120	120.00	
	Sub-base: (Assume 125mm)	1	m3	110	110.00	
	General CBR: (Assume 300mm)	2.4	m3	70	168.00	
6	Double-double seal	8	m2	10	80.00	
7	Hydromulching on respread topsoil	12	m2	3.5	42.00	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**954.70**	**$/m**
12	Prelims & Margin (10%)				95.47	$/m
13	Contingency (15%)				143.21	$/m
			Subtotal:		**1,193.38**	**$/m**
14	Consultant Fees (15%)				179.01	$/m
			Total:		**1,372.38**	**$/m**
				Say,	**1,370.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	69 to 274
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,370
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 137
v.	Allowance for subgrade replacement	274 to 548
vi.	Excavation in rock, culverts, etc	up to 274
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	69 to 137
viii.	Guardrails	up to 274
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

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- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - CLASS 5A RURAL ACCESS

Rate per m for 7m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 7m wide road (without footpath)**	Road Width:	7	m
		Footpath Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness:	0	m
		Seal width:	7	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	20	m2	10	200.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from site	4.2	m3	24	100.80	
4	Trim road box and bed	7	m2	3	21.00	
5	Pavement					
	Base: (Assume 125mm)	0.875	m3	120	105.00	
	Sub-base: (Assume 125mm)	0.875	m3	110	96.25	
	General CBR: (Assume 300mm)	2.1	m3	70	147.00	
6	Double-double seal	7	m2	10	70.00	
7	Hydromulching on respread topsoil	13	m2	3.5	45.50	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**881.05**	**$/m**
12	Prelims & Margin (10%)				88.11	$/m
13	Contingency (15%)				132.16	$/m
			Subtotal:		**1,101.31**	**$/m**
14	Consultant Fees (15%)				165.20	$/m
			Total:		**1,266.51**	**$/m**
				Say,	**1,270.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	64 to 254
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,270
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 127
v.	Allowance for subgrade replacement	254 to 508
vi.	Excavation in rock, culverts, etc	up to 254
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	64 to 127
viii.	Guardrails	uo to 254
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

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- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - CLASS 5B RURAL ACCESS

Rate per m for 7m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 7m wide road (without footpath)**	Road Width:	7	m
		Footpath Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness:	0	m
		Seal width:	6	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	20	m2	10	200.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from site	4.2	m3	24	100.80	
4	Trim road box and bed	7	m2	3	21.00	
5	Pavement					
	Base: (Assume 125mm)	0.875	m3	120	105.00	
	Sub-base: (Assume 125mm)	0.875	m3	110	96.25	
	General CBR: (Assume 300mm)	2.1	m3	70	147.00	
6	Double-double seal	7	m2	10	70.00	
7	Hydromulching on respread topsoil	13	m2	3.5	45.50	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**881.05**	**$/m**
12	Prelims & Margin (10%)				88.11	$/m
13	Contingency (15%)				132.16	$/m
			Subtotal:		**1,101.31**	**$/m**
14	Consultant Fees (15%)				165.20	$/m
			Total:		**1,266.51**	**$/m**
				Say,	**1,270.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	64 to 254
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,270
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 127
v.	Allowance for subgrade replacement	254 to 508
vi.	Excavation in rock, culverts, etc	up to 254
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	64 to 127
viii.	Guardrails	up to 254
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - CLASS 5C RURAL ACCESS

Rate per m for 7m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 7m wide road (without footpath)**	Road Width:	7	m
		Footpath Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness	0	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	20	m2	10	200.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from site	4.2	m3	24	100.80	
4	Trim road box and bed	7	m2	3	21.00	
5	Pavement					
6	Pavement Base: (Assume 125mm)	0.875	m3	120	105.00	
	Sub-base: (Assume 125mm)	0.875	m3	110	96.25	
	General CBR: (Assume 300mm)	2.1	m3	70	147.00	
7	Hydromulching on respread topsoil	13	m2	3.5	45.50	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**811.05**	**$/m**
12	Prelims & Margin (10%)				81.11	$/m
13	Contingency (15%)				121.66	$/m
			Subtotal:		**1,013.81**	**$/m**
14	Consultant Fees (15%)				152.07	$/m
			Total:		**1,165.88**	**$/m**
				Say,	**1,170.00**	**$/m**

Note: Grades greater than 10% to be two coats sealed

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	59 to 234
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,170
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 117
v.	Allowance for subgrade replacement	236 to 468
vi.	Excavation in rock, culverts, etc	up to 234
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	59 to 117
viii.	Guardrails	up to 234
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - CLASS 5D RURAL ACCESS

Rate per m for 5.5m Wide Pavement, 20m road reserve (without footpath)

Project Name:	Rate Build up for council std rd sec	Total Width:	20	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**20m road reserve, 5.5m wide road (without footpath)**	Road Width:	5.5	m
		Footpath Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath No:	0	no
Date:	5-Sep-14	Footpath thickness:	0	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	20	m2	10	200.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	2	m3	13	26.00	
3	Pavement excavation (Assume 600mm) including removal of excess from site	3.3	m3	24	79.20	
4	Trim road box and bed	5.5	m2	3	16.50	
5	Pavement					
6	Pavement Base: (Assume 125mm)	0.6875	m3	120	82.50	
	Sub-base: (Assume 125mm)	0.6875	m3	110	75.63	
	General CBR: (Assume 300mm)	1.65	m3	70	115.50	
7	Hydromulching on respread topsoil	14.5	m2	3.5	50.75	
8	Pavement Marking	3	m	1.5	4.50	
9	Allowance for forming swale	1	m	50	50.00	
10	Electrical / allowance per m	1	m	excl.		
11	Signage / allowance per m , standard single post road signs	1	m	15	15.00	
			Subtotal:		**715.58**	**$/m**
12	Prelims & Margin (10%)				71.56	$/m
13	Contingency (15%)				107.34	$/m
			Subtotal:		**894.48**	**$/m**
14	Consultant Fees (15%)				134.17	$/m
			Total:		**1,028.65**	**$/m**
				Say,	**1,030.00**	**$/m**

Note: Grades greater than 10% to be two coats sealed

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	52 to 206
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 1,030
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 103
v.	Allowance for subgrade replacement	206 to 412
vi.	Excavation in rock, culverts, etc	up to 206
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	52 to 103
viii.	Guardrails	up to 206
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - 2500 SHARED PATH

Rate per m for 2.5m Wide shared path, 4m reserve

Project Name:	Rate Build up for council std rd sec	Total Width:	4	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**2.5m wide shared path, 4m reserve**	Road Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath Width:	2.5	m
Date:	5-Sep-14	Footpath No:	1	no
		Footpath thickness	0.125	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	4	m2	10	40.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	0.4	m3	13	5.20	
3	Pavement excavation (Assume 600mm) including removal of excess from sit	0.375	m3	24	9.00	
4	Footpath					
	Sand blinding layer	2.5	m2	5	12.50	
	Compaction	2.5	m2	4	10.00	
	Concrete	0.3125	m3	270	1.56	
	Reinforcement	2.5	m2	15	37.50	
	Formwork	2	m	30	60.00	
	Non-slip finish	2.5	m2	25	62.50	
	Allowance for joints	1	m	75	75.00	
5	Topsoil respread (assume 100mm) to receive turf (turf costed below)	0.4	m3	6	2.40	
6	Turfing	1.5	m2	4	6.00	
7	Electrical / allowance per m	1	m	excl.		
8	Signage / allowance per m , standard single post road signs	1	m	10	10.00	
			Subtotal:		**331.66**	**$/m**
9	Prelims & Margin (10%)				33.17	$/m
10	Contingency (15%)				49.75	$/m
			Subtotal:		**414.58**	**$/m**
11	Consultant Fees (15%)				62.19	$/m
			Total:		**476.76**	**$/m**
				Say,	**480.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	24 to 96
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 480
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 48
v.	Allowance for subgrade replacement	96 to 192
vi.	Excavation in rock, culverts, etc	up to 96
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	24 to 48
viii.	Guardrails	up to 96
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Multiple contractors set up facilities (contractor camps / accommodation)
- Costs for extra requirements at intersections e.g. extra signage etc
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

GREENFIELD - 1500 FOOTPATH

Rate per m for 1.5m Wide footpath, 4m reserve

Project Name:	Rate Build up for council std rd sec	Total Width:	4	m
Client:	Scenic Rim Regional Council	Total length:	1	m
Rate for:	**1.5m wide shared path, 4m reserve**	Road Width:	0	m
Ref Drwg:	R-11 Rev.B	Footpath Width:	1.5	m
Date:	5-Sep-14	Footpath No:	1	no
		Footpath thickness:	0.125	m

Item	Description of Work	Qty	Unit	Rate ($)	Amount ($)	
For cost of 1m length:						
1	Clearing and grubbing (mostly grassed areas with medium density vegetation & minimal trees)	4	m2	10	40.00	
2	Stripping top soil and deposit and spoil heaps (assume 100mm)	0.4	m3	13	5.20	
3	Pavement excavation (Assume 600mm) including removal of excess from site	0.225	m3	24	5.40	
4	Footpath					
	Sand blinding layer	1.5	m2	5	7.50	
	Compaction	1.5	m2	4	6.00	
	Concrete	0.1875	m3	270	0.94	
	Reinforcement	1.5	m2	15	22.50	
	Formwork	2	m	30	60.00	
	Non-slip finish	1.5	m2	25	37.50	
	Allowance for joints	1	m	75	75.00	
5	Topsoil respread (assume 100mm) to receive turf (turf costed below)	0.4	m3	6	2.40	
6	Turfing	2.5	m2	4	10.00	
7	Electrical / allowance per m	1	m	excl.		
8	Signage / allowance per m , standard single post road signs	1	m	10	10.00	
			Subtotal:		**282.44**	**$/m**
9	Prelims & Margin (10%)				28.24	$/m
10	Contingency (15%)				42.37	$/m
			Subtotal:		**353.05**	**$/m**
11	Consultant Fees (15%)				52.96	$/m
			Total:		**406.01**	**$/m**
				Say,	**410.00**	**$/m**

	Depending on the site specific requirements, below is a guide on the range of extra cost to be added to the above linear m rate to derive a more complete opinion of cost per m	**$/m**
i.	Relocation and/ or protection of existing services	21 to 82
ii.	Traffic management work / side track for Brownfield sites	N.A
iii.	Earthwork and retaining walls (note: only site preparation and forming of road box are included in above	up to 410
iv.	Removal of high density shrubs and large trees or hardscape (allowance in above rate is for medium density shrubs)	up to 41
v.	Allowance for subgrade replacement	82 to 164
vi.	Excavation in rock, culverts, etc	up to 82
vii.	Drainage related work, e.g. new stormwater drainage or modifications to existing stormwater lines (note: only cost of subsoil drains has been allowed where required in above linear m rate	21 to 41
viii.	Guardrails	up to 82
ix.	Electrical (trenching for & including conduits, pits, light poles, light fittings)	200 to 400

Excludes:

- Statutory fees
- Land acquisition costs
- Out of hours work
- Costs for extra requirements at intersections e.g. extra signage etc
- Multiple contractors set up facilities (contractor camps / accommodation)
- Traffic lights
- GST

Note:

- Above rates including prelims & margin are based on current market conditions (September 2014). Rates could vary in different market conditions
- Contingency allowance should be assessed on a case by case basis, as they may vary dramatically depending on specific site conditions

SCENIC RIM REGIONAL COUNCIL

File No: 19/03/004

2 October 2015

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Veitch Lister Consulting Pty Ltd

September 2015

Scenic Rim Regional Council - Transport Infrastructure Review

Traffic Forecasts and Assessments

Prepared for

Scenic Rim Regional Council

By

Veitch Lister Consulting Pty Ltd

(VLC Project No.14-031)

SCENIC RIM REGIONAL COUNCIL
- TRANSPORT INFRASTRUCTURE REVIEW

TRAFFIC FORECASTS AND ASSESSMENTS

Date Issued	Revision	Prepared By	Checked By	Approved By	Description
30-09-2015	v.1	GH	KT	KT	Draft Report

Table of Contents

1.0 Introduction

1.1 Background

In 2010-2011, Veitch Lister Consulting (VLC) assisted other consultants Aurecon (planning) and SKM (engineering) with the preparation of a Priority Infrastructure Plan (PIP) for the Scenic Rim Regional Council to implement. VLC's principle role in that consulting team was to produce traffic forecasts with which to identify the Region's trunk road requirements and also to assist with the preparation of the Plan, in particular the Schedule of Charges for the Trunk Road Infrastructure.

Since implementing the resulting Plan in 2012, a number of the key planning assumptions underlying it have changed. In particular, the anticipated sequencing of residential development within Beaudesert Township has changed and more detail about what is likely to be established in some of the future development precincts has become known (as a result of development applications).

Given this, Scenic Rim Regional Council engaged Veitch Lister Consulting in 2014 to undertake a review of the Region's transport infrastructure requirements. In addition to examining transport needs at the PIP horizon of 2031, VLC were also asked to examine the 'ultimate' requirements (nominally 2051) as well.

1.2 Purpose of this Report

The purpose of this report is to document the principal methods and assumptions used by VLC in producing the new series of traffic forecasts and the subsequent assessments of road infrastructure requirements and costs.

1.3 Contents of this Report

This report has 6 chapters and 1 appendix. The remaining contents are as follows:

- **Chapter 2** presents the background to and the preparation of the Zenith models used in this review, plus details of the base year (2011) model validation;
- **Chapter 3** describes the information sources and methods of derivation of the demographic projections used in the future year models;
- **Chapter 4** presents a summary of the traffic forecasts and assessments produced for the 2031 planning horizon;
- **Chapter 5** presents a summary of the traffic forecasts and assessments produced for the 'ultimate' (2051) horizon,
- **Chapter 6** provides an analysis of road space usage across the Region in 2031;
- **Appendix A** (a separate document) contains Figures.

2.0 Modelling Background and Development

2.1 VLC's Zenith Software

Veitch Lister Consulting are specialists in multi-modal travel demand forecasting. To support this role, the company has developed travel models of all of Australia's state capital cities, except Hobart, using their proprietary 'Zenith' software.

'Zenith' is at the leading edge, internationally, in terms of its sophistication and capabilities as a fully integrated (4 stage) multi-modal travel demand-forecasting package. As such, it forecasts the demands for individual travel modes, rather than use estimated or 'target' mode shares as an input to the modelling process. The structure of the 'Zenith' package, including its various sub-models, is shown in **Figure 2.1.**

The primary inputs to each Zenith model are:

- Detailed demographic estimates
- A transport infrastructure network, plus
- Public transport services and stop locations

In addition, the models use comprehensive sets of empirically derived parameters (for different travel purposes), which are utilised within the various sub-model algorithms, eg:

- Trip rates,
- Trip distribution parameters,
- Time period factors,
- Mode share parameters, and
- Vehicle occupancy rates.

Most of these parameters are city specific and have been produced by self-funded research and analysis of publicly available information.

2.2 Heritage of the Scenic Rim Models

The Zenith models used by VLC to forecast traffic in the Scenic Rim Region, back in 2010-2011, were localised refinements of a comparable set of models used for Logan City's PIP, a few months earlier. The refinements included using a more detailed zone system within Scenic Rim, particularly in and around Beaudesert Township and Bromelton, plus the use of customised demographic projections within Scenic Rim that reflected Council's expected planning outcomes in more detail.

The resulting series of Scenic Rim models consisted of a 2006 base year model, plus future horizons of 2021, 2026, and 2031. NB. The Logan City PIP models also included a 2051 model, but this was never adapted and used for Scenic Rim's purposes.

Both the Logan City and Scenic Rim series of models are localised refinements of VLC's Zenith models of South-east Queensland and Northern New South Wales. They use exactly the same trip rates and other travel parameters/algorithms as the 'parent' models; the only difference is the level of detail incorporated in the 'area of interest'.

All of VLC's models of SEQ, including the Logan/Scenic Rim derivatives, incorporate an extensive 'buffer area' which (as shown in **Figure 2.2**) extends to north of Gympie, west of Toowoomba and southward into NSW as far as Lismore. Use of such a large buffer area eliminates the potential distortions in forecast travel patterns within the 'core area', as a result of trips being 'reflected off the boundary'.

2.3 Further Adaptation for this Review

The principal focus of this Infrastructure Review was to re-examine the road network requirements of Scenic Rim at the PIP's design horizon of 2031. Additionally, rather than re-examine the near term requirements at 2021 and 2026, Council wished to examine the road network requirements in an 'ultimate' scenario, in which Beaudesert Township was fully developed in accordance with the Outline Structure Plan.

To address these objectives, VLC's principal tasks involved:

- Devise a new, more detailed zone system within Scenic Rim,
- Establish and run a 2011 model using this new zone system,
- Prepare new demographic projections at zonal levels for both 2031 and 2051,
- Establish the 2031 model and assess road infrastructure needs and options
- Establish the 2051 model and assess road infrastructure needs and options
- Apportion the value of future road infrastructure to future users.

2.4 The New Zone System used within Scenic Rim

One of the most significant changes in this new set of models was the use of a completely new zone system to represent land use within the Region. The new zones were all based on 'Statistical Areas – Level 1' (i.e. 'SA1's) from the 2011 Census; whereas the zones in the previous model were based on Census Collector Districts (CCDs) from the 2006 Census.

All the new zones throughout Scenic Rim were either SA1s or sub-divisions of SA1s. Partly as a result of the SA1s being generally smaller than the CCDs and partly due to extra disaggregation incorporated by VLC, in Beaudesert in particular, the new model was more detailed, as summarised below.

Table 2.1: Numbers of Census Units / Model Zones within Scenic Rim

Base Year	Census Units	Zones with SRRC	Total Zones in Model
2006	75 CCDs	215	3,746
2011	98 SA1s	274	3,811

The resulting zone system enables an accurate reflection of the future land use patterns and their accessibility to the future 'local' road network. The zone system adopted within Beaudesert Township and Bromelton is shown in **Figure 2.3.**

2.5 Model Validation

A pre-requisite step in developing any travel forecasting model is to prepare and validate a 'base year' model. The purpose of this validation is to demonstrate that the model system (both the parameters and processes used) can replicate the actual travel demands that were observed/recorded in the 'base year' period.

The previous Scenic Rim models, used in 2010-2011, had a 2006 base year and were well validated against thousands of traffic counts throughout SEQ, including over 200 counts within Scenic Rim. However, VLC have since updated their Zenith models of SEQ to a 2011 base year, in order to 'anchor' the future demographic projections to the latest census data. This new series of Scenic Rim models have been similarly rebased for the same reasons.

Unfortunately, only a limited number of traffic counts from the 2011 era were available for sites within Scenic Rim at the start of this study. As result, validation of the new model has to rely on the previous 2006 model validation, to some extent.

SEQ-wide Validation

VLC's 2011 model of SEQ has been well validated against:

- a comprehensive set of 2011-2012 traffic counts forming 43 screen-lines across the SEQ region,
- a large set of bus patronage data by route and rail patronage data by line, and
- Sector-to-sector travel patterns across SEQ, derived from State Government Household Travel Survey records.

The results of this validation were comprehensively reported to DTMR in a *Model Validation and Existing Conditions Report (June 2013)*, as an initial stage of the Logan Area Transport Study (LATS) in 2013-2014. Salient extracts from that report are provided as **Attachment 1**.

Validation within Scenic Rim

The limited number of traffic counts available within Scenic Rim from the 2011 era are insufficient to demonstrate model validation. Nevertheless, the previous validation results (of the 2006 model) are still a valid indication of the ability of the Zenith modelling system to replicate observed traffic in Scenic Rim. This is reasonable, given that none of the calibrated travel parameters used by the Zenith model have changed in the intervening period (the only changes have related to algorithms used to determine toll-road usage).

The screen-lines, in and around Scenic Rim Region, that were used by VLC to validate the 2006 model are shown in **Figure 2.4**. The ability of the previous SRRC model to predict 2006 traffic volumes at each crossing point on the 5 screen-lines in and immediately around Scenic Rim are shown in the following:

- **Figure 2.5a:** North Beaudesert Screen-line
- **Figure 2.5b:** North Boonah Screen-line
- **Figure 2.5c:** Logan River Screen-line
- **Figure 2.5d:** Albert River Screen-line
- **Figure 2.5e:** Coomera River Screen-line

Additionally, the ability of the SRRC model in predicting the daily 2006 traffic volumes at the 216 traffic count sites within Scenic Rim are shown in **Figure 2.6**.

All of the preceding figures indicate good, if not very good, levels of model validation.

3.0 Future Demographic Assumptions

3.1 Demographic Projections for External Areas

For the purposes of this study, it was agreed with Council that the new 2031 and 2051 models for Scenic Rim would be established within the framework of the previous Logan City PIP models (which was how the previous Scenic Rim models were produced in 2010). The basic intention of this was to reuse the previous zone system and demographic projections for all areas outside of Scenic Rim. The only difference between the previous and new 2031 models of Scenic Rim would, therefore, be the land use assumptions and demographic projections within Scenic Rim itself.

The demographics used within the 2031 Logan PIP model were sourced as follows:

- The demographics within Logan City were produced by Logan City Council, using their 'Logan Development Projections Model' in 2010
- The demographics within other Local Government Areas (LGAs) were derived from a set of SEQ-wide projections produced by DTMR in 2010 and referred to as the 'Regional Plan Consistent, Version 4' projections.

The demographics used within the 2051 Logan PIP model were sourced as follows:

- The demographics within Logan City were produced by Logan City Council, using their 'Logan Development Projections Model' in 2010
- The demographics within Ipswich City and Gold Coast City were based on 'ultimate development' scenarios produced by VLC for a previous DTMR study.
- The 2051 demographics in all the other LGAs in the SEQ model were the same as assumed for 2031.

The population and employment levels assumed in each of the three local government areas abutting Scenic Rim, in 2031 and 2051, are summarized (and compared with the actual 2011) in the following tables:

Table 3.1a: Population Assumptions in Surrounding Local Government Areas

LGA ('08)	2011	2031	2051
Ipswich City	172,290	436,116	679, 239
Logan City	287,474	410,024	571,886
Gold Coast City	515,202	749,114	901,015

Table 3.1b: Employment Assumptions in Surrounding Local Government Areas

LGA ('08)	2011	2031	2051
Ipswich City	63,750	145,082	313,338
Logan City	97,639	132,113	293,907
Gold Coast City	241,725	322,776	384,535

3.2 Demographic Projections for Scenic Rim Region

The population and employment projections, for the Scenic Rim Region, were derived by VLC using information provided to it by Council, in differing formats, as follows:

- The population and employment estimates within Beaudesert Township were provided on a lot by lot basis, in a GIS file.
- The future population and employment totals for other 'localities' across the Region were provided in tabular format.

Population Projections within Beaudesert Township

During their review of the GIS file provided by Council, VLC found and corrected a number of minor errors (e.g. duplicate or overlapping objects, and some computational errors). The corrected population estimates were only slightly lower, however. VLC then estimated average dwelling profiles (i.e. workers/dwelling, age group proportions, etc.) for each residential precinct, taking into account the existing (2011) profiles, the future housing density and the 'age' of the area. Using these profiles, VLC were able to estimate the sub-populations in each area or 'zone' and in the town in overall. The estimated community profile at each planning horizon is summarized, below.

Table 3.2: 'As Modelled' Community Profile (Beaudesert Township)

Demographic	2011		2031		2051	
	No.	Per Dw.	No.	Per Dw.	No.	Per Dw.
(Occupied) Dwellings	2,795	-	11,653	-	18,811	-
Resident Workforce	2,734	0.98	12,906	1.11	21,173	1.13
Dependents 0-17 yrs	1,844	0.66	7,625	0.65	12,241	0.65
Dependents 18-64 yrs	1,361	0.49	5,061	0.43	8,277	0.44
Dependents >65 years	1,249	0.45	5,126	0.44	8,367	0.44
Resident Population	7,188	2.57	30,717	2.64	50,058	2.66
School Aged Children:						
Pre/Primary School	820	-	2,965	-	4,760	-
Secondary School	512	-	2,542	-	4,080	-

The forecast population growths and resulting densities in the Township are shown in:

- **Figure 3.1a:** Population Growth, Beaudesert Township (2011-2031)
- **Figure 3.1b:** Population Growth, Beaudesert Township (2031-2051)

Education Capacity within Beaudesert Township

Based on the above, VLC also made estimates of the required educational capacity within the township and, after discussion with Council, agreed the following school locations and enrolment numbers, for modelling purposes.

Table 3.3: 'As Modelled' School Locations and Enrolment Estimates

School [4]	2011[1]	2031	2051
P1: Gleneagle State Primary	154	900	1,000
P2: St Mary's Catholic Primary	339	700	900
P3: Beaudesert State Primary	738	900	1,000
P4: New (Kerry Rd) Primary	-	900	1,000
P5: New (Gould Hill Rd) Primary	-	-	1,000
Sub-total (Primary Schools)	**1,231[2]**	**3,400**	**4,900**
S1: Beaudesert State High	1,361	2,000	2,000
S2: Proposed Catholic High	-	1,400	1,400
S3: New (Kerry Rd) State High	-	-	1,500
Sub-total (Secondary Schools)	**1,361[3]**	**3,400**	**4,900**

Notes: 1. 2013 enrolments numbers were sourced and used in the 2011 model
2. the town had a net surplus of about 400 enrolments, catering for surrounding rural areas
3. the town had a net surplus of about 800 enrolments, catering for surrounding rural areas
4. the school 'reference numbers' (eg. P1, S2) are annotated in the two previous figures.

Employment Projections within Beaudesert Township

The lot-based employment estimates provided by Council in the GIS file only related to the 2031 horizon. Additionally, on review, VLC noted that the total jobs estimated in the town (6,274) represented very low growth (61%) relative to the 3,900 jobs that existed in 2011.

In order to identify an appropriate level of employment for 2051 and, in the process, reappraise the 2031 level; VLC produced a set of 'target' employment estimates for the town at both horizons, using a set of 'minimum' per capita employment rates, as summarized in **Figure 3-2**.

It should be noted that Redland City is chosen as a benchmark (for 'reasonable minimum' levels of employment) as it is largely self-sufficient (except for higher order health and education services) and does not support a 'drive through' market of any significance. It should be noted that in deriving and applying employment rates at Beaudesert, VLC have acknowledged that the town also supports about 5,000 persons in the surrounding rural areas.

VLC distributed the above employment targets throughout the township, largely by factoring up existing patterns and employment categories, but allowed for new centres and expansion/redevelopment in some areas. The adopted growth in job numbers and resulting densities in the town are shown in:

- **Figure 3.3a:** Employment Growth, Beaudesert Township (2011-2031)
- **Figure 3.3b:** Employment Growth, Beaudesert Township (2031-2051)

VLC believe the 2031 employment estimates (and their distribution within the Town) are suitable for traffic modelling and for making reasonable medium term planning decisions in respect of road infrastructure. However, the employment and education densities that resulted for 2051 are at the upper end of VLC's range. We believe that the township's long term employment and education needs and potential capacity should be examined in more detail, in due course. Accordingly, the 2051 traffic forecasts herein must be considered in this context (and acknowledge that future employment and education may be more dispersed across the town).

Employment Projections at Bromelton

The quantum and distribution of employment within the Bromelton industrial area, at both future horizons, were produced by VLC in consultation with Council staff. The total new jobs at each horizon (9,350 at 2031 and 15,980 at 2051) were advised by Council, based on planning reports including the *'Bromelton Employment, Industrial Land Demand, Freight Demand and Generation Study – 2008 Update'* by Economic Associates, dated January 2009.

The distribution of these job numbers within the various sites/precincts took account of the Bromelton Structure Plan, employment estimates previously produced by the developers (as in Table 7.1 of the EA report, above) and conservative limits on job densities. The assumed employment distributions are shown in **Figure 3.4**.

The estimated numbers of jobs in the Beaudesert/Bromelton area per worker resident in the township has been examined in the following table.

Table 3.4: Review of Job/Worker Ratios

Demographic	2011	2031	2051
Resident Workforce (Township)	2,734	12,906	21,173
No. of Jobs (Township)	3,899	8,601	13,296
No. of Jobs (Bromelton)	-	9,353	15,780
Total No. of Jobs	*3,899*	*17,954*	*29,076*
Jobs (in Township) per worker	1.43	0.67	0.63
Jobs (in Total) per worker	1.43	1.39	1.37

Demographic Projections elsewhere in Scenic Rim

To establish the previous models, in 2010, Council provided VLC with a table of population and employment forecasts by 'locality', for years 2016, 2021, 2026 & 2031, for all areas outside of Beaudesert Township. VLC were advised to reuse those 2031 projections for the new 2031 model, and were additionally provided with a table of estimated populations for 2051. The 2051 employment numbers were derived by factoring the 2031 employment by the same ratio as which the locality populations grew. The 'as modelled' populations and employment are summarized in the following tables.

Table 3.5a: Population Projections - Other Areas

LOCALITY	2011	2031	2051
Former Beaudesert Shire:			
Canungra	768	3,003	3,814
Kooralbyn	1,410	3,652	2,921
Tamborine Mtn.	7,238	7,889	9,468
Canungra Rural	2,389	2,986	3,196
Beaudesert Rural	3,212	3,854	7,208
Tamborine	2,409	2,891	5,087
Former Boonah Shire:			
Aratula	515	577	1,269
Boonah	2,521	3,454	5,975
Kalbar	739	1,079	2,773
Warrill View	326	326	2,533
Mt Alford	354	354	354
Boonah Rural	5,033	7,600	8,665
Former Ipswich City:			
Peak Crossing	406	406	759
Harrisville	436	632	1,012
Ipswich Rural	775	876	998

Table 3.5a: Employment Projections - Other Areas

LOCALITY	2011	2031	2051
Former Beaudesert Shire:			
Canungra	427	730	927
Kooralbyn	174	491	491
Tamborine Mtn.	2,013	2,154	2,584
Canungra Rural	878	878	1,154
Beaudesert Rural	1,090	1,444	2,700
Tamborine	356	356	627
Former Boonah Shire:			
Aratula	112	253	557
Boonah	1,620	1,620	2,803
Kalbar	70	140	360
Warrill View	47	47	364
Mt Alford	74	74	74
Boonah Rural	1,190	1,190	1,356
Former Ipswich City:			
Peak Crossing	50	84	157
Harrisville	361	361	577
Ipswich Rural	93	191	218

Scenic Rim Region Totals

The overall total population and employment levels estimated in Scenic Rim Region, at the differing horizons, are summarised by locality, below.

Table 3.6a: Summary of 'As Modelled' Populations - Scenic Rim Region

Locality	2011	2031	2051
Beaudesert Township[1]	7,188	31,036	50,297
Bromelton[2]	34	17	13
Balance of Beaudesert SA2	5,518	8,253	10,255
Beaudesert SA2	12,740	39,306	60,565
Tamborine-Canungra SA2	13,536	17,648	23,208
Boonah SA2	11,138	15,340	24,395
TOTAL (Scenic Rim)	*37,414*	*72,294*	*108,168*

Notes: 1. Urban Footprint, as defined in the Outline Structure Plan
2. As defined by the Outline Structure Plan

Table 3.6b: Summary of 'As Modelled' Employment - Scenic Rim Region

Locality	2011	2031	2051
Beaudesert Township[1]	3,810	8,602	13,295
Bromelton[2]	262	9,781	16,022
Balance of Beaudesert SA2	1,408	2,013	3,042
Beaudesert SA2	5,480	20,396	32,359
Tamborine-Canungra SA2	3,896	4,405	5,828
Boonah SA2	3,638	3,985	6,506
TOTAL (Scenic Rim)	*13,014*	*28,786*	*44,693*

4.0 Traffic Forecasts - 2031

4.1 Base Network and Transport Assumptions

To commence the 2031 modelling process, it was first necessary to identify and encode a starting or 'base' transport system. This base transport system was established by considering it in three parts, as follows:

External Road Improvements

The road network assumed outside of Scenic Rim was that identified and recommended for 2031 by the Logan City PIP study. The principal road network improvements in the vicinity of Scenic Rim Region included:

- Mt Lindesay Highway upgraded to a 4-lane expressway standard to just south of Logan River and to a 4-lane rural arterial from there to Millstream Road, just south of Jimboomba.
- Significant additional 'local' roads within Flagstone, Yarrabilba, and Park Ridge, to support development within those areas
- Of note, however, there were no major east-west links (such as the Southern Infrastructure Corridor) assumed to be established by 2031.

Internal Road Improvements

A number of additions and improvements to the road network within Beaudesert Township were assumed. In addition to the local streets that would be implemented to support specific subdivisions, a number of enhancements to the trunk road network are anticipated (with hindsight to the 2010 PIP study) to be needed by 2031. These enhancements, now assumed within the 2031 base network, are shown in **Figure 4.1a** and summarized below.

Table 4.1: Trunk Road Enhancements Anticipated by 2031

Ref.	Road Segment	Intended Standard	By[3]
A-B	Bromelton House Road	Upgrade to 2-lane Rural Collector[1]	C
B-C	Allan Creek Road	Upgrade to 2-lane Rural Collector	C
D-E	Fields Road	Upgrade to 2-lane Urban Collector	C
E-F	Gould Hill Road	Upgrade to 2-lane Urban Collector	C
G-L	North-east Ring Road	New 2-lane Urban Sub-arterial[2]	C
L-N	South-east Ring Road	New 2-lane Urban Sub-arterial	C
N-O	Kerry Road (inner section)	Upgrade to 2-lane Urban Sub-arterial	C
O-P	Brisbane Street	Upgrade to 2-lane Urban Sub-arterial	C
Q-R	Tina Street	Upgrade to 2-lane Urban Collector	C
R-H	Tina Street Extension	New 2-lane Urban Collector	C
S-T	Tubber Street	Upgrade to 2-lane Urban Collector	C
U-V	Town Centre Bypass (Stg. 1)	New 2-lane Urban Arterial	M
V-A	Beaudesert-Boonah Road	Upgrade to 2-lane Arterial (3m shoulders)	M
W-X	Cryna Road	Upgrade to 2-lane Urban Sub-arterial	C
Y-Z	Ferguson Road	Form as 2-lane Rural Road	Q

Notes: 1. Through movements by heavy goods vehicles would be banned on Bromelton House Road
2. All movement intersections at H, J & K only. All other intersections = left-in/left-out
3. C=Council, M=Main Roads, Q=Developer (Neilson's Quarry)

The road network in the Bromelton area will also need to be augmented and upgraded to cater for the industrial developments. The road network that is envisaged to exist by 2031 is shown in **Figure 4.1b**. Key functional elements will be:

- New 4-lane (undivided) industrial collector roads, constructed by the developers, to provide access and circulation within the industrial area,
- Light vehicles will be able to use Bromelton House Road to bypass the town, but heavy vehicles would need to enter Beaudesert to use the CBD Bypass
- The Beaudesert-Boonah Road (E-F) would be upgraded to a high standard 2-lane arterial, including extra wide (3m) shoulders, to accommodate truck breakdowns.
- Sandy Creek Road would cease to connect to Beaudesert-Boonah Road at X1
- The industrial collector network would not connect with Brabazon Road at X2
- The south western industrial collector would not connect with Sandy Creek Rd at X3

Public Transport Improvements

The enlarged Beaudesert Township will justify a much improved public transport system. The servicing strategy assumed for the 2031 base involved:

- Extending the existing Route 540 (to/from Brisbane via Browns Plains) through the town centre to Bromelton, and increasing its frequency, and
- Adding two external services and three internal services as shown in **Figure 4.2**. The assumed future routes were:

  External Routes
  - Flagstone Town Centre to Bromelton, via Beaudesert Town Centre
  - Yarrabilba Town Centre to Bromelton, via Beaudesert Town Centre

  Internal Routes – Three separate routes within the town, each terminating in the town centre - one serving the northern suburbs, one serving the southern suburbs and one serving the new inner suburbs

4.2 Performance of the Base Network

The traffic volumes and operating conditions forecast on this 'base' network in 2031 are presented, briefly, as follows:

Scenic Rim Region

- **Figure 4.3a:** Average Weekday Traffic (2031 Base)
- **Figure 4.3b:** Maximum Volume/Capacity Ratios (2031 Base)

These figures suggest that the highest traffic volumes in the Region will relate to traffic accessing Bromelton from the north and that the only network deficiencies of any significance would be in and around Beaudesert Township.

Beaudesert Area

- **Figure 4.4a:** Average Weekday Traffic (2031 Base)
- **Figure 4.4b**: Heavy Goods Vehicles (2031 Base)
- **Figure 4.4c:** Maximum Volume/Capacity Ratios (2031 Base)

These figures suggest that a significant part of the traffic volumes accessing Bromelton from the north will be heavy goods vehicles.

Beaudesert Township

- **Figure 4.5a:** Average Weekday Traffic (2031 Base)
- **Figure 4.5b:** AM Peak 1 Hour Traffic (2031 Base)
- **Figure 4.5c:** PM Peak 1 Hour Traffic (2031 Base)

Closer examination of the peak hour volumes and V/C ratios forecast around the township indicates the following road segments would operate at or near their capacities:

- Boonah-Beaudesert Road; traffic demands west of Bromelton House Road would exceed its capacity and those to the east would result in poor operating conditions
- Kerry Road: the sections immediately south east of the Ring Road (which have not been assumed to be upgraded) would operate under duress.
- Mt Lindesay Highway; the section north of Enterprise Drive would operate at its design capacity
- Beaudesert-Nerang Road; the section east of the Ring Road would operate at its design capacity, also

Additionally, it could be expected that a number of key intersections along the major roads (particularly State roads) will need upgrades and potentially signalisation. The prime candidates are:

- Mt Lindesay Highway / Alan Creek Road
- Mt Lindesay Highway / Gould Hill Road
- Bromelton Street / Telemon St
- Albert Street / Tina Street
- Beaudesert-Nerang Road / Brooklands Drive

NB. The following intersections were assumed to be signalised, when first constructed, and therefore should have been designed to have sufficient capacity:

- Mt Lindesay Highway / Enterprise Drive / Ring Road
- Mt Lindesay Highway / CBD Bypass
- Bromelton Street / CBD Bypass
- Beaudesert-Nerang Road / Kingsley Drive / Oakland Stage 1 Collector
- Beaudesert-Nerang Road / Ring Road

4.3 The Network Development Tests

A series of potential road network improvements were tested, under these 2031 traffic demands. These incremental improvements were as follows:

Test Network 1

The three improvements (relative to the Base Network) are shown in **Figure 4.6a**. The improvement and their intent are:

- Gould Hill Road – Flagstone Creek Road; upgraded to a sealed, rural collector standard. This is partly justified on maintenance grounds, but it was expected to provide a more direct route to the east for the suburbs in the north; thereby relieving the 'warm' spots on Mt Lindesay Highway and Beaudesert-Nerang Road
- Kerry Road; upgrade sections east of the Rind Road to a sub-arterial and collector standard, commensurate with the demands
- Stage 2 of the CBD Bypass; implement this, to attract more traffic out of the CBD and to lessen (or perhaps avoid) upgrade costs for the Bromelton Street/ Telemon Street intersection

Figure 4.6b shows the change in average weekday traffic (and the resulting maximum V/C ratios), on road links in the town in 2031, if these network enhancements were introduced. This shows that:

- Upgrading/sealing Gould Hill Road – Flagstone Creek Road attracts only 500 vpd; providing minor relief to Beaudesert-Nerang Road but, conversely, adds a small amount of extra traffic to the critical section of Mt Lindesay Highway.
- Introduction of Stage 2 of the CDB Bypass would have both traffic and amenity benefits outside St Mary's School and to a lesser extent in the town centre.

Test Network 2

The road network additions and improvements incorporated in Network 2 (vs. Network 1) are shown in **Figure 4.7a**. The basic strategy was to provide a northern access route into Bromelton, by:

- Constructing a new 2-lane highway, linking Mt Lindesay Highway at Woodhill with Brookland Road
- Upgrading a section of Brookland Road to arterial standard, and extending this southward into Bromelton. (NB. Brabazon Road would not connect with Bromelton)

Figure 4.7b shows the changes in average weekday traffic (and the resulting maximum V/C ratios), if this northern route was introduced in 2031. This shows that there would be significant reductions in traffic on the Boonah Road as well as on Mt Lindesay Highway, south of the new connection. It should be especially noted that the reductions in traffic on the Highway, from Allan Creek Road southward, is almost entirely heavy goods vehicles (i.e. 3,200 HGVs less past the State High School). There would be a minor benefit to volumes and operating conditions on Beaudesert-Nerang Road as well.

Test Network 3

Although the preceding yielded a generally satisfactory outcome, it was appropriate to investigate what extra benefit might accrue if the new Bromelton route was extended southward to Mt Lindesay Highway, to form an outer western bypass, as shown in **Figure 4.8a**. It can be noted from **Figure 4.8b** that completion of this outer bypass would provide a further small benefit, by reducing N-S traffic through the town.

4.4 The Anticipated 2031 Network

The previous network tests have confirmed that establishing a northern route into the Bromelton industrial area, direct from Mt Lindesay Highway, would provide appreciable reductions in traffic volumes within Beaudesert Township, particularly heavy goods vehicle numbers. Despite the tangible and intangible benefits to the township, the northern route is being treated by the State as a long-term 'supplement' rather than a pre-requisite for Bromelton's establishment. As a result, Council's own network planning must progress on the basis that this access route might not exist by 2031.

Given this, it has been agreed with Council that it is more likely that the State would further upgrade the Beaudesert - Boonah Road to a 4-lane rural arterial standard, rather than expend much larger sums on the northern route. As a result, the road network that is anticipated to exist in Beaudesert Township, at 2031, would be as shown in **Figure 4.9**. The additional road network improvements included in this network (over and above those shown in Figure 4-1 and listed in Table 4-1) include the following.

Table 4.2: Additional Trunk Road Enhancements Anticipated by 2031

Ref.	Road Segment	Intended Standard	By[1]
A-B	Gould Hill Road (Future Urban Section)	Upgrade to 2-lane Urban Collector	C
C-D	Beaudesert-Boonah Road	Upgrade to 4-lane Rural Arterial	M
D-E	Town Centre Bypass (Stg. 2)	New 2-lane Urban Arterial	M
F-G	Kerry Road (outer section)	Upgrade to 2-lane Urban Sub-arterial/Collector	C

Notes: 1. C=Council, M=Main Roads

The traffic volumes/conditions forecast on this anticipated network in 2031 are shown in:

- **Figure 4.9a:** Average Weekday Traffic (Anticipated Network, 2031)
- **Figure 4.9b:** AM Peak 1 Hour Volumes (Anticipated Network, 2031)
- **Figure 4.9c:** PM Peak 1 Hour Volumes (Anticipated Network, 2031)

These latter figures suggest that, subject to a number of intersections being signalized or upgraded, traffic conditions within and around the township will generally be good. A number of intersections (as listed in Section 4.2) were anticipated to need upgrading or signalisation by 2031. In addition to these, the performance of the intersection of Brisbane Street and William Street was specifically assessed (using SIDRA). The findings are summarised, below.

Table 4.3: Performance of Brisbane Street / William Street Intersection

Year / Scenario	AM Peak		Post-School		PM Peak	
	DoS[1]	Max.Q[2]	DoS	Max.Q	DoS	Max.Q
2011 'Observed'	0.65	90m	0.68	80m	0.63	75m
2031 Base	1.17	382m	1.15	469m	1.08	381m
2031 'Anticipated'	1.20	440m	1.20	545m	1.11	441m

Notes: 1. Degree of Saturation
2. 95 percentile queue length; maximum of all approaches

The above indicates that the existing intersection layout and signal arrangements will have inadequate capacity for the forecast 2031 traffic demands. Given the complex traffic turning movements and the need to cater for relatively high pedestrian movements across all 4 approaches, any significant improvement to the capacity of this intersection is likely to require land acquisition. VLC suggest that other measures (such as a potential southern CBD bypass) might be a more practicable solution and should be explored.

5.0 Traffic Forecasts - 2051

5.1 2051 Base Network

The base network used as the starting point for these 2051 assessments was the 'anticipated' 2031 network, with 2 minor amendments in the Gleneagle area, as follows:

- Fields Road, south of Veresdale Scrub Road, upgraded to 2-lane Urban Collector
- New subdivision access streets, connecting to Gould Hill Road

The base network is shown, in terms of modelled road hierarchy, in **Figure 5-1.** NB. There were no improvements or additions assumed in the Bromelton area.

The traffic volumes and operating conditions forecast on this base network in 2051 are presented, briefly, as follows:

Scenic Rim Region

- **Figure 5.2a:** Average Weekday Traffic (2051 Base)
- **Figure 5.2b:** Maximum Volume/Capacity Ratios (2051 Base)

These figures suggest that traffic growth related to industrial developments at Ebenezer and the expanding townships at Flagstone and Yarrabilba will encroach into Scenic Rim. Except for routes to the south, all roads into and out of Beaudesert would need to operate at or beyond their capacities.

