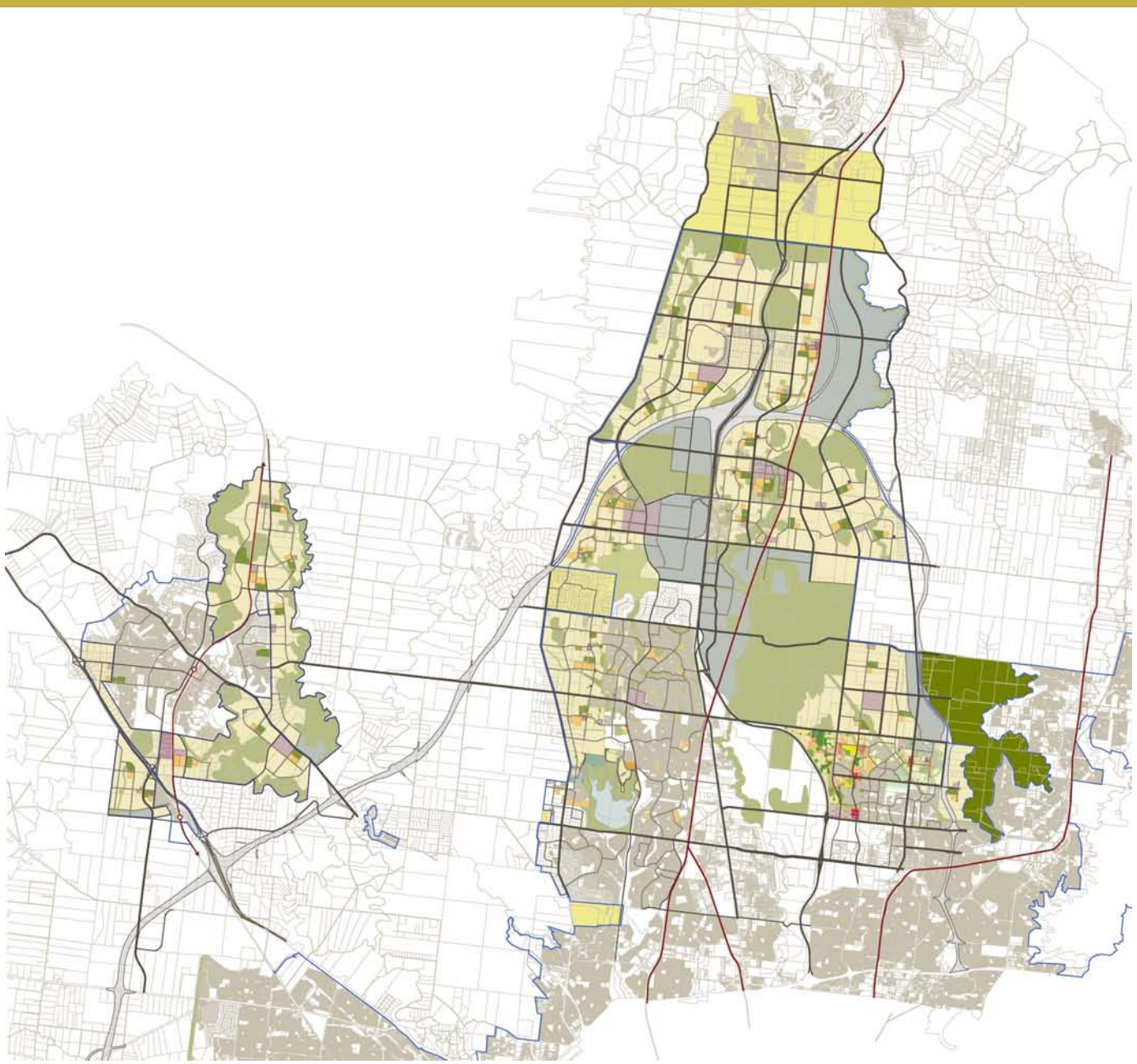
Northern Growth Corridor
2046 Strategic Transport Model



growth areas AUTHORITY

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CONTENTS

1 INTRODUCTION

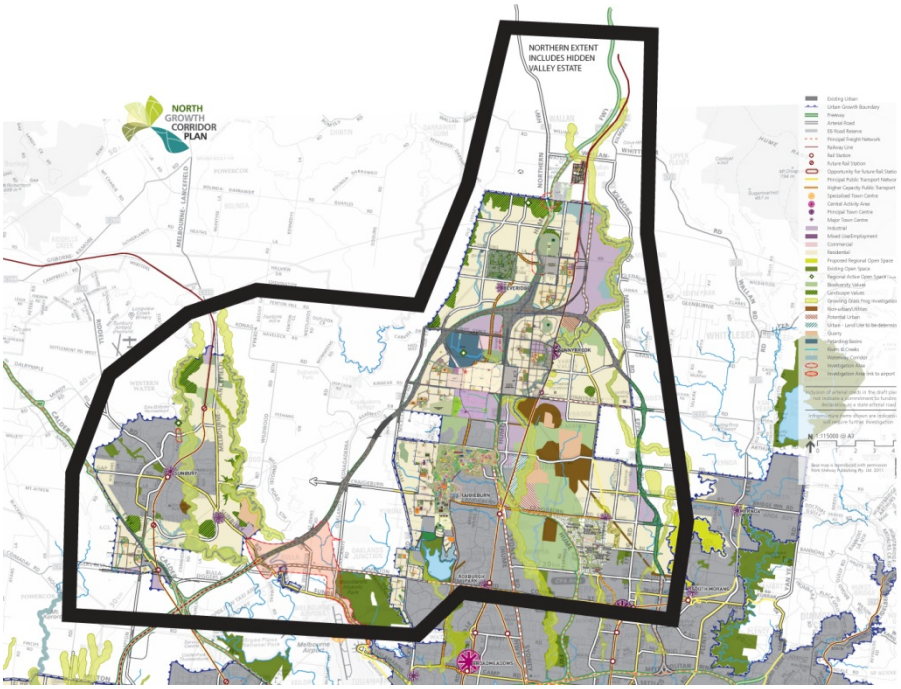
This report provides an overview of the strategic transport model developed by Sinclair Knight Merz (SKM) for Melbourne's Northern Growth Region (see Figure 1). The purpose of the model is to provide a 2046 reference case for the Growth Areas Authority to investigate future land use and transport scenarios for the region. These will in turn feed into the Precinct Structure Plans (PSPs) of individual development areas.

The model is based on the Department of Transport's Victorian Integrated Transport Model (VITM). As part of the model's development, SKM reviewed the network and land use assumptions for the base 2011 scenario from the VITM and validated this against recent traffic counts and public transport patronage. The model's validation is reported separately in *Northern Growth Corridor Transport Model Validation – Final Report*.

The model was developed in consultation with a stakeholder group that comprised the three municipalities that form the Northern Growth Corridor – Hume City Council, Whittlesea Council and Mitchell Shire – as well as VicRoads, the Department of Transport and GAA.

This report presents a summary of the updates to the 2046 model, and a summary of key model inputs. The report also provides a selection of outputs from the model, but these are intended only to illustrate the model's performance, and should not be taken as definitive forecasts of future conditions.

- *Figure 1: Northern Growth Region Transport Modelling Boundary*



1.1 LIMITATION STATEMENT

The sole purpose of this report and the associated services performed by Sinclair Knight Merz (SKM) is to provide a strategic transport model in connection with the Northern Growth Corridor of Melbourne. The services were provided in accordance with the scope of services set out in the contract between SKM and the Growth Areas Authority (the 'Client'). That scope of services, as described in this report, was developed with the Client.

Modelling and forecasting is not a precise science. Forecasts are only an indication of what might happen in the future and they may not be achieved. They rely upon complex sets of input data and assumptions. There is no guarantee that these assumptions will in fact be correct or accurate and there are numerous factors which can influence the actual future traffic volumes of the Project.

This report has been prepared on behalf of and for the exclusive use of, SKM's Client, and is subject to, and issued in accordance with, the provisions of the agreement between SKM and its Client. SKM accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon this report by any third party.

1.2 GLOSSARY

This is a technical report; therefore to aid the reader a glossary of technical terms has been defined below along with the acronyms used.

AM Peak: The model used for this project produces results that represent the volume of trips made within four distinct periods of an average weekday. Each period covers a different length of time, therefore to standardise outputs volumes shown are two-hourly volumes. These can be factored up to calculate daily traffic. The AM Peak represents 7-9am.

Calibration: The act of checking or adjusting a model to better reflect observed travel data.

PM Peak: The PM Peak represents 3-6pm. Volumes shown on maps are two-hourly volumes. Also see AM peak.

Posted speed: The actual speed limit of a road as denoted by physical sign posts.

Screenline: An arbitrary line drawn across a transport corridor used to calculate the total volume of traffic travelling from one side of the line to the other. It is a useful method to validate the overall quantum of traffic in a demand matrix, as it aggregates traffic that is travelling in a similar direction but on different (sometimes competing) routes.

Speed-flow curve: A mathematical relationship used to represent congestion effects on road links. It is typically depicted as a curved line which represents the effect on average speed as the volume of traffic on a road increases. For example, most roads tend to allow traffic to travel at close to the posted speed limit until the volume of traffic increases to a point where vehicles must travel slower due to safety and congestion issues. The shape of this curve indicates when the speed begins to decrease and how rapidly it decreases.

Validation: The process of determining the degree to which a model is an accurate representation of the real world from the perspective of the intended uses of the model.

V/C ratios: The ratio of traffic volume at a point on a road to the theoretical capacity of the road. A value close to one indicates the road is heavily congested and the traffic on that road is expected to suffer significant delays. Technically values greater than one should not be permitted, however if no other suitable routes are available VITM will permit V/C ratios greater than one.

Acronyms

- COW – City of Whittlesea

- DOT – Department of Transport
- GAA – Growth Areas Authority
- HCC – Hume City Council
- MATRS – Melbourne Airport Transport Requirements Study
- PSP – Precinct Structure Plan
- PTV – Public Transport Victoria
- SKM – Sinclair Knight Merz
- VIF – Victoria in Future
- VITM – Victorian Integrated Transport Model

2 MODEL UPDATES

This section details the changes made to the 2046 VITM reference scenario provided by the Department of Transport for this study.

