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Strategic Transport Modelling of the Sunbury & Diggers Rest Growth Corridor (Sunbury South PSP 1074 & Lancefield Road PSP 1075)

Client // Metropolitan Planning Authority
Office // VIC
Reference // 15M1526000
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Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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1. Introduction

1.1 Background

The Lancefield Road and Sunbury South Precinct Structure Plans (PSP 1075 & 1074) are located in the Sunbury-Diggers Rest Growth Corridor in Melbourne's northwest. It is forecast that the corridor will grow to accommodate an additional population of up to 93,000 and 10,000 jobs, with the majority of the growth located in the two PSPs.

The two growth areas are almost completely undeveloped, and have limited to no transport network, with the exception of the Sunbury rail line that extends north-south through the two growth area precincts, as well as the key roads of Sunbury Road, Lancefield Road and Vineyard Road.

East-west connections through and around the Sunbury town centre are limited and with the introduction of the two PSPs, the MPA in conjunction with Hume City Council and VicRoads, are exploring the impact of the two potential Jackson Creek crossings in the north and south of the corridor – within PSP 1074 and 1075.

1.2 Purpose of this Report

GTA Consultants (GTA) has been engaged by the Metropolitan Planning Authority (MPA) to undertake strategic transport modelling to determine the anticipated demands on the transport network as a result of the two PSPs, and to test the impacts of potentially introducing new crossings of Jackson Creek. The outputs will be used to:

- Determine the suitability and necessity of the Jacksons Creek crossings for an interim and ultimate (2046) scenario.
- Understand the need for any further infrastructure to support the two PSPs.

This report is intended to provide the MPA with strategic modelling advice for the purpose of assisting with the transport planning for the PSP. All inputs and assumptions have been provided to GTA from the MPA through its stakeholders.

It is important to note that the preparation of this report has been completed to the best possible industry standards and expertise. GTA do not take any responsibility for the realisation of the assumptions (including forecast growth and design years) and associated outputs and should be read in this context.

1.3 References

In preparing this report, reference has been made to a number of background documents, including:

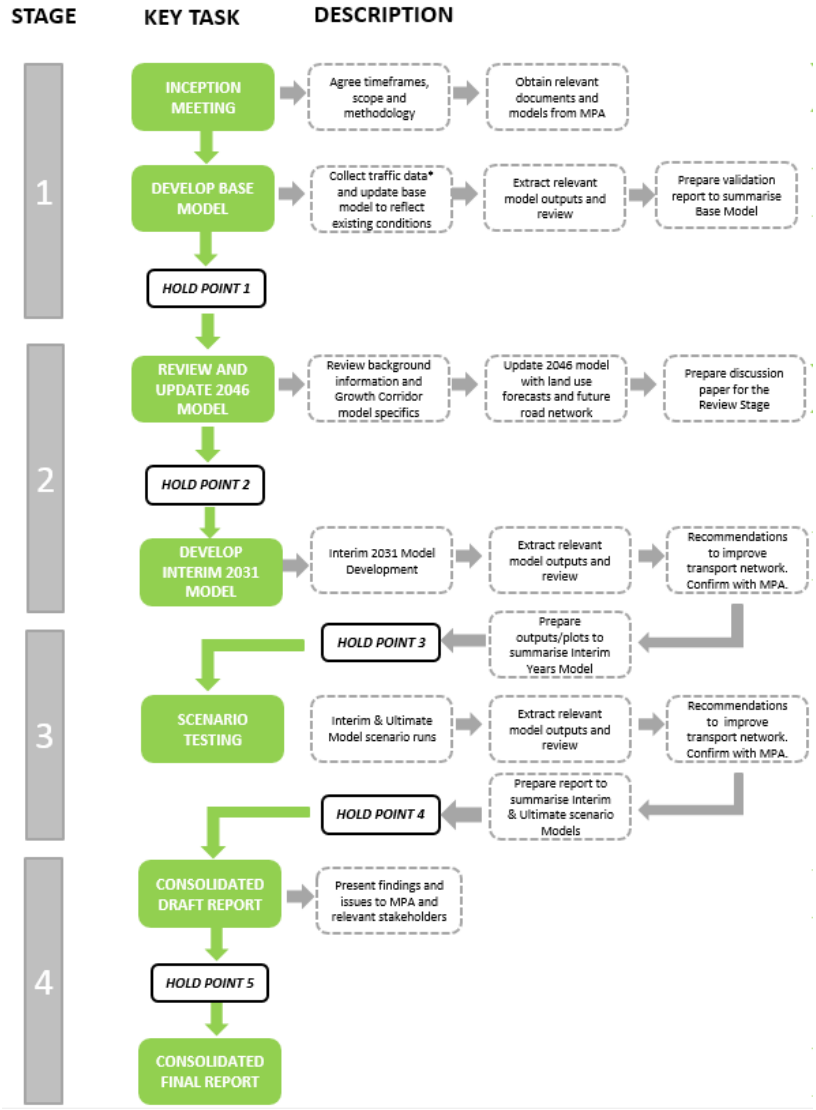
- plans for the PSP prepared by Metropolitan Planning Authority (MPA)
- VITM Northern Growth Corridor Model
- "*Sunbury & Diggers Rest Growth Corridor – Strategic Model Calibration and Validation Modelling*" prepare by GTA Consultants, dated July 2015
- Future public transport routes and frequencies provided by Public Transport Victoria (PTV)
- Future land use for the PSPs provided by MPA
- Future land use for Sunbury township provided by Hume Council
- various technical data as referenced in this report
- other documents as nominated.

2. Modelling Approach

2.1 Study Methodology

The study methodology was designed to meet the objective of the study and is based on a typical delivery model for these types of projects. Figure 2.1 summarises the methodology undertaken to complete the modelling for this study.

Figure 2.1: Study Methodology



The methodology was designed to be flexible having regard for the needs of project stakeholders, and its 'iterative' nature ensures that it can meet the objectives of the study.

2.2 Consultation

Key consultation activities and approvals were undertaken throughout the course of the project as follows:

- 8 January 2015 – inception meeting with MPA, VicRoads and Council to discuss methodology, project timeframe, receive data and confirmation of the version of the VITM Northern Growth Corridor model.
- 18 February 2015 – Variation to the project proposal which was to include zone desegregation to calibrate and validate existing model.
- 3 March 2015 – meeting with Department of Economic Development, Job, Transport and Resources (DEDJTR) to discuss VITM inputs, model calibration and validation and future testing.
- 10 March 2015 – meeting with MPA to discuss model progress and key issues.
- 2 April 2015 – meeting with MPA, VicRoads, Hume Council and DEDJTR to discuss model calibration and validation and agree on methodology to resolve key issues.
- 1 May 2015 – phone conference with Hume Council to discuss model fit for purpose.
- 12 June 2015 – meeting with MPA to discuss the 2046 option models.
- 13 June 2015 – Variation to the project proposal to include additional options.

3. Strategic Modelling Overview

3.1 General

A strategic model is a tool used to evaluate transport strategies. It is *not* generally used to *predict* exact volumes on roads (or patronage on public transport) rather it is used to analyse the travel *demand* given a specific scenario (and to compare against).

It is typically used for, but not limited to, the following:

- large corridor studies
- wide area impact studies
- major road projects
- major public transport projects
- different land use change scenarios
- travel demand change / mode shift etc
- policy settings (i.e. public transport fares, parking charges, toll charges etc.).

This project uses the model to determine the impacts of introduction of the Sunbury South and Lancefield Road PSPs, the Jacksons Creek crossings scenarios, as well as gaining understanding of a range of supporting infrastructure required for the future years.

3.2 Victorian Integrated Transport Model (VITM)

The Victorian Integrated Transport Model (VITM) is a tool developed by the Department of Transport (DoT) (now Department of Economic Development Jobs, Transport and Resources (DEDJTR)) to assist in the planning of road and public transport infrastructure in Victoria. VITM is a multimodal strategic model that uses future population, employment and land use data projections to forecast travel behaviour and the impacts of changes to the road and public transport networks. VITM contains all major freeways, main arterials and connector roads within the Melbourne Statistical Division.

The extent of the VITM network is shown graphically in Figure 3.1.

Figure 3.1: VITM Network Extent

The Victorian Integrated Transport Model (VITM) is a simplified representation of the real world and as such should be used as a decision guidance tool. The transport model's strengths lie in indicating the likely scale of changes brought about by the implementation of transport infrastructure schemes, land use changes or policy driven measures, and the use of outputs in a sensible and pragmatic manner.

The outputs of the transport model have to be interpreted in accordance with the design of the model, taking into account the complexity of the model and its probable robustness. The benefit of the Strategic Transport Model (i.e. VITM) is that having it calibrated at an existing situation, it can be used to forecast the effects of a variety of future land uses, transport infrastructure and/or policy changes on travel.

VITM's road structure consists of major freeway/highway links and key arterial roads within metropolitan Melbourne. Key links within the study area were added/refined in the model to ensure that the model is "fit for purpose" when assessing the options.

3.3 Northern Growth Corridor

Jacobs (formerly SKM) was commissioned by MPA (formerly GAA) to calibrate and refine the Department of Transport's (now DTPLI) Victorian Integrated Transport Model (VITM) for Melbourne's North Growth Corridor. The refinements to VITM included the following:

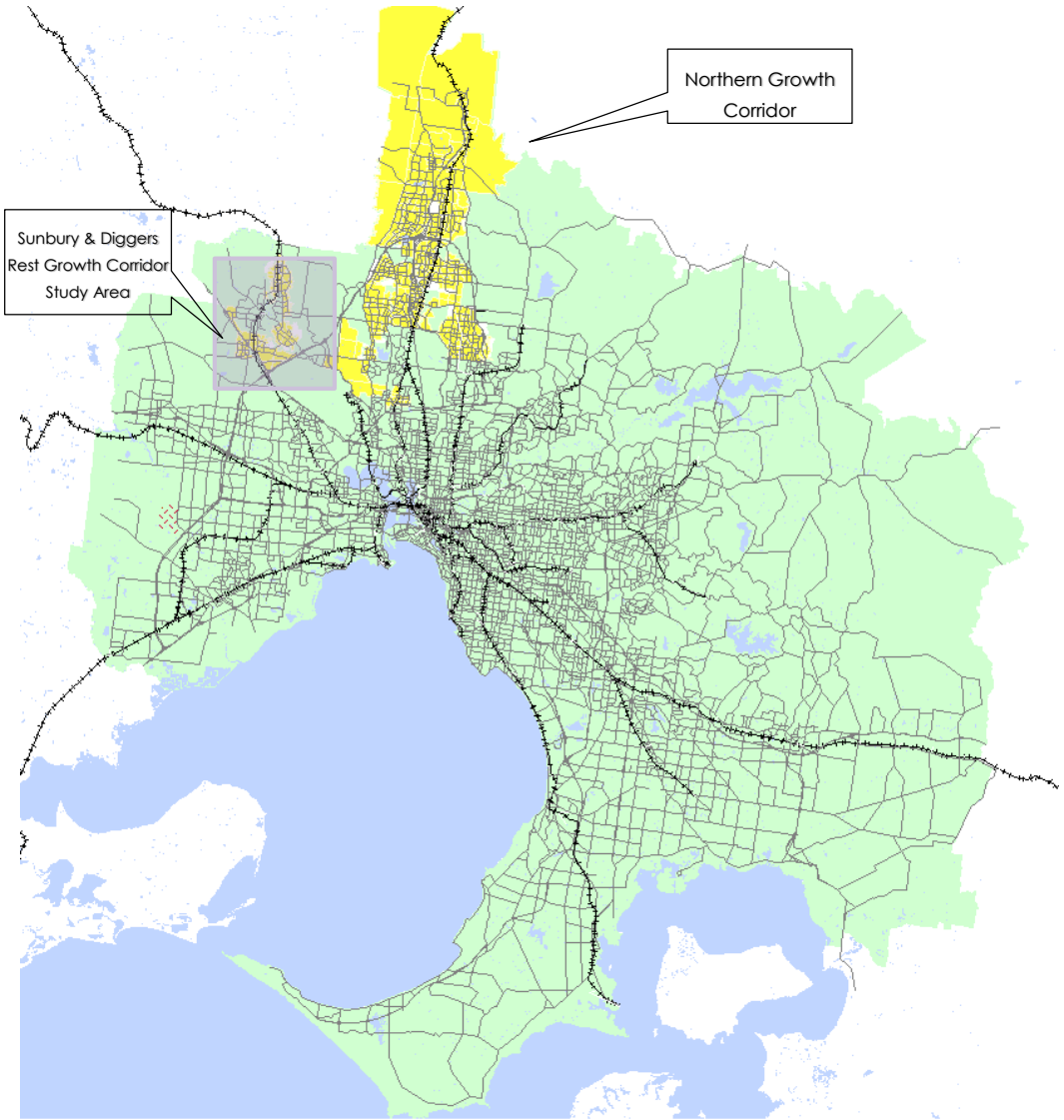
- disaggregation of the zone system within the growth corridor
- updates to the future modelled land use yields to reflect the level of growth predicted by the MPA within the corridor
- updates to the road network within the corridor.

The purpose of the project was to provide a strategic model of the North Growth Corridor which could be to understand the transport needs of the MPA, Hume City Council, Whittlesea City Council and VicRoads for projects (such as PSPs) within the corridor.

This model formed the basis for the VITM modelling undertaken as part of this package of work.

The context of the study area as it relates to the northern growth area and the study area for Sunbury and Diggers Rest Growth Corridor is shown in Figure 3.2.

Figure 3.2: VITM Zone Structure in the Context of the Northern Growth Corridor Model



3.4 Zone Connectors and Link Capacities

In the following detail of this report, reference is made to technical terms used within the strategic modelling process. These are discussed for reference below:

Zone Connectors

Zone connectors demonstrate the location that trips are loaded (or added) onto the network. These locations typically consist of localised intersections that are not specifically included in the model or at key intersections in the form of an additional approach to the intersection. They can also be located in between intersection at likely access and egress points.

Link Capacities

The model has the ability to gauge the effect on the road networks by increasing or decreasing the capacity of a section of road (known as a "link"). Through this, the model is able to simulate the effect of adding or removing lanes of traffic. The alterations to road capacities is typically applied at a daily volume basis, that is, by increasing or reducing the amount of traffic a road link is physically able to carry per day.

Once this volume threshold is exceeded, the model reports either a reduction in travel time, diverts traffic elsewhere, or shifts car drivers/passengers to other transport modes.

4. Site Context

4.1 Subject Site

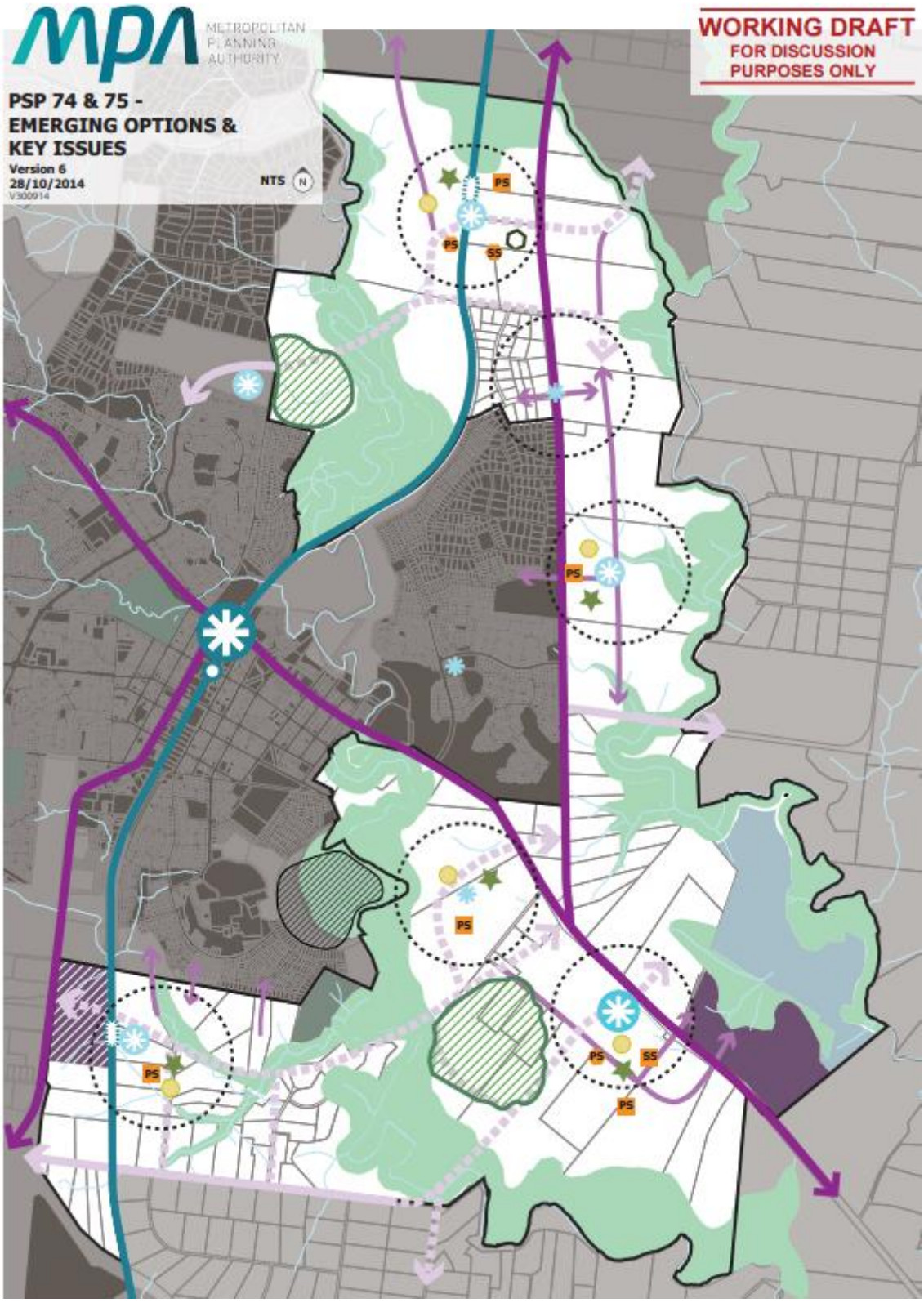
The location of the Sunbury and Diggers Rest Growth Corridor in its local context are illustrated in in Figure 4.1.

Figure 4.1: Sunbury and Diggers Rest Growth Corridor

4.2 Sunbury South and Lancefield Road PSPs

The MPA has commenced the preparation of the Sunbury South (No. 1074) and Lancefield Road (No. 1075) PSPs. Both Sunbury South and Lancefield Road are located in the City of Hume and will ultimately form part of an expansion of the exiting Sunbury Township. Proposed projected yield is in order of 9,000 dwellings for Sunbury South PSP and 6,000 dwellings for Lancefield Road PSP. The PSP preparation will further identify the supporting infrastructures as well as services required for both Sunbury South and Lancefield Road PSP areas. The draft layout of the emerging option of the two PSP areas are shown in Figure 4.2.

Figure 4.2: Sunbury South and Lancefield Road PSPs

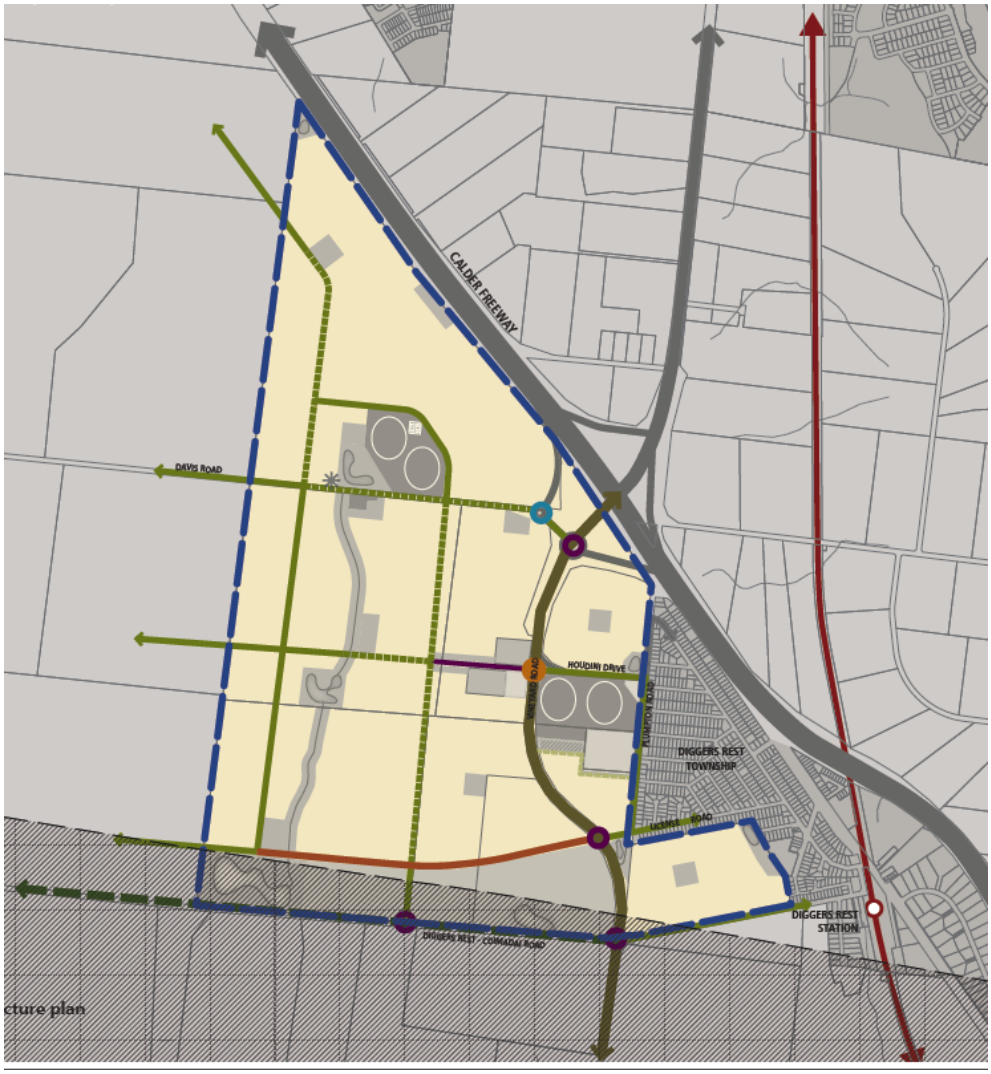


4.3 Other PSP in the Area

The Diggers Rest PSP (No. 1073), Sunbury West PSP (No.1095) and Sunbury North PSP (No.1072) are also located within the Sunbury Diggers Rest Growth Corridor.

Diggers Rest PSP is located within Melton Shire Council municipal area and is bound by the existing Diggers Rest Township to the east, Calder freeway to the north and Urban Growth Boundary to the south and west. The urban structure of the Diggers Rest PSP is shown in Figure 4.3. This study does not include the traffic assessment for this PSP, however the land use information has been included in ultimate and interim scenarios.

Figure 4.3: Diggers Rest PSP Urban Structure



In addition, this assessment has regard for the forecast land uses of the Sunbury West and Sunbury North PSPs, however their urban structures have not been included in this assessment as its status is unknown.

5. Existing and Future Road Network

5.1 Overview

The boundaries of the Sunbury South and Lancefield Road PSPs generally interact with key existing arterials including Racecourse Road, Lancefield Road, Vineyard Road, Patterson Street, Watsons Road, and Emu Creek. The existing and anticipated future characteristics of key roads in the vicinity of the PSP areas are discussed in more detail below.

5.2 Arterial Road Network

5.2.1 Sunbury Road

Sunbury Road is an arterial road controlled by VicRoads and connects Sunbury to Melbourne Airport and the Tullamarine Freeway. It is a four lane divided road between Powlett Street and Racecourse Road and forms a two-lane road in the remaining section of the corridor. Sunbury Road will ultimately consist of a six lane cross section between Diggers Rest Road and Racecourse Road, and a four lane cross section north of Racecourse Road.

5.2.2 Vineyard Road

Vineyard Road is a four lane divided arterial road controlled by VicRoads and provides access from the Sunbury Township to the Calder Freeway. At full development of the PSPs, Vineyard Road will ultimately consist of a six lane cross section in the vicinity of the Calder Freeway.

5.2.3 Melbourne-Lancefield Road

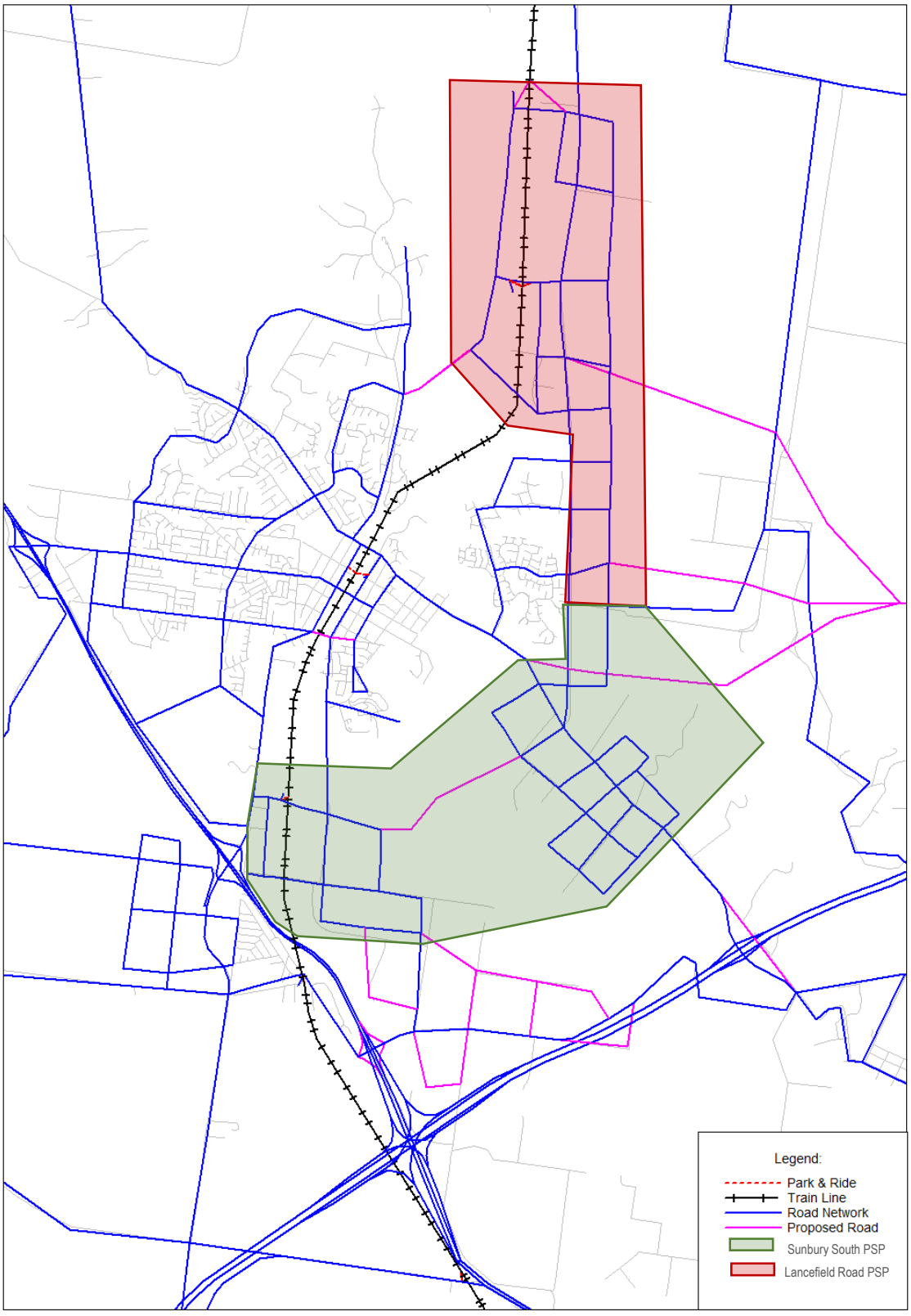
Melbourne-Lancefield Road is a two-way sealed road aligned in a north-south direction. It provides connection from Sunbury Road in the south to the Lancefield Township, and will ultimately consist of a six lane cross section (three lanes in each direction) through the study area.

5.3 Internal Road Network

The internal road network for the two PSPs is underpinned by a grid network of collector and boulevard road types that provide internal connectivity to local convenience centres as well as the external network.

The refined road network as depicted in the VITM model is shown in Figure 5.1.

Figure 5.1: Sunbury and Diggers Rest Corridor VITM Road Network (2046)



Further discussion on the transport modelling is provided in Section 6 and 7.

6. Model Calibration and Validation

6.1 Overview

Model calibration is a process in which the model inputs (including the road network and land use)are refined to reflect observed conditions. It allows the model to produce travel demands in line with actual measured traffic conditions.

Existing traffic counts are compared to the corresponding modelled link volumes after each model assignment. Following any link adjustments the model demands are once again assigned and modelled results compared to the traffic counts. This process is repeated until the model results converge to a point where they meet a number of calibration criteria.

Strategic network models are generally calibrated to reflect existing traffic counts across a wide corridor or regional area. Strategic network models are not expected to accurately match traffic counts at individual locations, instead model calibration is typically measured by comparing counts across a number of locations such as a screen line, and/or a group of counts at a regional level. Therefore it is necessary to exercise caution when interpreting the model outputs at a local level.

Full details of this calibration and validation results are provided in the calibration and validation report dated 2 July 2015 in Appendix A.

6.2 Calibration and Validation Results

Within the study area, the model generally reflected well against observed volumes, however it is noted that not all roads reflected observed data and have been considered when analysing future year options. It is also noted that whilst some of the criteria have not strictly been met, every effort has been undertaken to ensure that the model is as good as it can possibly be for this purpose of this study. These efforts have been undertaken in collaboration with Key stakeholders.

The calibration and validation process identified that some caution should be applied when interpreting the full results of the future scenarios, particularly in and around the Sunbury Town Centre. Notwithstanding, the model has been calibrated and validated using sound modelling practice and process and is considered to be suitable for use in testing the future land uses and bridge option for Jacksons Creek.

7. Options

7.1 Options

A total of nine road network options were developed with input from the MPA and their stakeholders for ultimate (2046) design year. These options are designed to test a range of locations for the Jacksons Creek crossings, railway stations as well as additional connection to Calder Highway. The nine options are summarised in Table 7.1.

Table 7.1: 2046 Options

Option	Creek Crossing in PSP 1074	Railway Station in PSP 1074 (Jacksons Hill Station)	Creek Crossing in PSP 1075	Railway Station in PSP 1075 (Raes Road Station)	Additional Connection to Calder Highway south of PSP 1074	Comments
1	✓	✓	✓	✓		
2	✓	✓		✓		
3			✓	✓		
4				✓		
5	✓	✓	✓	✓	✓	
6	✓	✓	✓	✓	✓	No OMR
7	✓	✓		✓	✓	No OMR
8			✓	✓	✓	No OMR
9				✓	✓	No OMR

Based on the outcomes of the modelling, one option was selected to be tested in the interim year and was subsequently modelled (Option – no Jackson Creek Crossings). The purpose of this option was to understand how the Sunbury network would operate in the interim should both bridges not be constructed.

All options are tested with the land uses forecast for ultimate (2046) and interim years outlined in section 7.2.

7.2 Zone Refinements and Land Use Assumptions

The zone configuration of the Sunbury South and Lancefield Road PSPs were desegregated for the purpose of this assessment. The zone system is based around the proposed urban structure plan's land uses and road network characteristics provided by the MPA.

The zone refinements from the NGC and this study are shown graphically in Figure 7.1 and Figure 7.2, whilst Figure 7.3 provides details of the zone numbering adopted for the study area and each respective PSP area.

Figure 7.1: NGC VITM Zone Structure

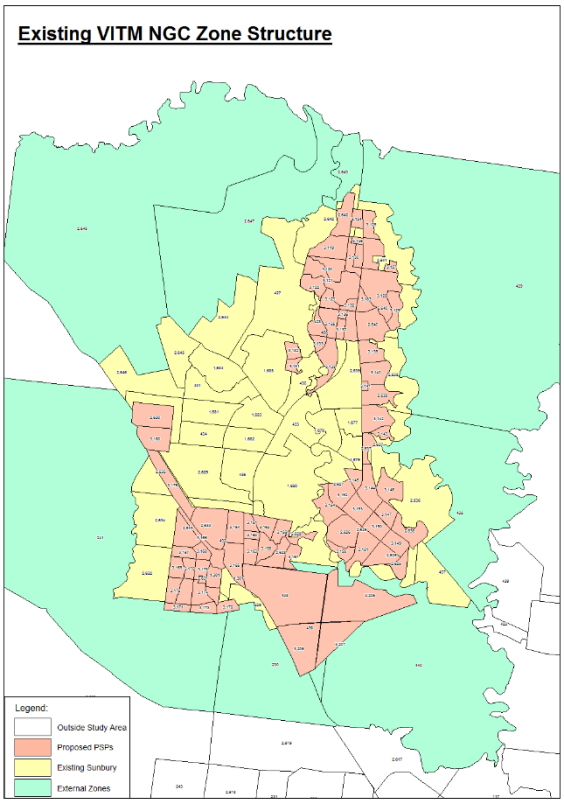


Figure 7.2: Refined VITM Zone Structure

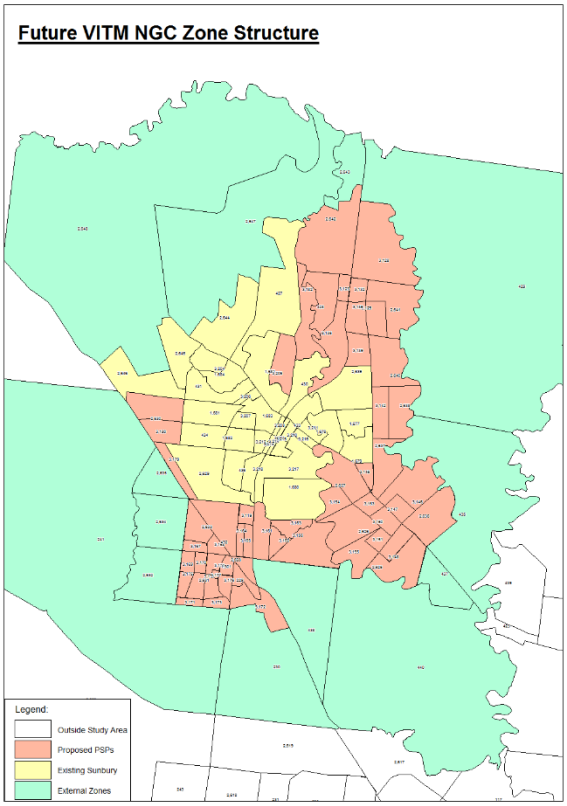
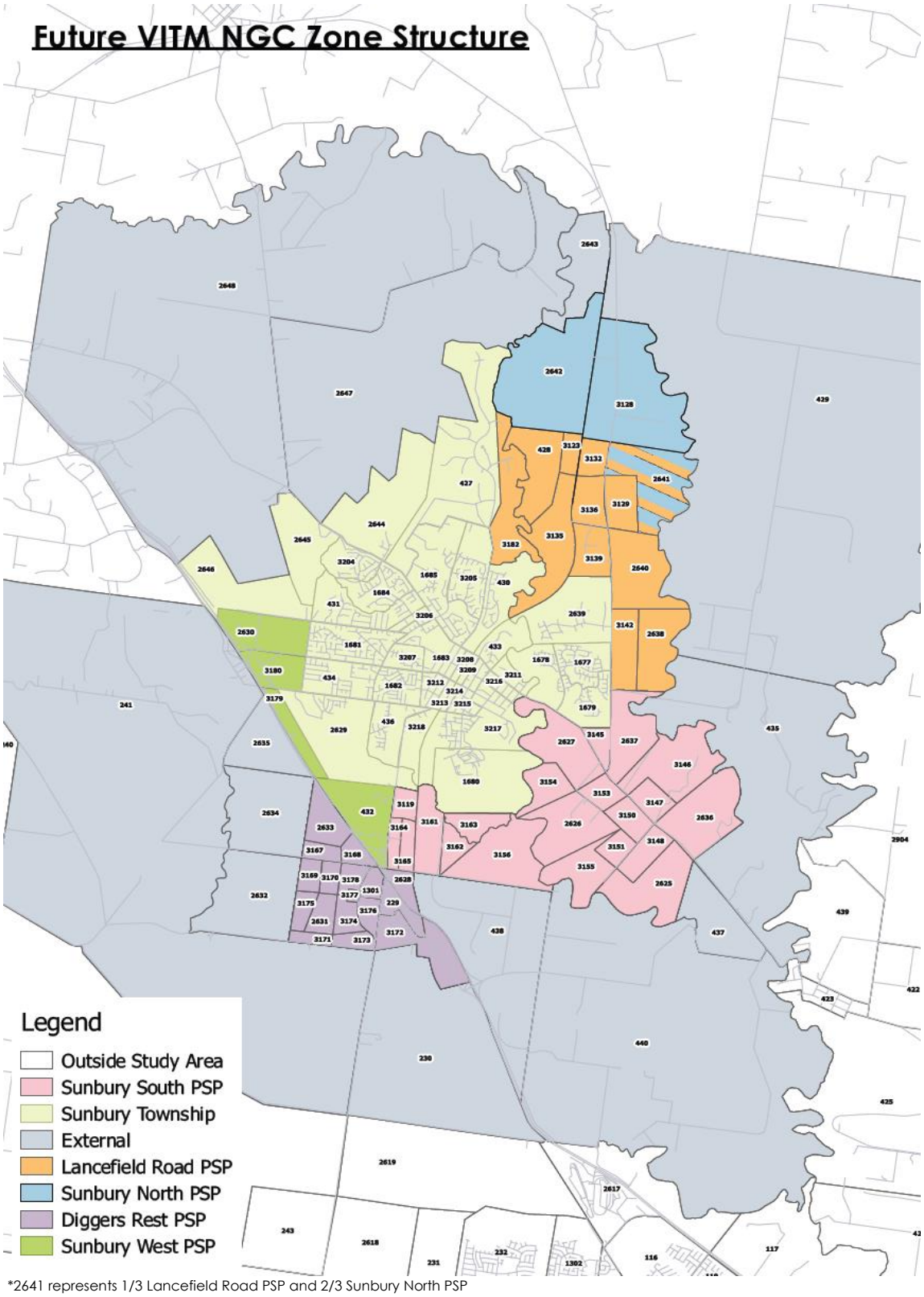


Figure 7.3: Sunbury and Diggers Rest Growth Corridor Zone Numbering



*2641 represents 1/3 Lancefield Road PSP and 2/3 Sunbury North PSP

In addition, the land use specifications for the PSPs within Sunbury and Diggers Rest Growth Corridor have been provided from the MPA and Hume City Council, and are summarised in Table 7.2.

Table 7.2: Sunbury and Diggers Rest Growth Corridor Land Use Summary (2046)

Area	2046			
	Population	Retail Employment	Total Employment	Enrolment
Existing Sunbury Township	45,915	3,430	9,939	8,002
Sunbury South Precinct (PSP 1074)	29,370	1,050	4,113	2,853
Lancefield Road Precinct (PSP 1075)	21,580	683	1,664	11,502
Sunbury West Precinct (1095)*	7,155	233	350	450
Sunbury North Precinct (1072)*	17,373	167	552	451
Diggers Rest Precinct (PSP 1073)	11,846	333	1,792	451
External	1,900	22	448	0
Total Sunbury and Diggers Rest Growth Corridor	**135,139**	**5,918**	**18,858**	**23,709**

*Full details of Sunbury West and Sunbury North Precincts are still unknown.

Ultimately, the Sunbury and Diggers Rest Growth Corridor will total a population of 135,139, which is an increase of approximately 235% (existing population is 40,211). Total employment and enrolments will increase by approximately 120% and 255% (existing total employment is 8,630 and total enrolments are 6,697), respectively.

Plots illustrating the location and make up of the existing and future land uses in the Sunbury and Diggers Rest Corridor are provided in Figures 7.4 – 7.10, with full details of the land uses is provided in Appendix B.

Figure 7.4: Population (Existing)

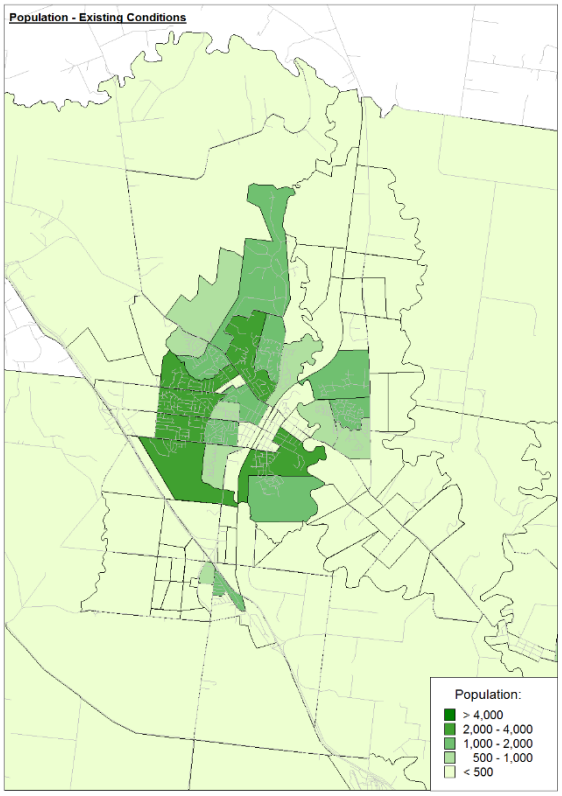


Figure 7.5: Population (2046)

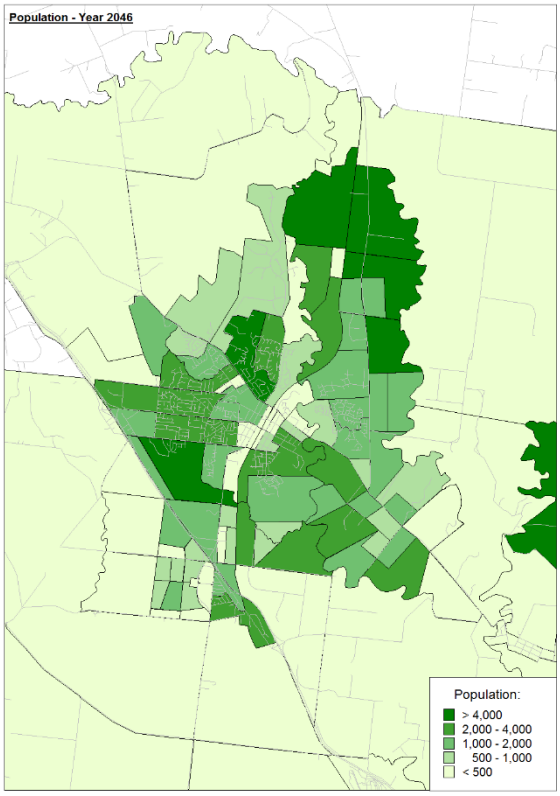


Figure 7.6: Employment (Existing)

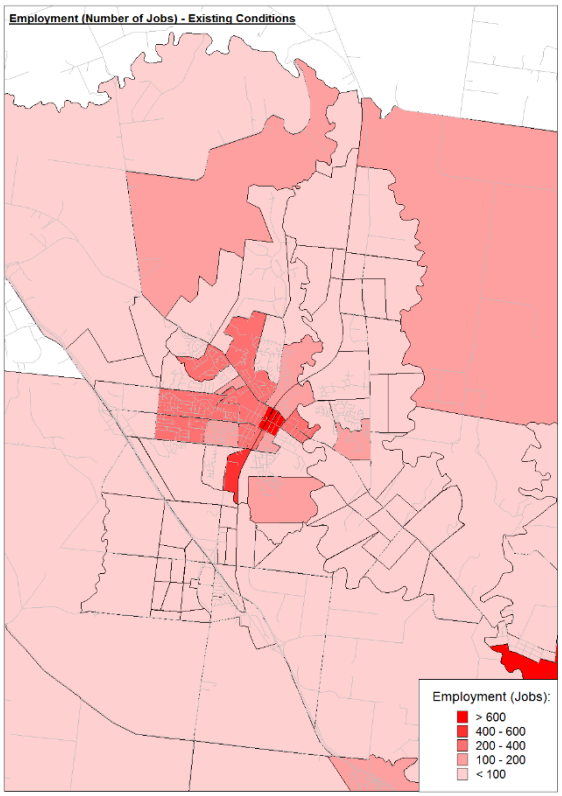


Figure 7.7: Employment (2046)

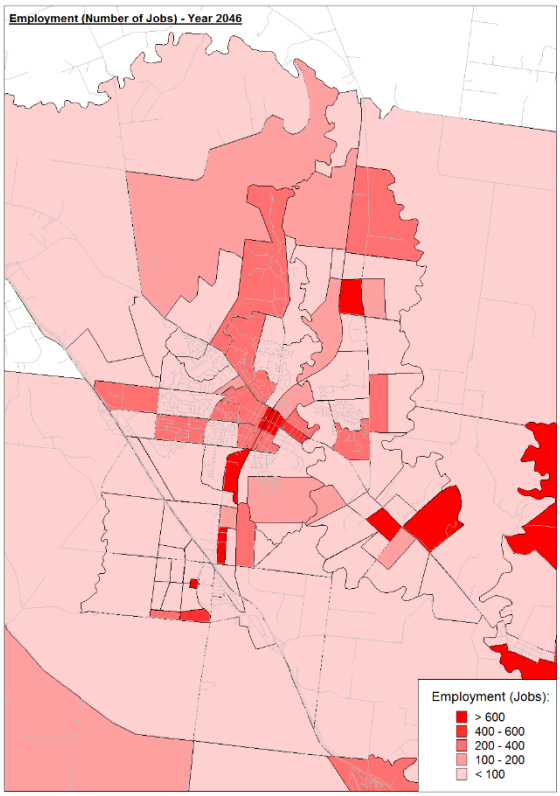


Figure 7.8: Enrolment (Existing)

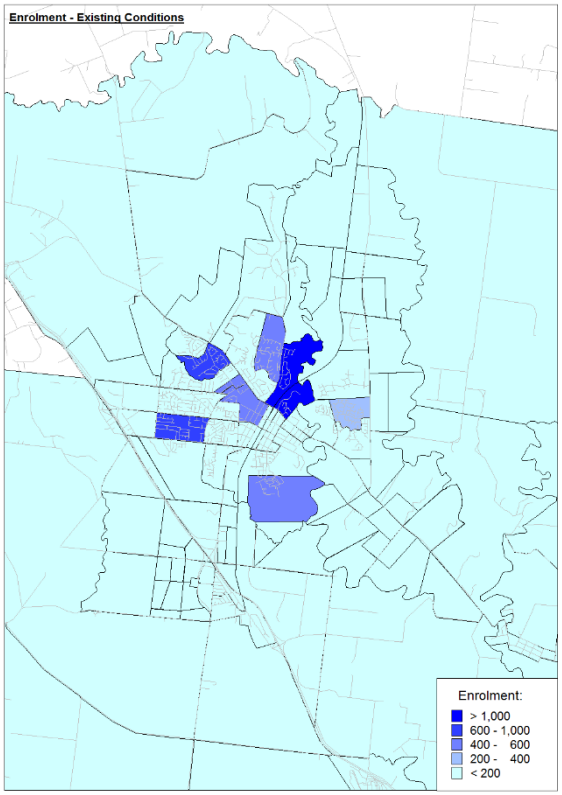
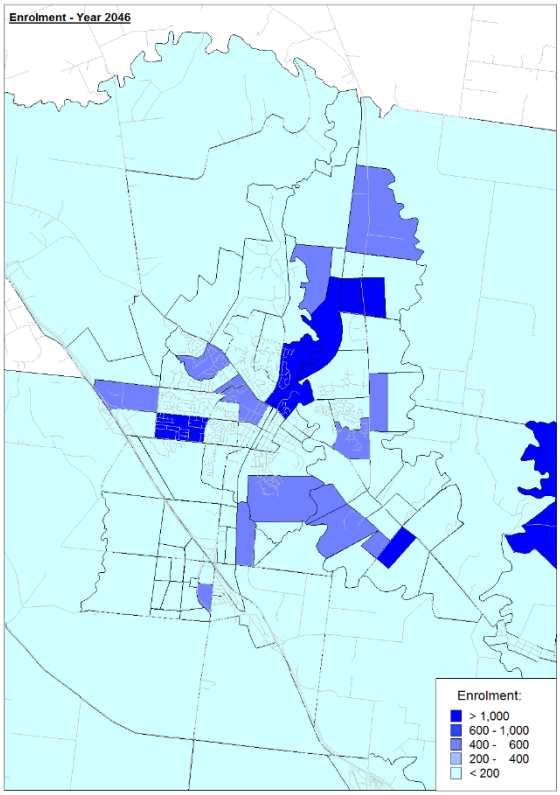


Figure 7.9: Enrolment (2046)



Interim Year Land Uses

As advised by MPA, 75% of 2046 land uses summarised in Table 7.2 have been adopted for the interim year for the following precincts:

- Sunbury South
- Lancefield Road
- Diggers Rest
- Sunbury West.

It is assumed that 20% of the Sunbury North Precinct land use will be adopted in the interim year and no change will be made to the external zones. However, for the Existing Sunbury Township, 75% of the additional increase in population and employment has been adopted for the interim year, whilst enrolment numbers adopted are the same as the ultimate year.

7.3 Road Network Refinements

A number of network refinements were undertaken in the models to reflect the existing conditions, future known improvements and urban structure plan provided. In summary the following network refinements were made to both the Interim year and Ultimate 2046 models:

- additional links and adjustments to the road network in the study area
- refinement of the zone connections to reflect the proposed Sunbury South and Lancefield Road PSP areas
- refinement of the link speeds and capacities for the PSP and surrounding network.

The extent of the GTA network refinements are shown in Figure 7.10 to 7.15.