Beaudesert Area

- **Figure 5.3a:** Average Weekday Traffic (2051 Base)
- **Figure 5.3b**: Daily Goods Vehicles (2051 Base)
- **Figure 5.3c**: Maximum V/C Ratios (2051 Base)

These figures suggest that segments of Mt Lindesay Highway, the Boonah-Beaudesert Road and the Beaudesert-Nerang Road would all be over-saturated; potentially displacing demands onto Council roads (Millstream Road, Brookland Road, and Flagstone Creek Road).

Beaudesert Township

- **Figure 5.4a:** Average Weekday Traffic (2051 Base)
- **Figure 5.4b:** AM Peak 1 Hour Traffic (2051 Base)
- **Figure 5.4c:** PM Peak 1 Hour Traffic (2051 Base)

These figures indicate that most of the roads and streets within the town would operate comfortably within their capacities. However, a number of 'key' road segments would have reached or exceeded their capacities. These deficiencies would have a significant impact on the performance of the town's network:

- Bromelton House Road
- Mt Lindesay Highway, at Water Creek
- Bromelton Street & McKee Street

Additionally, a number of localised deficiencies are forecast at:

- Gould Hill Road & Flagstone Creek Road
- Beaudesert-Nerang Road, east of the Ring Road
- Kerry Road, south of the Ring Road
- Cryna Road, south of the Ring Road
- Brolga Road, south of Kerry Road

5.2 Network Development Tests

Similar to the process for 2031, a series of potential road network improvements have been tested, but operating under these 2051 traffic demands. These improvements were tested in increments, as follows:

Test Network 1

This network incorporated three sets of improvements, each aimed at alleviating deficiencies in specific areas, as shown in **Figure 5.5**:

- Bromelton Northern Access Route – aimed at alleviating excessive 'through traffic' within the township

  A-B: Mt Lindesay H'way (Millstream Rd to Woodhill), upgrade to 4-lane rural arterial
  B-C: New 2-lane highway (Woodhill to Brookland Road)
  C-D: Brookland Road, upgrade to 2-lane arterial
  D-E: New 2-lane arterial (Brookland Road Extension)
  E-F: New 2-lane urban sub-arterial, utilizing part of Brabazon Road.
- G-H: Gould Hill Road and Flagstone Creek Road - sealed and upgraded to a 2-lane Rural Collector, primarily on maintenance / safety grounds, but potentially providing relief to Beaudesert-Nerang Road.
- J-K: Southern Ring Road – complete the missing section of the ring road, between Kerry Road and Cryna Road, aimed at alleviating the local network deficiencies, but potentially providing relief to McKee Street as well

The changes in daily volumes that would result from the above improvements in 2051 are shown in **Figure 5.5a.** This indicates that:

- Introducing the Bromelton access would provide some significant relief to secondary routes (Millstream Road, Bromelton House Road and even Mundoolun Road).
- The sealing and upgrade of Flagstone Creek Road would attract a further 1,000 vpd (presumably from Beaudesert-Nerang Road)
- The completion of the ring road provides relief to the targeted sections of Kerry Road and Brolga Road, but has an adverse impact on the section of Cryna Road

Resulting average weekday traffic volumes (and maximum V/C ratios) in the broader Beaudesert area are shown in **Figure 5.5b.** Compared with Figure 5.3c, this indicates that much of the congestion on the higher order access routes into Beaudesert would be alleviated. However, deficiencies would still remain on Mt Lindesay Highway, between Woodhill and Gleneagle, and on the north end of Brookland Road.

The resulting weekday traffic volumes within Beaudesert Township are shown in detail in **Figure 5.5c**. Except for the section at Waters Creek, the Mt Lindesay Highway and the CBD Bypass would operate within capacity. The local deficiencies in the south of town would be alleviated, but not eliminated. Similarly, the poor conditions at Bromelton Street / McKee Street and on Beaudesert-Nerang Road, between the Ring Road and Brooklands Drive, would also be alleviated, but not eliminated.

Test Network 2

Relative to Network 1, this network incorporated two groups of improvements, as shown in **Figure 5.6**:

- *Outer Western Bypass* – aimed at attracting further extraneous traffic from the town.

  L-M: Brookland Road, upgrade to a 2-lane rural sub-arterial
  M-N: Upgrade Brookland Road and Extension to a 4-lane rural arterial
  N-O: New 2-lane highway
  O-P: New 2-lane highway (no connection with Sandy Creek Road)

- *Localised Upgrades* – aimed at improving their own performance
  Q-R: Cryna Road, upgrade to a 2-lane urban collector
  S-T: Brolga Road, upgrade to a 2-lane urban collector
  T-U: Kerry Road, upgrade to a 2-lane urban sub-arterial

The changes in daily volumes, forecast to result from the above improvements in 2051, are shown in **Figure 5.6a.** This indicates that:

- The 'outer western bypass' provides further relief to Bromelton House Road and the critical section of Mt Lindesay Highway, south of Woodhill, with the southern section also relieving Mt Lindesay Highway South and Sandy Creek Road.
- The local upgrades make little difference to traffic patterns in the south of the town

Resulting average weekday traffic volumes in the broader Beaudesert area are shown in **Figure 5.6b.** Compared with Figure 5.5b, the previous deficiencies on the higher order routes into Beaudesert have been largely eliminated. However, a new localised problem on a segment of Boonah-Beaudesert Road is created by traffic attempting to access the outer bypass. A potential solution might be for the bypass to have a connection with Sandy Creek Road, but with no connection (i.e. a flyover) at Boonah-Beaudesert Road.

The resulting weekday traffic volumes and conditions within Beaudesert Township are shown in detail in **Figure 5.6c**. This indicates that volumes passing through three previous areas of concern (being Bromelton Street / McKee St, Kerry Road south of the Ring Road, and Beaudesert-Nerang Road east of the Ring Road) have been reduced to a point where good design of intersections and restraints on frontage access could be sufficient. The one remaining problem, however, is still the excessive volume on Mt Lindesay Highway at Waters Creek. While a 2-lane arterial could carry up to 30,000 vpd, if its bounding intersections are efficiently designed to provide priority to the main road, this is not the case here (where both intersections will have 4 approaches and will need a minimum of 4 signal phases).

Test Network 3

This final network (as shown in **Figure 5.7**) adds a new north-south road, parallel with the critical section of Mt Lindesay Highway. This is achieved by a further extension of Tina Street, as a 70kph urban collector, from the Ring Road to Gould Hill Road (along with a new local access connection).

The forecast changes in daily volumes are shown in **Figure 5.7a.** This indicates that the extension would attract a veritable 7,400 vpd but, due to secondary shifts (from Bromelton House Road), the reduction on Mt Lindesay Highway is only 3,600 vpd.

As can be seen in **Figure 5.7b,** the critical section of Mt Lindesay Highway would still need to carry just over 20,000 vpd. This is now down to a level, where the bounding intersections could reasonably be designed to provide an adequate level of service.

5.3 The Ultimate Network

The previous network tests have confirmed that some significant road infrastructure will need to be implemented by the State, in the long-term, if Beaudesert Township is to be protected from the large amounts of extraneous traffic that will be attracted to and generated by the Bromelton industrial area. Without this augmentation of the 'strategic' network, attempts to address traffic problems within the town will be futile.

The additions and improvements to the road network that are expected to be needed in and around Beaudesert in the long-term are shown in **Figure 5-8** and summarised in the following table.

Table 5.1: Trunk Road Enhancements Needed in the Long Term (2051)

Ref.	Road Segment	Intended Standard	By[1]
A-B	Mt Lindesay Highway	Upgrade to 4-lane Rural Arterial	M
B-C	Bromelton North Access	New 2-lane Highway	M
C-D	Brookland Road	Upgrade to 4-lane Rural Arterial	M
D-E	Brookland Road Extension	New 4-lane Rural Arterial	M
E-F	Outer Bypass (North)	New 2-lane Highway	M
F-G	Outer Bypass (South)	New 2-lane Highway	M
E-H	Bromelton Connector	New 4-lane Urban Sub-arterial	M
J-C	Brookland Road	Upgrade to 2-lane Rural Sub-arterial	C
K-L	Fields Road	Upgrade to 2-lane Urban Collector	C
M-N	Gould Hill Road	Upgrade to 2-lane Rural Collector	C
N-O	Flagstone Creek Road	Upgrade to 2-lane Rural Collector	C
M-P	Tina Street Extension (Pt.2)	New 2-lane Urban Collector	C
Q-R	Ring Road (South)	New 2-lane Urban Sub-arterial	C
R-S	Cryna Road	Upgrade to 2-lane Urban Collector	C
T-U	Brolga Road	Upgrade to 2-lane Urban Collector	C
U-V	Kerry Road	Upgrade to 2-lane Urban Sub-arterial[2]	C
W	Local Streets	New 2-lane Access Streets	D

Notes: 1. C=Council, M=Main Roads, D=Developers
2. This segment needed to be upgraded to Collector by 2031. Build final standard from the start?

As was the case for 2031, a number of intersections in and around the township are also likely to also need upgrading (most likely signalisation) in the longer term. Again, the intersection of Brisbane Street and William Street is of specific concern and has been assessed, when operating under the forecast demands if the 'do minimum' network was effected.

Table 5.2: Performance of Brisbane Street / William Street Intersection

Year / Scenario	AM Peak		Post-School		PM Peak	
	DoS[1]	Max.Q[2]	DoS	Max.Q	DoS	Max.Q
2011 'Observed'	0.65	90m	0.68	80m	0.63	75m
2031 'Anticipated'	1.20	440m	1.20	545m	1.11	441m
2051 'Do Minimum'	1.40	626m	1.34	748m	1.29	616m

Notes: 1. Degree of Saturation
2. 95 percentile queue length; maximum of all approaches

The above indicates that operating conditions, which would be unacceptable at 2031, would have deteriorated much further; to the point where a solution would be imperative. VLC recommend investigation of a possible CBD southern bypass.

6.0 Assessments of the Region's Road Usage

6.1 Introduction

Most of the Transport Infrastructure Charges Plans, which VLC have assisted local governments to prepare, have had their 'schedule of charges' based on the premise that developments should be charged in proportion with the value of road space that they consume. The effect of this is that a 'transport inefficient' development (located in remote locations or on the 'fringe' of an urban area) is charged more than an equivalent development located in a place where its travel interactions are more efficiently achieved (through shorter average trip lengths and higher walk/cycle/PT mode shares, etc).

VLC have reservations that differential charges are appropriate within Beaudesert Township as, at this point in time, the location of many of the major trip attractors (e.g. schools, local shopping centres) are still uncertain. As a result, the model's forecasts of road space consumption (for differing areas within the town) would be dependent, to some extent, on these assumptions.

VLC have, nevertheless, produced estimates of 'values of road space consumed' for differing parts of Scenic Rim, using the 2031 model and the 'anticipated' network, as summarised in the following sections.

6.2 'Ownership' of the Road Network

A pre-requisite step to assigning a value to each model road link (within Scenic Rim), was to identify the 'owner' of the road. It should be noted that this 'ownership' more strictly relates to who 'funded' the road's construction. This differentiation is necessary, as Council can only recover costs related to its trunk infrastructure network. Roads and streets constructed by developers (at their own cost, without receiving a 'contributions credit') should not be included in the trunk infrastructure. Similarly, State roads or State roads that may be 'demained' and handed to Council should also be excluded from the computations.

All modelled road links, throughout the Region, were assigned one of five 'ownership' categories as shown in the following figures:

- **Figure 6.1a:** Road Ownership Classifications – Beaudesert Township
- **Figure 6.1b:** Road Ownership Classifications – Former Boonah Shire
- **Figure 6.1c:** Road Ownership Classifications – Former Beaudesert Shire

6.3 Valuation of the Road Network

A value (2014 dollars) was assigned to every road segment in Council's trunk road network, as defined above, using a set of unit rates (by road type and cross section) that had been produced for Council by Davis Langdon in 2014. An extract from their report is reproduced in **Figure 6.2**.

Except for the proposed sub-arterials (the Ring Road and Kerry Road), the capital cost of the proposed upgrades and additions to the Council trunk network were estimated using the 'greenfield' rates shown in the extracted page. The sub-arterials were valued at $4,250/m (13% higher than the trunk collectors), as these will have higher intersection costs than a collector. Projects that involved new roads (e.g. the Ring Road and Tina Street extension) had their underlying road reserves valued at $70/m^2. Upgraded roads did not have any underlying land value included.

All existing trunk roads were valued using the 'brownfield' rates, but with a discount applied to reflect pavement condition (i.e. a mid lifecycle value). Underlying land values were not incorporated for these existing trunk roads, either.

Similar valuation methods and parameters were used for estimating the values of DTMR roads, Council's non-trunk network, and the streets expected to be established by developers entirely at their own cost. It should be noted that usage of all/any of these 3 categories of roads/streets is not considered when setting the transport infrastructure charges. Assessments of the usage of these categories of roads/street has been included only to 'complete the picture' and enable understanding of road space utilization throughout the Region.

Based on these parameters, the differing improvement projects anticipated on the Scenic Rim trunk road network by 2031 were valued as follows:

Table 6.1: Summary of Trunk Road Improvement Valuations

Ref	Road Name	Standard	Length	Gr/Br	Rate/m	Value($m)
1.	Allan Creek Rd	Rural Collector	1,175 m	Br	$1,230	$1.45
2.	Bromelton House Rd	Rural Collector	5,375m	Br	$1,230	$6.61
3.	New collector, Gleneagle	Urban Collector	1,942m	Gr	$3,760	$9.75(1)
4.	Carrigan Way Extension	Urban Collector	219m	Gr	$3,760	$1.10(1)
5.	Fields Road	Urban Collector	860m	Br	$3,730	$3.21
6a	Gould Hill Road (existing)	Urban Collector	708m	Br	$3,730	$2.64
6b	Gould Hill Road (new)	Urban Collector	460m	Gr	$3,760	$2.31(1)
7.	North-east Ring Road	Urban Subarterial	4,228m	Gr	$4,250	$24.48(2)
8.	South-east Ring Road	Urban Subarterial	1,614m	Gr	$4,250	$9.35(2)
9.	Tina Street Extension	Urban Collector	1,542m	Gr	$3,760	$7.74(1)
10.	Tina Street	Urban Collector	841m	Br	$2,310	$1.94(3)
11.	Tubber Street	Urban Collector	1,557m	Br	$2,310	$3.60(3)
12.	Brisbane Street	Urban Subarterial	1,005m	Br	$3,730	$3.75(3)
13.	Kerry Rd (west of Brolga)	Urban Subarterial	1,931m	Br	$4,250	$8.21
14.	Kerry Rd (east of Brolga)	Urban Collector	1,203m	Br	$3,730	$4.49
15.	Cryna Rd	Urban Collector	1,109m	Br	$3,730	$4.14
16.	Finch Road (Canungra)	Urban Collector	533m	Br	$3,730	$1.99
	TOTAL	-	-	-	-	**$96.76**

Notes: 1. also includes 18m road reserve @ $70/m^2
2. also includes 22m road reserve @ $70/m^2
3. value on completion. The upgrade will cost less (signs, markings, intersections, lighting, etc)

The full ('as modelled') road network within Scenic Rim was valued as follows:

Table 6.2: Summary of 'As Modelled' Road Network Valuation

Road Owner / Component	Value($m)	
SRRC - Trunk Roads (Added/Improved)	$96.76	
SRRC - Trunk Roads (Existing/Unimproved)	$353.09	
Sub-total (SRRC – Trunk Roads)		$449.85
SRRC - Non-Trunk Roads		$357.76
DTMR	$972.87	
DTMR (potentially 'demained')	$4.87	
Sub-total (DTMR Roads)		$977.74
Developer Implemented		$89.29
TOTAL		$1,874.65

6.4 Road Network Usage

Using a proprietary 'assignment' technique, VLC's Zenith software can record the origin and the destination of every vehicular trip that is forecast to use each and every link in the model network. For any given link, the portion of its total capacity (and value) that is 'consumed' by traffic can be apportioned to the forecast users (half to the trip origin, half

to the trip destination). It is then possible, by aggregating this data, to estimate the value of road space consumed by differing areas or 'sectors'.

Such an analysis of the 'consumption' of the Scenic Rim road network, in 2031, is presented in **Figure 6.3.** This figure presents the 'consumption' in 2 ways:

- *Table 6.3a:* This presents the 'total value of road space' in each classification that is consumed by trips generated or attracted by differing areas within Scenic Rim. It can be noted that, overall, only around 20% of the network (in value terms) would be utilized and that a significant proportion is 'consumed' by trips to/from external areas.
- *Table 6.3b:* This presents the proportion of vehicular travel undertaken on the differing road types, by each sector. It can be noted that a significant proportion of travel, for areas outside of Beaudesert Township, is undertaken on State Controlled Roads. NB. The VLC model will be under-estimating usage of local roads in the rural areas. This is because vehicular trips within any model zone do not get loaded on to the model network. These intra-zonal trips are proportionally higher in the large rural zones.

Further processing of this valuation data is provided in **Figure 6.4,** as follows:

- *Table 6.4a:* This table presents the value of road space consumed by an average vehicular trip originating or ending in each sector (= the total road valuations in Table 6.3a, divided by the total vehicular trip-ends generated by each sector in 2031, which are shown in Table 6.4b). The unit values listed for 'SR Trunk' could be used, with or without adjustment, as the 'infrastructure charge' per trip-end for future development.
- *Table 6.4b:* This presents the potential maximum revenue, from each sector and in total, if :
  - Future development occurred to the extents and in the locations assumed
  - The SR Trunk 'values consumed' are adopted as the charge rates, and
  - The development approval processes capture 100% of the growth in trips generated/attracted (this is unlikely).

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September 2015

Scenic Rim Regional Council - Transport Infrastructure Review

Traffic Forecasts and Assessments

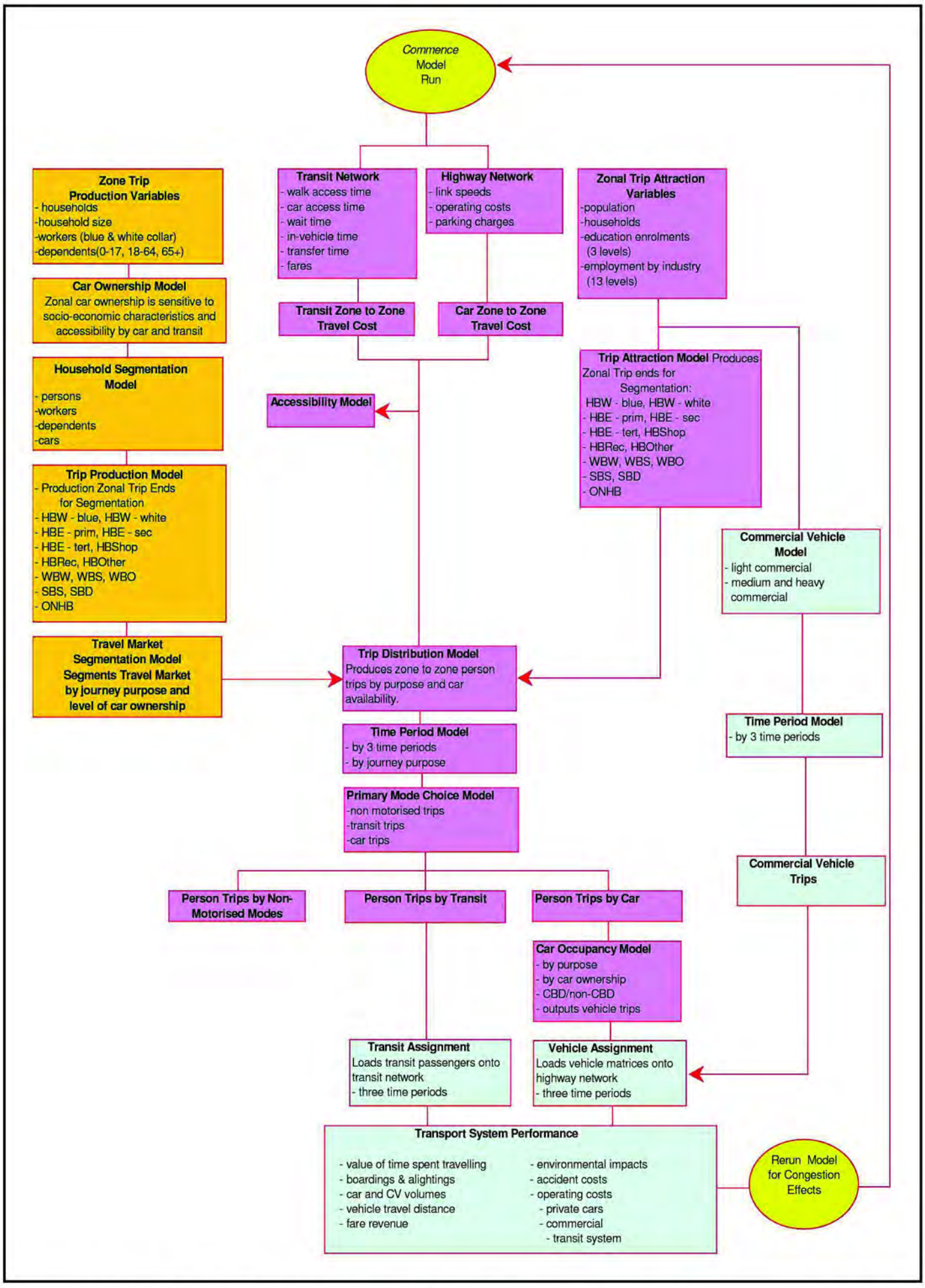
- Appendix (Figures)

Prepared for

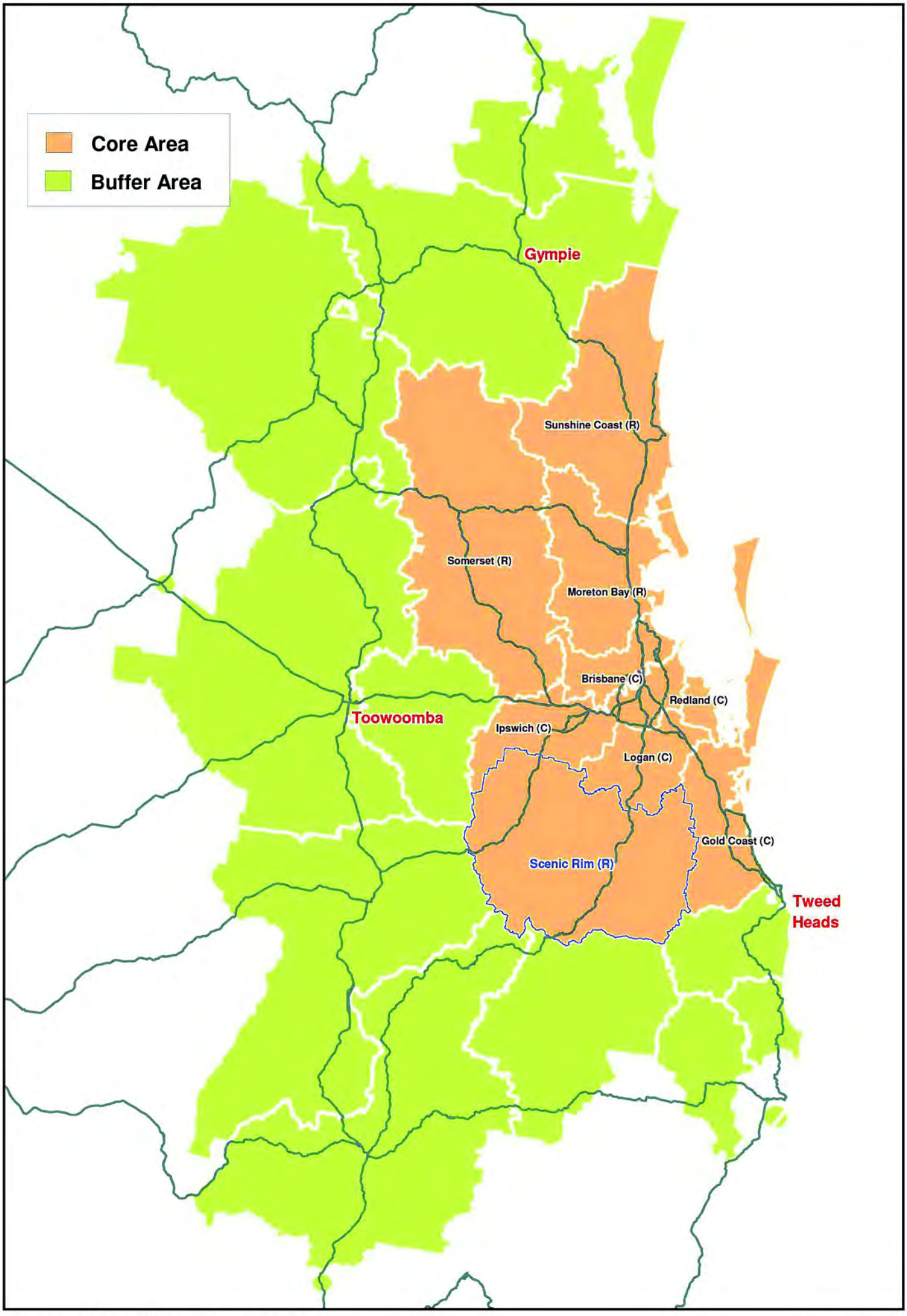
Scenic Rim Regional Council

By

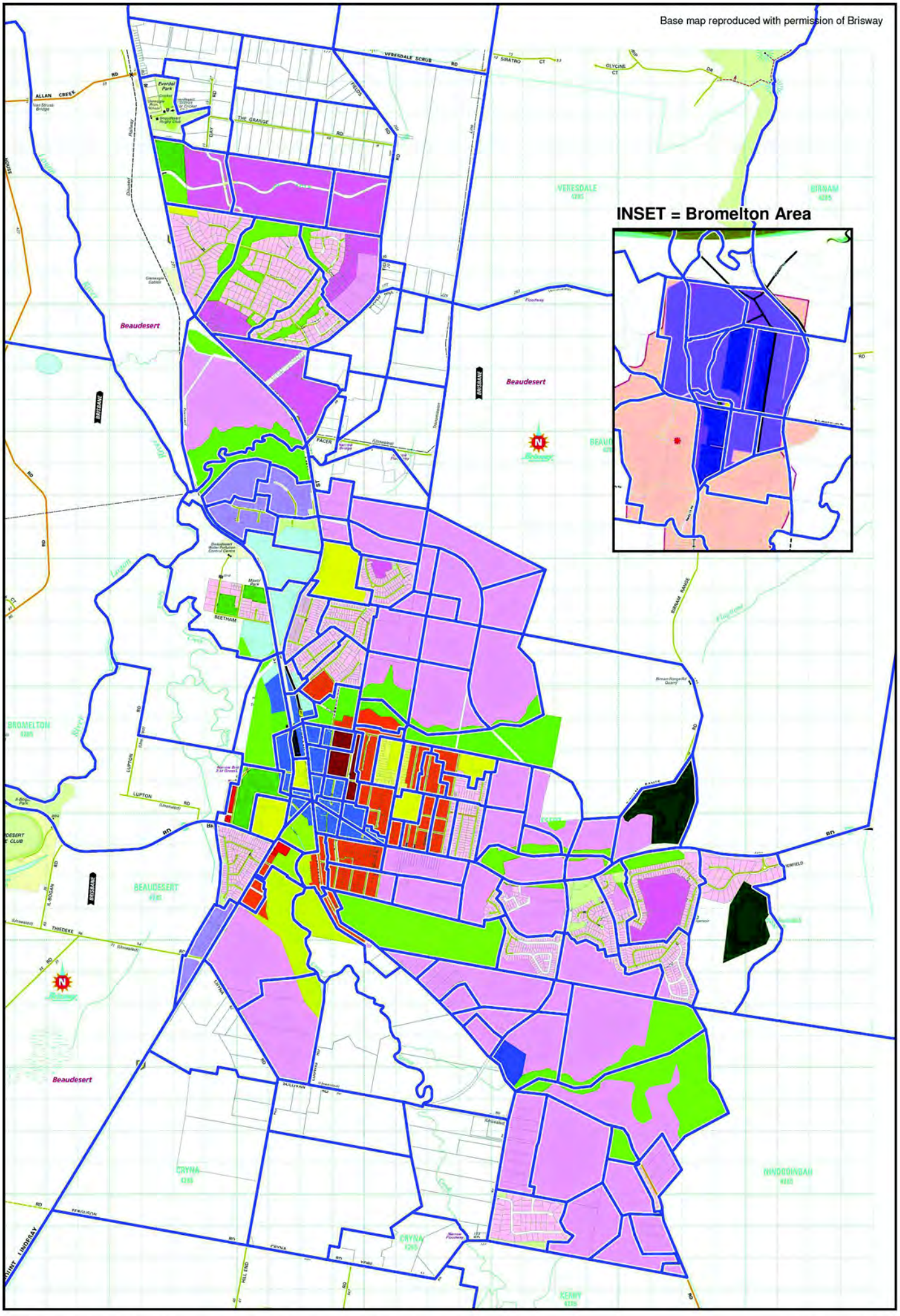
Veitch Lister Consulting Pty Ltd



Structure of the ZENITH Integrated Travel Demand Forecasting Model **Figure 2.1**

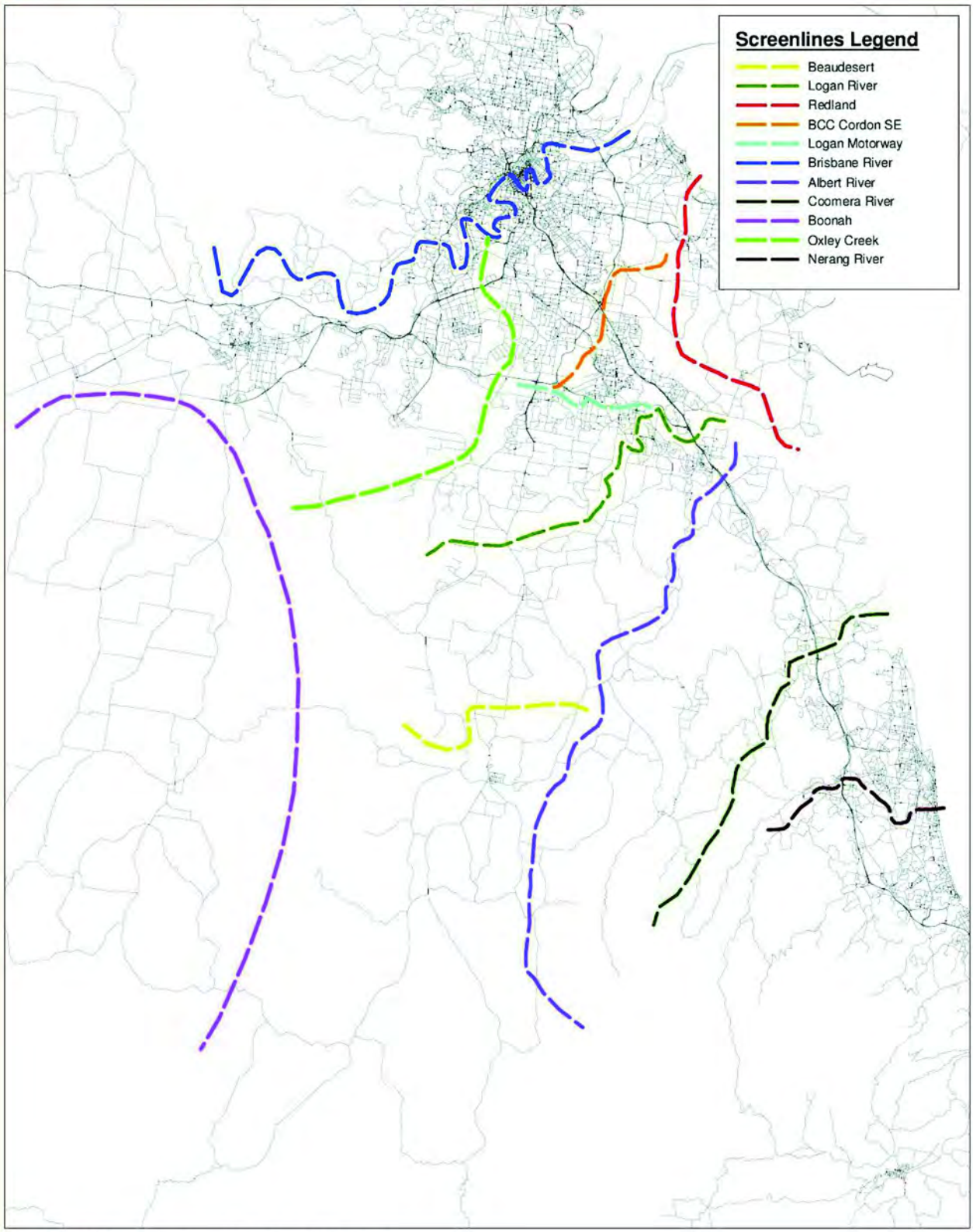


Extent of VLC's Models of SEQ **Figure 2-2**



Model Zone System used in Beaudesert Township **Figure 2-3**

Figure 2.4: VLC Screenlines in the broader region



Location of Screenlines used in Model Validation

Figure 2.5a Validation of weekday traffic volumes across Beaudesert North screenline (SL-10)

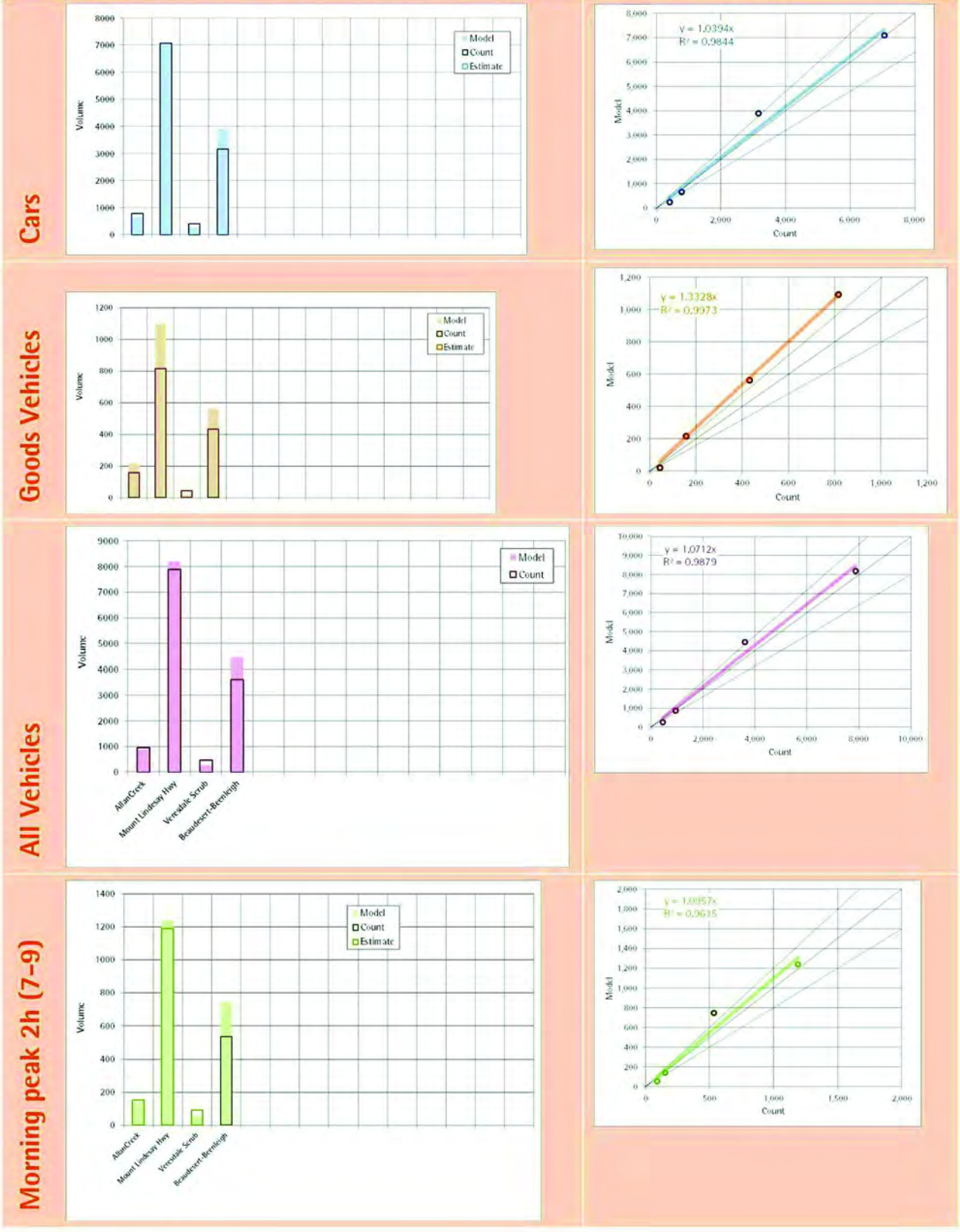
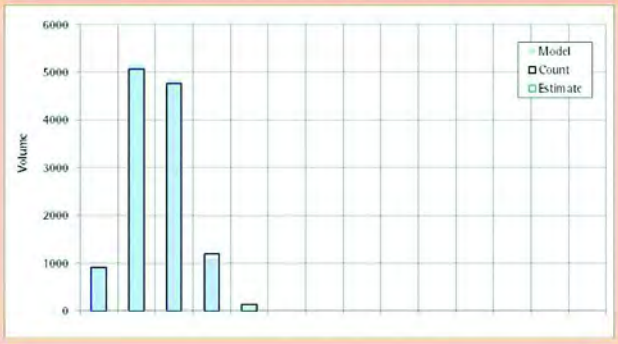
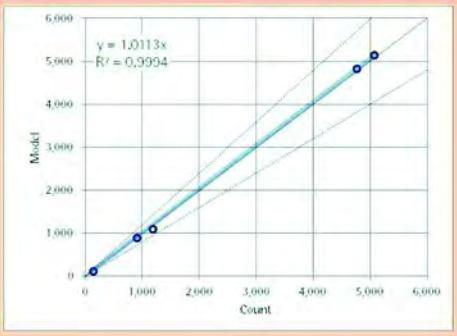


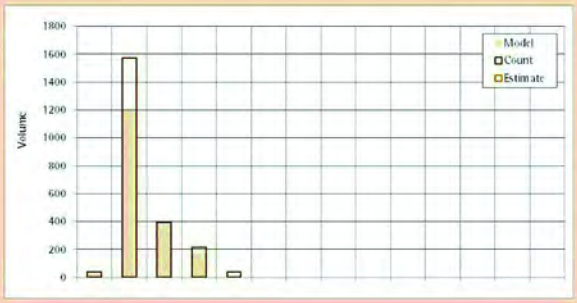
Figure 2.5b Validation of weekday traffic volumes across Boonah North screenline (SL-11)

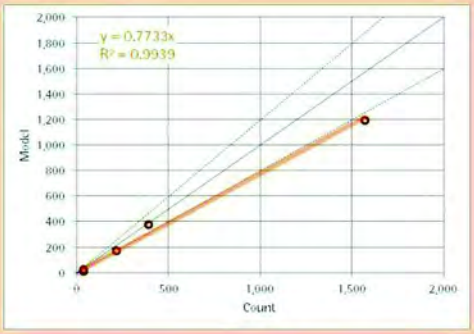
Cars



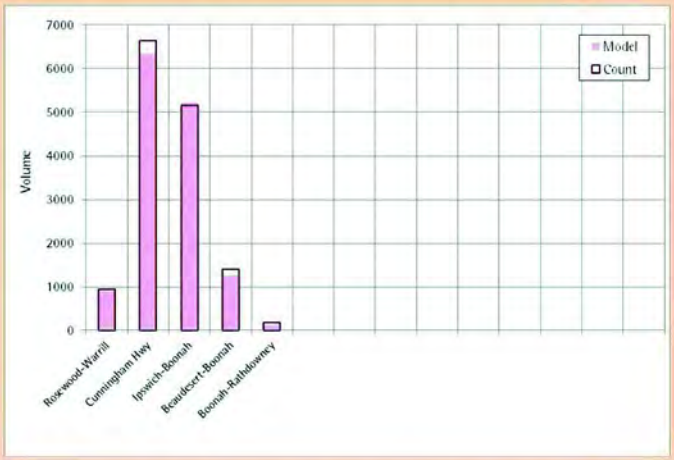


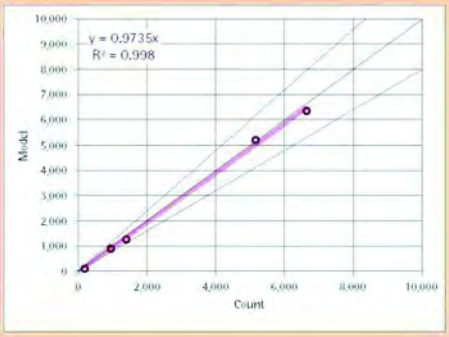
Goods Vehicles



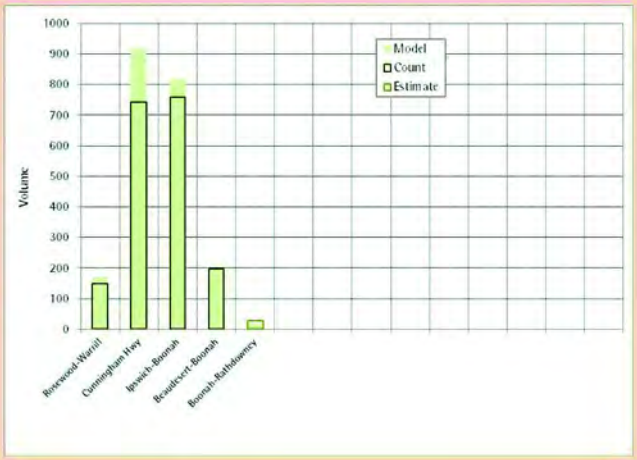


All Vehicles





Morning peak 2h (7-9)



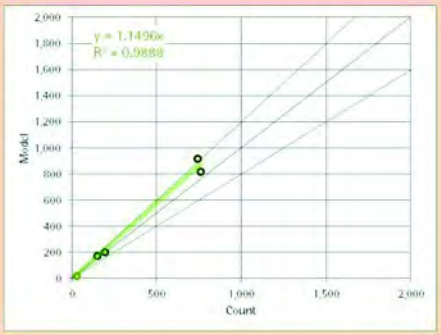
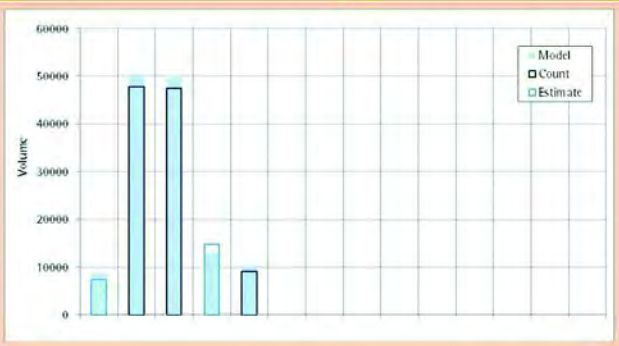


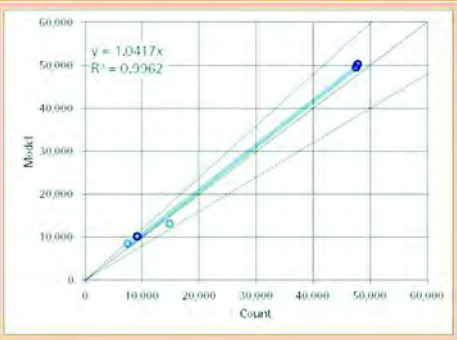
Figure 2.5c Validation of weekday traffic volumes across Logan River screenline (SL-06)

Figure 2.5d Validation of weekday traffic volumes across Albert River screenline (SL-07)

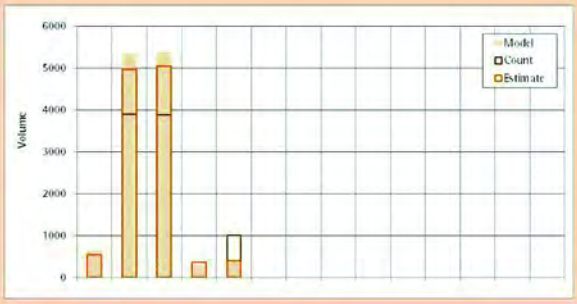
Figure 2.5e Validation of weekday traffic volumes across Coomera River screenline (SL-08)