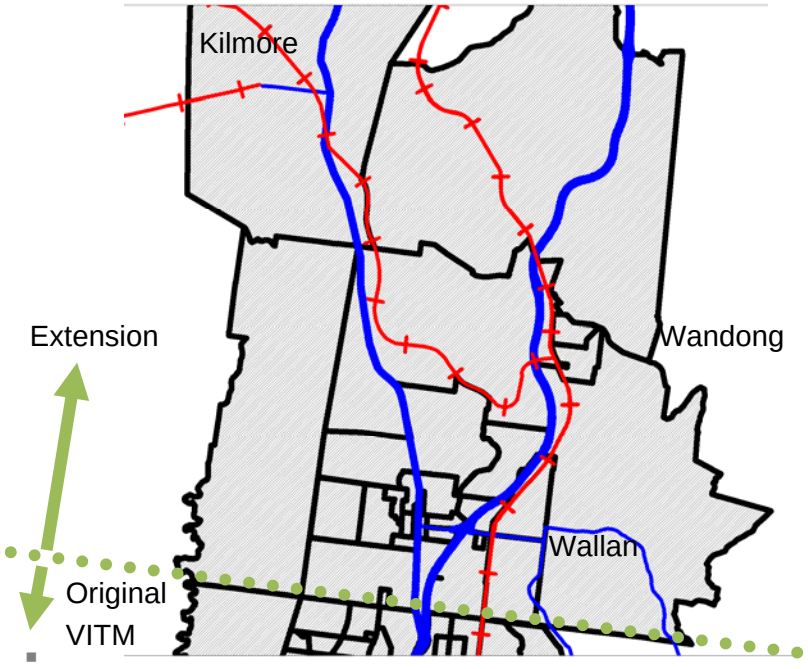
2.1 ZONE SYSTEM

A key requirement of this study was to introduce a more detailed zone system into VITM. The purpose of the zone refinement was to enable more detailed modelling of currently rural areas that will be developed into urban residential and employment precincts. This involved two types of changes to the model: disaggregation of existing large zones into smaller zones, roughly 800m by 800m with some smaller zones to represent special zones such as town centres, and an extension of the model to include Wallan. These changes are described below.

2.1.1 Model Extension

The 2046 Northern Growth Corridor model includes an extension of the VITM boundary northwards to incorporate Wallan. The Wallan extension includes 30 new zones with associated land use inputs and road network as shown in Figure 2. These zones are numbered 2894 -2923.

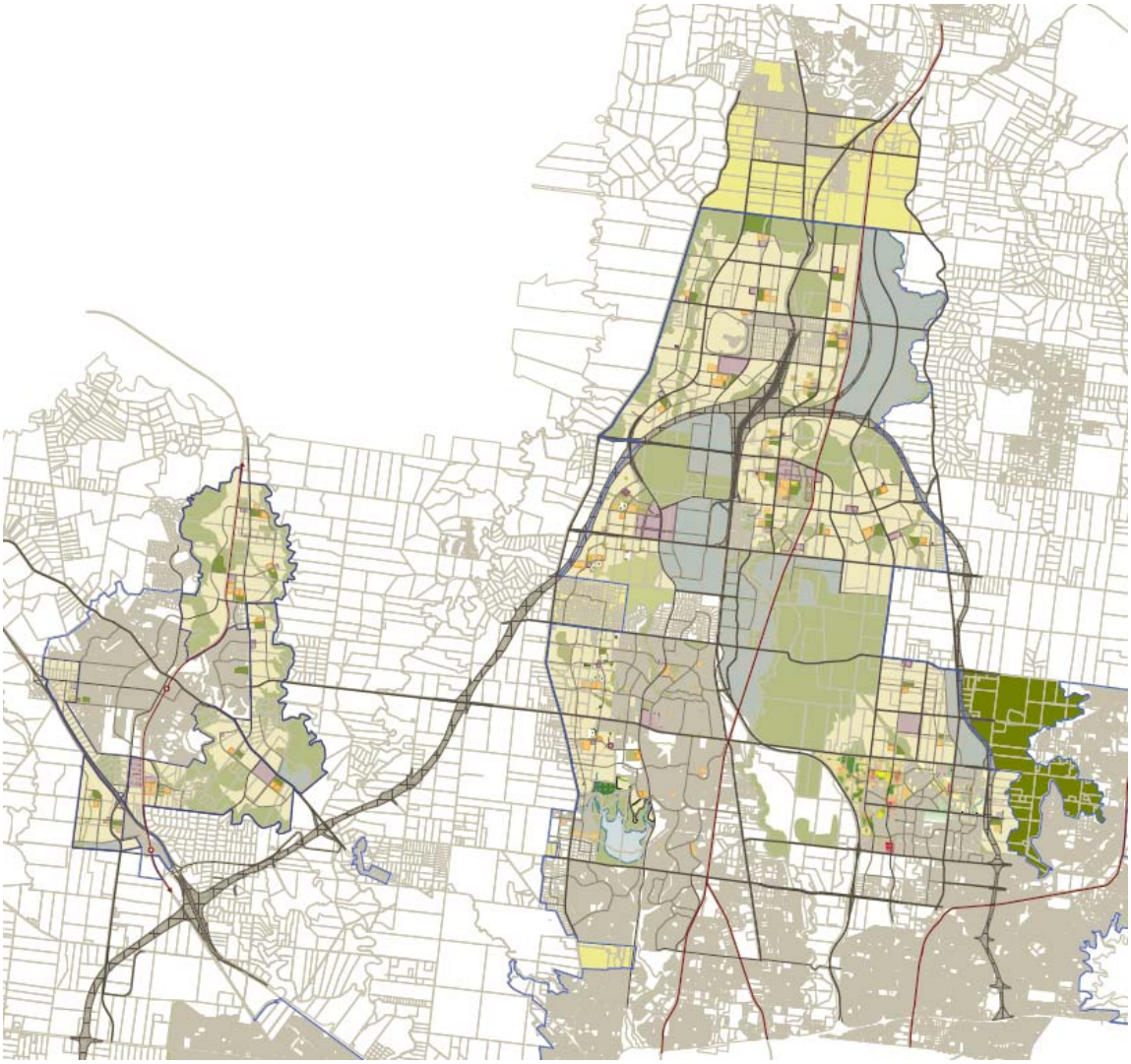
- *Figure 2: Wallan extension to VITM*



2.1.2 Zone Disaggregation

GAA developed a notional 2046 land use plan (see Figure 3) which was discussed and agreed with stakeholders. GAA then developed a zone system based on the land use plan which separately identified areas of different land use. SKM developed an equivalence table to equate original VITM zones to the new zone system. This became the key tool for transforming the many inputs in VITM to the new zone system. In total an additional 261 zones were added to VITM through this disaggregation process. These zones are numbered 2924 -3184.

- *Figure 3: Northern Growth Corridor Land Use - 2046*



2.1.3 External Car Zones

The northern extent of VITM (before the Wallan extension) contained three external zones which fed a fixed number of car trips into the model from outside the model boundary. In the new model, the total volumes of external trips from these three

zones were relocated north of Wallan and reduced by 20%[1]. The reduction is to account for the traffic generated by Wallan that is included in the external car trips and no longer required since Wallan is now part of the model. The traffic growth rate along both the Northern Highway and Hume Highway north of Wallan is assumed to be 2% per annum between 2011 and 2046.

The three original external zones fed traffic into the highway network at the following locations:

- Epping-Kilmore Road and Hadfield Road West;
- Wallan-Whittlesea Road and Hadfield Road; and
- Hume Highway and Northern Freeway interchange.

In the new model, these have been relocated to the following two locations:

- Hume Highway north of Wandong (zone 3194)
- Northern Highway south of Kilmore (zone 3193)

Based on observed traffic volumes from the report "*Traffic Modelling for the Kilmore-Wallan Bypass Options Examination*" two-thirds of the external trips have been allocated to the Hume Highway with the remaining one-third to the Northern Highway.

The same split of traffic has been applied to the fixed freight matrix. External zones are now numbered 3185-3203.

2.1.4 External PT Zones

External public transport zones have a similar function to the external car zones and typically account for V/Line travel to and from stations outside the model boundary. A small change was made to these zones with Wallan now included in the main model.

External PT zones are now numbered 3204-3250.

2.2 LAND USE

The 2046 land use plan developed by GAA (see Figure 3) was reviewed by stakeholders, and the following land use attributes added by GAA to each of the new zones:

[1] The approximate difference between observed traffic screenline counts north and south of Wallan as part of the Kilmore-Wallan Bypass Study.

- Number of households
- Retail jobs
- Total jobs
- Primary school enrolments
- Secondary school enrolments

As VITM uses a more detailed disaggregation of demographic and employment data (such as population by age category and number of dependants by age category) the following set of rules were developed to generate appropriate inputs for the model:

- Persons per household were assumed to be as per VIF2046 projections for each LGA
- Age category splits were assumed to be as per VIF2046 projections for each LGA
- Number of dependents by age category were assumed to be as per VIF2046 projections for each LGA
- No tertiary enrolments were assumed in new zones
- Zones in the Beveridge area were assumed to take on the characteristics of the Hume LGA

For existing zones, the land use inputs were taken from the VIF2046 projections with the following exceptions:

- Sunbury town centre employment was specified by HCC at 8,866 total jobs
- Broadmeadows activity centre employment was specified by HCC at 8,490 total jobs
- Epping central employment and population was specified by CoW in the form of the Epping Central Structure Plan Precincts
- Wandong overall growth projections are consistent with forecasts produced by id for the Shire of Mitchell.

A summary of the 2046 land use inputs compared against the 2011 inputs is shown in Table 1. There are no figures included for Mitchell in 2011 as Wallan and areas to the north were outside of the 2011 VITM study area. The '*Wallan-Kilmore Bypass Study, 2007*' indicates that the population of the region containing Wallan, Wandong and Kilmore was 14,758 in 2006. This is less than one tenth of the 2046 projection.

Maps of the assumed number of households and employment for each of the new zones is shown in Appendix A.

- *Table 1: Land use input summary, 2011 and 2046*

Input	2011		2046		
	Hume	Whittlesea	Hume	Whittlesea	Mitchell
Population	176,687	163,172	438,418	366,029	190,859
Households	57,137	54,660	151,170	133,466	66,036
Retail Employment	7,325	4,599	31,464	13,588	6,834
Total Employment	85,221	39,032	177,435	114,594	18,358
Primary Enrolments	17,384	14,038	32,538	26,628	8,789
Secondary Enrolments	11,985	9,018	29,311	17,858	9,600
Tertiary Enrolments	37,865	12,026	47,970	15,653	-

2.2.1 Melbourne Airport

VITM includes a separate module (MATRS) to forecast trips generated by air passengers to and from Melbourne Airport. The number of trip attractions and productions per day assumed by the MATRS module in 2046 is 234,496 persons; this represents a conservative long-term growth rate of 2.1% p.a since 2011. It is noted that PTV is currently planning an overhaul of the MATRS module to better incorporate future air passenger forecasts. Once these changes are complete, we recommend that they be applied to the Northern Growth Corridor model.

In the interim, we have updated one input to MATRS – the assumed time period split of air passengers – to better match observed passenger time profiles at the airport.

The forecast number of employees at the airport remains unchanged at 32,783.

2.3 PUBLIC TRANSPORT

In general the public transport service patterns included in the model were taken from DOT's 2031 reference case along with a selection of expected improvements to the network as detailed in the following sections. The 2031 reference case was used as it was seen to contain a more realistic set of assumptions about service frequencies, particularly buses.

2.3.1 Rail

Two metropolitan train lines currently serve part of the study area (Craigieburn and Upfield lines) and two regional lines pass through the study area (Bendigo and Seymour lines).