Figure 7.10: VITM NGC - Road Network - 2046

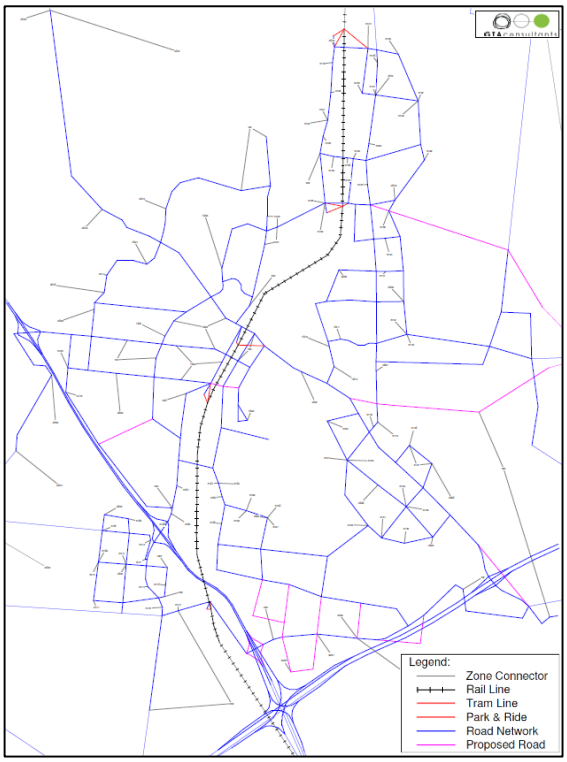


Figure 7.11: Refined VITM NGC - Road Network - 2046

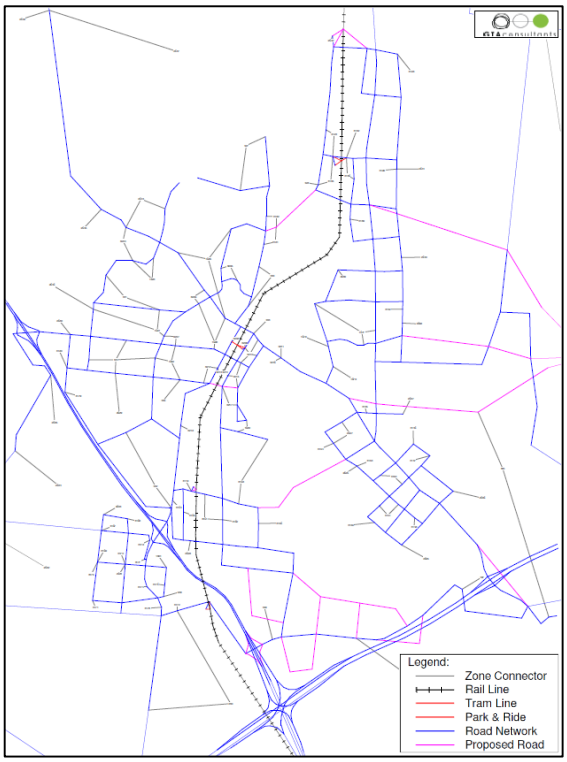


Figure 7.12: VITM NGC – Number of Lanes - 2046

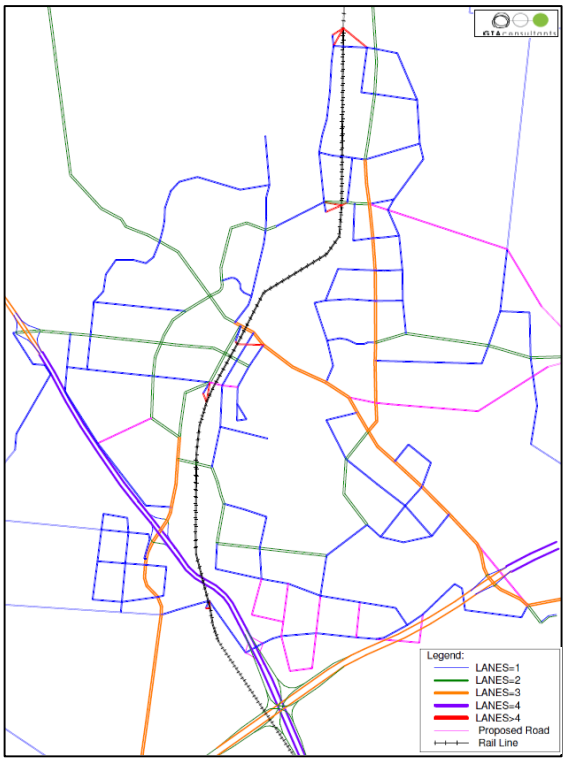


Figure 7.13: Refined VITM NGC – Number of Lanes - 2046

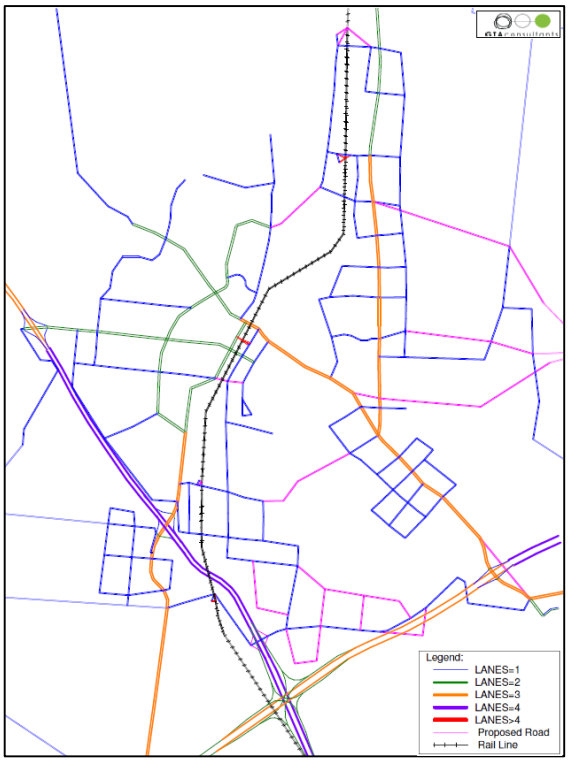


Figure 7.14: VITM NGC – Posted Speed - 2046

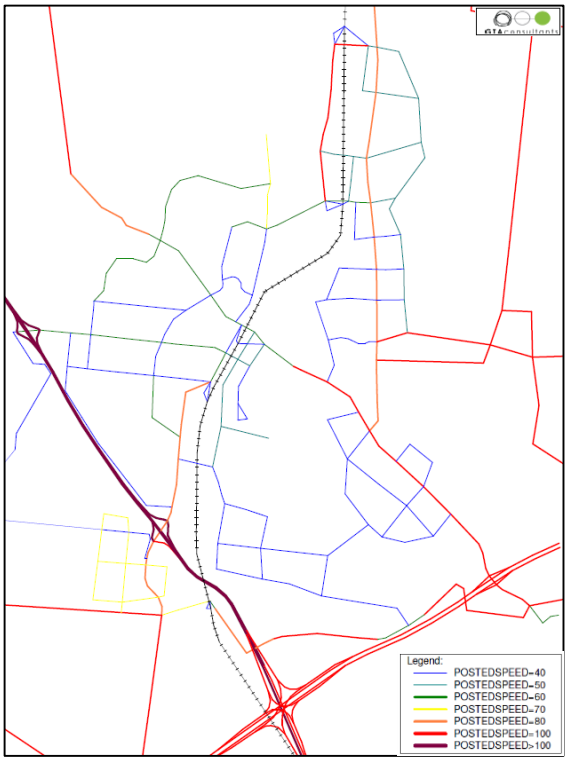


Figure 7.15: Refined VITM NGC – Posted Speed - 2046

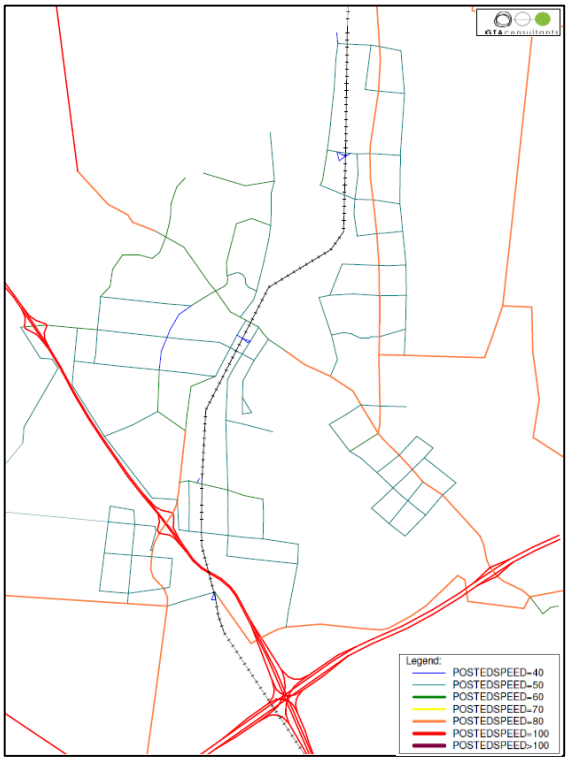


Figure 7.16: VITM NGC – Link Class - 2046

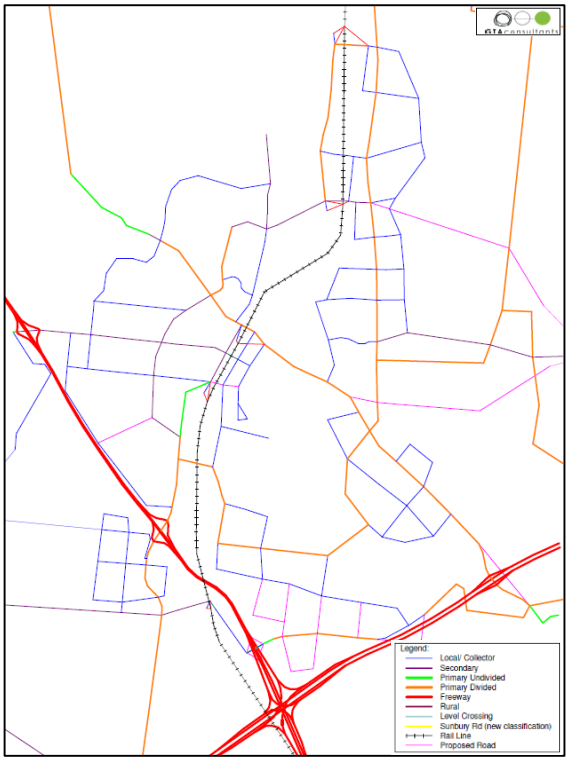
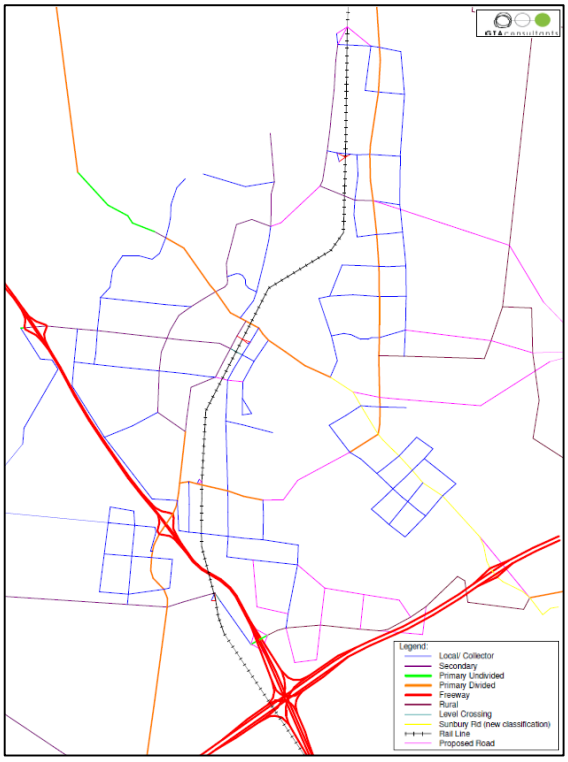


Figure 7.17: Refined VITM NGC – Link Class - 2046



The network refinements made to the 2046 scenario are summarised as follows:

- Zone connector refinements to reflect disaggregated Sunbury town centre based on calibrated and validated base model.
- Sunbury train station refinements to reflect outcomes from the calibrated and validated base model.
- Local street adjustments within the PSPs to reflect MPA's Urban Structure Plans.
- Zone connector refinements within the PSPs to reflect MPA's Urban Structure Plans.
- Location of both the proposed Jackson Creek Crossings has been amended based on the route alignment study.
- Removal of the connection between Canterbury Ave and Albert Road.
- Inclusion of the connection between Elizabeth Drive extension and proposed link parallel to Calder Freeway.
- Removal of the train station on Williamsons Road (north of Sunbury).
- Removal of the extension of Sunningdale Avenue to the Outer Metropolitan Ring Road.
- Sign posted speed adjustments at the following locations:
    - Calder Freeway reduced from 110km/h to 100km/h
    - Racecourse Road (north of proposed link) reduced from 70km/h to 50km/h
    - Racecourse Road (south of proposed link) increased from 40km/h to 50km/h
    - Proposed Jackson Creek crossing in Sunbury South increased from 40km/h to 60km/h
    - Local streets within Diggers Rest PSP reduced from 70km/h to 50km/h
    - Local streets within Sunbury South PSP increased from 40km/h to 50km/h
    - Local streets within Lancefield Road PSP increased from 40km/h to 50km/h
    - Vineyard Road (south of Mitchells Lane) increased from 60km/h to 80km/h
    - Bulla-Diggers Rest Road decreased from 100km/h to 80km/h
    - Gellies Road and Wildwood Road reduced from 100km/h to 80km/h.

- Lane capacity adjustments at the following locations:
  - Some local streets within Sunbury South PSP reduced from two lanes to one lane in each direction.
  - Sunbury Road (west of Philip Drive) reduced from two lanes to one lane in each direction.
- Link class changes to the following:
  - Sunbury Road (east of Francis Boulevard) to new link class classification as per the outcomes of the calibrated and validated base model.
  - Elizabeth Drive (north of Sunbury Road) from a Primary Divided to Secondary.
  - North-south link west of Melbourne Lancefield Road in Lancefield Road PSP from a Primary Divided to Secondary.
  - Bulla-Diggers Rest Road, Gellies Road and Wildwood Road from a Primary Divided to Rural.

The refinements were undertaken in consultation with MPA, VicRoads and Council and were made to enhance how the model will reflect the likely access arrangements for the Sunbury South PSP and Lancefield Road PSP. It is highlighted that the refinements did not result in any noteworthy changes to the interim year and ultimate 2046 network beyond the bounds of the study area.

7.3.1 Bulla Bypass

The proposed Bulla Bypass is an arterial road that is envisioned to improve connectivity between the Sunbury & Diggers Rest Corridor and relieve pressure on the already congested Sunbury–Bulla Road. The Bulla Bypass will begin east of Oaklands Road on Somerton Road in Greenvale and extend in a westerly direction along Somerton Road, connecting with Sunbury Road (west of Bulla).

All options in the Ultimate 2046 year include the Bulla Bypass, even with the exclusion of the OMR (Options 6 to 9).

Plots of the road network characteristics (i.e. speeds, lanes, capacities etc.) are located in Appendix C.

7.4 Public Transport Refinements

The existing VITM public transport network was refined to reflect proposed bus route and frequency information provided by Public Transport Victoria (PTV). It should be noted that the public transport network outside of the study has been assumed to have no change from the NGC Model.

8. Option Assessment

8.1 Overview

A range of outputs have been extracted from the models and are reported in this section. The key outputs reported are summarised as follows:

- Network Performance characteristics.
- Vehicle Kilometres Travelled (VKT) represents the total distance travelled by all trips in the Sunbury & Diggers Rest Growth Corridor highlighted in Figure 5.1 (excluding the Calder Freeway and OMR).
- Vehicle Hours Travelled (VHT) represents the total time travelled by all trips in the Sunbury & Diggers Rest Growth Corridor as shown in Figure 5.1 (excluding the Calder Freeway and OMR).
- Average Speed (km/hr) of the Sunbury & Diggers Rest Growth Corridor (excluding the Calder Freeway and OMR).
- Link volumes at key locations for the AM, PM and Daily periods. These have been reported for both the interim and ultimate design years (2046).
- Volume to capacity (or degree of saturation) outputs for the network in the respective peak periods and design years.
- Mode share characteristics.
- Select link plots or assessments for the key locations previously identified.

The outputs are discussed in the following sections with a summary provided thereafter.

8.2 Network Performance Statistics

The VKT, VHT and average speeds for the Sunbury & Diggers Rest Corridor (excluding the Calder Freeway and OMR) are provided in Table 8.1 and Table 8.2.

Table 8.1: Network Statistic Summary (AM Peak – 2 Hrs)

Options	VKT (km)	VHT (Hr)	Average Speed (km/hr)
Existing (2011)	83,665	1,950	42.90
Interim Year	156,007	5,116	30.49
2046 – Option 1	222,429	5,718	38.90
2046 – Option 2	225,161	5,794	38.86
2046 – Option 3	220,172	5,794	38.00
2046 – Option 4	222,306	5,821	38.19
2046 – Option 5	223,451	5,696	39.23
2046 – Option 6	224,250	5,602	40.03
2046 – Option 7	226,570	5,581	40.60
2046 – Option 8	226,507	5,757	39.35
2046 – Option 9	229,736	5,748	39.97
2046 - Metropolitan Melbourne (Option 5)	25,513,852	710,705	35.90

Table 8.2: Network Statistic Summary (PM Peak – 2 Hrs)

Options	VKT (km)	VHT (Hr)	Average Speed (km/hr)
Existing (2011)	90,334	2,197	41.13
Interim Year	167,943	5,769	29.11
2046 – Option 1	254,564	6,685	38.08
2046 – Option 2	257,799	6,780	38.03
2046 – Option 3	252,156	6,770	37.24
2046 – Option 4	254,776	6,855	37.17
2046 – Option 5	256,037	6,664	38.42
2046 – Option 6	254,477	6,485	39.24
2046 – Option 7	257,392	6,578	39.13
2046 – Option 8	259,869	6,740	38.55
2046 – Option 9	262,064	6,774	38.69
2046 - Metropolitan Melbourne (Option 5)	27,876,432	754,730	36.94

Options with a higher VKT demonstrate a model network where vehicles generally travel longer distances to reach their destinations whilst the VHT is a representation of the time taken to reach their destination. The average speed is a good way to compare the operation of the network against one another.

The results indicate that of the options with the OMR, option 5 provided the best outcomes in terms of VHT and average speed in both the AM and the PM peak period.

The interim option indicates that the average speed will reduce by approximately 12km/h in the AM peak and PM peak in comparison to the Existing Conditions model. This reiterates the need for the duplication of Sunbury Road, Vineyard Road, Melbourne-Lancefield Road and Gap Road.

Overall, the modelling shows that in each of the options, the network operating conditions will not be too dissimilar to current levels, as demonstrated by the average speed of the Sunbury and Diggers Rest Growth Corridor.

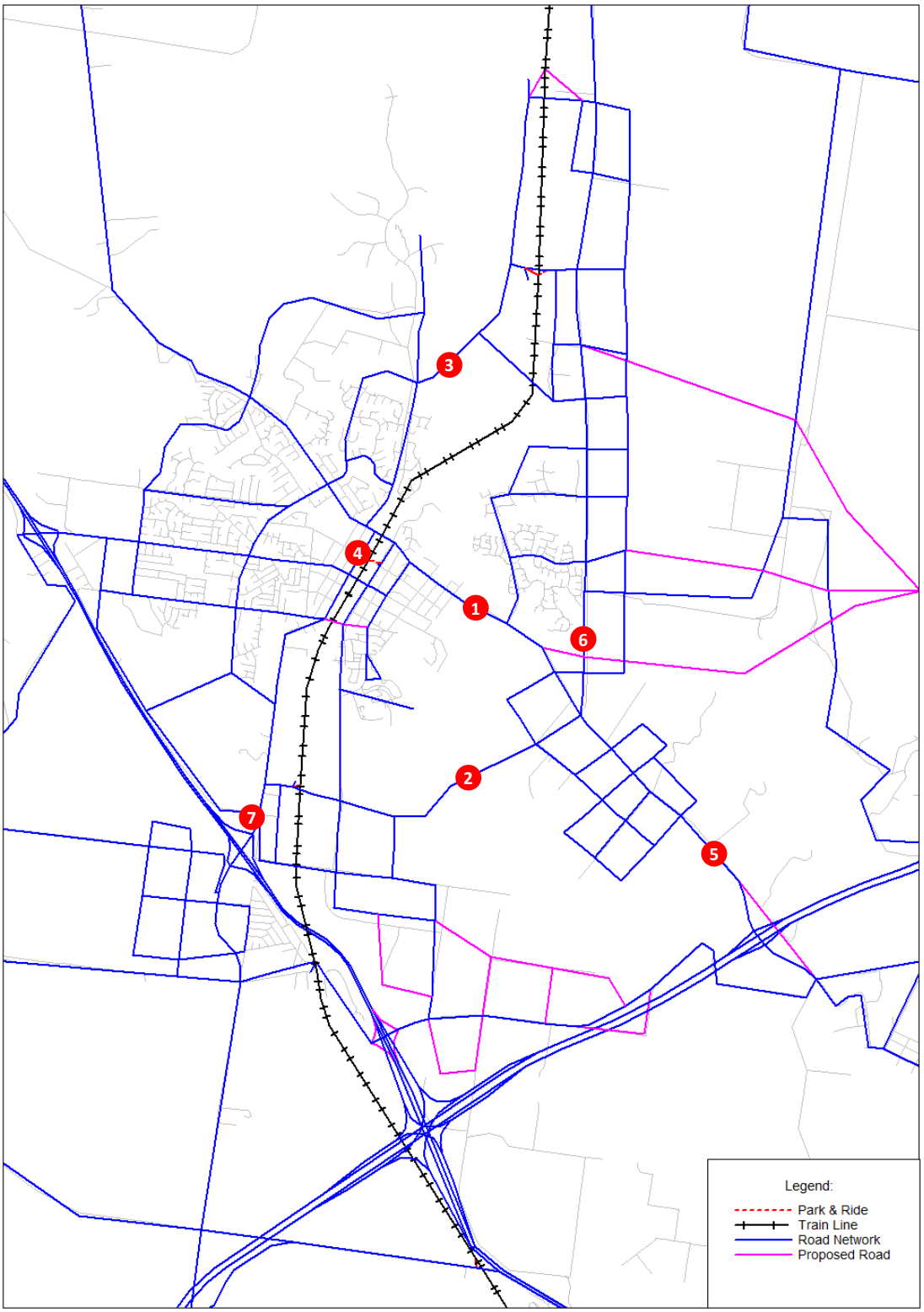
This outcome will result in the Sunbury and Diggers Rest Growth Corridor performance generally being maintained, or not significantly worse than the current levels.

Further interrogation of some of the forecast constraints in the network are provided in the following sections.

8.3 Link Volumes

Seven key locations across the network have been identified in consultation with MPA to report on a range of outputs including volumes and capacity information. The locations on the road network are shown graphically in Figure 8.1.

Figure 8.1: Key Locations for Link Volumes and Capacity Reporting



8.3.1 Ultimate (2046)

The link volumes for the key locations, as identified in Figure 8.1, have been extracted from the model and are summarised in Table 8.3 for the all options tested in the Ultimate design year (2046).

Table 8.3: AM Peak Link Volumes 2046

No	Road Name	2011	Opt1	Opt2	Opt3	Opt4	Opt5	Opt6	Opt7	Opt8	Opt9
1	Sunbury Road between Evans Street and Francis Boulevard NWB	1,960	2,880	3,480	3,190	3,840	2,870	3,290	3,960	3,887	4,750
	Sunbury Road between Evans Street and Francis Boulevard SEB	1,890	2,710	3,070	2,890	3,290	2,740	3,520	4,030	4,122	4,810
2	Jacksons Creek Crossing in Sunbury South PSP EB	-	730	780	-	-	720	1,640	1,740	-	-
	Jacksons Creek Crossing in Sunbury South PSP WB	-	1,190	1,290	-	-	1,400	1,690	1,760	-	-
3	Jacksons Creek Crossing in Lancefield Road PSP NEB	-	1,030	-	1,100	-	1,010	1,230	-	1,417	-
	Jacksons Creek Crossing in Lancefield Road PSP SWB	-	1,330	-	1,380	-	1,310	1,410	-	1,577	-
4	Horne Street between Gap Road and Riddell Road NB	1,230	1,780	1,770	2,240	2,240	1,750	2,280	2,170	2,604	2,610
	Horne Street between Gap Road and Riddell Road SB	1,360	1,770	1,630	1,850	1,780	1,780	2,170	2,030	2,432	2,410
5	Sunbury Road north of Bulla-Diggers Road NWB	1,360	4,460	4,550	4,420	4,510	4,490	2,970	2,960	2,840	3,280
	Sunbury Road north of Bulla-Diggers Road SEB	2,240	7,370	7,410	7,490	7,530	7,320	6,660	6,660	7,004	7,020
6	Melbourne-Lancefield Road south of Gellies Road NB	330	2,300	2,860	2,200	2,800	2,320	1,850	2,510	3,237	2,320
	Melbourne-Lancefield Road south of Gellies Road SB	710	3,820	4,290	3,550	4,110	3,900	3,400	4,040	3,069	3,930
7	Vineyard Road north of interchange NB	1,190	3,590	3,590	3,470	3,440	3,560	4,300	4,190	4,022	3,970
	Vineyard Road north of interchange SB	1,980	5,200	5,160	5,490	5,390	5,130	5,320	5,220	5,588	5,560

Table 8.4: PM Peak Link Volumes - 2046

No	Road Name	2011	Opt1	Opt2	Opt3	Opt4	Opt5	Opt6	Opt7	Opt8	Opt9
1	Sunbury Road between Evans Street and Francis Boulevard NWB	1,960	3,100	3,580	3,240	3,730	3,170	4,110	4,800	4,970	5,520
	Sunbury Road between Evans Street and Francis Boulevard SEB	1,630	3,160	3,890	3,550	4,300	3,160	3,530	4,300	4,400	5,250
2	Jacksons Creek Crossing in Sunbury South PSP EB	-	1,330	1,400	-	-	1,600	1,820	1,890	-	-
	Jacksons Creek Crossing in Sunbury South PSP WB	-	870	930	-	-	870	1,710	1,810	-	-
3	Jacksons Creek Crossing in Lancefield Road PSP NEB	-	1,530	-	1,600	-	1,510	1,600	-	1,780	-
	Jacksons Creek Crossing in Lancefield Road PSP SWB	-	1,300	-	1,390	-	1,300	1,510	-	1,700	-
4	Horne Street between Gap Road and Riddell Road NB	1,600	2,100	2,060	2,290	2,280	2,090	2,290	2,260	2,460	2,450
	Horne Street between Gap Road and Riddell Road SB	1,430	2,150	2,140	2,440	2,400	2,140	2,520	2,420	2,600	3,800
5	Sunbury Road north of Bulla-Diggers Road NWB	2,230	7,590	7,620	7,720	7,760	7,530	6,650	6,650	6,800	7,080
	Sunbury Road north of Bulla-Diggers Road SEB	1,260	5,210	5,330	5,240	5,380	5,230	3,320	3,310	3,240	550
6	Melbourne-Lancefield Road south of Gellies Road NB	750	4,340	4,590	4,110	4,720	4,450	3,910	4,560	3,570	4,370
	Melbourne-Lancefield Road south of Gellies Road SB	500	2,820	3,240	2,650	3,160	2,830	2,140	2,740	1,730	2,730
7	Vineyard Road north of interchange NB	1,900	5,590	5,560	5,560	5,510	5,350	5,620	5,520	5,760	5,860
	Vineyard Road north of interchange SB	1,600	4,240	4,240	4,140	4,090	4,200	4,800	4,700	4,530	4,580

Table 8.5: Daily Link Volumes - 2046 (two way combined)

No	Road Name	2011	Opt1	Opt2	Opt3	Opt4	Opt5	Opt6	Opt7	Opt8	Opt9
1	Sunbury Road between Evans Street and Francis Boulevard	23,200	37,600	44,400	40,500	47,900	37,900	43,800	44,200	49,300	59,000
2	Jacksons Creek Crossing in Sunbury South PSP	-	10,600	11,200	-	-	11,100	20,800	21,500	-	-
3	Jacksons Creek Crossing in Lancefield Road PSP	-	14,300	-	15,200	-	14,300	17,400	-	18,700	-
4	Horne Street between Gap Road and Riddell Road	16,300	24,100	24,200	26,900	24,600	24,000	28,000	27,800	33,100	32,800
5	Sunbury Road north of Bulla-Diggers Road	24,600	79,900	80,900	79,800	80,700	80,100	60,000	53,000	64,500	64,800
6	Melbourne-Lancefield Road south of Gellies Road	7,800	40,700	46,200	38,800	44,900	41,000	34,200	40,300	30,600	39,500
7	Vineyard Road north of interchange	17,900	53,300	53,200	54,600	54,400	52,300	60,700	63,300	59,500	59,000

The results show that with the OMR in place Sunbury Road will attract up to 20,000vpd more than if the OMR was not in place. This shows that the OMR in itself is a big attractor for travel to and from the PSPs.

8.3.2 Interim Year

The link volumes for the key locations, as identified in Figure 8.1, have been extracted from the model and are summarised in Table 8.6 for the preferred Interim year Scenario (Option 4).

Table 8.6: AM/PM/Daily Peak Link Volumes – Interim Year

No	Road Name	AM Peak (2 hrs)	PM Peak (2 hrs)	Daily (two-way)
1	Sunbury Road between Evans Street and Francis Boulevard NWB	2,806	1,844	29,100
	Sunbury Road between Evans Street and Francis Boulevard SEB	1,512	2,953	
2	Jacksons Creek Crossing in Sunbury South PSP EB	-	-	-
	Jacksons Creek Crossing in Sunbury South PSP WB	-	-	
3	Jacksons Creek Crossing in Lancefield Road PSP NEB	-	-	-
	Jacksons Creek Crossing in Lancefield Road PSP SWB	-	-	
4	Horne Street between Gap Road and Riddell Road NB	2,482	2,319	27,900
	Horne Street between Gap Road and Riddell Road SB	2,207	2,488	
5	Sunbury Road south of Bulla-Diggers Road NWB	1,523	2,721	33,700
	Sunbury Road south of Bulla-Diggers Road SEB	2,675	1,702	
6	Melbourne-Lancefield Road south of Gellies Road NB	1,400	1,908	22,700
	Melbourne-Lancefield Road south of Gellies Road SB	1,719	1,344	
7	Vineyard Road north of interchange NB	2,260	3,719	39,900
	Vineyard Road north of interchange SB	4,159	3,000	

The interim year results show that there is a substantial difference (almost half) when compared to the ultimate volumes.

8.4 Mode Share

The mode share is defined as the percentage of passenger trips using a particular type of transportation. Variance in mode share is due to a range of factors including catchment areas, geographic travel data (i.e. number of available vehicles), public transport accessibility and ongoing travel costs.

The resultant outputs are summarised in Table 8.7.

Table 8.7: Summary of Resultant Mode Share for the Sunbury and Diggers Rest Corridor (Daily)

Option	Mode	Sunbury South PSP	Lancefield Road PSP	Diggers Rest PSP	Sunbury & Diggers Rest Corridor	Metropolitan Melbourne
Existing Conditions (2011)	Car	91.0%	91.0%	83.3%	86.6%	83.5%
	Active Travel/ PT	9.0%	9.0%	16.7%	13.4%	16.5%
Interim Year	Car	81.3%	82.5%	79.4%	80.4%	78.6%
	Active Travel/ PT	18.7%	17.5%	20.6%	19.6%	21.4%
2046 – Option 1	Car	83.2%	78.5%	82.1%	81.9%	80.3%
	Active Travel/ PT	16.8%	21.5%	17.9%	18.1%	19.7%
2046 – Option 2	Car	83.3%	78.1%	82.1%	82.0%	80.3%
	Active Travel/ PT	16.7%	21.9%	17.9%	18.0%	19.7%
2046 – Option 3	Car	84.8%	78.3%	82.1%	82.4%	80.3%
	Active Travel/ PT	15.2%	21.7%	17.9%	17.6%	19.7%
2046 – Option 4	Car	84.8%	77.9%	82.1%	82.3%	80.3%
	Active Travel/ PT	15.2%	22.1%	17.9%	17.7%	19.7%
2046 – Option 5	Car	83.3%	78.6%	82.2%	82.2%	80.3%
	Active Travel/ PT	16.7%	21.4%	17.8%	17.8%	19.7%
2046 – Option 6	Car	81.7%	76.7%	80.8%	80.7%	78.2%
	Active Travel/ PT	18.3%	23.3%	19.2%	19.3%	21.8%
2046 – Option 7	Car	81.7%	76.2%	80.8%	80.6%	78.2%
	Active Travel/ PT	18.3%	23.8%	19.2%	19.4%	21.2%
2046 – Option 8	Car	84.1%	77.3%	81.0%	81.4%	78.2%
	Active Travel/ PT	15.9%	22.7%	19.0%	18.6%	21.8%
2046 – Option 9	Car	84.2%	76.8%	80.9%	81.3%	78.3%
	Active Travel/ PT	15.8%	23.2%	19.1%	18.7%	21.7%

D tes with OMR
D tes without OMR

The results indicate that there is a mode shift change for each precinct for 2046 and the broader VITM (Melbourne) network between the options with and without the OMR. More specifically, a comparison of the statistics indicate a small uplift in active travel and public transport usage and a corresponding decrease in car travel.

Options 5 to 9 indicate a significant decrease in car travel due to the exclusion of the OMR. And this data supports strategic transport observations which suggests subsequent mode shift changes will eventuate when the precinct structure plans are developed.

Further interrogation can be sought from the boarding's and alighting's for the three stations in the PSPs as shown in Table 8.8, Table 8.9 and Table 8.10.

Table 8.8: Sunbury and Diggers Rest Corridor - Boarding's and Alighting's – AM Peak

Station		2011 Base	Interim Year	2046 Opt1	2046 Opt2	2046 Opt3	2046 Opt4	2046 Opt5	2046 Opt6	2046 Opt7	2046 Opt8	2046 Opt9
Sunbury South Station	Boarding	-	-	2,626	2,629	-	-	2,605	2,395	2,344	-	-
	Alighting	-	-	121	121	-	-	121	113	110	-	-
Sunbury Station	Boarding	1,051	5,423	1,787	1,833	2,555	2,604	1,775	2,074	2,118	2,772	2,837
	Alighting	133	1,890	275	283	284	290	276	294	299	300	306
Raes Road Station	Boarding	-	-	3,623	3,674	3,703	3,747	3,606	4,100	4,143	3,940	4,008
	Alighting	-	-	570	616	554	602	571	612	665	589	653
Total	Boarding	1,051	5,423	8,036	8,136	6,258	6,351	7,986	8,569	8,605	6,712	6,845
	Alighting	133	1,890	966	1,020	838	892	968	1,019	1,074	889	959

Table 8.9: Sunbury and Diggers Rest Corridor - Boarding's and Alighting's – PM Peak

Station		2011 Base	Interim Year	2046 Opt1	2046 Opt2	2046 Opt3	2046 Opt4	2046 Opt5	2046 Opt6	2046 Opt7	2046 Opt8	2046 Opt9
Sunbury South Station	Boarding	-	-	95	95	-	-	104	107	108	-	-
	Alighting	-	-	1,280	1,282	-	-	1,537	1,435	1,432	-	-
Sunbury Station	Boarding	126	869	222	232	226	235	222	213	220	231	238
	Alighting	779	3,050	1,818	1,879	2,152	2,222	1,800	2,102	2,175	2,379	2,447
Raes Road Station	Boarding	-	-	442	481	424	466	443	466	513	451	506
	Alighting	-	-	2,746	2,768	2,804	2,818	2,734	3,088	3,101	2,973	3,000
Total	Boarding	126	869	759	808	650	701	769	786	841	682	744
	Alighting	779	3,050	5,844	5,929	4,956	5,040	6,071	6,625	6,708	5,352	5,447

Table 8.10: Sunbury and Diggers Rest Corridor - Boarding's and Alighting's – Daily

Station		2011 Base	Interim Year	2046 Opt1	2046 Opt2	2046 Opt3	2046 Opt4	2046 Opt5	2046 Opt6	2046 Opt7	2046 Opt8	2046 Opt9
Sunbury South Station	Boarding	-	-	12,514	12,530	-	-	12,433	11,877	11,674	-	-
	Alighting	-	-	10,796	10,807	-	-	12,326	11,733	11,685	-	-
Sunbury Station	Boarding	5,212	12,341	8,872	9,106	12,426	12,687	8,831	10,189	10,418	13,547	13,855
	Alighting	4,372	12,862	9,213	9,565	11,028	11,417	9,131	10,615	11,017	12,154	12,526
Raes Road Station	Boarding	-	-	18,026	18,370	18,368	18,688	17,953	20,364	20,688	19,578	20,035
	Alighting	-	-	17,144	17,394	17,399	17,617	17,084	19,262	19,469	18,497	18,877
Total	Boarding	5,212	12,341	39,412	40,006	30,794	31,375	39,217	42,430	42,780	33,125	33,890
	Alighting	4,372	12,862	37,153	37,766	28,427	29,034	38,541	41,610	42,171	30,651	31,403

The boarding and alighting volumes indicate that a large number of future trips will be public transport based, specifically rail. The results indicate that the Raes Road station would exhibit higher patronage than the proposed Sunbury South station and the existing Sunbury Station. This is due to a higher frequency service as the station is served by the Southern Cross to Bendigo and the Southern Cross to Kyneton Vline services. The Vline services provide a limited stop 'express' service between the study area and the CBD.

In addition a limitation of the VITM model is that it does not have regard for the station capacity in the amount of person trips per station, (i.e. based on number of car parks etc.), however the results suggest that regardless of the outcome of the creek crossings public transport facilities, such as train stations, will require further investigation.

8.5 Degree of Saturation

The volume to capacity ration (degree of saturation) is a good indicator as to the operation of the network at the specific link locations. The volume to capacity ratio (VCR) are also able to be correlated with the Level of Service Definitions as defined in Austroads outlined in Table 8.11.

Table 8.11: Level of Service Definitions

LOS	Definition	Volume to Capacity Ratio
A	Conditions of free flow, speed is controlled by driver's desires, speed limits or physical Roadway conditions	0.0-0.35
B	Conditions of stable flow, operating speeds begin to be restricted, little or no restrictions on manoeuvrability from other vehicles	0.35-0.50
C	Conditions of stable flow, speeds and manoeuvrability more closely restricted, occasional backups behind left-turning vehicles at intersections	0.50-0.75
D	Conditions approach unstable flow, tolerable speeds can be maintained but temporary restrictions may cause extensive delays, little freedom to manoeuvre	0.75-0.90
E	Conditions approach capacity, unstable flow with stoppages of momentary duration, manoeuvrability severely limited	0.90-1.00
F	Forced flow conditions, stoppages for long periods, low operating speeds	1.00 or >1.00

The following section summarises the level of service for the specific links in the relevant sections and design years.

8.5.1 Ultimate 2046

The VCR outputs for the key locations, as identified in Figure 8.1, have been extracted from the model and are summarised in Table 8.12 and Table 8.13.

Table 8.12: AM Peak (two hour) Volume to Capacity Outputs and Level of Service - Year 2046

No	Road Name	Opt1	Opt2	Opt3	Opt4	Opt5	Opt6	Opt7	Opt8	Opt9
1	Sunbury Road between Evans Street and Francis Boulevard NWB	0.48	0.58	0.53	0.64	0.46	0.55	0.66	0.65	0.79
	Sunbury Road between Evans Street and Francis Boulevard SEB	0.45	0.51	0.48	0.55	0.46	0.59	0.67	0.69	0.80
2	Jacksons Creek Crossing in Sunbury South PSP EB	0.36	0.39	-	-	0.36	0.82	0.87	-	-
	Jacksons Creek Crossing in Sunbury South PSP WB	0.60	0.65	-	-	0.70	0.84	0.88	-	-
3	Jacksons Creek Crossing in Lancefield Road PSP NEB	0.51	-	0.55	-	0.51	0.62	-	0.71	-
	Jacksons Creek Crossing in Lancefield Road PSP SWB	0.66	-	0.69	-	0.66	0.70	-	0.79	-
4	Horne Street between Gap Road and Riddell Road NB	0.59	0.59	0.75	0.75	0.46	0.76	0.72	0.87	0.87
	Horne Street between Gap Road and Riddell Road SB	0.59	0.54	0.62	0.59	0.51	0.72	0.68	0.81	0.80
5	Sunbury Road north of Bulla-Diggers Road NWB	0.62	0.63	0.61	0.63	0.62	0.41	0.41	0.45	0.46
	Sunbury Road north of Bulla-Diggers Road SEB	1.02	1.03	1.04	1.05	1.02	0.93	0.92	0.97	0.98
6	Melbourne-Lancefield Road south of Gellies Road NB	0.38	0.48	0.37	0.47	0.39	0.31	0.42	0.27	0.39
	Melbourne-Lancefield Road south of Gellies Road SB	0.64	0.72	0.59	0.69	0.65	0.57	0.67	0.51	0.66
7	Vineyard Road north of interchange NB	0.60	0.60	0.58	0.57	0.59	0.72	0.70	0.67	0.66
	Vineyard Road north of interchange SB	0.87	0.86	0.91	0.90	0.85	0.89	0.87	0.93	0.93

The AM peak shows that the citybound traffic on Sunbury Road and Vineyard Road are the most critical points in the network with DOS values approaching or exceeding their theoretical capacities. The options with the OMR in place (Options 1 to 5) indicate that Sunbury Road will be required to be considered as part of its planning with DOS values of greater than 1.

The key links in and around the Sunbury town centre indicate that the network will be expected to operate well in all scenarios in 2046.

Table 8.13: PM Peak (two hour) Volume to Capacity Outputs and Level of Service - Year 2046

No	Road Name	Opt1	Opt2	Opt3	Opt4	Opt5	Opt6	Opt7	Opt8	Opt9
1	Sunbury Road between Evans Street and Francis Boulevard NWB	0.52	0.60	0.54	0.62	0.53	0.69	0.80	0.79	0.92
	Sunbury Road between Evans Street and Francis Boulevard SEB	0.53	0.65	0.59	0.72	0.53	0.59	0.72	0.73	0.88
2	Jacksons Creek Crossing in Sunbury South PSP EB	0.67	0.70	-	-	0.80	0.91	0.95	-	-
	Jacksons Creek Crossing in Sunbury South PSP WB	0.44	0.47	-	-	0.43	0.86	0.91	-	-
3	Jacksons Creek Crossing in Lancefield Road PSP NEB	0.76	-	0.80	-	0.76	0.80	-	0.90	-
	Jacksons Creek Crossing in Lancefield Road PSP SWB	0.65	-	0.69	-	0.65	0.76	-	0.85	-
4	Horne Street between Gap Road and Riddell Road NB	0.70	0.69	0.76	0.76	0.58	0.76	0.75	0.81	0.82
	Horne Street between Gap Road and Riddell Road SB	0.72	0.71	0.81	0.80	0.58	0.84	0.81	0.86	0.82
5	Sunbury Road north of Bulla-Diggers Road NWB	1.05	1.06	1.07	1.08	1.05	0.95	0.95	0.99	0.98
	Sunbury Road north of Bulla-Diggers Road SEB	0.72	0.74	0.73	0.75	0.73	0.46	0.46	0.53	0.53
6	Melbourne-Lancefield Road south of Gellies Road NB	0.72	0.83	0.68	0.79	0.74	0.65	0.76	0.30	0.73
	Melbourne-Lancefield Road south of Gellies Road SB	0.47	0.54	0.44	0.53	0.47	0.36	0.46	0.32	0.46
7	Vineyard Road north of interchange NB	0.93	0.93	0.93	0.86	0.89	0.94	0.92	0.98	0.98
	Vineyard Road north of interchange SB	0.71	0.71	0.69	0.65	0.70	0.80	0.78	0.77	0.76

Similarly to the AM peak, the network in generally rarely exceeds a DOS value of more than 1, with the major exception being Sunbury Road and Vineyard Road. The proposed southern crossing performs at its best with the northern crossing but without the southern railway station, indicating its importance as a connection for public transport users.

8.5.2 Interim Year

The VCR outputs for the key locations, as identified in Figure 8.1, have been extracted from the Interim Year model and are summarised in Table 8.14.

Table 8.14: AM and PM Peak (two hour) Volume to Capacity Outputs and Level of Service – Interim Year

No	Road Name	AM Peak	PM Peak
1	Sunbury Road between Evans Street and Francis Boulevard NWB	1.40	0.92
	Sunbury Road between Evans Street and Francis Boulevard SEB	0.76	1.48
2	Jacksons Creek Crossing in Sunbury South PSP EB	-	-
	Jacksons Creek Crossing in Sunbury South PSP WB	-	-
3	Jacksons Creek Crossing in Lancefield Road PSP NEB	-	-
	Jacksons Creek Crossing in Lancefield Road PSP SWB	-	-
4	Horne Street between Gap Road and Riddell Road NB	0.83	0.77
	Horne Street between Gap Road and Riddell Road SB	0.74	0.83
5	Sunbury Road south of Bulla-Diggers Road NWB	0.63	1.13

No	Road Name	AM Peak	PM Peak
	Sunbury Road south of Bulla-Diggers Road SEB	1.11	0.71
6	Melbourne-Lancefield Road south of Gellies Road NB	0.70	0.95
	Melbourne-Lancefield Road south of Gellies Road SB	0.86	0.67
7	Vineyard Road north of interchange NB	0.57	0.93
	Vineyard Road north of interchange SB	1.04	0.75

The above results indicate that without the duplication of Sunbury Road, Vineyard Road and Melbourne-Lancefield Road, all of the major arterial links within the corridor are likely to reach and/or exceed their theoretical capacity. As per the ultimate scenario, Horne Street in the Sunbury town centre is expected to operate well with acceptable levels of service.

8.6 Select Link Analysis

In order to gain a better understanding on the likely usage of the proposed creek crossings, select link analyses have been carried out at the creek crossings for each scenario. The select link analysis provides the origin and destinations for vehicles using each crossing. A summary of the percent of vehicles using each crossing that are associated with the PSPs are presented in Table 8.15 and Table 8.16 for the AM and PM peak periods respectively.

Table 8.15: Percentage of Creek Crossing Traffic Associated with Sunbury South and Lancefield Road PSPs – AM Peak Period

Select Link Location	Opt1	Opt2	Opt3	Opt4	Opt5	Opt6	Opt7	Opt8	Opt9
Jacksons Creek Crossing in Sunbury South PSP	76%	79%	-	-	75%	57%	54%	-	-
Jacksons Creek Crossing in Lancefield Road PSP	74%	-	66%	-	75%	71%	-	66%	-

Table 8.16: Percentage of Creek Crossing Traffic Associated with Sunbury South and Lancefield Road PSPs – PM Peak Period

Select Link Location	Opt1	Opt2	Opt3	Opt4	Opt5	Opt6	Opt7	Opt8	Opt9
Jacksons Creek Crossing in Sunbury South PSP	73%	73%	-	-	79%	63%	63%	-	-
Jacksons Creek Crossing in Lancefield Road PSP	76%	-	66%	-	70%	71%	-	65%	-

These results indicate that a high percentage of the trips using the proposed creek crossings during the AM and PM peak periods have either an origin or a destination within either the Sunbury South PSP or the Lancefield Road PSP. The Jackson's Creek Crossing in the Sunbury South PSP exhibits a slightly higher proportion of through traffic than the crossing in the Lancefield Road PSP.

A range of plots for the select link analysis have been prepared and are included in Appendix D.

8.7 Difference Plots

In order to gain an understanding of the change in daily volume on the network, in and around the Sunbury town centre, difference plots have been prepared for the daily traffic on the network for Options 4 and 5 (i.e. with the OMR) and Options 6 and 9 (without the OMR). Figures 8.2 and 8.3 show the resultant daily difference plots for the two respective scenarios.

Figure 8.2: Daily Vehicle Volume Difference – Option 4 Vs Option 5

Figure 8.3: Daily Vehicle Volume Difference – Option 9 Vs Option 6

Key observations from the difference plots with and without the crossings:

- The Sunbury town centre experiences a reduction between 2,000 and 5,000 vehicles per day with the introduction of both bridges regardless of the OMR.
- Sunbury Road between Barkly Street and Francis Boulevard will experience approximately 10,000 to 15,000 vehicles per day less with the introduction of the two bridges regardless of the OMR.
- Vineyard Road north of the interchange will experience between 1,000 to 4,000 less vehicles per day.
- Melbourne-Lancefield Road will experience a reduction between 3,500 and 5,500 vehicles per day with the introduction of the two crossings, regardless of the OMR.
- Overall, there is clearly a reduction in traffic through the Sunbury town centre with the introduction of the bridges. Notwithstanding, the operation of the town centre in both options indicate that the town centre will operate with acceptable levels of service.

8.8 Reference Plots

A range of pots for the Modelled Scenarios have been prepared and are located in Appendix E. These include:

- AM and PM Total Vehicle Volumes
- Daily Link Volumes
- AM and PM Peak Period Degree of Saturation
- Select Link Analysis.

9. Summary

The results of the modelling have been prepared based on the road network and land area forecasts provided by the MPA and its stakeholders. The forecast growth includes a substantial increase in population growth and a moderate increase in employment. As a result, commuters in the Sunbury Township are required to travel to and from their workplace in areas beyond Sunbury, resulting in added congestion on both Sunbury Road and Vineyard Road.

The Sunbury town centre will experience an increase in traffic as a result of the growth however it is still expected to operate at acceptable levels. The introduction of the OMR will change the travel behaviour in that Sunbury Road is expected to increase by more than 25%. The introduction of the OMR has an added outcome of reducing public transport usage in Sunbury.

The two bridges are anticipated to carry up to 15,000 vehicles per day and would likely fit the operation category of a lower order arterial or connector road. They provide more flexibility in the network and reduce volumes in the town centre. Notwithstanding, the results demonstrate from a transport perspective that the two PSPs are able to function regardless of the introduction of the river crossings.

Appendix A

Model Calibration and Validation

GTAconsultants

Sunbury & Diggers Rest Growth Corridor Strategic Model Calibration and Validation Modelling Report

Client // Metropolitan Planning Authority
Office // VIC
Reference // 15M1526000
Date // 02.07.15

Sunbury & Diggers Rest Growth Corridor

Strategic Model

Calibration and Validation Modelling Report

Issue: A 02.07.15

Client: Metropolitan Planning Authority
Reference: 15M1526000
GTA Consultants Office: VIC

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A-Dr	12/03/2015	Draft	Sal Ahmad, Emma Akiyama Reeves	Reece Humphreys	Reece Humphreys	
A-Dr	27/05/2015	Revised Draft	Sal Ahmad	Reece Humphreys	Reece Humphreys	
A	02/07/2015	Final	Sal Ahmad	Reece Humphreys	Reece Humphreys	

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1. Introduction

1.1 Background

The Lancefield Road and Sunbury South Precinct Structure Plans (PSP 1075 & 1074) cover two growth areas anticipated in the Sunbury-Diggers Rest Growth Corridor, located to the northeast and southeast of the Sunbury Township respectively.

These two growth areas are almost completely undeveloped, and have limited to no transport network, with the exception of the Sunbury train line that extends north-south through the two growth area precincts.

On this basis, GTA Consultants (GTA) have been commissioned by the Metropolitan Planning Authority (MPA) to undertake strategic transport modelling to test the transport network with the introduction of the Jackson Creek crossings on the future year scenarios.

This report has been prepared to provide a summary of the existing conditions VITM modelling approach, and to document the outcomes of the calibration and validation. Further, this report will eventually form a part of the overall VITM modelling report providing more detail of option testing of the future scenarios.

1.2 Overview of Calibration and Validation Process

Model calibration is a process in which the model inputs are refined to reflect observed conditions. It allows the model to produce travel demands in line with actual measured traffic conditions.

Existing traffic counts are compared to the corresponding modelled link volumes after each model assignment. Following any link adjustments, the model demands are once again assigned and modelled results compared to the traffic counts. This process is repeated until the model results converge to a point where they meet a number of calibration criteria.

Strategic network models are generally calibrated to reflect existing traffic counts across a wide corridor or regional area. Strategic network models are not expected to accurately match traffic counts at individual locations, instead model calibration is typically measured by comparing counts across a number of locations such as a screenline, and/or a group of counts at a regional level.

Model Calibration and Validation guidelines have been developed by VicRoads for use in strategic modelling work. The document entitled *'Transport Modelling Guidelines, Volume 2: Strategic Modelling (April 2012)'* has been used as a reference in this case. This document outlines the model calibration targets for VITM modelled traffic volumes.

1.3 VITM Overview and Version

VITM is a tool developed by the Department of Economic Development, Jobs, Transport and Resource to assist in the planning of road and public transport infrastructure in Victoria. It is a multimodal strategic model that uses future population, employment and land use data projections to forecast travel behaviour and the impacts of changes to the road and public transport networks. VITM contains all major freeways, main arterials and connector roads within the Melbourne Statistical Division.

The model is a link-based traffic model which is implemented in the CUBE Voyager software environment (developed by Citilabs). The model version that used for this project is the VITM Northern Growth Corridor model updated as part of the Hume Strategy. The model updated with the VITM 2011 land use data refined by Council to match zone disaggregation (further discussed in Section 2.1).

1.4 Stakeholder Input

The transport modelling completed for the Sunbury Township has involved extensive collaboration with key stakeholders including MPA, Hume City Council, DEDSTR, VicRoads and PTV. Specifically, the stakeholder group provided input and confirmation of the following key items:

- Supplementary Traffic Data
- Land use information as it relations to the zone desegregation
- Zone connector and splitting information
- Public transport- connections

Initial results presented to the group highlighted a range of concerns with the model outputs. Predominantly, the concern of note was in relation to Sunbury Road and Vineyard Road. A working group meeting with the Stakeholder group agreed that the most appropriate resolution of these concerns was to amend the network constraints to provide a more accurate demand on the concerned links. The changes are documented within this report.

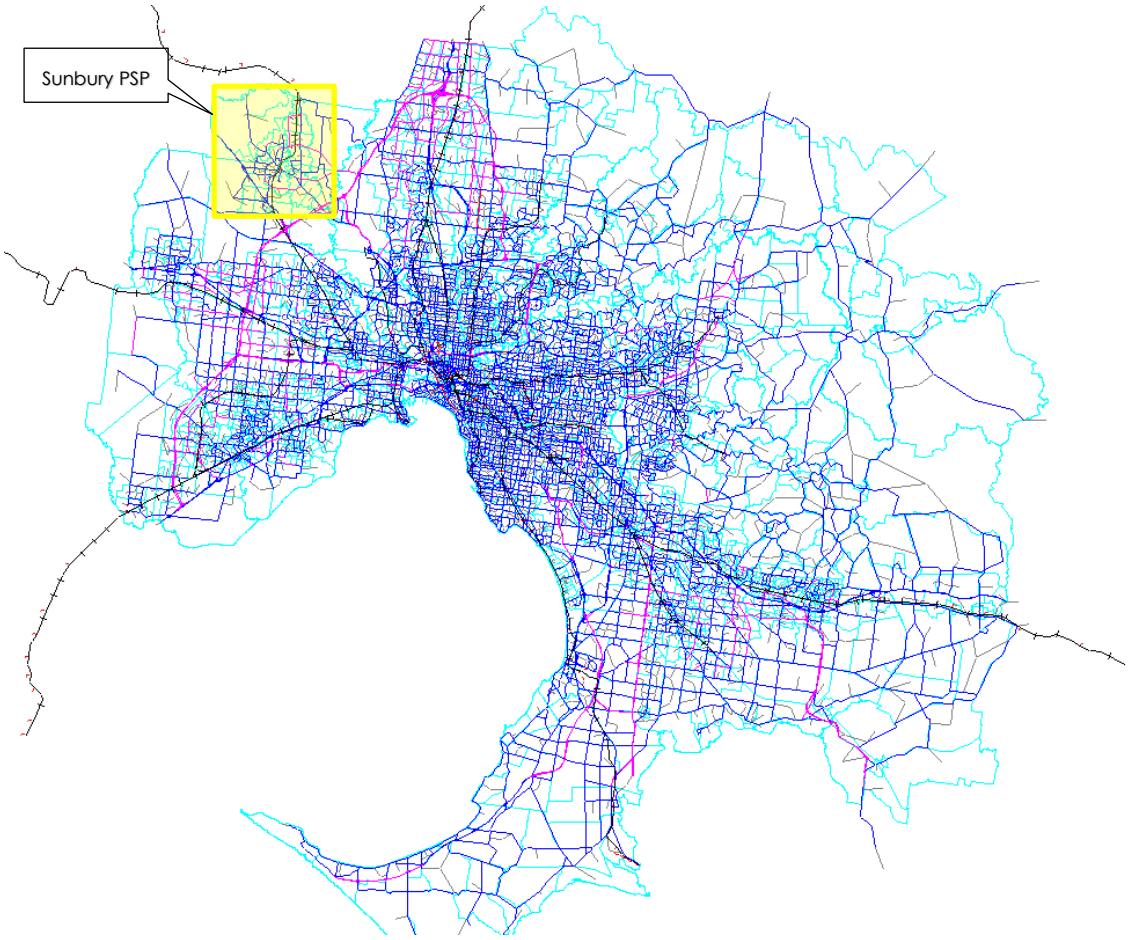
The outcome of the modelling is that the volumes on Sunbury Road and Vineyard Road are more accurately represented which provides a strong platform for which to assess future year options.