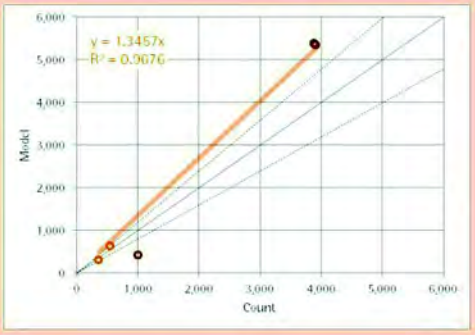
Cars



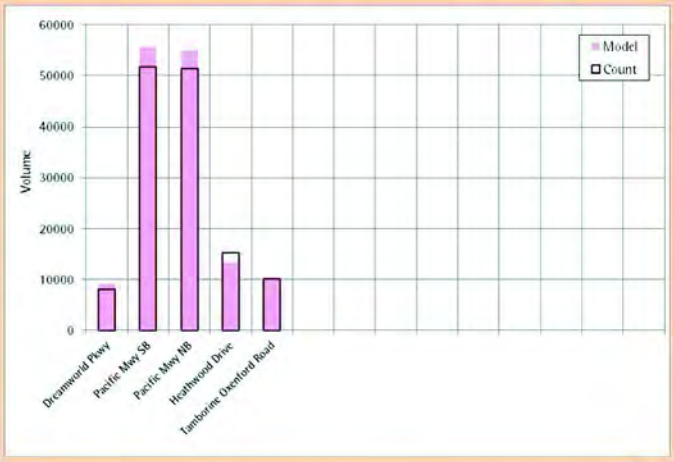


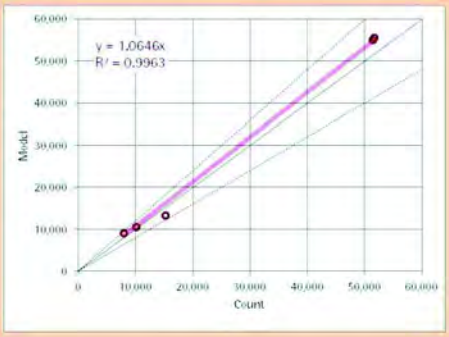
Goods Vehicles



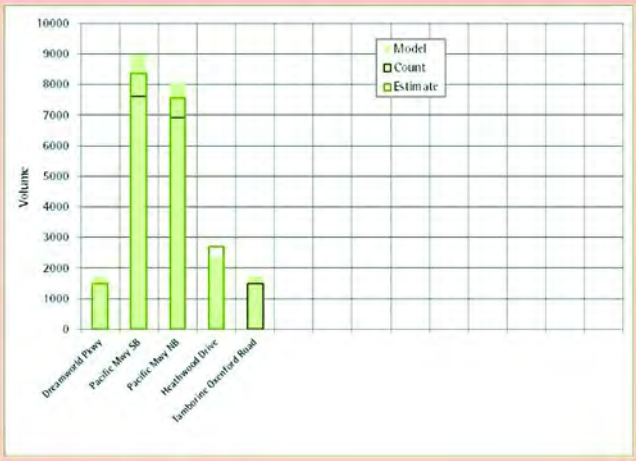


All Vehicles (7-9)





Morning peak 2h



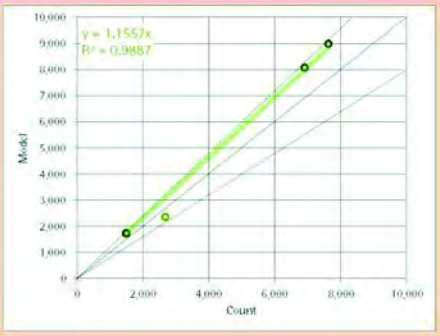
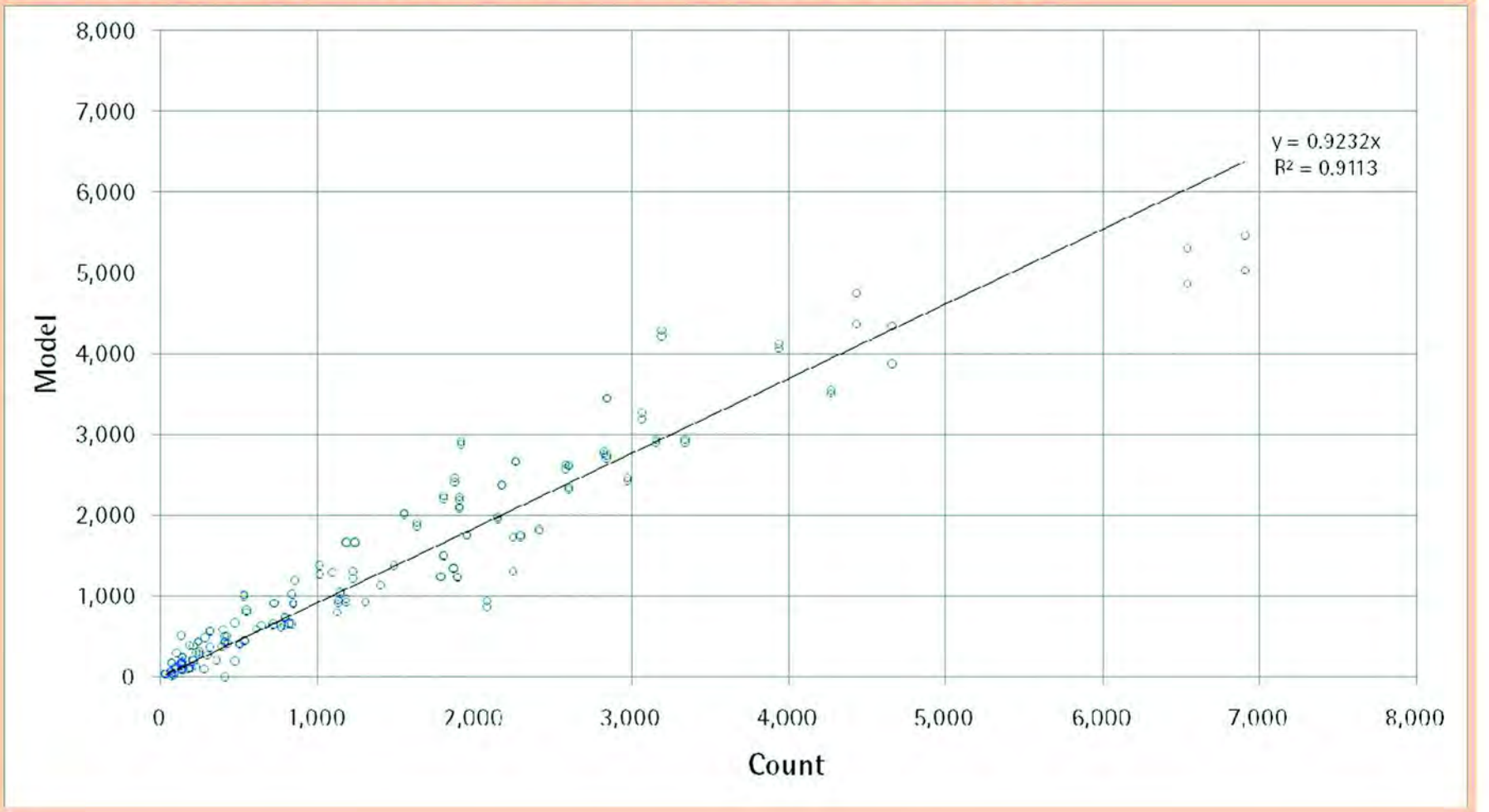
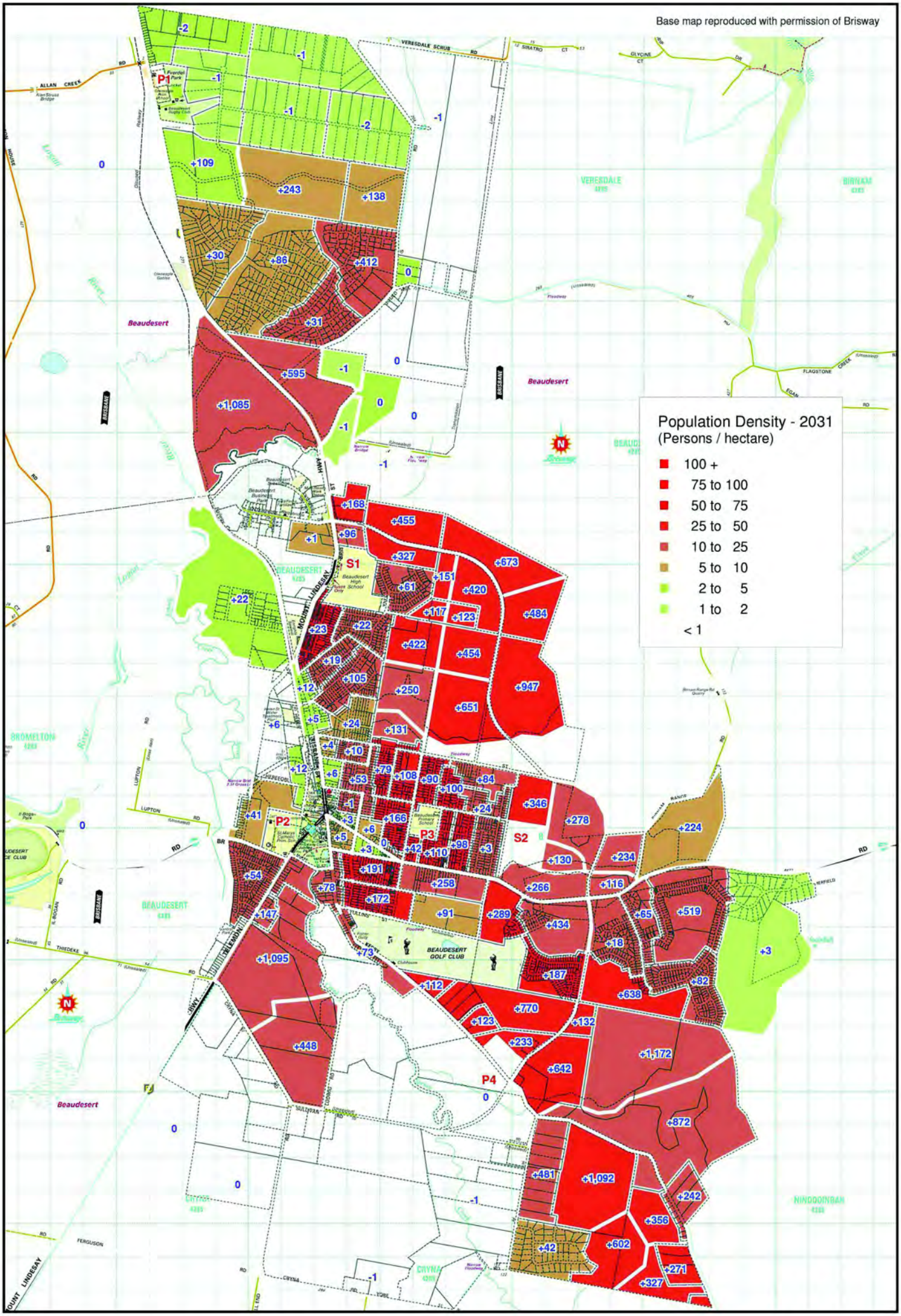
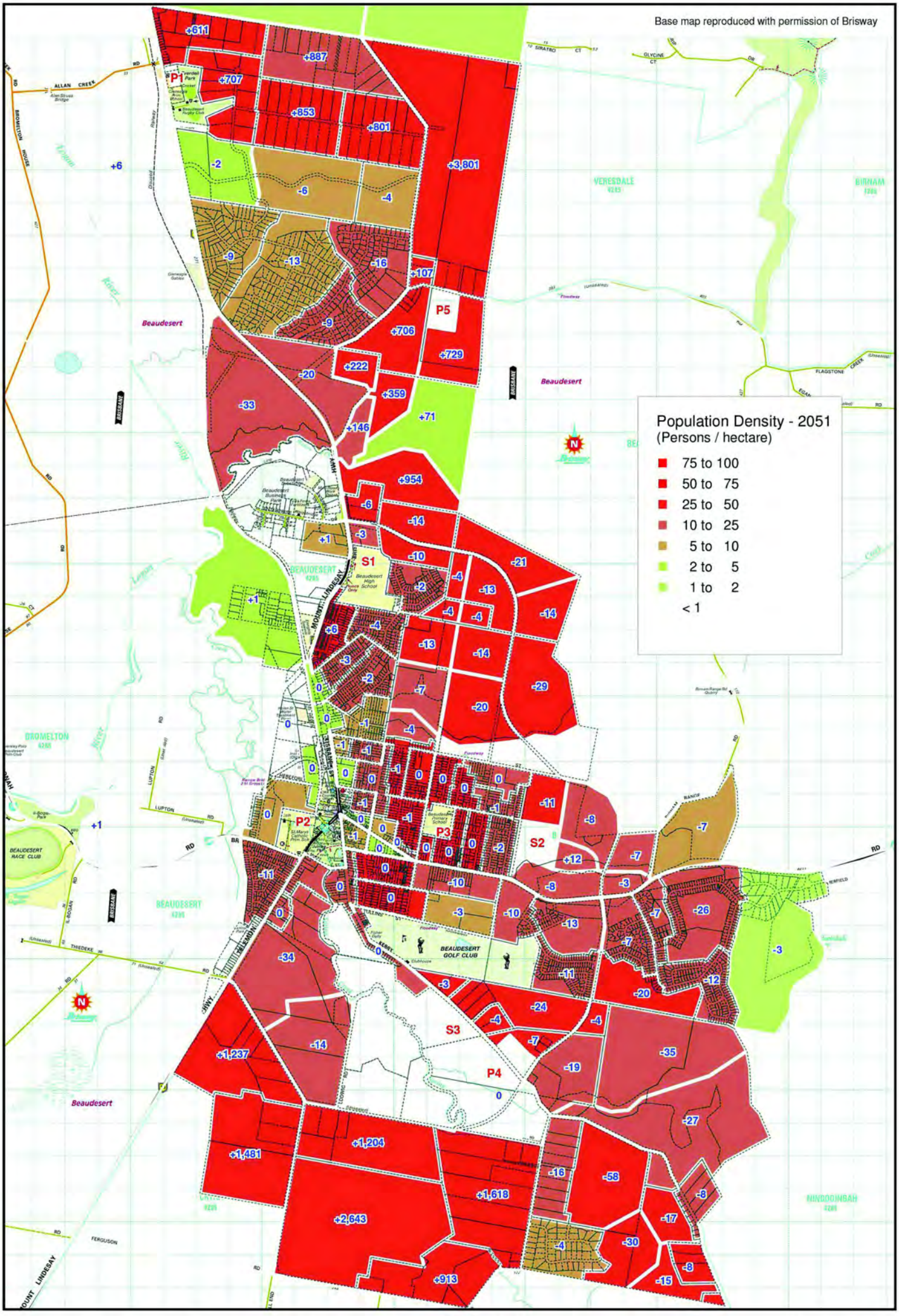


Figure 2.6 Regression Plot of Modelled and Observed Weekday Traffic Volumes (across Scenic Rim Region)





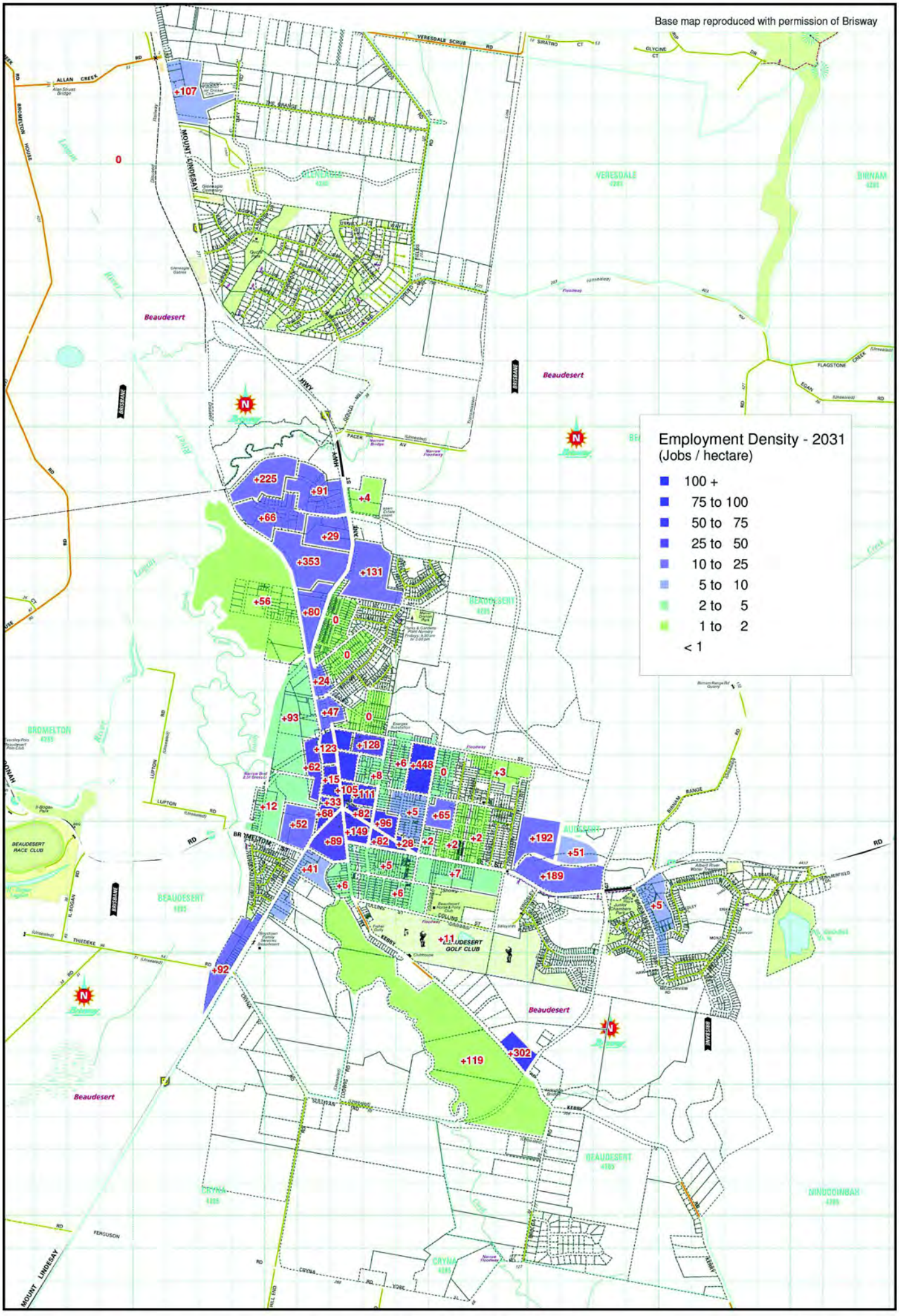
Population Growth, Beaudesert Township (2011-2031) **Figure 3.1a**



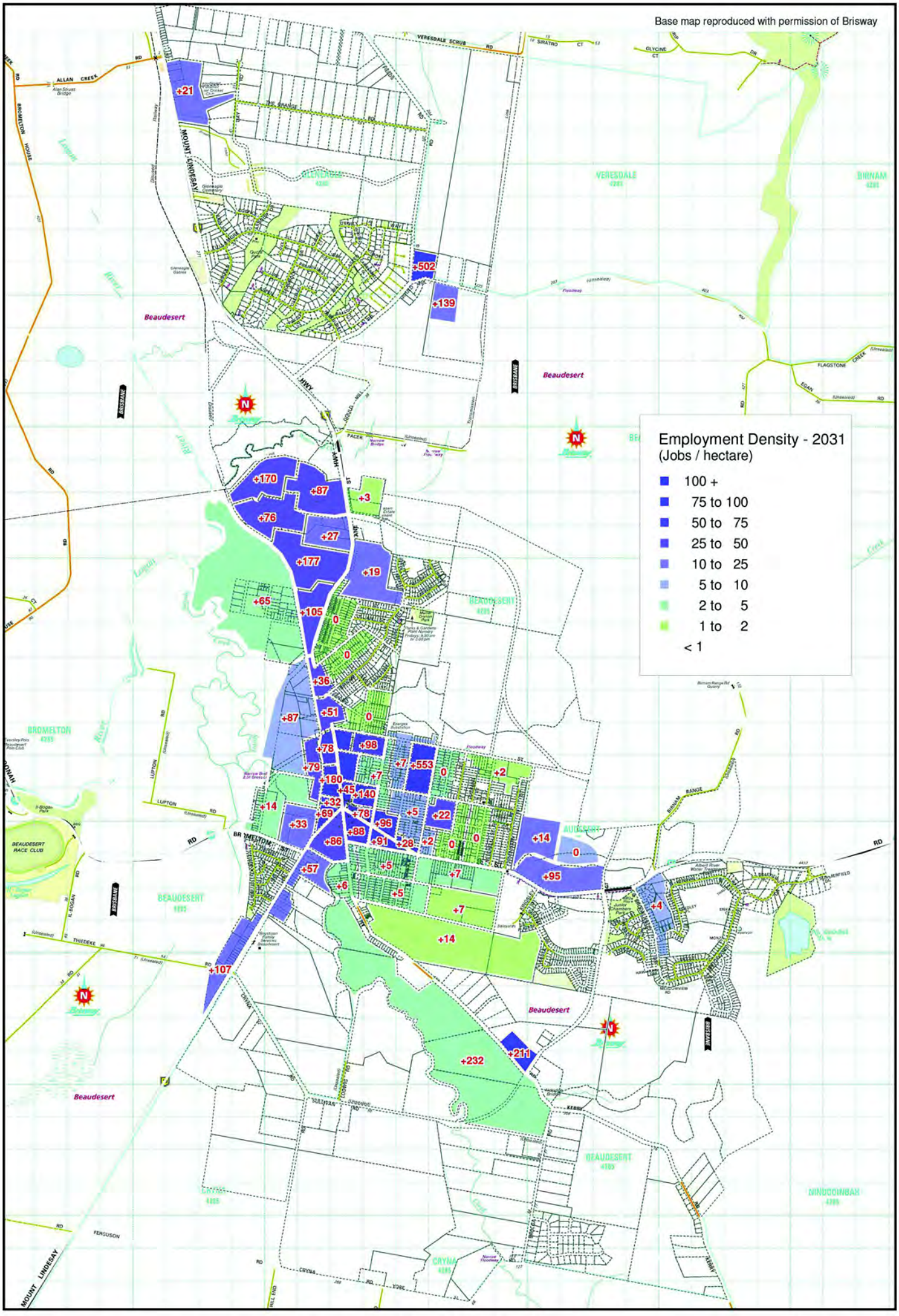
Population Growth, Beaudesert Township (2031-2051) **Figure 3.1b**

Industry Category (ANZSIC 2006)	Jobs per 1,000 pop. (in 2011)		Suggested Minimum Rates	Target Employment Levels	
	Redland City (143,000 pop.)	Beaudesert Town (7,200 pop. +5,000 rural)		2031 (31,000 pop + 5,000 rural)	2051 (50,000 pop +5,000 rural)
A. Agriculture, Forestry & Fishing	2.4	5.2	0#	0	0
B. Mining	2.2	0.0	0	0	0
C. Manufacturing	25.1	18.1	12	432	660
D. Electricity, Gas, Water & waste Services	2.4	6.9	3	108	165
E. Construction	32.6	24.8	20	720	1,100
F. Wholesale Trade	10.2	8.4	8	288	440
G. Retail Trade	45.3	40.7	42	1,512	2,310
H. Accommodation & Food Services	23.3	25.5	23	828	1,265
I. Transport, Postal & Warehousing	9.4	8.1	7	252	385
J. Information Media & Telecommunications	3.6	7.5	3	108	165
K. Financial & Insurance Services	5.0	5.2	5	180	275
L. Rental, Hiring & Real Estate Services	5.9	4.6	5	180	275
M. Professional, Scientific & Technical Services	15.2	11.3	12	432	660
N. Administrative & Support Services	10.7	6.6	7	252	385
O. Public Administration & Safety	11.9	30.6	12	432	660
P. Education & Training	27.6	34.1	25	900	1,375
Q. Health Care & Social Assistance	39.9	59.6	40	1,440	2,200
R. Arts & Recreation	3.6	6.4	4	144	220
S. Other Services	13.5	15.8	13	468	715
. Inadequately Described / Not Stated	7.2	0.0		0	0
TOTAL	**297.0**	**319.4**	241.0	**8,676**	**13,255**

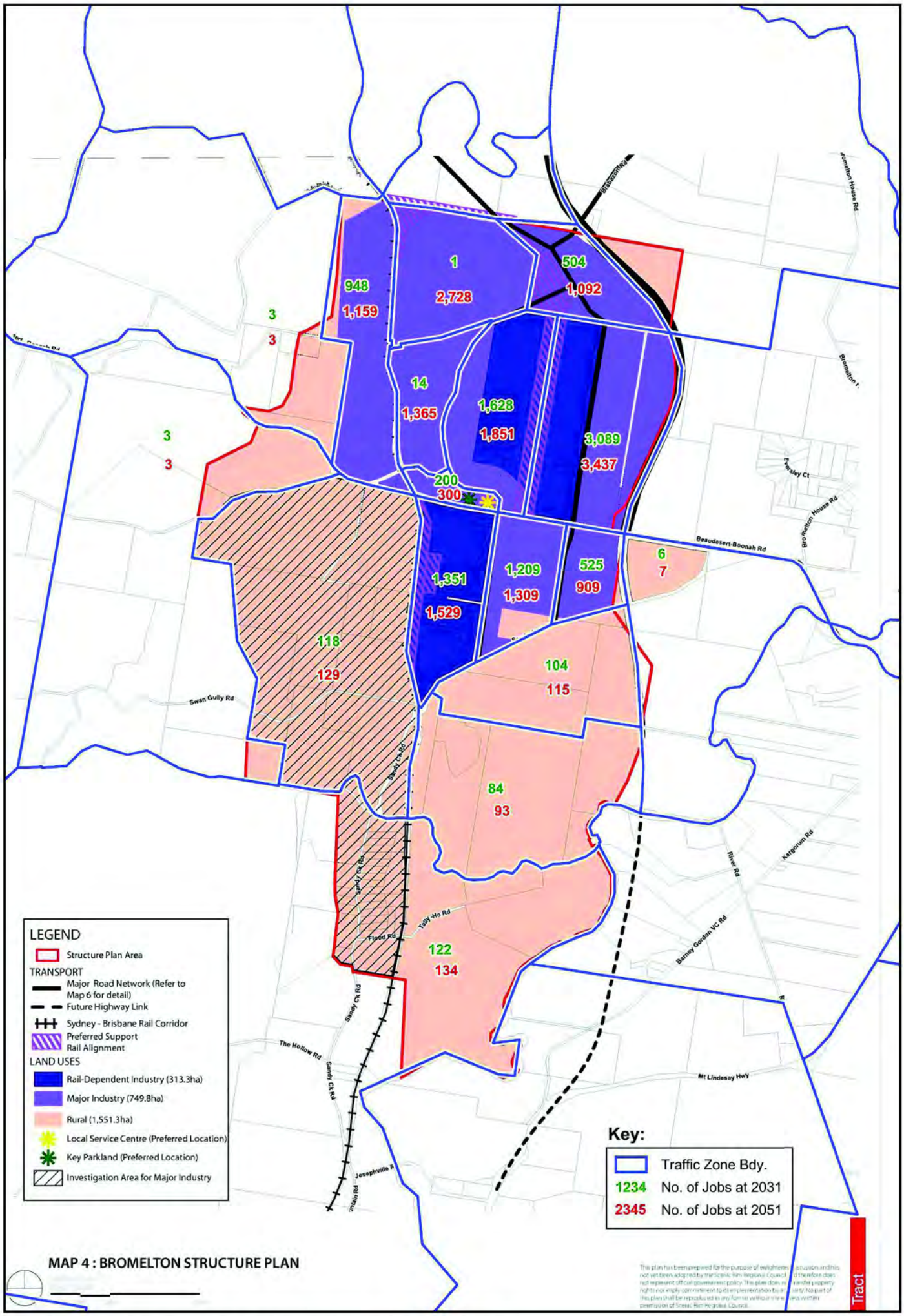
Minimum Employment Rates and Job Targets **Figure 3-2**



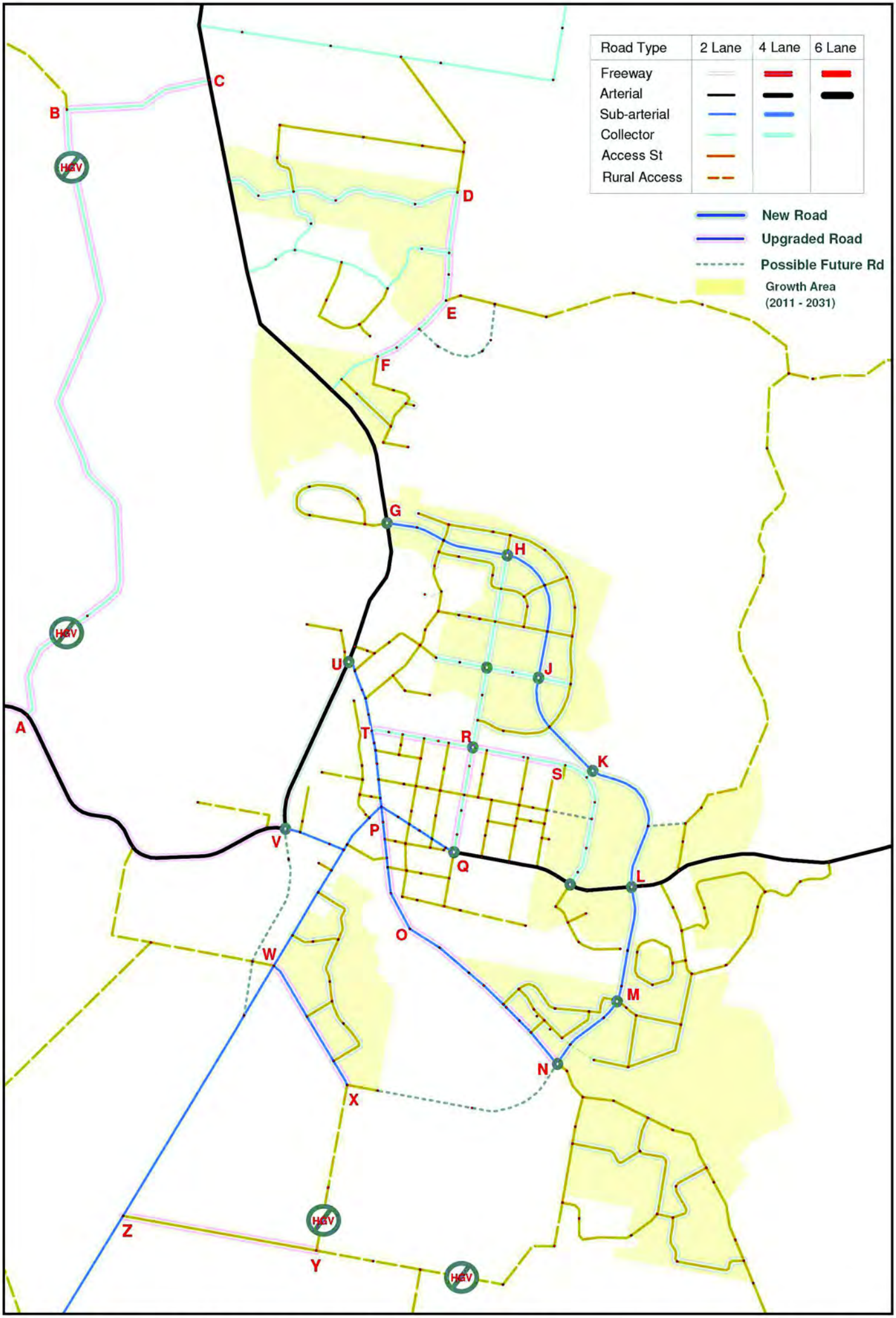
Employment Growth, Beaudesert Township (2011-2031) **Figure 3.3a**



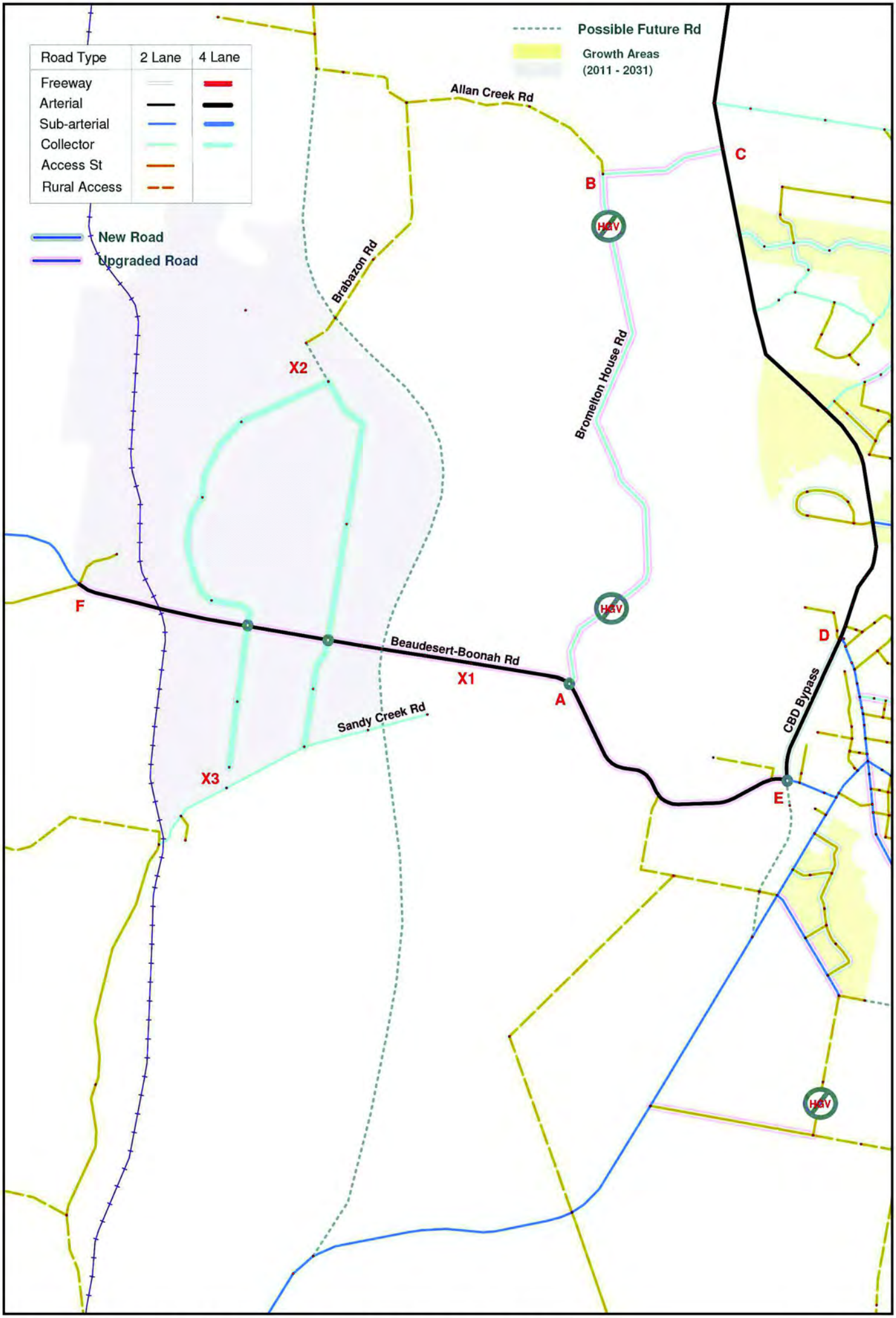
Employment Growth, Beaudesert Township (2031-2051) **Figure 3.3b**



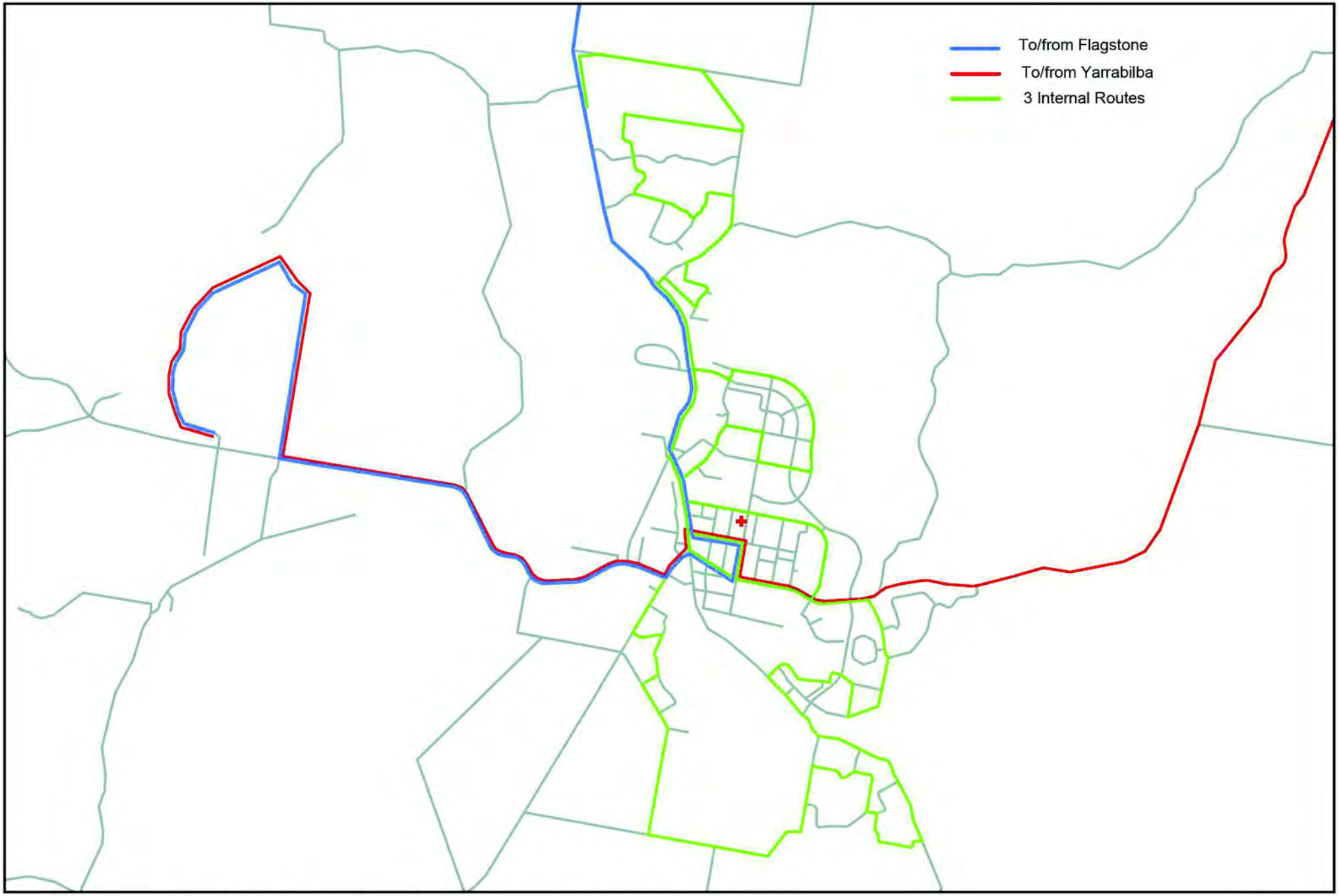
Employment Estimates at Bromelton, 2031 & 2051 **Figure 3.4**



2031 Base Network - 'As Modelled' Road Hierarchy (Beaudesert) **Figure 4-1a**

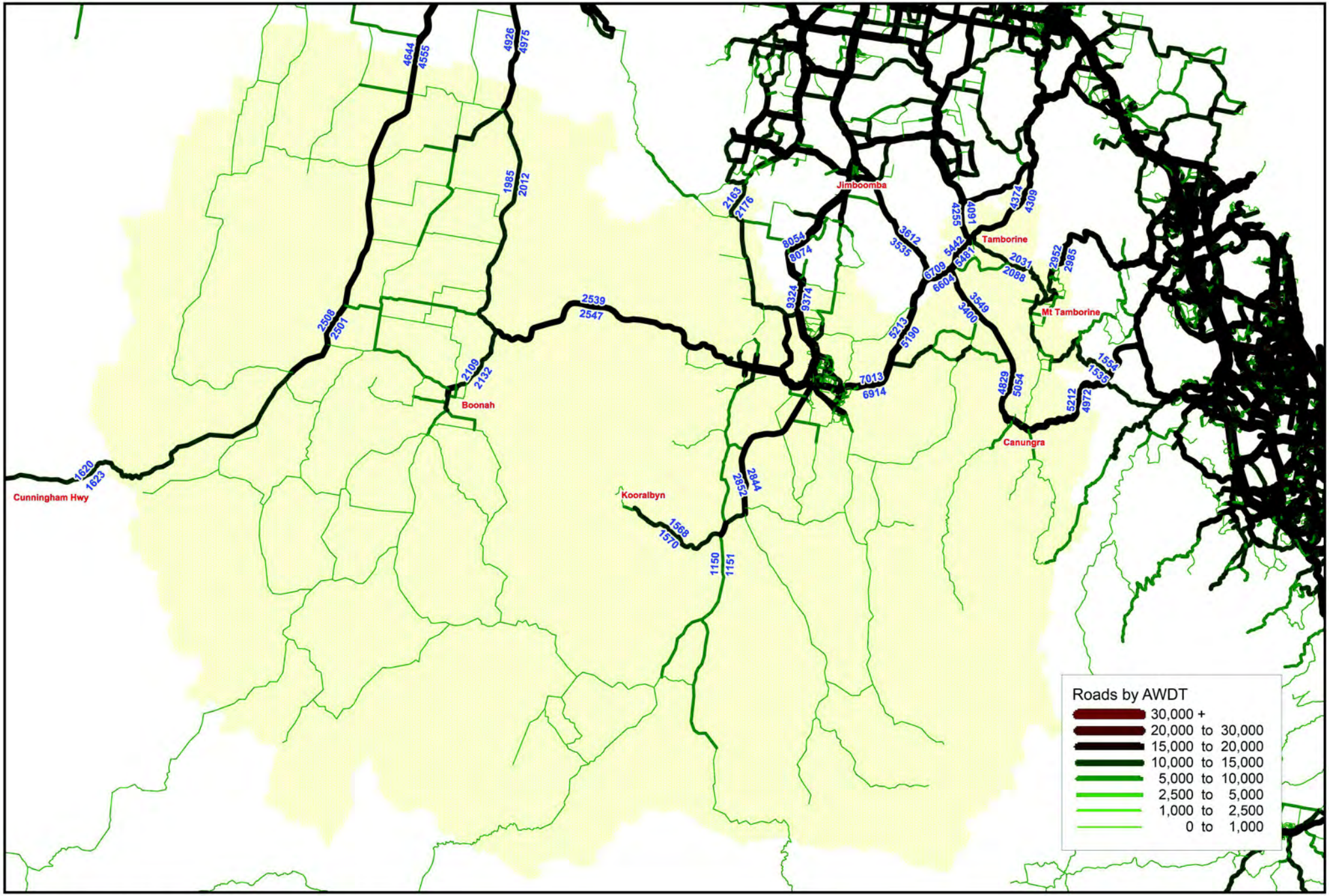


2031 Base Network - 'As Modelled' Road Hierarchy (Bromelton) **Figure 4-1b**



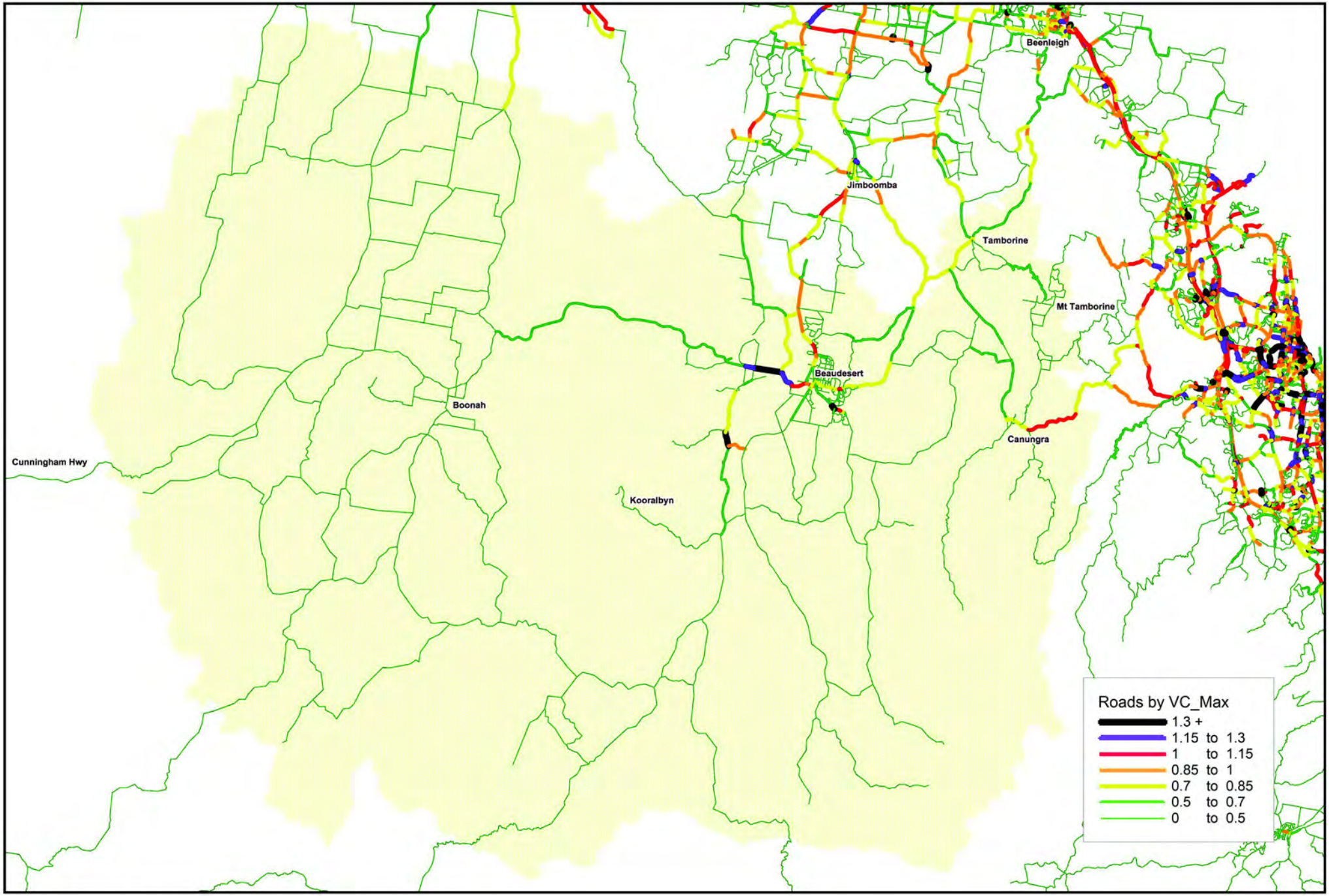
2031 Base Network - 'As Modelled' Bus Routes (Beaudesert / Bromelton)