Headways and service patterns were taken from the 2031 reference case as shown in Table 2. In addition, the following changes were made to the network:

- Metropolitan services extended from Craigieburn to Wallan with 10 minute services for all time periods
- New stations at South Morang, Lockerbie, Jackson's Hill and Raes Road
- Donnybrook, Beveridge and Wallan stations added to the electrified rail network
- Services from north of Craigieburn run via the Upfield line as the Broadmeadows line is too congested
- VLine services will stop at Wallan, Roxburgh Park then Southern Cross
- Beveridge and Donnybrook coded as the major park-and-ride stations
- Lockerbie coded as a non park-and-ride station.
- Small park-and-ride catchment for Wallan station
- Reduce park-and-ride at Craigieburn (as it is no longer the end of the line)
- Sunbury rail services left as per the 2031 reference case, with stops at Jackson's Hill and Raes Road

Table 2 Modelled rail headways (2046)

	Average headway across period			
Station	**AM**	**IP**	**PM**	**OP**
TO CITY				
Craigieburn	4	10	4	10
Upfield	5	10	5	10
Sunbury	7.5	10	7.5	10
Wallan Metro	10	10	10	10
Wallan V/Line	30	60	60	60
FROM CITY				
Craigieburn	4	10	4	10
Upfield	5	10	5	10
Sunbury	7.5	10	7.5	10
Wallan Metro	10	10	10	10
Wallan V/Line	60	60	30	60

2.3.2 Bus

All services contained in DOT's 2031 reference case were retained along with an additional 15 routes to cater for the growth areas north of Mount Ridley Road and two further services in Sunbury. The additional routes were extracted from the 2046+ public transport network currently under development by PTV.

The new services included and their frequencies are as follows:

- Mickleham – Mernda (20 mins)
- Donnybrook - Craigieburn TC (20 mins)

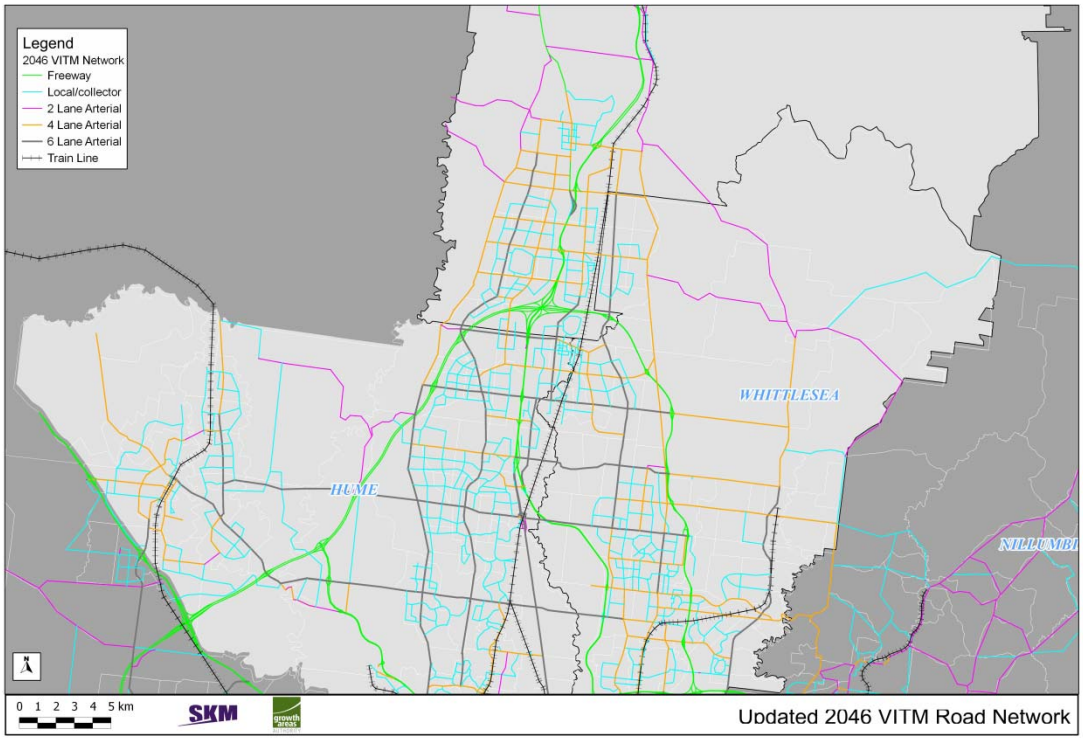
- Lockerbie – Donnybrook (20 mins)
- Lockerbie West – Lockerbie (20 mins)
- Mandalay – Lockerbie (30 mins)
- Lockerbie South – Lockerbie (60 mins)
- Lockerbie – Donnybrook (60 mins)
- Lockerbie North – Lockerbie (30 mins)
- Mickleham – Craigieburn (60 mins)
- Mickleham - Craigieburn TC (30 mins)
- Donnybrook – Craigieburn (60 mins)
- Mt Ridley – Craigieburn (60 mins)
- Whittlesea and Lockerbie – Broadmeadows (10 mins)
- Mernda Extension – Whittlesea (10 mins)
- Moonee Ponds to Sunbury (60 mins)
- Sunbury to Diggers Rest (60 mins)
- Wallan Town Centre to Wallan Station (30mins)

2.4 ROAD NETWORKS

GAA developed a notional network of arterial roads (2, 4 or 6 lanes) and collector streets (2 lanes) which was circulated amongst the three councils and VicRoads for comments. Once the network was agreed, the changes were coded using the VicRoads 2046+ network as the basis for speed limits and link classes.

A record of all comments on the network is provided in Appendix B along with a list of SKM's responses to the comments. The final road network as coded in the Northern Growth Area model is shown in Figure 4. For further details refer to Appendix C.

■ *Figure 4: 2046 ultimate highway network – final*



2.1 OTHER MODEL UPDATES

This section lists other changes made to the model.

2.1.1 Speed-flow curves

The VITM speed-flow curves were updated with a revised curve for unsealed roads. This was provided by VicRoads / DOT and has the effect of lowering the volume of traffic on unsealed roads to more realistic totals.

A new road classification[2] was added specifically for rural highways such as Sunbury Road which are observed to carry much higher volumes of traffic at higher speeds than urban arterial roads with the equivalent number of lanes. The different speed-flow profile is mainly due to the long stretches of road without traffic signals and higher posted speeds.

2.1.2 External trip matrices

No changes were made to the volumes contained in the car and PT external trip matrices as these were recently updated by VicRoads. The trips were redistributed

[2] Linkclass = 26, Capacity = 1600, Ja = 1.0, % posted speed = 0.9

based on the equivalence table between the new disaggregated zone system and existing VITM zones.

2.1.3 Freight matrices

No changes were made to the freight matrix volumes as part of this model update. Future changes to freight demand will be made by the Department of Transport. The existing trips were re-distributed based on the equivalence table between the new disaggregated zone system and existing VITM zones.

2.1.4 Catalogue keys

An additional four catalogue keys[3] were added to enable the total number of trips in each time period to be factored for the study area if necessary. The only factor used was for the off-peak period where the model was found to underestimate the observed number of trips in the 2011 validation . In line with the findings of the validation, a factor of 1.33 was used for the off-peak period.

[3] Catalogue keys refer to global inputs that are specified separately for each scenario modelled in the Cube software package.

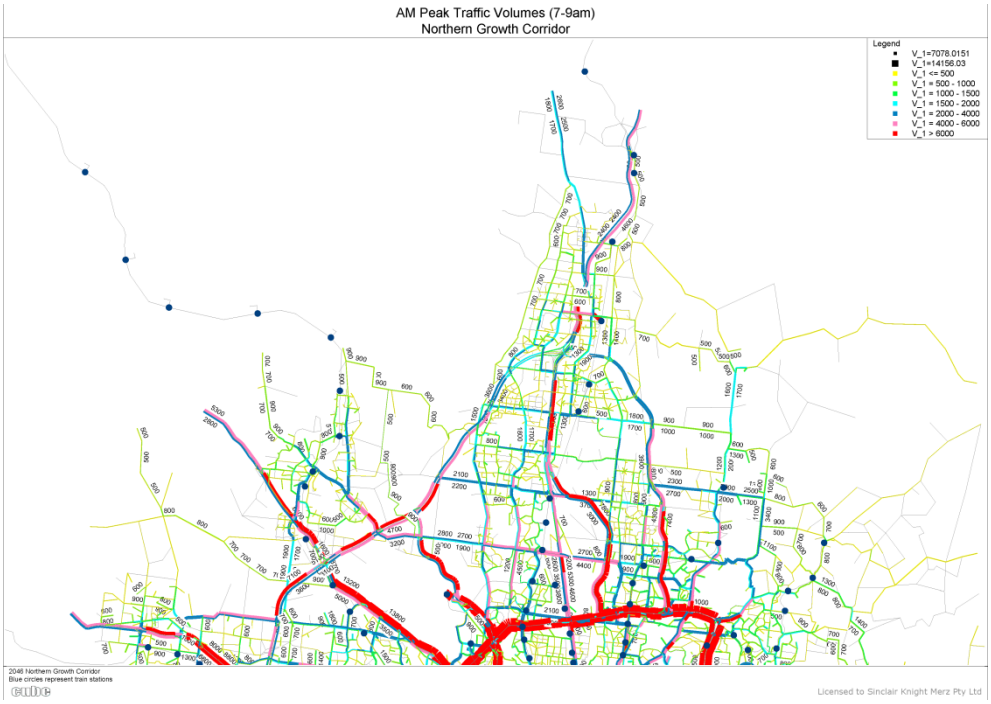
3 2046 OUTPUTS

This section contains high level summary outputs for the 2046 Northern Growth Corridor Model. Refer to Appendix D for A3 versions of the maps. A large scale electronic version of the map has also been produced for detailed analysis of traffic volumes.

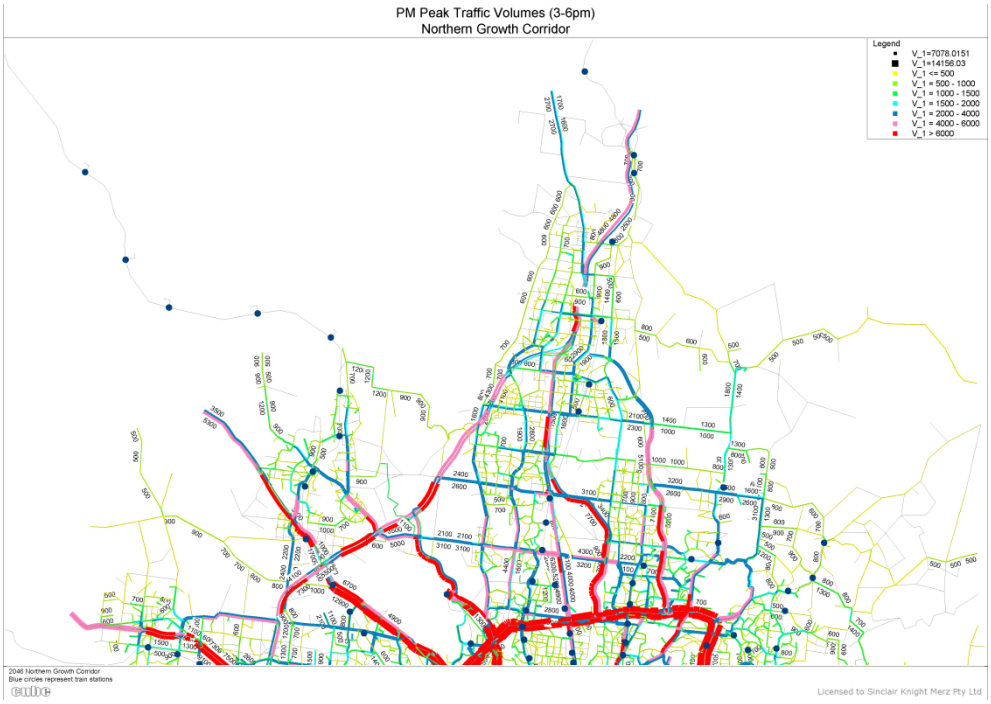
3.1 TRAFFIC VOLUMES

Volume bandwidth plots have been produced for each time period. In these plots, thicker lines represent higher traffic volumes. Figure 5 to Figure 7 show sample plots for the AM peak, PM peak and daily respectively.