2. Model Structure

2.1 Zone System

The VITM zone system contains a total of 2,912 zones (including external zones) which have been developed based on Census Collector Districts (CCD), aggregated or disaggregated where necessary. The zone system for the strategic model study area in the content of the entire VITM extent is shown in Figure 2.1 on the following page.

Figure 2.1: Study Area in the Context of the Overall VITM Network



For the purpose of this study, zone refinements (additional zones and zone connectors) were undertaken as part of the calibration and validation process to provide a finer level of detail in the traffic movements within the Sunbury and Diggers Rest study area.

The revised zone system contains an additional 15 zones which replicate the Sunbury and Diggers Rest precinct, respectively. The zone refinements will allow for an improved definition of land use within the study area, and therefore will result in a more precise distribution of trips. A detailed map of zone refinements is shown in Figure 2.2 and Figure 2.3.

Figure 2.2: Existing Zone Structure in VITM

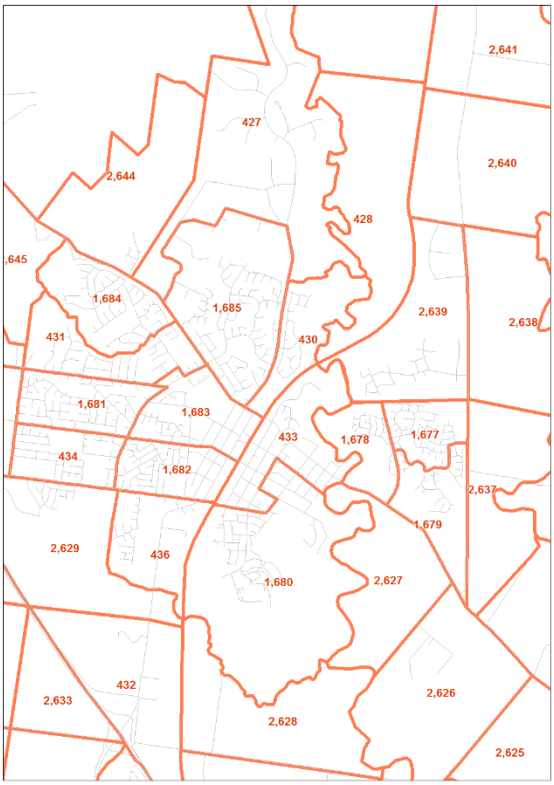
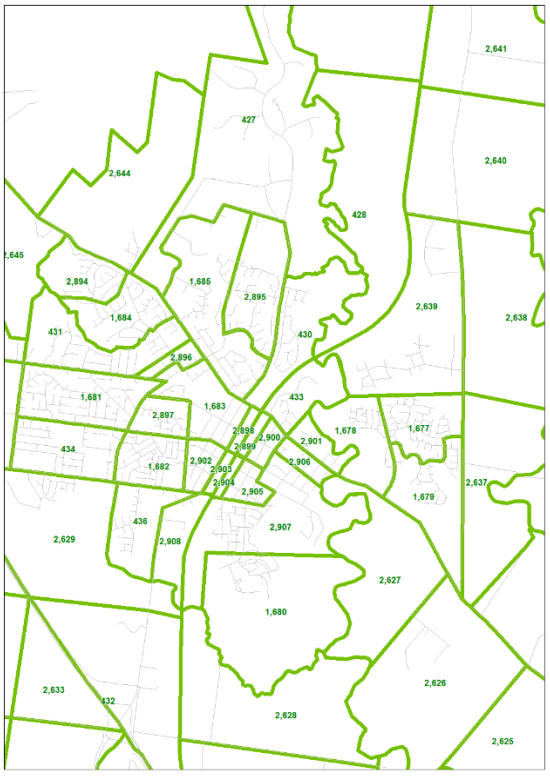


Figure 2.3: Zone Structure Refinements



Recent land use data was obtained from DEDJTR in January 2015 for a newer 2014 version of VITM (yet to be released). Through validation process, the VITM 2011 NGC model was found to better represent the existing condition of the road network. As such VITM 2011 NGC land use was based and utilised by Council to refine the zones which is summarised in Table 2.2. Table 2.1 summarises the land use based on the existing zone structure for comparative purposes. It is noted that the new additional zones are highlighted in green within the table.

Table 2.1: Existing Zone Structure Land Use Comparison

Zone	Population	Dwelling	Employment - Retail	Employment - Total	Enrolment - Primary	Enrolment - Secondary	Enrolment – Tertiary
431	2842	864	0	157	565	0	0
433	1216	579	884	2817	299	1100	0
436	973	339	115	627	0	0	0
1680	3572	1232	4	439	398	65	1025
1682	2072	881	182	780	0	0	0
1683	2004	811	344	889	547	0	0
1684	2565	798	14	271	517	0	0
1685	4156	1417	14	369	431	0	0

Table 2.2: Sunbury and Diggers Rest Refined Zone Land Use Summary

Zone	Population	Dwelling	Employment - Retail	Employment - Total	Enrolment - Primary	Enrolment - Secondary	Enrolment – Tertiary
431	2842	864	0	0	0	0	0
433	262	125	0	190	299	1100	0
436	973	339	45	45	0	0	0
1680	1153	408	4	170	398	65	0
1682	1776	755	0	101	0	0	0
1683	1483	600	4	251	547	0	0
1684	1824	567	14	271	657	0	0
1685	2559	872	14	299	0	0	0
2894	741	231	0	0	0	0	0
2895	1597	545	0	70	431	0	0
2896	0	0	0	157	565	0	0
2897	521	211	125	222	0	0	0
2898	0	0	482	889	0	0	0
2900	63	30	312	973	0	0	0
2901	126	60	0	220	0	0	0
2902	296	126	150	321	0	0	0
2903	0	0	44	358	0	0	0
2904	0	0	171	232	0	0	0
2905	355	169	34	137	0	0	0
2906	410	195	50	382	0	0	0
2907	2419	824	0	50	0	0	0
2908	0	0	70	581	0	0	0

2.2 Road Network and Zone Connectors

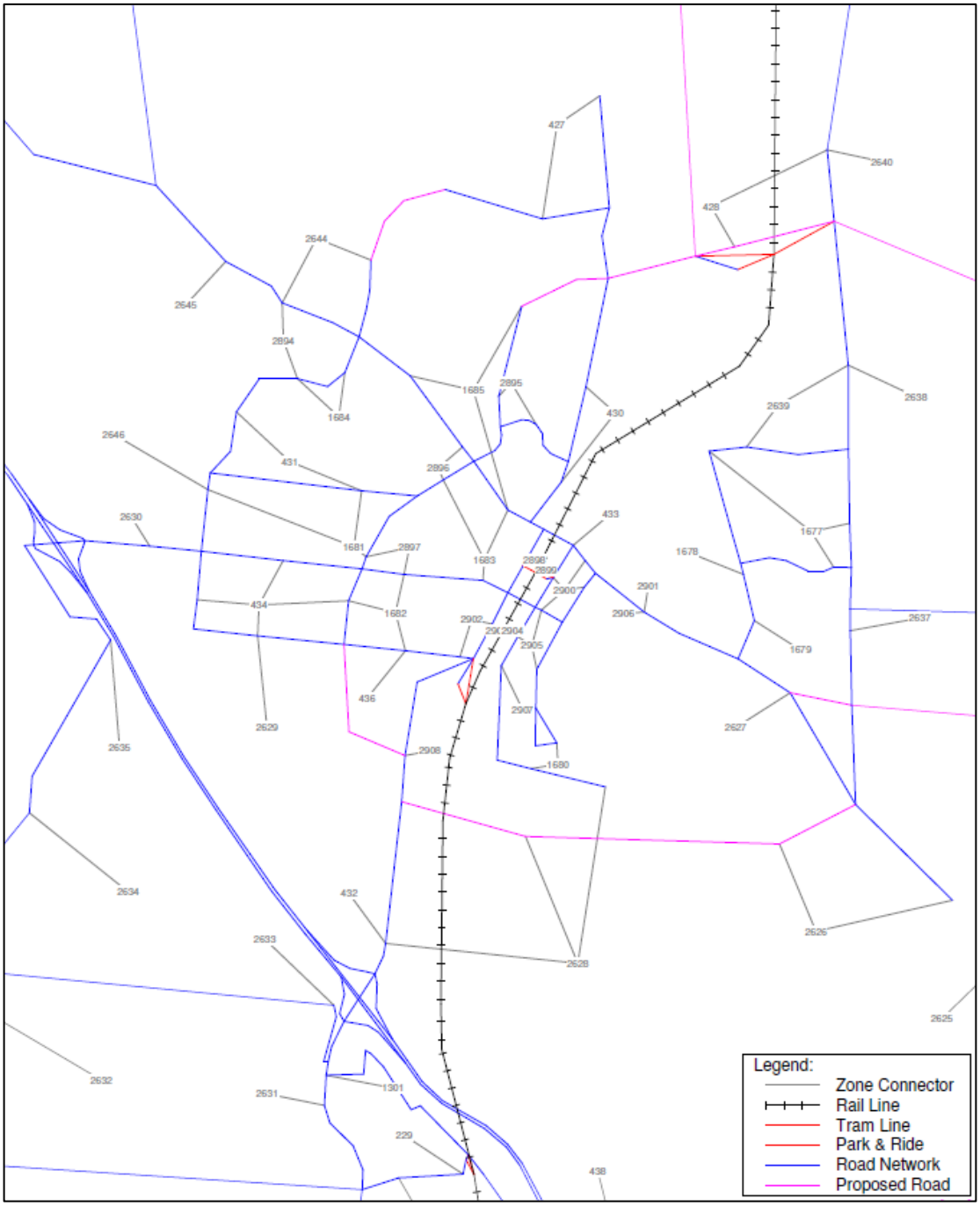
For the purpose of this assessment, a full review of all links within the study area was conducted to ensure that they reflect existing road conditions in terms of number of lanes, speeds etc.

A number of zone connectors have been reviewed and additional connections have been incorporated to better reflect the zone access of the network. Figure 2.4 shows the refined road network and zone connectors, with a summary of the changes included in the modelled network is provided as follows:

- Sign posted speed adjustments at the following locations:
  - Wilsons Lane and Philip Dr (north of Gap Road) – increased from 50km/h to 60km/h as depicted out on site.
  - Gellies Road and Wildwood Road– reduced from 100km/h to 70km/h as a result of unposted speed signs and unstable road surfaces.
  - Bulla-Diggers Rest Road – reduced from 100km/hr to 80km/hr as a result of unposted speed signs and unstable road surfaces.
- Train station refinements:
  - Additional zones included in catchment area (new zones).
  - Revised connection to park and ride link from Evans Street (removed from Horne Street).
- Reduction of lane capacity at the following locations:

- Wildwood Road – reduced from 1600 to 800 as a result of the unstable conditions, no sealed shoulders and steep sections. Shared lane for both movements of travel at sections throughout the road.
- Gellies Road – reduced from 1600 to 800 as a result of the unstable conditions, no sealed shoulders and steep sections. Shared lane for both movements of travel at sections throughout the road.
- Konagaderra Road – reduced from 1600 to 800 as a result of the unstable conditions, no sealed shoulders and steep sections.

Figure 2.4: Road Network and Zone Connectors Refinements



2.3 Summary of Refinements

In addition to those refinements included in the base model as part of the process to calibrate and validate it, a number of the refinements were assessed, and as a result were discounted due to their impact on the results, and therefore were discarded and/or reverted back.

A summary of all the refinements tested as part of this process are located in Appendix A, including the model refinements tested and adopted in the final model run.

2.4 Sunbury Road Refinements

After completion of the first draft of the Calibration and Validation model report, it was concluded that the traffic along Sunbury Road was underestimating the volumes in the peak direction for both the AM and PM peaks. As this is a key arterial road for traffic entering and exiting Sunbury and the connection to Bulla bypass, it was necessary to try and update the model to reflect the observed volumes.

In 2012, SKM undertook a validation of the 2011 scenario from VITM as part of a transport study for the Hume City Council. During the validation it became apparent that Sunbury road was not functioning as the observed data suggested (i.e. travel times, average speed etc), subsequently, a new road classification was created specifically for rural highways such as Sunbury Road. The attributes of the new link class are detailed below.

Table 2.3: Sunbury Road Linkclass changes

	Capacity	% of Posted Speed	Ja Factor
VITM	900	0.7	1.0
SKM	1500	0.9	0.7
GTA	1200	0.95	0.7

A review of SKM's linkclass classification was made and in return GTA has adopted the linkclass detailed above to help replicate the existing operation of Sunbury Road.

3. Transport Data Collection

Extensive transport data collection has been undertaken to help with the existing conditions models prepared as part of this study accurately reflects the current operation of the road network. Table 3.1 summarises the transport data collected with the locations of the traffic counts illustrated in Figure 3.1 and Figure 3.2.

Table 3.1: Transport Data Collection Summary

Data Type	Source	Survey Date(s)	Survey Times	Description
Automatic Tube Counts[3]	Traffic and Parking Surveys (TPS)	Mon 2 to Sun 8 February 2015	24/7	Surveys at key locations shown in Figure 3.1.
SCATS Traffic Volumes	VicRoads	Mon 2 to Fri 6 February 2015	24 hours data	SCATS traffic volume data requested at all signalised intersections within the wider study area. It is noted that some data is missing as a result of faults at some sites.
Travel Time Surveys	GTA	Tuesday 20 January 2015	AM: 7:00am to 10:00am PM: 3:00pm to 6:00pm	GPS method using floating car runs. Travel time routes as shown in Figure 3.2.
Site Observations	GTA	Tuesday 3 February 2015	AM: 7:30am to 9:00am PM: 4:30pm to 6:00pm	Observe existing conditions operation including queue lengths, road geometry and characteristics, driver behaviour, public transport operation etc.

[1] TPS have advised that vandalism to some of the automatic tube counters occurred during the survey period. As such, some location do not have complete data set and data from available dates have been utilised for calibration and validation.

Figure 3.1: Transport Data Collection Locations – Traffic Volumes

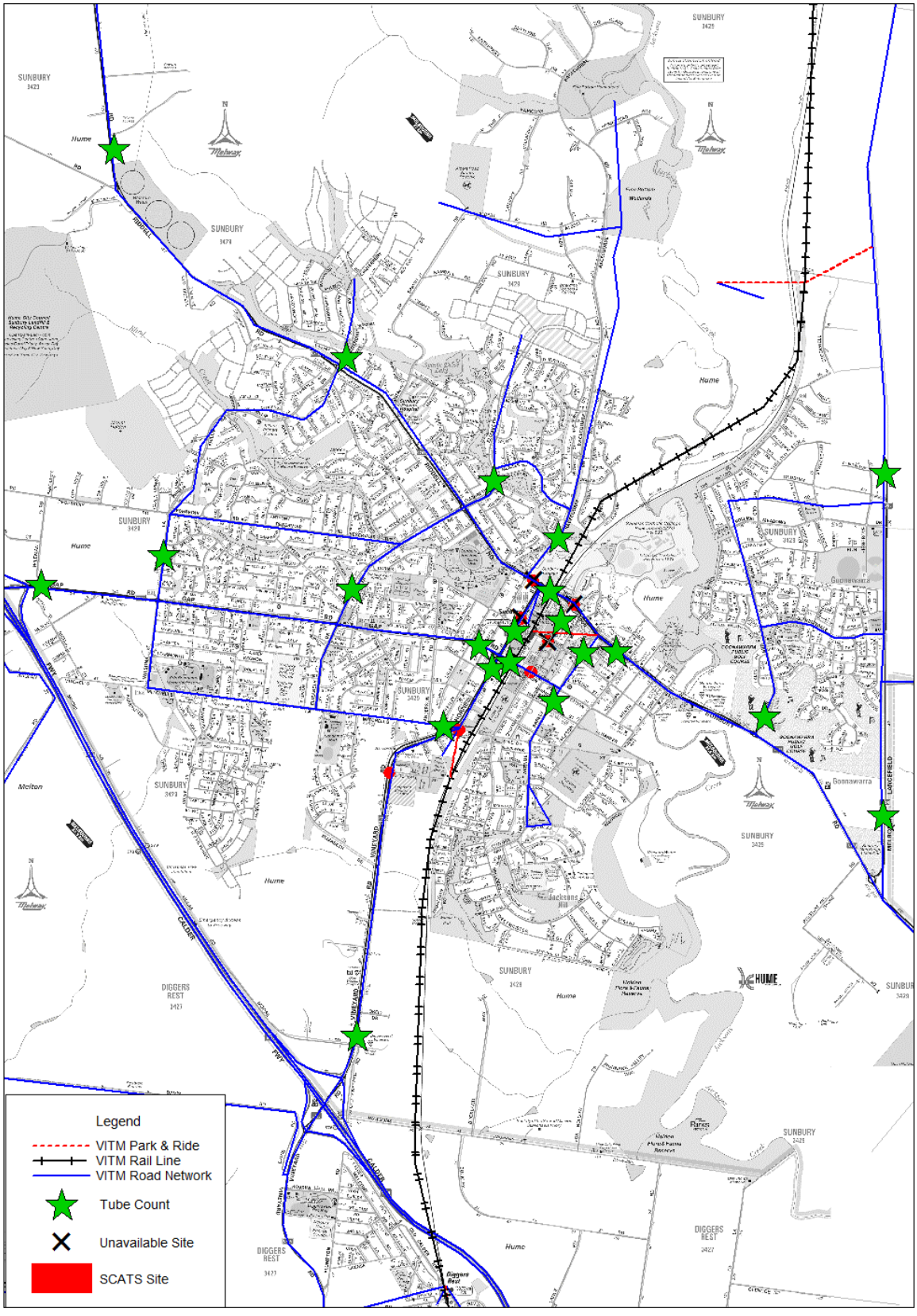
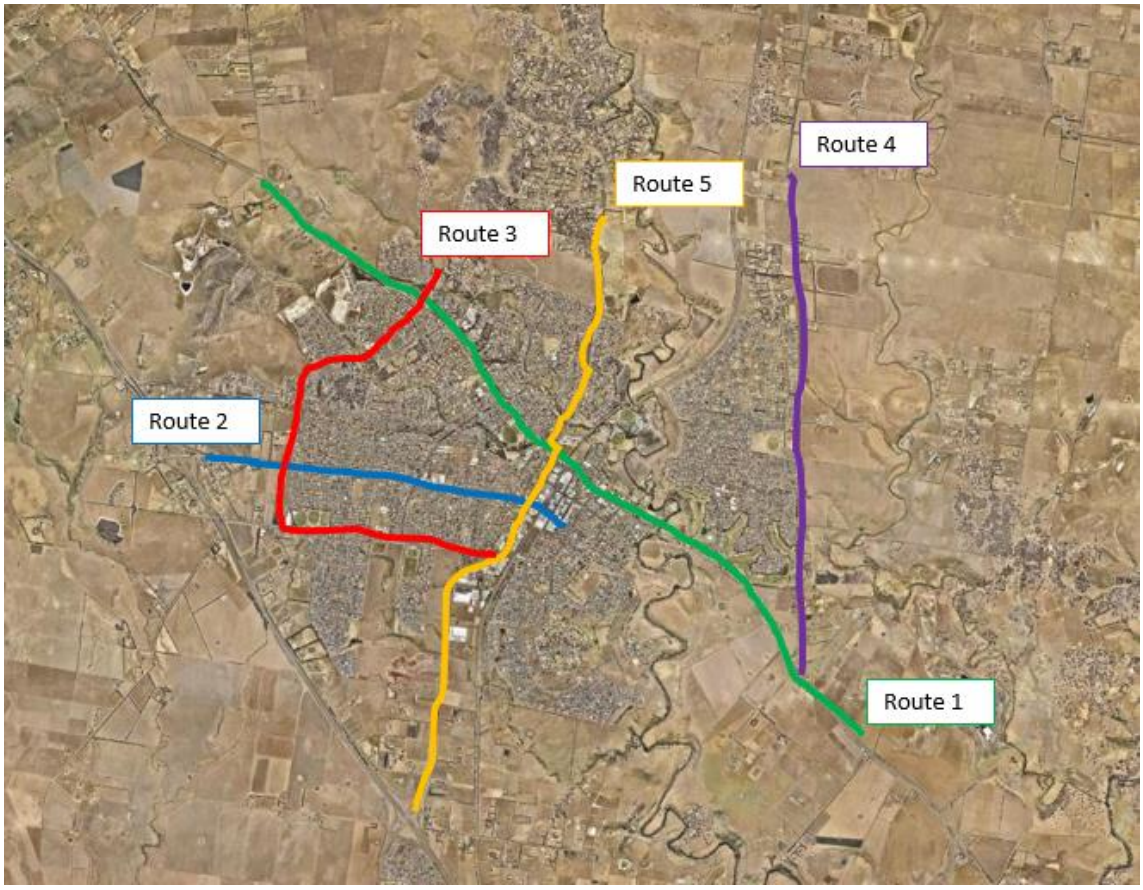


Figure 3.2: Transport Data Collection Locations – Travel Times



4. Screenlines and Local Traffic Counts

4.1 Local Screenlines

Figure 4.1 and Figure 4.2 illustrate the screenlines that have been adopted as part of the calibration and validation. It is noted that Figure 4.1 presents the five local screenlines used to validate the study area, which details of the traffic counts are in Appendix B.

A summary of the data points relating to each of the local screenlines are presented in Table 4.1.

Figure 4.1: Local Screenline Locations and Data Points

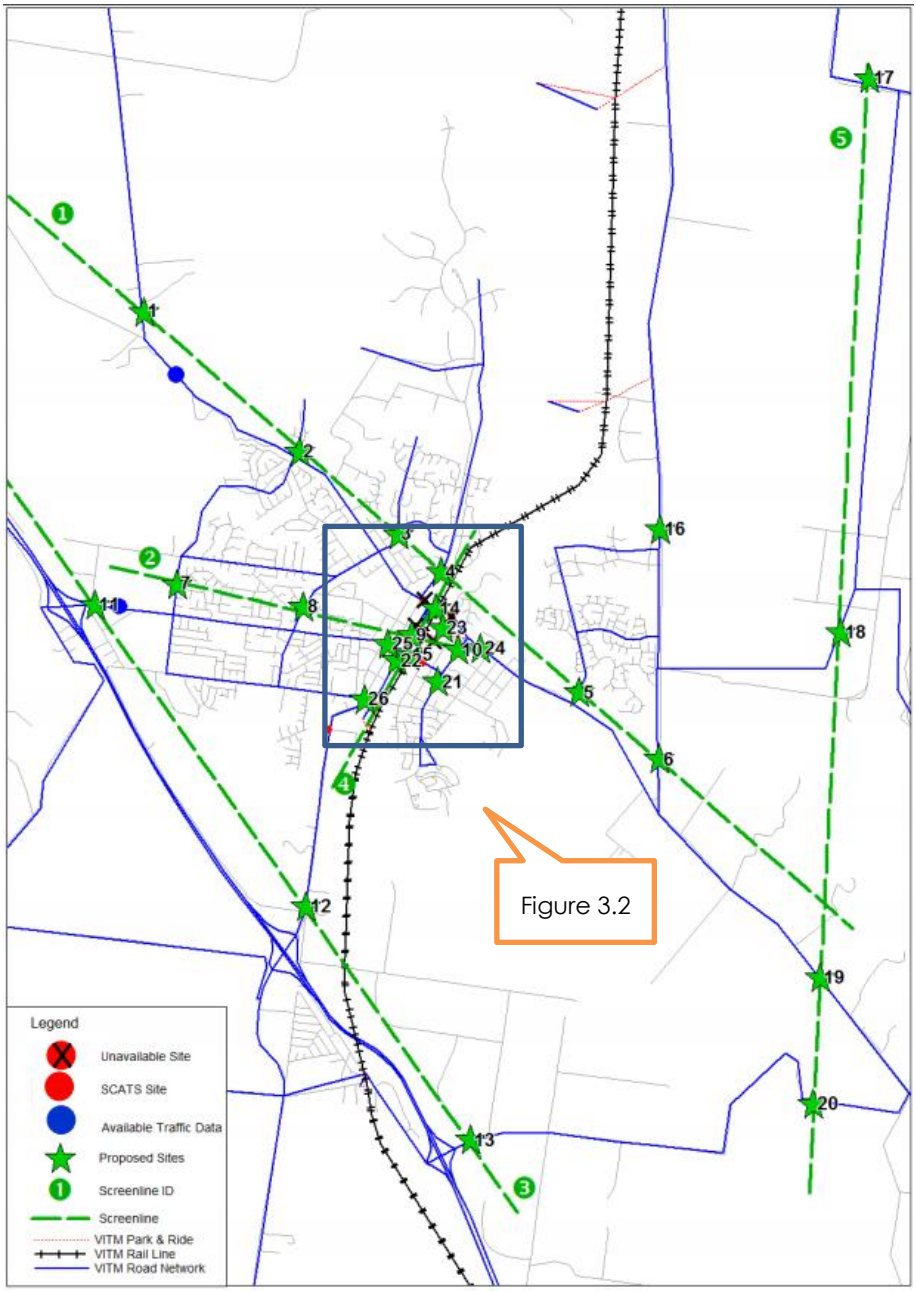


Figure 4.2: Local Screenline Locations and Data Points – Sunbury Central Area

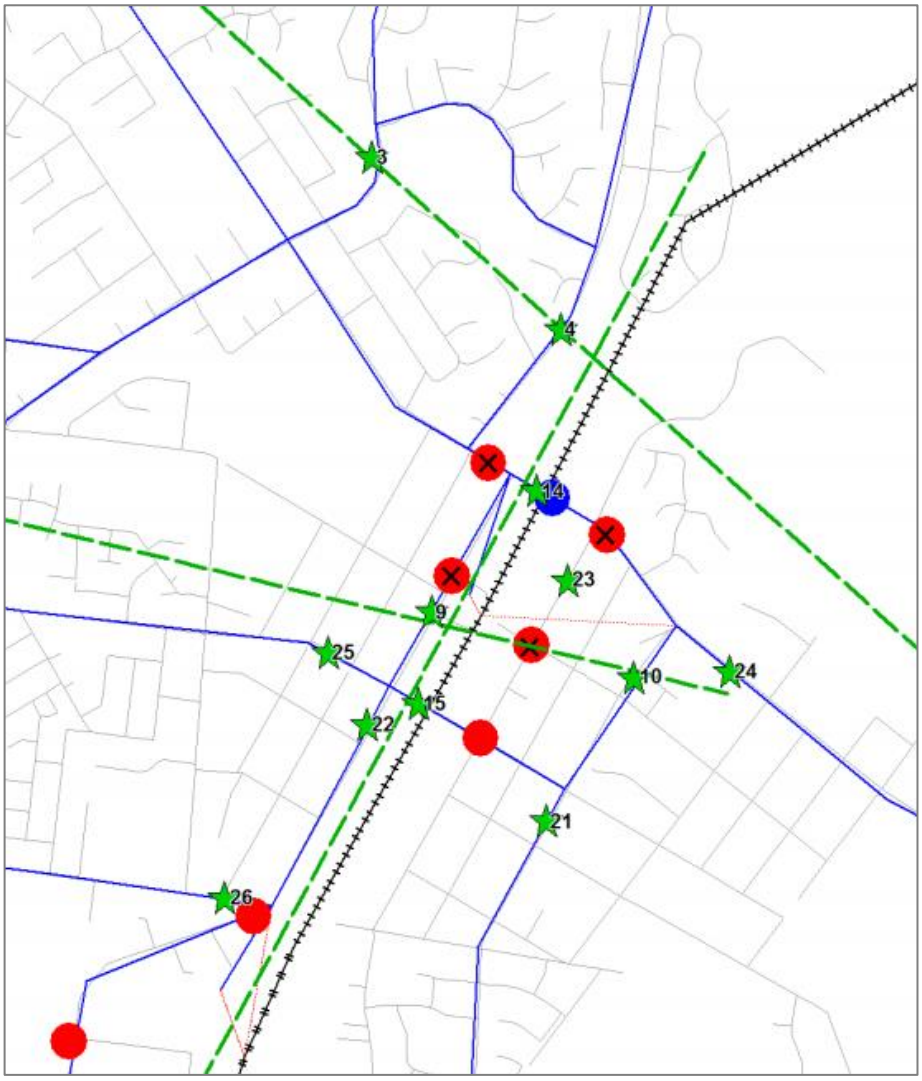


Table 4.1: Summary of Screenline Data Points

Screenline	Data Point Site No.	Location
Screenline 1	1	Riddle Rd north of Dalrymple Rd
	2	Canterbury Ave north of Riddell Rd
	3	Elizabeth Dr north of east of Riddell Rd
	4	Racecourse Rd north of Riddell Rd
	5	Francis Blvd north of Riddell Rd
	6	Melbourne – Lancefield Rd north –east of Sunbury Rd
Screenline 2	7	Wilsons Ln between Reservoir Rd & Gap Rd
	8	Elizabeth Dr between Reservoir Rd & Gap Rd
	9	Horne St between Riddell Rd & Gap Rd
	10	Barkly St between Riddell Rd & Gap Rd
Screenline 3	11	Gap Rd east of Calder Fwy
	12	Vineyard Rd north of Calder Fwy
	13	Bulla-Diggers Rest Rd east of Calder Fwy
Screenline 4	14	Riddell Rd between Horne St & Rail Line
	15	Gap Rd between Horne St & Rail Line
Screenline 5	17	Konagaderra Rd west of Wildwood Rd
	18	Gellies Rd west of Wildwood Rd
	19	Sunbury Rd southeast of Shepherds Ln
	20	Bulla-Diggers Rest Rd west of Jacksons Creek

5. Validation Results

5.1 Assignment Convergence

The following criteria are required to be satisfied under the VicRoads guidelines:

- RGAP : Relative difference between the costs along the chosen routes and those along the minimum cost routes, summed across the whole network, and expressed as a percentage of the minimum costs (also referred to as 'Delta' or the Duality Gap).
- Average absolute difference in link flows between successive iterations.
- Relative average absolute difference in link flows between successive iteration.
- Pdiff: Percentage of links whose change in volumes between iterations is less than a set value.

The results of the assignment convergence validation against the targets set out in the guidelines are shown on Table 5.1, indicating that the criteria are met.

Table 5.1: AM & PM Peak Validation Summary - Assignment Convergence

No	Parameter	GTA Model		Requirement	Within Criteria
		AM	PM		
1	RGAP	1%	1%	<1%	✓
	And one of the following (stability)				
2	RAAD	0.5%	0.5%	<1%	✓
3	AAD	0.5	0.5	<1 Veh/h	✓
4	Pdiff	1	1	>95%	✓

5.2 Feedback Convergence

The VicRoads guidelines recommended either of the following two statistics to be used to test for feedback convergence:

- the percent root mean square error for travel time or link flow, or
- the maximum GEH for link flows.

Given that the guidelines do not require stopping criteria to be adhered to, Figure 5.1 illustrates the results of the convergence feedback process between assignment and distribution of the maximum GEH for link flows.

Figure 5.1: Test Convergence - Change of Max GEH with Feedback Cycle

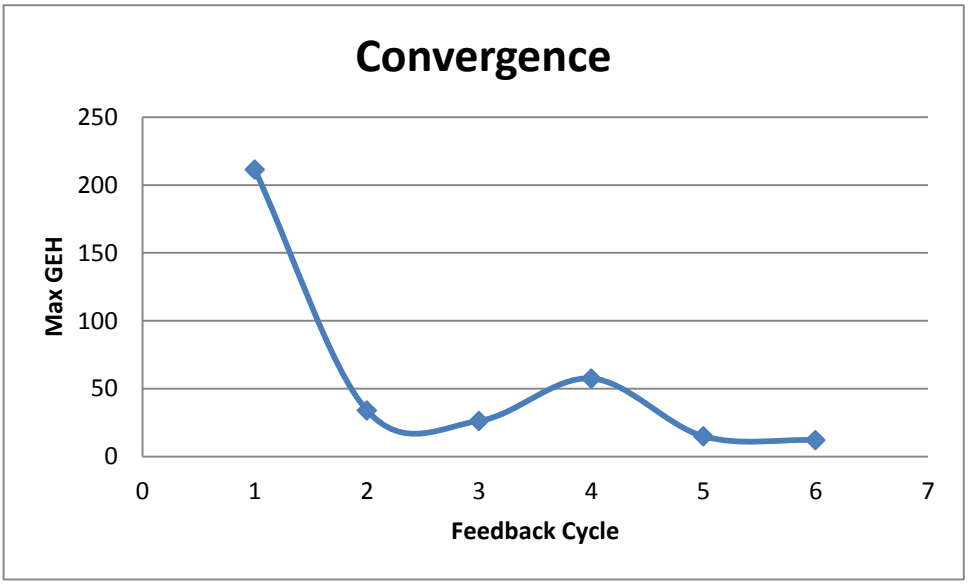


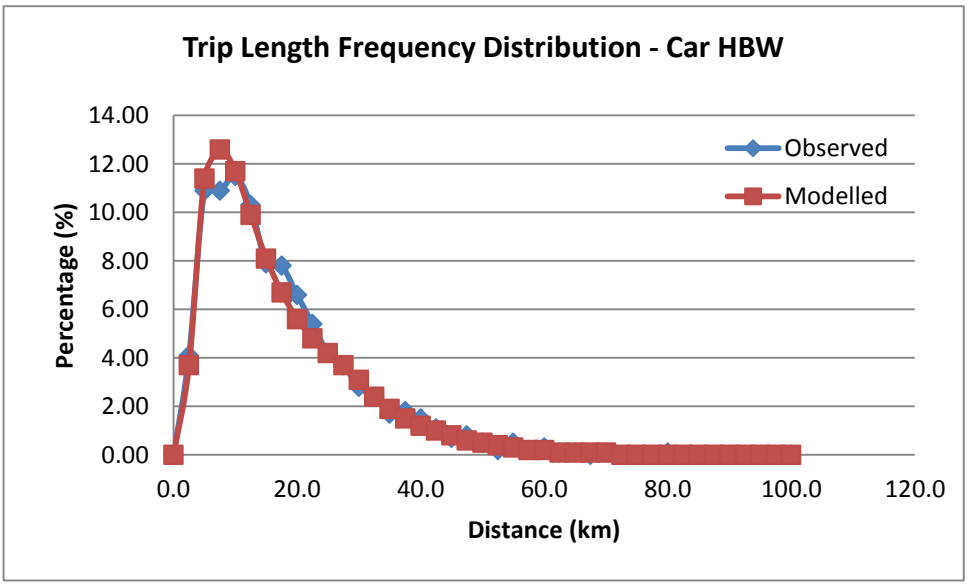
Figure 5.1 illustrates that the maximum GEH for link flows stabilises after the fourth feedback cycle and continues to reduce to the acceptable criteria.

The acceptance target in this criterion as stated in the **transport modelling guidelines from VicRoads**, page 4 "*Previous work has shown that convergence is very slow to achieve using these stopping criteria. Therefore VicRoads, at present requires no stopping criteria to be adhered to. However, a convergent feedback process between assignment and distribution is required, and reporting on one of the above convergence measures for each feedback cycle is required*".

5.3 Trip Length Distribution

The VicRoads guidelines recommend that the comparison of observed and estimated trip lengths is undertaken as part of the validation process. Figure 5.2 illustrates how well the model replicates observed trip lengths over the range of times in the daily trips.

Figure 5.2: Comparison of Observed and Estimated Trip Length Distribution – Daily Trips



A visual comparison of the results presented in Figure 5.2 illustrates a good correlation between observed and modelled trip lengths.

5.4 Screenlines

Total screenlines volumes for each screenlines (shown in Table 5.2), which also compares the difference between the total observed volume (vehicle) and total volume model (vehicle) for the AM and PM peak periods.

Table 5.2: Total Volume Screenlines Surveyed and Modelled, AM and PM Peak trips

	Screenline	Number of Data	2 Hrs. AM Total Volume (000)			2 Hrs. PM Total Volume (000)		
			Observed	Model	%Diff	Observed	Model	%Diff
1	Screenline 1	12	5.5	6.0	8.0	6.5	6.4	-1.4
2	Screenline 2	8	5.3	5.8	11.1	7.0	6.8	-3.4
3	Screenline 3	6	5.1	5.7	13.5	6.2	6.4	3.5
4	Screenline 4	4	6.1	5.6	-7.3	7.6	5.9	-21.7
5	Screenline 5	10	4.8	5.3	12.1	5.2	5.4	4.4
	Total	**40**	**26.7**	**28.5**	**6.4**	**32.5**	**31.0**	**-4.8**

The total volumes on the network indicates that the modelled volumes at the data collection points are higher than the observed.

A plot of two screenline volume validation is shown in Figure 5.3 and Figure 5.4.

Figure 5.3: AM Peaks Screenline Volume Validation

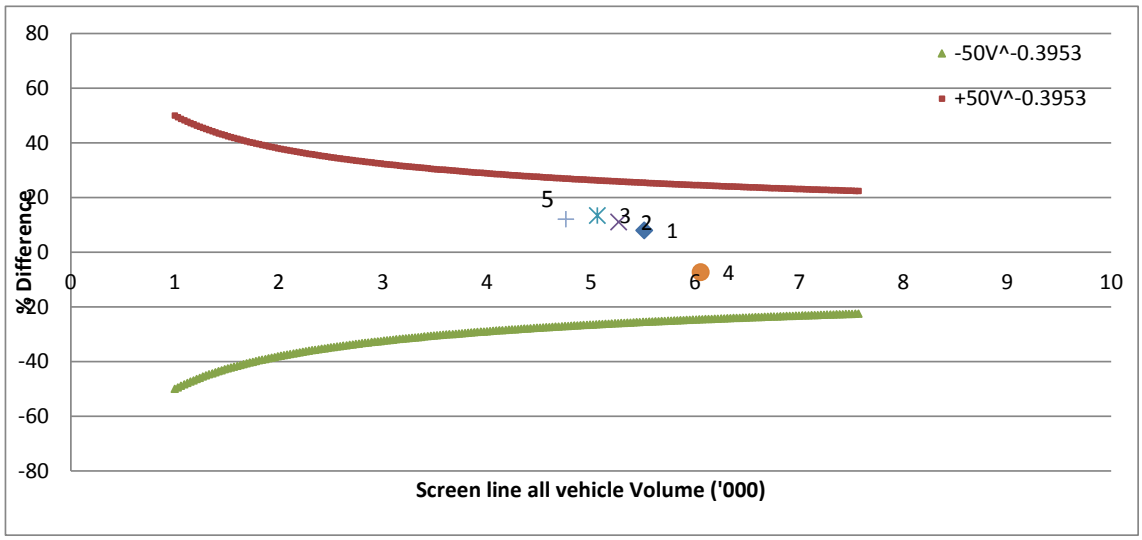


Figure 5.4: PM Peaks Screenline Volume Validation

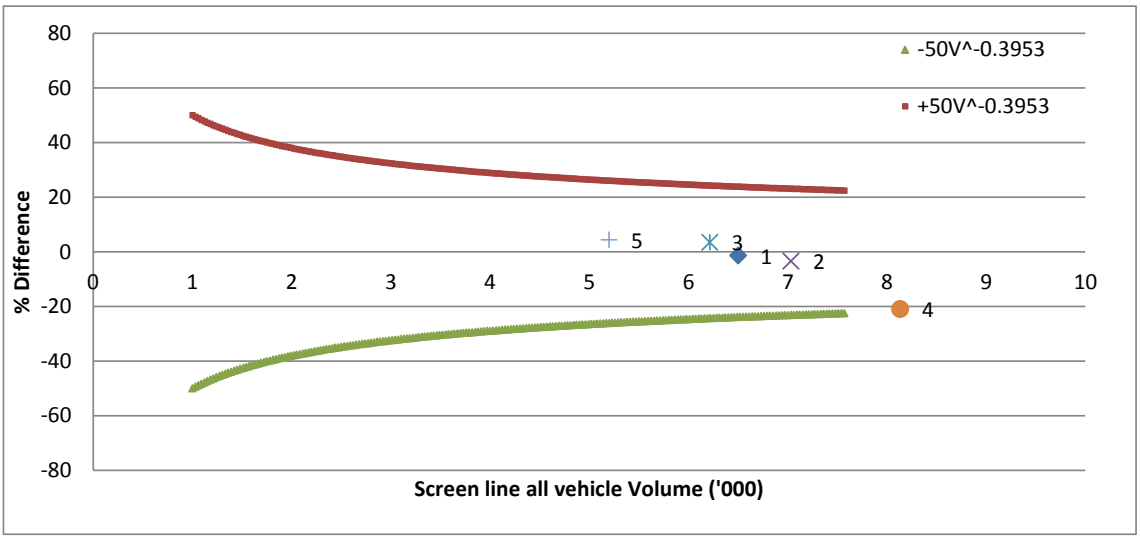


Figure 5.3 and Figure 5.4 illustrate that all the results are within the two line criteria's and that VicRoads criterion is satisfied for the total screenline volumes.

5.5 Inbound and Outbound Flows

Further interrogation of the model is undertaken by assessing the inbound and outbound flows which are summarised in Table 5.3 and Figure 5.5 to Figure 5.8.

Table 5.3: Total Volume Screenlines Surveyed and Modelled (Inbound and Outbound)

Screenline		Number of Data	2 Hrs. AM Total Volume (000)			Number of Data	2 Hrs. PM Total Volume (000)		
			Observed	Model	%Diff		Observed	Model	%Diff
Inbound									
1	Screenline 1	6	3.8	3.7	-2.7	6	2.4	2.6	5.6
2	Screenline 2	4	2.5	2.5	3.5	4	3.6	3.7	2.9
3	Screenline 3	3	2.1	2.2	6.4	3	3.7	3.7	-0.5
4	Screenline 4	2	3.7	3.2	-13.7	2	3.5	2.5	-28.6
5	Screenline 5	5	1.3	2.1	63.9	5	3.6	3.3	-7.8
	Total	**20**	**13.3**	**13.7**	**-3.1**	**20**	**16.9**	**15.8**	**-6.3**
Outbound									
1	Screenline 1	6	1.7	2.3	30.9	6	4.1	3.8	-5.6
2	Screenline 2	4	2.8	3.3	17.7	4	3.4	3.1	-9.9
3	Screenline 3	3	3.0	3.5	18.4	3	2.5	2.7	9.4
4	Screenline 4	2	2.4	2.4	2.7	2	4.6	3.4	-25.5
5	Screenline 5	5	3.5	3.3	-6.6	5	1.6	2.1	31.5
	Total	**20**	**13.4**	**14.8**	**10.6**	**20**	**16.2**	**14.2**	**-6.2**

Figure 5.5: AM Inbound Screenlines Volume

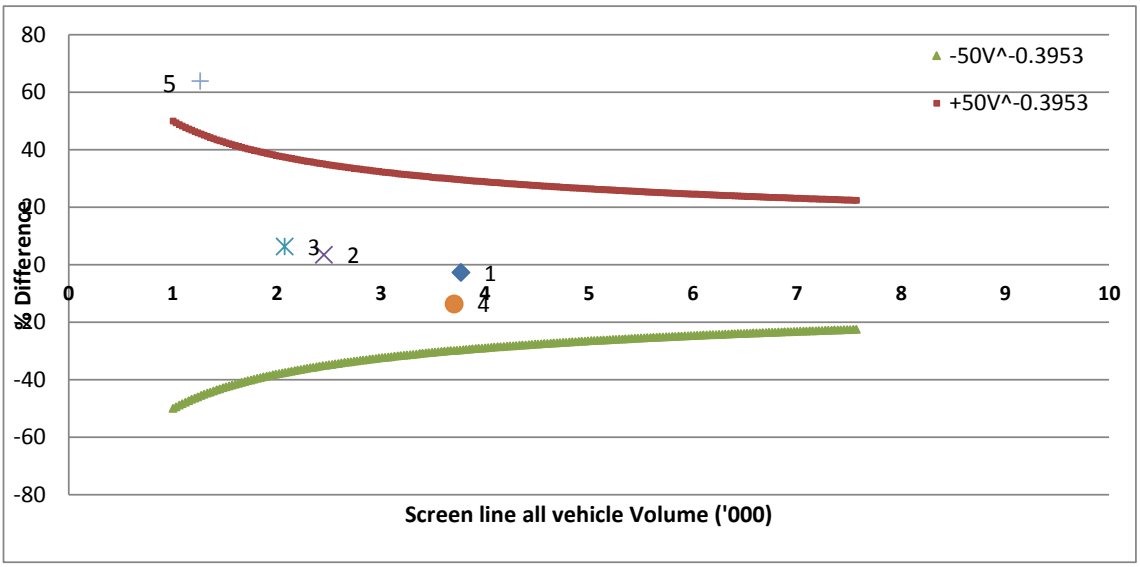


Figure 5.6: PM Inbound Screenlines Volume

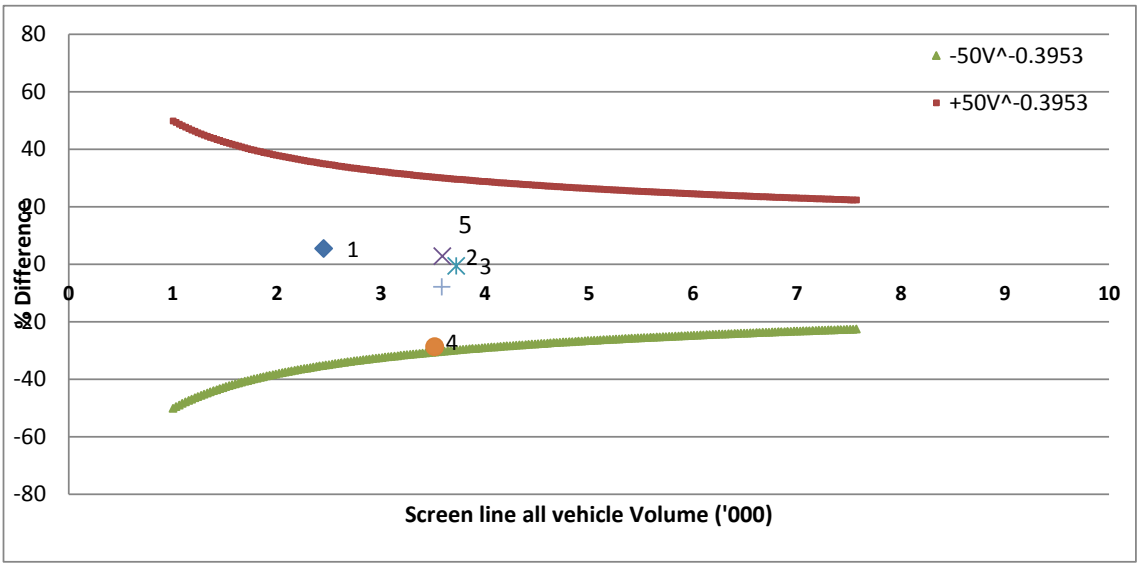


Figure 5.7: AM Outbound Screenlines Volume

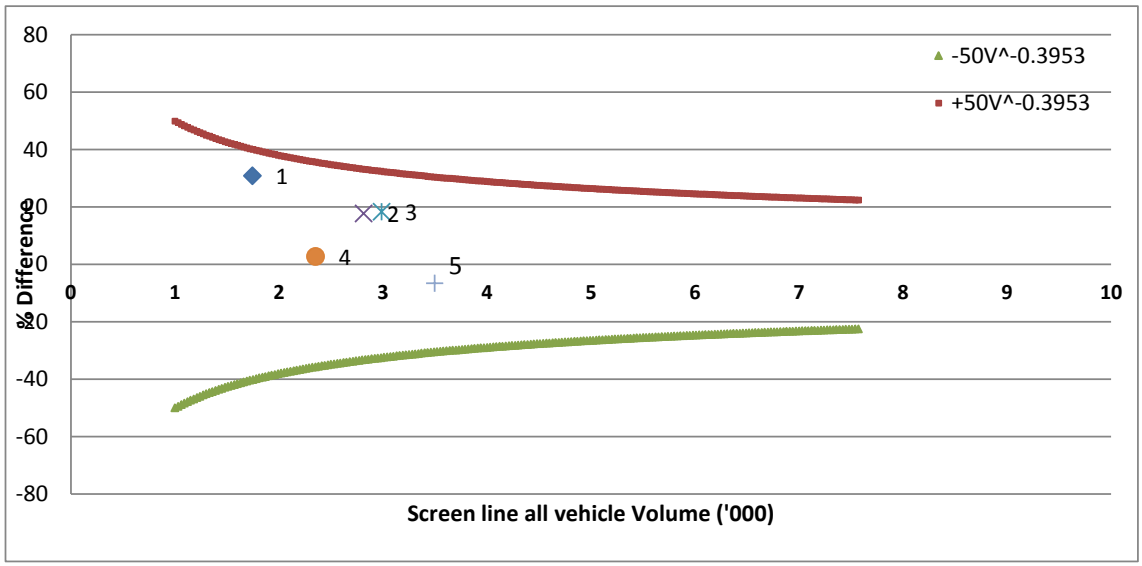


Figure 5.8: PM Outbound Screenlines Volume

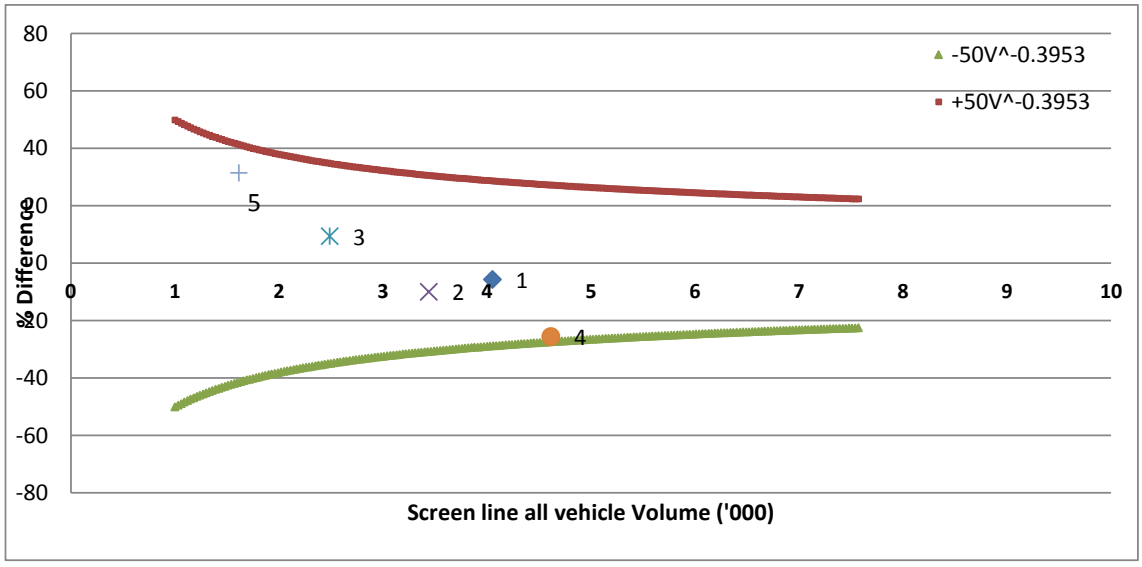


Figure 5.5 to Figure 5.8 demonstrate that the inbound and outbound flows are within the Power function parameters with the exceptions of Screenline 5 in the AM peak inbound. Screenline 5 represents the traffic entering and exiting Sunbury. The model overestimates the volume of traffic entering Sunbury during the AM peak (not the peak direction) due to changes to the link class along Sunbury Road.

5.6 Scatter Plots

Figure 5.9 and Figure 5.10 present AM and PM comparison between surveyed and modelled traffic volumes for all local traffic counts. Each plot shows the best fit regression line and the coefficient of determination (RSQ). The VicRoads guidelines set out targets for slope of the best fit regression line between 0.9 and 1.1 and greater than or equal to 0.90 for RSQ.