Figure 4-2



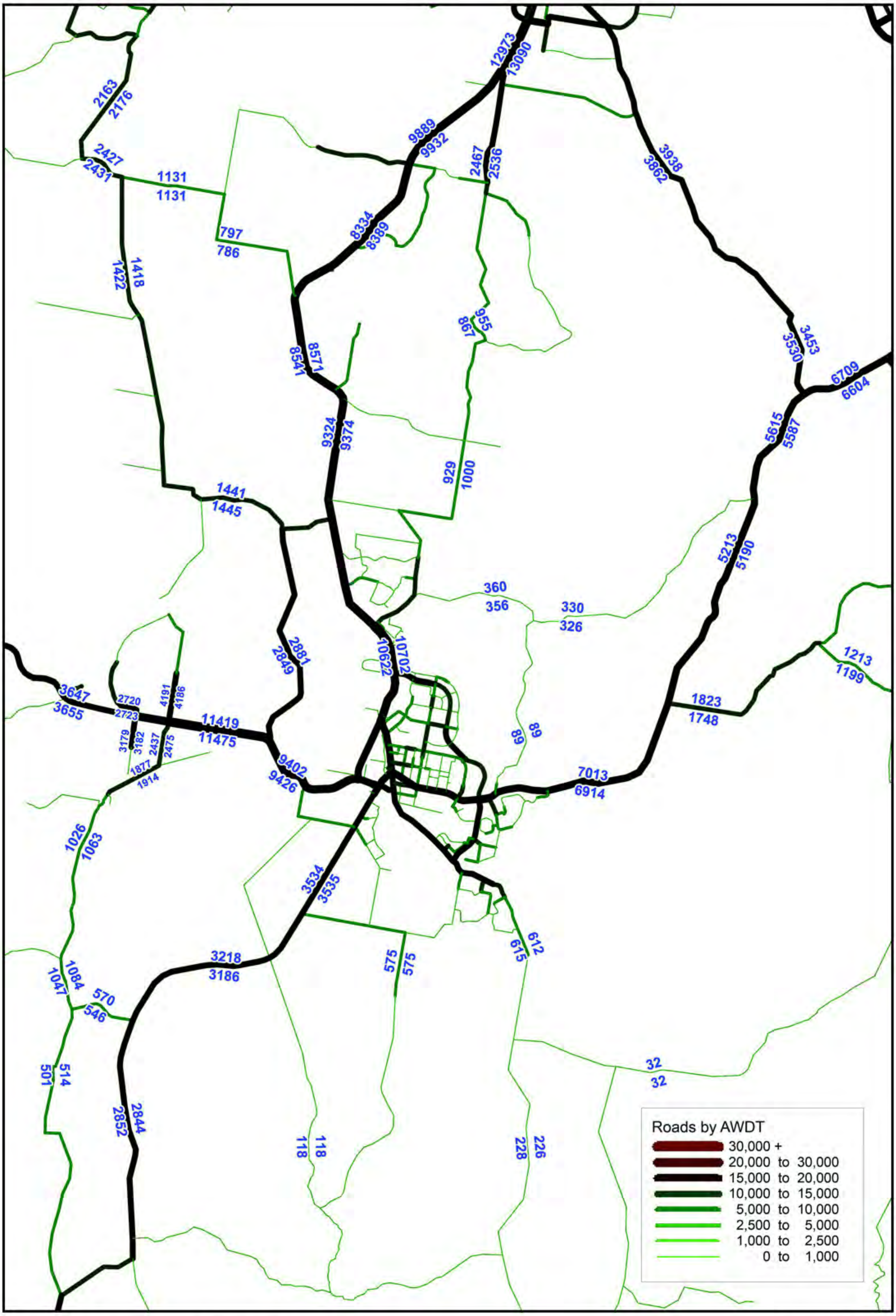
2031 Base Network - Daily Traffic Volumes

Figure 4-3a



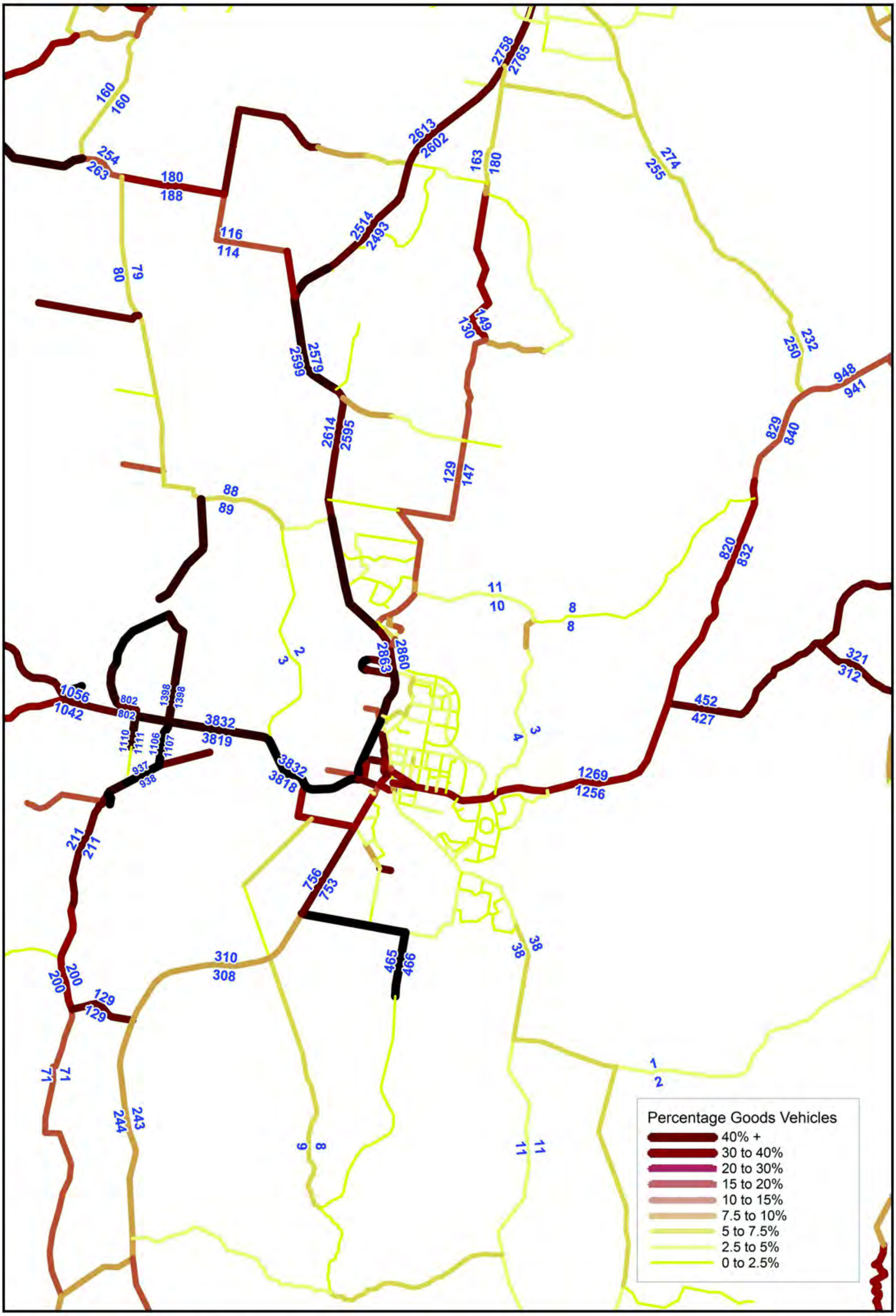
2031 Base Network - Maximum V/C Ratio

Figure 4-3b



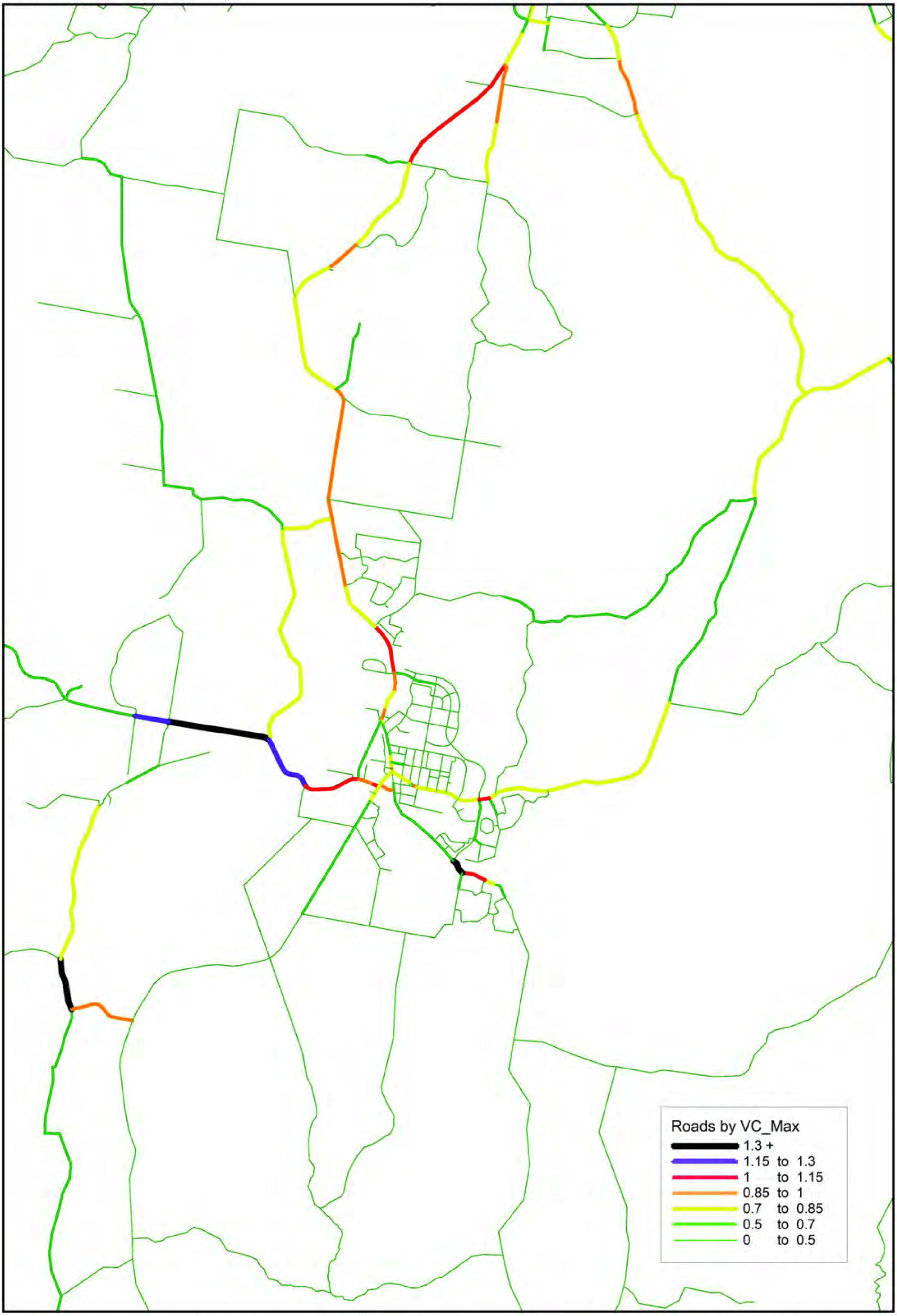
2031 Base Network - Daily Traffic Volumes

Figure 4-4a

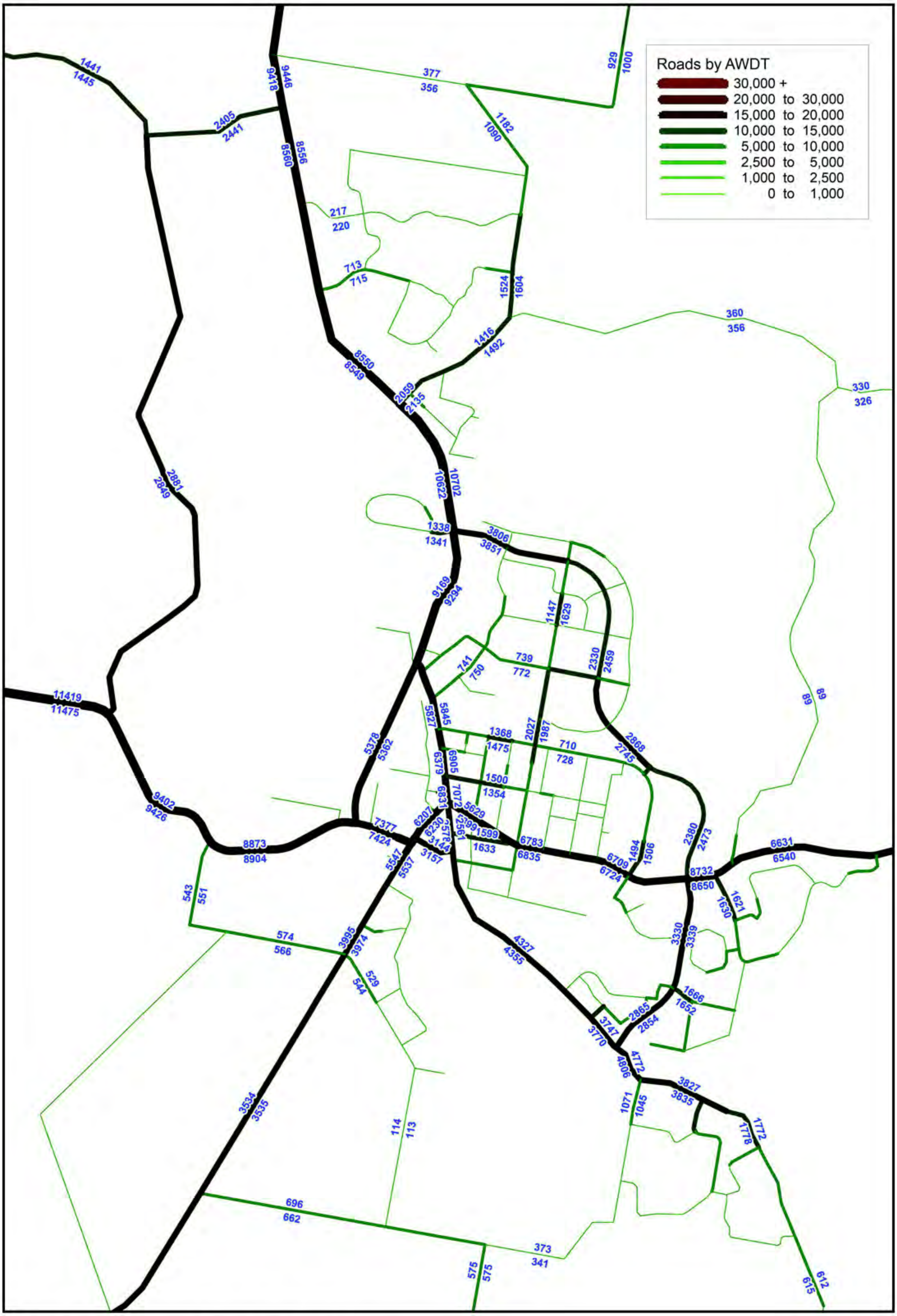


2031 Base Network - Daily Goods Vehicle Volumes

Figure 4-4b

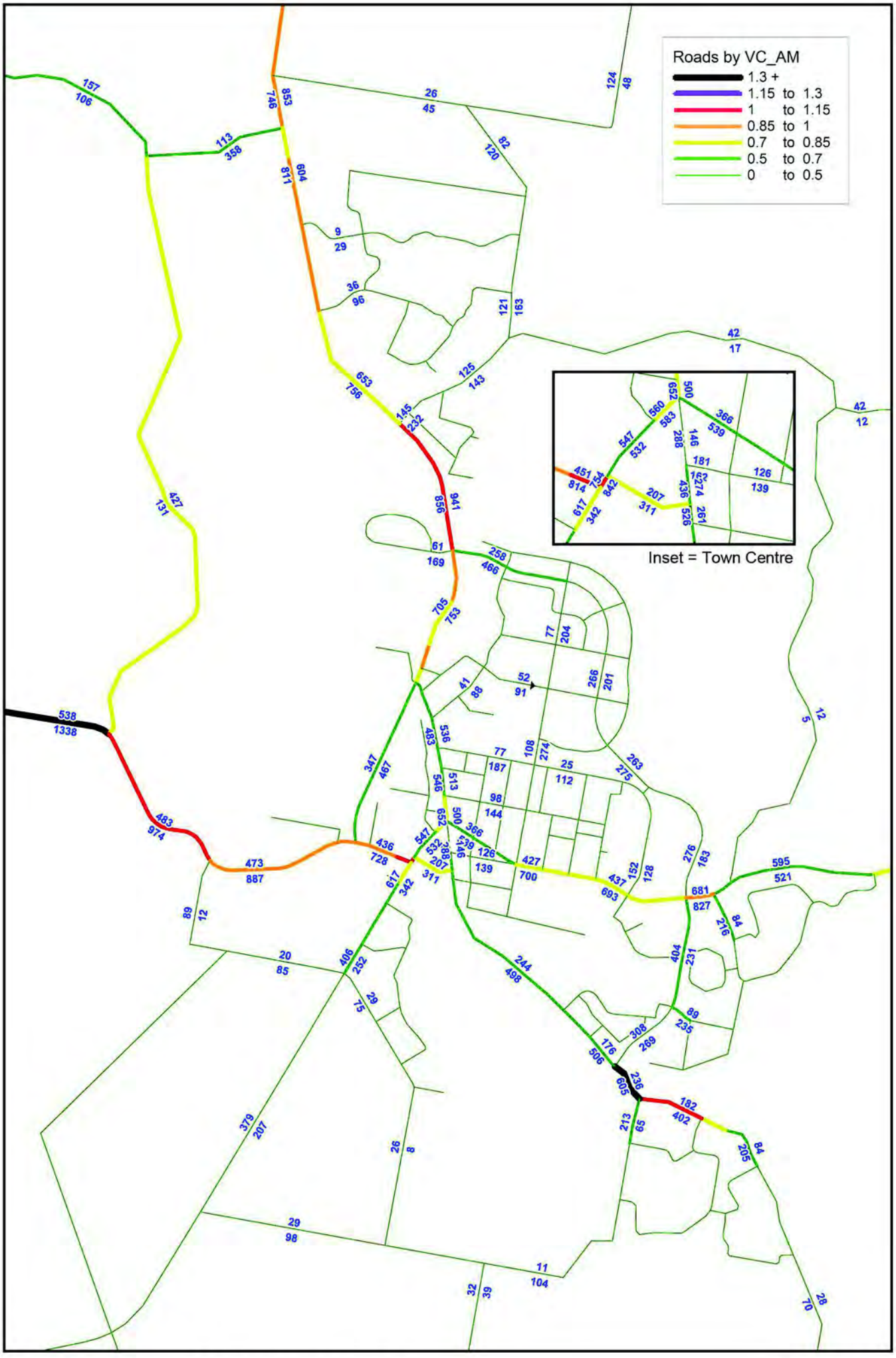


2031 Base Network - Maximum V/C Ratios **Figure 4-4c**

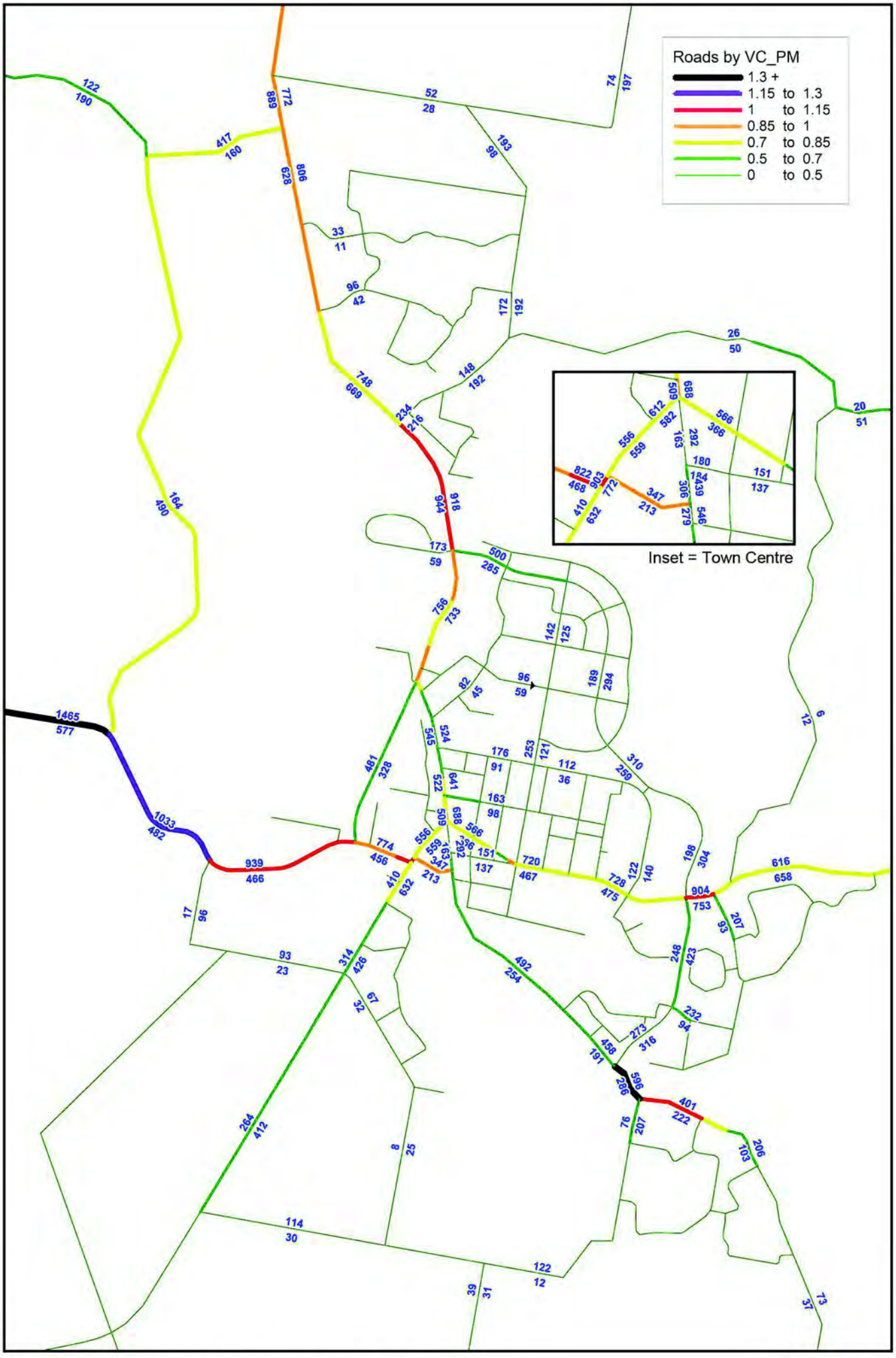


2031 Base Network - Daily Traffic Volumes

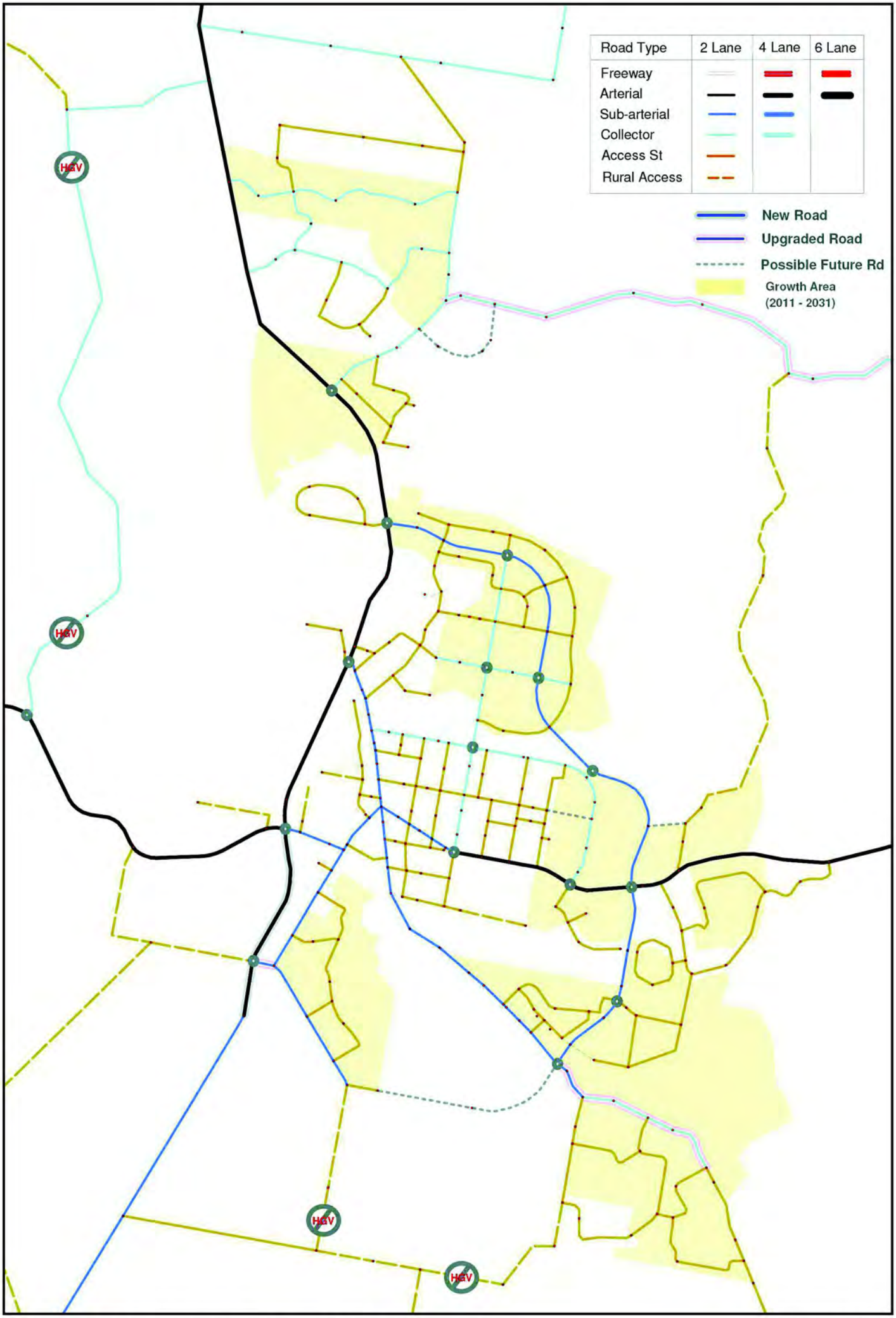
Figure 4-5a



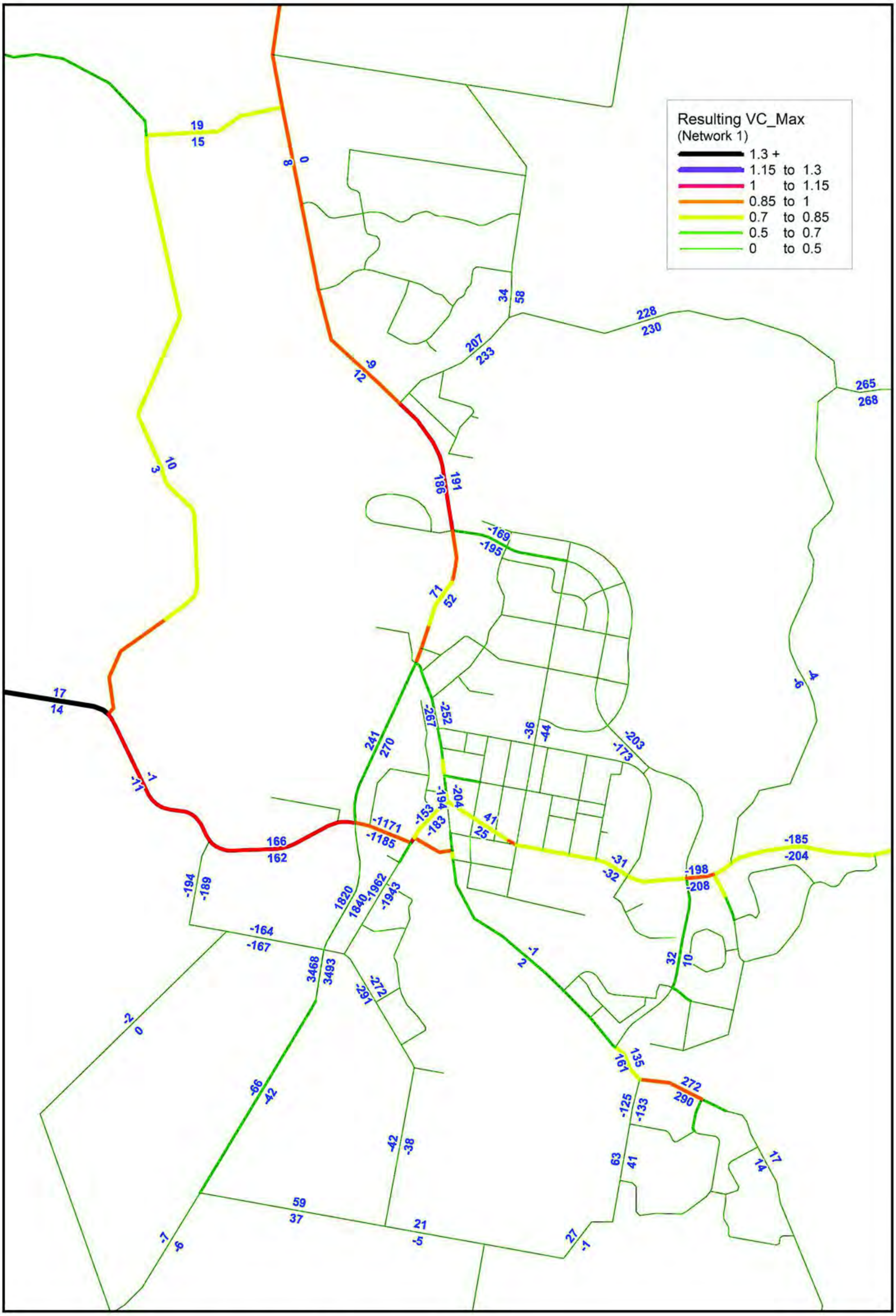
2031 Base Network - AM Peak 1 Hour Volumes **Figure 4-5b**



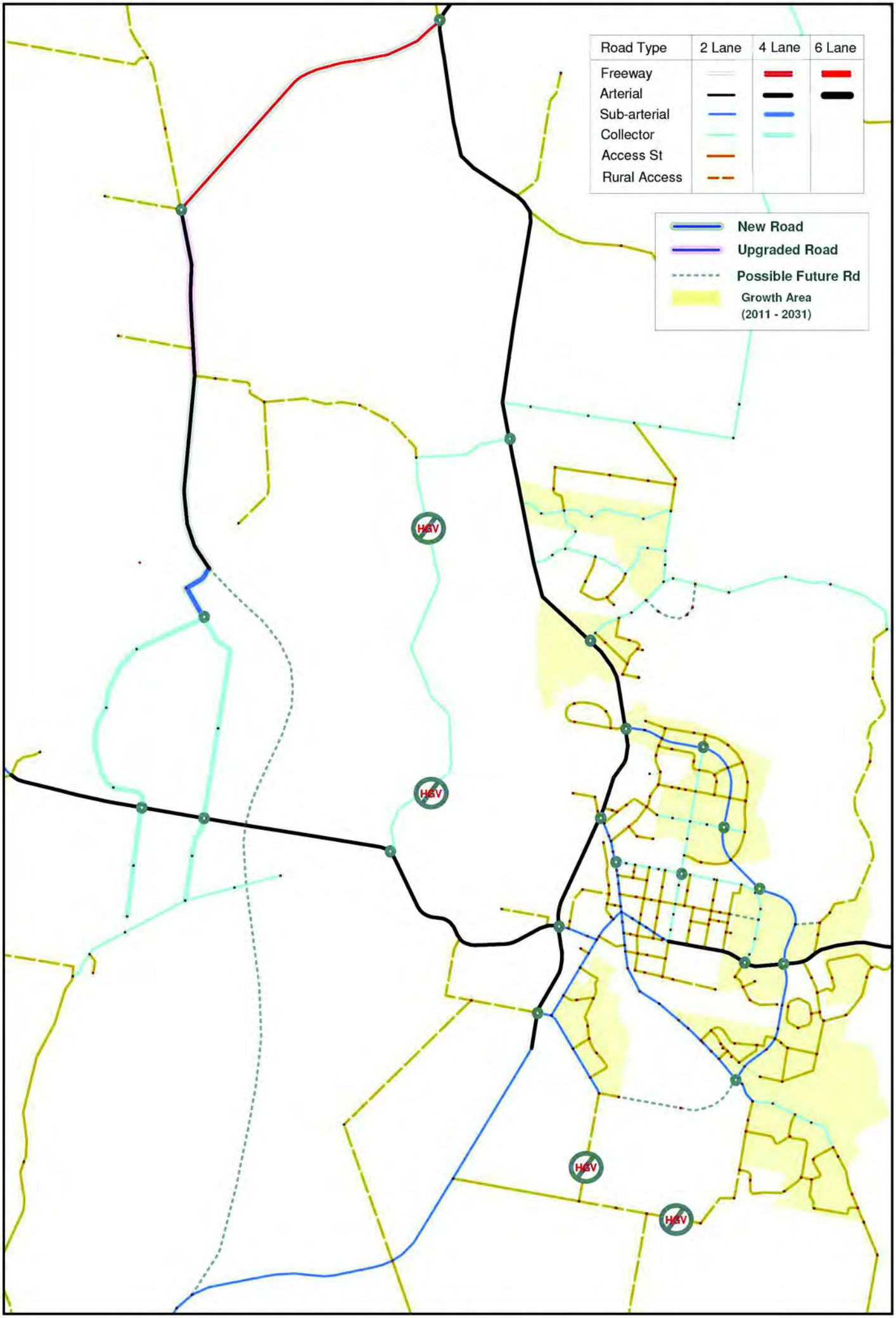
2031 Base Network - PM Peak 1 Hour Volumes **Figure 4-5c**



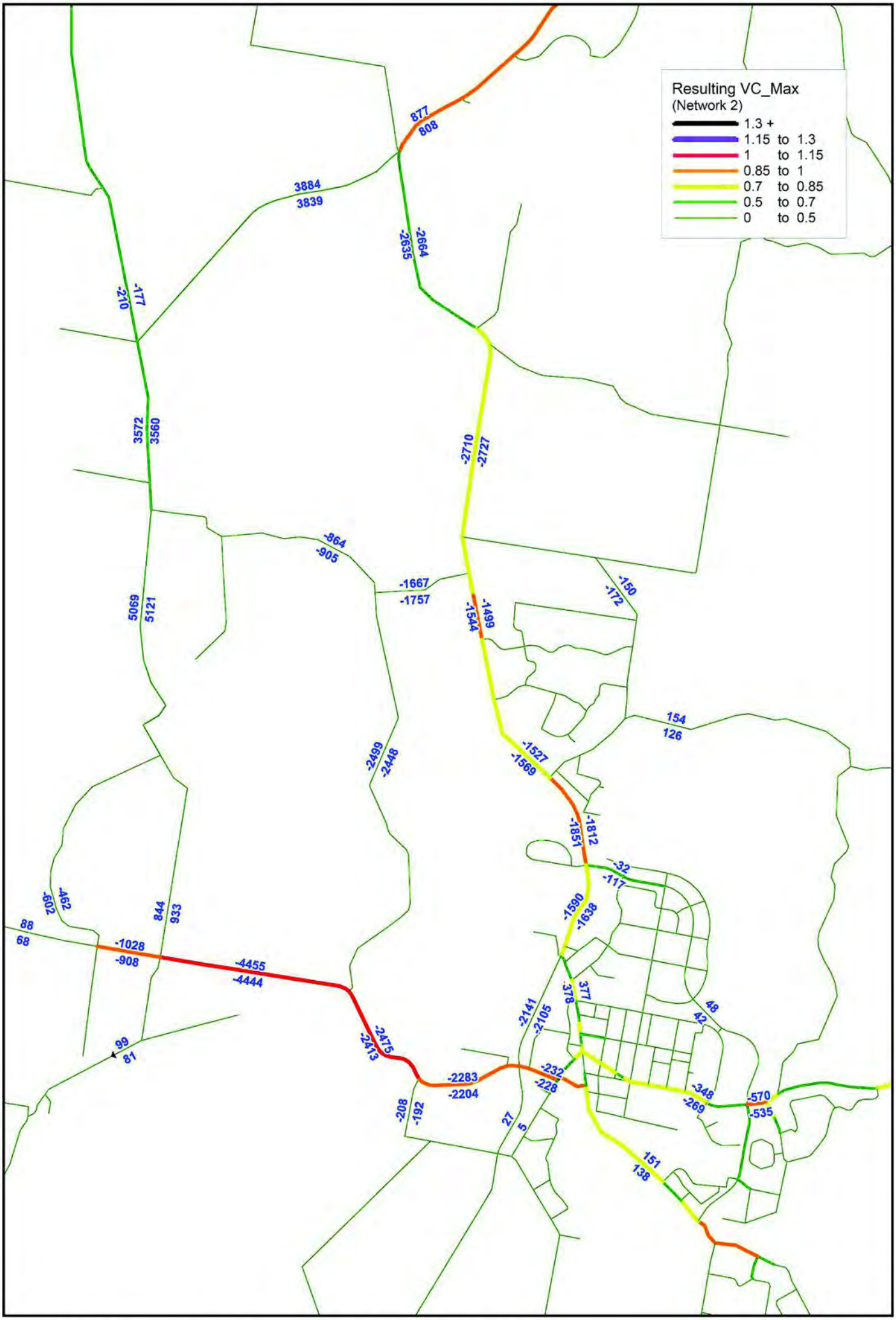
2031 Test Network 1 - 'As Modelled' Road Hierarchy **Figure 4-6a**



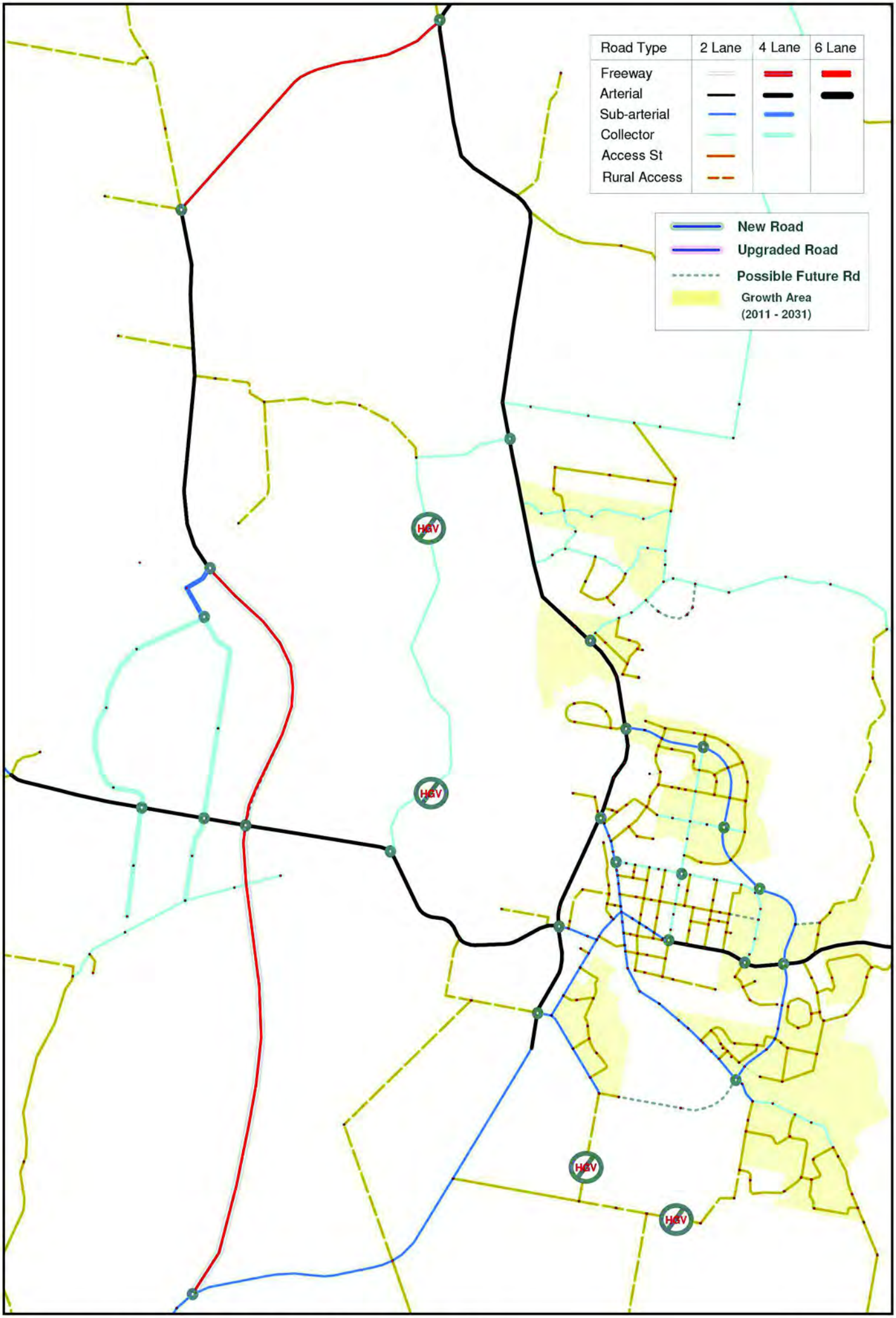
Change in Daily Traffic (Network 1 vs. Base), 2031 **Figure 4-6b**