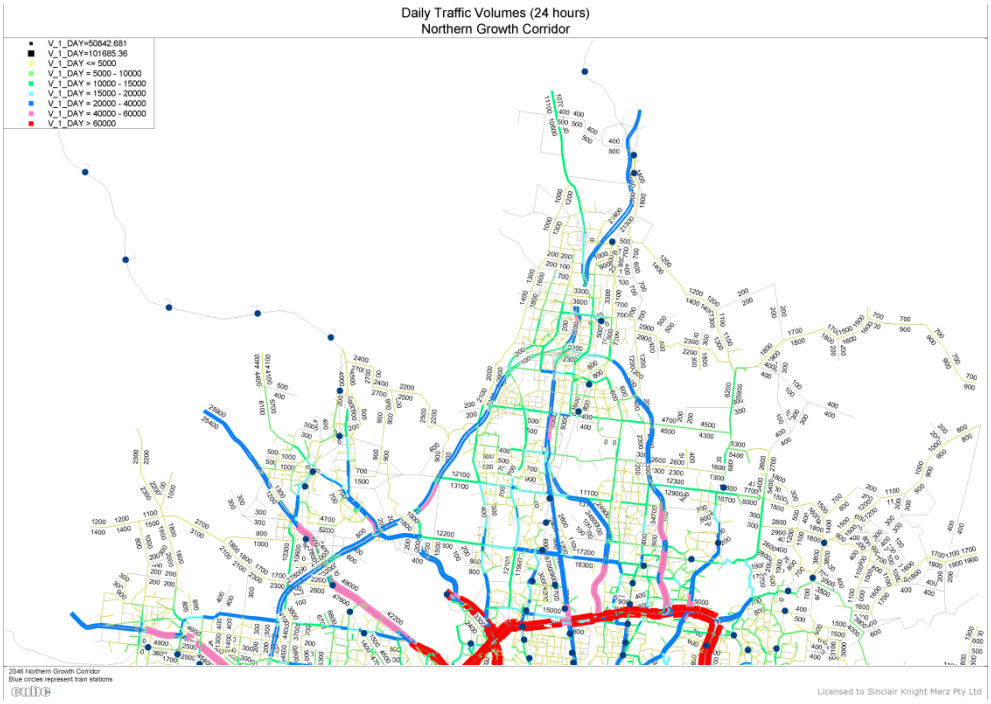
- *Figure 5: AM peak (7-9am) one-way modelled volumes ('000)*



■ *Figure 6: PM peak (3-6pm) one-way modelled volumes ('000)*



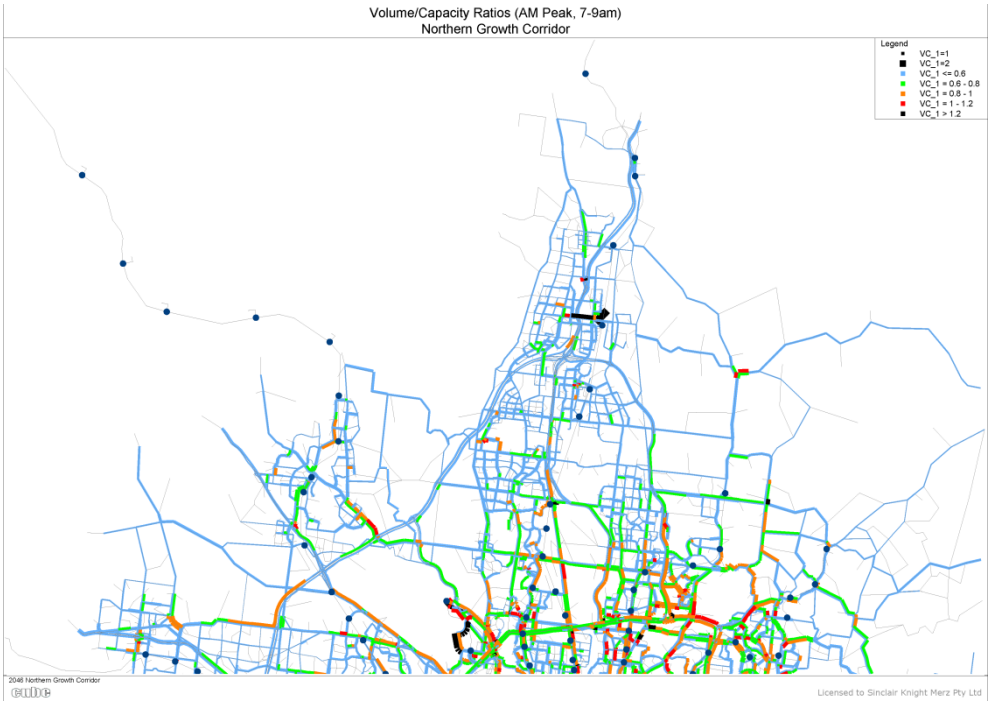
■ *Figure 7: Daily one-way modelled volumes ('000)*



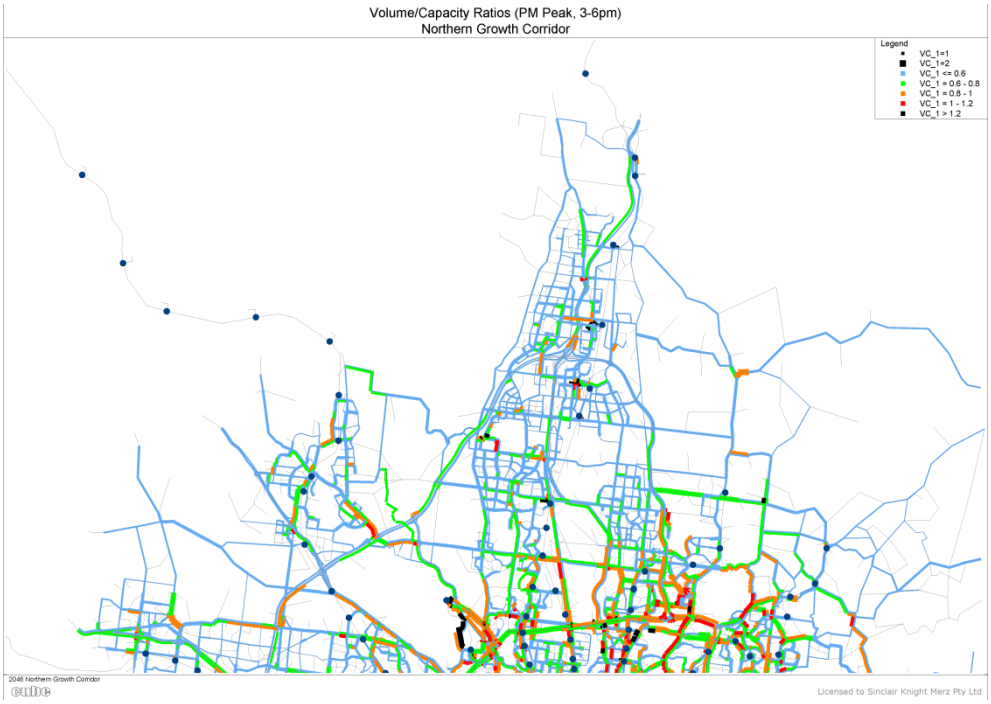
3.2 VOLUME TO CAPACITY RATIOS

Volume to capacity plots have been produced for the peak periods (Figure 8 and Figure 9). These indicate the main congestion points in the study area. With the 2046 ultimate road network that has been adopted there is very little congestion in the Northern Growth Corridor, although quite significant congestion in the inner suburbs. In the Northern Growth Corridor, the model suggests that the main congestion points will be around train stations due to the high volumes of rail users parking at these stations.

- *Figure 8: AM peak (7-9am) volume to capacity ratios*



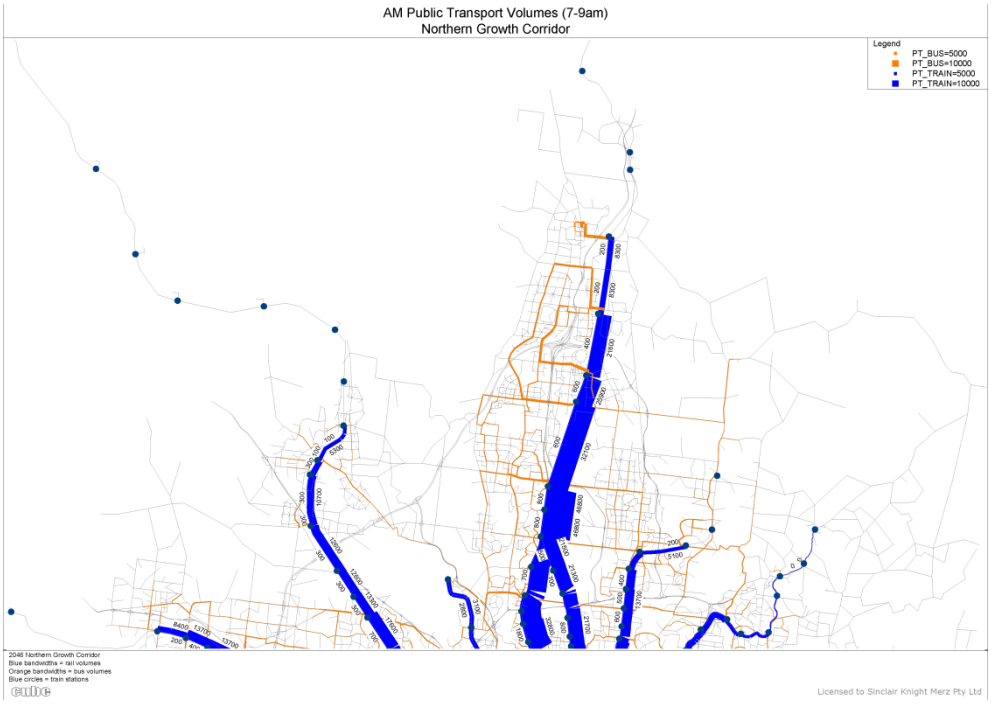
■ *Figure 9: PM peak (3pm-6pm) volume to capacity ratios*