Figure 5.9: Modelled vs. Observed Traffic for all Traffic Counts (AM 2 hours)

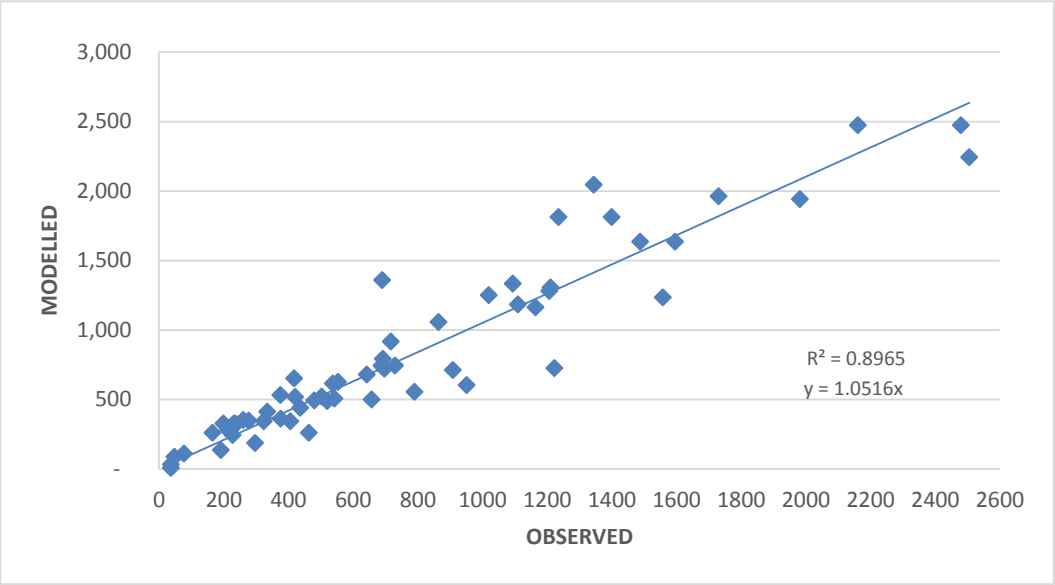
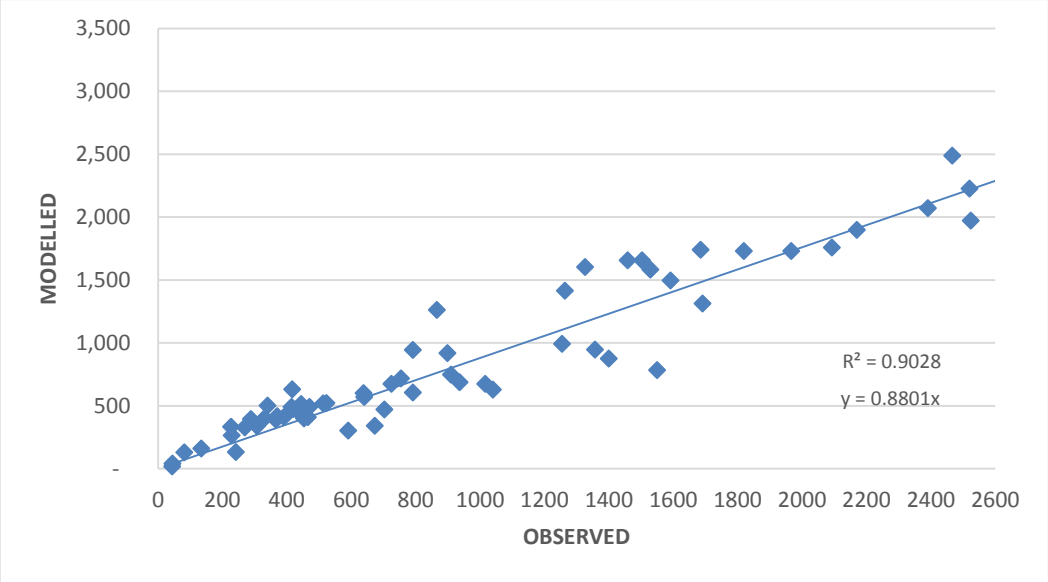


Figure 5.10: Modelled vs. Observed Traffic for all Traffic Counts (PM 2 hours)



The results presented in Figure 5.9 and Figure 5.10 illustrate that modelled traffic volumes meet the slope of best-fit regression criteria in the AM peak but not in the PM peak. In addition, the AM marginally does not meet the criteria for RSQ whilst the PM peak does. Review of the data points indicates that the key reason for their marginal discrepancies are related to the data points located at Sunbury Road (south of Shepherds Lane and between Horne Street and the railway line) travelling in the non-peak direction (modelled volumes are higher than observed) and Gap Road travelling eastbound in both peak periods. If two of these three data points were excluded from the results in each peak, the AM Peak and the PM peak models would meet both the slope of best-fit regression and RSQ criteria (y=1.03 and RSQ=0.92 in the AM Peak and y=0.90 and RSQ=0.91 in the PM Peak).

To better understand the relationship between the modelled and observed traffic volumes, difference plots illustrating the GEH levels are presented in Figure 5.11 and Figure 5.12 for both the AM and PM peak periods.

Figure 5.11: Modelled vs. Observed GEH Plot (AM 1 hour)

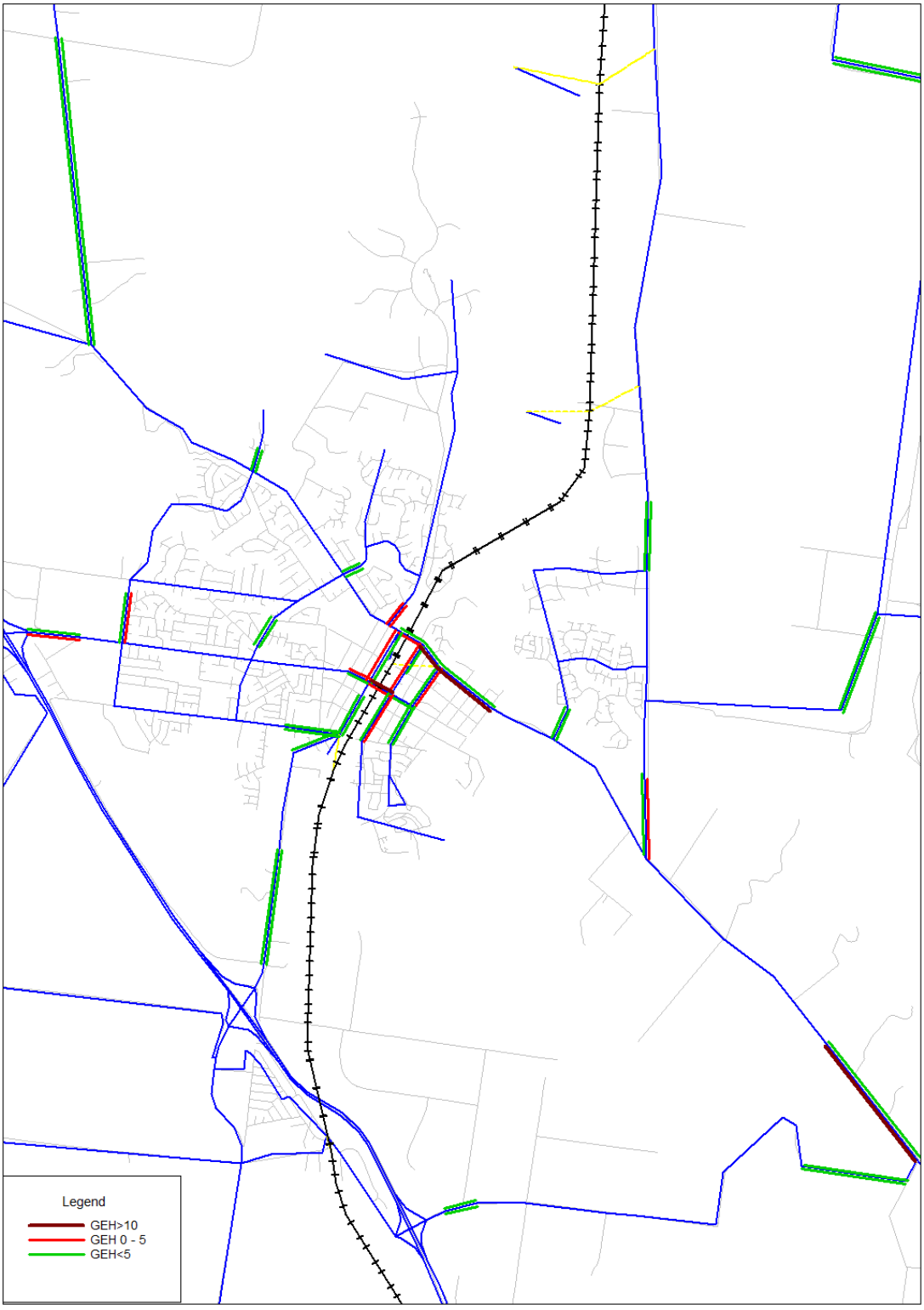
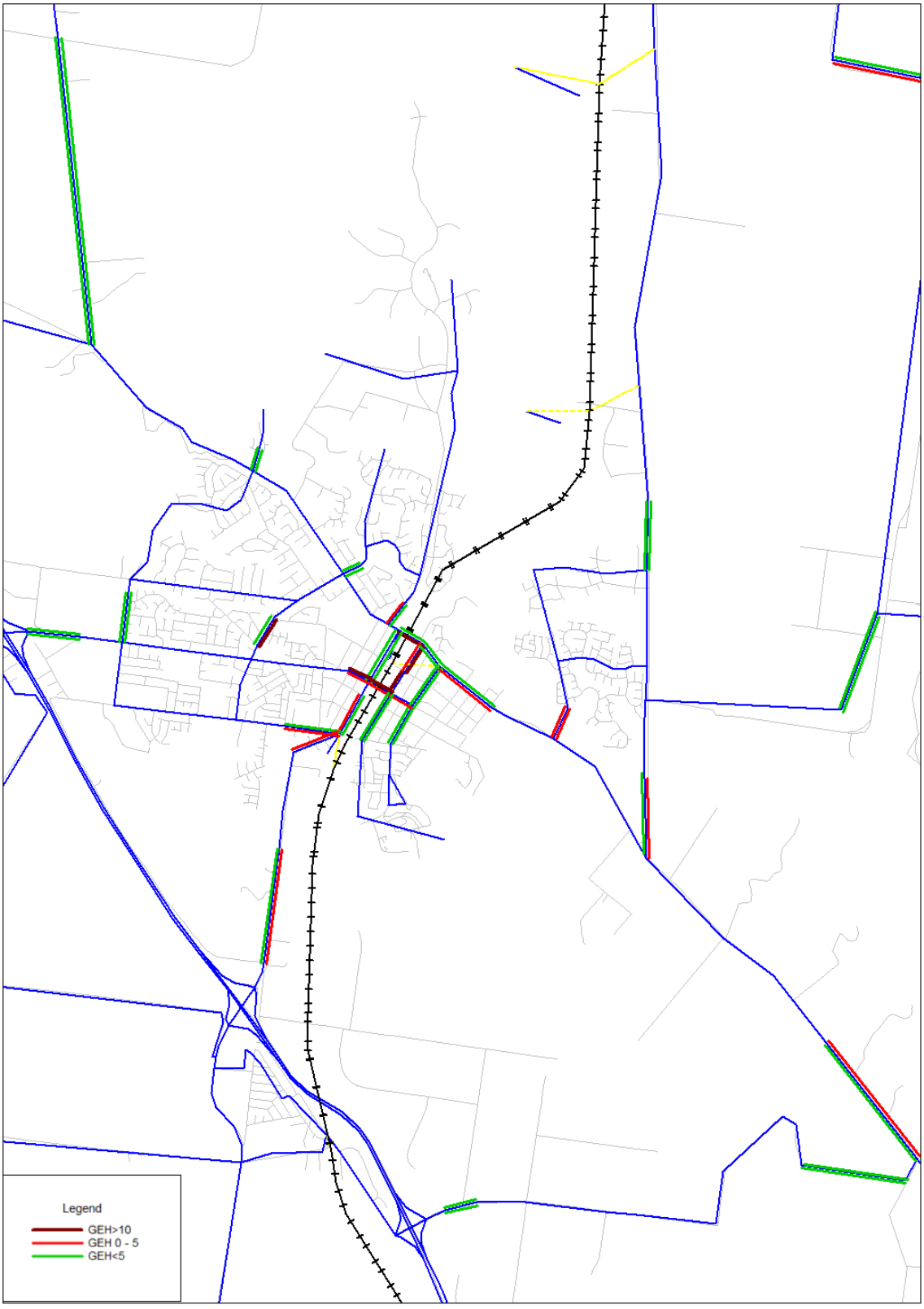


Figure 5.12: Modelled vs. Observed GEH Plot (PM 1 hour)



The GEH plots show that the larger areas of discrepancy between modelled and observed points are located around the town centre. One notable is the Sunbury Road north east bound in the AM peak which models more volume than observed.

The critical links and their corresponding observed and modelled volumes are summarised in Table 5.4 and Table 5.5 for both the AM and PM peaks. The table also indicates whether the model is currently overestimating, underestimating or replicating existing traffic volumes.

Table 5.4: Modelled Vs Observed Traffic Volume – AM Peak

Road Name (Section)	Approach	Observed Vol	Modelled Vol	Diff	Category
Sunbury Road (southeast of Shepherds Lane)	North-westbound	690	1,358	668	Overestimating
	South-eastbound	2,505	2,242	-263	Replicating
Macedon Street (between Barkley Street and Jackson Street)	North-westbound	1,344	2,043	699	Overestimating
	South-eastbound	1,982	1,940	-42	Replicating
Riddell Road (between Horne Street and Rail Line)	North-westbound	1,400	1,812	412	Overestimating
	South-eastbound	2,479	2,472	-7	Replicating
Gap Road (east of Calder Freeway)	Eastbound	421	517	96	Replicating
	Westbound	1,019	1,251	232	Replicating
Gap Road (west of Horne Street)	Eastbound	643	679	36	Replicating
	Westbound	1,558	1,223	-325	Underestimating
Gap Road (between Horne Street and Rail Line)	Eastbound	952	604	-348	Underestimating
	Westbound	1,223	724	-499	Underestimating
Vineyard Road (north of Calder Freeway)	Northbound	1,110	1,183	73	Replicating
	Southbound	1,731	1,962	231	Replicating
Horne Street (between Mitchells Lane and Neil Street)	Northbound	1,210	1,305	95	Replicating
	Southbound	1,596	1,635	39	Replicating
Melbourne Lancefield Road (north of Rolling Meadows Drive)	Northbound	221	283	62	Replicating
	Southbound	697	720	23	Replicating
Bulla-Diggers Road (west of Jacksons Creek)	Eastbound	519	487	-32	Replicating
	Westbound	165	259	94	Replicating

Results indicate that Gap Road's modelled traffic volume is less than observed in both directions during the AM peak. Traffic travelling north-west bound (opposing peak direction) along Sunbury Road/ Macedon Street/ Riddell Road is higher than observed.

Table 5.5: Modelled Vs Observed Traffic Volume – PM Peak

Road Name (Section)	Approach	Observed Vol	Modelled Vol	Diff	Category
Sunbury Road (southeast of Shepherds Lane)	North-westbound	2,521	2,226	-295	Replicating
	South-eastbound	867	1,262	395	Overestimating
Macedon Street (between Barkley Street and Jackson Street)	North-westbound	2,391	2,070	-321	Replicating
	South-eastbound	1,685	1,739	54	Replicating
Riddell Road (between Horne Street and Rail Line)	North-westbound	3,256	2,489	-767	Underestimating
	South-eastbound	1,967	1,729	-238	Replicating
Gap Road (east of Calder Freeway)	Eastbound	1,264	1,414	150	Replicating
	Westbound	638	599	39	Replicating
Gap Road (west of Horne Street)	Eastbound	1,692	1,311	-381	Underestimating
	Westbound	1,401	875	-526	Underestimating
Gap Road (between Horne Street and Rail Line)	Eastbound	1,358	946	-411	Underestimating
	Westbound	1,550	783	-768	Underestimating
Vineyard Road (north of Calder Freeway)	Northbound	2,171	1,898	-274	Replicating
	Southbound	1,327	1,603	276	Overestimating
Horne Street (between Mitchells Lane and Neil Street)	Northbound	2,093	1,758	-336	Underestimating
	Southbound	1,503	1,655	151	Replicating
Melbourne Lancefield Road (north of Rolling Meadows Drive)	Northbound	755	716	-39	Replicating
	Southbound	331	402	71	Replicating
Bulla-Diggers Road (west of Jacksons Creek)	Eastbound	227	328	58	Replicating
	Westbound	429	471	42	Replicating

As demonstrated in the AM peak, Gap Road traffic volumes are less than observed in both directions during the PM peak. Results also indicate that Sunbury Road (southeast of Shephards Lane) travelling south-eastbound (opposing peak direction) is overestimating, whilst Riddell Road (between Horne Street and Rail Line) travelling north-westbound has less traffic volume than observed. The model slightly overestimates the traffic volume on Vineyard Road travelling southbound in the PM peak whilst underestimating the traffic volumes travelling northbound on Horne Street between Mitchells Lane and Neil Street.

The results for the each Screenlines scatter plots are shown on Table 5.4. The table shows that the total comparison of screenline data satisfies VicRoads criteria. It is noted that the traffic counts are marginally below the RSQ measure, which are predominately due to the low number of data points collected for each screenline. These are also provided in more detail in Table 5.6.

Table 5.6: Local Traffic Count Validation

Screenline	AM Peak		PM Peak	
	Slope of Best Fit	RSQ	Slope of Best Fit	RSQ
Screenline 1	1.01	0.75	0.90	0.87
Screenline 2	1.11	0.92	0.96	0.88
Screenline 3	1.13	0.98	1.00	0.93
Screenline 4	0.96	0.82	0.75	0.90
Screenline 5	0.98	0.90	0.95	0.95
Total	**1.04**	**0.87**	**0.91**	**0.91**

It is highlighted that the purpose of strategic modelling is to identify broad level traffic and travel patterns and changes, rather than individual traffic counts on local roads.

With regard to the results, Table 5.4 shows that a number of screenlines do not meet the VicRoads guidelines, specifically, Screenline 1, 2, 3 and 4 in the AM peak and 1, 2 and 4 in the PM peak.

Reference to the VicRoads guidelines section 2.7.4 stated *"Result of scattered plots should be presented for model validation. Only if the validation criteria for scattered plots are marginally not met, the GEH should be used for model validation"*. In this instance, the GEH result for all screenlines are shown in Table 5.7.

Table 5.7: GEH Statistic (1 way, 1 hour equivalent link volume)

Screenline	AM		PM	
	GEH < 5	GEH <10	GEH < 5	GEH <10
Screenline 1	75%	100%	67%	100%
Screenline 2	63%	100%	88%	88%
Screenline 3	83%	100%	83%	100%
Screenline 4	25%	75%	25%	50%
Screenline 5	90%	90%	80%	100%

The VicRoads targets for applying GEH statistic are 50% of cases to have GEH <5 and 80% of cases to have GEH <10. The results of the GEH statistics presented in Table 5.7: GEH Statistic (1 way, 1 hour equivalent link volume)

Table 5.5 shows that Screenline 4 does not meet the guidelines in the AM and PM peak.

It is recognised that these points fall outside of the criteria and it is considered that these are predominantly due to the dataset (only two data points within the town centre). Further interrogation of the outputs are provided when separating the data points by direction, i.e. inbound and outbound. Inbound trips are those in the direction of the Sunbury PSP, whilst outbound are the opposite direction.

Table 5.8 and Table 5.9 show the results of slope of best fit and R square by direction (inbound and outbound).

Table 5.8: VicRoads Screenline and Local Traffic Counting Validation Inbound/Outbound Trips

Screenline	AM Peak		PM Peak	
	Slope of Best Fit	RSQ	Slope of Best Fit	RSQ
Inbound Trips				
Screenline 1	0.95	0.65	0.97	0.74
Screenline 2	1.08	0.92	1.00	0.97
Screenline 3	1.06	0.97	0.94	0.97
Screenline 4	0.92	1.00	0.74	1.00
Screenline 5	1.81	0.97	0.89	0.99
Outbound Trips				
Screenline 1	1.28	0.83	0.88	0.88
Screenline 2	1.13	0.98	0.91	0.83
Screenline 3	1.16	1.00	1.14	1.00
Screenline 4	1.09	1.00	0.75	1.00
Screenline 5	0.90	1.00	1.39	0.98

Table 5.9: GEH Statistic (1 way, 1 hour equivalent link volume)

Screenline	AM		PM	
	GEH < 5	GEH <10	GEH < 5	GEH <10
Inbound				
Screenline 1	67%	100%	67%	100%
Screenline 2	75%	100%	100%	100%
Screenline 3	100%	100%	100%	100%
Screenline 4	50%	50%	50%	50%
Screenline 5	80%	80%	80%	100%
Outbound				
Screenline 1	83%	100%	67%	100%
Screenline 2	50%	100%	75%	75%
Screenline 3	67%	100%	67%	100%
Screenline 4	0%	100%	0%	50%
Screenline 5	100%	100%	80%	100%

During the AM peak, the outbound trips satisfy the VicRoads criteria, and Screenline 4 and 5 in the inbound direction does not. These results highlight not only the small sample set of data points but the small margins of where and how the data does not meet the criteria.

During the PM peak, the results show the model does not meet the criteria in two of the screenlines for the outbound direction and one of the screenlines for the inbound direction. Interrogation of the results indicate that Screenline 2's differences between the criteria are extremely close to the acceptable ranges. The remaining sites are again highlighting the small dataset.

5.7 Percent Root Mean Square Errors

The Percentage Root Mean Squared Error (%RMSE) is an indication of the correlation between modelled volumes and counts; however it is dependent on the size of the count volume. The %RMSE is generally used during the validation process of a strategic model, as it emphasises the need for counts with high volumes to be validated accurately. The VicRoads criteria for the validation of strategic models states that the overall %RMSE should be below 30%.

Table 5.10 shows the %RMSE criteria results for both AM and PM for VicRoads and study area screenlines.

Table 5.10: %RMSE at VicRoads and Local Traffic Counting (target <30%)

Screenline	AM Model	PM Model
Screenline 1	31	26
Screenline 2	22	20
Screenline 3	19	19
Screenline 4	28	34
Screenline 5	52	34
Total	**28**	**26**

The results show that Screenline 1 and 2 marginally fall outside the VicRoads guidelines for the %RMSE in the AM peak as well as Screenline 4 in the PM peak. Screenline 5 does not meet the criteria in both peaks. The data has also been presented by direction (inbound and outbound) as shown in Table 5.11.

Table 5.11: %RMSE at VicRoads and Local Traffic Counting (target <30%)

Screenline	AM Model	PM Model	AM Model	PM Model
	Inbound		Outbound	
Screenline 1	31	26	43	25
Screenline 2	27	12	22	29
Screenline 3	13	19	24	24
Screenline 4	27	46	46	38
Screenline 5	135	23	20	64

The results of the %RMSE by direction show that the inbound direction only Screenlines 1 and 5 do not meet the criteria of VicRoads in the AM peak. In the PM peak, Screenlines 1 and 4 do not meet the criteria. For the outbound direction in the AM peak, Screenlines 4 does not meet the VicRoads guidelines and in the PM peak, Screenlines 4 and 5. Screenline 1 is marginally outside of the criteria and could be impacted by one or two outlying data points.

Table 5.12 has been prepared to illustrate the %RMSE for each time period modelled within five volume bans.

Table 5.12: %RMSE by Screen line and Local Traffic Counting by Number of Volume Group (target <30%)

Screenline	1 Way Volume (per 2hr)	VITM % RMSE		Screenline	1 Way Volume (per 2hr)	VITM % RMSE	
		AM	PM			AM	PM
1	0 - 1000	31	26	2	0 - 1000	27	31
	1000 - 2000				1000 - 2000	22	7
	2000 - 5000				2000 - 5000		
	5000 - 10000				5000 - 10000		
	10000 +				10000 +		
	SL 1 Total	**31**	**26**		**SL 2 Total**	**24**	**19**
3	0 - 1000	24	19	4	0 - 1000		
	1000 - 2000	18	20		1000 - 2000	49	45
	2000 - 5000				2000 - 5000	7	7
	5000 - 10000				5000 - 10000		
	10000 +				10000 +		
	SL 4 Total	**21**	**20**		**SL 5 Total**	**28**	**26**
5	0 - 1000	97	25	**Total**	0 - 1000	42	27
	1000 - 2000				1000 - 2000	25	27
	2000 - 5000				2000 - 5000	11	33
	5000 - 10000				5000 - 10000		
	10000 +				10000 +		
	SL 6 Total	**97**	**25**		**Grand Total**	**30**	**29**

The results indicate that there are two range of volume bans (i.e. 0-1000 and 2000-5000) which do not meet the VicRoads criteria, one for each peak period. Review of the results again indicate that the modelled volumes are lower than the observed.

5.8 Travel Time

The modelled and observed travel times have been compared for each of the AM and PM peaks along the travel time routes presented in Figure 3.2 (Transport Data Collection section). The following figures illustrate the comparison of modelled and observed travel times for these routes.

Figure 5.13: Route 1 – Sunbury Rd Northbound – AM Peak

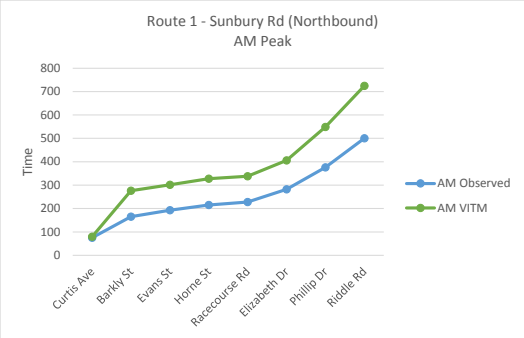


Figure 5.14: Route 1 – Sunbury Rd Southbound – AM Peak

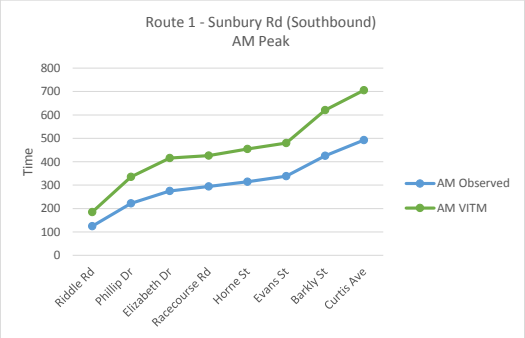


Figure 5.15: Route 1 – Sunbury Rd Northbound – PM Peak

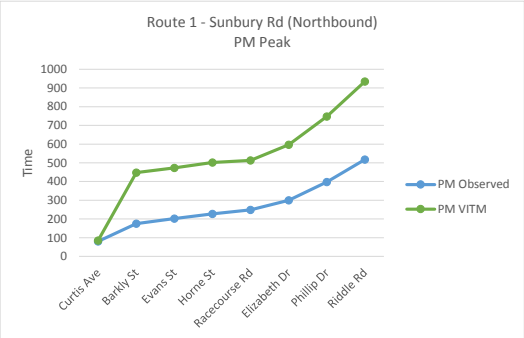


Figure 5.16: Route 1 – Sunbury Rd Southbound – PM Peak

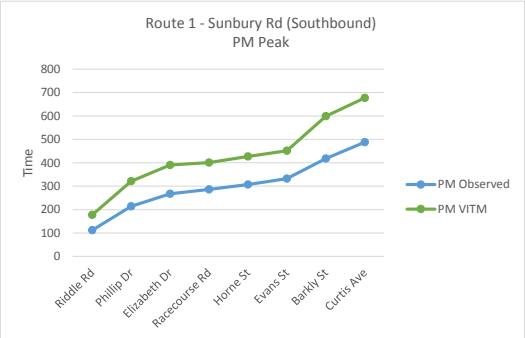


Figure 5.17: Route 2 – Gap Rd Eastbound – AM Peak

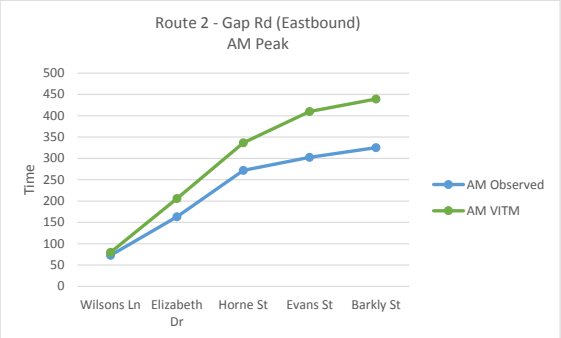


Figure 5.18: Route 2 – Gap Rd Westbound – AM Peak

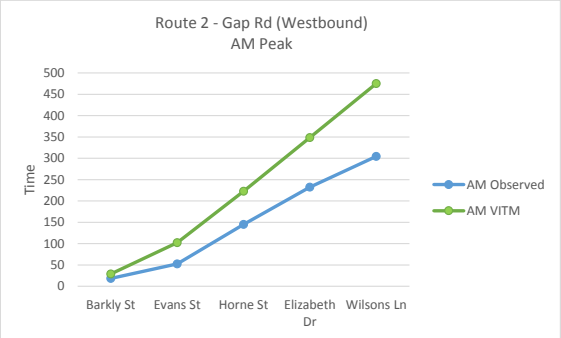


Figure 5.19: Route 2 – Gap Rd Eastbound – PM Peak

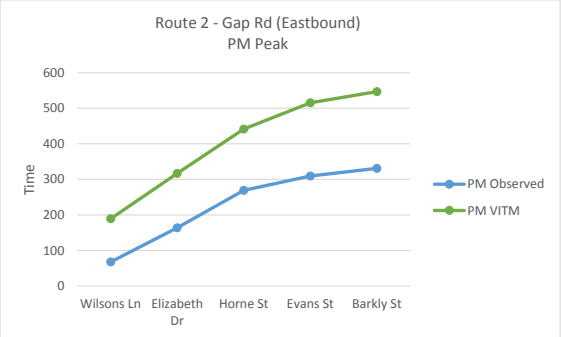


Figure 5.20: Route 2 – Gap Rd Westbound – PM Peak

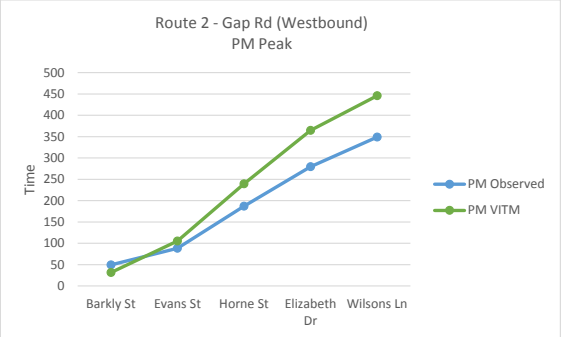


Figure 5.21: Route 3 – Mitchells Ln Northbound – AM Peak

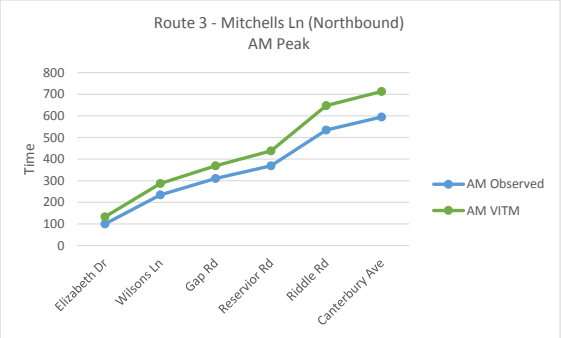


Figure 5.22: Route 3 – Mitchells Ln Southbound – AM Peak

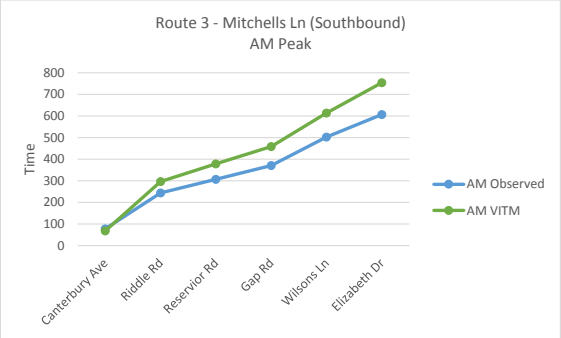


Figure 5.23: Route 3 – Mitchells Ln Northbound – PM Peak

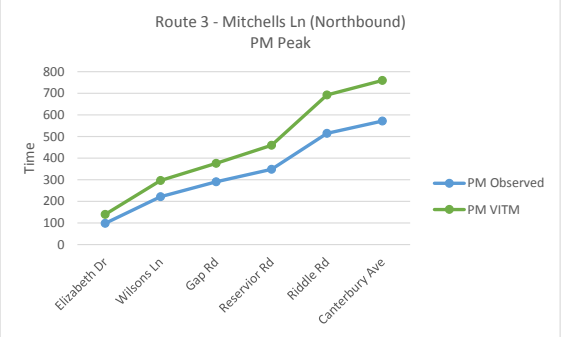


Figure 5.24: Route 3 – Mitchells Ln Southbound – PM Peak

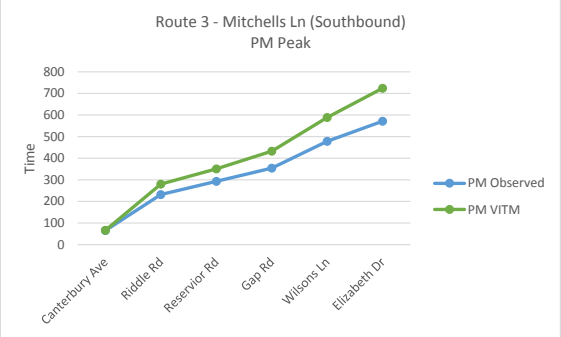


Figure 5.25: Route 4 Melbourne – Lancefield Rd Northbound – AM Peak

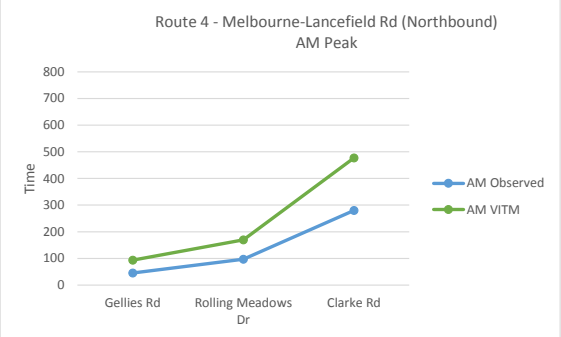


Figure 5.26: Route 4 Melbourne – Lancefield Rd Southbound – AM Peak

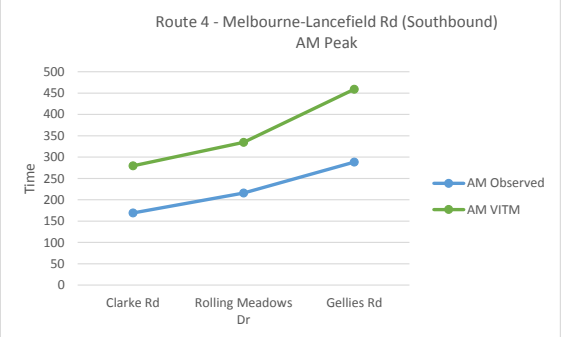


Figure 5.27: Route 4 Melbourne – Lancefield Rd Northbound – PM Peak

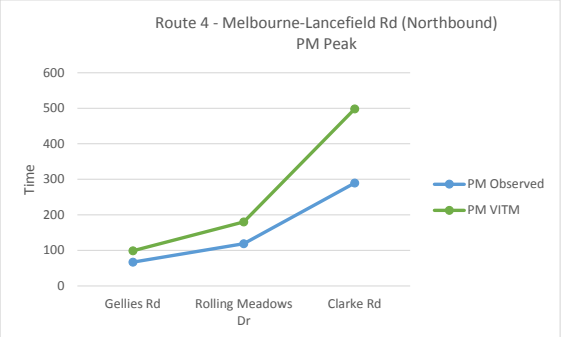


Figure 5.28: Route 4 Melbourne – Lancefield Rd Southbound – PM Peak

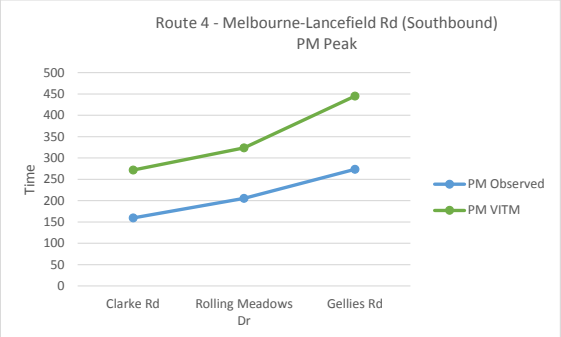


Figure 5.29: Route 5 – Racecourse Rd Northbound – AM Peak

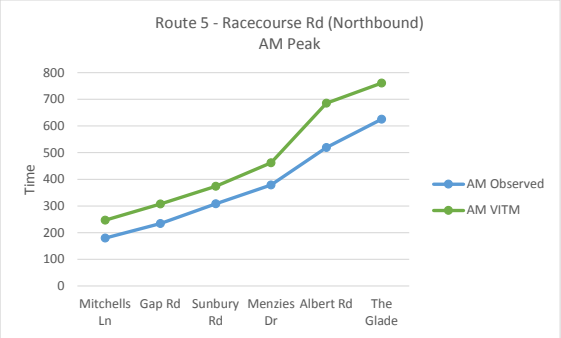


Figure 5.30: Route 5 – Racecourse Rd Southbound – AM Peak

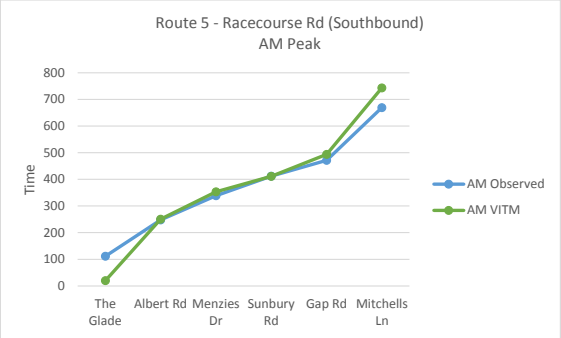


Figure 5.31: Route 5 – Racecourse Rd Northbound – PM Peak

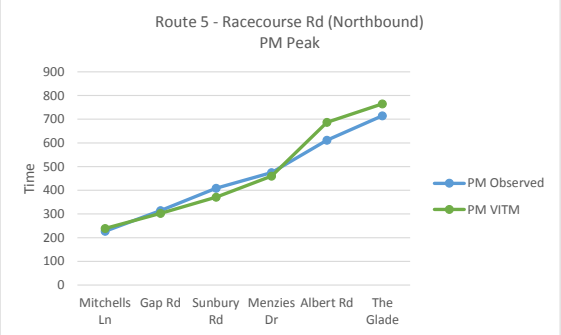
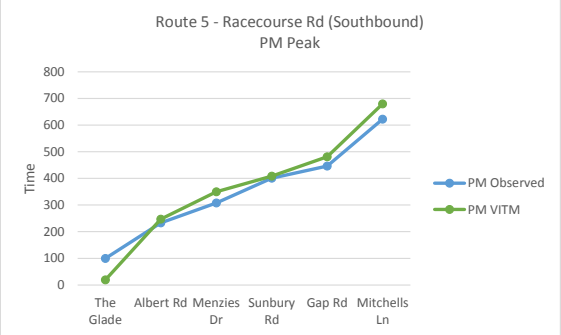


Figure 5.32: Route 5 – Racecourse Rd Southbound – PM Peak



The figures above generally indicate a good correlation between the modelled and observed travel times for all routes in the AM and PM peaks.

Notwithstanding, the VicRoads guidelines indicate that travel times are to be collected for a minimum of three days during the peak times and multiple runs should be undertaken. The travel times collected as part of the transport data collection were collected for one day during the AM and PM peaks (as per the project brief). As such, it is considered that there are some limitations in the data sets for use in undertaking a travel time comparison in the strategic model. Further, in our experience with strategic transport modelling across Australia, industry practice does not generally require the validation of the travel times to be met, rather ensuring that traffic volumes are being accurately modelled given the broader level view of strategic modelling assessments. In the case of this Jacksons Creek assessment, the modelled travel time are considered to be suitable for use as part of the options testing.

Mode Share

Table 5.13 indicates the mode share splits within the Sunbury SLA and within Hume LGA in comparison to the wider VITM network in the existing conditions model.

Table 5.13: Existing Conditions – Mode Share Splits

Area	Active	Public Transport	Car
Sunbury SLA	7,110 (5.8%)	7,940 (6.5%)	106,880 (87.7%)
Hume LGA	37,010 (6.4%)	36,730 (6.3%)	504,760 (87.3%)
Metropolitan Melbourne	1,325,770 (9.3%)	1,030,620 (7.2%)	11,889,590 (83.5%)

The above demonstrates that Sunbury and the Hume LGA have a higher car dependency (87.7%) to the rest of Metropolitan Melbourne (83.5%). This is expected given the semi regional nature of the Sunbury Township.

6. Conclusions

The VITM model for the Sunbury PSP has been refined in an attempt to meet the VicRoads requirements. It is noted that some of the criteria are not strictly met however every effort has been undertaken to ensure that the model is as good as it can possibly be for this purpose of this study. This has been undertaken in collaboration with Key stakeholders. Indeed, the model has been calibrated and validated using sound modelling practice and process outlines within this report. The data used to validate the model was thoroughly analysed to ensure the quality of model inputs, however it is noted that there are some limitations on the sample size of data available.

The information presented in this report aims to inform the study team and it has been agreed by the stakeholders that the existing conditions model is suitable for use in testing future land use and bridge options for Jacksons Creek.

Appendix A

Model Refinements Summary

Table A.1: Summary of Model Refinements Tested

Model Refinements	Description	Status
Posted Speed	Posted speed limit was reduced to 70km/hr from 100km/hr on Gellies Road and Wildwood Road	Adopted in Calibrated Model
Posted Speed	Posted speed limit was reduced to 80km/hr from 100km/hr on Bulla-Diggers Rest Road	Adopted in Calibrated Model
Posted Speed	Posted speed limit was increased to 60km/hr from 50km/hr on Wilsons Road and Phillip Drive (north of Gap Road)	Adopted in Calibrated Model
Zone Location	Zone No. 431 was relocated east of Wilsons Lane	Adopted in Calibrated Model
Centroid Connector	Additional centroid connector to Reservoir Road from Zone No. 431	Adopted in Calibrated Model
Centroid Connector	Additional centroid connector to Reservoir Road from Zone No. 1681	Adopted in Calibrated Model
Centroid Connector	Realignment of centroid connector from Zone No. 1681	Adopted in Calibrated Model
Centroid Connector	Additional centroid connector to Wilsons Lane from Zone No. 434	Adopted in Calibrated Model
Centroid Connector	Additional centroid connector to Mitchells Lane from Zone No. 434	Adopted in Calibrated Model
Centroid Connector	Relocation of centroid connector from Vineyard Road to Mitchells Lane from Zone No. 436	Adopted in Calibrated Model
Centroid Connector	Realignment of centroid connector on Evans Street from Zone No. 1680	Adopted in Calibrated Model
Link	Relocation of Park & Ride access link (Link Class 46) to Horne Street	Discounted Measures
Link	Relocation of Mode Connector for Train and Others (Link Class 45) to Evans Street	Discounted Measures
Centroid Connector	Relocation of centroid connector to Macedon Street from intersection of Macedon Street and Evans Street	Adopted in Calibrated Model
Centroid Connector	Relocation of centroid connector to Station Street from intersection of Station Street and Evans Street	Adopted in Calibrated Model
Centroid Connector	Additional centroid connector to Evans Street from Zone No. 433	Adopted in Calibrated Model
Centroid Connector	Additional centroid connector to Barkly Street from Zone No. 433	Adopted in Calibrated Model
Centroid Connector	Additional centroid connector to Racecourse Road from Zone 1685	Discounted Measures
Centroid Connector	Additional centroid connector to Curtis Avenue from Zone 1677	Adopted in Calibrated Model
Centroid Connector	Additional centroid connector to Lancefield Road from Zone 1677	Adopted in Calibrated Model
Lane Capacity	Wildwood Road, Gellies Road and Konagaderra Road lane capacity was reduced from 1600 to 800	Adopted in Calibrated Model
Lane Capacity	Bulla-Diggers Rest Road lane capacity was reduced from 1800 to 900	Discounted Measures
Zone Location	Zone No. 1685 was relocated east of Elizabeth Drive	Discounted Measures
Zone Location	Zone No. 1683 was relocated slightly west towards Elizabeth Drive	Discounted Measures
Zone Location	Zone No. 1680 was relocated south immediately north of Evans Street	Adopted in Calibrated Model
Link	Park & Ride access link (Link Class 46) to Horne Street and Evans Street	Discounted Measures
Landuse	2014 Northern Growth Corridor landuse was adopted	Discounted Measures
Link	Linkclass was changed to 24 from 5 on Bulla-Diggers Rest Road, Gellies Road, Wildwood Road, and Konagaderra Road	Adopted in Calibrated Model

Model Refinements	Description	Status
Landuse	2011 Northern Growth Corridor landuse was adopted	Discounted Measures
Zone Location	Zone No. 1685 was relocated west of Elizabeth Drive	Adopted in Calibrated Model
Centroid Connector	Additional centroid connector to Racecourse Road from Zone 430	Adopted in Calibrated Model
Zone Location	Zone No. 431 was relocated north of Macedon Street	Discounted Measures
Zone Location	Zone No. 1681 was relocated immediately west of Evans Street	Discounted Measures
External matrix	External matrix was linked to VITM 2011 Base model	Adopted in Calibrated Model
Linkclass	Ja factor of linkclass was reduced from 250 to 100 on Bulla-Diggers Rest Road	Discounted Measures
Zone Disaggregation	Zones within Sunbury central area was disaggregated	Adopted in Calibrated Model
Linkclass	Ja factor of linkclass was reduced from 250 to 4 on Bulla-Diggers Rest Road	Adopted in Calibrated Model
Landuse	Lanuse within disaggregated zones were refined by Council	Adopted in Calibrated Model
Zone Location	Zone No. 1677 was relocated slightly east towards Lancefield Road	Adopted in Calibrated Model
Zone Location	Zone No. 1683 was relocated slightly south towards Gap Road	Adopted in Calibrated Model
Centroid Connector	Removal of centroid connector to Gap Road from Zone No. 1681	Adopted in Calibrated Model
Landuse	Landuse within Zone no. 2695 was reduced	Adopted in Calibrated Model
Landuse	Landuse within Zone no. 1685 was increased	Adopted in Calibrated Model
Landuse	Landuse within Zone no. 430 was reduced	Adopted in Calibrated Model
Zone Location	Zone No. 2895 was relocated immediately east of Elizabeth Drive	Adopted in Calibrated Model
Centroid Connector	Centroid connector to Sunningdale Avenue was realigned from Zone No. 1677	Adopted in Calibrated Model
Link	Relocation of Park & Ride access link (Link Class 46) to Evans Street	Adopted in Calibrated Model
Link	Relocation of Mode Connector for Train and Others (Link Class 45) to Horne Street	Adopted in Calibrated Model
Centroid Connector	Additional centroid connector to end of Elizabeth Drive from Zone No. 1685	Adopted in Calibrated Model
Centroid Connector	Relocation of centroid connector from Curtis Avenue to intersection of Curtis Avenue and Rolling Meadows Drive	Adopted in Calibrated Model
Linkclass	Changed the linkclass of Sunbury Road to new classification (linkclass 26)	Adopted in Calibrated Model
Centroid Connector	Zone No. 1677 was relocated slightly west towards Francis Blvd	Adopted in Calibrated Model

Appendix B

Traffic Count Validation

Turn Count Validation

		AM							
No	SL	TC	Model	(M-TC)^2	RMSE	Slope	RSQ	GEH<5	GEH <10
1	Tot	46178	49,592	2,743,577	28	1.03	0.90	72%	93%
2	1	5512	5,951	220,894	31	1.01	0.75	75%	100%
	1_In	3768	3,668	142,068	27	0.95	0.65	67%	100%
	1_Out	1744	2,283	78,826	43	1.28	0.83	83%	100%
3	2	5265	5,849	153,140	22	1.11	0.92	63%	100%
	2_In	2451	2,536	81,899	27	1.08	0.92	75%	100%
	2_Out	2815	3,313	71,241	22	1.13	0.98	50%	100%
4	3	5061	5,742	130,638	19	1.13	0.98	83%	100%
	3_In	2074	2,206	16,031	13	1.06	0.97	100%	100%
	3_Out	2987	3,536	114,607	24	1.16	1.00	67%	100%
5	4	6054	5,612	539,651	28	0.96	0.82	25%	75%
	4_In	3702	3,196	248,859	27	0.92	1.00	50%	50%
	4_Out	2352	2,416	290,791	46	1.09	1.00	0%	100%
6	5	4759	5,335	543,758	52	0.98	0.90	90%	90%
	5_In	1262	2,069	462,127	135	1.81	0.97	80%	80%
	5_Out	3497	3,266	81,631	20	0.90	1.00	100%	100%

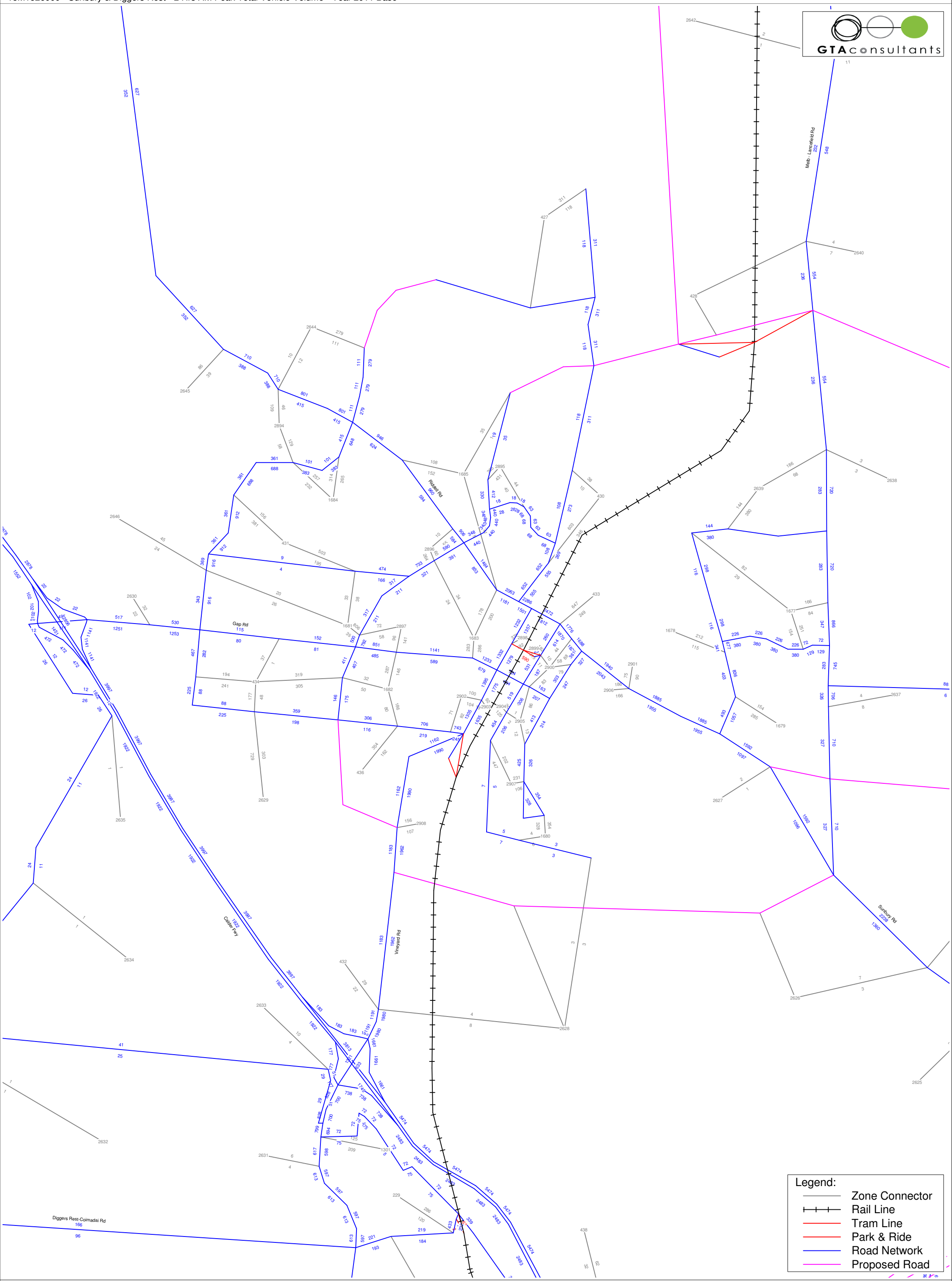
		PM							
No	SL	TC	Model	(M-TC)^2	RMSE	Slope	RSQ	GEH<5	GEH <10
1	Tot	59,033	53,699	3,756,961	26	0.87	0.90	66%	90%
2	1	6,500	6,408	214,018	26	0.90	0.87	67%	100%
	1_In	2,448	2,584	68,367	29	0.97	0.74	67%	100%
	1_Out	4,051	3,824	145,651	25	0.88	0.88	67%	100%
3	2	7,030	6,794	214,364	20	0.96	0.88	88%	88%
	2_In	3,591	3,694	33,266	12	1.00	0.97	100%	100%
	2_Out	3,440	3,099	181,098	29	0.91	0.83	75%	75%
4	3	6,212	6,427	185,901	19	1.00	0.93	83%	100%
	3_In	3,724	3,704	108,162	19	0.94	0.97	100%	100%
	3_Out	2,489	2,723	77,739	24	1.14	1.00	67%	100%
5	4	8,131	5,946	1,403,160	34	0.75	0.90	25%	50%
	4_In	3,517	2,512	645,988	46	0.74	1.00	50%	50%
	4_Out	4,613	3,435	757,172	38	0.75	1.00	0%	50%
6	5	5,198	5,426	274,631	34	0.95	0.95	80%	100%
	5_In	3,585	3,305	104,978	23	0.89	0.99	80%	100%
	5_Out	1,613	2,121	169,653	64	1.39	0.98	80%	100%