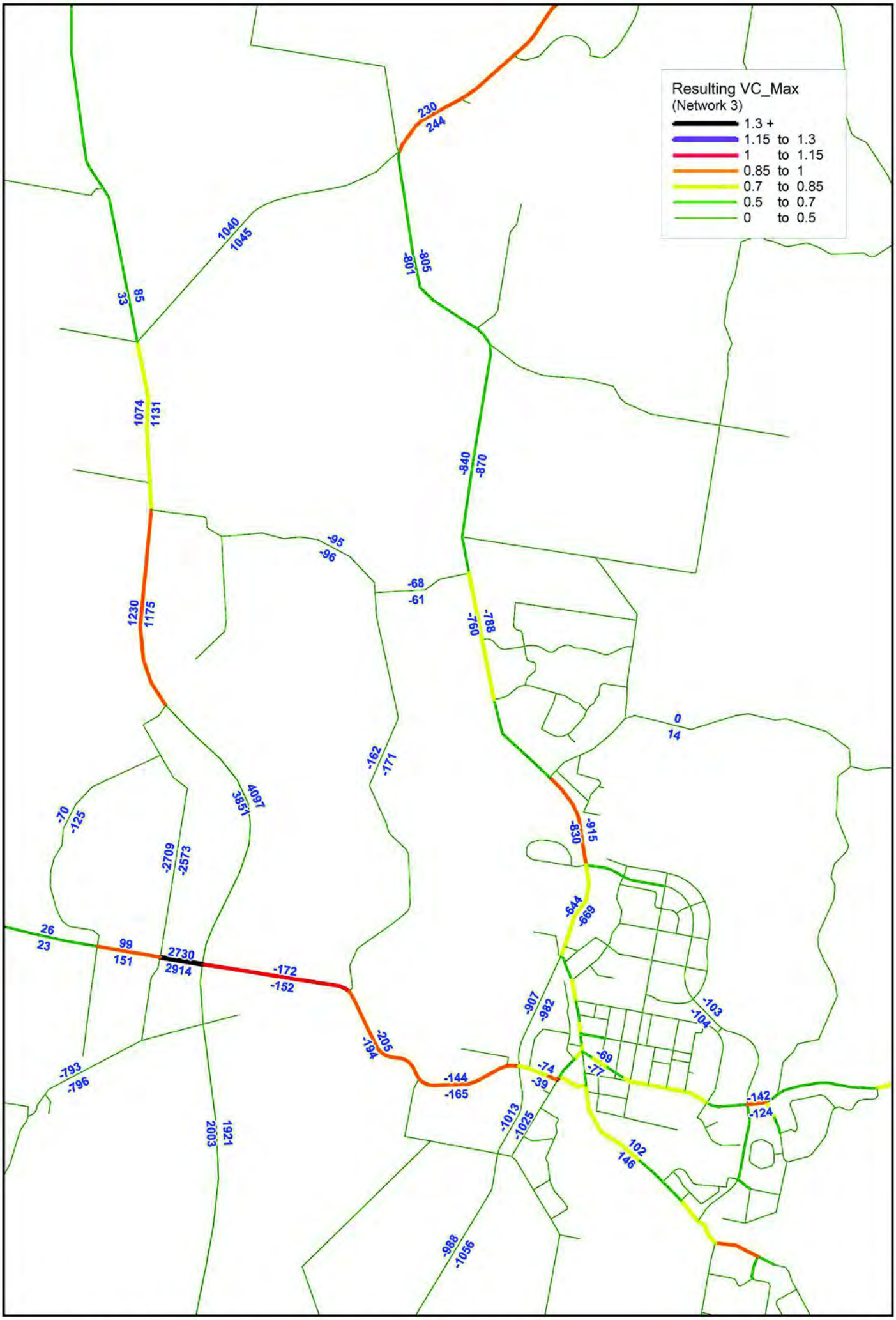
2031 Test Network 2 - 'As Modelled' Road Hierarchy **Figure 4-7a**



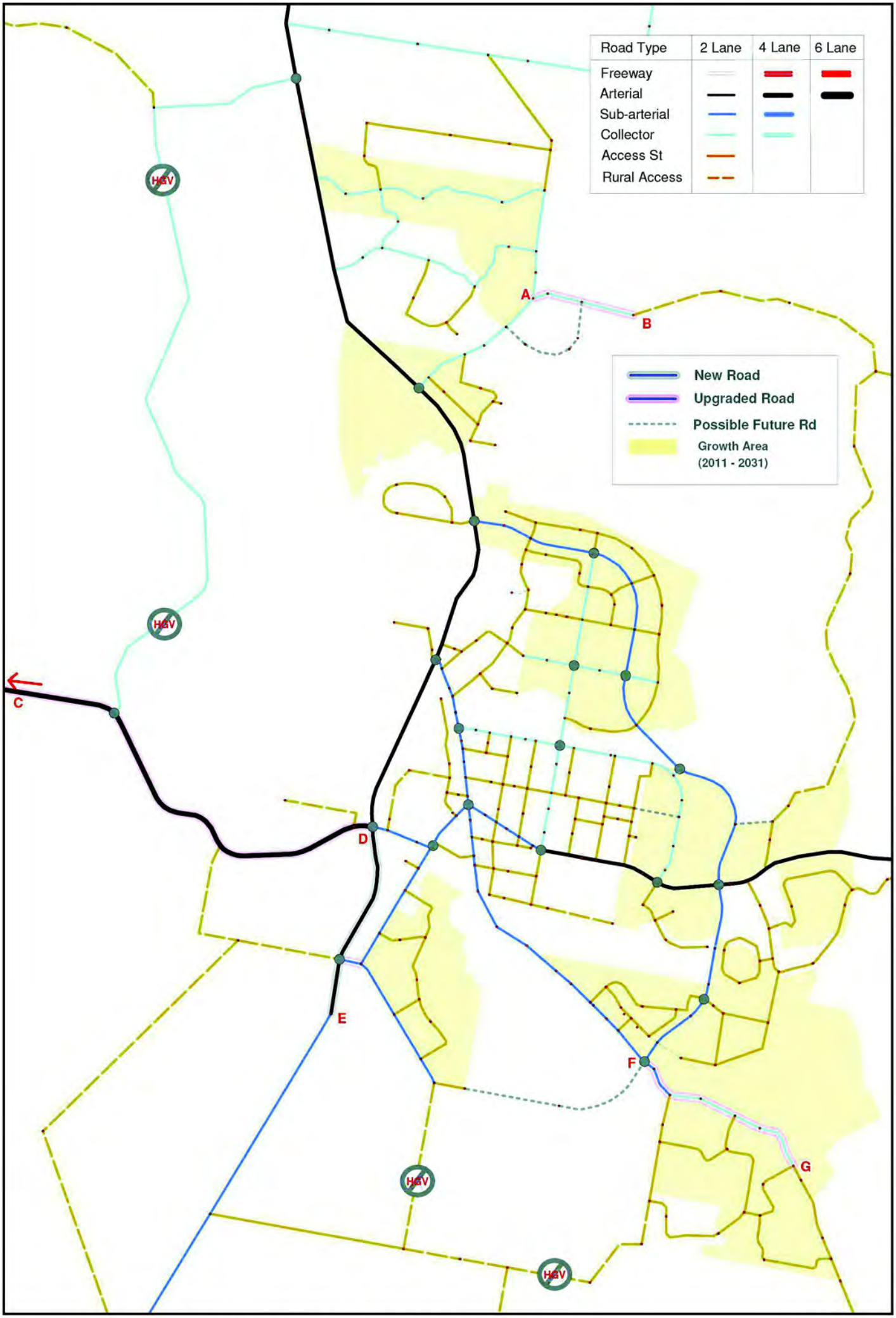
Change in Daily Traffic (Network 2 vs. Network 1), 2031 **Figure 4-7b**



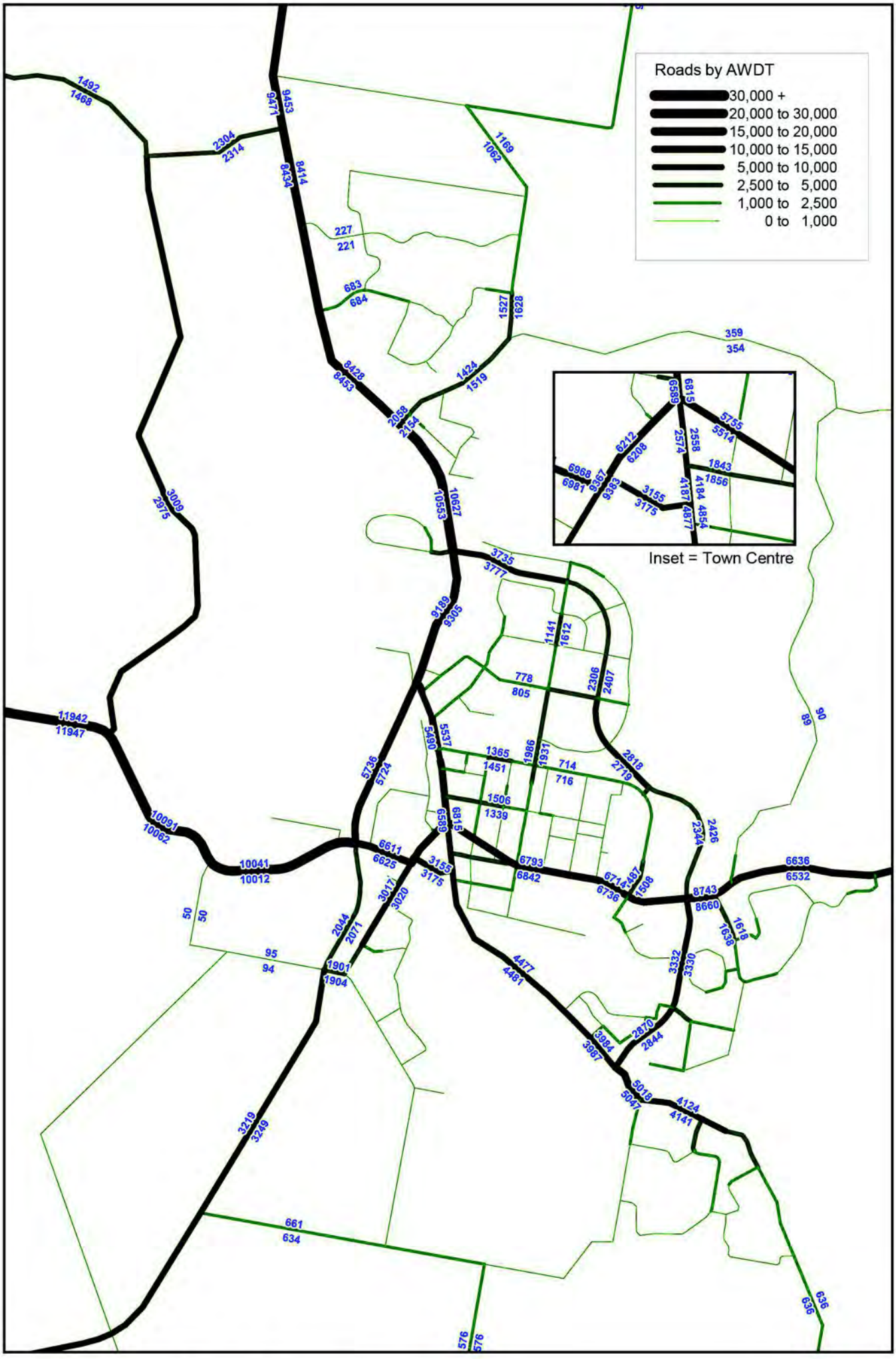
2031 Test Network 3 - 'As Modelled' Road Hierarchy **Figure 4-8a**



Change in Daily Traffic (Network 3 vs. Network 2), 2031 **Figure 4-8b**

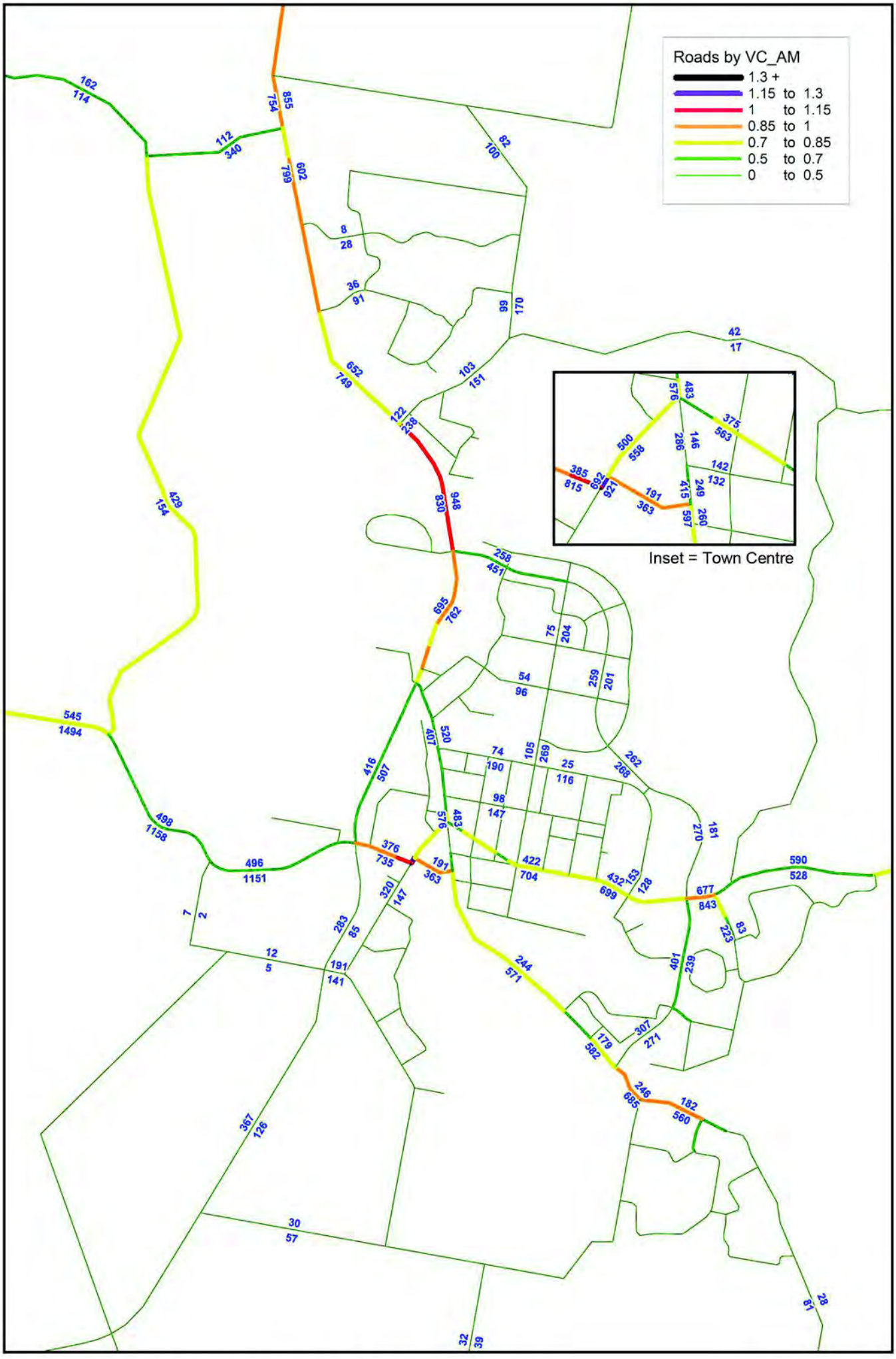


Anticipated 2031 Network - 'As Modelled' Road Hierarchy **Figure 4-9**



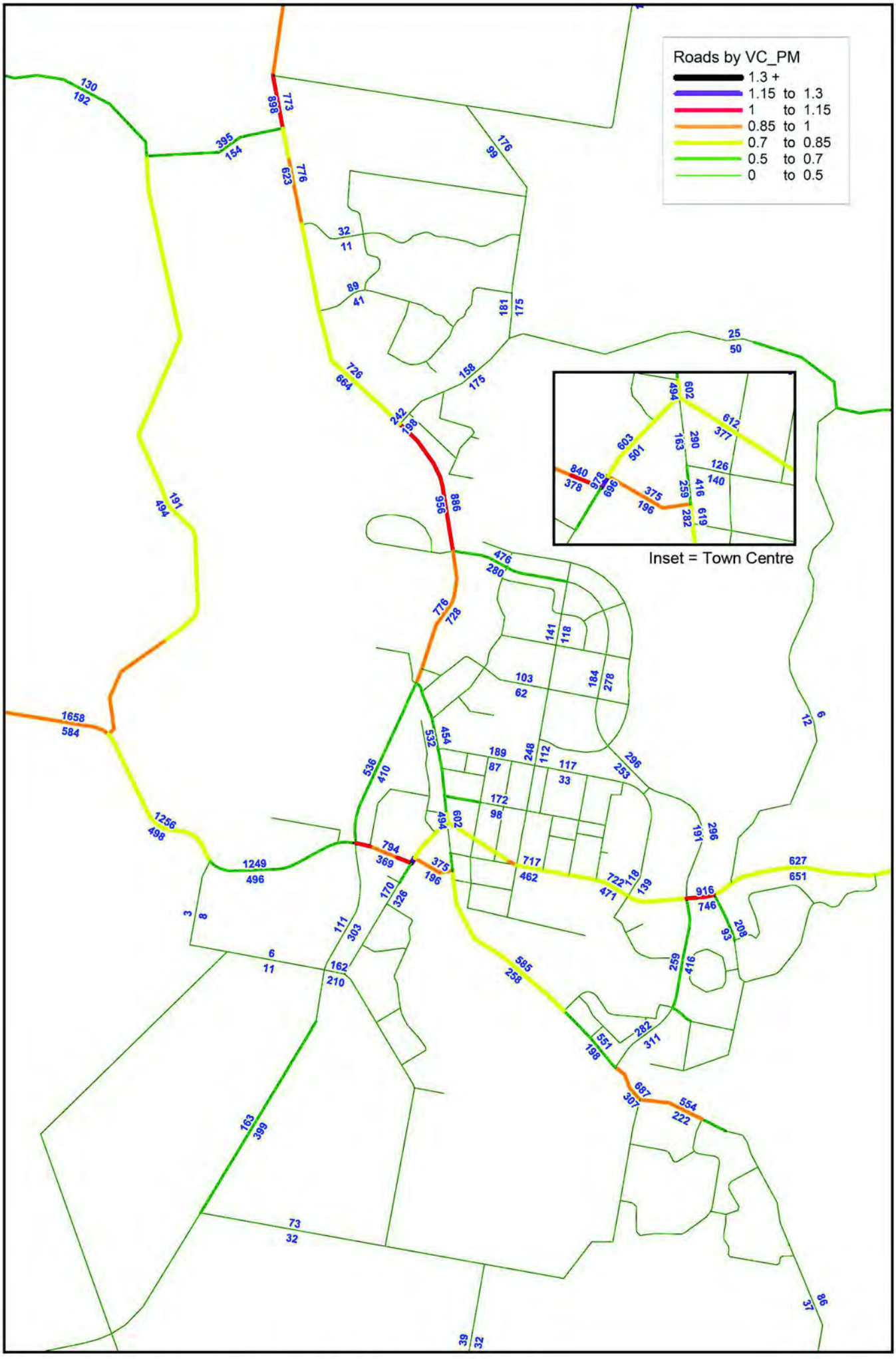
Anticipated 2031 Network - Daily Traffic Volumes

Figure 4-9a



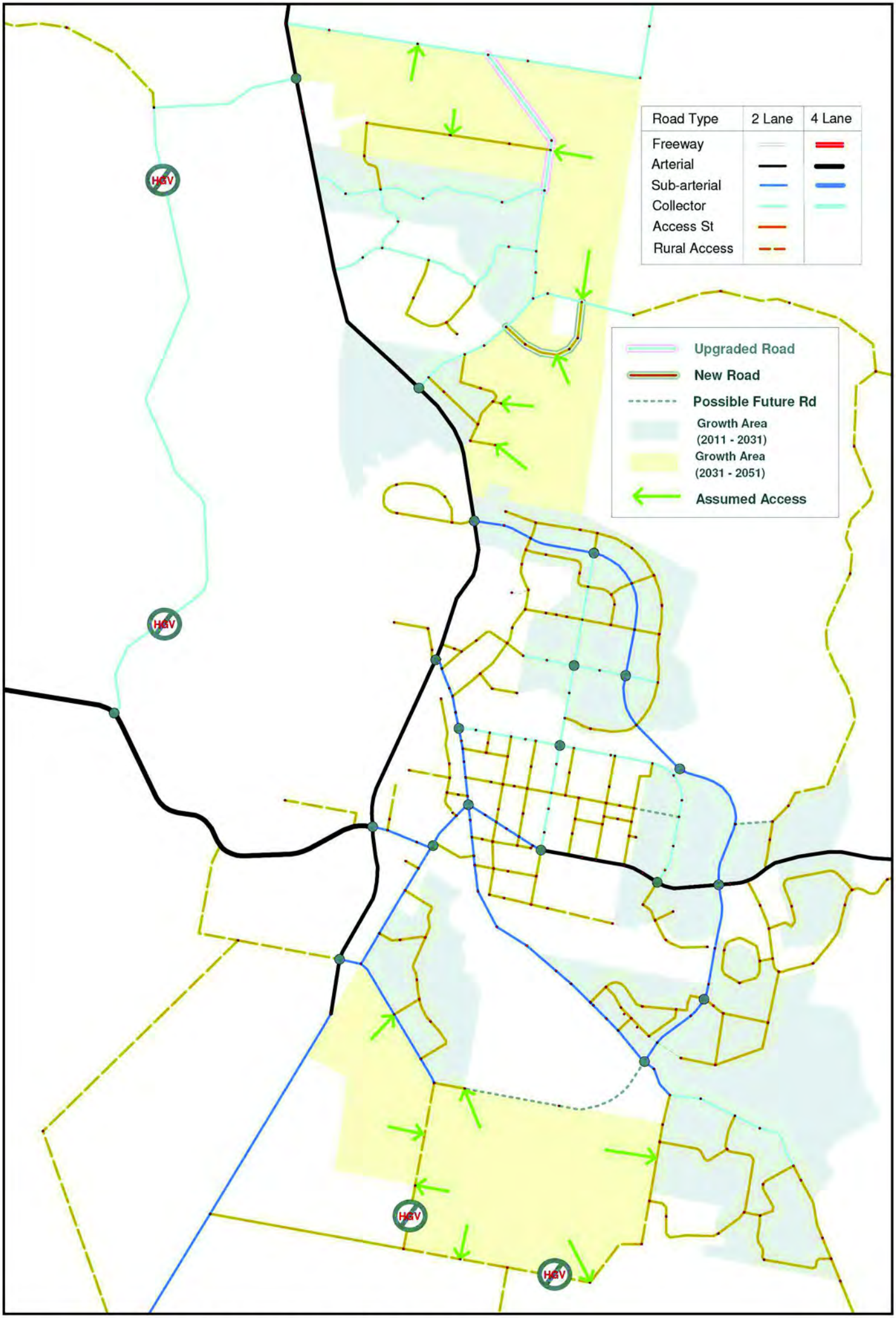
Anticipated 2031 Network - AM Peak 1 Hour Volumes

Figure 4-9b

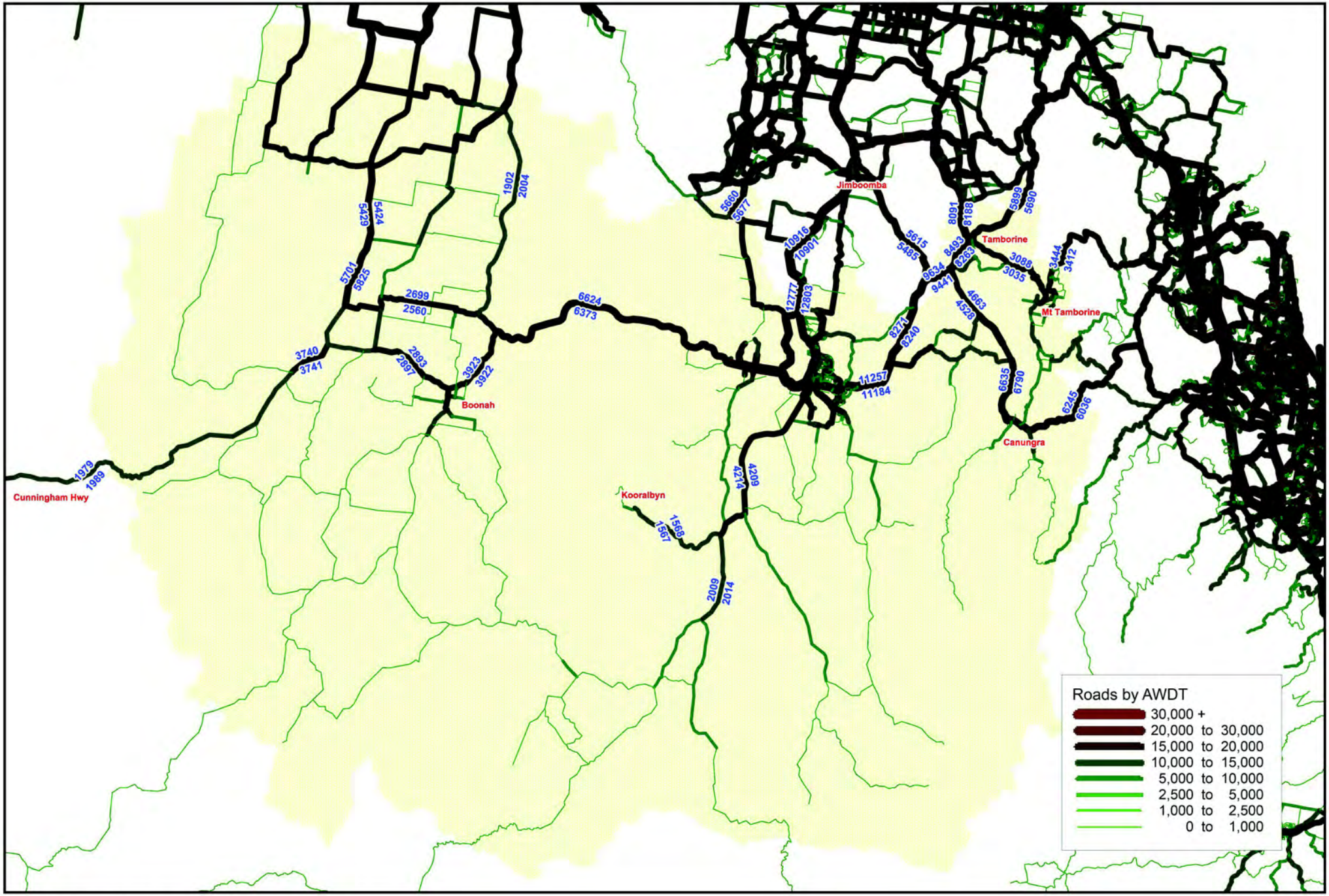


Anticipated 2031 Network - PM Peak 1 Hour Volumes

Figure 4-9c

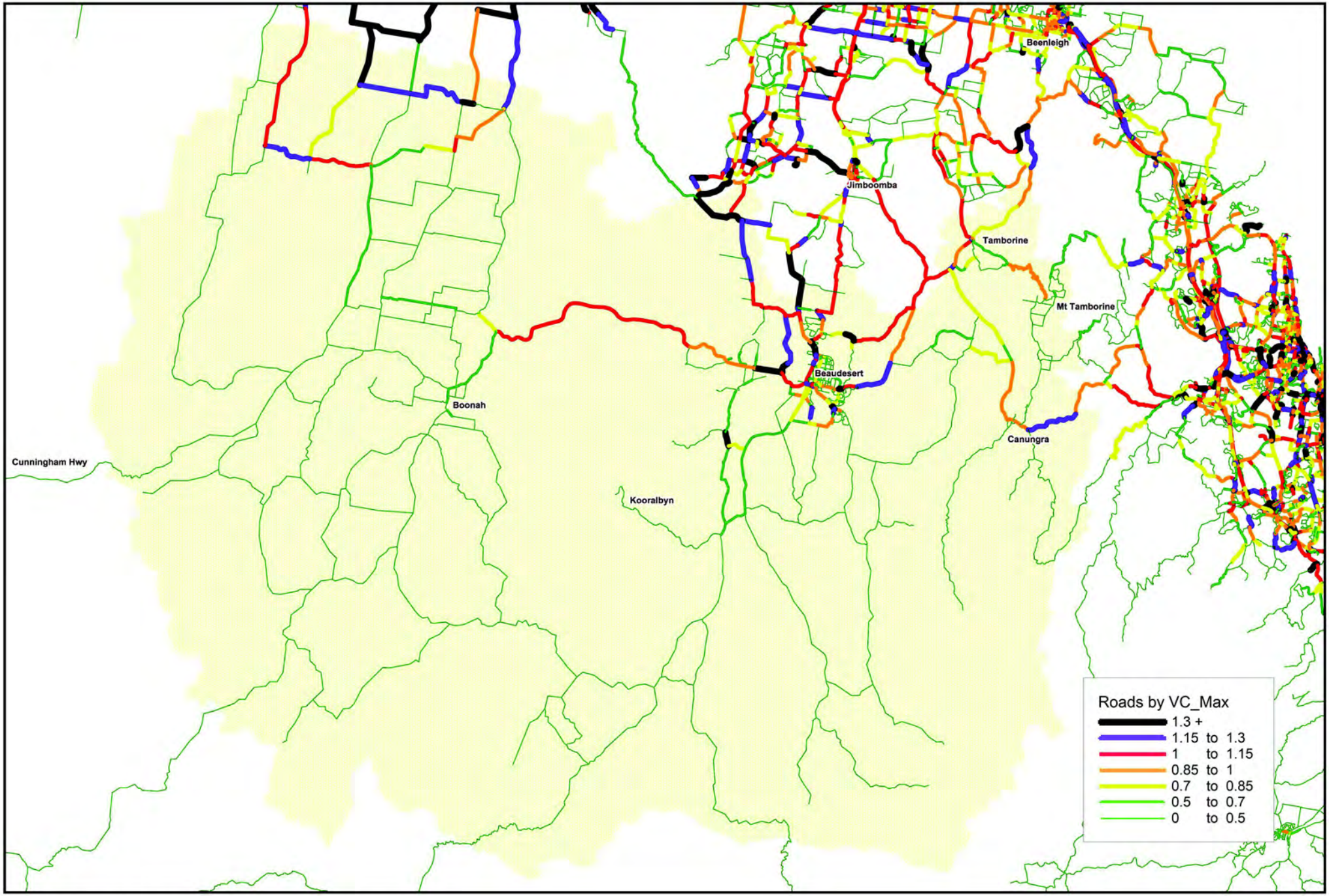


2051 Base Network - 'As Modelled' Road Hierarchy **Figure 5-1**



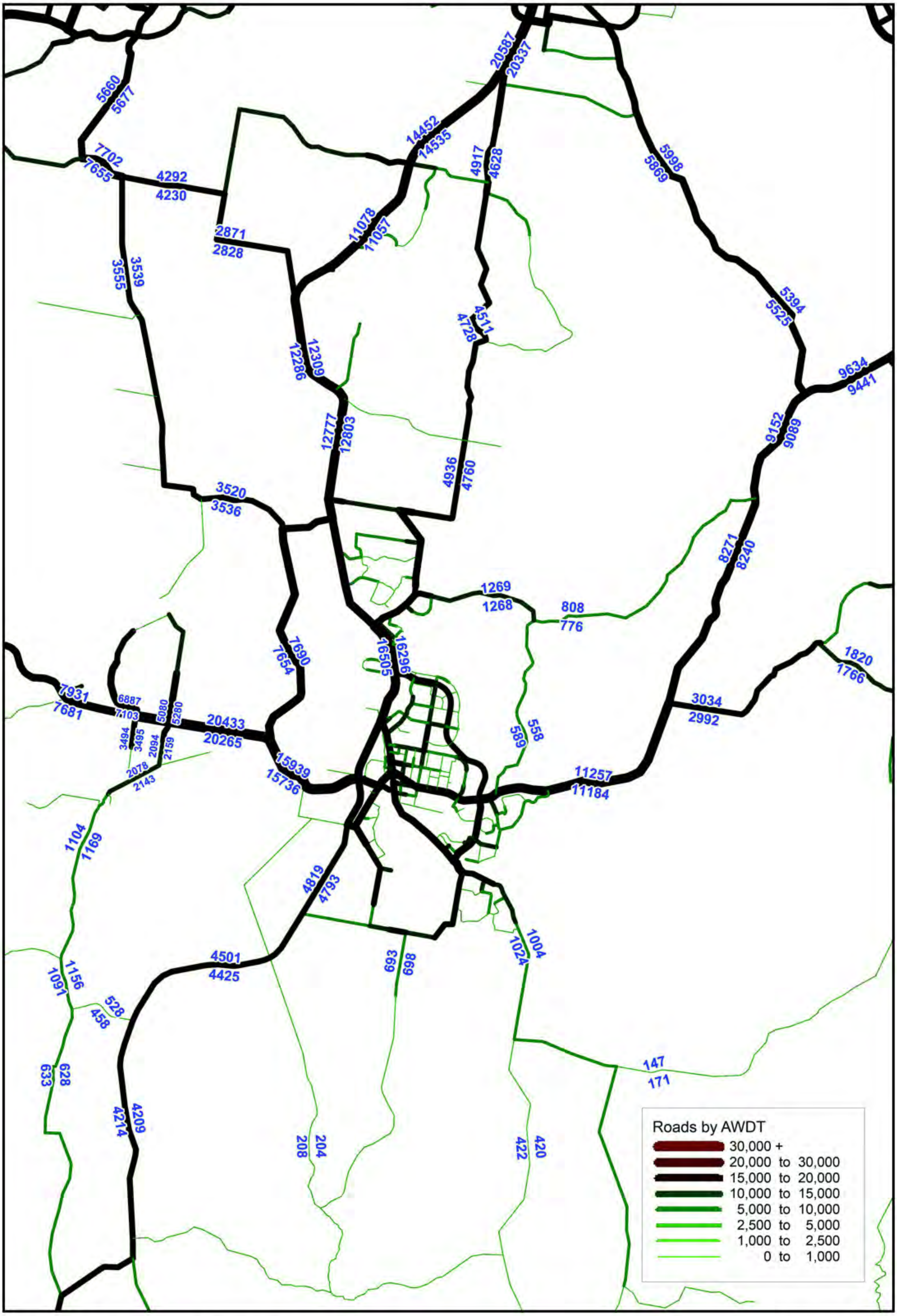
2051 Base Network - Daily Traffic Volumes

Figure 5-2a



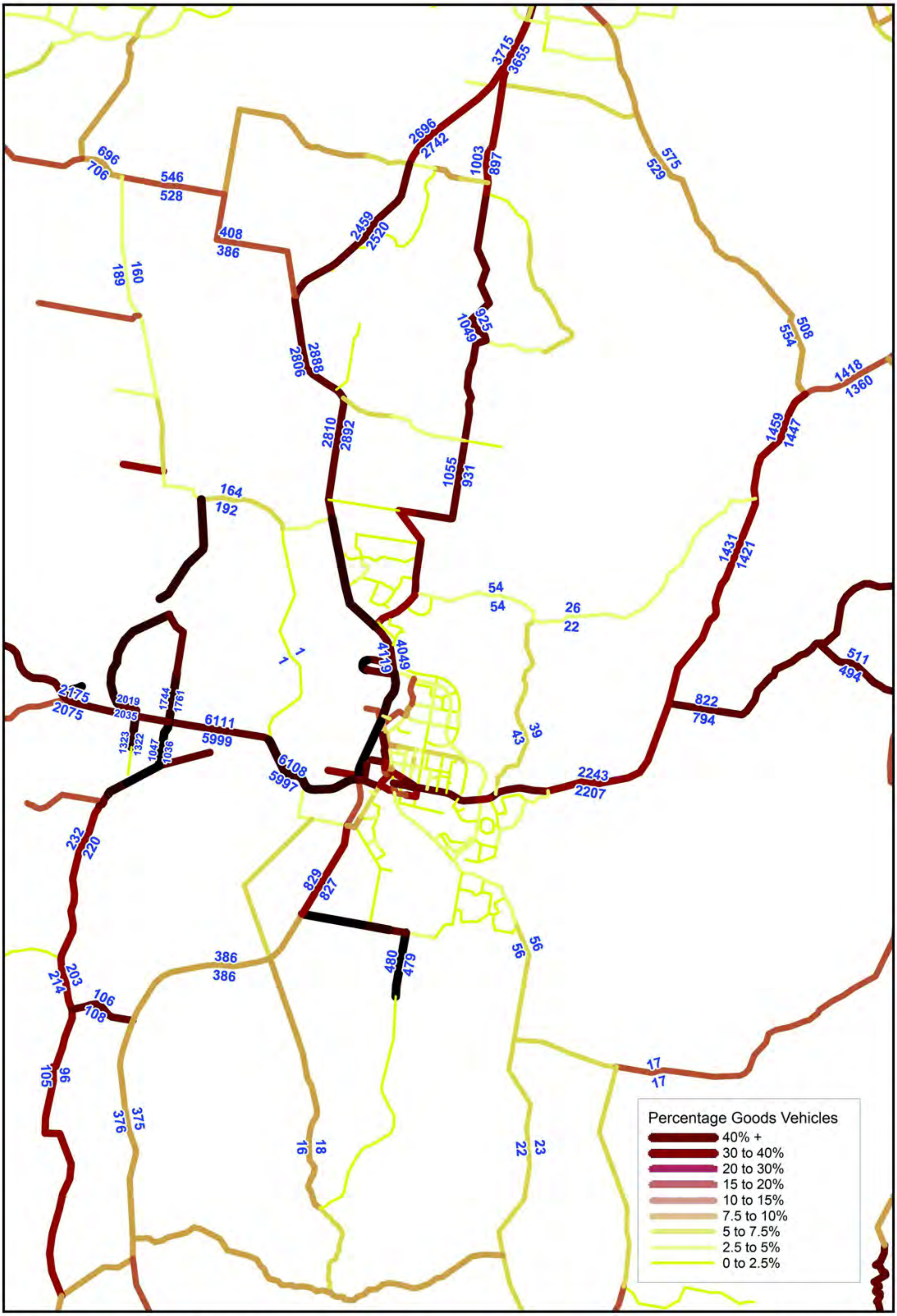
2051 Base Network - Maximum V/C Ratio

Figure 5-2b



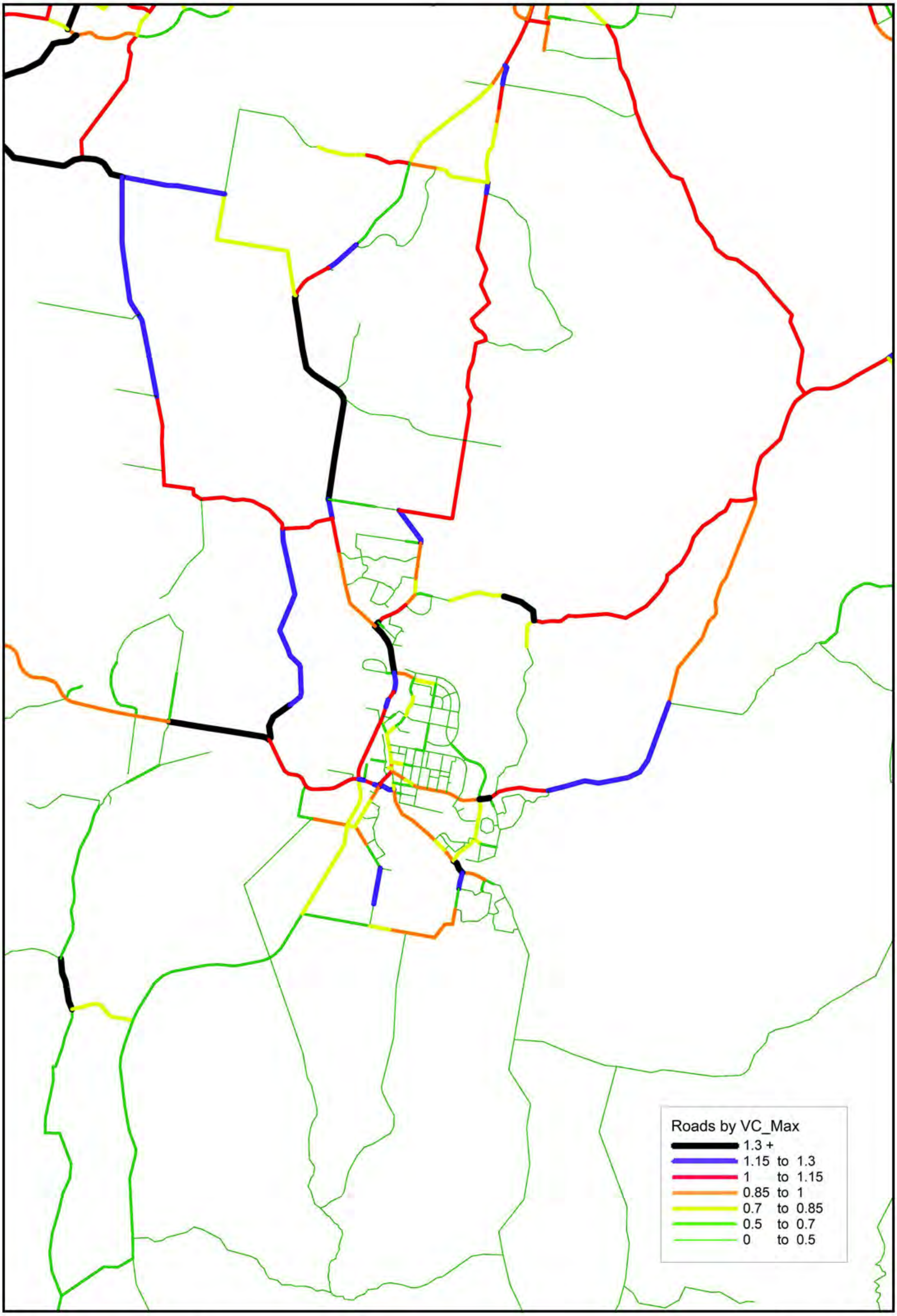
2051 Base Network - Daily Traffic Volumes

Figure 5-3a



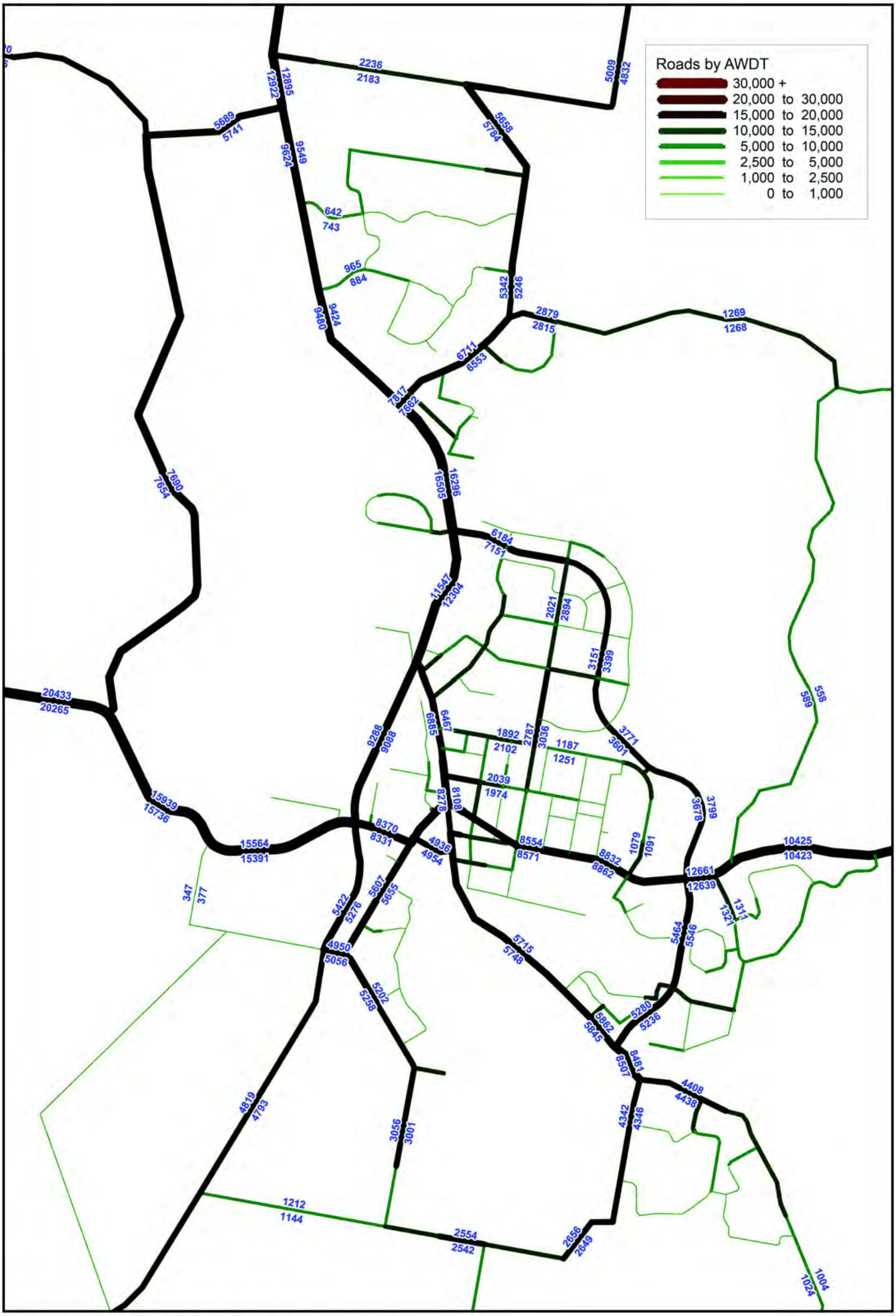
2051 Base Network - Daily Goods Vehicle Volumes