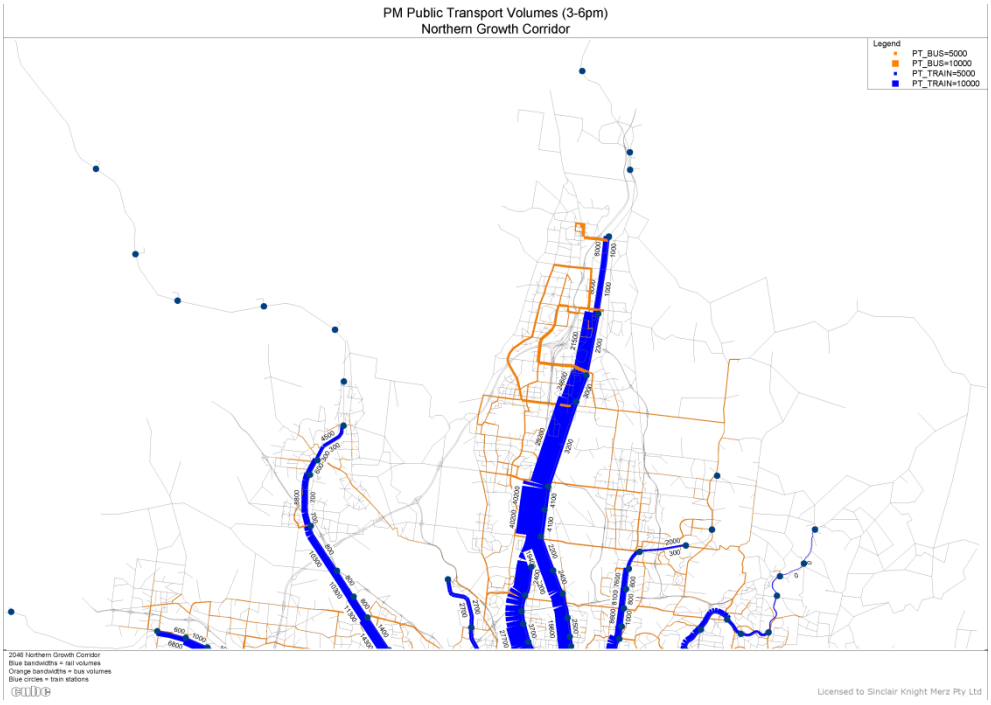
3.1 PUBLIC TRANSPORT LOADS

Public transport bandwidth plots have been produced for the AM and PM peak periods; thicker lines represent higher passenger volumes. The forecast rail patronage between Wallan and Roxburgh Park (where the Upfield and Craigieburn Lines merge) is very high and is unlikely to be accommodated by the future rail network capacity. We recommend that the model be run with public transport capacity constraints so that forecasts are within more reasonable bounds.

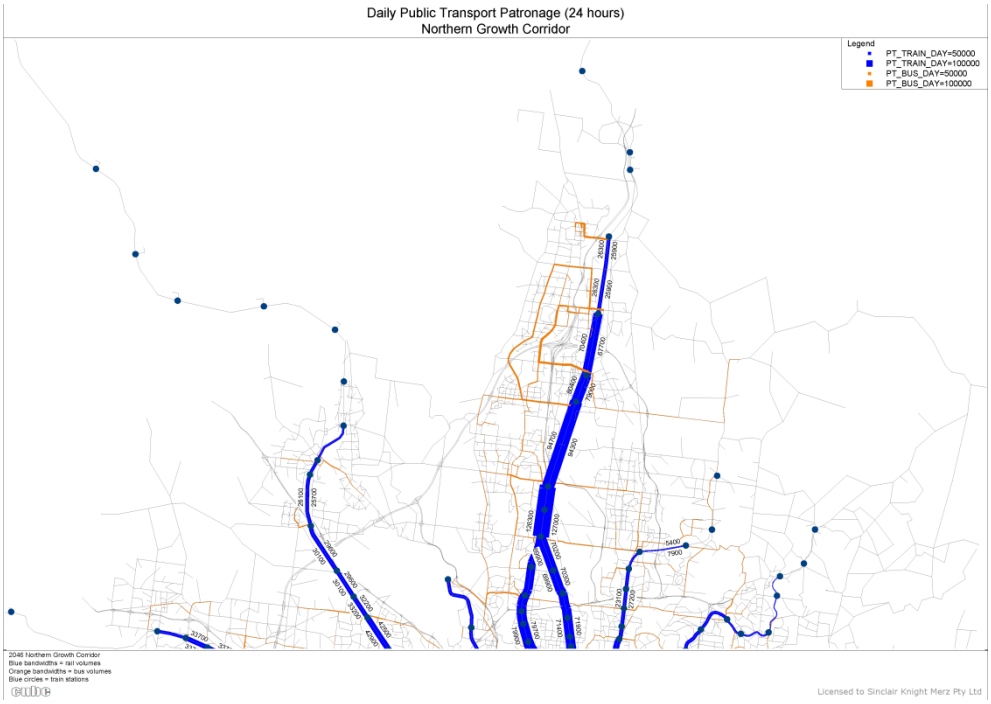
- *Figure 10: AM peak (7-9am) one-way modelled public transport patronage ('000)*



- *Figure 11: PM peak (3-6pm) one-way modelled public transport patronage ('000)*



■ *Figure 12: Daily one-way modelled public transport patronage ('000)*



3.2 TRIPS BY MODE AND LGA

The number of trips within the Hume and Whittlesea municipalities is forecast to increase by over 250% between 2011 and 2046 as shown in Table 3. The Shire of Mitchell was not included in the 2011 model, but part of the municipality is now included in the updated Northern Growth Corridor Model to cover the areas of Beveridge, Wallan and Wandong. These three areas alone account for over 900,000 trips on an average weekday, more than the volume of trips generated by Whittlesea in 2011.

The share of trips made by public transport increases from around 5% in 2011 to 9.4% in Hume and 7.6% in Whittlesea. Public transport mode shares have not been quoted for Mitchell because only a portion of this municipality is included in the model. The included portion is in close proximity to the rail corridor, so modelled public transport patronage is not likely to be representative for the municipality as a whole.

- *Table 3: Mode shares and total trips to and from each LGA*

LGA	2011			2046		
	% CAR	% PT	TOTAL	% CAR	% PT	TOTAL
Hume	94.7%	5.3%	1,077,587	90.7%	9.3%	2,699,652
Whittlesea	95.5%	4.5%	786,549	92.5%	7.5%	1,789,852
Mitchell	n/a	n/a	n/a	n/a	n/a*	932,319**

** The likely %PT for the Shire of Mitchell is likely to be higher than for Hume due to the close proximity of residential and employment precincts to train stations (Wallan, Beveridge, Lockerbie and Donnybrook stations) and a frequent service running to the CBD.*

** *The Mitchell trip volumes only apply to the portion of the municipality within the model.*

4 SENSITIVITY TESTING

The VITM base model does not include any constraints on public transport capacity. Given the high volumes of public transport usage forecast for 2046, concerns were raised by the stakeholder group about the realism of the unconstrained forecasts. A sensitivity test was therefore carried out to determine how constraints on public transport capacity would influence traffic forecasts and public transport patronage[4]. This chapter summarises the assumptions and outcomes of the constrained sensitivity test.

4.1 INPUTS

All future train services were assumed to operate with nine car carriages with a total seating capacity of 650 and a crush capacity of 2100. V/Line service capacities varied by line, from 296 seats and 326 crush capacity on the Seymour Line to 518 seats and 570 crush capacity on the Geelong line. Buses were assumed to have seats for 50 people and a crush capacity of 75.

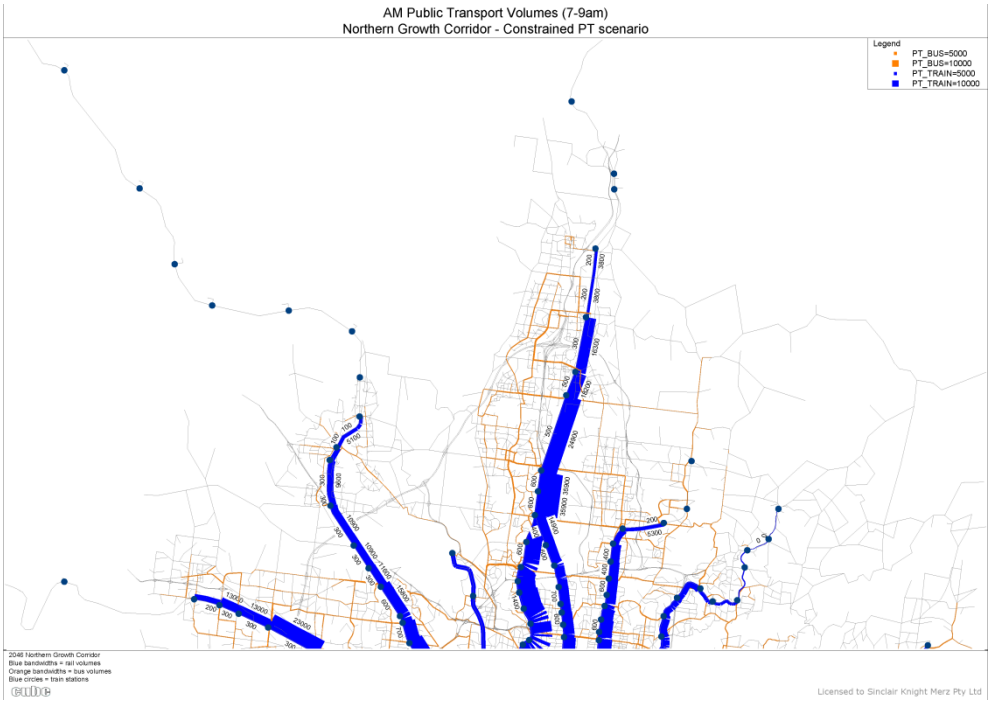
All other inputs to the model remain the same as described in Section 2 of this report.