			AM								PM								
Road Name	In/Out	TC Group	TC Observed	Model	M - TC	M - TC(%)	(M - TC)^2	TC (1 Hr)	Model (1 Hr)	GEH)	In/Out	TC Group	TC Observed	Model	M - TC	M - TC(%)	(M - TC)^2	TC (1 Hr)	Model (1 Hr)	GEH)
Riddell Rd north of Dalrymple Rd NB	1_Out	1	260	352	92	35%	8416	143	194	3.9	1_Out	1	725	673	-52	-7%	2708	399	370	1.5
Riddell Rd north of Dalrymple Rd SB	1_In	1	553	627	73	13%	5380	304	345	2.2	1_In	1	370	417	47	13%	2177	204	229	1.7
Canterbury Ave north of Riddell Rd NB	1_Out	1	77	111	34	44%	1139	43	61	2.6	1_Out	1	229	264	34	15%	1178	126	145	1.6
Canterbury Ave north of Riddell Rd SB	1_In	1	214	279	65	30%	4239	118	154	3.1	1_In	1	135	161	26	19%	687	74	88	1.6
Elizabeth Dr northeast of Riddell Rd NEB	1_Out	1	277	348	71	26%	5094	152	192	3.0	1_Out	1	514	519	5	1%	21	283	285	0.1
Elizabeth Dr northeast of Riddell Rd SWB	1_In	1	437	440	3	1%	8	240	242	0.1	1_In	1	366	388	22	6%	481	201	213	0.8
Racecourse Rd north of Riddell Rd NB	1_Out	1	418	652	234	56%	54958	230	359	7.5	1_Out	1	417	630	213	51%	45469	229	347	6.9
Racecourse Rd north of Riddell Rd SB	1_In	1	790	555	-236	-30%	55615	435	305	6.7	1_In	1	445	514	69	16%	4770	245	283	2.3
Francis Blvd north of Riddell Rd NB	1_Out	1	480	493	13	3%	165	264	271	0.4	1_Out	2	1255	992	-263	-21%	69420	690	545	5.8
Francis Blvd north of Riddell Rd SB	1_In	1	864	1,057	193	22%	37218	475	581	4.6	1_In	1	792	605	-187	-24%	34964	436	333	5.2
Melbourne-Lancefield Rd north of Sunbury Rd NB	1_Out	1	232	327	95	41%	9053	128	180	4.2	1_Out	1	910	746	-164	-18%	26856	501	410	4.2
Melbourne-Lancefield Rd north of Sunbury Rd SB	1_In	1	909	710	-199	-22%	39609	500	391	5.2	1_In	1	340	499	159	47%	25288	187	275	5.8
Wilsons Ln between Reservoir Rd & Gap Rd NB	2_In	1	324	343	18	6%	335	178	188	0.7	2_In	1	792	943	150	19%	22633	436	518	3.8
Wilsons Ln between Reservoir Rd & Gap Rd SB	2_Out	1	717	916	199	28%	39795	394	504	5.2	2_Out	1	415	489	74	18%	5462	228	269	2.6
Elizabeth Dr between Reservoir Rd & Gap Rd NB	2_In	1	657	500	-157	-24%	24571	361	275	4.8	2_In	1	899	917	18	2%	338	494	504	0.5
Elizabeth Dr between Reservoir Rd & Gap Rd SB	2_Out	1	692	792	100	14%	9987	381	436	2.7	2_Out	2	1041	629	-412	-40%	169961	572	346	10.6
Horne St between Riddell Rd & Gap Rd NB	2_In	2	1094	1,332	238	22%	56772	602	733	5.1	2_In	2	1592	1,496	-97	-6%	9330	876	823	1.8
Horne St between Riddell Rd & Gap Rd SB	2_Out	2	1207	1,279	72	6%	5121	664	703	1.5	2_Out	2	1530	1,582	52	3%	2741	841	870	1.0
Barkly St between Riddell Rd & Gap Rd NB	2_In	1	376	361	-15	-4%	220	207	199	0.6	2_In	1	307	338	31	10%	966	169	186	1.3
Barkly St between Riddell Rd & Gap Rd SB	2_Out	1	199	327	128	64%	16338	109	180	5.8	2_Out	1	454	400	-54	-12%	2934	250	220	1.9
Gap Rd east of Calder Fwy EB	3_In	1	421	517	96	23%	9165	232	284	3.3	3_In	2	1264	1,414	150	12%	22508	695	778	3.0
Gap Rd east of Calder Fwy WB	3_Out	2	1019	1,251	232	23%	53642	561	688	5.1	3_Out	1	638	599	-39	-6%	1516	351	330	1.2
Vineyard Rd north of Calder Fwy NB	3_In	2	1110	1,183	74	7%	5453	610	651	1.6	3_In	3	2171	1,898	-274	-13%	74810	1194	1044	4.5
Vineyard Rd north of Calder Fwy SB	3_Out	2	1731	1,962	231	13%	53571	952	1079	4.0	3_Out	2	1327	1,603	276	21%	76215	730	882	5.3
Bulla-Diggers Rest Rd east of Calder Fwy EB	3_In	1	543	505	-38	-7%	1414	299	278	1.2	3_In	1	289	393	104	36%	10844	159	216	4.2
Bulla-Diggers Rest Rd east of Calder Fwy WB	3_Out	1	238	324	86	36%	7393	131	178	3.8	3_Out	1	523	521	-3	-1%	8	288	286	0.1
Riddell Rd between Horne St & Rail Line NWB	4_Out	2	1400	1,812	412	29%	169886	770	997	7.6	4_Out	3	3256	2,489	-767	-24%	587874	1791	1369	10.6
Riddell Rd between Horne St & Rail Line SEB	4_In	3	2479	2,472	-7	0%	56	1364	1359	0.1	4_In	2	1967	1,729	-238	-12%	56765	1082	951	4.1
Gap Rd between Horne St & Rail Line NWB	4_Out	1	952	604	-348	-37%	120905	523	332	9.2	4_Out	2	1358	946	-411	-30%	169298	747	520	9.0
Gap Rd between Horne St & Rail Line SEB	4_In	2	1223	724	-499	-41%	248804	673	398	11.9	4_In	2	1550	783	-768	-50%	589223	853	431	16.7
Melbourne Lancefield Rd north of Rolling Meadows Dr NB		1	221	283	62	28%	3808	122	156	2.9		1	755	716	-39	-5%	1506	415	394	1.1
Melbourne Lancefield Rd north of Rolling Meadows Dr SB		1	697	720	23	3%	527	383	396	0.6		1	331	402	71	21%	5053	182	221	2.8
Konagaderra Rd west of Wildwood Rd EB	5_Out	1	191	135	-56	-29%	3165	105	74	3.3	5_Out	1	46	39	-7	-15%	45	25	21	0.8
Konagaderra Rd west of Wildwood Rd WB	5_In	1	36	33	-3	-9%	11	20	18	0.4	5_In	1	242	132	-110	-46%	12156	133	72	6.0
Gellies Rd west of Wildwood Rd NB	5_Out	1	47	88	41	86%	1650	26	48	3.7	5_Out	1	44	17	-28	-62%	758	24	9	3.7
Gellies Rd west of Wildwood Rd SB	5_In	1	36	6	-30	-83%	917	20	3	4.9	5_In	1	82	130	48	59%	2340	45	72	3.5
Sunbury Rd southeast of Shepherds Ln NWB	5_In	1	690	1,358	668	97%	446228	380	747	15.5	5_In	3	2521	2,226	-295	-12%	86757	1386	1224	4.5
Sunbury Rd southeast of Shepherds Ln SEB	5_Out	3	2505	2,242	-263	-11%	69374	1378	1233	4.0	5_Out	1	867	1,262	395	46%	156004	477	694	9.0
Bulla-Diggers Rest Rd west of Jacksons Creek EB	5_Out	1	519	487	-32	-6%	1051	286	268	1.1	5_Out	1	227	332	105	46%	11074	125	183	4.7
Bulla-Diggers Rest Rd west of Jacksons Creek WB	5_In	1	165	259	94	57%	8870	91	143	4.8	5_In	1	470	489	19	4%	353	259	269	0.6
Barkly St between Station St and Harker St NEB	5_In	1	334	413	78	23%	6101	184	227	3.0	5_In	1	270	328	58	21%	3373	149	181	2.5
Barkly St between Station St and Harker St SWB	5_Out	1	234	314	80	34%	6392	129	173	3.6	5_Out	1	429	471	42	10%	1772	236	259	1.5
Horne St between Mitchells Ln and Neil St NEB		2	1210	1,305	94	8%	8891	666	718	2.0		3	2093	1,758	-336	-16%	112747	1151	967	5.7
Horne St between Mitchells Ln and Neil St SWB		2	1596	1,635	39	2%	1508	878	899	0.7		2	1503	1,655	151	10%	22936	827	910	2.8
Evans St between Macedon St and Brook St NEB		1	463	260	-204	-44%	41503	255	143	7.9		2	1016	674	-342	-34%	116925	559	371	8.7
Evans St between Macedon St and Brook St SWB		1	538	614	77	14%	5905	296	338	2.4		1	674	339	-335	-50%	112054	371	186	11.0
Macedon St between Barkly ST and Jackson St NWB		2	1344	2,043	699	52%	488912	739	1124	12.6		3	2391	2,070	-321	-13%	103053	1315	1139	5.0
Macedon St between Barkly ST and Jackson St SEB		2	1982	1,940	-42	-2%	1783	1090	1067	0.7		2	1685	1,739	54	3%	2872	927	956	1.0
Gap Rd west of Horne St NWB		1	643	679	36	6%	1323	353	373	1.0		2	1692	1,311	-381	-23%	145097	931	721	7.3
Gap Rd west of Horne St SEB		2	1558	1,233	-325	-21%	105801	857	678	6.5		2	1401	875	-526	-38%	276167	770	481	11.6
Mitchells Ln west of Horne St EB		1	730	743	13	2%	177	401	409	0.4		1	466	409	-57	-12%	3301	256	225	2.0
Mitchells Ln west of Horne St WB		1	227	245	18	8%	310	125	135	0.8		1	937	686	-251	-27%	63092	516	377	6.5
Evans St south of Brook St NB		1	375	531	156	42%	24298	206	292	5.4		1	591	301	-290	-49%	84159	325	165	10.2
Evans St south of Station ST NB		1	503	519	16	3%	259	277	286	0.5		1	420	471	51	12%	2635	231	259	1.8
Evans St north of Station St SB		1	297	187	-110	-37%	12095	163	103	5.2		1	641	569	-72	-11%	5240	353	313	2.2
Station St east of Evans ST WB		1	406	343	-63	-15%	3945	223	189	2.4		1	703	469	-234	-33%	54845	387	258	7.2
Macedon St near Evans St EB		3	2161	2,472	311	14%	96556	1189	1359	4.8		2	1820	1,729	-91	-5%	8327	1001	951	1.6
Macedon St near Evans St WB		2	1235	1,812	577	47%	333359	679	997	11.0		3	2467	2,489	22	1%	478	1357	1369	0.3
Vineyard Rd south of Mitchells Ln NB		2	1164	1,162	-2	0%	3	640	639	0.0		3	2525	1,972	-553	-22%	305730	1389	1085	8.6
Horne St north of Mitchells Ln SB		2	1488	1,635	147	10%	21500	818	899	2.8		2	1459	1,655	196	13%	38356	802	910	3.7
Mitchells Ln west of Horne St EB		1	688	743	55	8%	3035	378	409	1.5		1	391	409	18	5%	315	215	225	0.7

Appendix C

Model Plots

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak Total Vehicle Volume - Year 2011 Base



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23/04/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak Total Vehicle Volume - Year 2011 Base

GTAconsultants

Melb - Lancefield Rd

Gap Rd

Riddell Rd

Calder Fwy

Vineyard Rd

Sunbury Rd

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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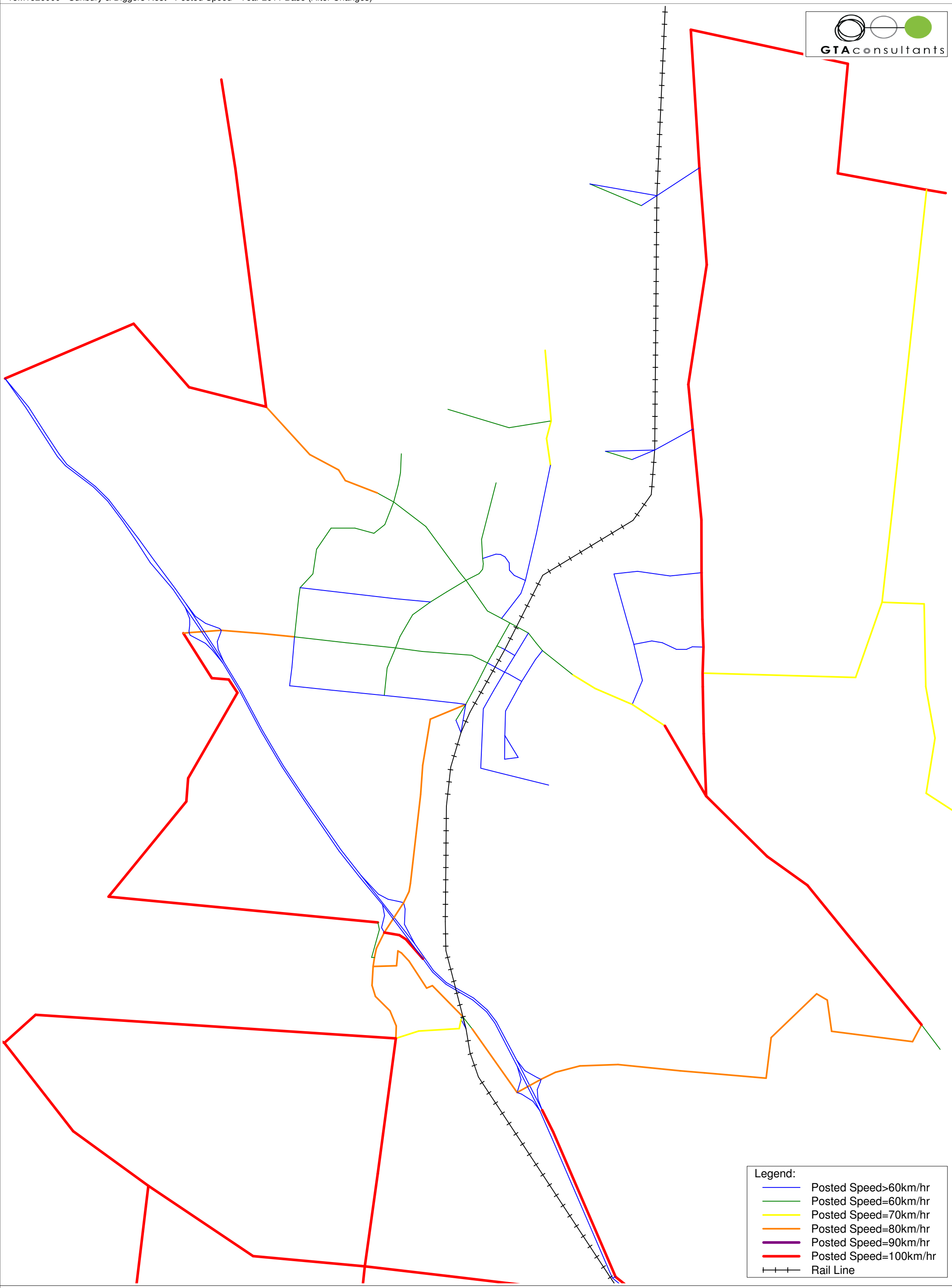
23/04/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Posted Speed - Year 2011 Base (After Changes)



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3/03/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - No. of Lanes - Year 2011 Base (After Changes)

GTAconsultants

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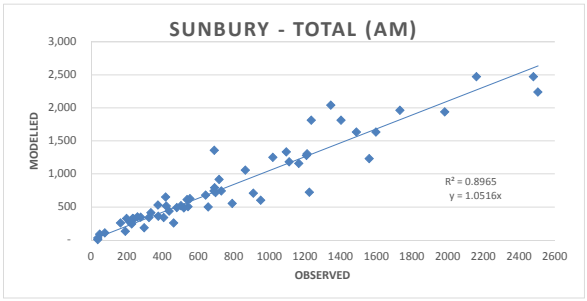
3/03/2015

cube

Appendix D

Scatter Plots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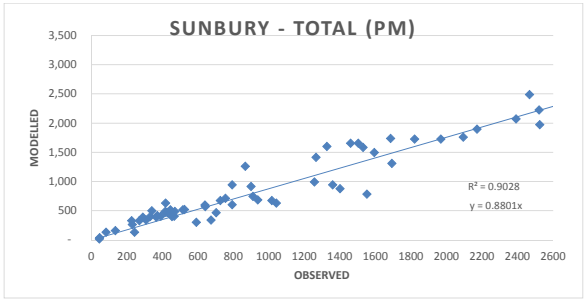
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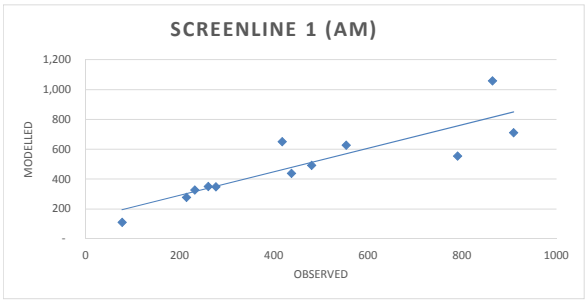
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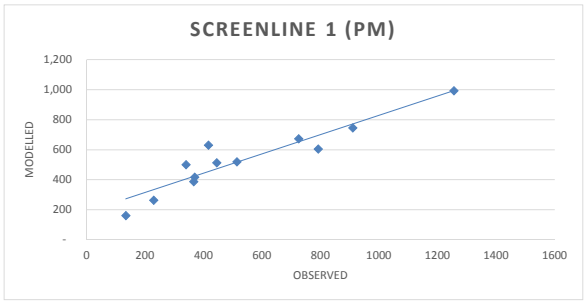
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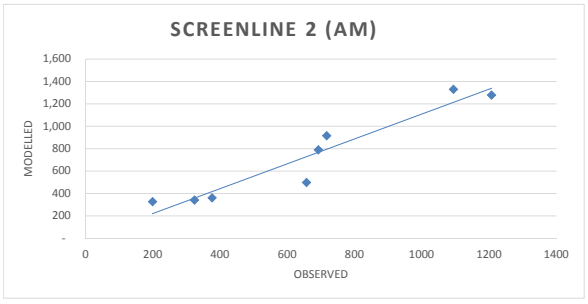
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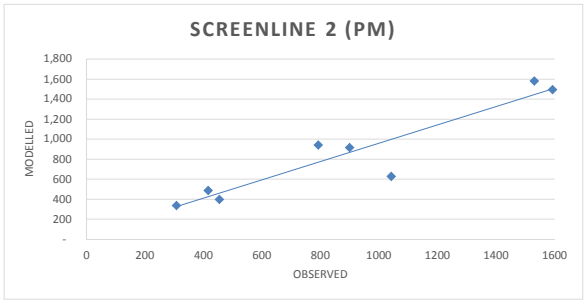
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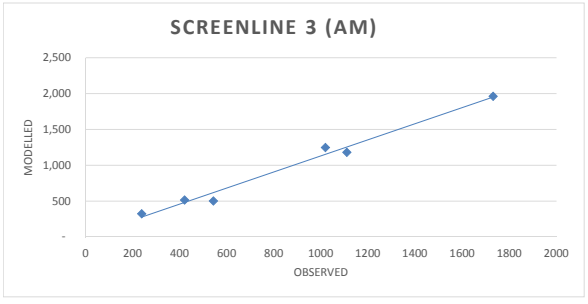
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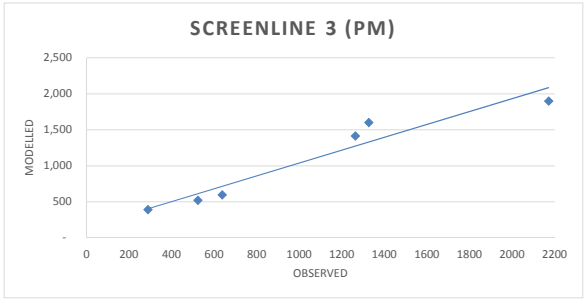
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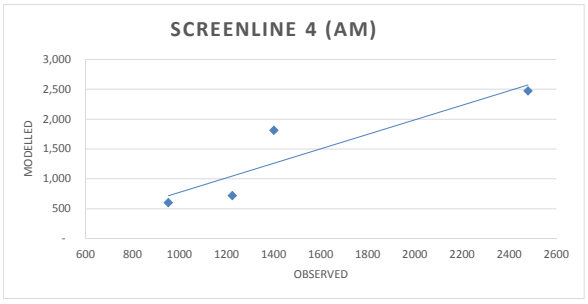
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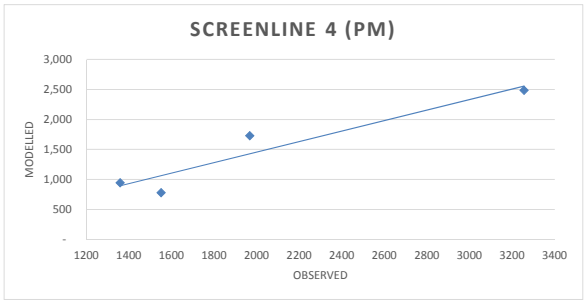
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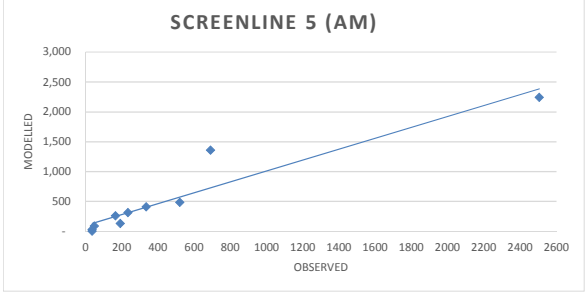
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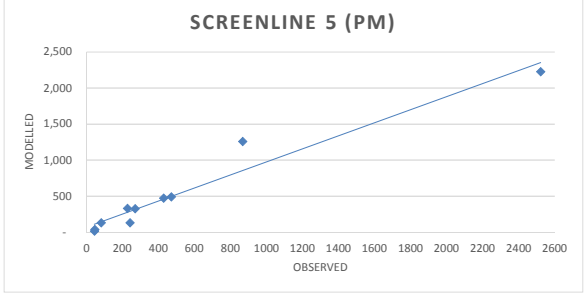
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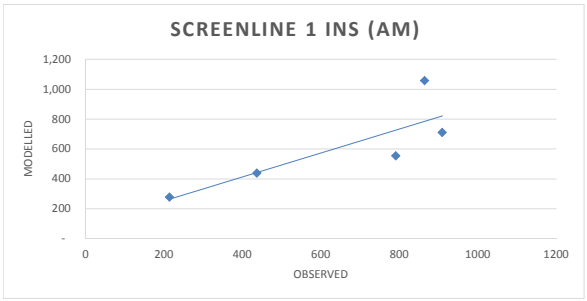
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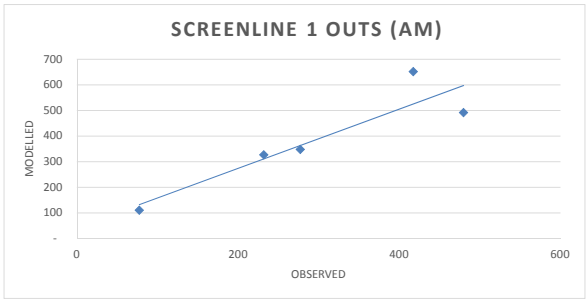
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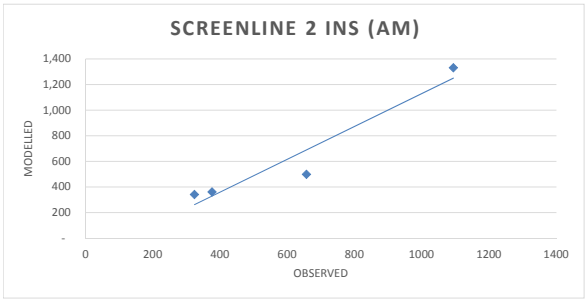
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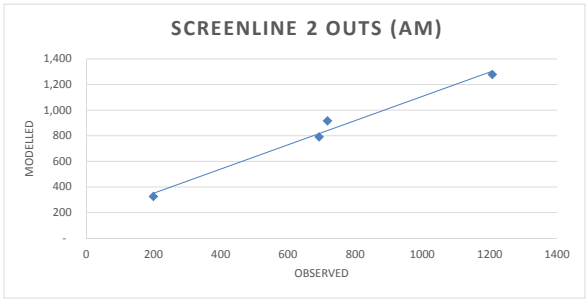
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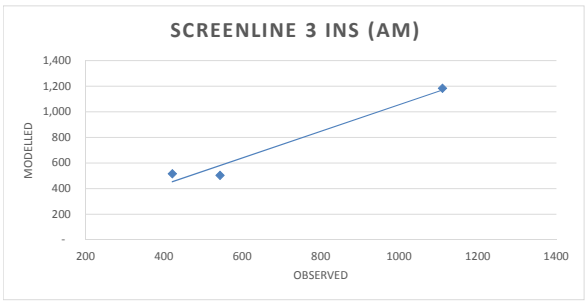
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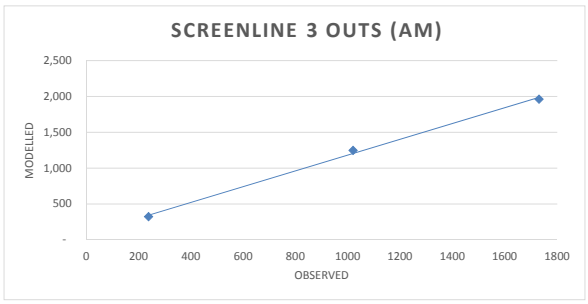
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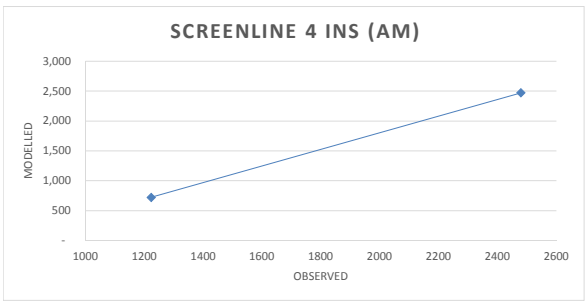
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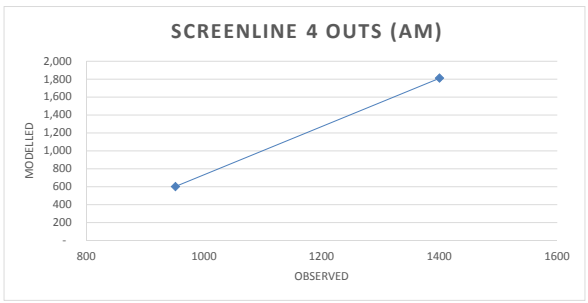
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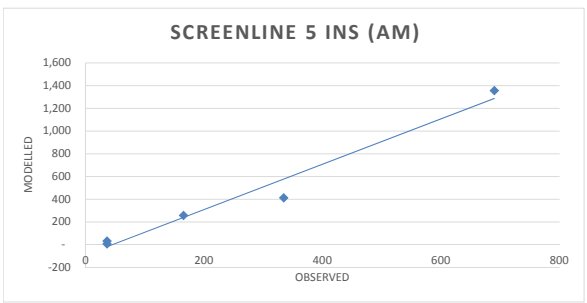
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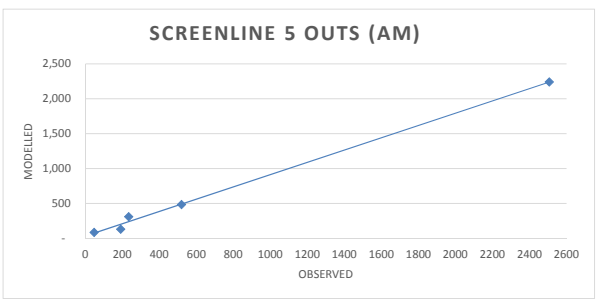
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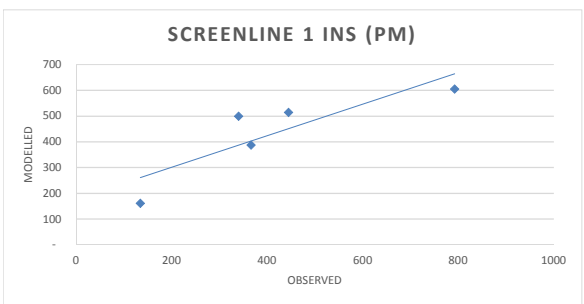
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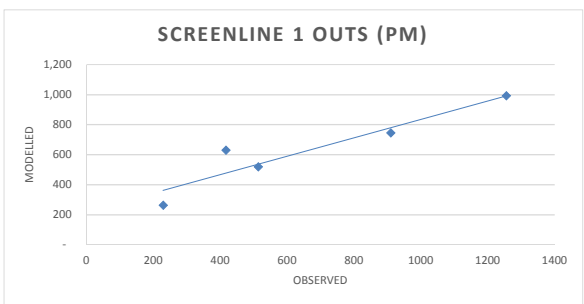
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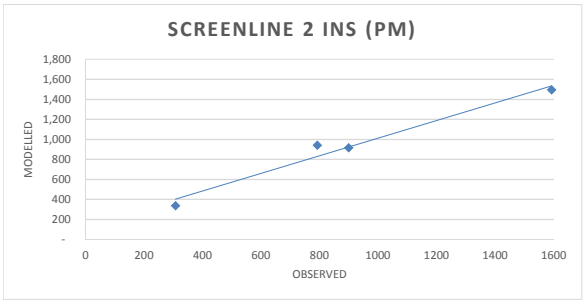
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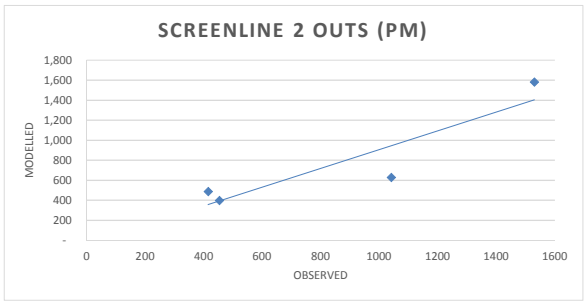
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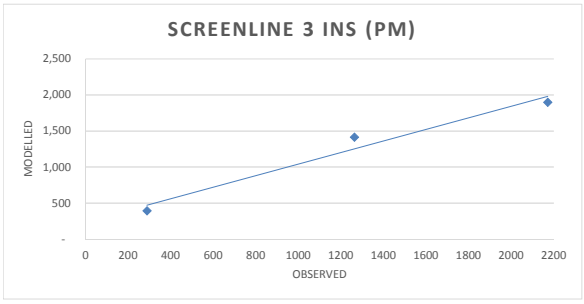
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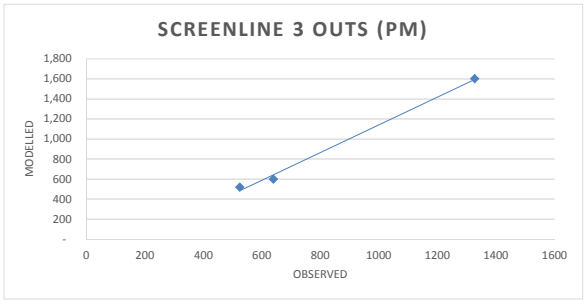
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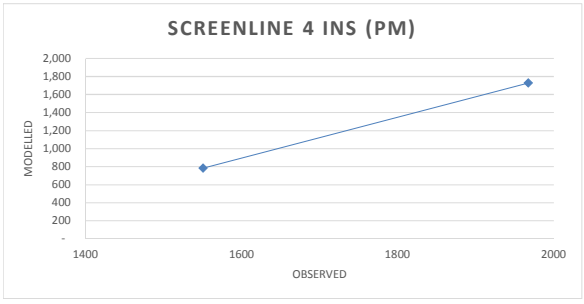
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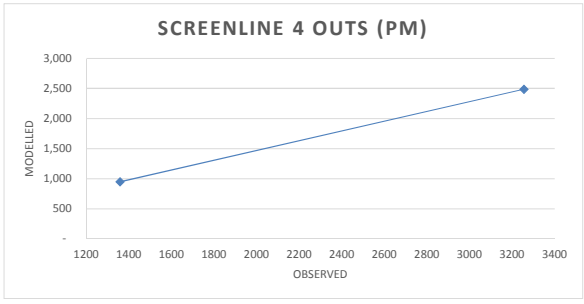
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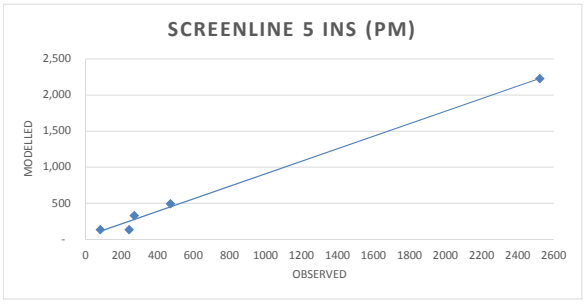
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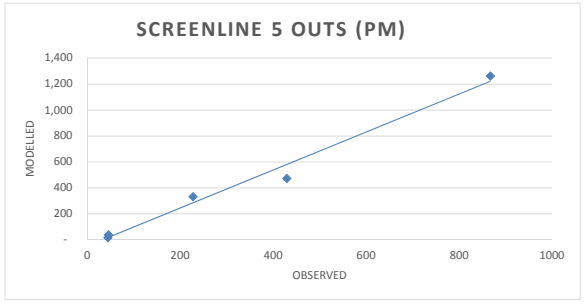
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OBSERVED

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E melbourne@gta.com.au

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Appendix B

Future Land Use

Ultimate Landuse - Year 2046

Sunbury Township

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
427	798	285	180	250	0	0	0
430	525	250	0	0	0	1100	1000
431	2419	864	0	0	0	0	0
433	420	200	0	190	450	1485	0
434	2050	804	0	320	450	1100	0
436	1725	639	0	0	0	0	0
1677	1718	625	0	0	0	0	0
1678	794	289	0	0	0	0	0
1679	1031	375	50	200	450	0	0
1680	1560	600	0	180	450	0	0
1681	2912	1142	0	0	0	0	0
1682	2246	881	0	0	0	0	0
1683	1470	700	4	250	547	0	0
1684	1587	567	0	55	520	0	0
1685	4247	1517	0	250	0	0	0
2629	7290	2700	0	0	0	0	0
2639	1625	591	0	0	0	0	0
2644	672	240	0	19	0	0	0
2645	1363	487	0	15	0	0	0
2646	352	126	0	36	0	0	0
3204	898	321	0	0	0	0	0
3206	0	0	0	157	450	0	0
3207	1328	521	150	250	0	0	0
3208	0	0	800	1707	0	0	0
3209	0	0	700	965	0	0	0
3210	84	40	700	1861	0	0	0
3211	210	100	0	320	0	0	0
3212	420	200	150	221	0	0	0
3213	0	0	150	221	0	0	0
3214	0	0	171	324	0	0	0
3215	630	300	150	253	0	0	0
3216	609	290	75	492	0	0	0
3217	2447	975	0	60	0	0	0
3218	52	20	150	1300	0	0	0
Total	**43482**	**16649**	**3430**	**9896**	**3317**	**3685**	**1000**

Sunbury South PSP

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
2625	2308	824	0	41	0	0	0
2626	2722	972	0	79	400	0	0
2627	3280	1172	0	59	0	0	0
2628	1042	372	0	19	0	0	0
2636	0	0	0	1169	0	0	0
2637	1999	714	0	36	0	0	0
3119	907	324	0	103	0	0	0
3145	1000	357	0	18	0	0	0
3146	710	254	0	13	0	0	0
3147	1174	419	0	41	0	0	0
3148	1134	405	0	110	0	1100	0
3150	851	304	833	1059	0	0	0
3151	977	349	0	57	451	0	0
3153	1243	444	0	22	0	0	0
3154	1025	366	50	118	451	0	0
3155	1630	582	0	29	0	0	0
3156	2573	919	0	46	0	0	0
3161	2092	747	167	279	451	0	0
3162	956	341	0	17	0	0	0
3163	676	242	0	12	0	0	0
3164	101	36	0	770	0	0	0
3165	974	348	0	17	0	0	0
Total	**29370**	**10490**	**1050**	**4113**	**1753**	**1100**	**0**

Lancefield Road PSP

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
428	2184	780	0	69	400	0	0
2638	1823	651	0	33	0	0	0
2640	4158	1485	17	91	0	0	0
2641	4204	1502	0	75	0	0	0
3123	244	87	0	4	0	0	0
3129	1829	653	0	123	0	1100	0
3132	4095	1463	0	73	0	0	0
3135	2352	840	0	172	451	1100	0
3136	1260	450	500	793	0	0	8000
3139	1044	373	0	19	0	0	0
3142	1191	425	167	263	451	0	0
3182	0	0	0	0	0	0	0
3205	2433	869	0	43	0	0	0
Total	**26816**	**9577**	**683**	**1757**	**1302**	**2200**	**8000**

Sunbury West PSP

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
432	1485	550	0	0	0	0	0
2630	2565	950	233	350	450	0	0
3179	1215	450	0	0	0	0	0
3180	1890	700	0	0	0	0	0
Total	**7155**	**2650**	**233**	**350**	**450**	**0**	**0**

Sunbury North PSP

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
2642	6842	2444	0	122	0	0	0
3128	7728	2760	167	380	451	0	0
Total	**14570**	**5204**	**167**	**502**	**451**	**0**	**0**

Diggers Rest PSP

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
229	1010	361	0	22	0	0	0
1301	416	149	0	7	0	0	0
2631	1058	378	0	19	0	0	0
2633	1970	704	0	35	0	0	0
3167	403	144	0	7	0	0	0
3168	601	215	0	11	0	0	0
3169	907	324	0	16	0	0	0
3170	628	224	0	11	0	0	0
3171	0	0	0	360	0	0	0
3172	2192	783	0	39	0	0	0
3173	0	0	0	500	0	0	0
3174	874	312	0	16	0	0	0
3175	823	294	0	15	0	0	0
3176	227	81	0	44	451	0	0
3177	0	0	333	676	0	0	0
3178	737	263	0	13	0	0	0
Total	**11846**	**4231**	**333**	**1792**	**451**	**0**	**0**

External

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
230	163	35	0	20	0	0	0
241	200	70	0	59	0	0	0
423	63	20	0	30	0	0	0
429	0	0	0	0	0	0	0
435	93	30	3	31	0	0	0
437	3	1	0	3	0	0	0
438	194	62	0	33	0	0	0
439	421	130	8	64	0	0	0
440	295	94	0	66	0	0	0
2632	6	2	0	4	0	0	0
2634	6	2	0	3	0	0	0
2635	3	1	0	3	0	0	0
2643	0	0	0	0	0	0	0
2647	59	18	3	112	0	0	0
2648	394	130	8	19	0	0	0
Total	**1900**	**594**	**22**	**448**	**0**	**0**	**0**

Interim Landuse - Year 2026

Sunbury Township

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
427	851	285	135	198	0	0	0
430	596	244	1	27	0	1100	1000
431	2525	864	0	0	0	0	0
433	380	181	0	190	450	1485	0
434	2086	804	4	300	450	1100	0
436	1537	564	11	11	0	0	0
1677	1718	619	1	22	0	0	0
1678	772	284	1	24	0	0	0
1679	1015	370	39	182	450	0	0
1680	1458	552	1	178	450	0	0
1681	2971	1142	4	71	0	0	0
1682	2128	850	0	25	0	0	0
1683	1473	675	4	250	547	0	0
1684	1646	567	4	109	520	0	0
1685	3825	1356	4	262	0	0	0
2629	6100	2239	1	16	0	0	0
2639	1700	584	0	2	0	0	0
2644	732	240	0	19	0	0	0
2645	1091	387	0	15	0	0	0
2646	294	104	0	36	0	0	0
3204	859	299	0	0	0	0	0
3206	0	0	0	157	450	0	0
3207	1126	444	144	243	0	0	0
3208	0	0	721	1503	0	0	0
3209	0	0	633	898	0	0	0
3210	79	38	603	1639	0	0	0
3211	189	90	0	295	0	0	0
3212	389	182	150	246	0	0	0
3213	0	0	124	255	0	0	0
3214	0	0	171	301	0	0	0
3215	561	267	121	224	0	0	0
3216	559	266	69	465	0	0	0
3217	2440	937	0	58	0	0	0
3218	39	15	130	1120	0	0	0
Total	**41140**	**15446**	**3074**	**9338**	**3317**	**3685**	**1000**

Sunbury South PSP

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
2625	1731	618	0	31	0	0	0
2626	2041	729	0	59	300	0	0
2627	2460	879	0	44	0	0	0
2628	781	279	0	14	0	0	0
2636	0	0	0	877	0	0	0
2637	1499	536	0	27	0	0	0
3119	680	243	0	77	0	0	0
3145	750	268	0	13	0	0	0
3146	532	190	0	10	0	0	0
3147	880	314	0	31	0	0	0
3148	851	304	0	83	0	825	0
3150	638	228	625	794	0	0	0
3151	732	262	0	43	338	0	0
3153	932	333	0	17	0	0	0
3154	769	275	38	89	338	0	0
3155	1222	437	0	22	0	0	0
3156	1929	689	0	34	0	0	0
3161	1569	560	125	209	338	0	0
3162	717	256	0	13	0	0	0
3163	507	181	0	9	0	0	0
3164	76	27	0	577	0	0	0
3165	731	261	0	13	0	0	0
Total	**22028**	**7867**	**788**	**3085**	**1315**	**825**	**0**

Lancefield Road PSP

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
428	1638	585	0	52	300	0	0
2638	1367	488	0	24	0	0	0
2640	3119	1114	13	68	0	0	0
2641	3153	1126	0	56	0	0	0
3123	183	65	0	3	0	0	0
3129	1372	490	0	92	0	825	0
3132	3071	1097	0	55	0	0	0
3135	1764	630	0	129	338	825	0
3136	945	338	375	594	0	0	6000
3139	783	280	0	14	0	0	0
3142	893	319	125	197	338	0	0
3182	0	0	0	0	0	0	0
3205	1825	652	0	33	0	0	0
Total	**20112**	**7183**	**513**	**1318**	**977**	**1650**	**6000**

Sunbury West PSP

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
432	1114	413	0	0	0	0	0
2630	1924	713	175	263	338	0	0
3179	911	338	0	0	0	0	0
3180	1418	525	0	0	0	0	0
Total	**5366**	**1988**	**175**	**263**	**338**	**0**	**0**

Sunbury North PSP

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
2642	1368	489	0	24	0	0	0
3128	1546	552	33	76	90	0	0
Total	**2914**	**1041**	**33**	**100**	**90**	**0**	**0**

Diggers Rest PSP

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
229	758	271	0	14	0	0	0
1301	312	111	0	6	0	0	0
2631	794	284	0	14	0	0	0
2633	1477	528	0	26	0	0	0
3167	302	108	0	5	0	0	0
3168	450	161	0	8	0	0	0
3169	680	243	0	12	0	0	0
3170	471	168	0	8	0	0	0
3171	0	0	0	270	0	0	0
3172	1644	587	0	29	0	0	0
3173	0	0	0	375	0	0	0
3174	655	234	0	12	0	0	0
3175	617	221	0	11	0	0	0
3176	170	61	0	33	338	0	0
3177	0	0	250	507	0	0	0
3178	553	197	0	10	0	0	0
Total	**8885**	**3173**	**250**	**1341**	**338**	**0**	**0**

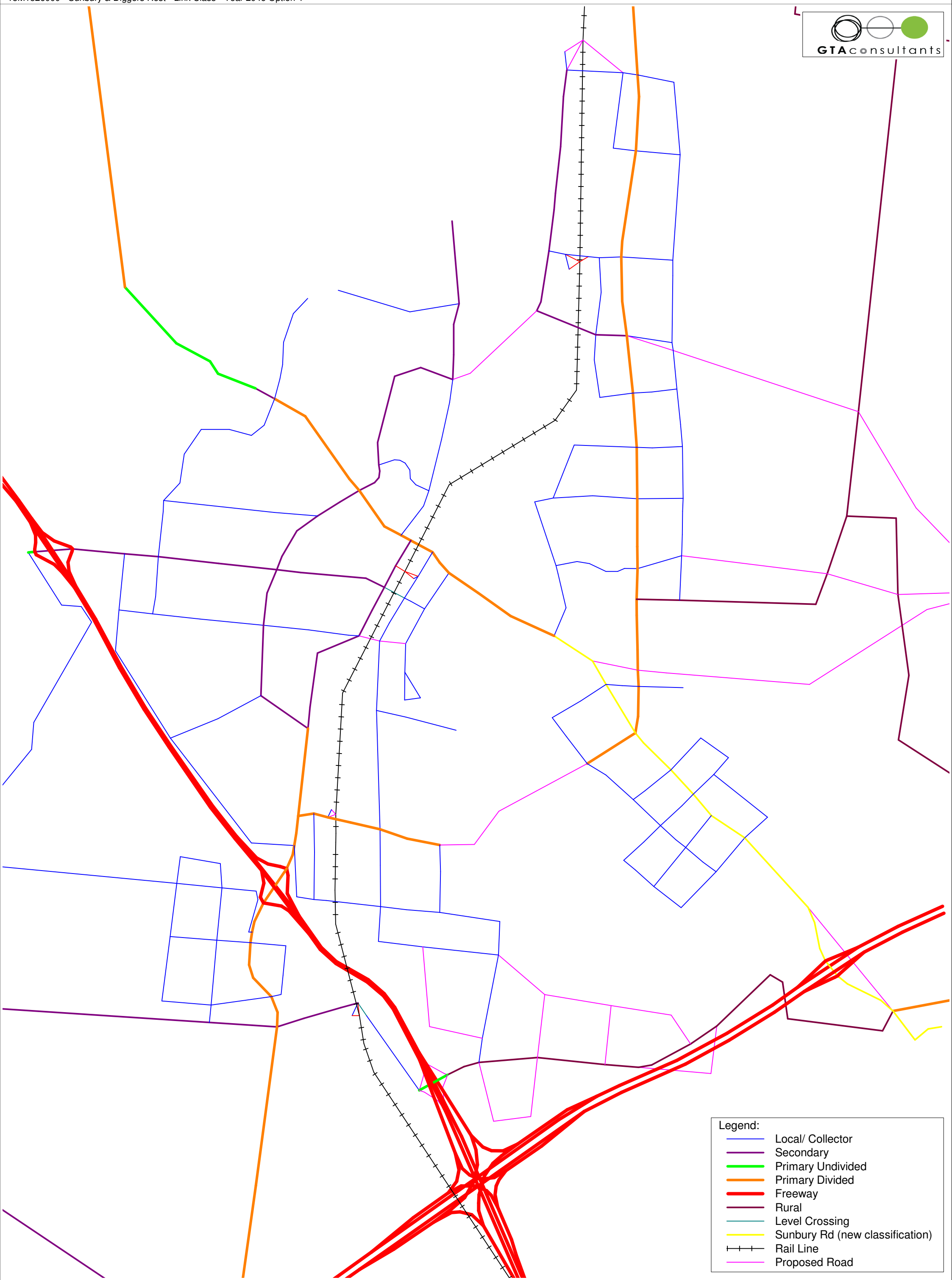
External

Zone	Population	Household	Employment (Retail)	Employment (Total)	Enrolment (Primary)	Enrolment (Secondary)	Enrolment (Tertiary)
230	163	35	0	20	0	0	0
241	200	70	0	59	0	0	0
423	63	20	0	30	0	0	0
429	0	0	0	0	0	0	0
435	93	30	3	31	0	0	0
437	3	1	0	3	0	0	0
438	194	62	0	33	0	0	0
439	421	130	8	64	0	0	0
440	295	94	0	66	0	0	0
2632	5	2	0	3	0	0	0
2634	6	2	0	3	0	0	0
2635	3	1	0	3	0	0	0
2643	0	0	0	0	0	0	0
2647	59	18	3	112	0	0	0
2648	394	130	8	19	0	0	0
Total	**1898**	**594**	**22**	**447**	**0**	**0**	**0**

Appendix C

Interim Year and Ultimate (2046) Modelled Road Networks

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Link Class - Year 2046 Option 4



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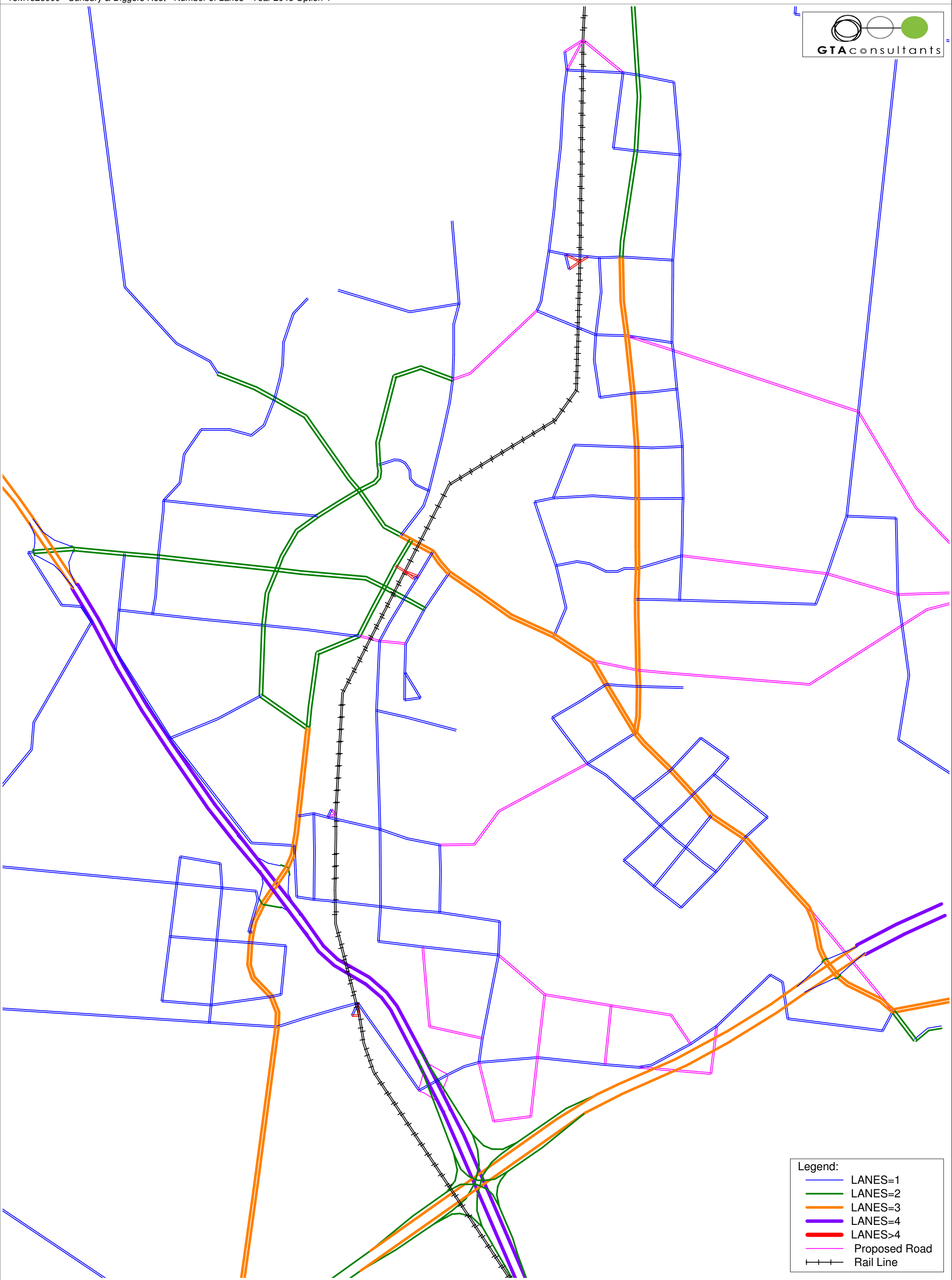
29/06/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Number of Lanes - Year 2046 Option 4