Figure 5-3b



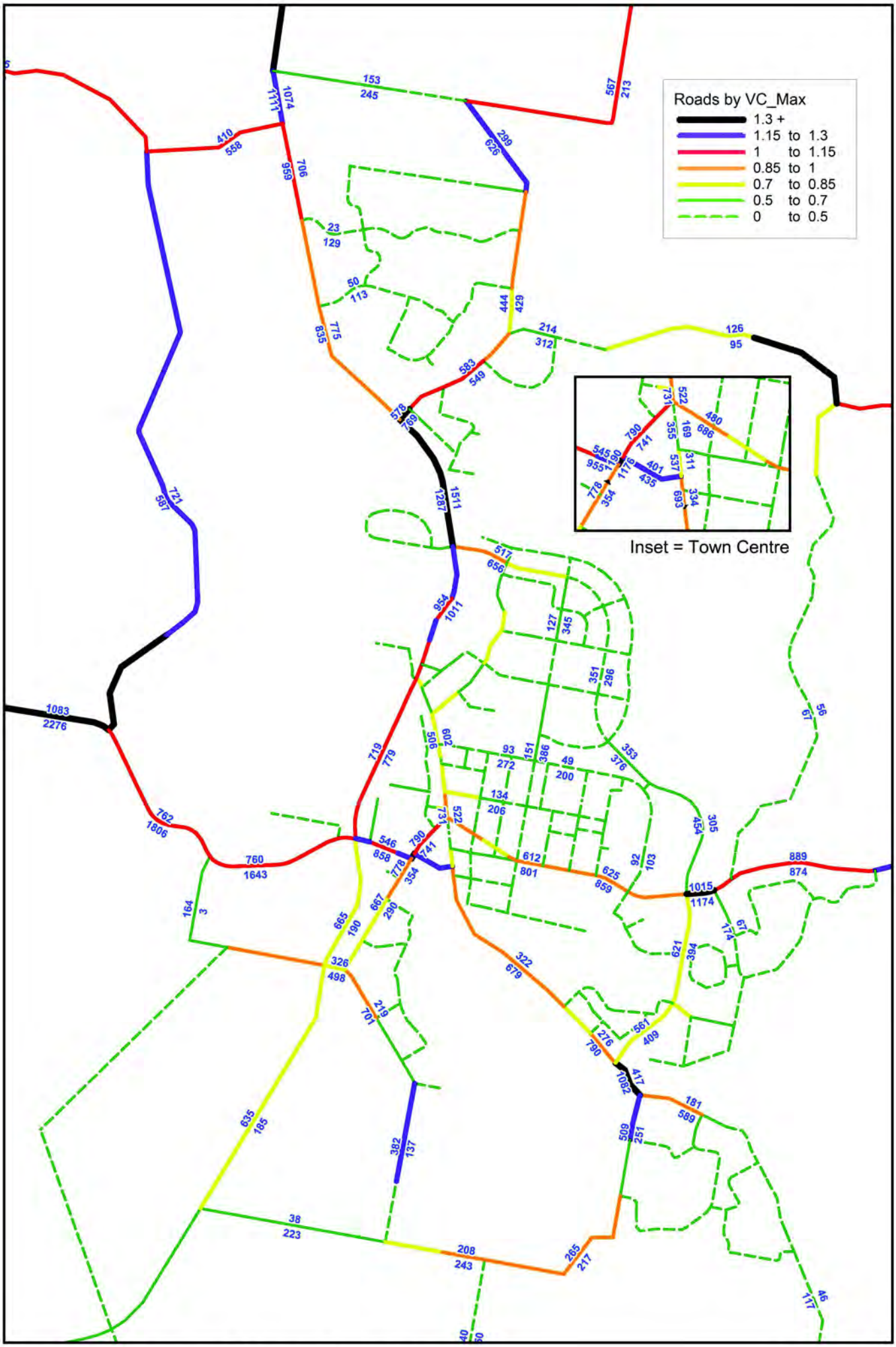
2051 Base Network - Maximum V/C Ratios

Figure 5-3c

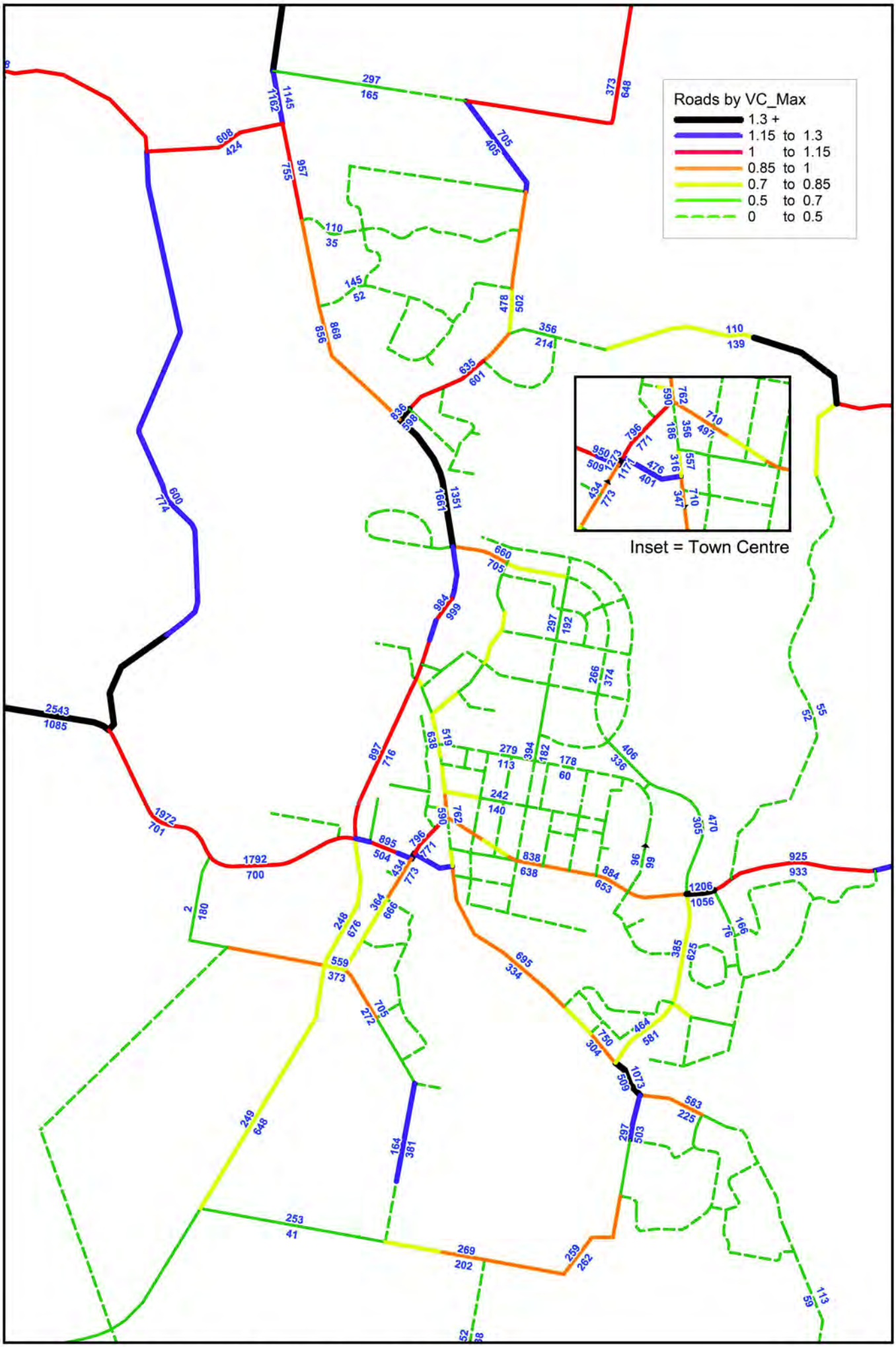


2051 Base Network - Daily Traffic Volumes

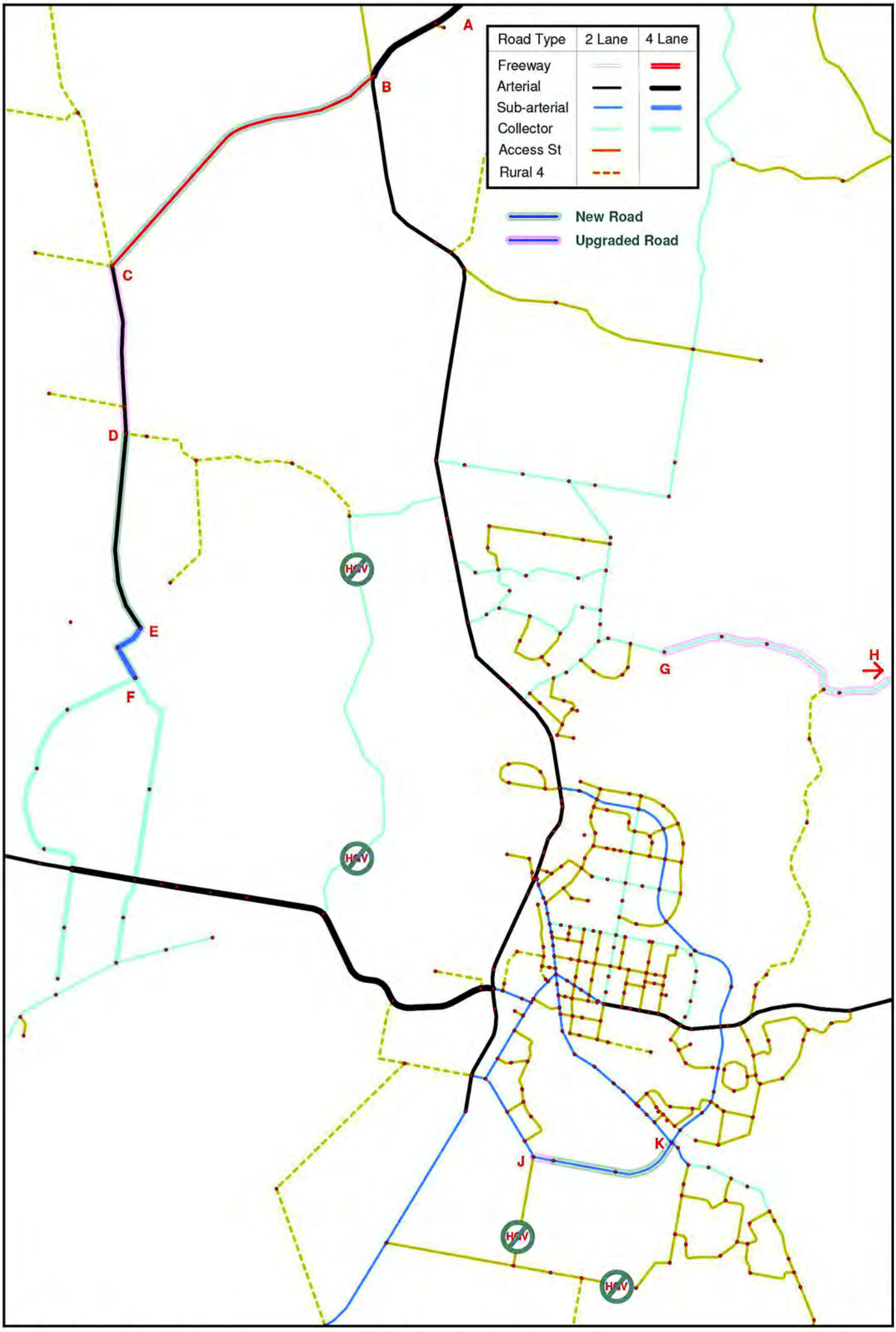
Figure 5-4a



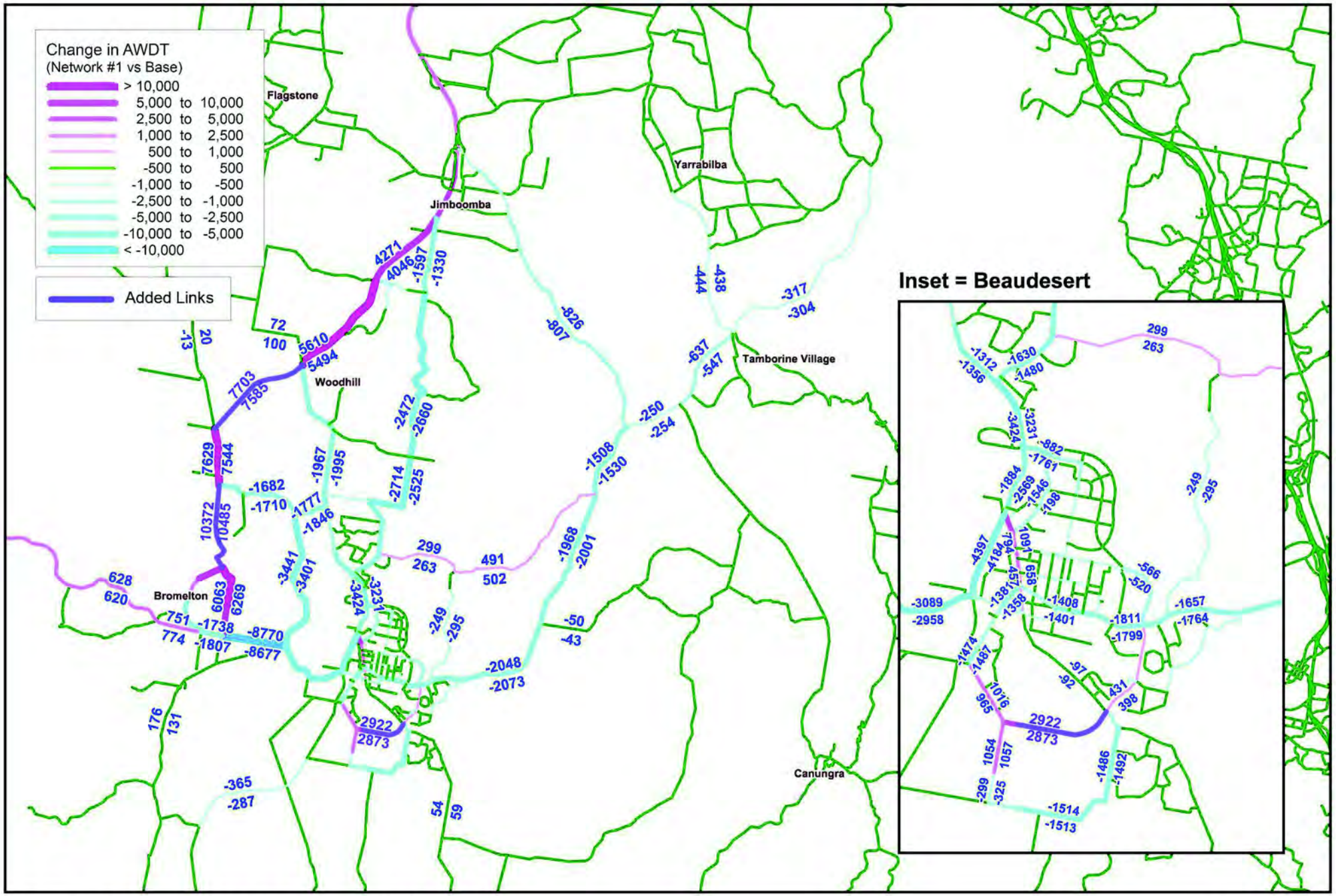
2051 Base Network - AM Peak 1 Hour Volumes **Figure 5-4b**



2051 Base Network - PM Peak 1 Hour Volumes **Figure 5-4c**

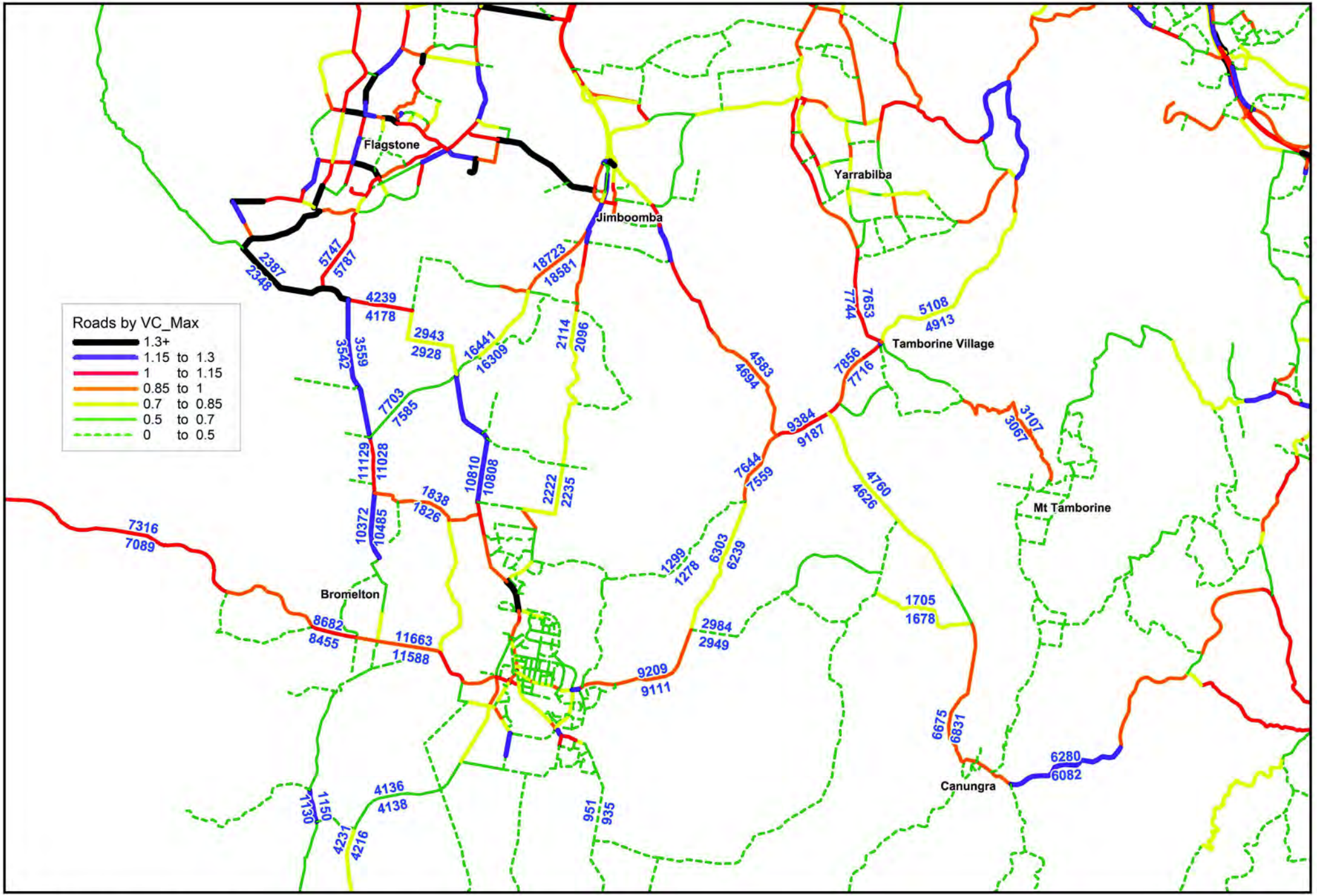


2051 Test Network 1 - 'As Modelled' Road Hierarchy **Figure 5-5**



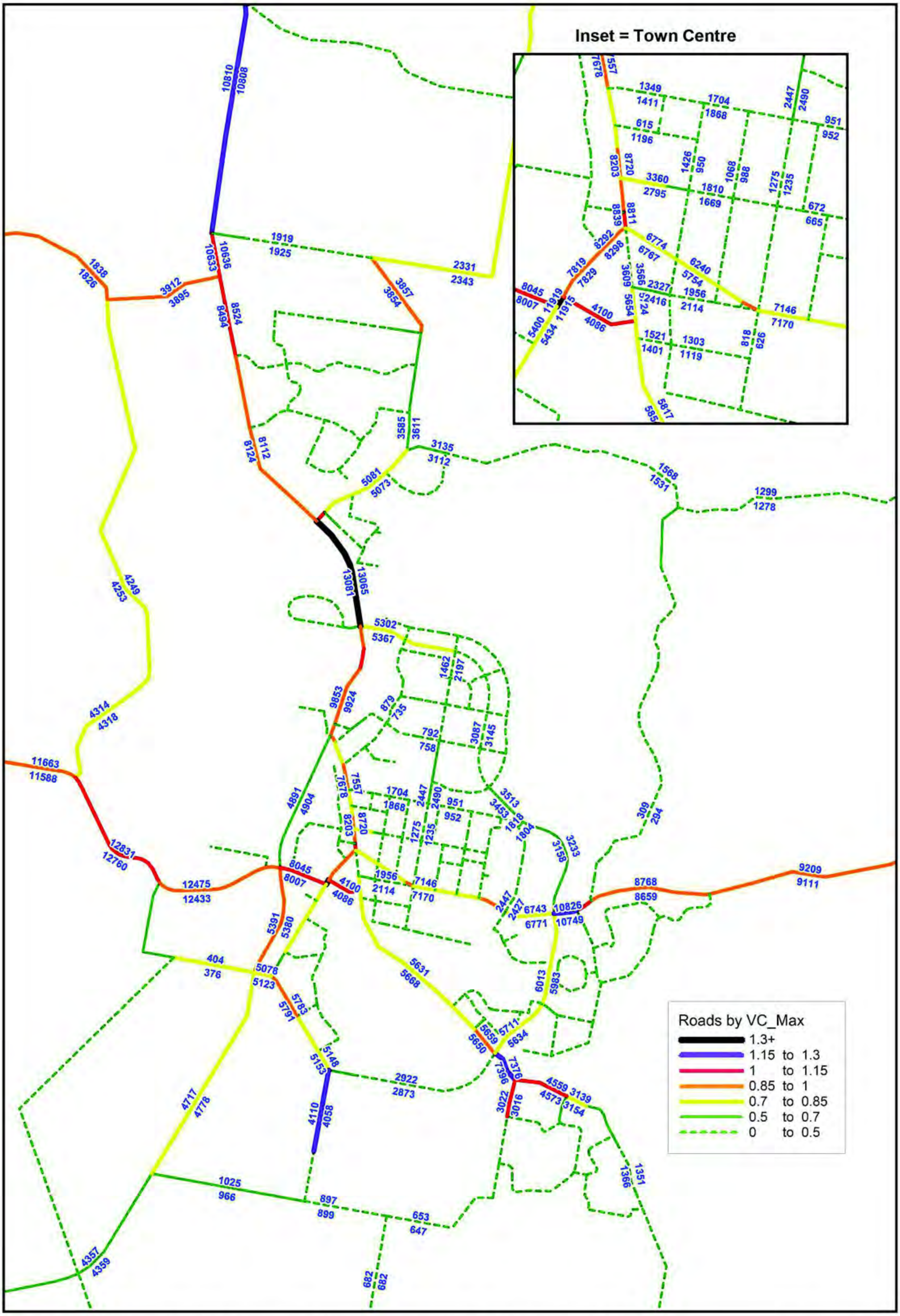
Change in Daily Traffic, 2051 (Network #1 vs. Base)

Figure 5-5a

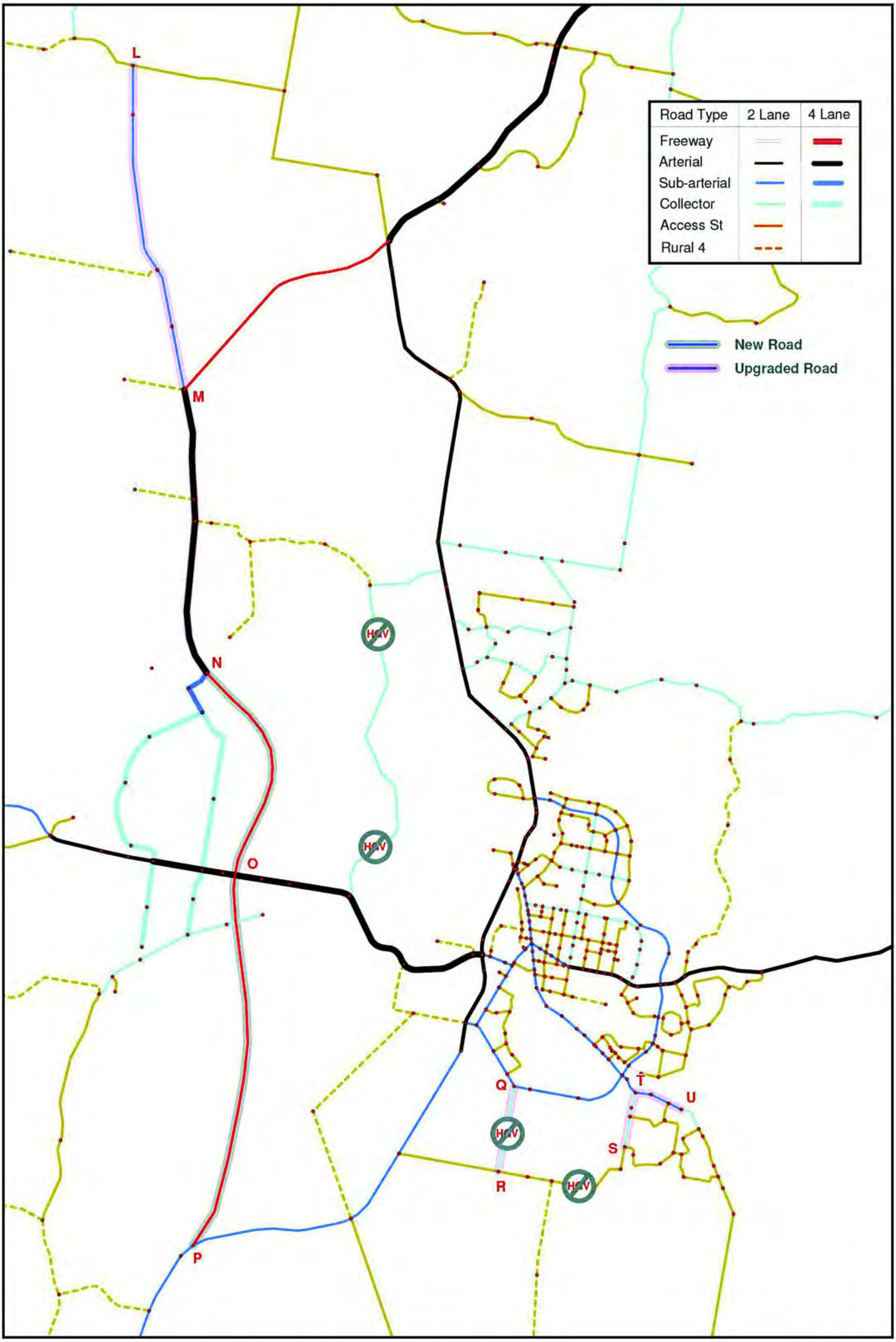


2051 Test Network #1 - Average Weekday Volumes & Maximum V/C Ratios

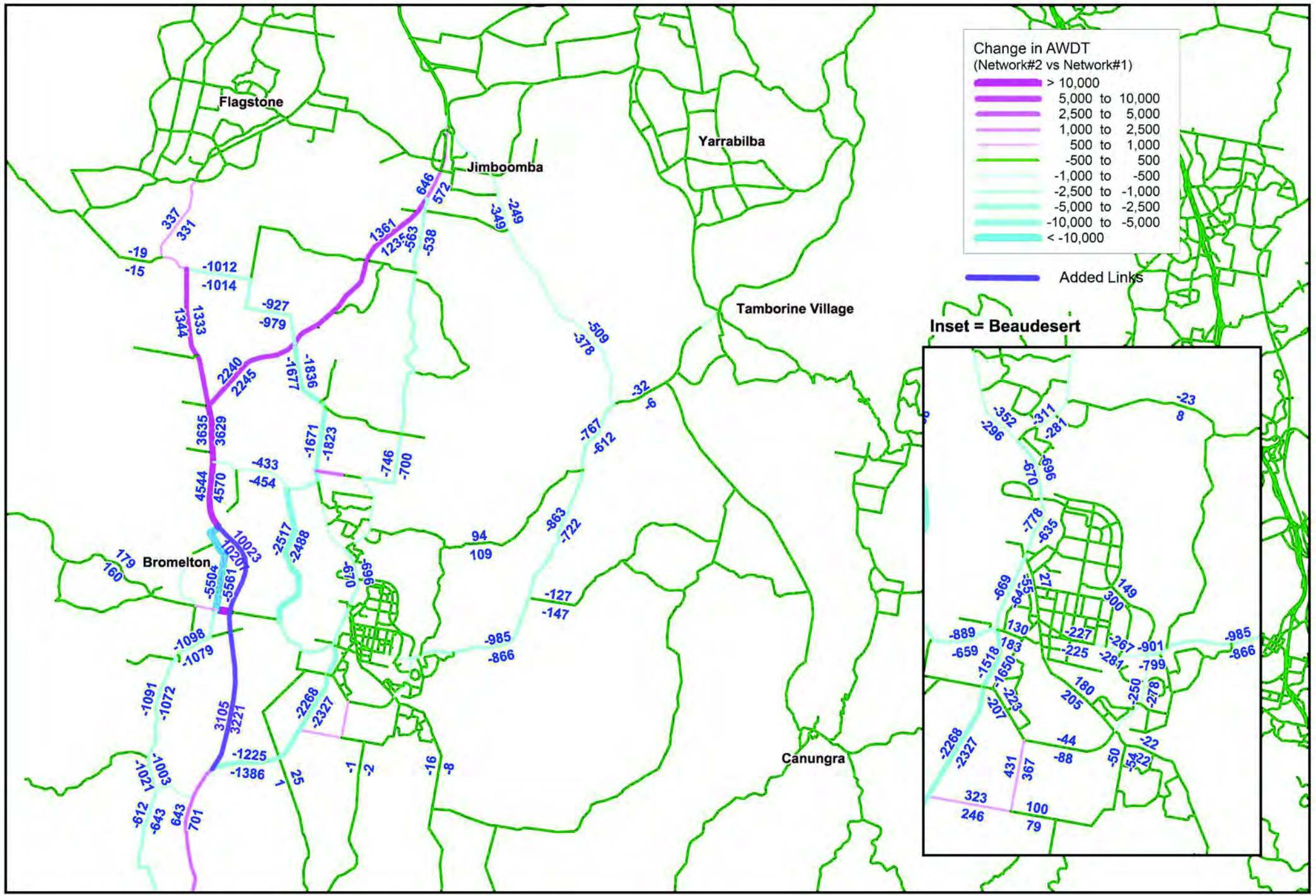
Figure 5-5b



2051 Test Network #1 - Average Weekday Traffic & Maximum V/C Ratios **Figure 5-5c**

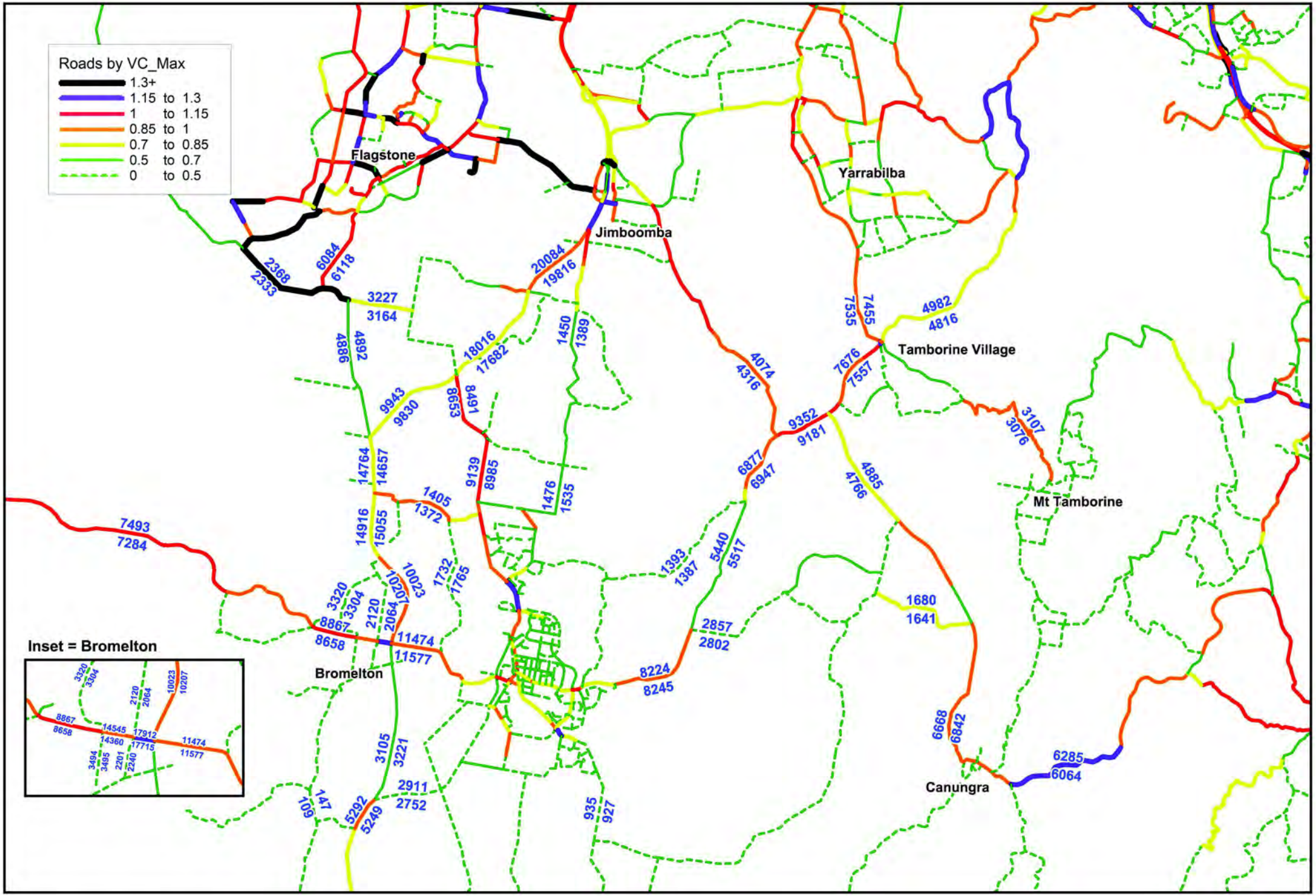


2051 Test Network #2 - 'As Modelled' Road Hierarchy **Figure 5-6**



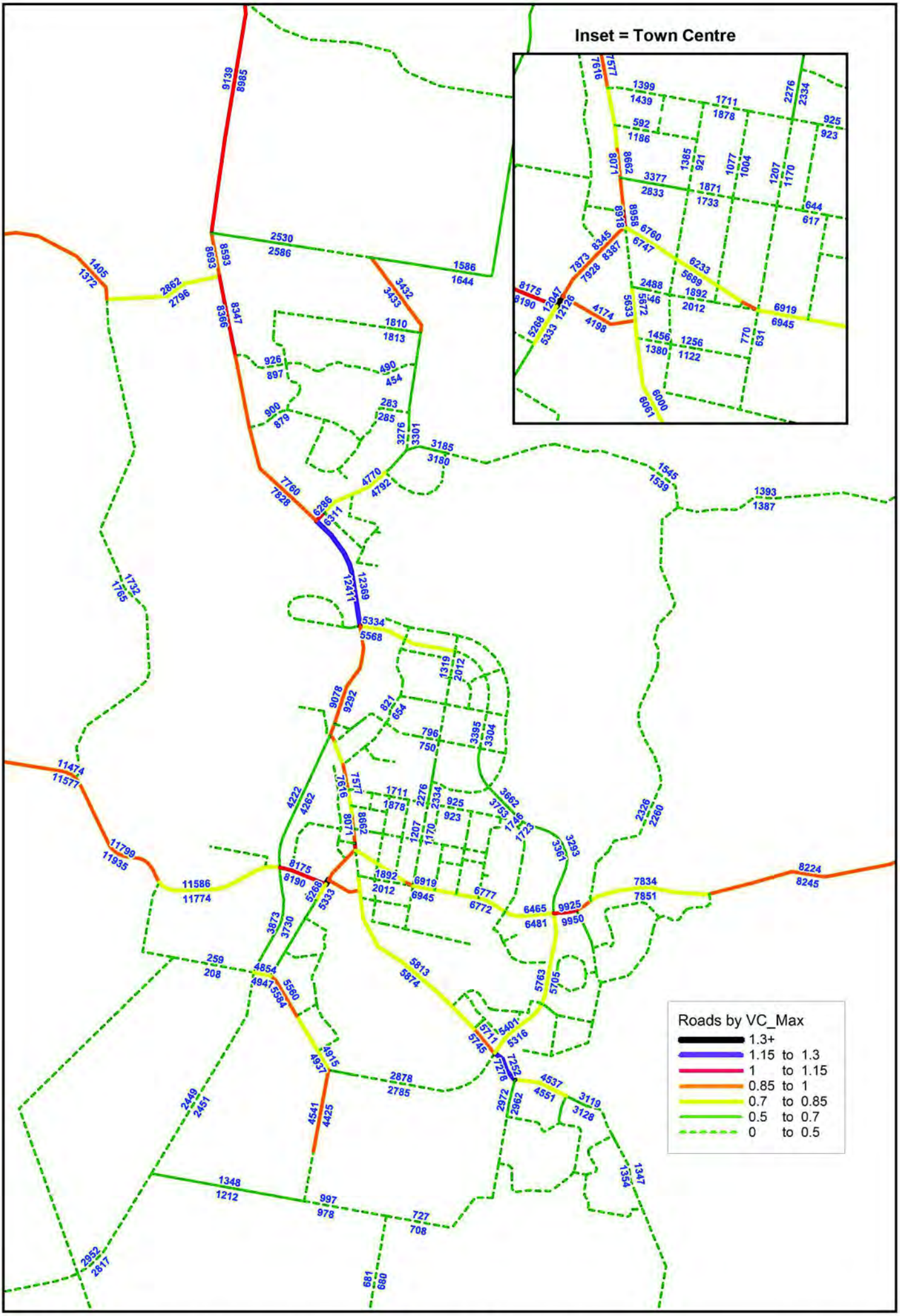
Change in Daily Traffic, 2051 (Network #2 vs. Network #1)