4.2 OUTPUTS

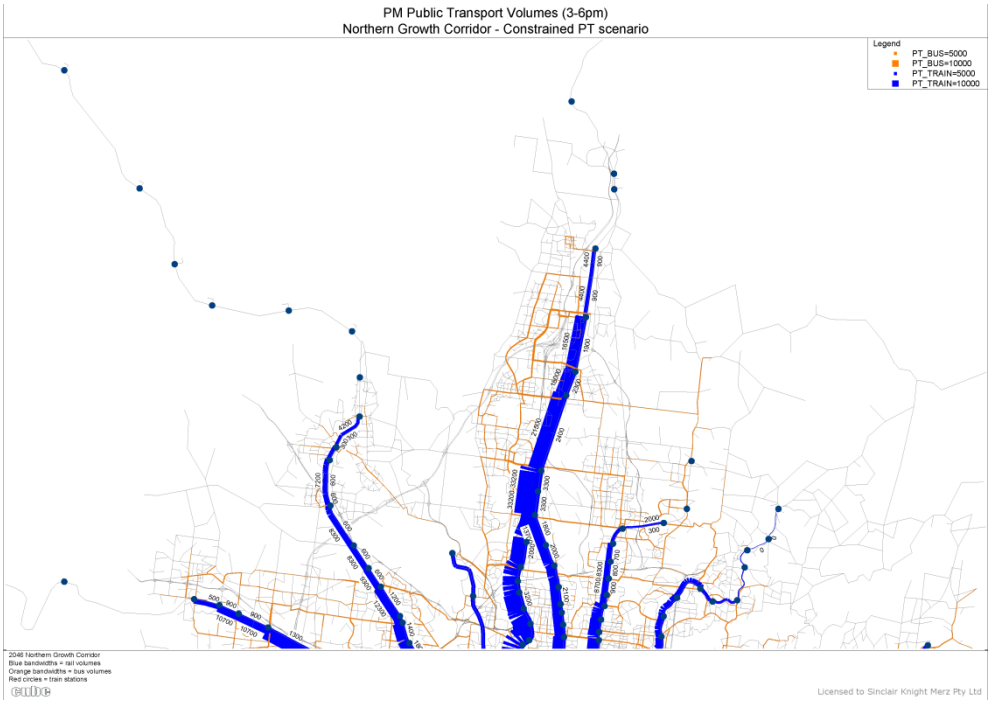
Running the VITM under constrained public transport conditions resulted in a decrease in rail patronage on the section of line between Wallan and Roxburgh Park of about 11,000 people (23%) in the AM peak and 7,000 (17%) in the PM peak. This is shown in Figure 13 and Figure 14 and can be compared against the unconstrained versions in Figure 10 and Figure 11 respectively. .

[4] It should be noted that the public transport service assumptions made in the sensitivity test are not a State Government endorsed plan for future public transport provision.

■ *Figure 13: Public transport patronage, AM peak, constrained public transport scenario*



■ *Figure 14: Public transport patronage, PM peak, constrained public transport scenario*

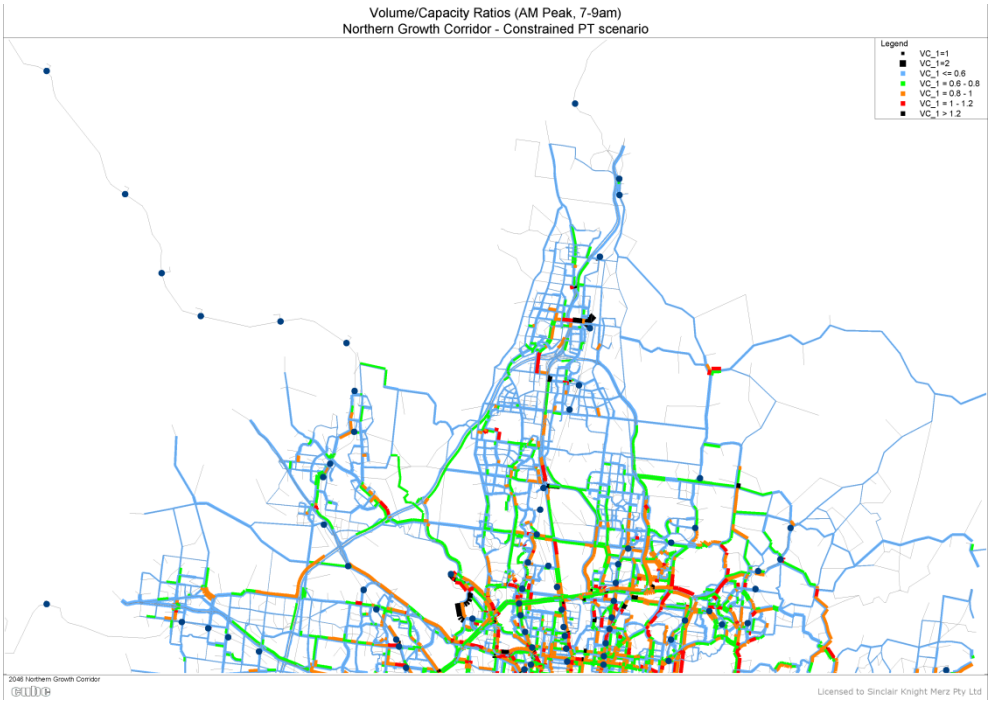


Most of these displaced public transport trips shifted to private vehicles, causing a small but noticeable negative impact on the road network. Five links in the AM

peak period became significantly more congested as shown in Figure 15. The specific locations where traffic becomes heavily congested are:

- Sunbury Road approach to OMR from Sunbury
- Melbourne Airport, all access routes except Sunbury Road
- Roads around Craigieburn Road / Hume Highway interchange
- 4-lane arterial parallel and to the west of Hume Highway at the OMR interchange
- Around Beveridge train station
- Broadmeadows town centre

Figure 15: Volume/Capacity Ratios, AM peak, constrained public transport scenario



The impact on overall mode shares is negligible for Whittlesea, and public transport usage in the Hume municipality reduces by one percentage point as shown in Table 4. The model indicated that overall motorised trip making would increase as a result of the increase in car mode share. This was due to additional non home-based trips being made in the model when a car was available during the day, for example a commuter driving a car to work might make a shopping trip with the car during a lunch break.

- *Table 4: Daily mode shares by LGA, 2046 scenarios*

LGA	2046 Unconstrained			2046 Constrained		
	% CAR	% PT	TOTAL	% CAR	% PT	TOTAL
Hume	90.7%	9.3%	2,699,652	91.7%	8.3%	2,715,097
Whittlesea	92.5%	7.5%	1,789,852	92.6%	7.4%	1,795,304
Mitchell	n/a	n/a*	932,319**	n/a	n/a*	946,593**

** The likely %PT for the Shire of Mitchell is likely to be higher than for Hume due to the close proximity of residential and employment precincts to train stations (Wallan, Beveridge, Lockerbie and Donnybrook stations) and a frequent service running to the CBD.*

** *The Mitchell trip volumes only apply to the portion of the municipality within the model.*

A3 plots of the outputs are provided in Appendix E

5 CONCLUSION

The Victorian Integrated Transport Model was validated against 2011 observed data in the northern metropolitan area and updated to represent a 2046 Northern Growth Corridor scenario as envisaged by the Growth Areas Authority. Through consultation with stakeholders the scenario incorporates:

- Land use consistent with GAA and council plans
- An aspirational ultimate road network which includes a wide range of projects that have been considered by stakeholders, except for projects that were not seen as feasible by VicRoads
- Public transport improvements to existing areas and new services to cater for the growth areas

The model has been tested to ensure it operates appropriately, with checks made to traffic volumes, congestion levels, public transport volumes and public transport mode shares. The outputs of the model are consistent with the inputs used and it provides a suitable starting point for further analysis of specific projects and earlier years.

An additional scenario was modelled to assess the sensitivity of the model to capacity constraints on public transport services. This arose as a result of very high train patronage forecast from the growth areas north of Craigieburn. The results indicated that train patronage in the busiest time period, the AM peak, would reduce by around 11,000 people with capacity constraints in place.

Our view is that the model is now fit for use as a study area model for the Northern Growth Corridor of Melbourne. There are some opportunities for further improvements to the model, as listed below. The potential improvements are:

- Include the updated Melbourne Airport module (MATRS) once completed by PTV
- Review the distribution of freight in the Northern Growth Corridor, particularly around the proposed Beveridge Intermodal Freight Terminal

APPENDIX A

2046 land use inputs

Refer to *AppendixA_landuse.pdf*

APPENDIX B

The following table is a summary of suggested changes to the 2046 ultimate road network and the actual changes made.

Also refer to *AppendixB_Comments on GAA road network.pdf*

Road Name	From	To	Stakeholder Comment	Change made
-	Sunbury Road	Lancefield Road	Question feasibility given drainage and topography	Link removed
Southern Link	Vineyard Road	Sunbury Road	Question whether is best alignment if logical inclusion area not developed. 6 lane probably not feasible or needed.	4 lanes, aligned as per GAA map
	Jacksons Hill	Sunbury South	Need a connection from Jacksons Hill to Sunbury South	Lind added as connector
Gap Road	Sunbury Town Centre	Calder Freeway	Question feasibility and need for 6 lanes when have extensive service lanes	4 lanes
Riddell Road	Town Centre	Calder Freeway	Question feasibility and need for 6 lanes when have extensive service lanes	4 lanes
Racecourse Road	Town Centre	Northwards	Question need and desirability of 4 lanes from town centre. Certainly no need to be more than 2 lanes north of Elizabeth Drive extension	2 lanes
Northern Link	Racecourse Road	Lancefield Road	Probably can't be 6 lanes given topography. Suggest aligns to train station to enable good bus connectivity	4 lanes
Sunbury Road	Town Centre	OMR	Question need for 6 lanes	6 lanes
Sunbury Road	OMR	Western Ring Rd	Critical that this appropriately included	
Bulla Bypass	OMR	Sunbury Road	Critical that this appropriately included	
Airport Link	OMR	Sunbury Road	Critical that this appropriately included	
Somerton Road	Bulla Bypass	Mickleham Rd	Critical that this appropriately included	
Intersection of Calder Freeway and Diggers Rest Road			Critical that this appropriately included	overpass
Diggers Rest Rd	Calder Freeway	Sunbury Road	Question feasibility given bridge and need given OMR	2 lanes
Road Layout in Greenvale Central PSP			Is Ok. Ignore	
East West Connector	Aitken Boulevard	Hume Freeway	Development Plan is only 4 lanes. Is located in wrong location.	4 lanes, and kept at location in VITM which was further north than GAA
Mt Ridley Rd Bridge over Hume			Will this bridge happen? Question if should be 6 lanes.	overpass, 4 to west, 6 to east
New Arterials around Donnybrook Road			Would this dog leg happen? Is 6 lanes necessary?	6 lanes, aligned as per VITM
O'herns Road	Hume Freeway	Westwards	Not 6 lane - where does it go?	removed, but local connector left in for centroid access