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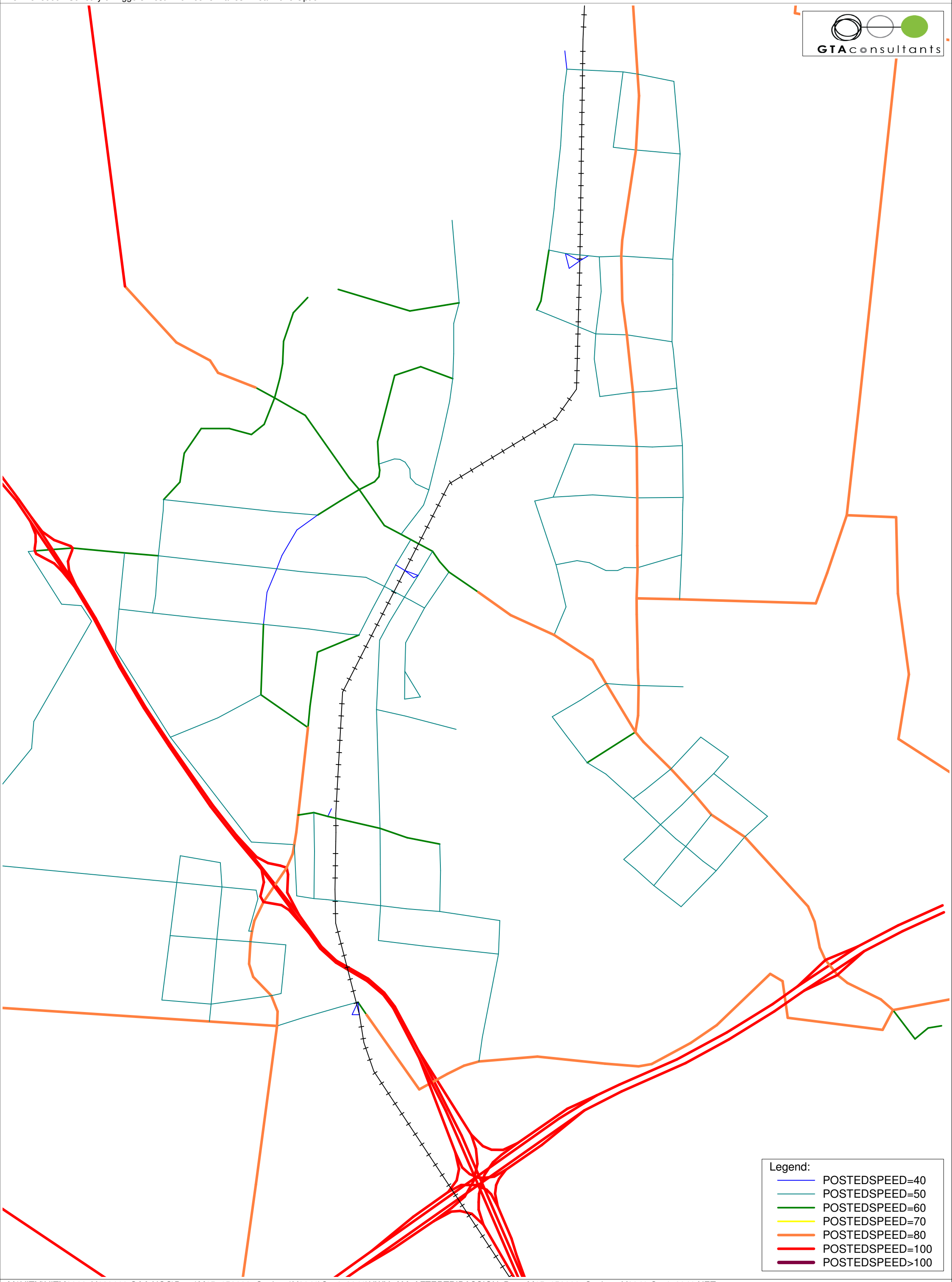
29/06/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Number of Lanes - Year 2046 Option 4



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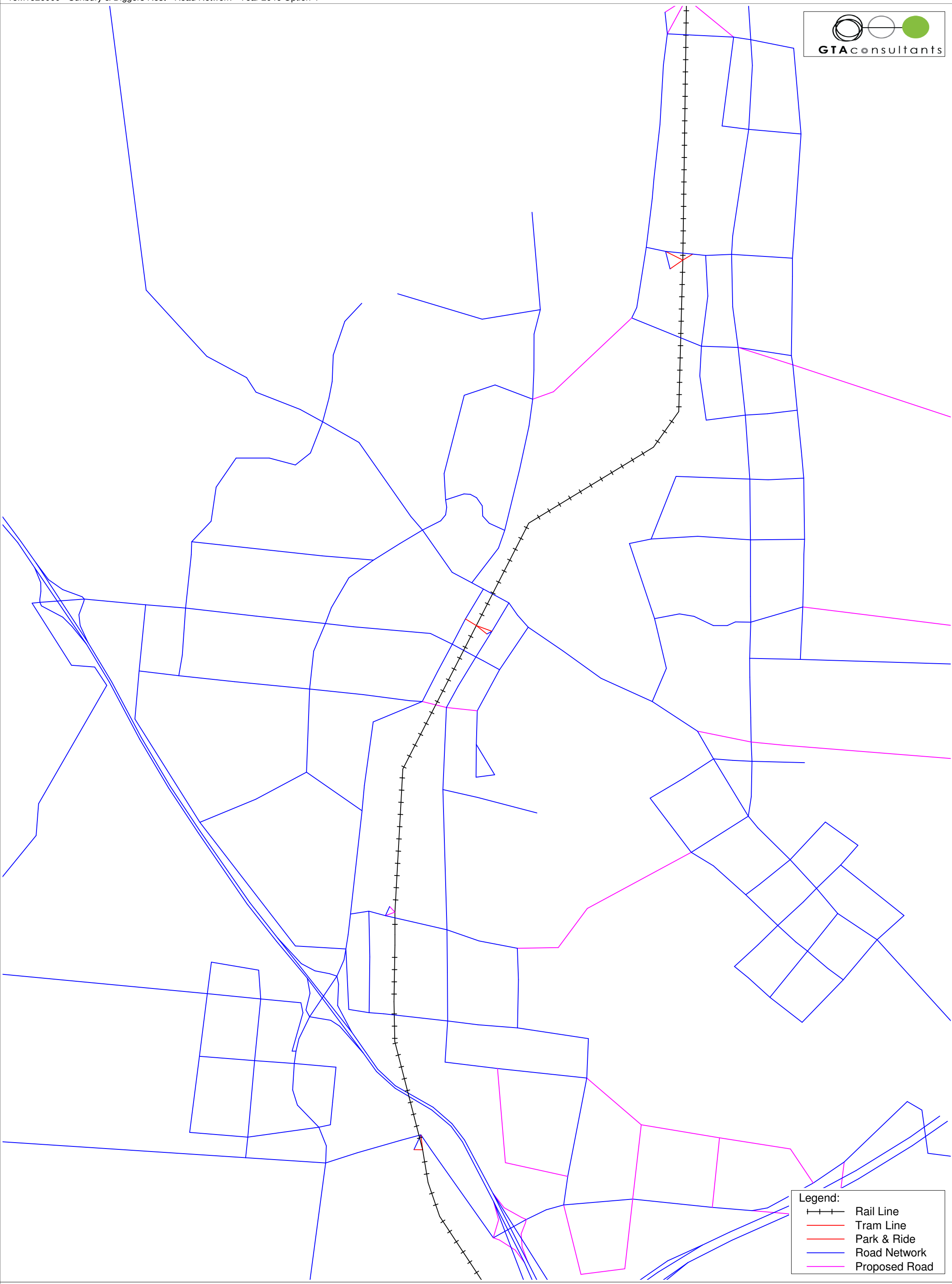
Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Road Network - Year 2046 Option 4



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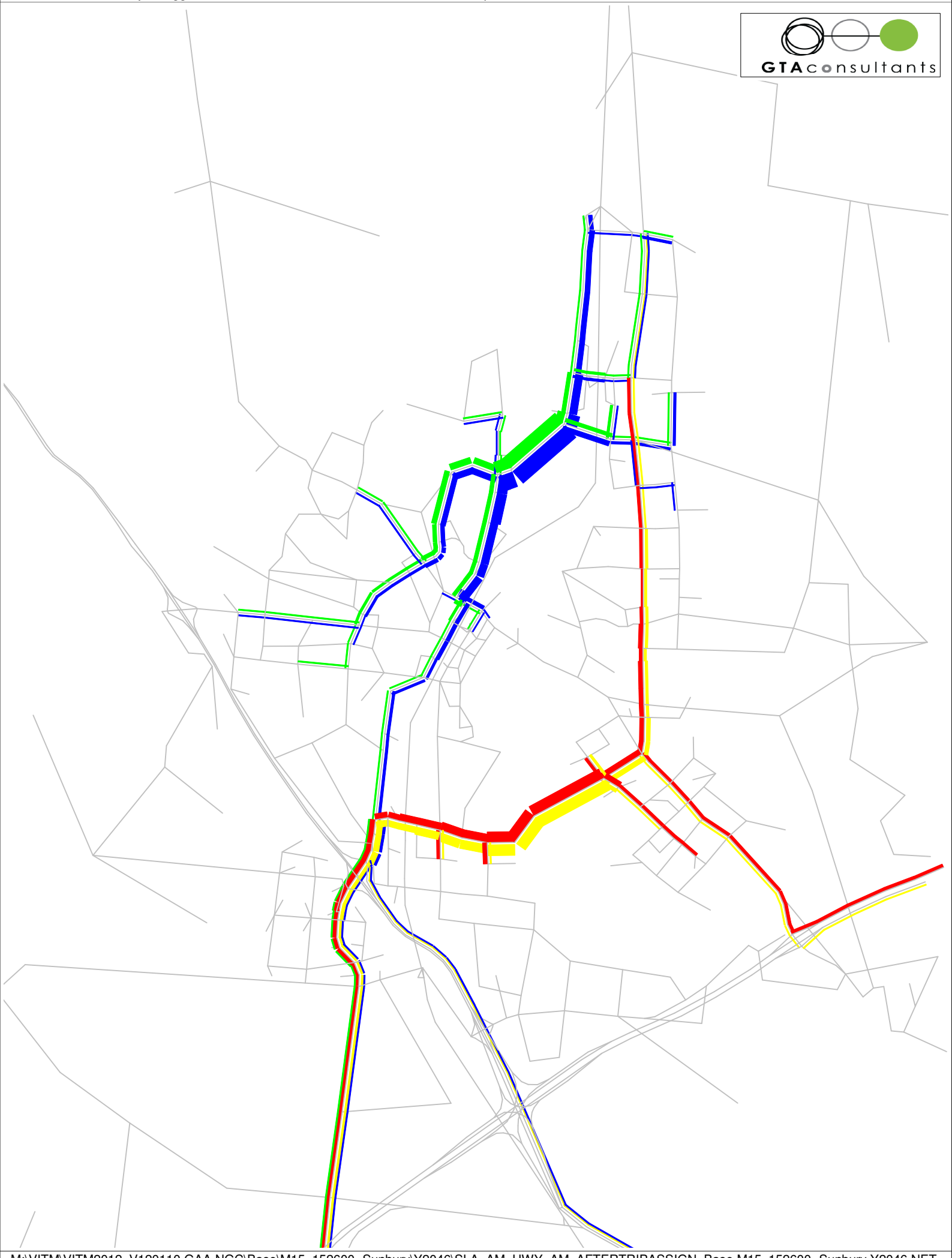
16/07/2015

Appendix D

Select Link Analysis Plots

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak Select Link - Year 2046 Option 1



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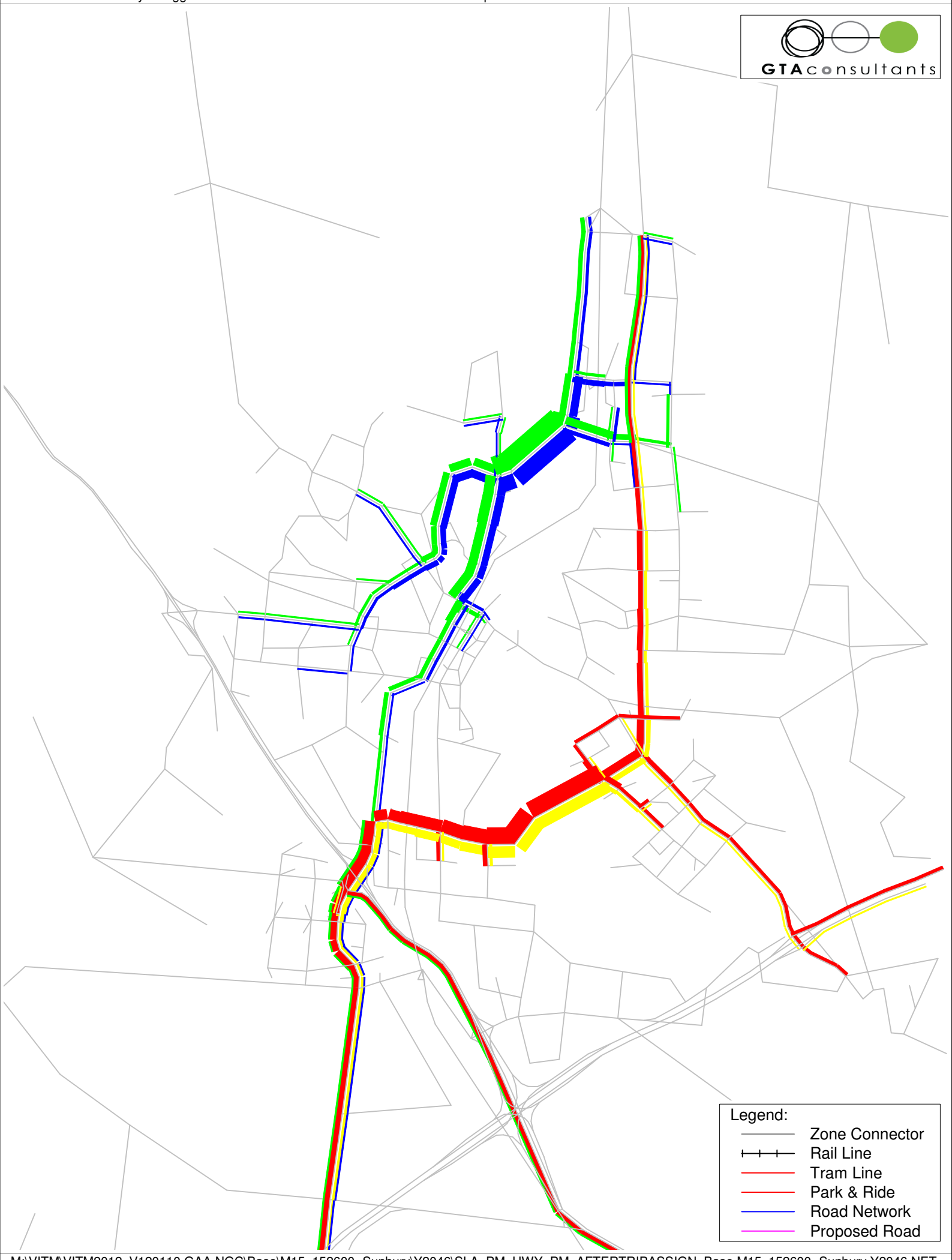
25/09/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak Select Link - Year 2046 Option 1



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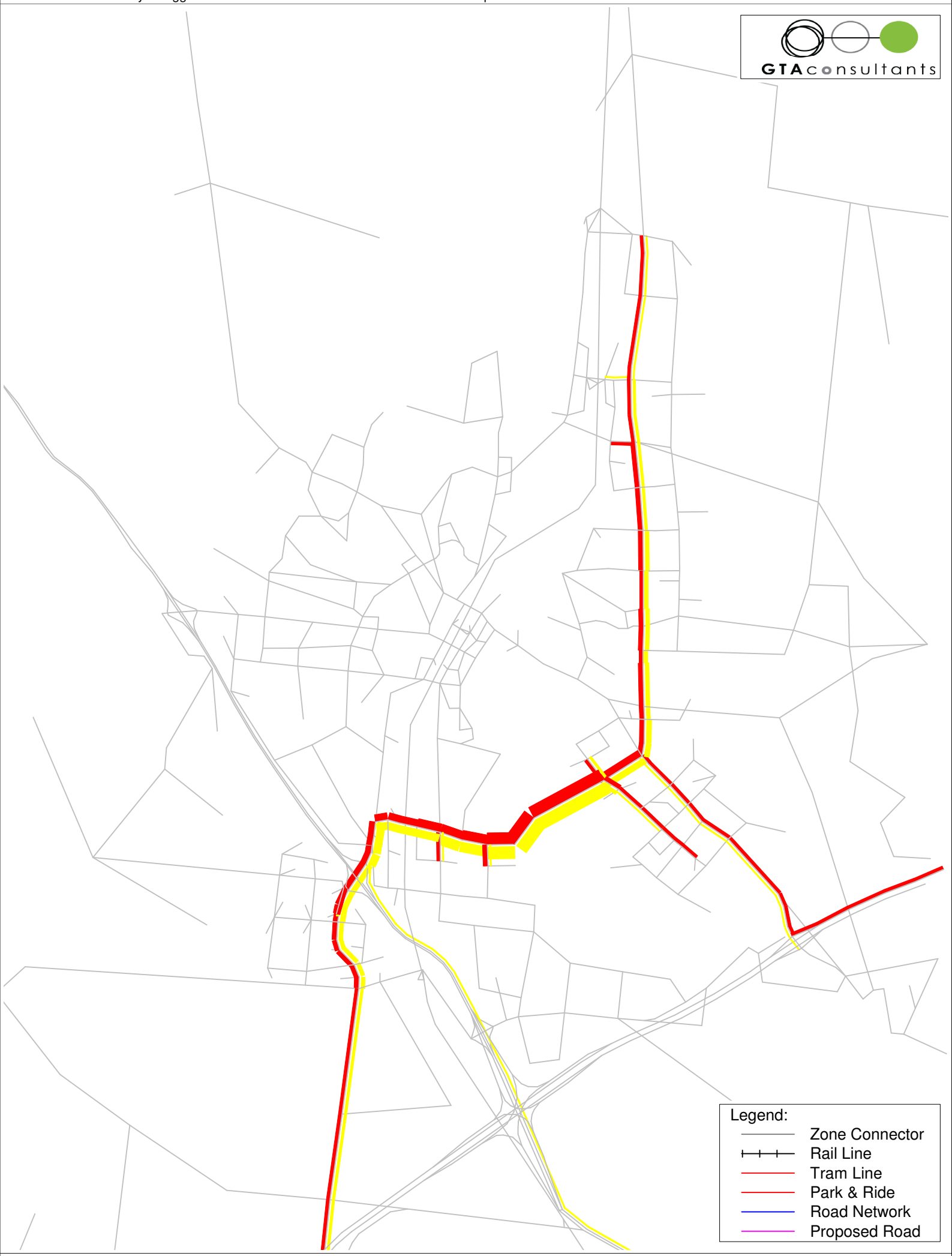
25/09/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak Select Link - Year 2046 Option 2



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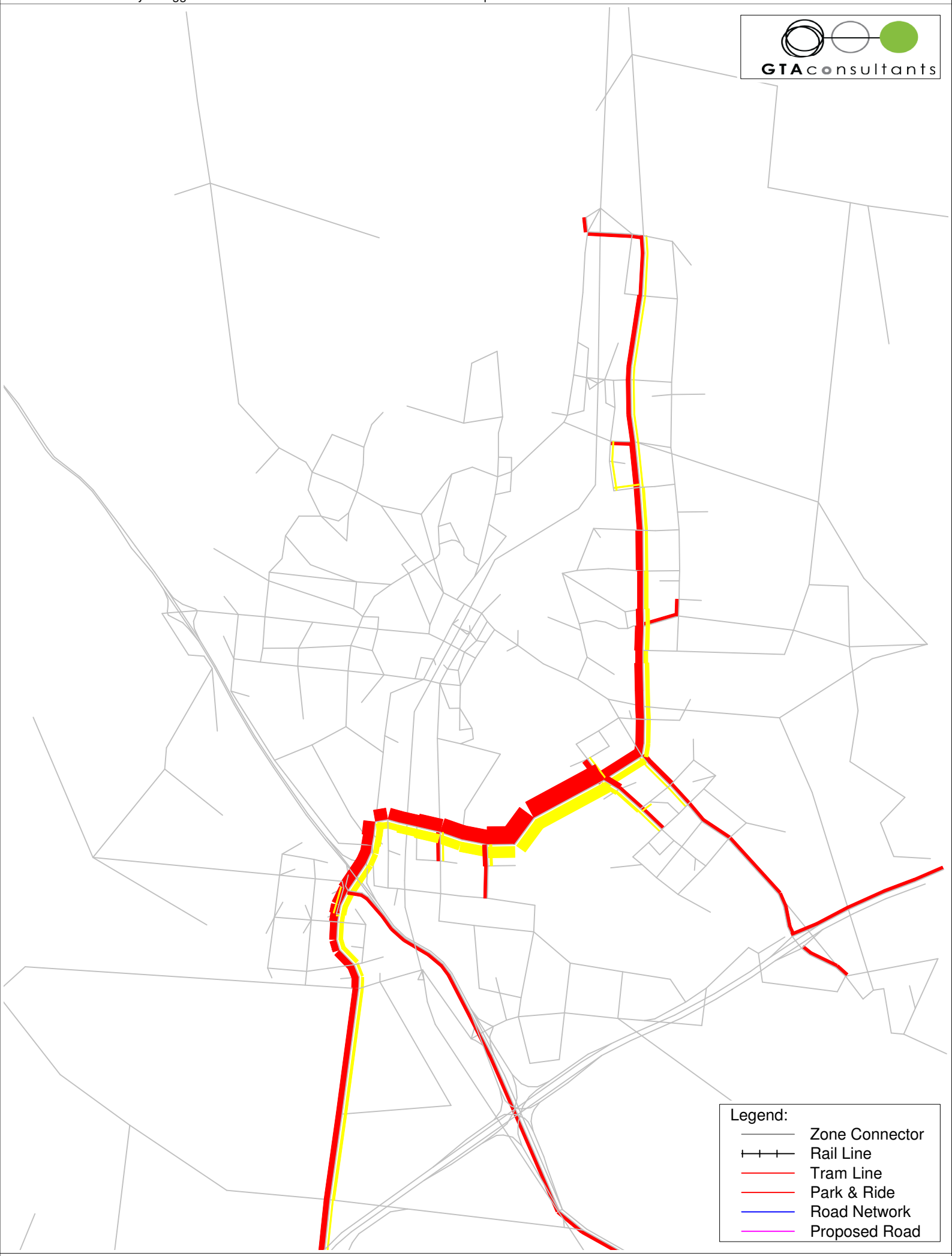
25/09/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak Select Link - Year 2046 Option 2



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25/09/2015
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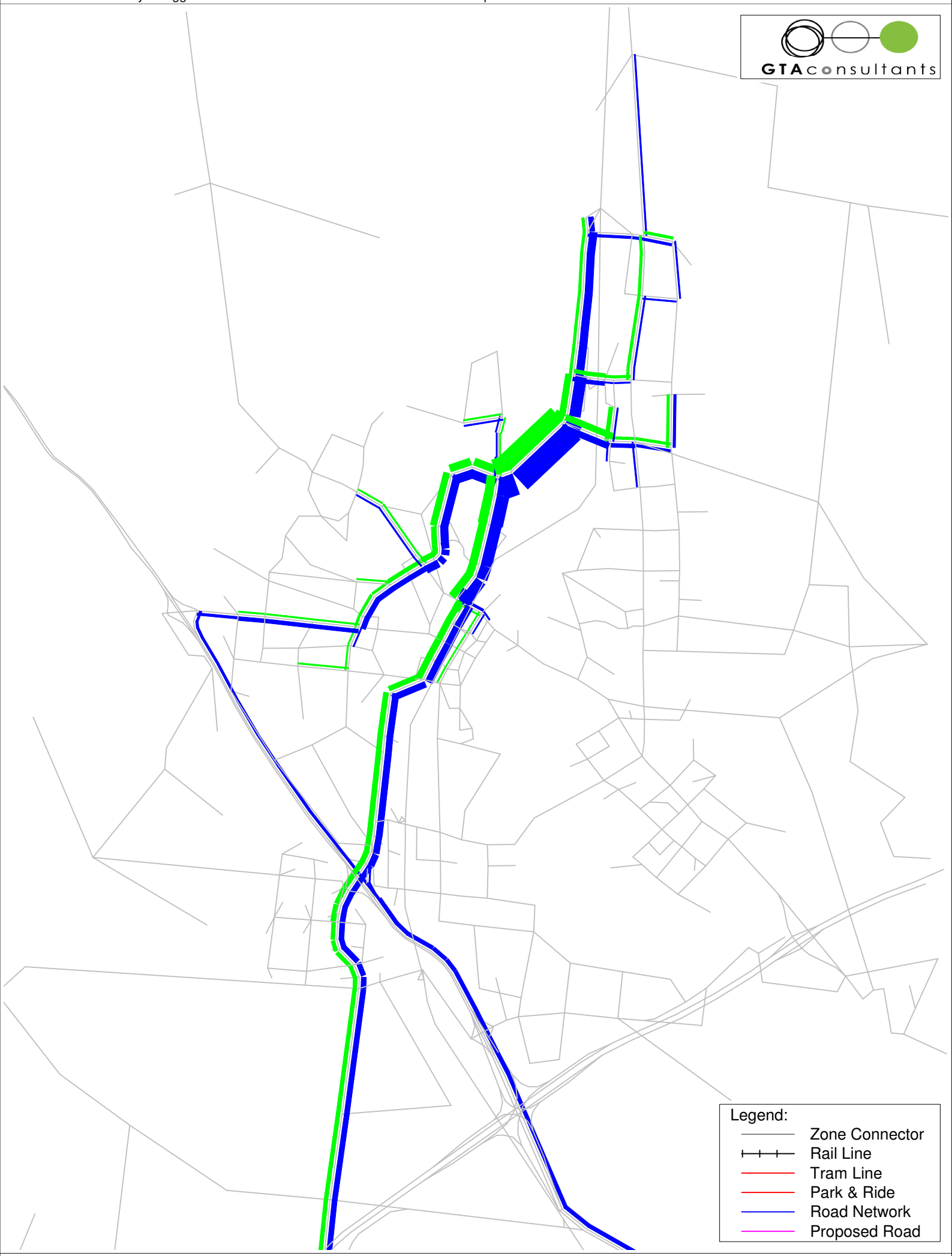
Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak Select Link - Year 2046 Option 3



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25/09/2015
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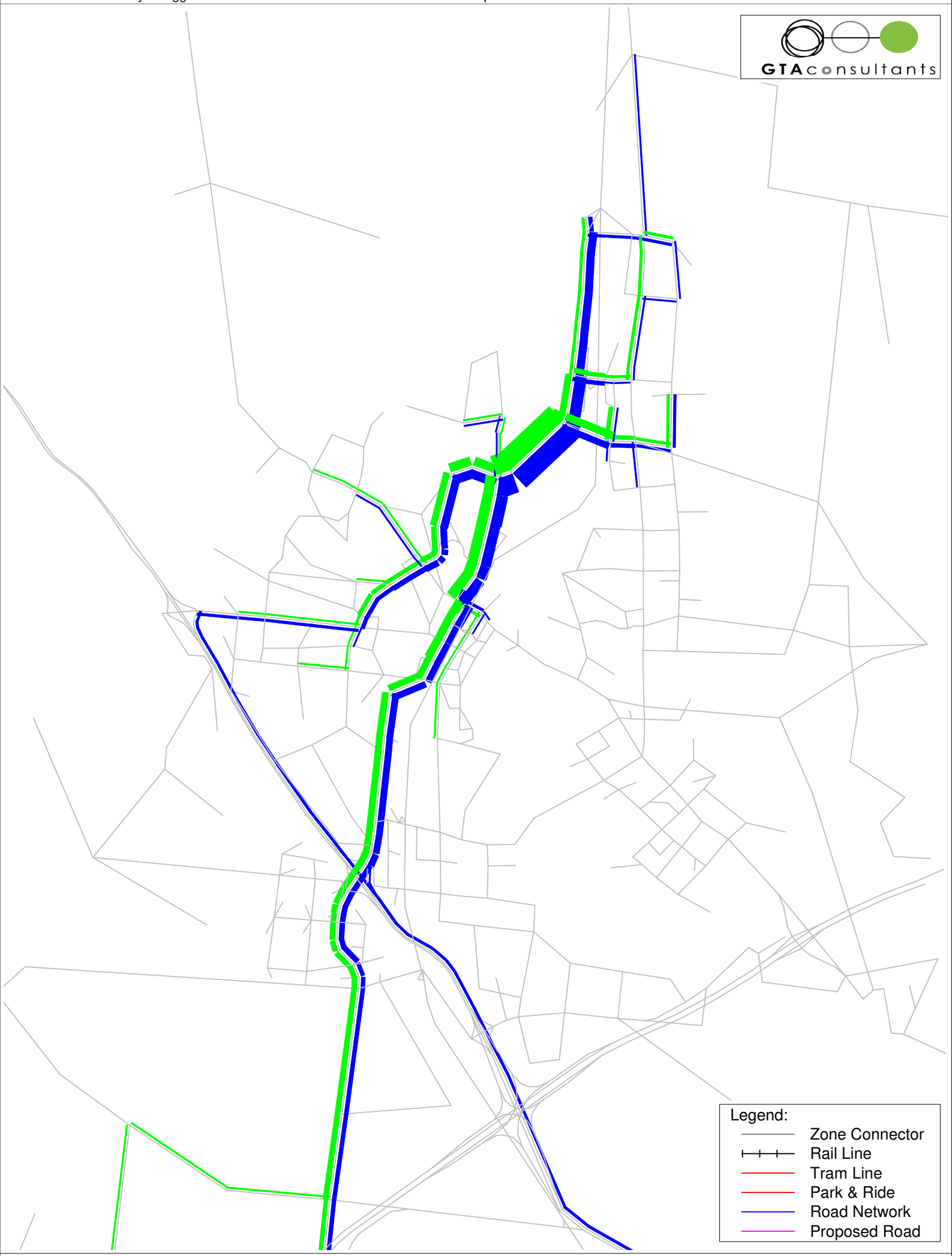
Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak Select Link - Year 2046 Option 3



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25/09/2015
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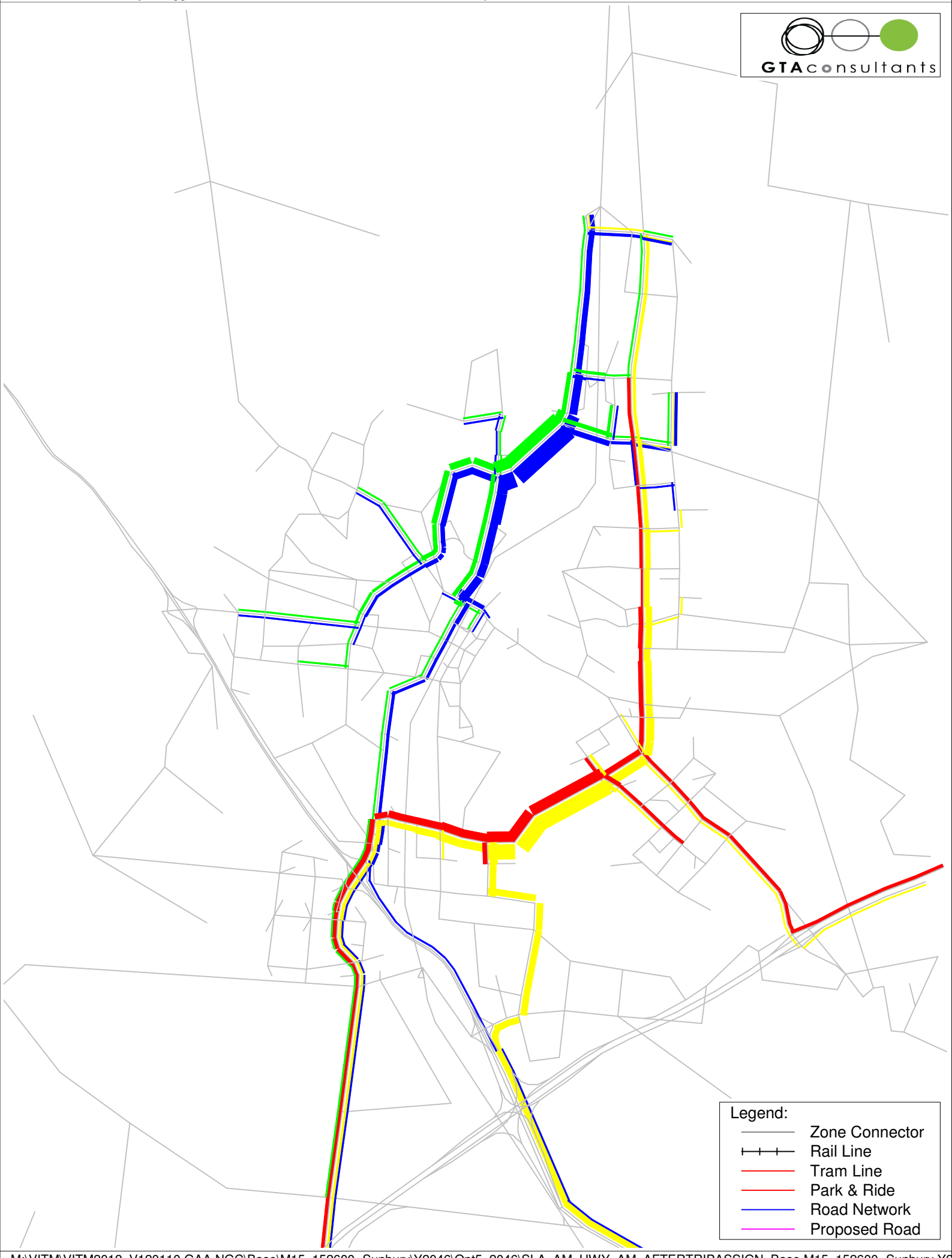
Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak Select Link - Year 2046 Option 5



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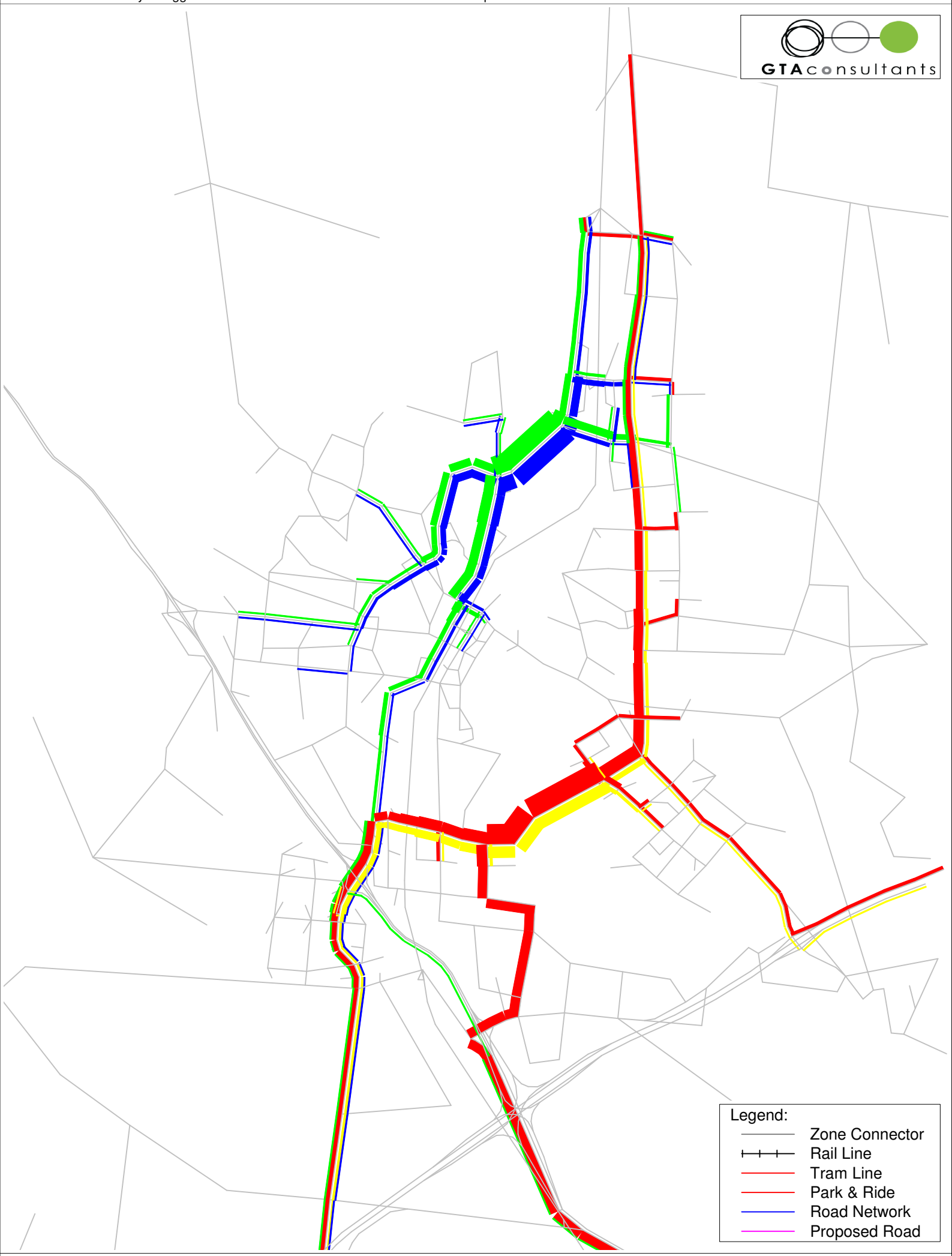
Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak Select Link - Year 2046 Option 5



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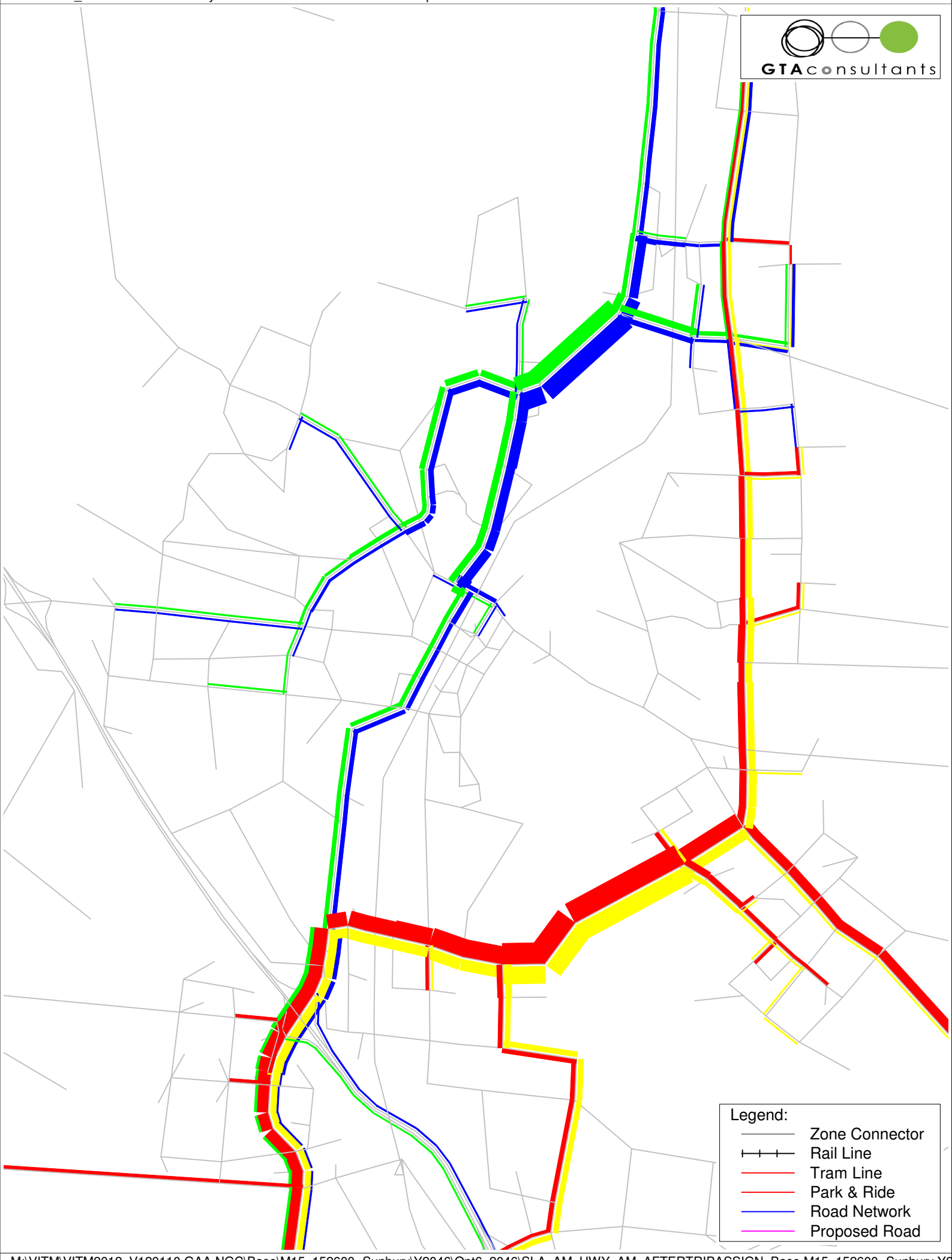
Victorian Integrated Transport Model (VITM)
150804stm_15M1526000 - Sunbury - 2Hrs AM Peak - SLA- Year 2046 Opt6



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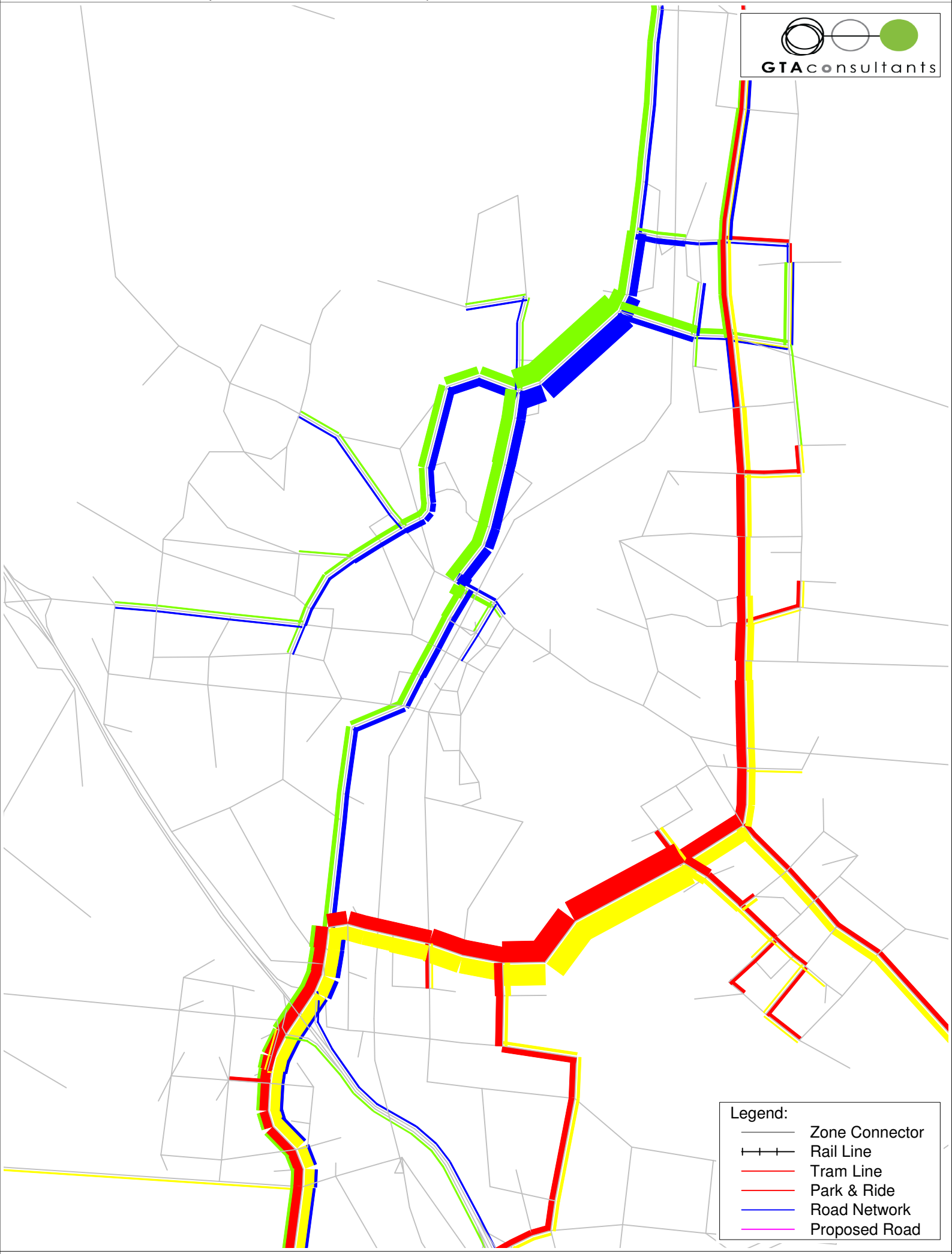
4/08/2015
cube

Victorian Integrated Transport Model (VITM)
150804stm_15M1526000 - Sunbury - 2Hrs PM Peak - SLA- Year 2046 Opt6



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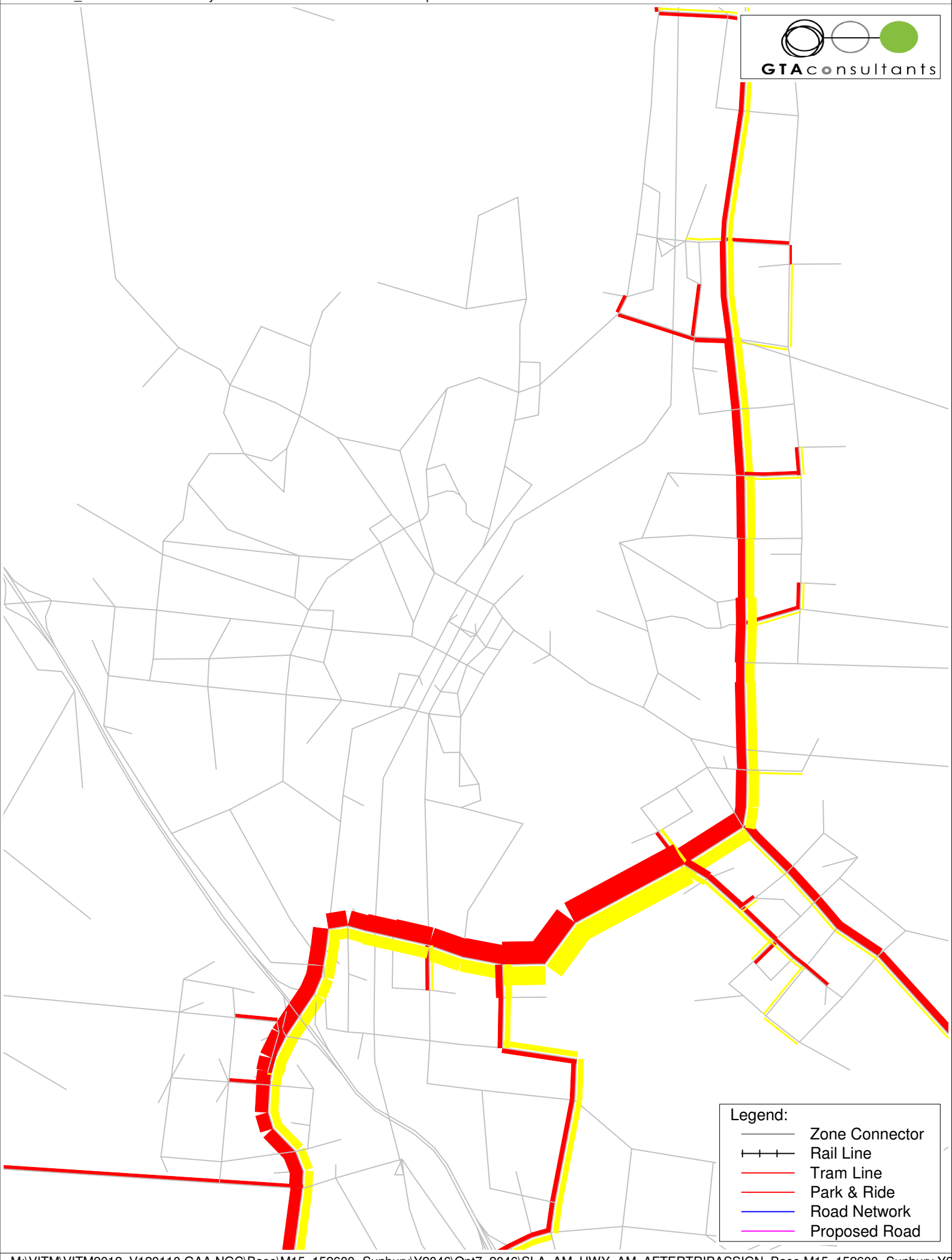
4/08/2015
cube

Victorian Integrated Transport Model (VITM)
150804stm_15M1526000 - Sunbury - 2Hrs AM Peak - SLA- Year 2046 Opt7



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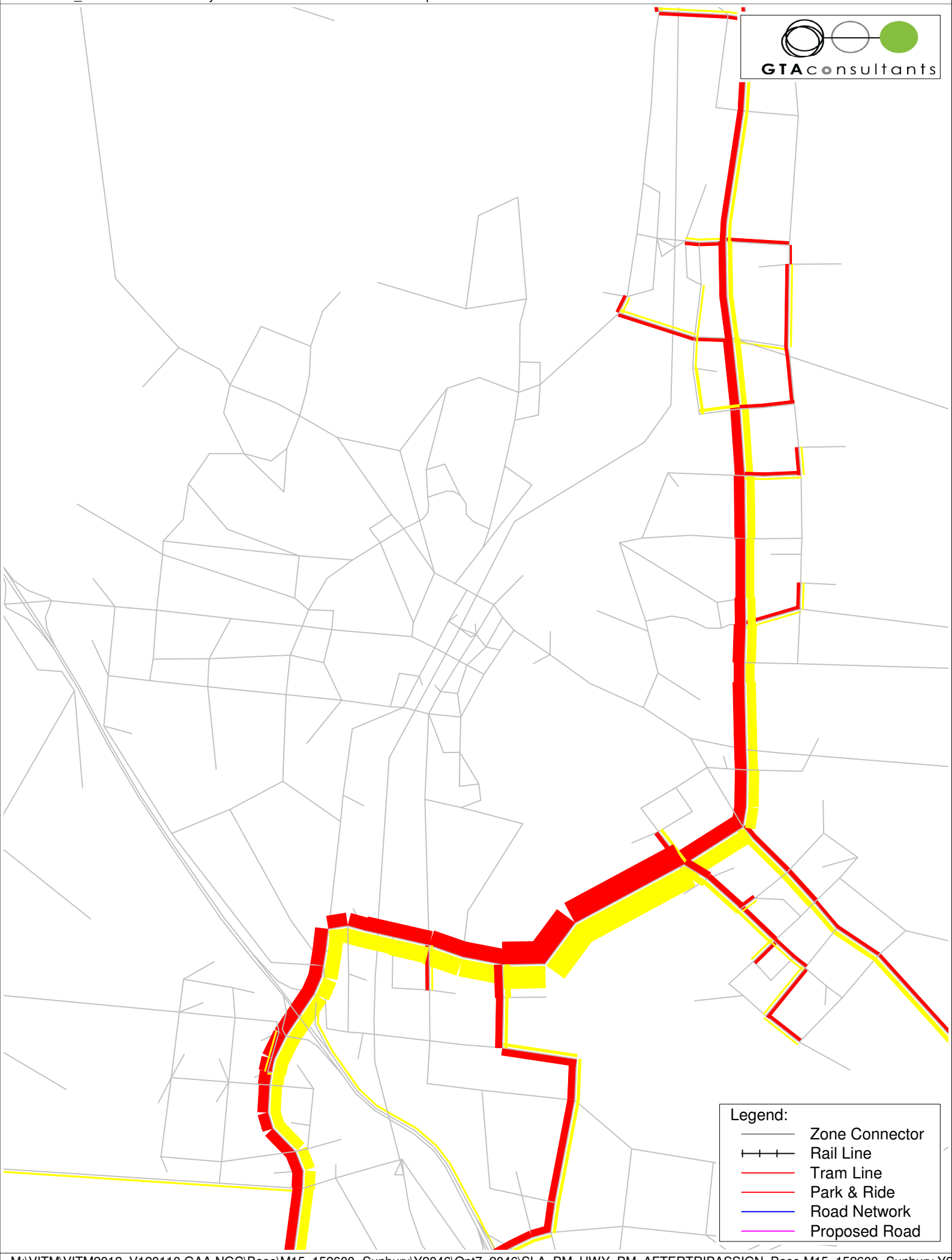
4/08/2015
cube