Figure 5-6a

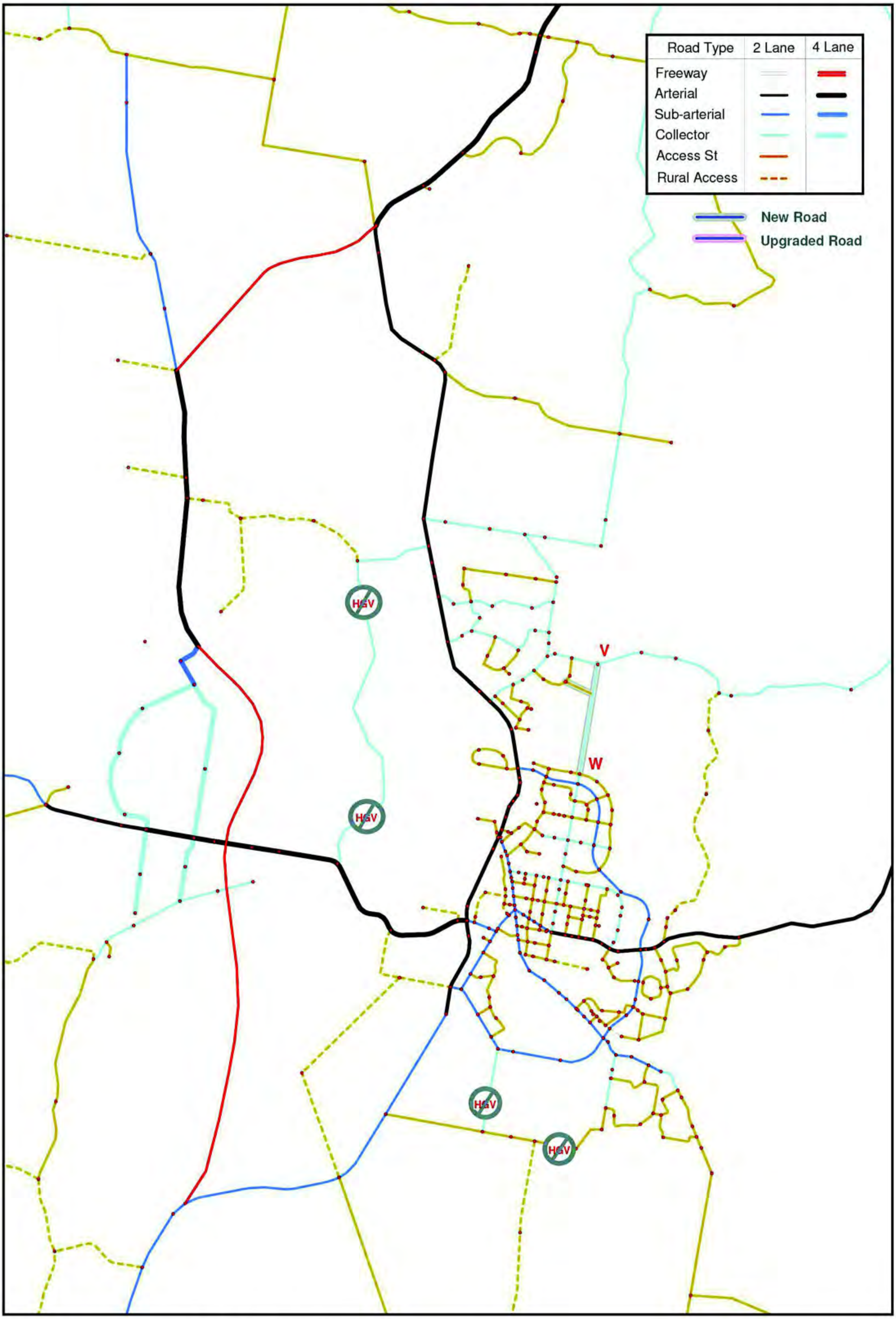


2051 Test Network #2 - Average Weekday Traffic & Maximum V/C Ratios

Figure 5-6b

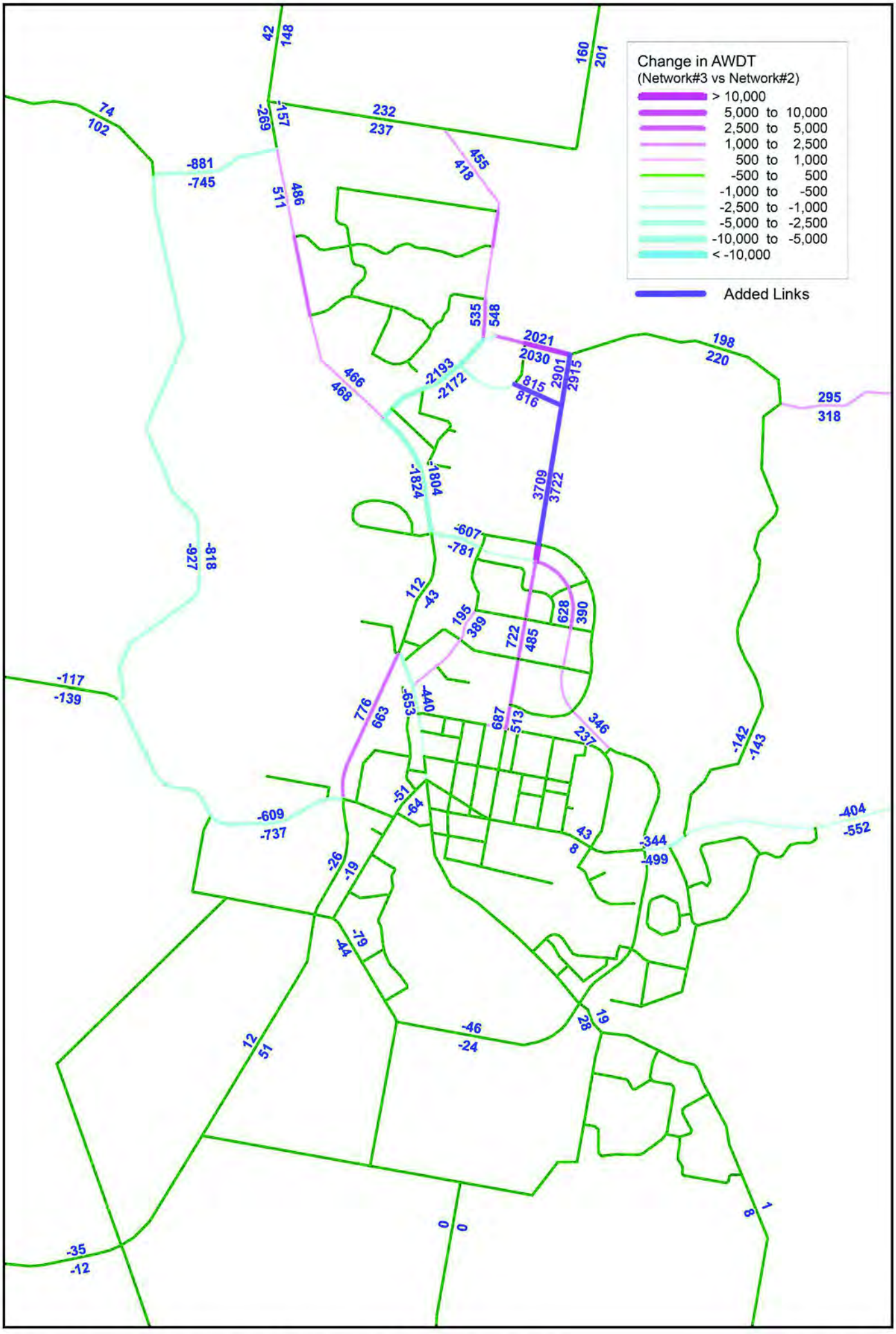


2051 Test Network #2 - Average Weekday Traffic & Maximum V/C Ratios **Figure 5-6c**

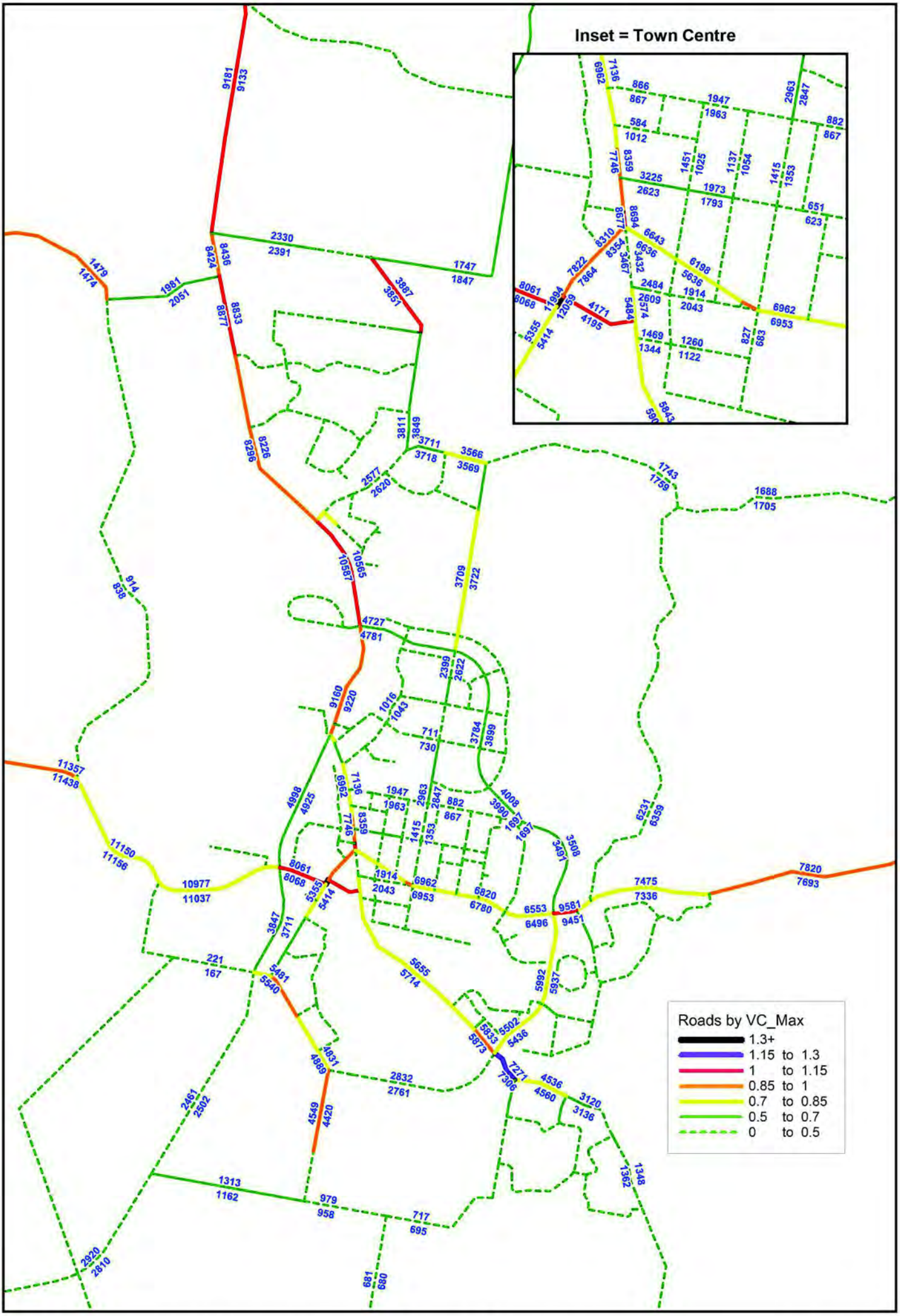


2051 Test Network #3 - 'As Modelled' Road Hierarchy

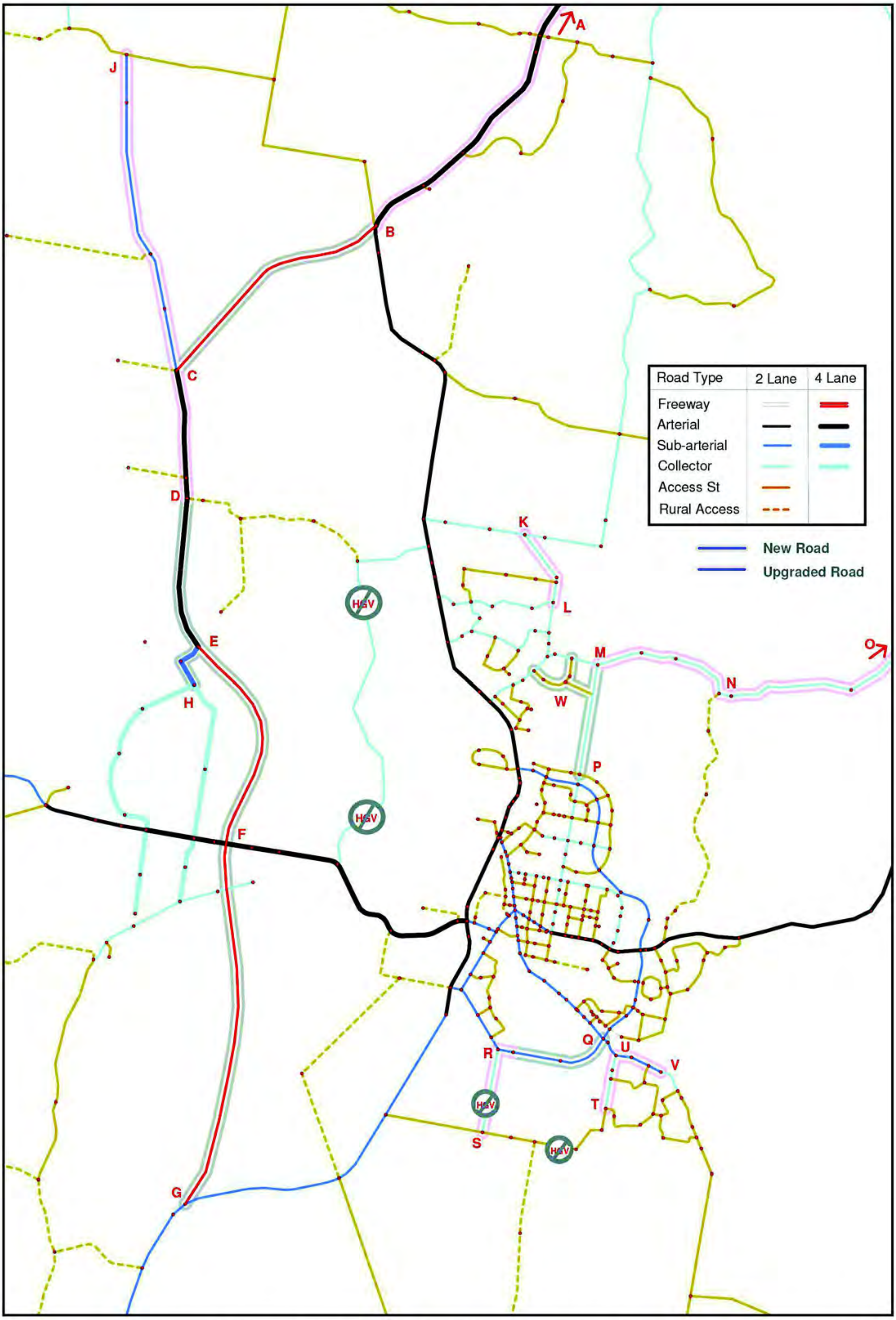
Figure 5-7



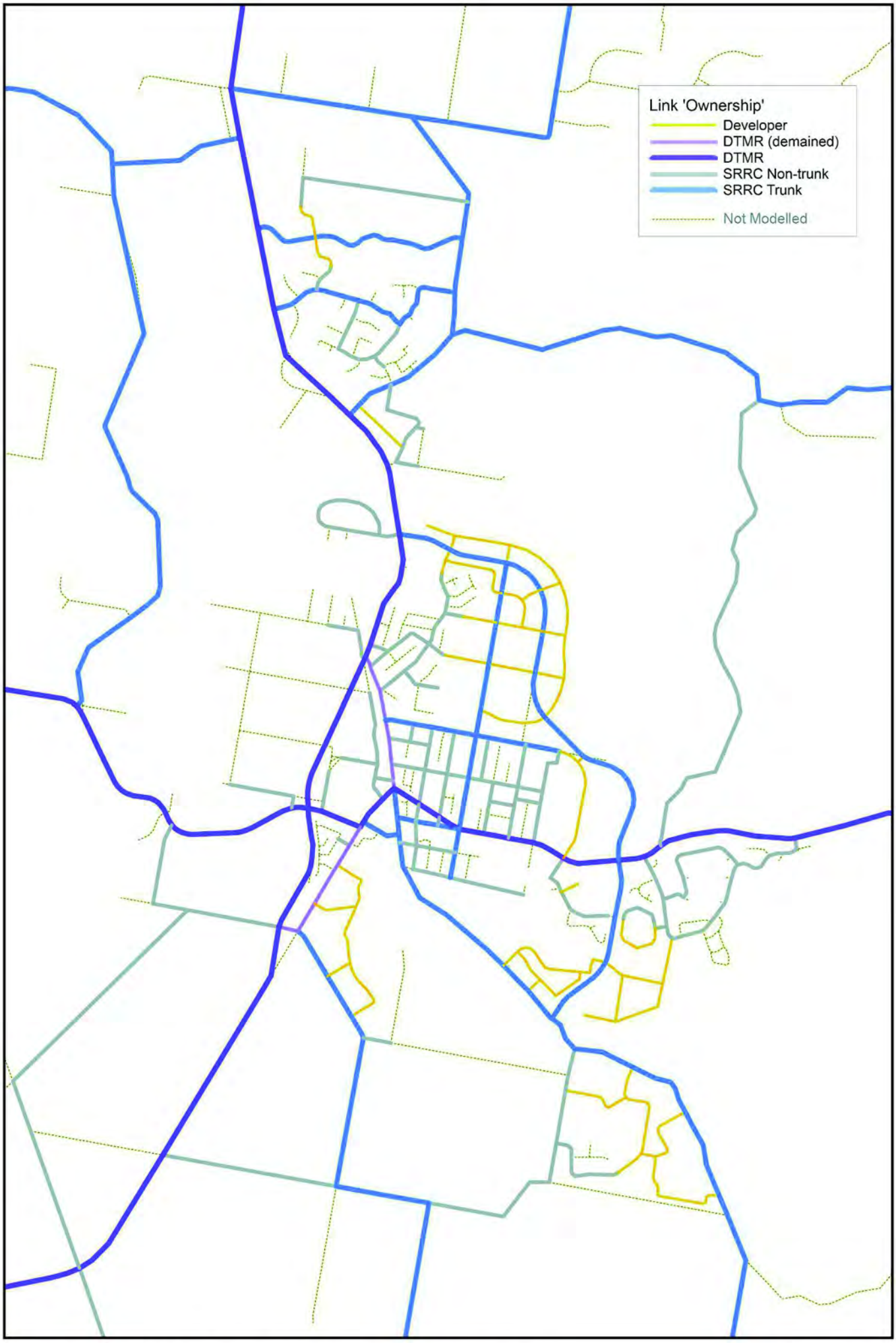
Change in Daily Traffic, 2051 (Network #3 vs. Network #2) **Figure 5-7a**



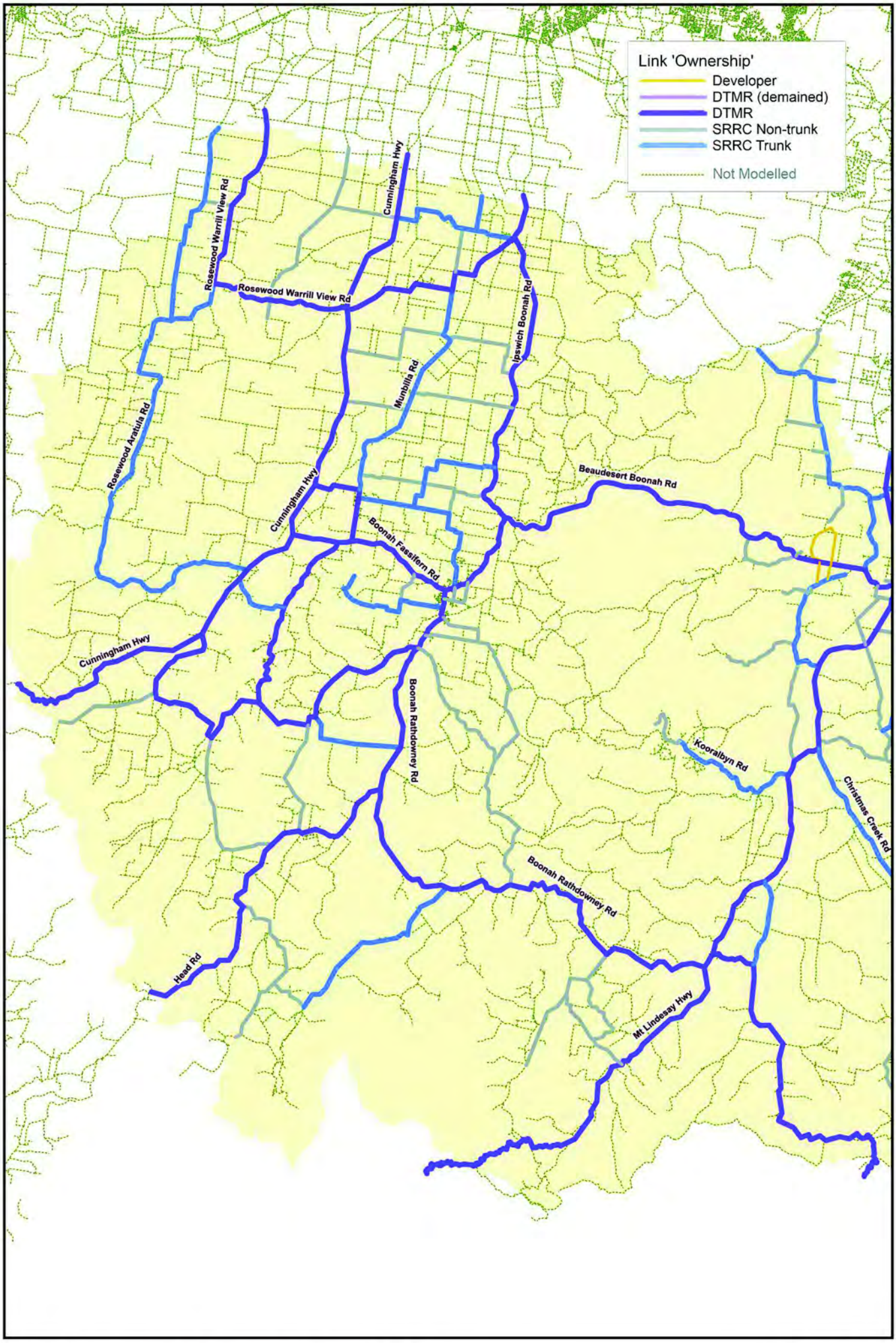
2051 Test Network #3 - Average Weekday Traffic & Maximum V/C Ratios **Figure 5-7b**



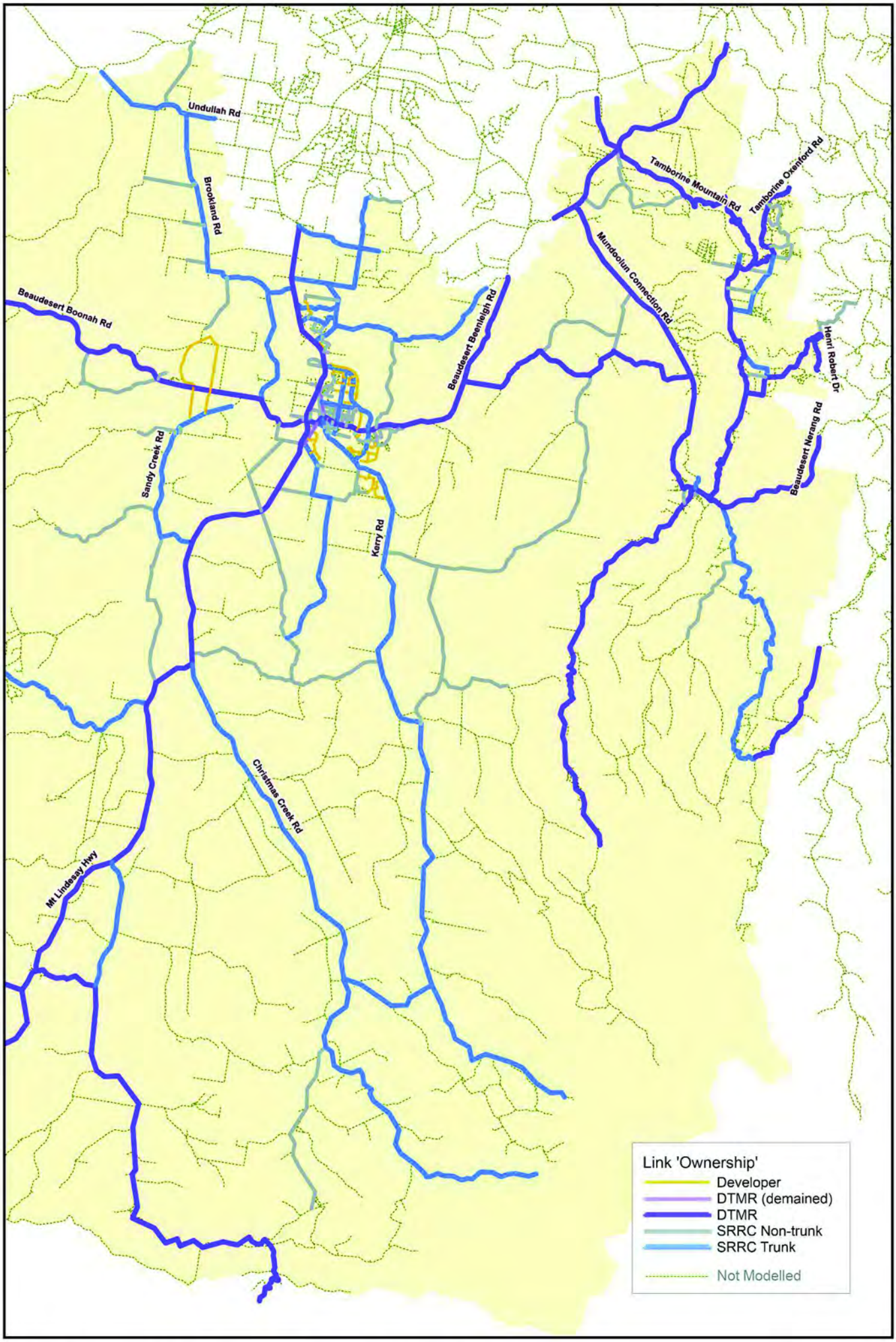
Anticipated 'Minimum' Network, 2051 - 'As Modelled' Road Hierarchy **Figure 5-8**



Road 'Ownership' Categories - Beaudesert Township **Figure 6-1a**



Road 'Ownership' Categories - Boonah Area **Figure 6-1b**



Road 'Ownership' Categories - Beaudesert Area **Figure 6-1c**

1.0 RATE BUILD-UPS

The following table schedules out the rate per m for various Council Standards Sections for both Greenfield and Brownfield developments:

Table 1: Rate Schedule

Item	Typical Road Section	Greenfield $/m (Excl. GST)	Brownfield $/m (Excl. GST)
1.0	Drawing R-09 Typical Cross Section Residential St.		
1.1	Trunk collector, connector street (with footpath)	3,760	3,730
1.2	Access street, collector street (with footpath)	2,370	2,310
1.3	Access place (without footpath)	1,660	1,600
2.0	Drawing R-10 Typical Cross Section Rural Rd – Class 4		
2.1	Class 4A, rural connector (without footpath)	1,480	1,390
2.2	Class 4B, rural collector (without footpath)	1,370	1,230
3.0	Drawing R-11 Typical Cross Section Rural Rd – Class 5		
3.1	Class 5A, rural access (without footpath)	1,270	1,170
3.2	Class 5B, rural access (without footpath)	1,270	1,170
3.3	Class 5C, rural access (without footpath)	1,170	1,060
3.4	Class 5D, rural access (without footpath)	1,030	920
4.0	Drawing R-13 Concrete Path Residential Areas		
4.1	2500 Shared path	480	470
4.2	1500 Footpath	410	390

Note:

1. Above brownfield rates exclude for traffic management / side tracks that is necessary for sites of this nature. Refer to Appendix A for a range of traffic management costs to be added to above rate for a more realistic opinion of cost. The extra amount to be added has to be assessed on a site by site basis.
2. Other site specific requirements like bulk earthworks, major / high density site clearance requirements etc. and exclusions listed in Section No.4.0 of the report need to be taken into consideration when using above rates to derive estimate for specific developments
3. Above rates exclude GST, include Preliminaries, Contingency and Consultant Fees
4. See Section 3.0 for inclusions and assumptions made in deriving the rate build-up and Section No.4.0 for the exclusions

Breakdown of each of the above rates is included in Appendix A

Extract from Davis Langdon Report **Figure 6-2**

Table 6-3a

Ref.	Sector Name	Total Value of Capacity Consumed by Trips associated with each Sector						
		SR Trunk	SR Other	DTMR	Demained	Developers		All Roads
1.0	Beaudesert	$ 30,278,195	$ 6,558,874	$ 38,322,619	$ 1,744,740	$ 7,569,037		$ 84,473,464
2.1	Beaudesert Rural	$ 6,705,786	$ 2,115,138	$ 14,463,832	$ 207,766	$ 323,084		$ 23,815,606
2.2	Bromelton	$ 8,957,734	$ 2,673,454	$ 26,801,985	$ 57,776	$ 3,943,498		$ 42,434,446
2.3	Kooralbyn	$ 3,486,054	$ 956,577	$ 5,605,590	$ 85,784	$ 156,999		$ 10,291,004
3.1	Tamborine	$ 192,993	$ 464,024	$ 4,525,586	$ 3,813	$ 28,323		$ 5,214,739
3.2	Tamborine Mtn.	$ 1,742,089	$ 2,478,355	$ 10,548,646	$ 3,145	$ 30,485		$ 14,802,721
3.3	Canungra	$ 383,310	$ 156,683	$ 5,278,935	$ 3,180	$ 27,548		$ 5,849,656
3.4	Canungra Rural	$ 1,623,836	$ 685,099	$ 8,550,943	$ 1,466	$ 36,367		$ 10,897,711
4.1	Boonah Township	$ 813,798	$ 654,444	$ 9,461,510	$ 1,453	$ 44,297		$ 10,975,501
4.2	Kalbar	$ 212,569	$ 322,907	$ 2,824,175	$ 25	$ 12,248		$ 3,371,923
4.3	Balance of Boonah	$ 3,922,975	$ 2,997,588	$ 32,945,255	$ 4,522	$ 117,421		$ 39,987,760
	All Scenic Rim Trip-ends	**$ 58,319,339**	**$ 20,063,143**	**$ 159,329,076**	**$ 2,113,669**	**$ 12,289,306**		**$ 252,114,533**
	External Trip-ends	$ 20,612,630	$ 6,528,210	$ 115,901,819	$ 301,328	$ 1,748,666		$ 145,092,652
	Total Consumed	$ 78,931,969	$ 26,591,353	$ 275,230,894	$ 2,414,997	$ 14,037,972		$ 397,207,185
	Total Network Value	$ 449,849,970	$ 357,761,120	$ 972,874,970	$ 4,870,000	$ 89,289,100		$ 1,874,645,160
	Value of Spare Capacity	$ 370,918,001	$ 331,169,767	$ 697,644,076	$ 2,455,003	$ 75,251,128		$ 1,477,437,975
	% Spare	82%	93%	72%	50%	84%		79%

Table 6-3b

Ref.	Sector Name	Proportion of Total Value Consumed, by each Sector, on each Road Type						
		SR Trunk	SR Other	DTMR	Demained	Developers		All Roads
1.0	Beaudesert	36%	8%	45%	2%	9%		100%
2.1	Beaudesert Rural	28%	9%	61%	1%	1%		100%
2.2	Bromelton	21%	6%	63%	0%	9%		100%
2.3	Kooralbyn	34%	9%	54%	1%	2%		100%
3.1	Tamborine	4%	9%	87%	0%	1%		100%
3.2	Tamborine Mtn.	12%	17%	71%	0%	0%		100%
3.3	Canungra	7%	3%	90%	0%	0%		100%
3.4	Canungra Rural	15%	6%	78%	0%	0%		100%
4.1	Boonah Township	7%	6%	86%	0%	0%		100%
4.2	Kalbar	6%	10%	84%	0%	0%		100%
4.3	Balance of Boonah	10%	7%	82%	0%	0%		100%
	All Scenic Rim Trips	**23%**	**8%**	**63%**	**1%**	**5%**		**100%**

Values of Road Space Consumed by Sector, 2031 — Figure 6-3

Table 6-4a

Ref.	Sector Name	Value of Capacity Consumed per Trip, by Sector					
		SR Trunk	SR Other	DTMR	Demained	Developers	All Roads
1.0	Beaudesert	$ 227	$ 49	$ 288	$ 13	$ 57	$ 634
2.1	Beaudesert Rural	$ 343	$ 108	$ 740	$ 11	$ 17	$ 1,219
2.2	Bromelton	$ 270	$ 80	$ 807	$ 2	$ 119	$ 1,277
2.3	Kooralbyn	$ 188	$ 51	$ 302	$ 5	$ 8	$ 554
3.1	Tamborine	$ 20	$ 49	$ 475	$ 0	$ 3	$ 547
3.2	Tamborine Mtn.	$ 46	$ 66	$ 279	$ 0	$ 1	$ 392
3.3	Canungra	$ 22	$ 9	$ 307	$ 0	$ 2	$ 340
3.4	Canungra Rural	$ 104	$ 44	$ 550	$ 0	$ 2	$ 701
4.1	Boonah Township	$ 35	$ 28	$ 410	$ 0	$ 2	$ 476
4.2	Kalbar	$ 46	$ 70	$ 613	$ 0	$ 3	$ 732
4.3	Balance of Boonah	$ 88	$ 68	$ 743	$ 0	$ 3	$ 901
	All Scenic Rim Trips	**$ 164**	**$ 56**	**$ 447**	**$ 6**	**$ 34**	**$ 707**

Table 6-4b

Ref.	Sector Name	Vehicle Trip-ends		Growth (2011-2031)	Assumed Charge Rate per Trip-end	Maximum Potential Revenue (2011-2031)
		2031	2011			
1.0	Beaudesert	133,140	35,532	97,608	$227	$ 22,197,622
2.1	Beaudesert Rural	19,544	10,103	9,441	$343	$ 3,239,307
2.2	Bromelton	33,231	869	32,362	$270	$ 8,723,488
2.3	Kooralbyn	18,575	2,634	15,941	$188	$ 2,991,714
3.1	Tamborine	9,525	6,472	3,053	$20	$ 61,857
3.2	Tamborine Mtn.	37,801	23,843	13,958	$46	$ 643,267
3.3	Canungra	17,184	3,681	13,503	$22	$ 301,200
3.4	Canungra Rural	15,554	8,961	6,593	$104	$ 688,282
4.1	Boonah Township	23,072	12,073	10,999	$35	$ 387,960
4.2	Kalbar	4,604	1,662	2,942	$46	$ 135,837
4.3	Balance of Boonah	44,360	17,656	26,704	$88	$ 2,361,557
	All Scenic Rim Trips	356,589	123,486	233,103		$ 41,732,091

Values of Road Space Consumed per Trip, 2031

Figure 6-4

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19-06-2013

Logan Area Transport Study

Model Validation and Existing Network Performance Report

Prepared for

Department of Transport and Main Roads (Qld)

Travel Demand Forecasting & Transport Infrastructure Planning

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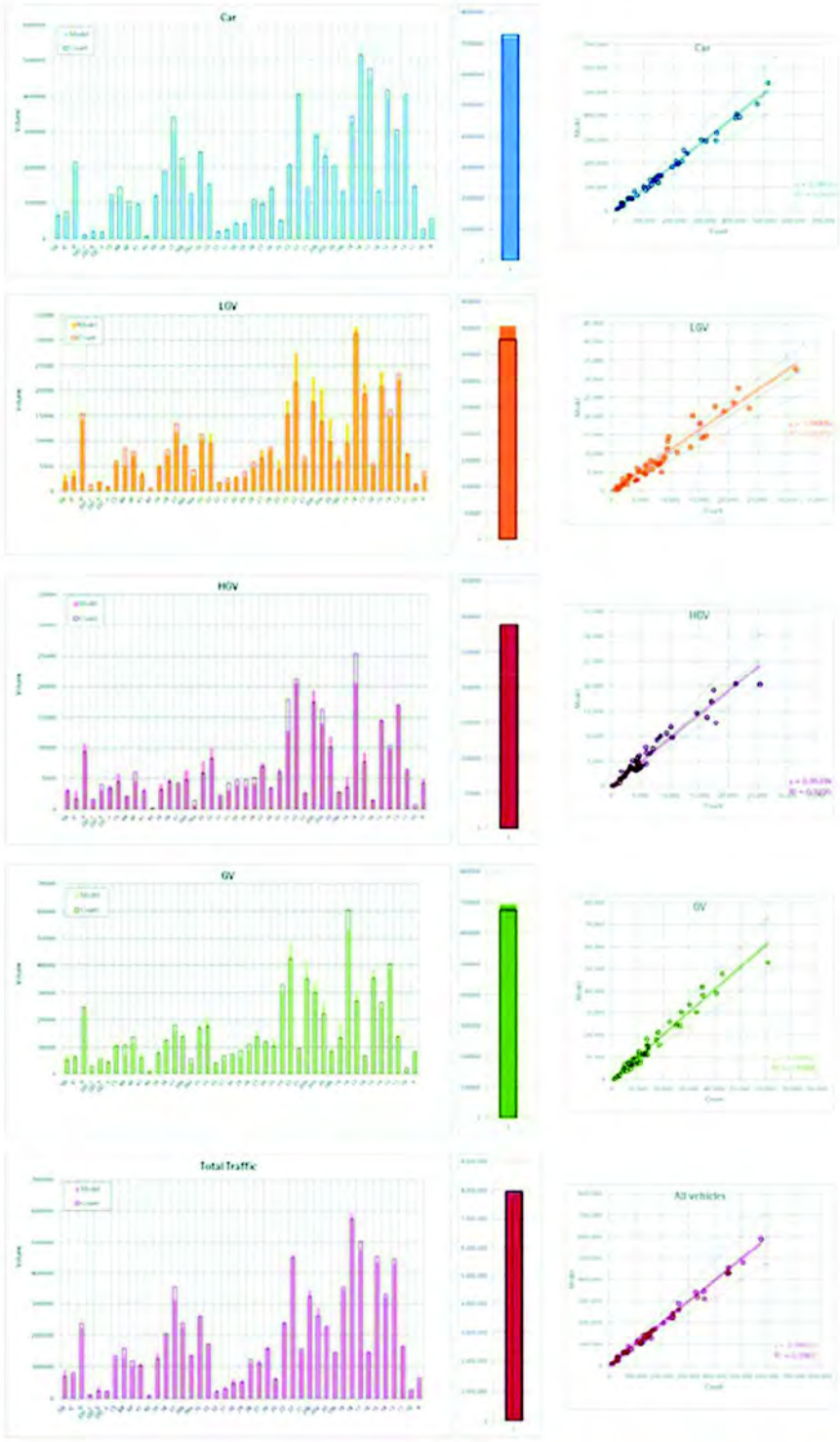


Figure 3-3: Modelled and observed 24 hour car and commercial vehicle traffic volumes across SEQ screenlines (2011/2012)

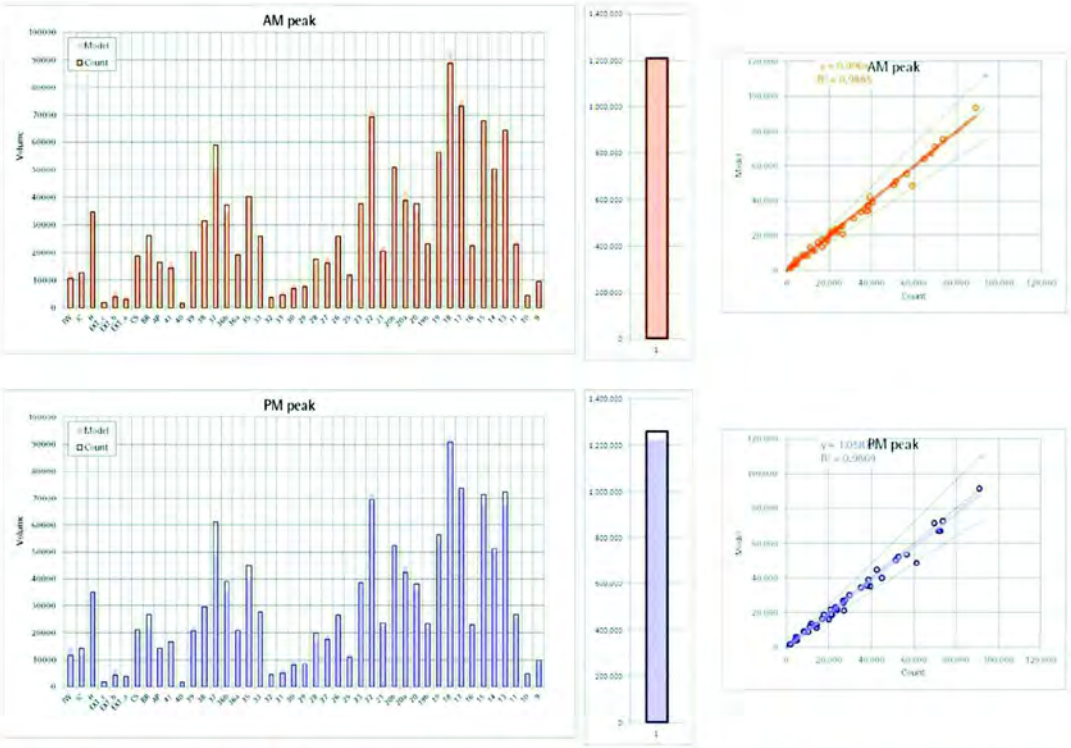


Figure 3-4: Modelled and observed AM and PM peak flows across SEQ screenlines (2011/2012) (all vehicles)

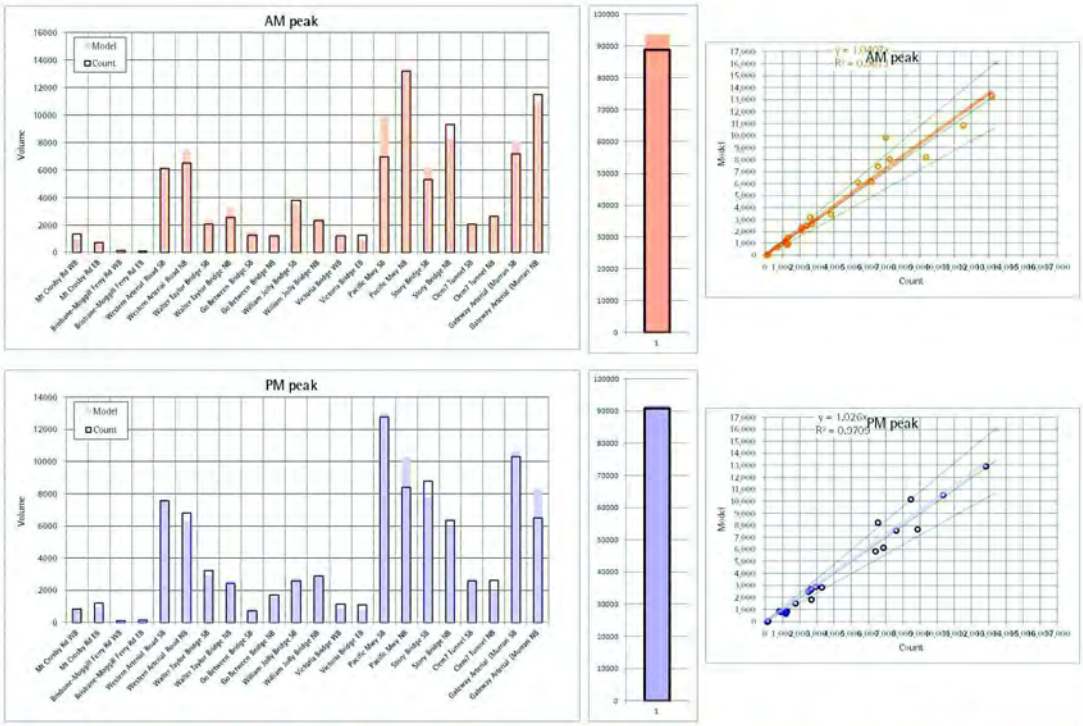


Figure 3-5: Modelled and observed peak period vehicle volumes crossing the Brisbane River (2011/2012) (all vehicles)

3.6 Validation of modelled public transport patronage

Table 3-5 below provides a comparison of the Zenith model's estimates of 2011 weekday peak period train boardings (total of both peaks) by line and the results of a survey undertaken by QR in the third quarter of 2011. Only peak direction services were surveyed – i.e. inbound AM peak and outbound PM peak.

Table 3-5: Modelled and surveyed weekday peak period rail boardings in 2011

Total AM/PM Passenger Boardings				
Line	Count	Model	Abs Diff	% Diff
CBD	53,271	55,854	2,583	5%
Beenleigh	12,189	15,456	3,267	27%
Gold Coast	3,841	4,764	923	24%
Caboolture	19,186	21,502	2,316	12%
Sunshine Coast	862	1,642	780	91%
Shorncliffe	3,353	3,039	-314	-9%
Airport	503	726	223	44%
Doomben	436	477	39	9%
Ferny Grove	8,148	9,696	1,548	19%
Ipswich	16,410	19,015	2,605	16%
Rosewood	261	1,519	1,258	482%
Springfield	1,212	365	-847	-70%
Cleveland	8,355	10,455	2,100	25%
Total	128,023	144,505	16,482	13%

In overall terms the modelled peak period passenger boardings are 13% higher than those reported by the QR survey. This level discrepancy is not surprising. The QR surveys involved only one day of survey for each service. They counted the number passengers boarding and alighting each train, at each stop, during the busy peak periods. VLC's experience is that such manual counting is likely to lead to under, rather over enumeration of the passenger demand. Only one "load surveyor" was allocated to each carriage, which makes accurately counting both boarding and alighting passengers for two carriage doors a challenging task – particularly at the busy stations.

Also, the QR rail passenger survey was conducted over a 5 week period, the last week of which was during school holidays, which will result in some degree of under-reporting of normal weekday passenger demands.

Generally speaking the model is reflecting the relativity of the passenger boardings across the various rail lines during the peaks.

The model appears to be currently over-estimating the Beenleigh Line rail boardings by 27% and the Gold Coast Line boardings by 24%.

Figure 3-13 provides a schematic map of the current Brisbane Southern Region bus network. This network covers all bus routes serving the LATS study area, as well as those operating close to the fringe of the area. Table 3-6 (that follows Figure 3-13) compares modelled bus passenger boardings with TransLink provided boarding for each of the routes shown in Figure 3-13.

Table 3-6: Modelled and reported bus passenger boardings for the Brisbane Southern Region

			Frequency (buses/hr)			Boardings		
Route	Name	Operator	AM	MD	PM	Observed	Modelled	abs
140	140 City - Browns Plains Buz Via Sunnybank	Brisbane Transport	10.0	8.0	10.0	6,299	6,340	+41
141	P141 City - Browns Plains Rocket Pre-Paid Only	Brisbane Transport	3.5	-	3.0	604	276	-328
142	P142 City - Browns Plains Bullet Pre-Paid Only	Brisbane Transport	2.5	-	2.5		86	
145	145 Browns Plains - Griffith Uni	Brisbane Transport	1.0	0.3	1.0	129	137	+8
150	150 City - Browns Plains Buz Via Runcorn	Brisbane Transport	8.5	9.9	14.0	9,192	9,181	-11
282	282 Logan Hyperdome - Redland Bay	Veolia Transport	2.0	0.9	1.5	419	419	+1
283	283 Logan Hyperdome - Redland Bay	Veolia Transport	-	1.1	0.5	50	116	+66
534	534 Browns Plains - Springfield Lakes Via Carole Park/Forest Lake/Heathwood	Park Ridge Transit	2.0	2.0	2.0	446	360	-86
[illegible]	S40 City - Beaudesert Via Ipswich Rd/Beaudesert Rd/Mt Lindesay Hwy	Park Ridge Transit	1.0	0.4	0.5	288	284	-4
541	541 Browns Plains - Greenbank Via Boronia Heights	Park Ridge Transit	2.5	2.0	2.5	330	296	-34
542	542 Browns Plains - Park Ridge Via Boronia Heights/Regents Park	Park Ridge Transit	1.5	2.1	3.0	392	479	+87
543	543 Browns Plains - Heritage Park Via Regents Park	Park Ridge Transit	3.5	2.0	2.5	183	260	+78
544	544 Browns Plains - Forestdale Via Forestdale/Hillcrest	Park Ridge Transit	1.5	1.0	1.5	111	93	-18
545	545 Browns Plains - Garden City Via Woodridge/Logan Central	Park Ridge Transit	3.5	4.0	4.0	1,935	1,316	-619
546	P546 City - Park Ridge Pre-Paid Only	Park Ridge Transit	2.5	0.1	3.0	682	388	-294
550	550 Browns Plains - Kingston - Springwood	Logan City Bus Service	4.0	4.0	4.0	1,414	1,637	+223
551	551 City - Crestmead	Logan City Bus Service	2.0	-	1.5	443	845	+403
	552 Logan Hyperdome - Kingston	Logan City Bus Service	4.0	2.9	4.0	926	462	-464
553	553 Logan Hyperdome - Beenleigh	Logan City Bus Service	2.0	2.0	2.0	606	488	-117
554	554 Garden City - Logan Central	Logan City Bus Service	4.0	2.0	3.5	973	285	-688
555	555 City - Logan Hyperdome Via Sth Busway	Logan City Bus Service	8.5	8.6	10.0	5,047	5,760	+713
556	556 Loganlea - Griffith University Busway	Logan City Bus Service	1.0	2.0	2.0	119	103	-16
557	557 Garden City - Springwood	Logan City Bus Service	0.5	0.3	1.0	8	8	-1
558	558 Logan Central Loop Hail & Ride	Logan City Bus Service	-	0.6	-	17	10	-7
560	560 Logan Hyperdome - Grand Plaza	Logan City Bus Service	4.0	4.0	4.0	1,819	2,116	+297
	561 City - Crestmead	Logan City Bus Service	2.0	-	1.0	386	761	+375
562	562 Logan Hyperdome - Beenleigh	Logan City Bus Service	2.0	2.0	2.0	424	382	-42
563	563 Logan Hyperdome - Beenleigh	Logan City Bus Service	2.0	2.0	2.0	755	338	-417
565	565 Logan Hyperdome - Beenleigh	Logan City Bus Service	1.5	2.0	1.5	239	510	+271
	566 City - Windaroo	Logan City Bus Service	2.5	-	1.5	583	988	+405
567	567 Beenleigh - Ormeau Via Yatala	Surfside Buslines	2.0	1.7	2.5	259	820	+561
	P569 City - Logan Hyperdome Pre-Paid Only	Logan City Bus Service	4.0	0.1	2.5	577	195	-383
570	Cornubia - Logan Hyperdome 570	Logan City Bus Service	0.5	1.0	0.5	105	184	+79
571	571 City - Loganholme	Logan City Bus Service	2.5	-	2.0	441	599	+158
572	572 Logan Hyperdome - Springwood Via Daisy Hill/Shailer Park	Logan City Bus Service	1.5	3.9	3.5	652	494	-157
573	573 City - Logan Hyperdome	Logan City Bus Service	5.5	-	4.5	1,059	1,179	+120
574	574 Logan Hyperdome - Springwood	Logan City Bus Service	1.0	2.0	2.0	219	195	-24
575	575 City - Logan Hyperdome	Logan City Bus Service	2.5	-	1.5	448	514	+66
576	576 Garden City - Springwood	Logan City Bus Service	1.0	2.0	1.5	319	230	-89
577	577 City - Springwood	Logan City Bus Service	3.0	-	2.5	425	584	+159
578	578 Garden City - Springwood	Logan City Bus Service	1.0	2.0	1.5	276	268	-8
579	579 City - Springwood	Logan City Bus Service	2.5	-	1.5	337	361	+24
581	P581 City - Springwood Pre-Paid Only	Logan City Bus Service	4.0	0.1	3.0	540	104	-436
						40,474	40,451	-23

1. Background

In 2015, Veitch Lister Consulting (VLC) completed a review of Scenic Rim's medium and long-term transport infrastructure needs. While the study report identified a 'desired' road network to serve Beaudesert Township in 2031, it also identified that the intersection of Brisbane Street and William Street, in the centre of town, would become overloaded by 2031. Accordingly, VLC suggested that mitigation measures be investigated.