Road Name	From	To	Stakeholder Comment	Change made
Mickleham Road	Donnybrook Road	Northwards	No need for 6 lanes	4 lanes to Old Sydney Road
-	OMR	Northwards	Question need for 6 lanes	6 lanes
Hume Highway	Craigieburn Rd	Western Ring Rd	Should be arterial. Is it 6 lanes the whole way or just south of Somerton?	6 lane arterial to metro Ring Road
Barry Road	Across Hume Freeway		Suggest not feasible.	Link not added as wouldn't go anywhere
Lancefield Road	Sunbury Road	Northwards	Should 6 lanes not 4	6 lanes
William St	Northern Hwy	Just before Hume	No connection to Hume Fwy	2 lane local connector
William St	Northern Hwy	West	Wallan	4 lane arterial
Northern Highway	Hume	Kilmore	Wallan	4 lanes
New Local connector	William St	Watson St	Wallan	2 lane local connector
Watson St	Northern Hwy	Epping Kilmore Road	Grade sep not possible	4 lanes
Epping Kilmore	Watson St	North		2 lane rural arterial
Epping Kilmore	Watson St	South	see no. 5 from Whittlesea	4 lane arterial
North South Arterials	Hadfield	Watson St	North south arterials either side of rail line	4 lanes
Hadfields Road			Entire length	4 lanes and grade seperated
Beveridge Road			Entire length	4 lanes and grade seperated, Freeway interchange added
Stewart Street	OMR	north		4 lanes north of OMR
Hume fwy/OMR interchange				Access restoration roads kept for ultimate network
Beveridge interchange				Interchange relocated
E14 (Aitken Blvd)	Taylors Road	Merrifield (DonnyBrook Road		6 lanes
E14 (Aitken Blvd)	Merrifield (DonnyBrook Road	South	Transit lanes	6 lanes
Old Sydney Road	Taylors Road	Gunns Gully Road		4 lanes
Old Sydney Road	Gunns Gully Road	north		rural 2 lane arterial
Gunns Gully Road	connection to Scanlon			6 lanes
east west road			south of Donnybrook, west of Scanlon	4 lane arterial, not connector
Masons Road	OMR	East		4 lanes
BodyCoats rd				4 lanes
Edgars Rd	O'herns	South	kept as 4 for consistency	4 lanes
Harvest Home Road			remove arterial section west of scanlon, and east of OMR	4 lanes
Hume Hwy	length			6 lane arterial, not highway
Cooper St	Edgars Road	Hume Hwy		6 lanes
Cooper St	Edgars Road	East		4 lanes

Road Name	From	To	Stakeholder Comment	Change made
O herns road			entire length	4 lanes
High st			see Epping Road directly below	4 lanes
Epping Road	Cooper Street	Watson St		4 lanes
Mcdonalds Road				4 lanes
Bindts Road				4 lanes
O'herns road			West of Hume Fwy (Bridge over creek)	remove
Edgars Rd	O'Herns Road	North		2 lane
North South	North off Craigieburn road		between Edgars and Epping	4 lanes
east west road	North of Craigieburn Road			4 lanes
Harvest Home Road				
East West connector			West of Wallan	Link removed
New north south connector	Watson St	William St		Connector added
OMR/Hume Fwy interchange, remove access restoration roads.				Access roads retained in network.
Edgars Road	O'Herns Road	South	6 lanes	Retained as 4 lanes. Not clear where 6 lanes will end
Atwood Conenctor			Not mentioned, but not in GAA network	removed
Hume/OMR interchange		Done	Delete the 2 roads coded as 2 lane arterials that run north south at the Hume/OMR interchange.	Deleted
Donovans Lane	All		Delete Donovans Lane and the collector distributor roads at the Hume/OMR interchange	Deleted
Stewart Street	1km South of OMR	1km north of OMR	Extend the 6 lane section on Stewart Street further north to the first intersection north of the OMR/E6	Extension of 6 lane section
Northern Highway/Hume Fwy interchange			Check the Northern Highway/Hume Fwy interchange – it looks like there is a 6 lane road, a collector road and freeway ramps overlain	Off ramps reduced from 3 lanes to 1 lane per direction
Brookville Drive			The collector road shown on the current Brookville Drive alignment should be deleted. Brookville Drive is realigned to intersect with Dwyer Street at Donnybrook Road and is a 6 lane road (as shown correctly on your plan)	Link to Donnybrook Rd broken
Sunbury north and south orbital			Not that it matters much, but let's code the two new creek crossings in Sunbury (ie north of and south of Sunbury township) as 2 lanes within general four lane roads	Bridges coded as 2 lanes
Various			Change the roads in Diggers Rest to collectors, aside from Vineyard Road and Diggers Rest – Comodai Road	Changed to collectors
			The road between Sunbury and	Removed

Road Name	From	To	Stakeholder Comment	Change made
			Craigieburn will probably carry too much traffic if left as a 2 lane arterial – may need downgrading	
Various			A couple of funny bits of two lane arterials in Whittlesea – please clean these up	Changed
Findon Road/O'Herns Road			Should be coded as a 4 lane arterial	4 lanes
Epping Road	O'Hern's Road	Craigieburn Road East	To be coded as a 6 lane road or whatever is in the 2046plus VITM network	4 lanes
			The road network in South Sunbury should be essentially deleted outside the Urban Growth Boundary	Collectors removed around Bulla-Diggers Rest Road
			Delete the short blue north-south link north of Hadfields Road and to the east of the Hume Freeway (just north of the Whittlesea boundary corner)	Deleted
			Have you got new train stations at Beveridge & Lockerbie in the 2046 model	Confirmed
Harvest Home Road	all		Code as 4 lane arterial	4 lanes
			Reduce 2 lane arterials to collectors around Lalor	coded as collectors
Patullos Lane	Train line	Hume Highway	Remove	Removed
The Lakes Boulevard	Gordons Road	Plenty Road	Include as collector	Included as collector
Melbourne-Lancefield Road	Sunbury North Station	North of Model	Reduce to 4 lane arterial	4 lanes
Redstone Hill Road	Orbital link to Melbourne-Lancefield Rd		Orbital route rather than link to Sunbury Rd east of Melboure-Lancefield Road	Orbital as 4 lane arterial
			Additional collector into Folkestone	Added
South Station Road	Macsfield Road	Next road south	Delete	Deleted
New connection	South of OMR	Scanlon St	Add 2 lane arterial	Added
E14 (Aitken Blvd)	Johnstone St	Western Ring Rd	Stop E14 at Johnstone St (Johnstone St at 4 lanes)	Removed (Johnstone St at 4 lanes)
West Gate Bridge	East side	West side	Code as 5 lanes per direction as per the recent upgrade	Changed to 5 lanes
West Gate Tunnel	East side	West side	Remove link - tunnel will never be built	Deleted
Main St			Improve distribution of traffic around Broadmeadows shopping centre	Centroid moved closer to Main st, connectors re-arranged
Station St	Horne St	Barkly St	Increase attractiveness of Station St to reflect observed conditions	Level crossing delay halved
Barkly St	Station St	Riddel's Road	Upgrade to reflect signed route to Sunbury Rd	Changed linkclass, posted speed increased to 60km/h
APAC Drive On Ramp	APAC Drive	Tullamarine Freeway	The bridge is currently under construction, and shown as a dotted line in the Melways (Mel Ref 5 E6)	Added to network

APPENDIX C

Final 2046 VITM road network maps

Refer to *AppendixC_Road Networks.pdf*

APPENDIX D

VITM outputs – highway volumes, volume/capacity ratios and public transport patronage.

Refer to *AppendixD_2046outputs.pdf*

APPENDIX E

2046 constrained PT sensitivity test outputs

Refer to *AppendixE_constrained.pdf*

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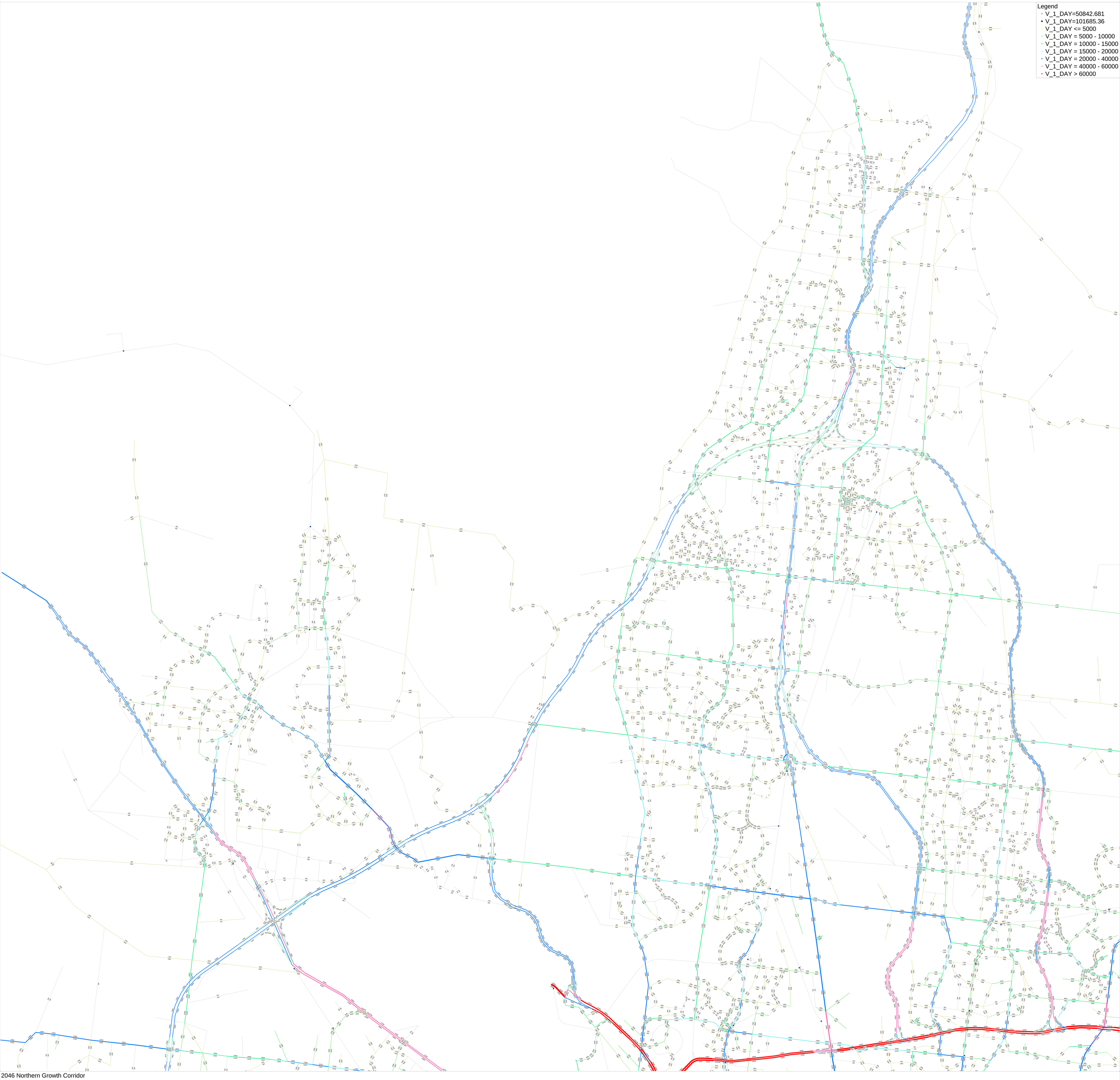
Daily Traffic Volumes (24 hours)
Northern Growth Corridor