Victorian Integrated Transport Model (VITM)
150804stm_15M1526000 - Sunbury - 2Hrs PM Peak - SLA- Year 2046 Opt7



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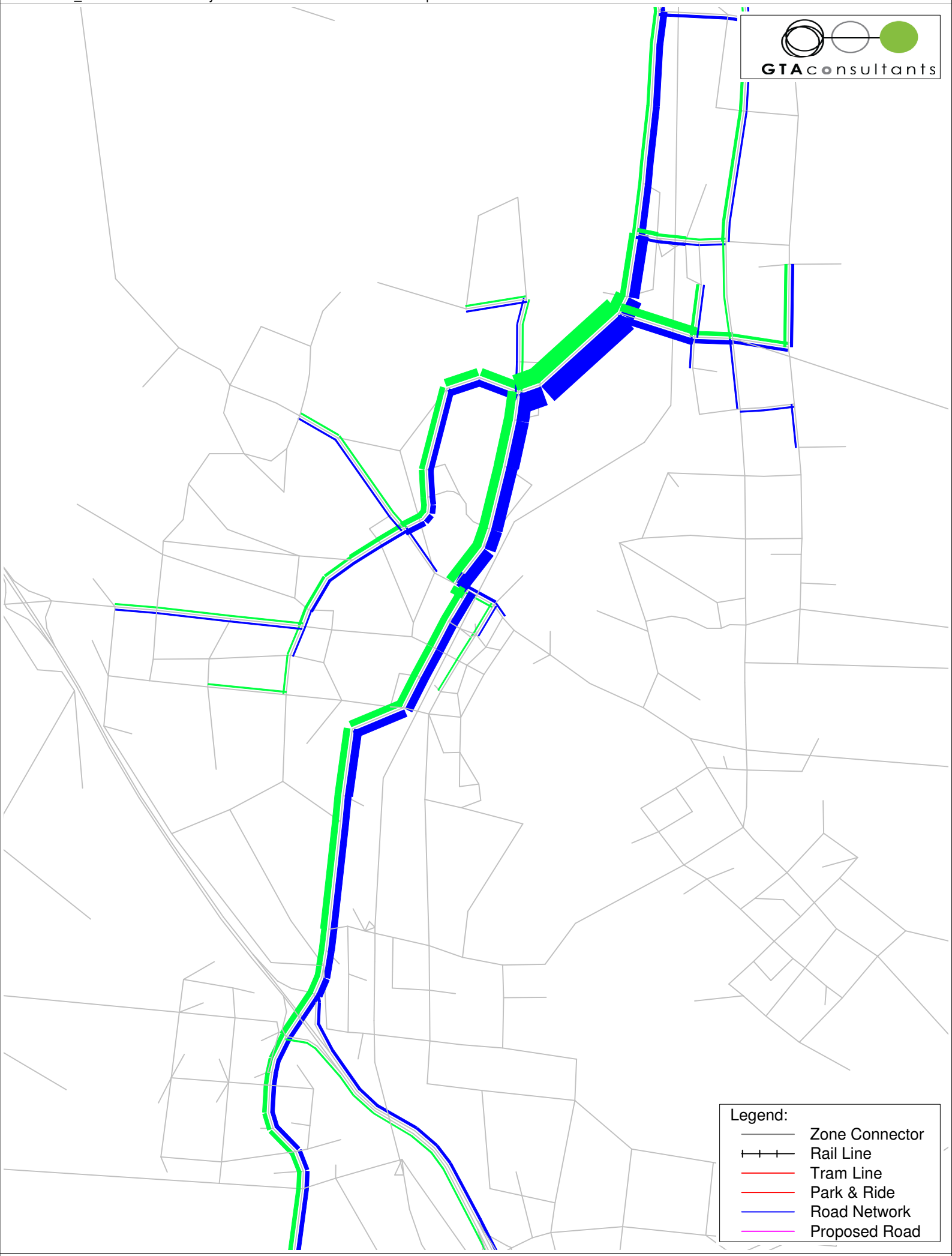
4/08/2015
cube

Victorian Integrated Transport Model (VITM)
150804stm_15M1526000 - Sunbury - 2Hrs AM Peak - SLA- Year 2046 Opt8



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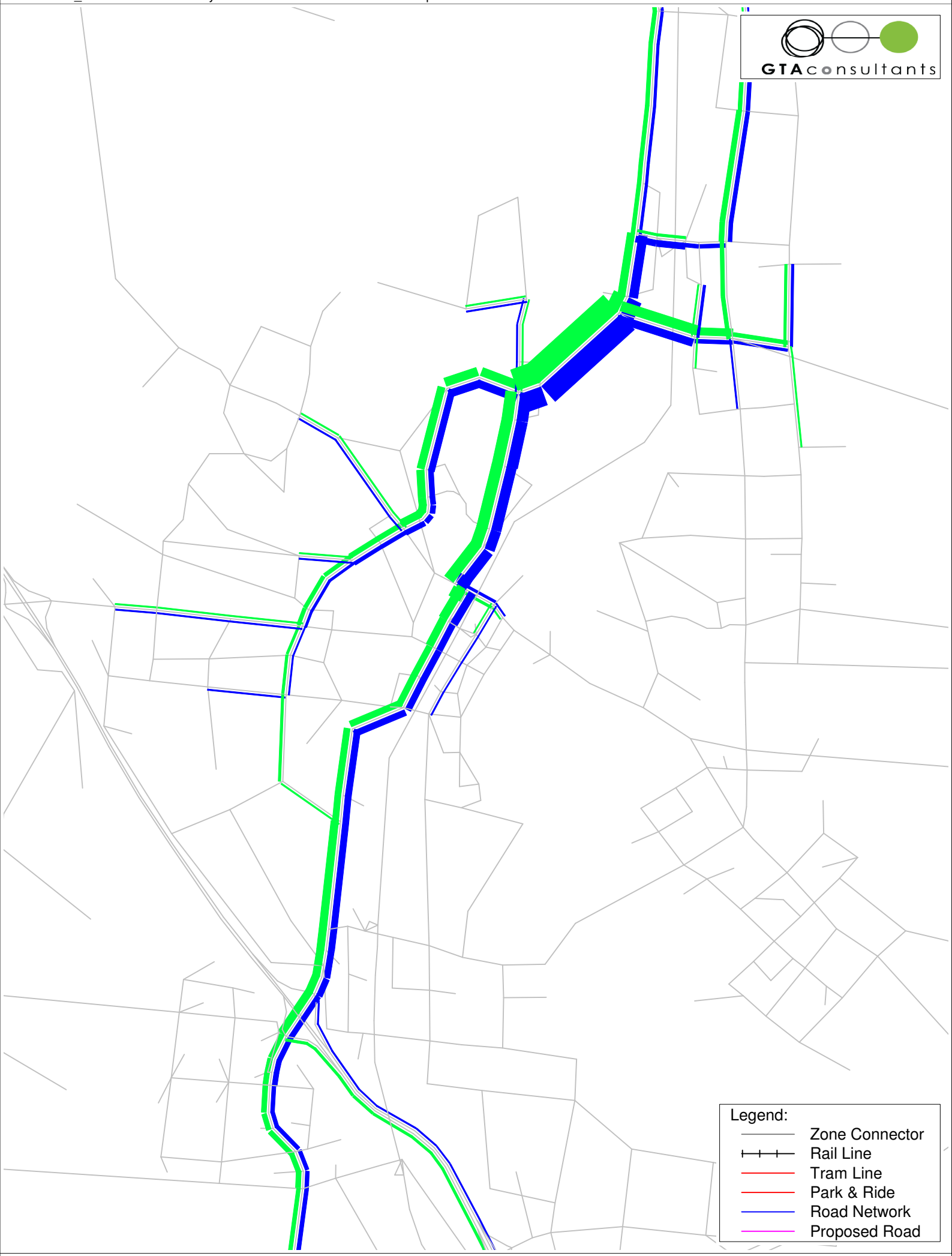
4/08/2015
cube

Victorian Integrated Transport Model (VITM)
150804stm_15M1526000 - Sunbury - 2Hrs PM Peak - SLA- Year 2046 Opt8



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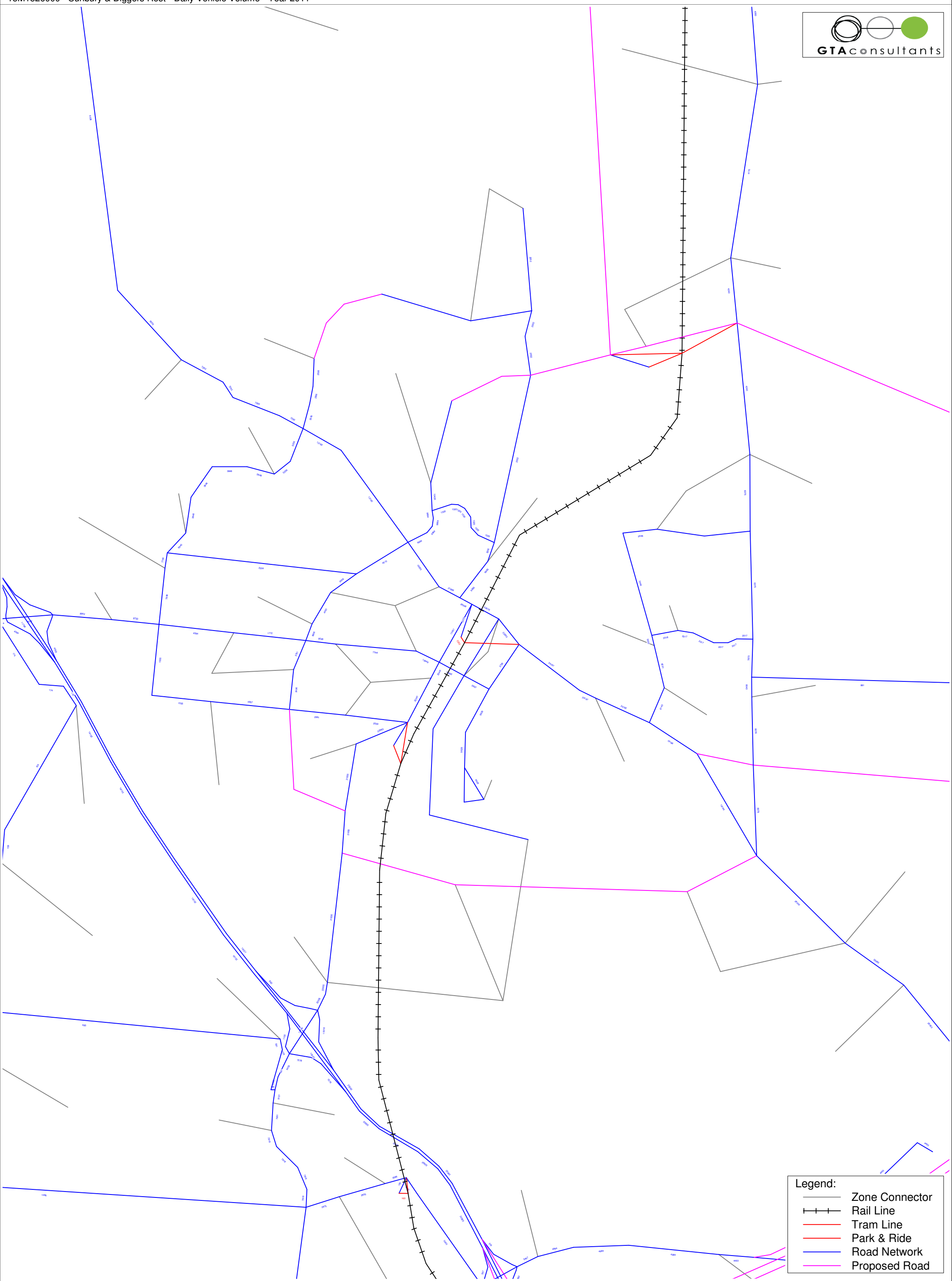
4/08/2015
cube

Appendix E

Existing Base Year (2011), Interim Year (2031) and Ultimate (2046) Base Network Output Plots

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily Vehicle Volume - Year 2011



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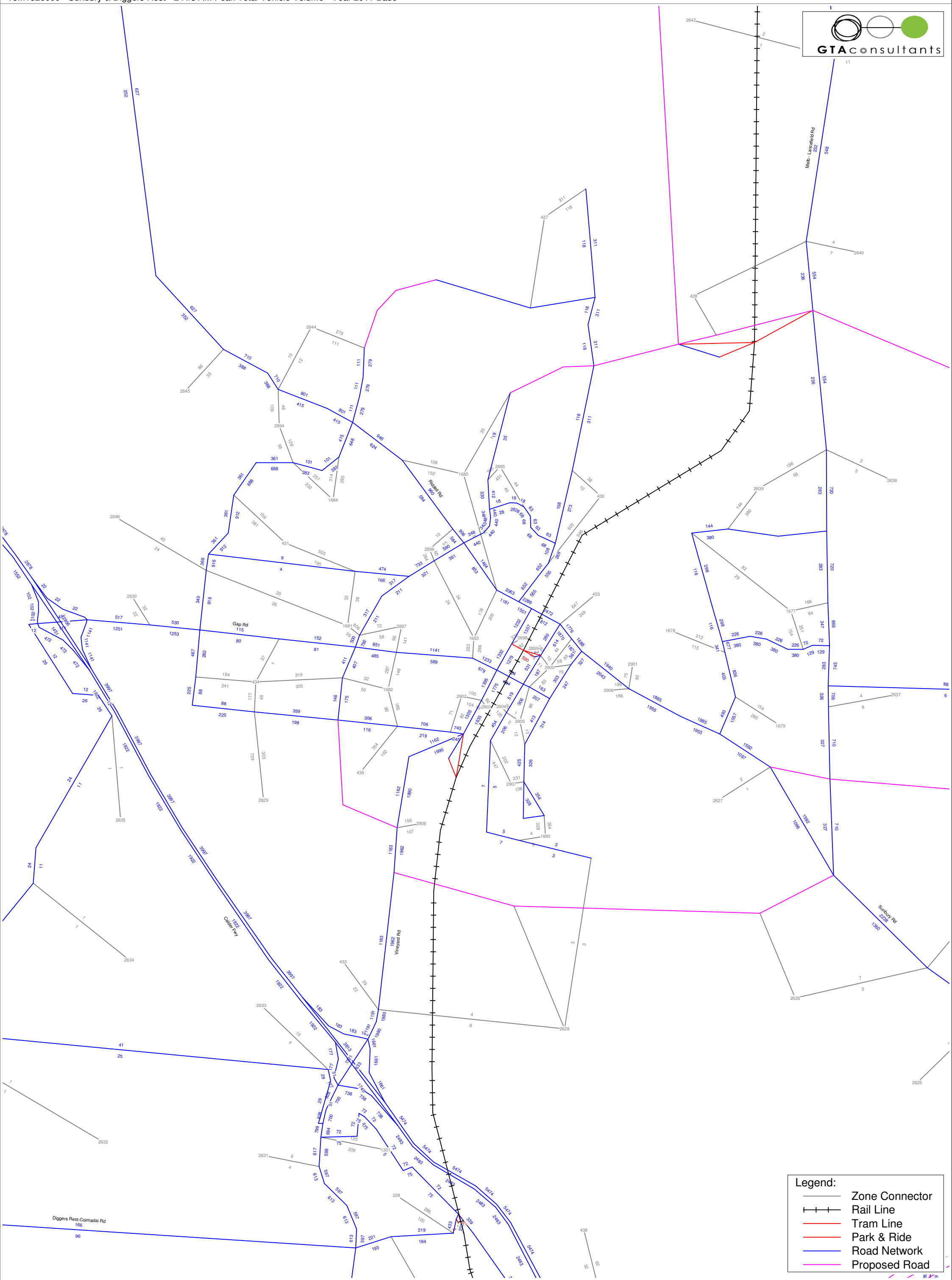
11/09/2015
cube

GTAconsultants

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak Total Vehicle Volume - Year 2011 Base



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23/04/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak DOS - Year 2011 Base

GTAconsultants

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2011\Y2011_V2\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2011.Y2011_V2.NET
1/05/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak Total Vehicle Volume - Year 2011 Base

GTAconsultants

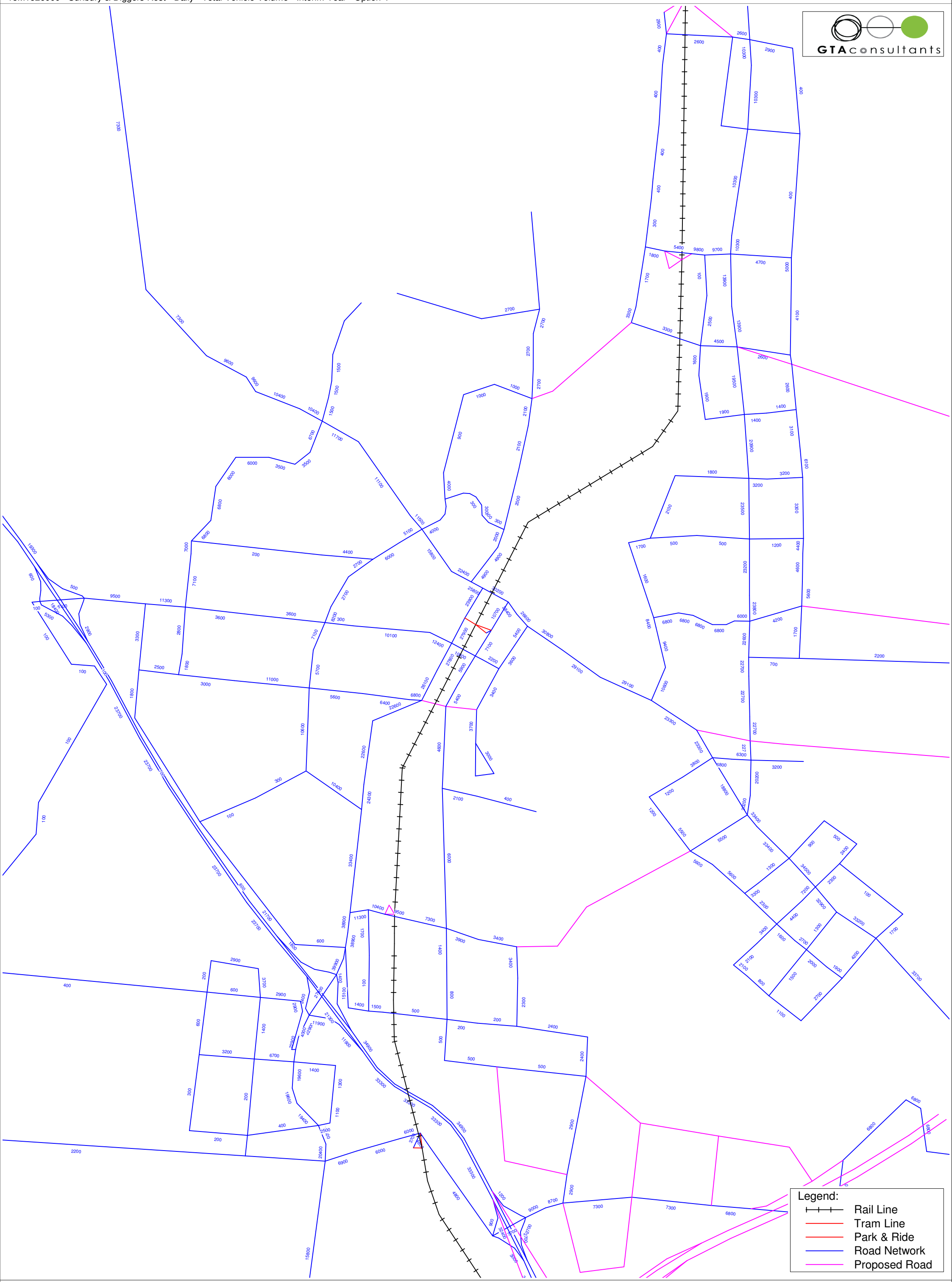
Melb - Lancefield Rd
Gap Rd
Riddell Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2011\Y2011_V2\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2011.Y2011_V2.NET
23/04/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Interim Year - Option 4



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16/07/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Interim Year - Option 4 (Zoomed Out)

GTAconsultants

Gilgs Rd
Gaskill Ave
Watsons Rd
Diggers Rest-Coimadai Rd
Sunbury Rd
Gellibrand Dr
Hume Fwy
Bulmans Rd
Taylors Rd
Clarke Rd
Hume Dr
Bloomfield Rd
Purnells Rd
Clarke Park Dr
Bulmans Rd
Taylors Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2031\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2031.NET
16/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Interim Year - Option 4

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2031\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2031.NET
16/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Interim Year - Option 4 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2031\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2031.NET
16/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Interim Year - Option 4

GTAconsultants

Melb - Lancefield Rd

Rudell Rd

Gap Rd

Vineyard Rd

Calder Fwy

Sunbury Rd

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Interim Year - Option 4 (Zoomed Out)

GTAconsultants

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2031\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2031.NET
16/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Interim Year - Option 4

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Caldar Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2031\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2031.NET
16/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Interim Year - Option 4 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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16/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Interim Year - Option 4

GTAconsultants

Melb - Lancefield Rd
Rudell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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16/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Interim Year - Option 4 (Zoomed Out)

GTAconsultants

Legend:
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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16/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 1 (Zoomed Out)

GTAconsultants

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

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6/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 1

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

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6/07/2015

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 1 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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6/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 1

GTAconsultants

Melb - Lancefield Rd
Ridgell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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6/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 1 (Zoomed Out)

GTAconsultants

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

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6/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 1

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
<0.35
0.35 - 0.50
0.50 - 0.75
0.75 - 0.90
0.90 - 1.00
>1.00
Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.NET
6/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 1 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.NET
6/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 1

GTAconsultants

Gap Rd
Ridgell Rd
1173
Melb - Lancefield Rd
2610
Vineyard Rd
2840
Calder Fwy
7119
Sunbury Rd
5038
Diggers Rest-Coimadai Rd
152

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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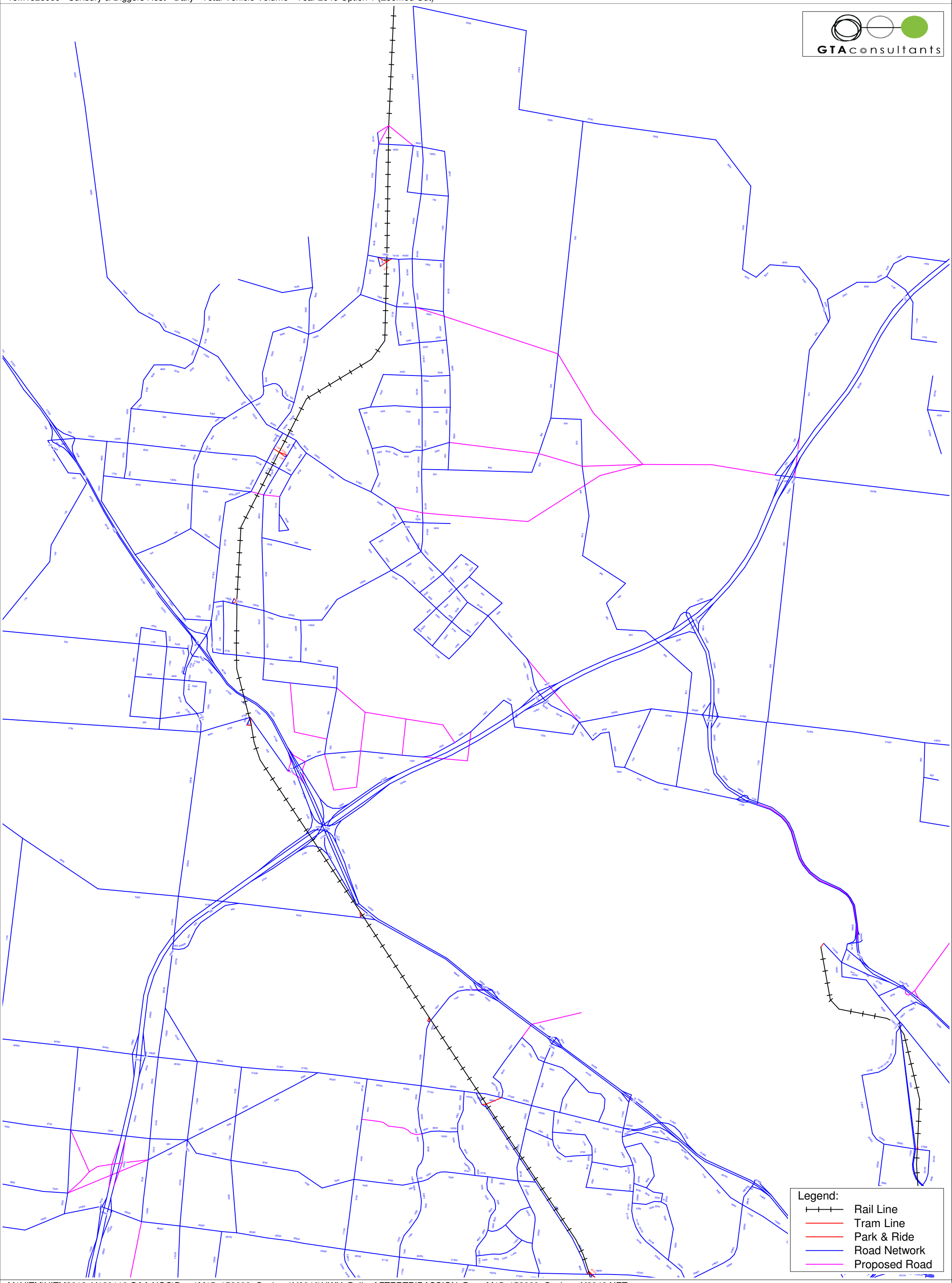
6/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 1 (Zoomed Out)

GTAconsultants



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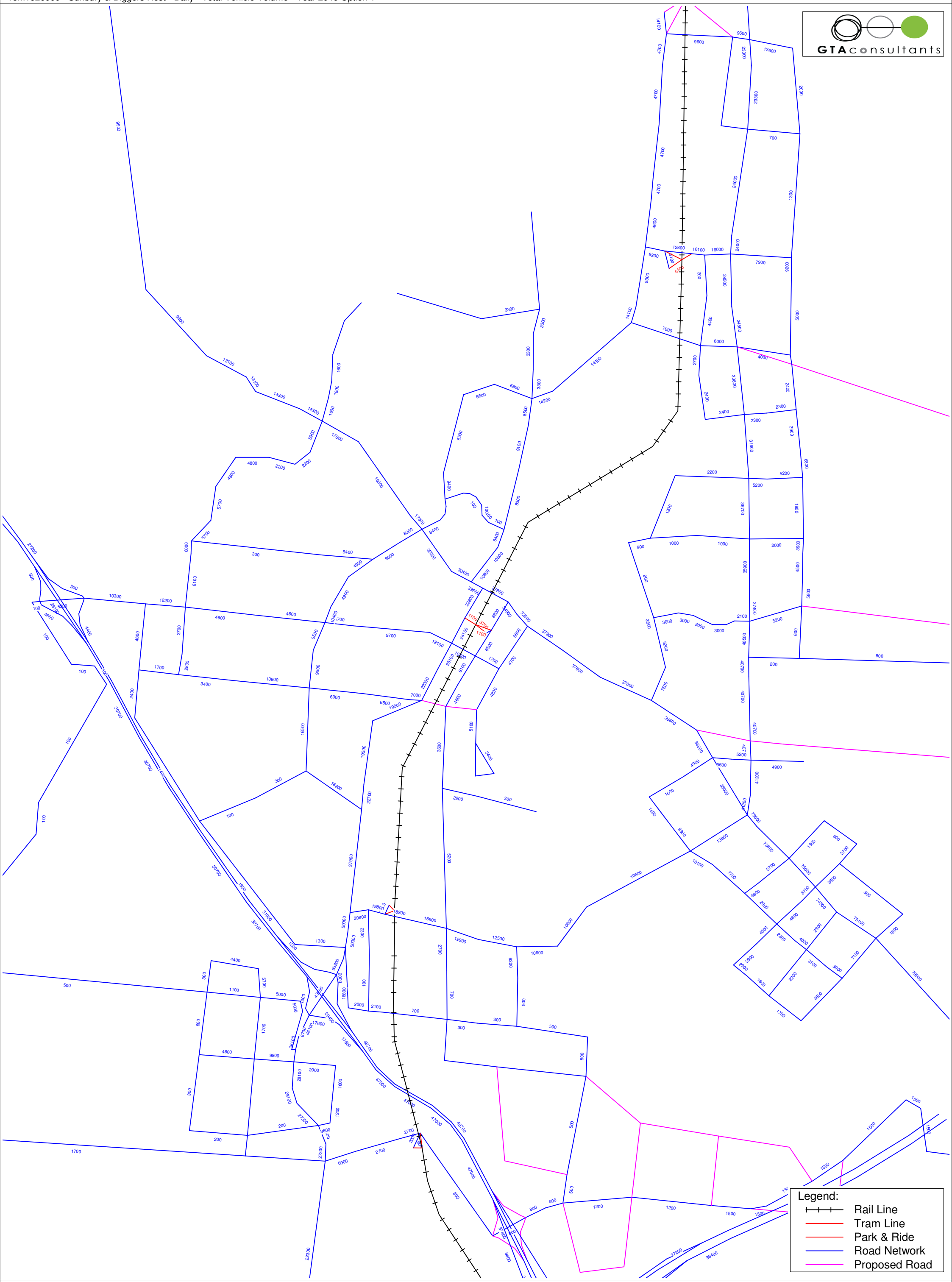
6/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 1



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6/07/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 2 (Zoomed Out)

GTAconsultants

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt2_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt2_2046.NET
3/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 2

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Caldier Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt2_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt2_2046.NET
3/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 2 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt2_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt2_2046.NET
3/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 2

GTAconsultants

Melb - Lancefield Rd

Ridgell Rd

Gap Rd

Gisborne Rd

Vineyard Rd

Calder Fwy

Sunbury Rd

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt2_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt2_2046.NET
3/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 2 (Zoomed Out)

GTAconsultants

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt2_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt2_2046.NET
3/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 2

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
<0.35
0.35 - 0.50
0.50 - 0.75
0.75 - 0.90
0.90 - 1.00
>1.00
Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt2_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt2_2046.NET
3/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 2 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt2_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt2_2046.NET
3/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 2

GTAconsultants

Melb - Lancefield Rd

Gap Rd

Riddell Rd

Vineyard Rd

Calder Fwy

Sunbury Rd

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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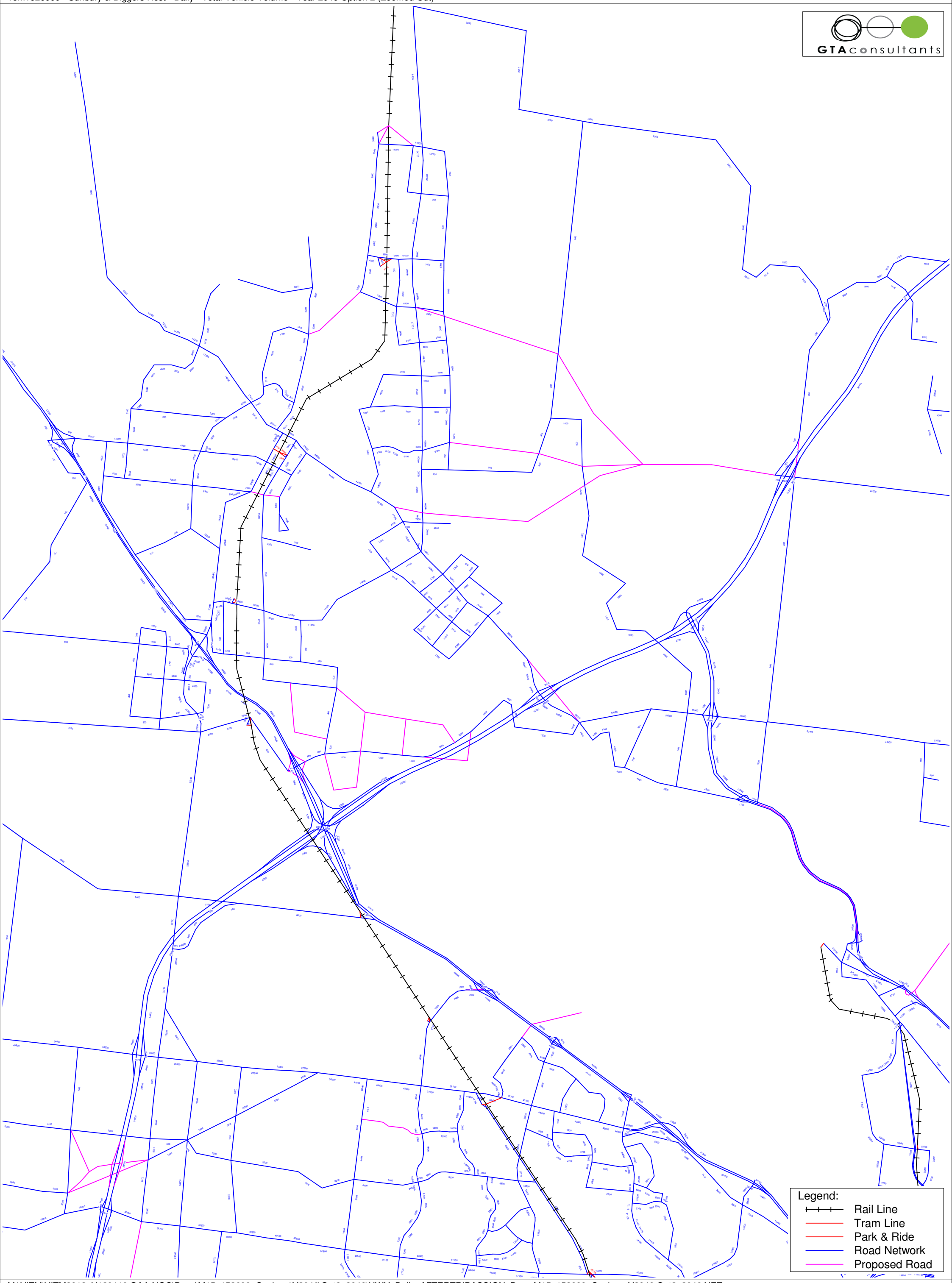
3/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 2 (Zoomed Out)

GTAconsultants



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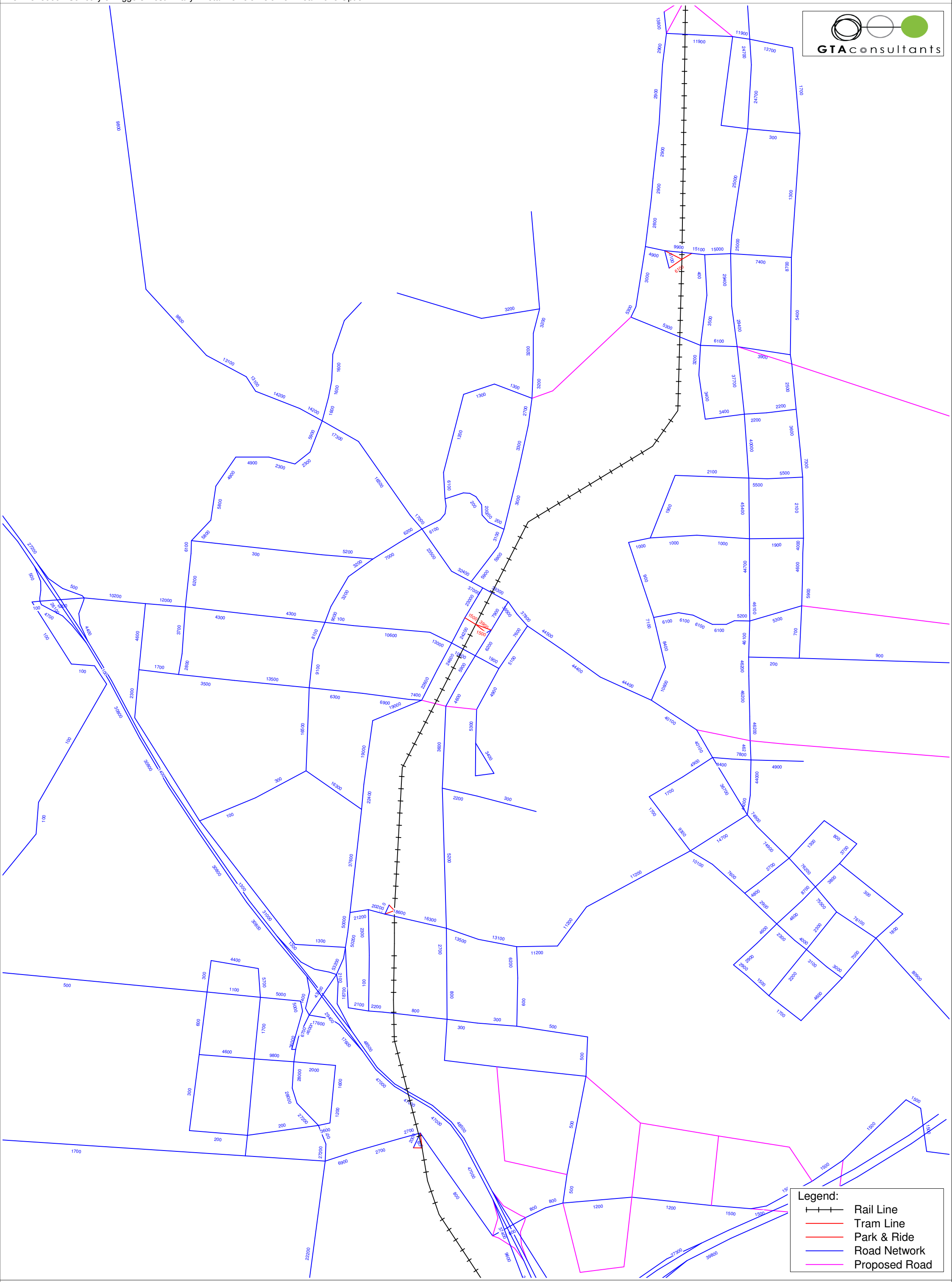
3/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 2



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3/07/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 3 (Zoomed Out)

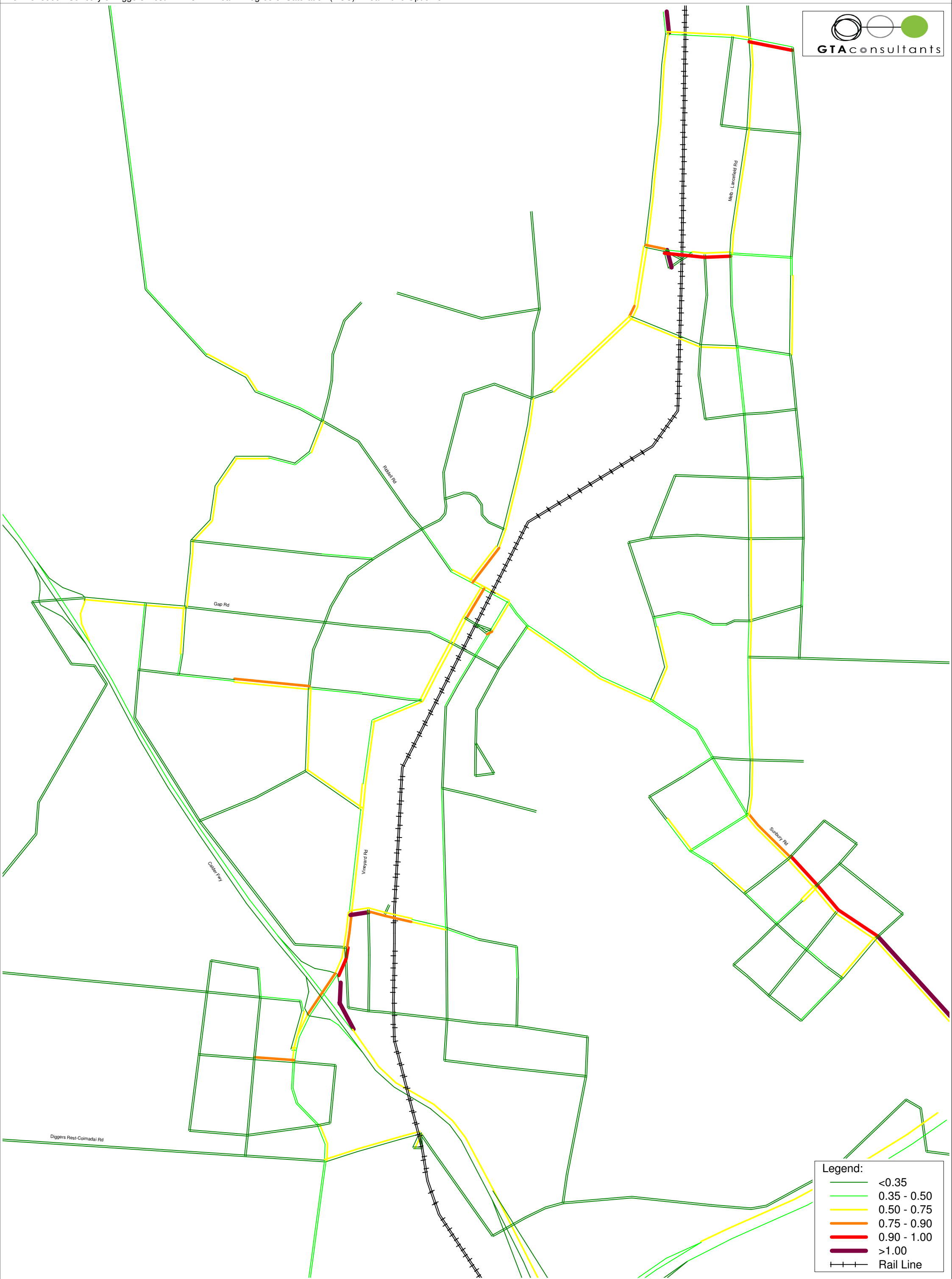
GTAconsultants

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt3_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt3_2046.NET
2/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 3



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2/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 3 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt3_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt3_2046.NET
2/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 3

GTAconsultants

Melb - Lancefield Rd

Ridgell Rd

Gap Rd

Gulder Fwy

Vineyard Rd

Sunbury Rd

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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2/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 3 (Zoomed Out)

GTAconsultants

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt3_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt3_2046.NET
2/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 3

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt3_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt3_2046.NET
2/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 3 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt3_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt3_2046.NET
2/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 3

GTAconsultants

Melb - Lancefield Rd
Gap Rd
Riddell Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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2/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 3 (Zoomed Out)

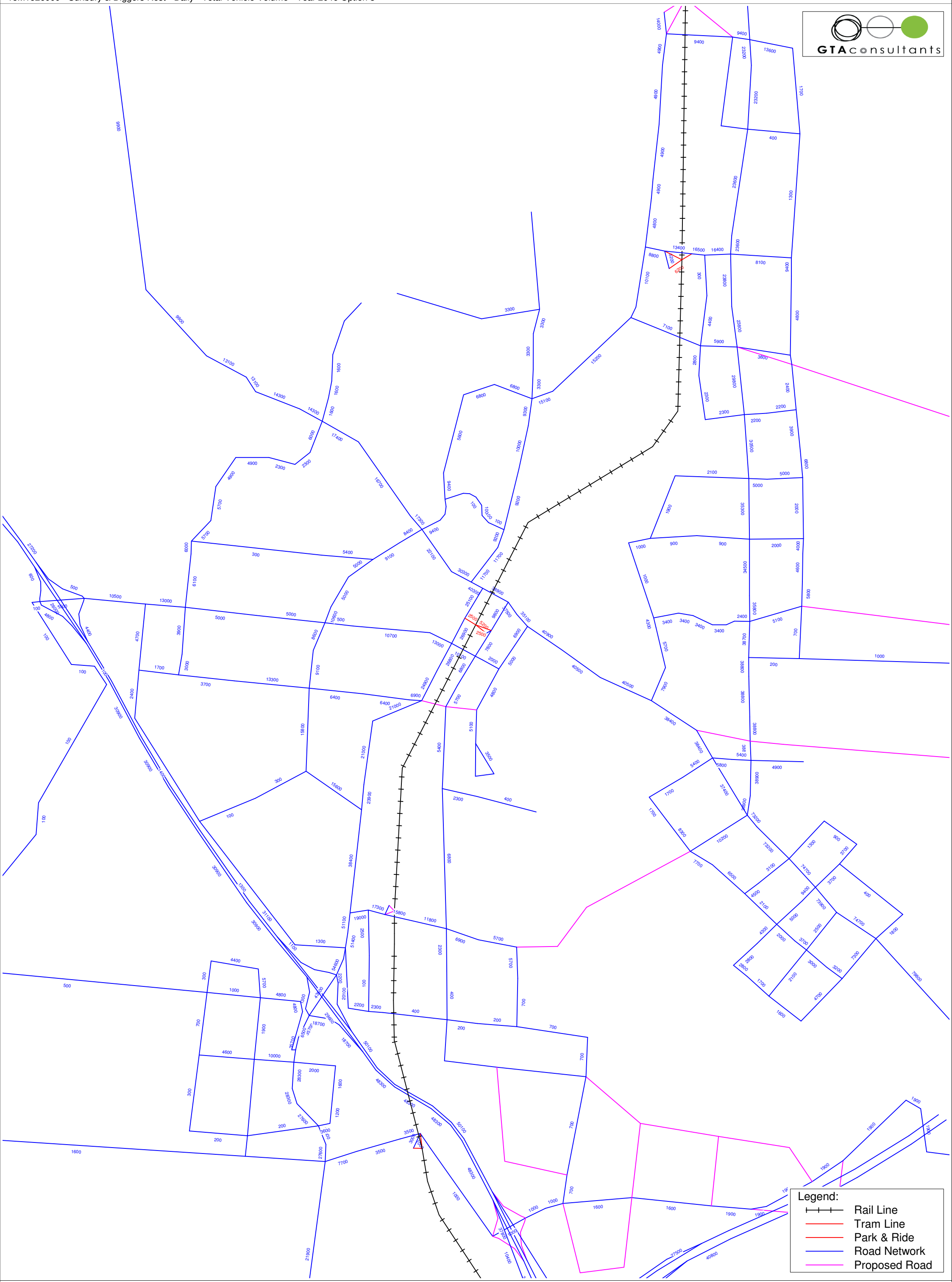
GTAconsultants

Legend:
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt3_2046\HWY_Daily_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt3_2046.NET
2/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 3



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2/07/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 4

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt4_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt4_2046.NET
24/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 4 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt4_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt4_2046.NET
25/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 4

GTAconsultants

Melb - Lancefield Rd

Gap Rd

Riddell Rd

Vineyard Rd

Calder Fwy

Sunbury Rd

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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24/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 4 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt4_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt4_2046.NET
25/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 4

GTAconsultants

Melb - Lancefield Rd

Gap Rd

Riddell Rd

Vineyard Rd

Calder Fwy

Sunbury Rd

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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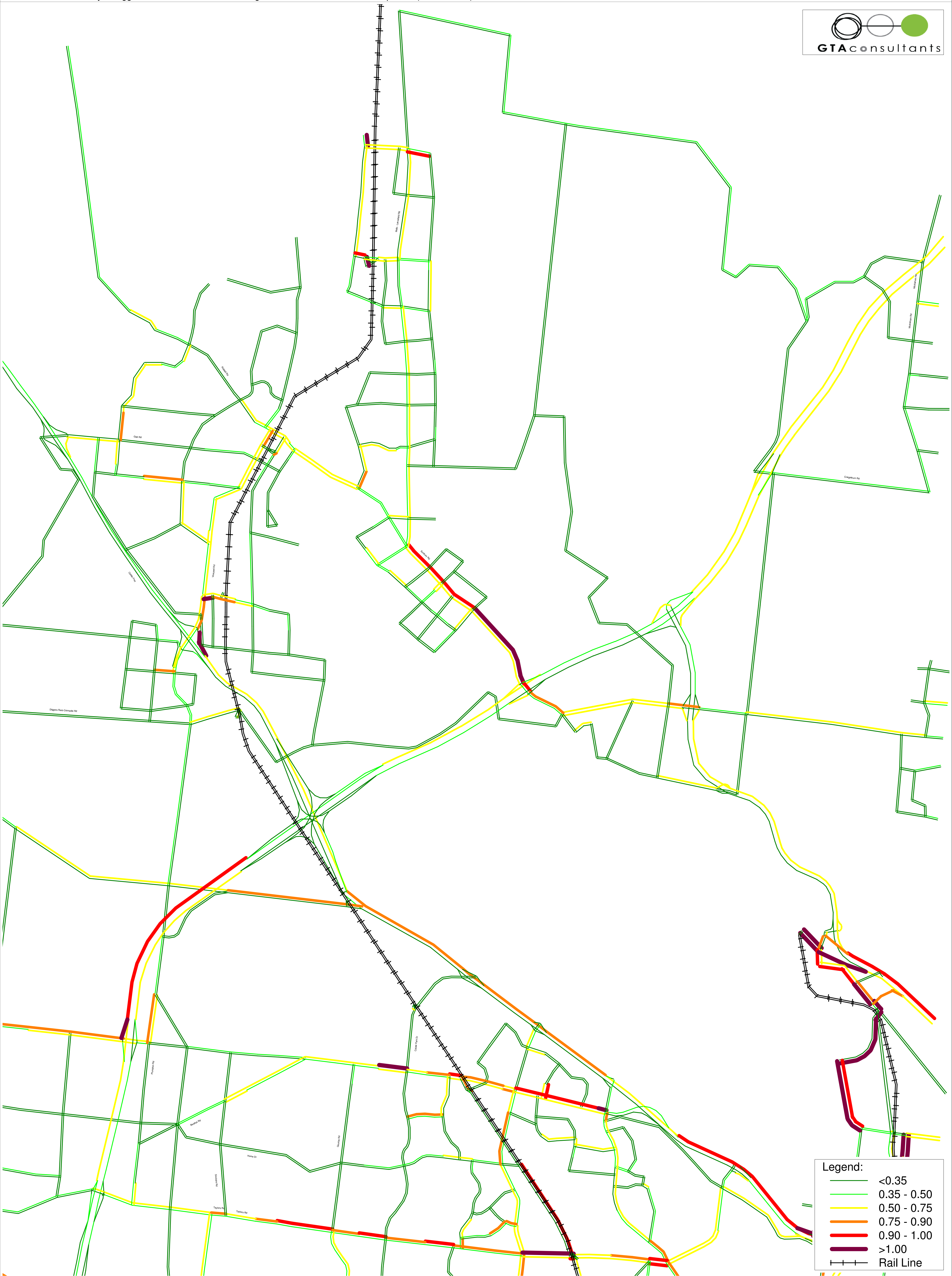
25/06/2015

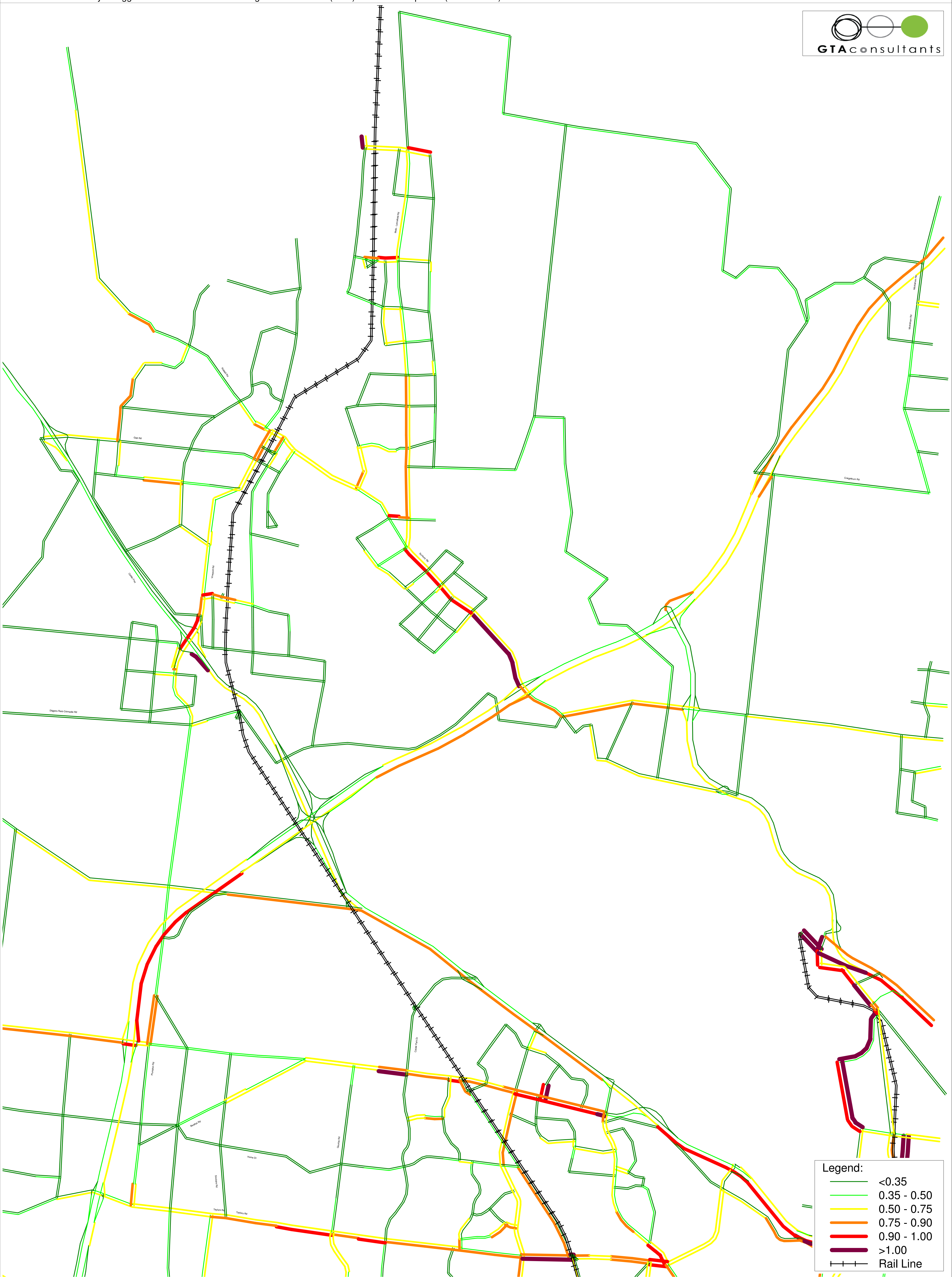
cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation - Year 2046 Option 4 (Zoomed Out)