In July 2016, after considering the 'engineering' options, Council asked VLC to model and assess the benefits of closing the southern leg of the intersection (i.e. Brisbane St). Council asked that VLC assess the impacts of the street closure against two 'base' scenarios, in 2031:

1. Being the 'Anticipated' 2031 Network, as documented in Section 4.4 of VLC's report
2. A 'Do minimum' 2031 network, involving less road improvements than assumed in 1.

Subsequently, VLC were also asked to report on the impacts and potential operational benefits of an 'east-west link', passing just to the south of the town centre utilising Albert Street.

VLC's traffic forecasts and assessments of these various road network scenarios were reported in *Technical Note #1 (Supplementary Assessments of Brisbane Street / William Street Intersection)*, dated 16 August 2016. While some of the issues and assessments presented in that document are repeated herein, it is suggested that readers be familiar with the content of that previous Technical Note.

2. The Purpose of this Technical Note (#2)

In October 2016, Council asked VLC to comment on the operational merits of a list of other potential road network configurations that had been identified by Council. This Technical Note is in response to that request.

No new modelling has been undertaken to produce this Technical Note. It merely examines the issues and traffic management needs of central Beaudesert Township.

3. An Overview of the Problem

Before reviewing the list of network options provided by Council, it is appropriate to examine the intersection in more depth and to consider the causes of its future deficiency. The layout of the intersection and the current signal phasing are shown in **Figure 3-1**. It can be noted that:

a) The skewed nature of the eastern and western legs of the intersection result in:
   - Longer N-S pedestrian crossings (requiring longer pedestrian 'clearance times')
   - A broader intersection in the N-S direction (requiring some longer 'all red' periods)
   - An inability to safely allow opposed right turns for the east and west approaches

b) All approaches and exits accommodate parallel parking in close proximity to the intersection. This on-street parking can impede traffic flows / operational efficiency.

c) The adjacent footpaths are not generous, and provide little scope for reconfiguring or adding lanes without property acquisition.

d) Due to the layout constraints and the turning movement patterns, it is currently necessary to adopt four separate signal phases (effectively providing one phase for each approach). This is inefficient, but necessary in the circumstances.

The performance of the intersection, operating under the traffic demands observed during a survey undertaken by TTM Consulting on 7 March 2010, has been assessed using *SIDRA Intersection*. As summarised below, the highest traffic demands in an hour were actually during the post-school period, and the AM commuting peak was more severe than the PM peak. This is normal for 'suburban' situations, with schools in the vicinity.

- AM Peak (8:00 – 9:00 am) = 1,465 vehicles entering the intersection
- Max. Hour (2:45 - 3:45 pm) = 1,568 vehicles entering the intersection
- PM Peak (4:15 - 5:15 pm) = 1,380 vehicles entering the intersection

The results of the SIDRA analysis are summarised in **Table 1**, below.

Table 1: Performance of Brisbane Street / William Street Intersection (7 March 2010)

Year / Scenario	AM Peak	Post-School	PM Peak
Degree of Saturation	0.65	0.68	0.63
Maximum Queue Length(1)	90m	80m	75m

Notes: 1. 95 percentile queue length (maximum of all approaches)

This shows that the intersection was operating reasonably comfortably, at 68% of its capacity, in the worst case 'post-school' period. The maximum queue lengths were not excessive, either.

By 2031, traffic volumes passing through the intersection are forecast to increase significantly, even with Stage 1 of the (western) Town Centre Bypass established. With the 'Anticipated' network established, traffic volumes entering the intersection in the peak periods would increase by 72-77%. However, if it was only possible to implement the 'Do Minimum' network (as shown in **Figure 3-2**) by 2031, then traffic volumes entering the intersection in the peak periods would increase by a further 14-16%.

As could be expected, these levels of traffic growth exceed the capacity of the intersection. The performance of the intersection, operating under the design turning movements for these two scenarios are summarised (and compared with the 2010 performance) in **Table 2**, below.

Table 2: Performance of Brisbane Street / William Street Intersection (2031)

	AM Peak		Post-School		PM Peak	
Year / Scenario	DoS(1)	Max.Q(2)	DoS	Max.Q	DoS	Max.Q
2010 'Observed'	0.65	90m	0.68	80m	0.63	75m
2031 'Anticipated'	1.15	418m	1.19	722m	1.11	564m
2031 'Do Minimum'	1.28	544m	1.26	860m	1.17	636m

Notes: 1. Degree of Saturation
2. 95 percentile queue length (maximum of all approaches)

The above confirms that future traffic volumes would be well in excess of the intersection's capacity, and that queues (and delays) would be unacceptably large.

AustRoads traffic engineering guidelines recommend that intersections be designed to provide a Degree of Saturation of 0.90 or lower. With this target and, if the intersection's layout / phasing are not changed, then we need to find a way to reduce traffic volumes entering the intersection by approximately 32% if the 'Anticipated' network were in place, or by 42% if not.

Alternatively, an arrangement by which two or more of the major (aka 'critical') movements can flow in the same phase needs to be found. This could potentially be achieved by banning some or all of the right turn movements. (More on this later).

4. Previous Options Tested

In Technical Note #1, VLC presented assessments related to two potential remedial measures:

- A full closure of Brisbane Street, immediately south of the intersection. This was tested relative to both the 'Anticipated' and the 'Do Minimum' networks.
- Implementation of a southern bypass of the town centre, referred to as the East-West Link. This was tested relative to the 'Anticipated' network only.

The concept for the east-west link was to extend Albert Street westward, across Jubilee Park, to connect with Telemon Street at its intersection with Bromelton Street. The local road hierarchy that would result, if this link was established (within the framework of the 'Anticipated' network), is shown in **Figure 4-1**.

The operational performance of these three network options is summarised (and compared with the 'base' scenarios) in **Table 3** on the next page.

Table 3: Performance of Brisbane Street / William Street Intersection (Options)

Year / Scenario	AM Peak		Post-School		PM Peak	
	DoS[1]	Max.Q[2]	DoS	Max.Q	DoS	Max.Q
2010 'Observed'	0.65	90m	0.68	80m	0.63	75m
2031 Anticipated	1.15	418m	1.19	722m	1.11	564m
2031 Anticipated (X)[3]	1.18	437m	1.08	498m	1.02	300m
2031 Do Minimum	1.28	544m	1.26	860m	1.17	636m
2031 Do Minimum (X)[3]	1.27	573m	1.22	582m	1.15	500m
2031 East-West Link	0.72	92m	0.67	81m	0.66	84m

Notes: 1. Degree of Saturation
2. 95 percentile queue length; = maximum of all approaches
3. With Brisbane Street (south) closed.

The above shows that the closure of Brisbane Street would only provide a small improvement in operating conditions; whereas implementing the East-West Link would provide satisfactory conditions, comparable with those observed in 2010.

In modelling the East-West Link, no bans on turning movements were implemented at the Brisbane Street / William Street intersection. The operational benefit at the intersection is therefore achieved by attracting much of the critical east-west through movements away to the southern route, as shown by the forecast change in volumes in **Figure 4-2**.

By comparison, the change in traffic routing forecast by the street closure scenarios (see **Figure 4-3** for example) results in some of the affected traffic still passing through the intersection, via Anna Street and William Street, instead.

5. The New Options

Council have considered the information in Technical Note #1 and have identified a number of alternative traffic management components. They are:

- An alternative alignment of the E-W link, which passes south of the public swimming pool, as shown in **Figure 5-1**, and
- A preference toward closing Brisbane Street (South) in one direction only, such that the Fire Station would have direct egress to the north, and
- Potential reductions in the speed limit on selected street segments in the town centre.

The various traffic management options that Council have now asked VLC to consider are:

Table 4: List of Additional Traffic Management Options for Consideration

No.	Base Network	E-W Link Variation	Street Closure (Brisbane Street South)	Competing Speed Limit[1]
1	Anticipated	E-W Link v2	1-way (south to north)	40 kph
2	Anticipated	E-W Link v2	1-way (south to north)	60 kph
3	Anticipated	None	1-way (south to north)	40 kph
4	Anticipated	None	1-way (south to north)	60 kph
5	Do Minimum	E-W Link v1	1-way (south to north)	60 kph
6	Do Minimum	E-W Link v2	1-way (south to north)	40 kph
7	Do Minimum	E-W Link v2	1-way (south to north)	60 kph
8	Do Minimum	E-W Link v2	Closed	60 kph
9	Do Minimum	E-W Link v2	Open	60 kph
10	Do Minimum	None	1-way (south to north)	60 kph
11	Do Minimum	None	Closed	60 kph
12	Do Minimum	None	Open	60 kph

Notes: 1. Speed limit on William St (Brisbane St to Albert St), Telemon St (Bromelton St to Brisbane St) and Brisbane St (Jane St to Selwyn St)

6. VLC's Initial Comments

VLC have considered the various options, and more particularly the traffic management elements that they comprise, and have the following comments:

a) Speed Limit Reductions

Reducing the speed limit on William Street and Telemon Street, from 60 kph to 40 kph, would not be sufficient on its own to deter enough traffic into using the current 'informal' bypass (Albert Street – Brisbane Street – McKee Street). NB. Average speeds on William Street would be less than 20 kph in the peak periods of 2031, anyway, due to the queue back from the intersection. Nevertheless, VLC believe it could be appropriate to reduce the speed limit on William Street (and parts of Brisbane Street) to 50 kph, on safety grounds, irrespective.

b) Options without an East-West Link

We suggest that there is no point in modelling / assessing any further networks without some form of East-West Link. The previous assessments indicate that it is the only effective means by which to reduce traffic volumes entering the Brisbane/William Street intersection by the 32-42% percentage needed.

c) Closures of Brisbane Street (South)

We found that closing Brisbane Street (South) completely will not alleviate conditions at the intersection, as the majority of the affected traffic would simply reroute via Anna Street and William Street, and would still pass through the intersection.

The new suggestion to convert this section of Brisbane Street to 1-way northbound will still provide four approaches and accommodate almost all of the existing movements, and so will still require four signal phases. NB. Making this street segment 1-way southbound (with provision for emergency vehicles to trigger a northbound phase) would allow the number of signal phases to reduce to three. However, most of the affected northbound traffic would still travel via Anna Street and William Street.

d) The alternative alignment of the East-West Link

The alternative alignment, as provided by Council in a sketch, is reproduced with reasonable accuracy in **Figure 6.1**. VLC have concerns about the implicit geometric features of this alignment:

- As drawn, the link would intersect with Brisbane Street at approximately 45 degrees. Design guidelines suggest that angles less than 75 degrees should be avoided. Such a low angle will create design problems in accommodating the swept paths for the acute right turn movements. The angle would also create problems with inter-visibility of traffic signals from different approaches.
- As drawn, the radius of the two reverse bends are about 100 metres. The minimum radius for a curve with a 60kph design speed and an adverse camber of 3%, as would exist on the departure side bends, is 200 metres for a new road (refer AustRoads' *Guide to Road Design (Part 3: Geometric Design), Table 7.10,* on page 159)

To alleviate these design and safety issues, this 'southern' alignment would need to adopt larger radii and would therefore need to impact on more properties.

7. VLC's Concluding Comments

As shown in Table 5 on the next page, VLC have effectively eliminated 10 of the 12 Council options. The underlying reasons for the various 'strike-outs' are:

- Given the potential funding issues, Council should be seeking a solution that works using the 'Do Minimum' network as the base.

- Any options relying solely on the Brisbane Street closure (or a 1-way variation) will not work on their own.
- If either of the East-West Links can be established to the required design standards and with acceptable property impacts, closures or part closures of Brisbane Street (South) don't need to be considered.

Table 5: Paring of the Additional Traffic Management Options

No.	Base Network	E-W Link Variation	Street Closure (Brisbane Street South)	Competing Speed Limit(1)
1	~~Anticipated~~	~~E-W Link v2~~	~~1-way (south to north)~~	40 kph
2	~~Anticipated~~	~~E-W Link v2~~	~~1-way (south to north)~~	60 kph
3	~~Anticipated~~	~~None~~	~~1-way (south to north)~~	40 kph
4	~~Anticipated~~	~~None~~	~~1-way (south to north)~~	60 kph
5	**Do Minimum**	**E-W Link v1**	**~~1-way (south to north)~~**	**60 kph**
6	Do Minimum	~~E-W Link v2~~	1-way (south to north)	40 kph
7	Do Minimum	~~E-W Link v2~~	1-way (south to north)	60 kph
8	Do Minimum	~~E-W Link v2~~	Closed	60 kph
9	Do Minimum	E-W Link v2	Open	60 kph
10	Do Minimum	~~None~~	~~1-way (south to north)~~	60 kph
11	Do Minimum	~~None~~	~~Closed~~	60 kph
12	Do Minimum	~~None~~	Open	60 kph

Notes: 1. Speed limit on William St (Brisbane St to Albert St), Telemon St (Bromelton St to Brisbane St) and Brisbane St (Jane St to Selwyn St)

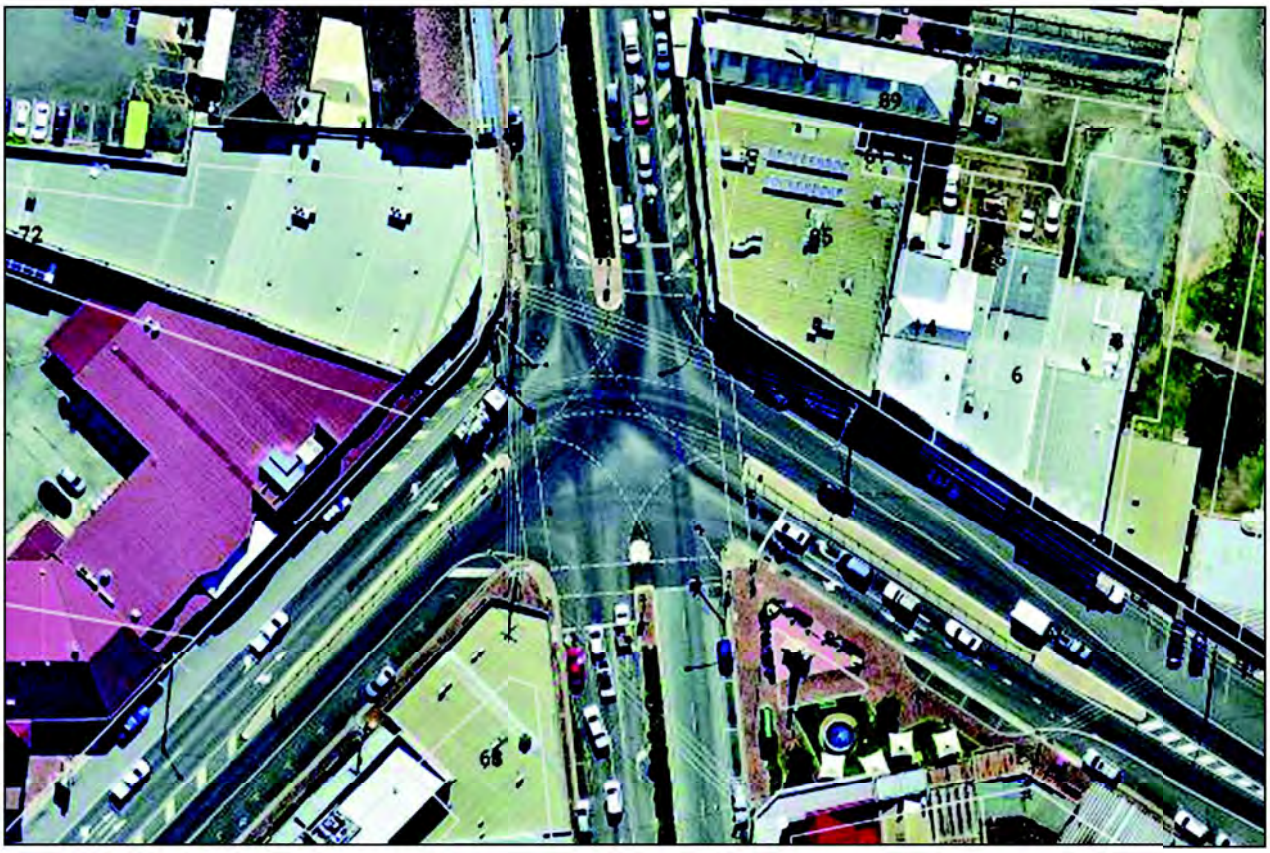
VLC's suggested assessments are:

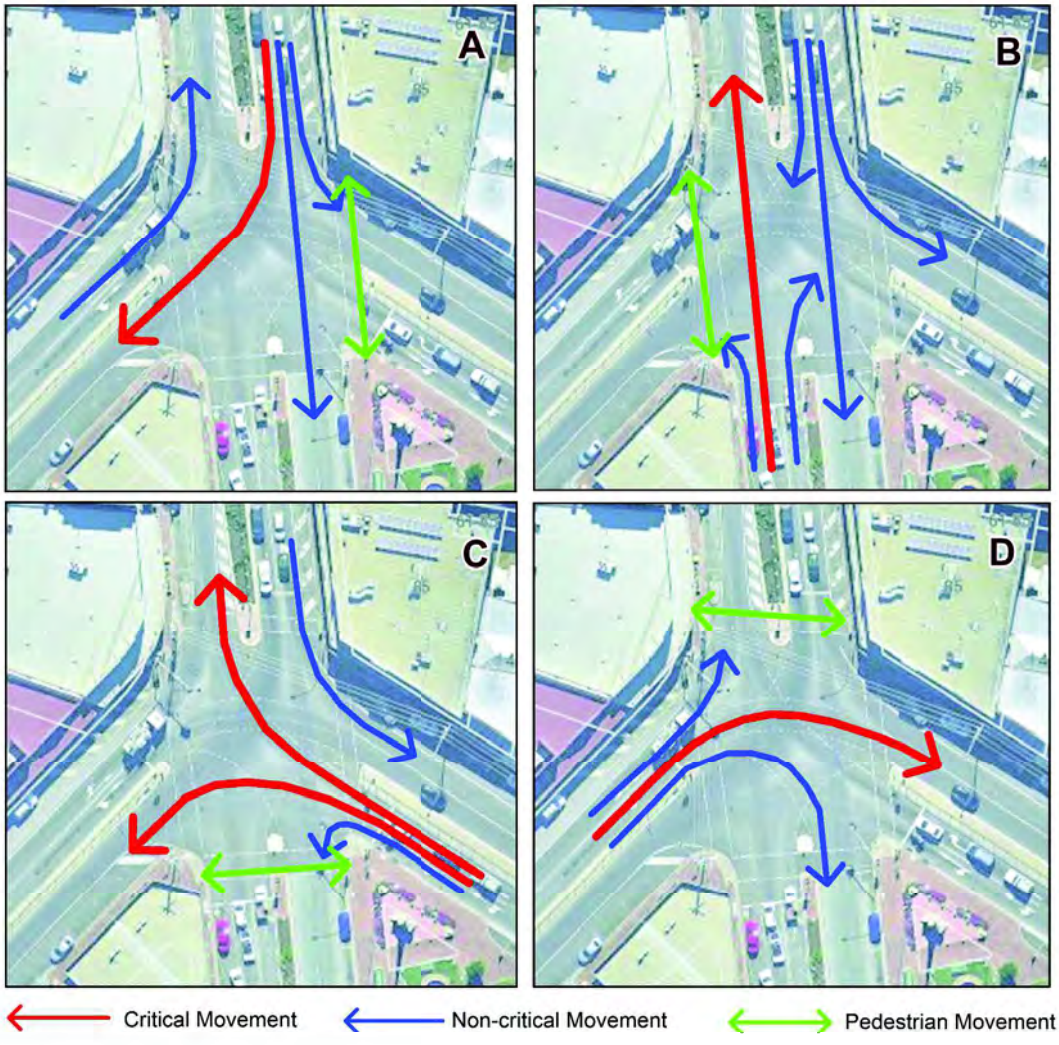
a) Northern East-West Link - If the northern alignment has not been ruled out, then it would be useful to confirm that it provides satisfactory performance within the framework of the 'Do Minimum' network.

b) Southern East-West Link - If a new southern alignment, which meets design guidelines and has acceptable property impacts can be identified, then also test this within the framework of the 'Do Minimum' network.

c) Partial right turn bans – it may be possible to effect a small improvement by banning the two minor right turns (west to south, and south to east). This need not be modelled, its performance benefits could be assessed using SIDRA only. VLC suspect that the potential reconfiguration of the signal phases still won't deliver the desired extent of improvement in DoS, though.

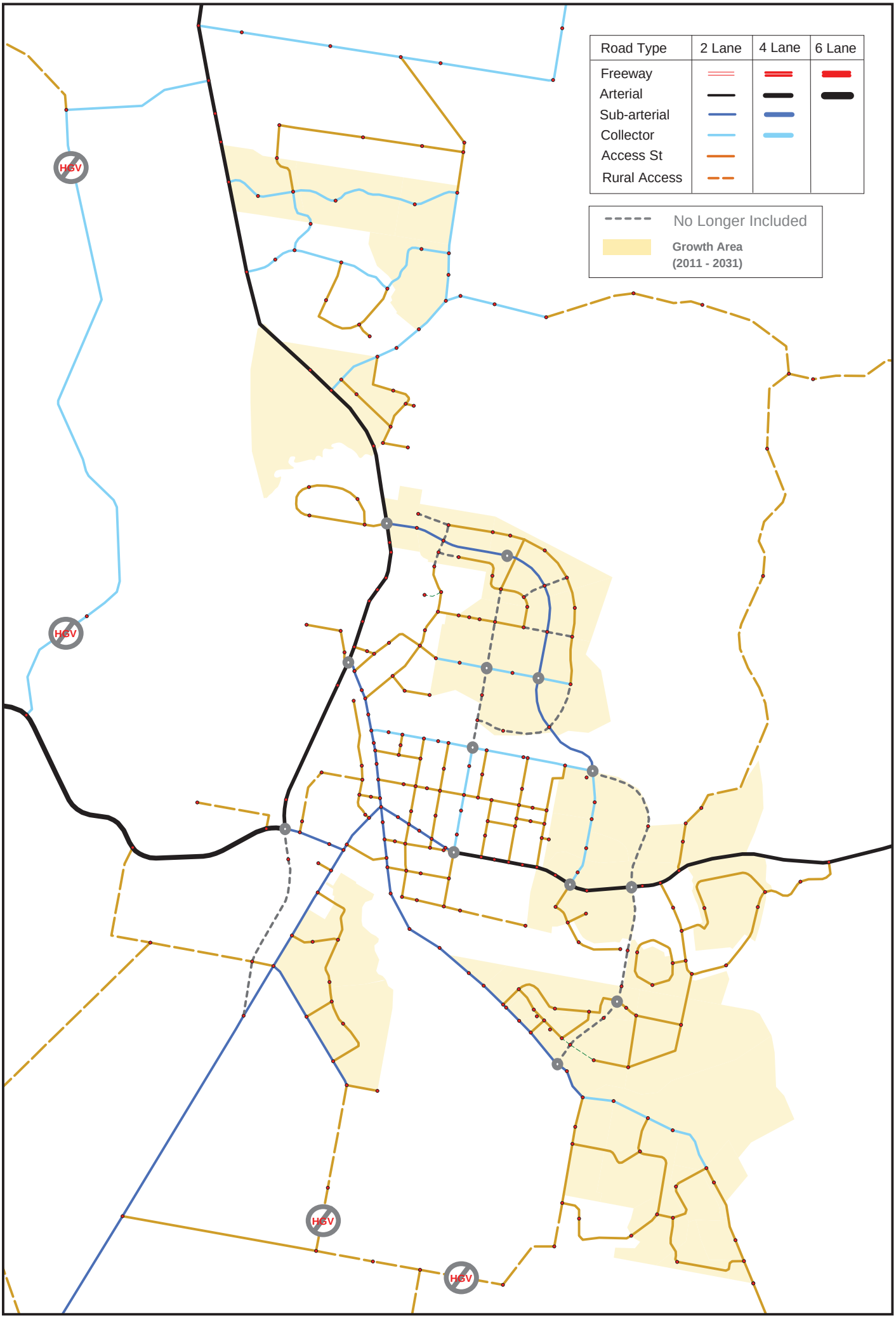
d) Full right turn bans – it may be possible to effect a significant improvement in capacity, by banning all four right turns, thereby allowing the intersection to potentially operate with just two phases. Although this arrangement might allow the critical intersection to work, it would transfer demands to other intersections and would be difficult to sign-post and would therefore be unpopular with drivers.





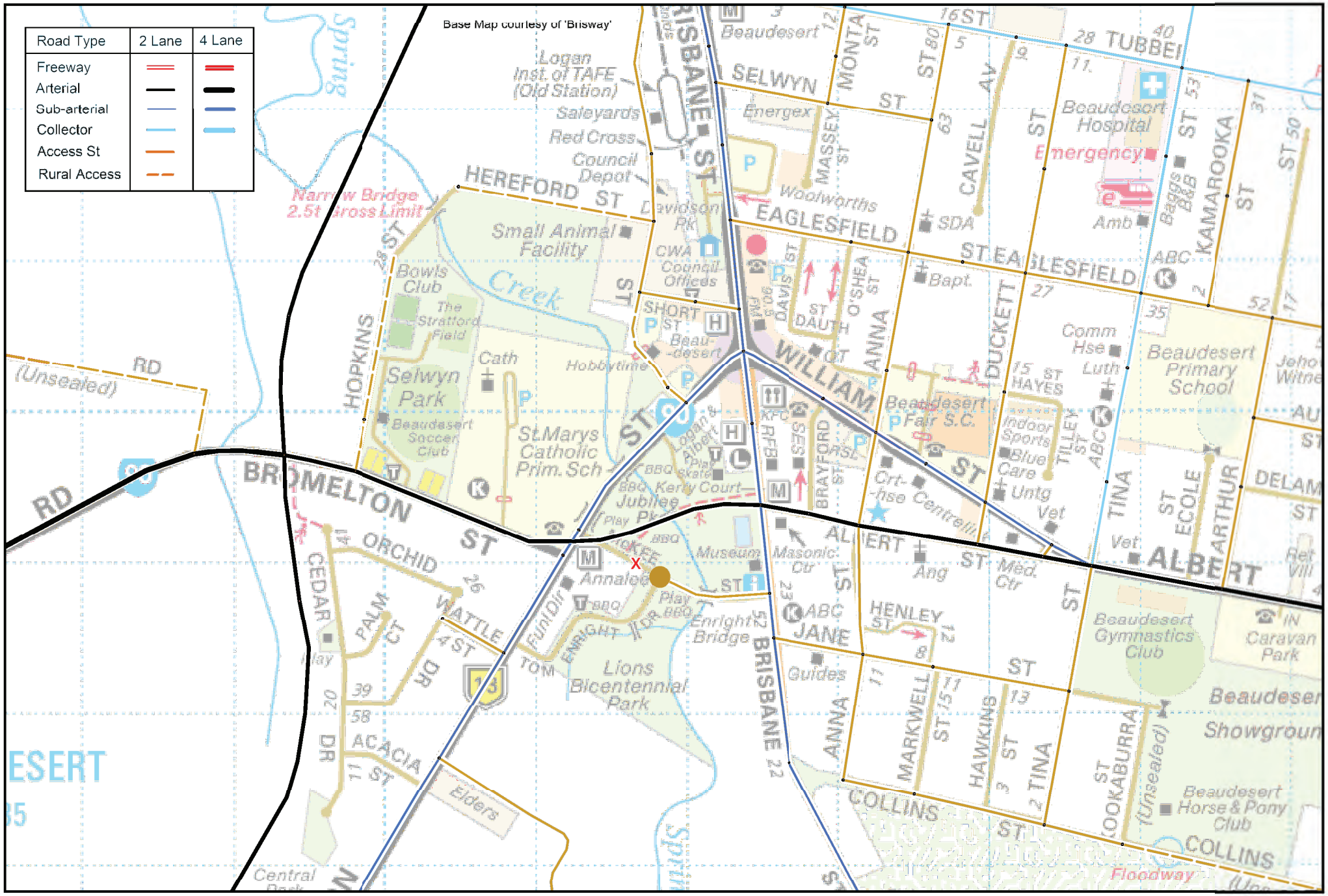
Intersection Layout & Signal Phases

Figure 3.1



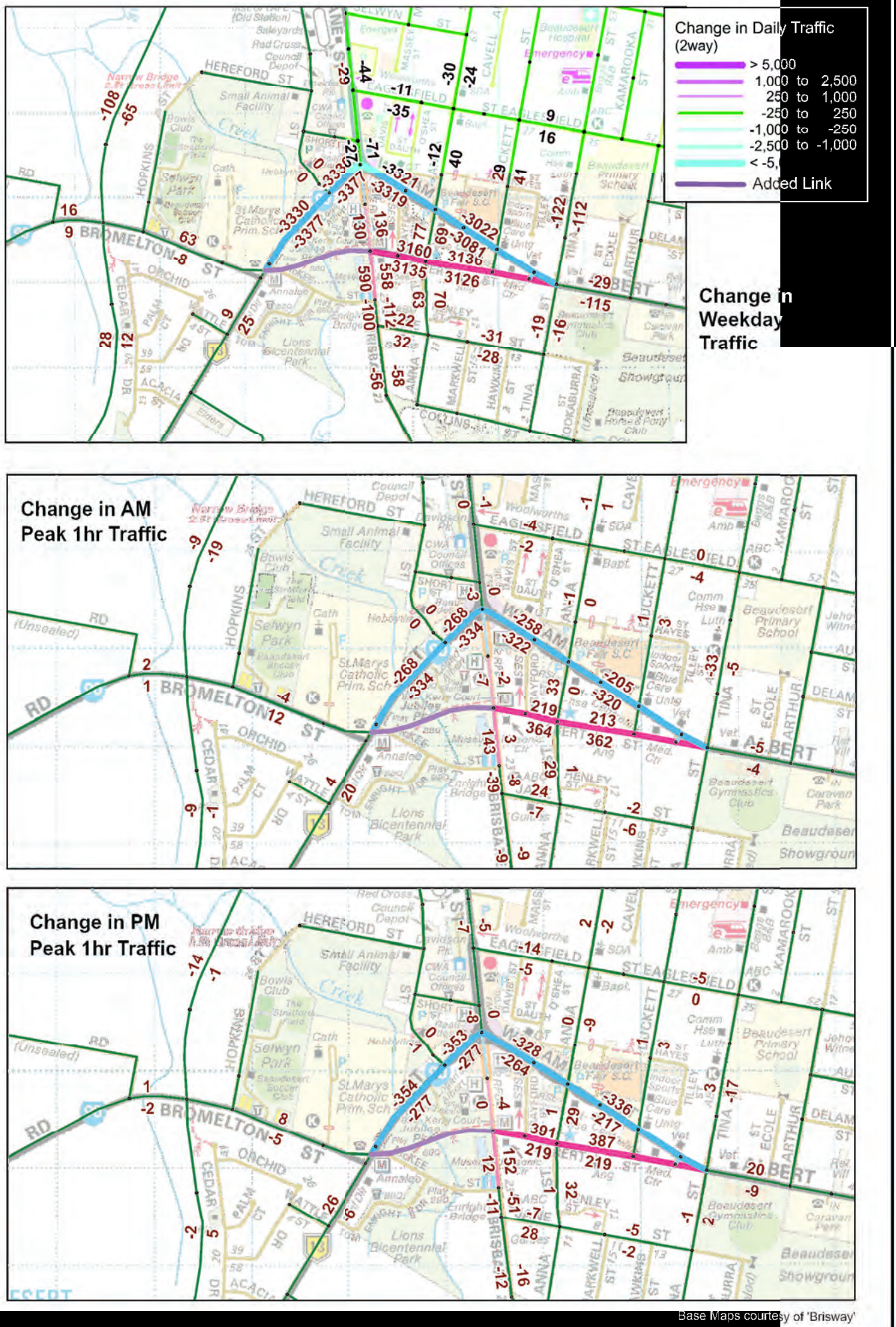
'As Modelled' Road Hierarchy -2031 'Do Minimum' Network

Figure 3-2



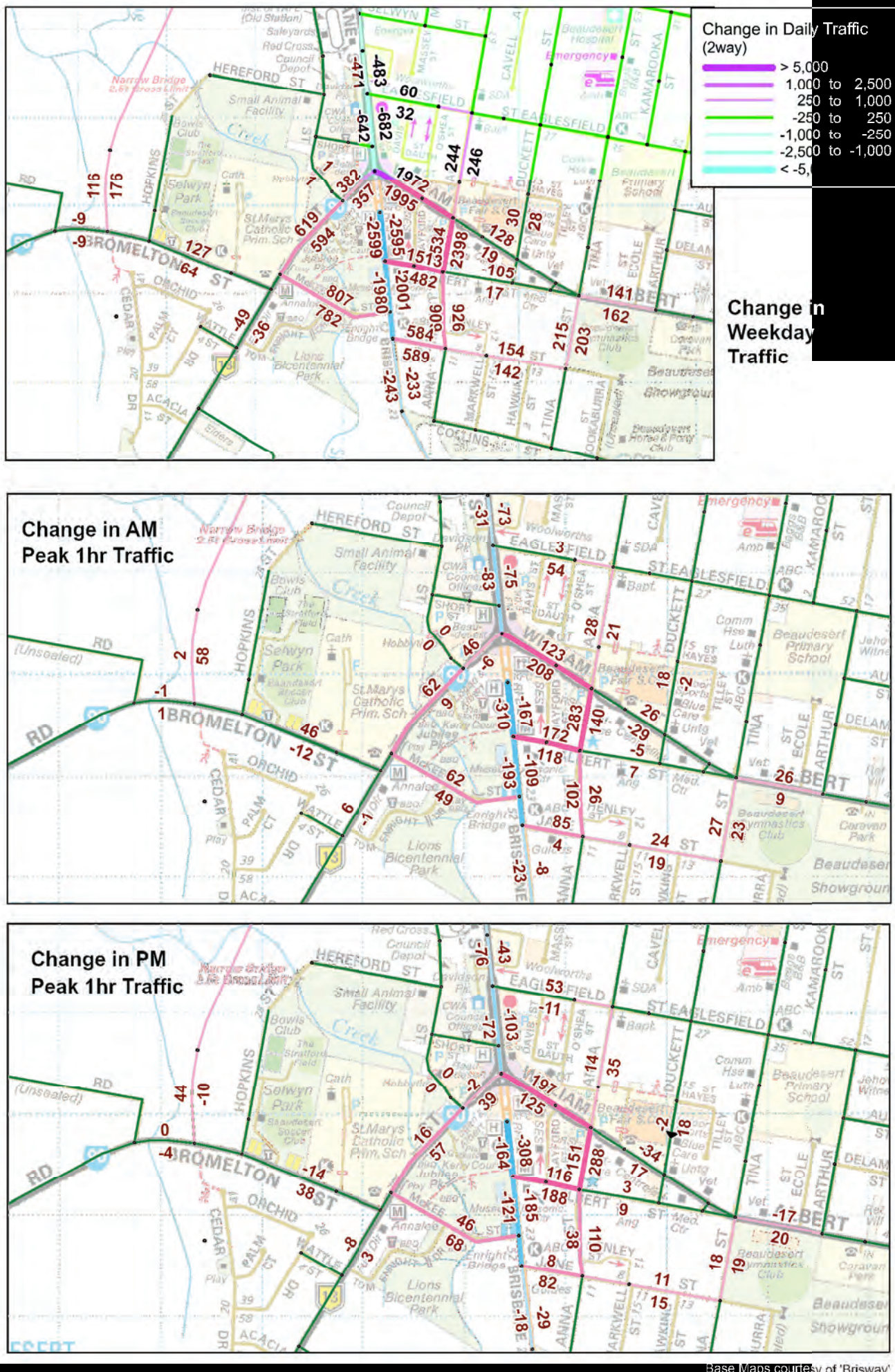
'As Modelled' Road Hierarchy -With 'East-West Link'

Figure 4-1



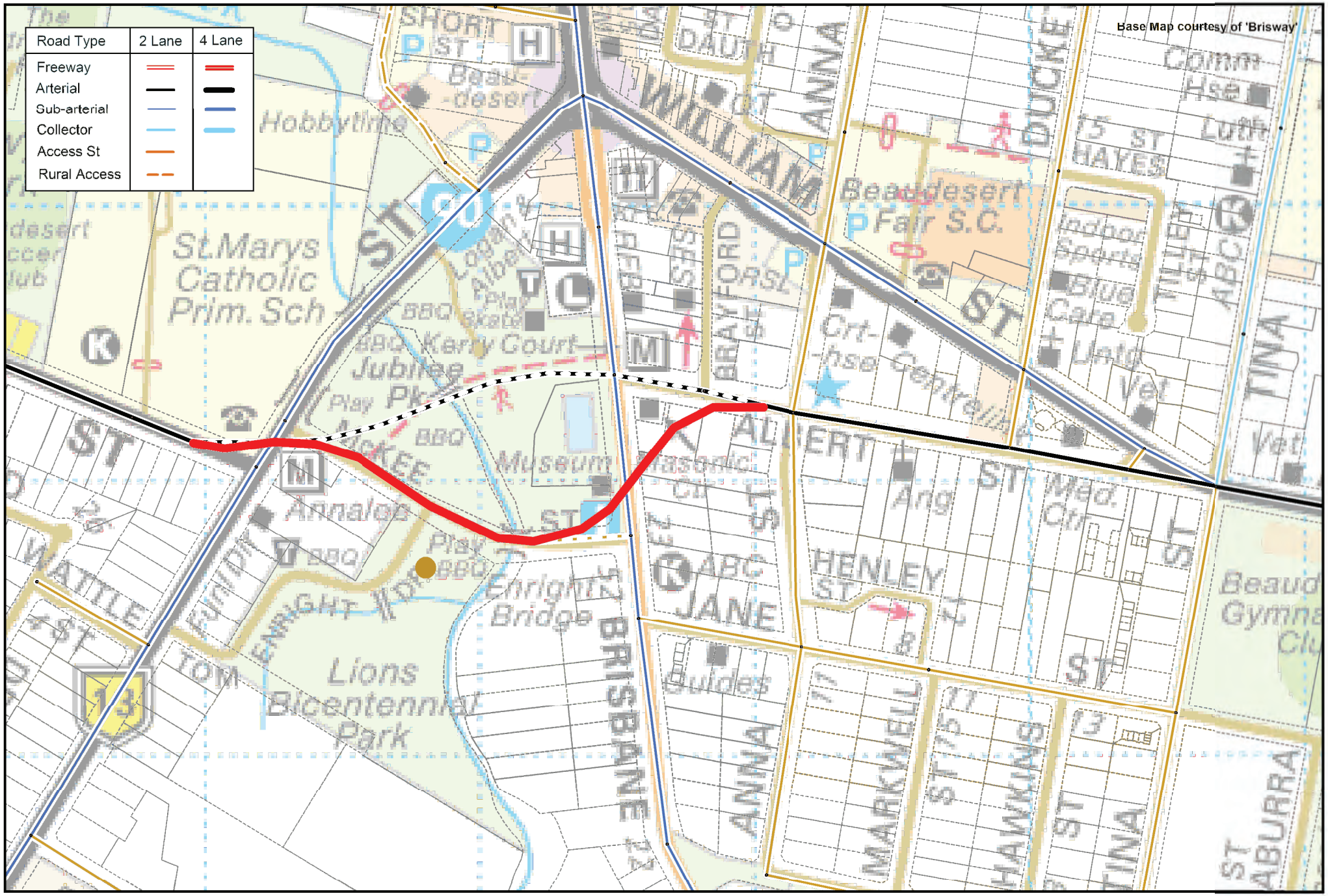
Forecast Changes in Traffic, 2031
('East-West Link' vs. 'Anticipated' Network)

Figure 4-2



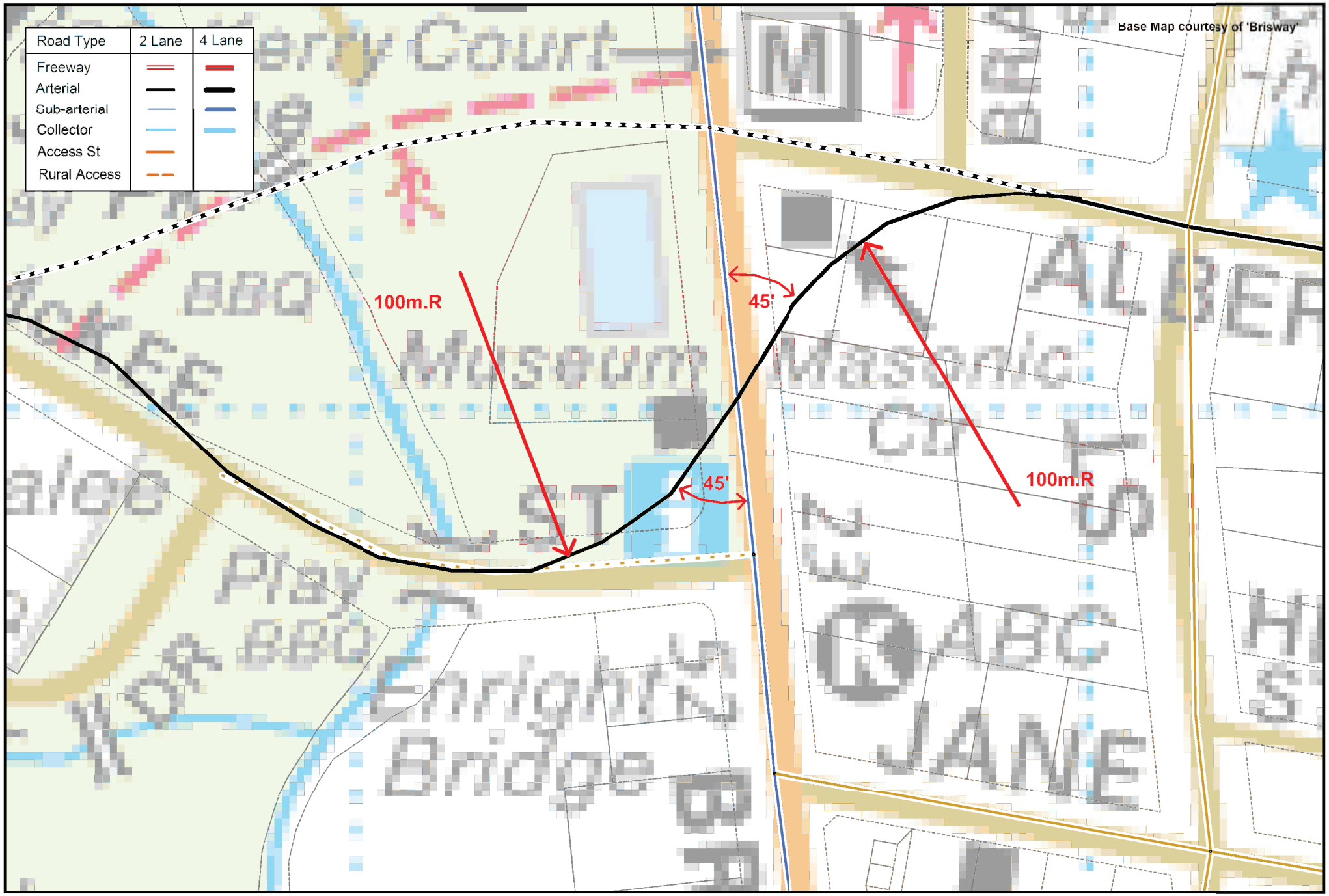
Forecast Changes in Traffic, 2031
('Brisbane St Closure' vs. 'Do Minimum' Network)

Figure 4-3



Suggested Alternative Alignment for the 'East-West Link'

Figure 5-1



Geometric Attributes of the Alternative 'East-West Link' Alignment **Figure 6-1**