GTAconsultants
Melb - Lancefield Rd
Riddell Rd
Gap Rd
Vineyard Rd
Calder Fwy
Sunbury Rd
Diggers Rest-Coimadai Rd
Mickleham Rd
Craigieburn Rd
Plumpton Rd
Beattys Rd
Hume Dr
Sinclairs Rd
Gourlay Rd
Calder Park Dr
Taylors Rd
Legend:
<0.35
0.35 - 0.50
0.50 - 0.75
0.75 - 0.90
0.90 - 1.00
>1.00
Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt4_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt4_2046.NET
25/06/2015
cube

15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 4 (Zoomed Out)



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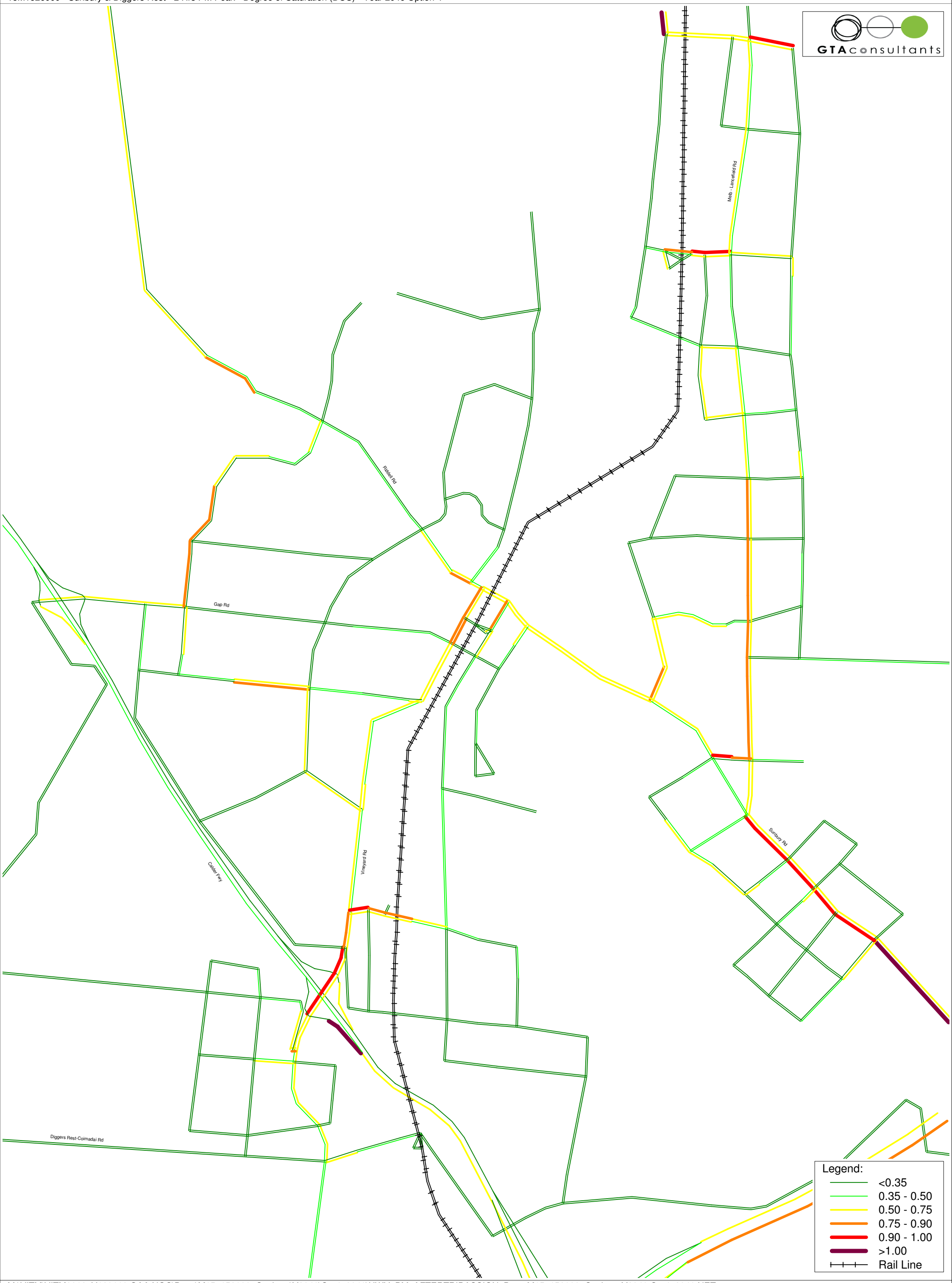
25/06/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 4



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25/06/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 4 (Zoomed Out)

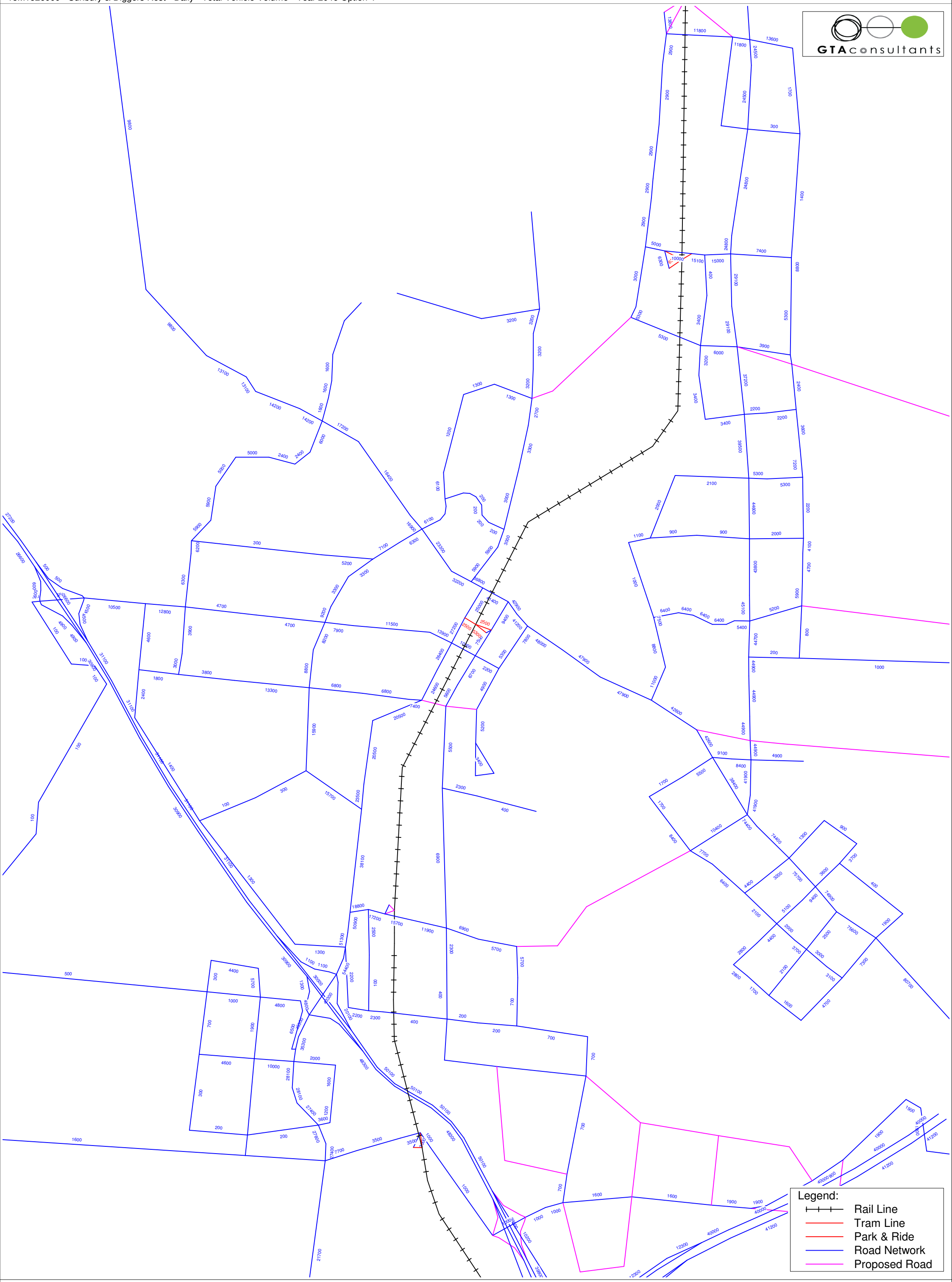
GTAconsultants

Legend:
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt4_2046\HWY_Daily_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt4_2046.NET
26/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 4



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26/06/2015

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 5 (Zoomed Out)

GTAconsultants

Gisp Rd
Watsons Rd
Vineyard Rd
Calder Park
Sunbury Rd
Diggers Rest-Coimadai Rd
Creightons Rd
Bulmans Rd
Hume Dr
Taylors Rd
Calder Park Dr

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt5_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt5_2046.NET
26/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 5

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
<0.35
0.35 - 0.50
0.50 - 0.75
0.75 - 0.90
0.90 - 1.00
>1.00
Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt5_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt5_2046.NET
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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 5 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt5_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt5_2046.NET
26/06/2015

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 5

GTAconsultants

Melb - Lancefield Rd
Rudell Rd
Gap Rd
Gisborne Rd
Vineyard Rd
Calder Fwy
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt5_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt5_2046.NET
26/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturarion (DOS) - Year 2046 Option 5 (Zoomed Out)

GTAconsultants

Gilbs Rd
Calder Park Dr
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd
Creightons Rd
Plumpton Rd
Bleazby Rd
Hume Dr
Sharpes Rd
Tiefora Rd
Tilfords Rd
Gourlay Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt5_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt5_2046.NET
26/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturarion (DOS) - Year 2046 Option 5

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt5_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt5_2046.NET
26/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 5 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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26/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 5

GTAconsultants

Melb - Lancefield Rd

Riddell Rd

Gap Rd

Vineyard Rd

Sunbury Rd

Calder Fwy

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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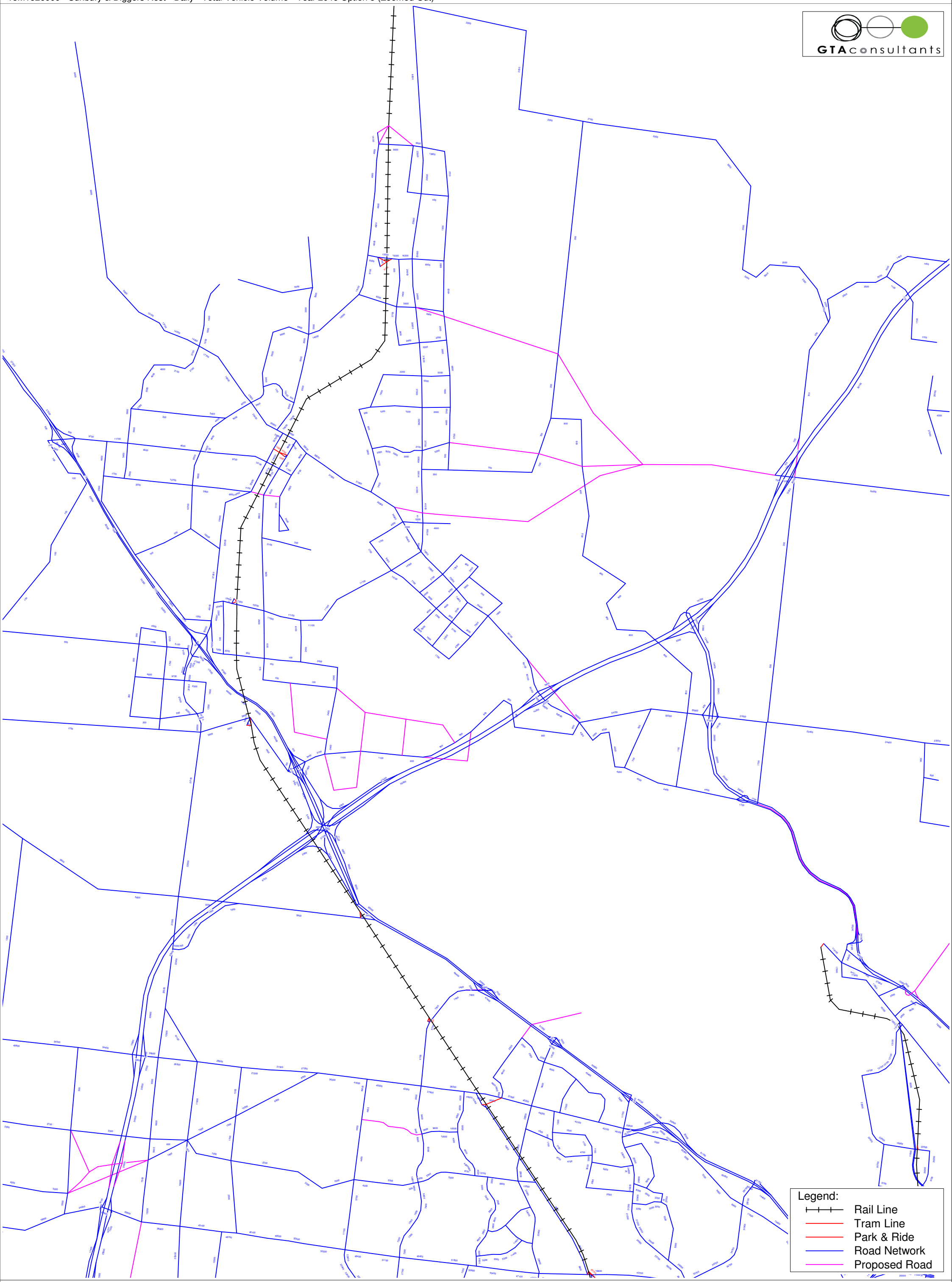
26/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 5 (Zoomed Out)



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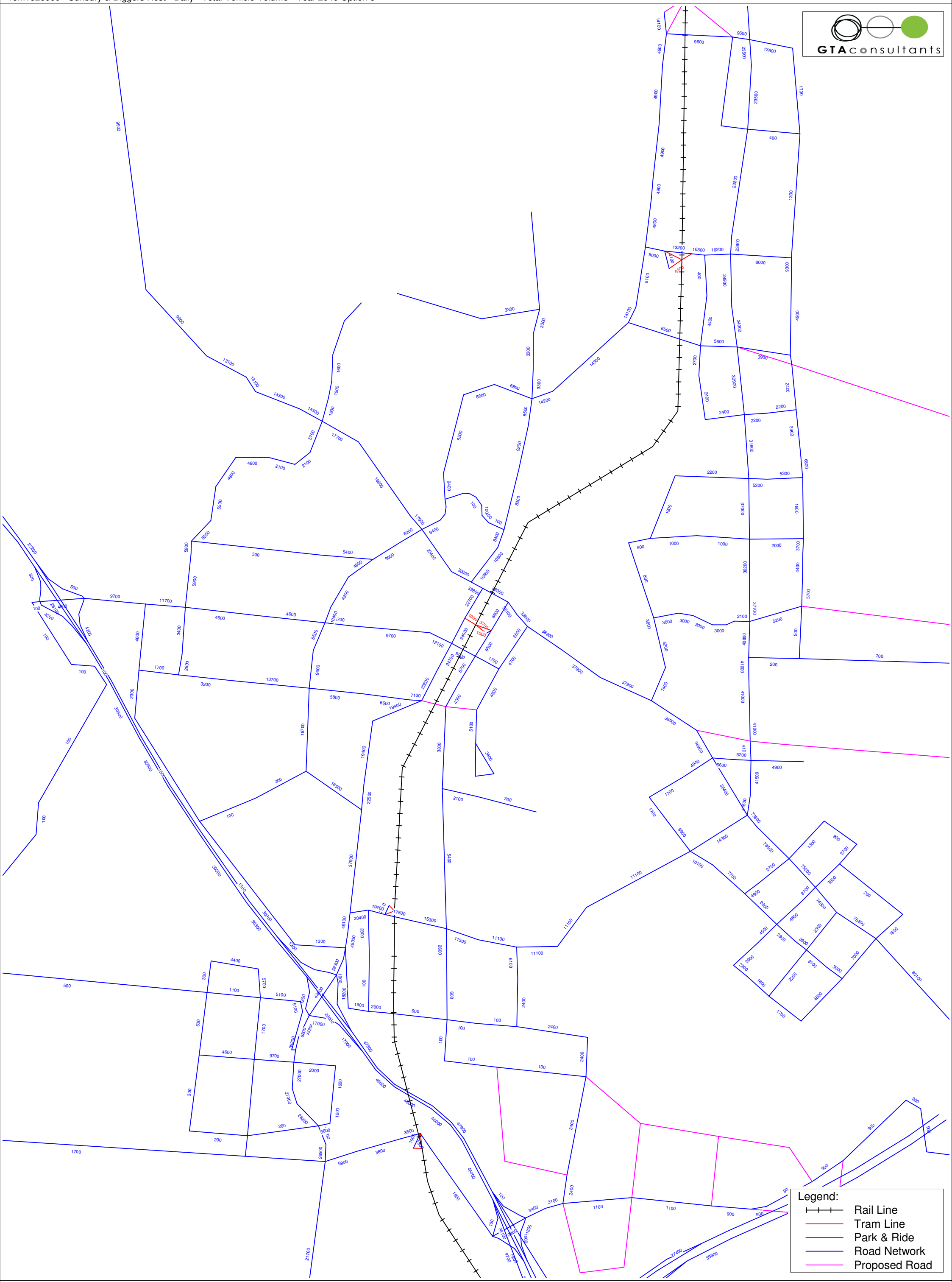
26/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 5



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26/06/2015

Victorian Integrated Transport Model (VITM)

15M1526000 - Sunbury & Diggers Rest - Daily Total Vehicle Volume Difference- Year 2046 Option 4 Vs Option 5

GTAconsultants

Legend:

Difference >0

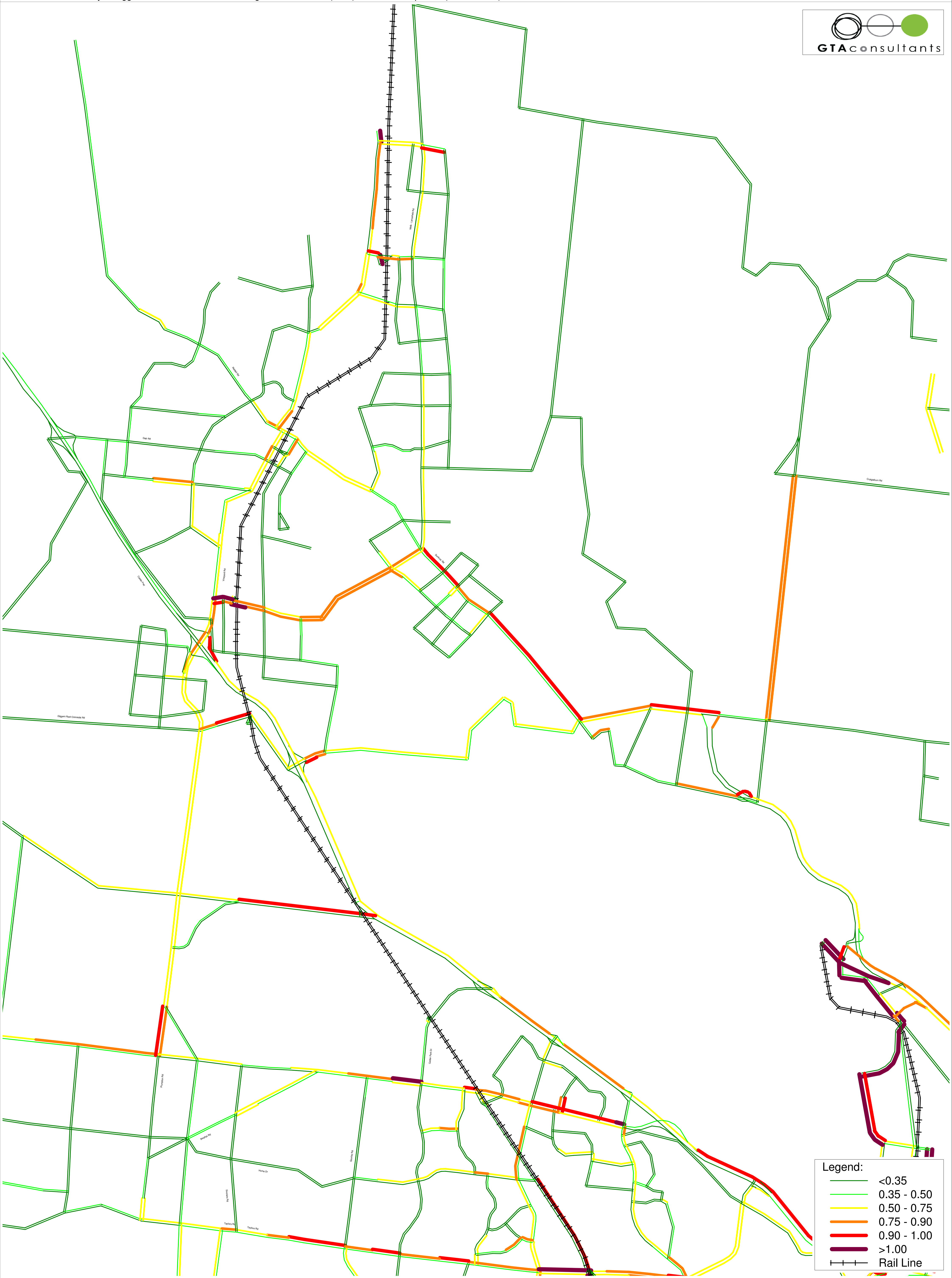
Difference < 0

M:\VITM\VITM2012_V120110 GAA NGC\BASE\M15_152600- SUNBURY\Y2046\OPT5_2046\COMPARE_2046OPT4_VS_2046OPT5_DAILY.NET

2/07/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 6 (Zoomed Out)



GTAconsultants
Riddell Rd
Melb - Lancefield Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Craigieburn Rd
Diggers Rest-Coimadai Rd
Calder Park Dr
Plumpton Rd
Beattys Rd
Hume Dr
Gourlay Rd
Sinclairs Rd
Taylors Rd
Taylors Rd
Legend:
<0.35
0.35 - 0.50
0.50 - 0.75
0.75 - 0.90
0.90 - 1.00
>1.00
Rail Line

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 6

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt6_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt6_2046.NET
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cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 6 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 6

GTAconsultants

Melb - Lancefield Rd

Gap Rd

Riddell Rd

Gisborne Rd

Vineyard Rd

Calder Fwy

Sunbury Rd

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 6 (Zoomed Out)

GTAconsultants

Gisp Rd
Calder Park
Watsons Rd
Sunbury Rd
Diggers Rest-Coimadai Rd
Creightons Rd
Plumpton Rd
Bulmans Rd
Hume Dr
Sharpes Rd
Tilleys Rd
Tilleys Rd
Calder Park Dr
Gisp Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt6_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt6_2046.NET
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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 6

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 6 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 6

GTAconsultants

Melb - Lancefield Rd

Gap Rd

Riddell Rd

Calder Fwy

Vineyard Rd

Sunbury Rd

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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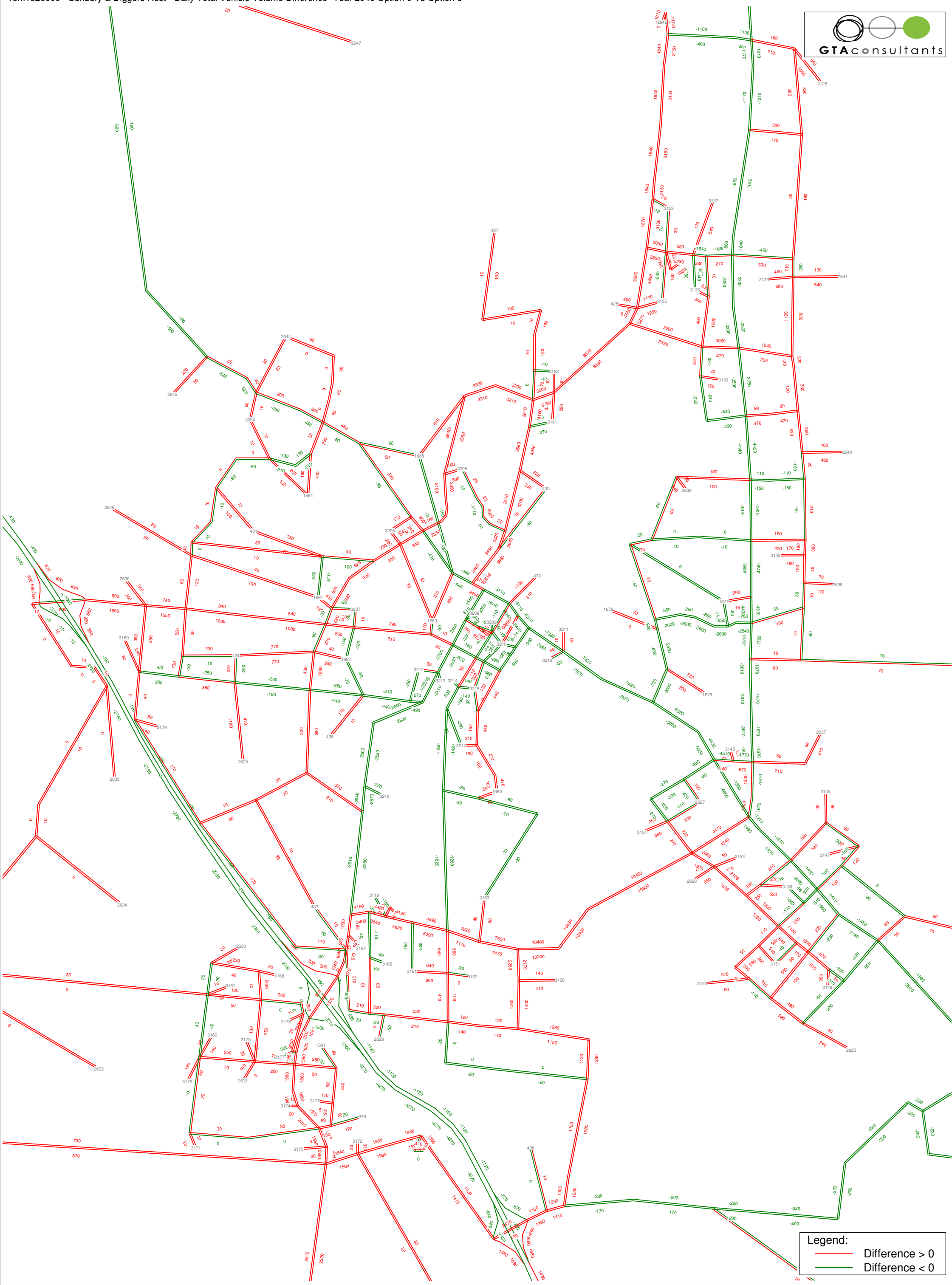
Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily Total Vehicle Volume Difference- Year 2046 Option 9 Vs Option 6



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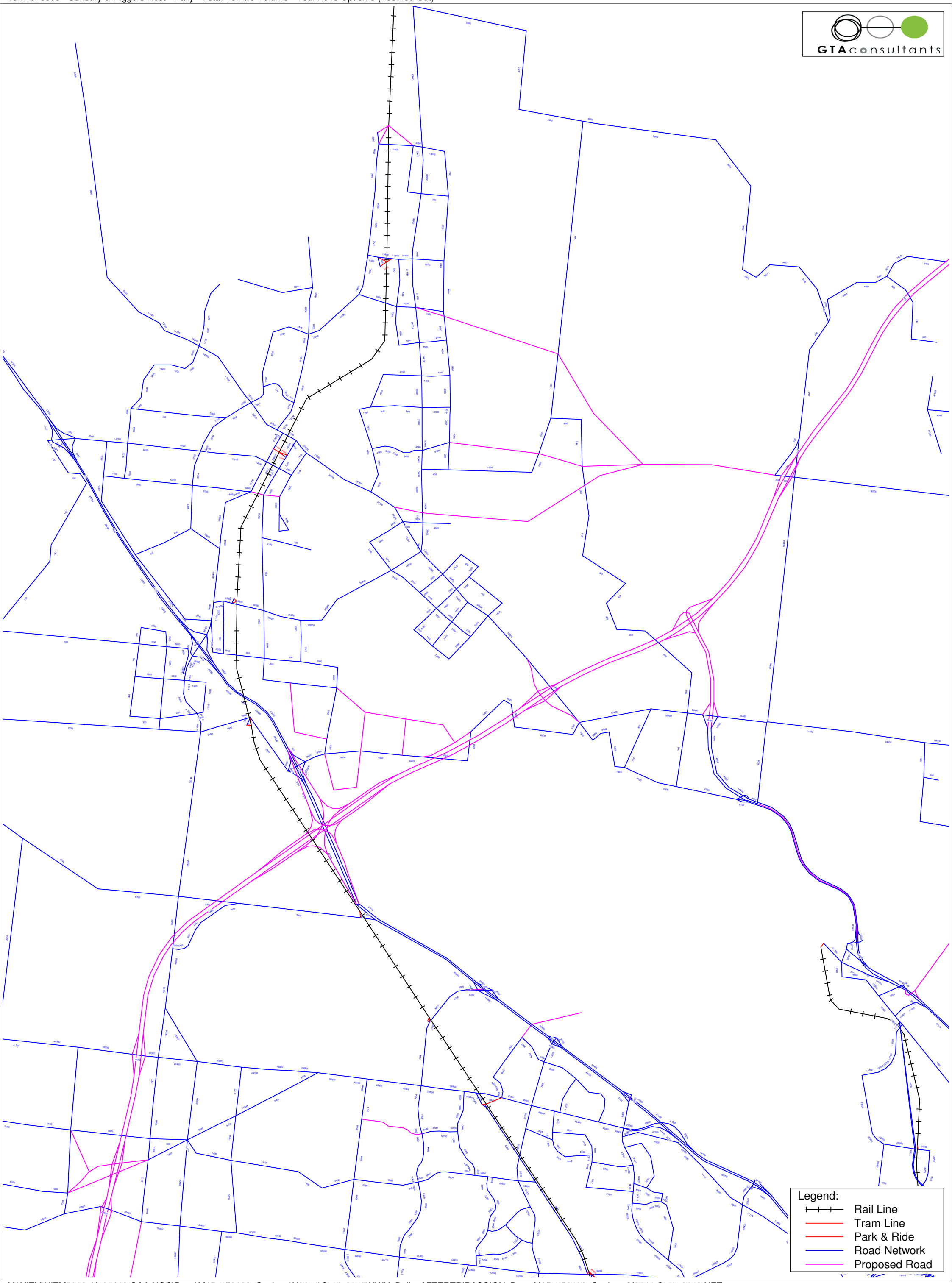
Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 6 (Zoomed Out)



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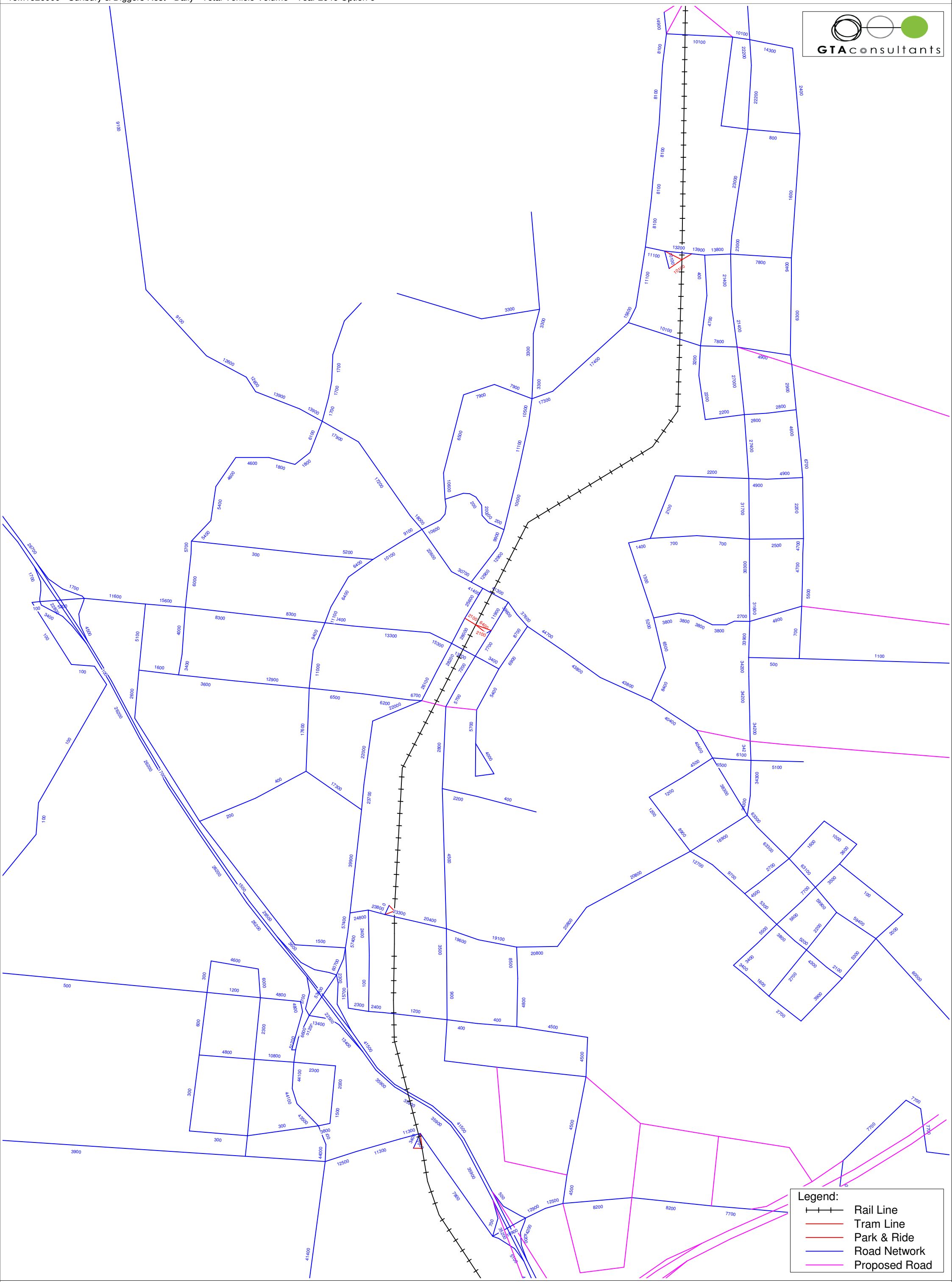
Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 6



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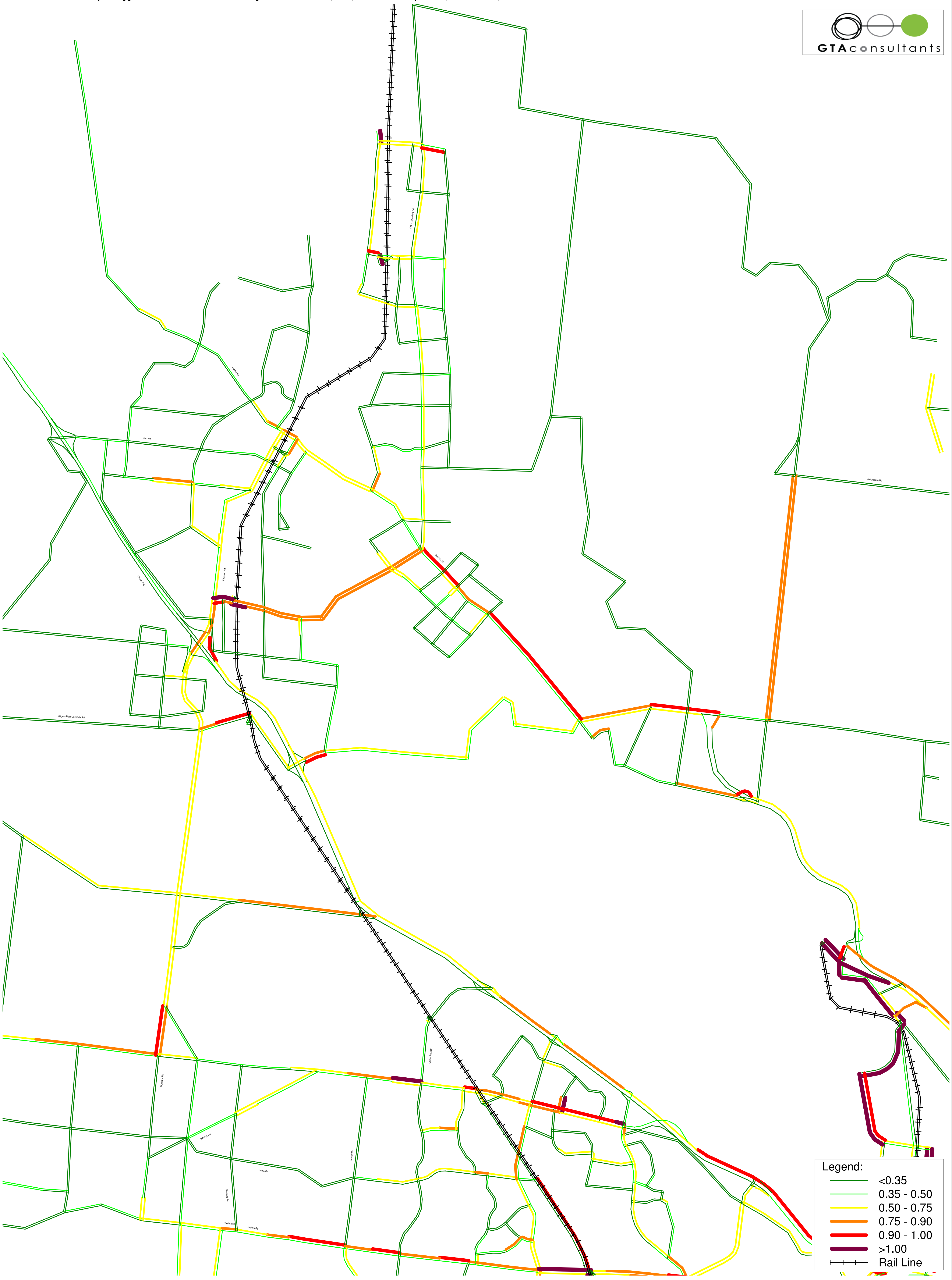
Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 7 (Zoomed Out)


GTAconsultants
Melb - Lancefield Rd
Riddell Rd
Gap Rd
Craigieburn Rd
Vineyard Rd
Calder Fwy
Sunbury Rd
Diggers Rest-Coimadai Rd
Plumpton Rd
Calder Park Dr
Beattys Rd
Hume Dr
Gourlay Rd
Sinclairs Rd
Taylors Rd
Taylors Rd
Legend:
<0.35
0.35 - 0.50
0.50 - 0.75
0.75 - 0.90
0.90 - 1.00
>1.00
Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt7_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt7_2046.NET
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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 7

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 7 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 7

GTAconsultants

Melb - Lancefield Rd
Ridgell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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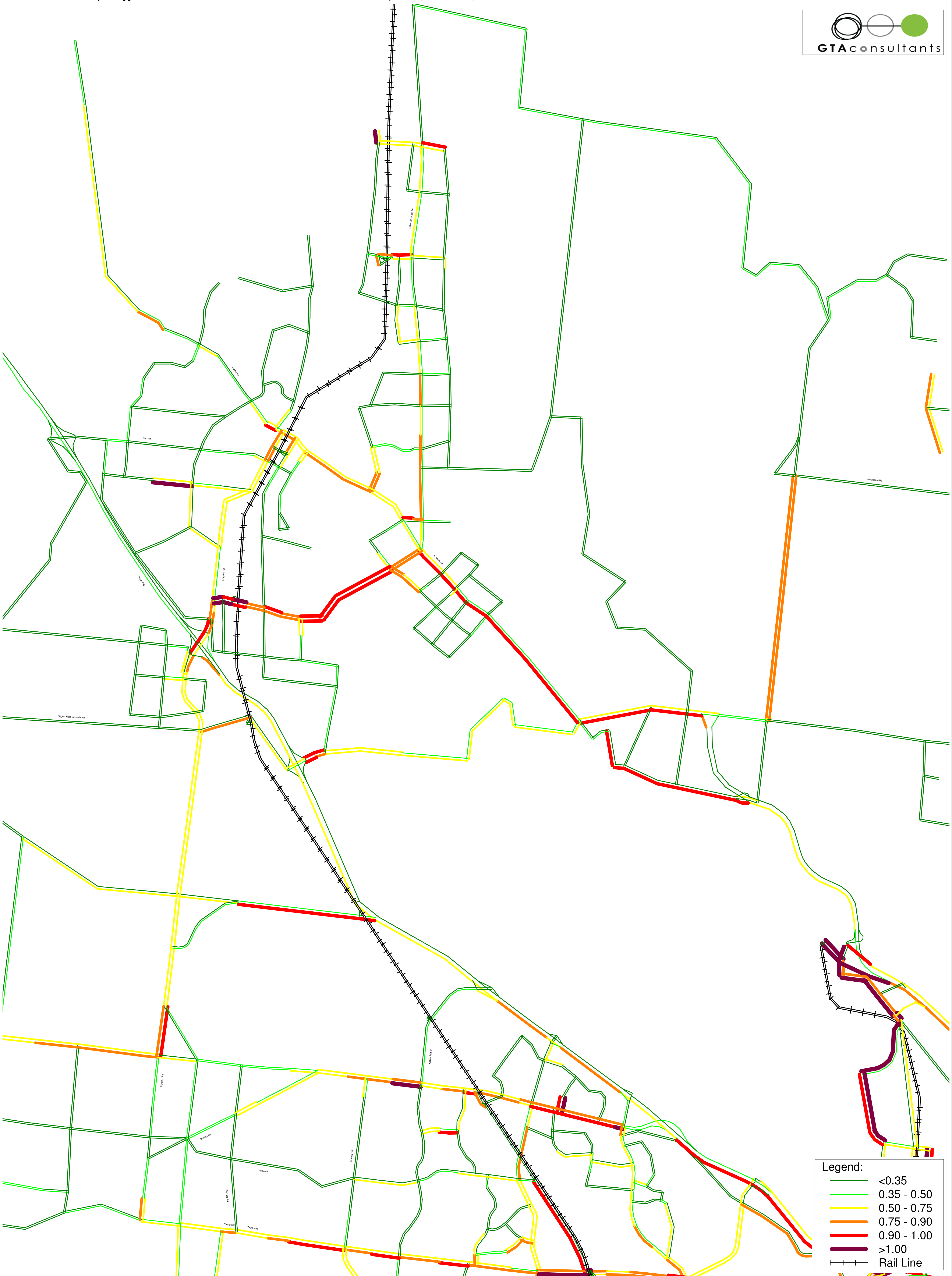
Victorian Integrated Transport Model (VITM)

15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 7 (Zoomed Out)



GTAconsultants
Melb - Lancefield Rd
Riddell Rd
Gap Rd
Craigieburn Rd
Vineyard Rd
Calder Fwy
Sunbury Rd
Diggers Rest-Coimadai Rd
Plumpton Rd
Calder Park Dr
Beattys Rd
Hume Dr
Sinclairs Rd
Gourlay Rd
Taylors Rd
Taylors Rd
Legend:
<0.35
0.35 - 0.50
0.50 - 0.75
0.75 - 0.90
0.90 - 1.00
>1.00
Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt7_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt7_2046.NET

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 7

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt7_2046\HWY_PM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt7_2046.NET
29/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 7 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 7

GTAconsultants

Melb - Lancefield Rd

Gap Rd

Riddell Rd

Vineyard Rd

Calder Fwy

Sunbury Rd

Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 7 (Zoomed Out)

GTAconsultants

Legend:
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt7_2046\HWY_Daily_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt7_2046.NET
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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 7

GTAconsultants

Legend:
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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1/07/2015

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 9 (Zoomed Out)

GTAconsultants

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Degree of Saturation (DOS) - Year 2046 Option 9

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- <0.35
- 0.35 - 0.50
- 0.50 - 0.75
- 0.75 - 0.90
- 0.90 - 1.00
- >1.00
- Rail Line

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 9

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt9_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt9_2046.NET
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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs AM Peak - Total Vehicle Volume - Year 2046 Option 9

GTAconsultants

Melb - Lancefield Rd

Ridgell Rd

Gap Rd

Calder Fwy

Vineyard Rd

Sunbury Rd

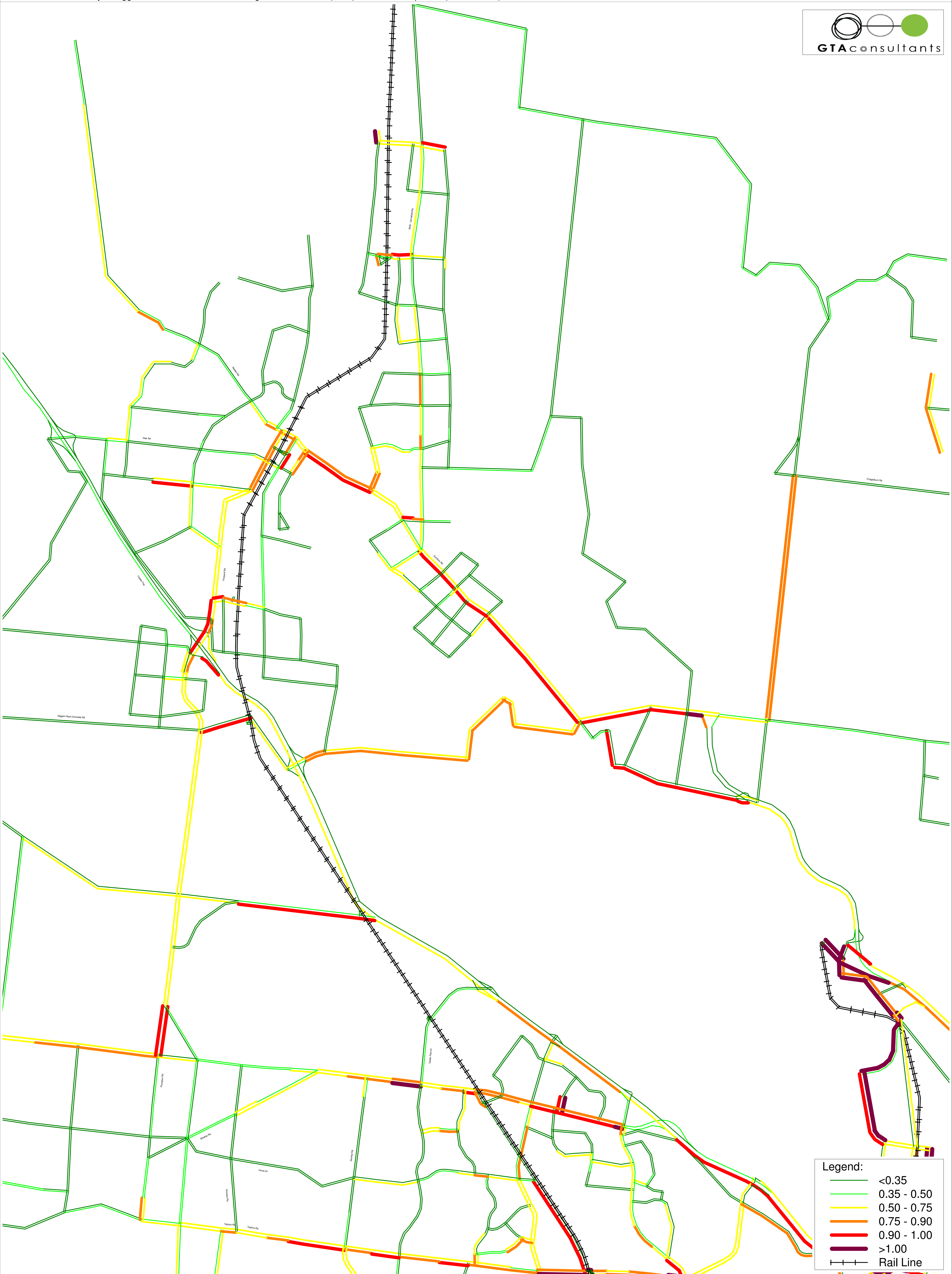
Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt9_2046\HWY_AM_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt9_2046.NET
30/06/2015

cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 9 (Zoomed Out)


GTAconsultants
Melb - Lancefield Rd
Riddell Rd
Gap Rd
Vineyard Rd
Calder Fwy
Sunbury Rd
Craigieburn Rd
Diggers Rest-Coimadai Rd
Plumpton Rd
Calder Park Dr
Beattys Rd
Hume Dr
Gourlay Rd
Sinclairs Rd
Taylors Rd
Taylors Rd
Legend:
<0.35
0.35 - 0.50
0.50 - 0.75
0.75 - 0.90
0.90 - 1.00
>1.00
Rail Line

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30/06/2015
cube

Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Degree of Saturation (DOS) - Year 2046 Option 9

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
<0.35
0.35 - 0.50
0.50 - 0.75
0.75 - 0.90
0.90 - 1.00
>1.00
Rail Line

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 9 (Zoomed Out)

GTAconsultants

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - 2 Hrs PM Peak - Total Vehicle Volume - Year 2046 Option 9

GTAconsultants

Melb - Lancefield Rd
Riddell Rd
Gap Rd
Calder Fwy
Vineyard Rd
Sunbury Rd
Diggers Rest-Coimadai Rd

Legend:
- Zone Connector
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 9 (Zoomed Out)

GTAconsultants

Legend:
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

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Victorian Integrated Transport Model (VITM)
15M1526000 - Sunbury & Diggers Rest - Daily - Total Vehicle Volume - Year 2046 Option 9

GTAconsultants

Legend:
- Rail Line
- Tram Line
- Park & Ride
- Road Network
- Proposed Road

M:\VITM\VITM2012_V120110 GAA NGC\Base\M15_152600- Sunbury\Y2046\Opt9_2046\HWY_Daily_AFTERTRIPASSIGN_Base.M15_152600- Sunbury.Y2046.Opt9_2046.NET
1/07/2015

cube

Melbourne

A Level 25, 55 Collins Street
PO Box 24055
MELBOURNE VIC 3000
P +613 9851 9600
E melbourne@gta.com.au

Brisbane

A Level 4, 283 Elizabeth Street
BRISBANE QLD 4000
GPO Box 115
BRISBANE QLD 4001
P +617 3113 5000
E brisbane@gta.com.au

Adelaide

A Suite 4, Level 1, 136 The Parade
PO Box 3421
NORWOOD SA 5067
P +618 8334 3600
E adelaide@gta.com.au

Townsville

A Level 1, 25 Sturt Street
PO Box 1064
TOWNSVILLE QLD 4810
P +617 4722 2765
E townsville@gta.com.au

Sydney

A Level 6, 15 Help Street
CHATSWOOD NSW 2067
PO Box 5254
WEST CHATSWOOD NSW 1515
P +612 8448 1800
E sydney@gta.com.au

Canberra

A Tower A, Level 5,
7 London Circuit
Canberra ACT 2600
P +612 6243 4826
E canberra@gta.com.au

Gold Coast

A Level 9, Corporate Centre 2
Box 37, 1 Corporate Court
BUNDALL QLD 4217
P +617 5510 4800
F +617 5510 4814
E goldcoast@gta.com.au

Perth

A Level 27, 44 St Georges Terrace
PERTH WA 6000
P +618 6361 4634
E perth@gta.com.au