2046 Northern Growth Corridor
Blue circles represent train stations

N

Number of households per zone

2,000 to 6,000
1,000 to 2,000
600 to 1,000
300 to 600
0 to 300

Arterial Road

Freeways and highways

Rail network

N

Employment by zone

5,000 to 10,000
1,500 to 5,000
600 to 1,500
300 to 600
0 to 300

Arterial Road

Freeways and highways

Rail network

CORRIDOR MODELLING 03/04/2012

SCALE 1:40,000 @A0

FREEWAY
6 LANE ARTERIAL
4 LANE ARTERIAL
CONNECTOR STREET
RAILWAY LINE
RAILWAY STATION

Cooper Street :
— 6 lanes to Edgars Rd
— 4 lanes east of Edgars Rd

O'Herns Rd & Findon Rd = 4 lanes

High Street & Epping Rd = 4 lanes

suggest 4 lanes max

suggest 4 lanes max

Edgars Rd - north of O'Herns Rd = 2 lanes

suggest 4 lanes max

remain

remain

Harvest Home Rd = 4 lanes

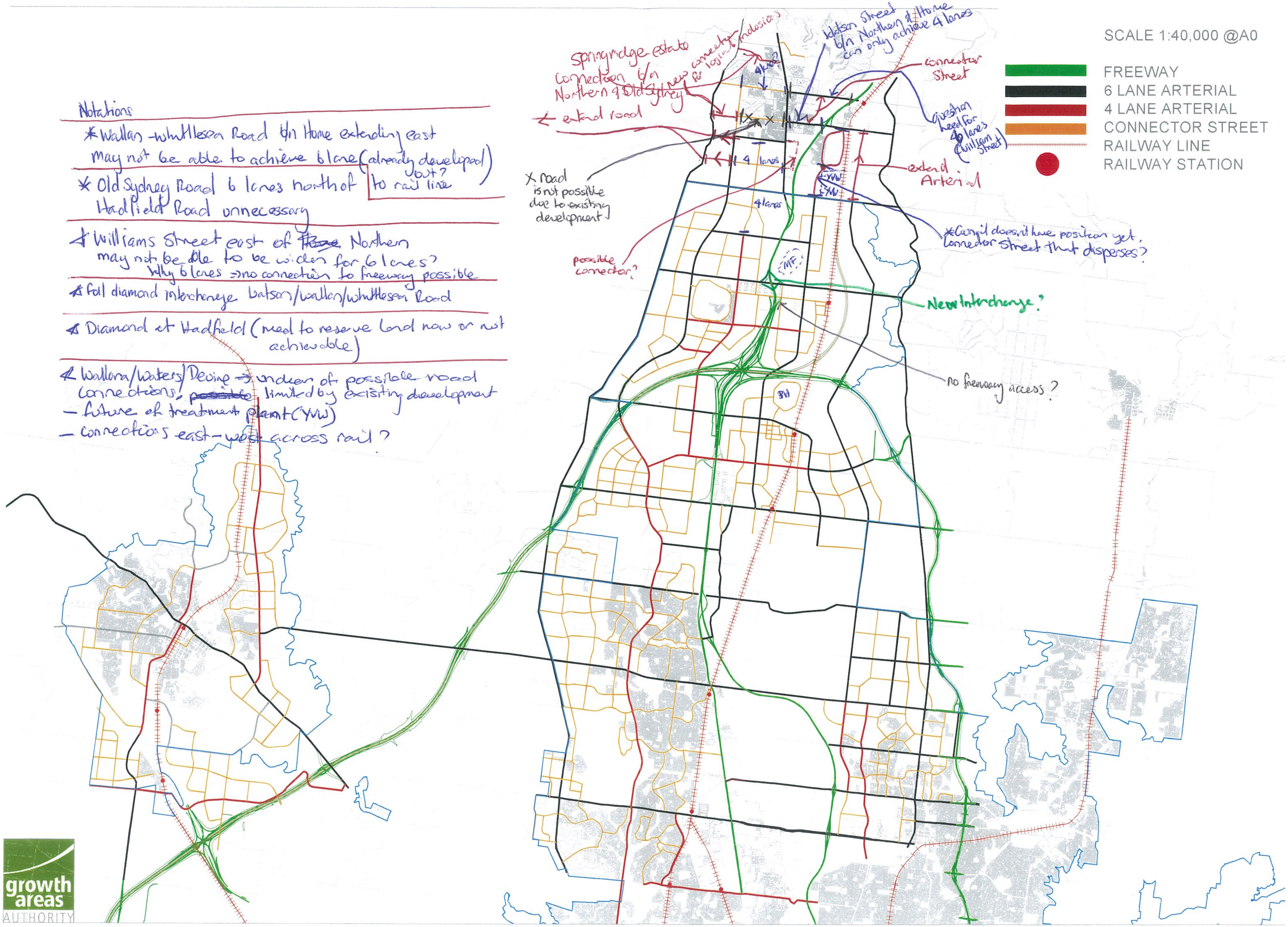
Bindts Road = 4 lanes

McDonalds Rd = 4 lanes

growth areas AUTHORITY

SKM growth areas AUTHORITY

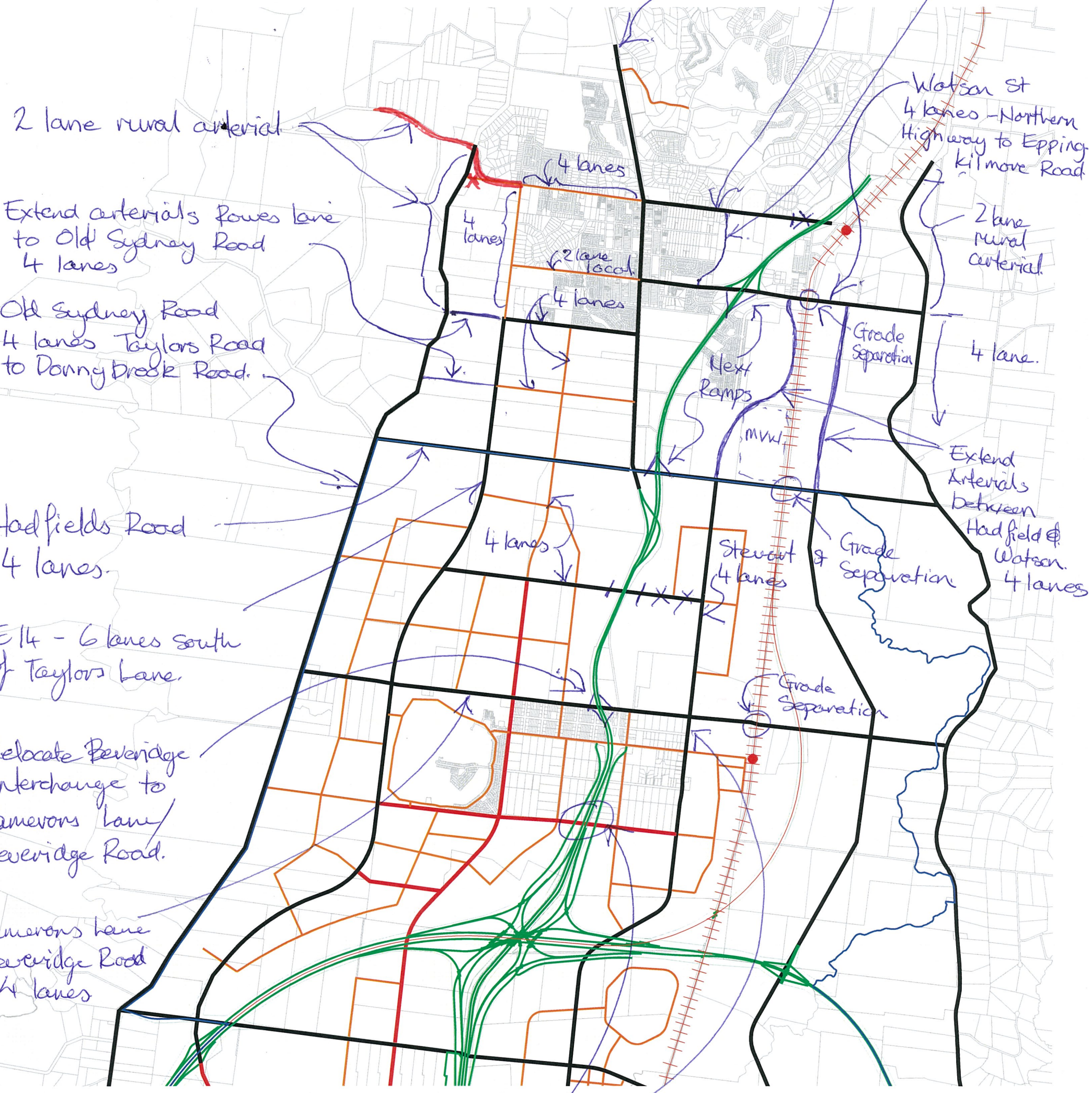
VITM 2046 Plus Road Network


SCALE 1:40,000 @A0
FREEWAY
6 LANE ARTERIAL
4 LANE ARTERIAL
CONNECTOR STREET
RAILWAY LINE
RAILWAY STATION
Notations
* Wallan-Whittlesea Road b/n Hume extending east may not be able to achieve 6 lane (already developed out?) to rail line
* Old Sydney Road 6 lanes north of Hadfield Road unnecessary
* Williams Street east of Northern may not be able to be widen for 6 lanes? Why 6 lanes => no connection to freeway possible
* Full diamond interchange Watson/Wallan/Whittlesea Road
* Diamond at Hadfield (need to reserve land now or not achievable)
* Wallara/Waters/Devine => unclear of possible road connections, limited by existing development
– future of treatment plant (YVW)
– connections east-west across rail?
Springridge estate connection b/n Northern & Old Sydney
new connector for logical inclusion
extend road
4 lanes?
4 lanes
4 lanes
X road is not possible due to existing development
possible connector?
Watson Street b/n Northern & Hume can only achieve 4 lanes
connector Street
Question need for 4 lanes (William Street)
extend Arterial
YVW
YVW
*Council doesn't have position yet. Connector street that disperses?
MF
New Interchange?
no freeway access?
BH
growth areas AUTHORITY

William St - 2 lane local collector
No connection to Hume.

Northern Highway 4 lanes - Hume Freeway to Kilmore.

New 2 lane local collector between William & Watson St



Extend arterials Bowes Lane to Old Sydney Road 4 lanes

Old Sydney Road 4 lanes Taylors Road to Donnybrook Road.

Hadfields Road 4 lanes.

E14 - 6 lanes south of Taylors Lane.

Relocate Beveridge Interchange to Camerons Lane/ Beveridge Road.

Camerons Lane Beveridge Road 4 lanes

Rankin St Interchange & extent of 6 lanes for Stewart St - Refer Vicroads NE Metro Comments.

Legend
Revised Network AM VITM
- Freeway
- Local/collector
- 2 Lane Arterial
- 4 Lane Arterial
- 6 Lane Arterial

show lane configuration ???

Remove Access Roads

4L

Link to Melb Lansfield Rd.

HUME

Epping Rd North of Grants Rd 2L

New connection to Scanlon St. 4L refer GCP

New Link to Grants Rd. 4L refer GCP

Epping Rd WHITTLESEA to Donnybrook Rd 6L

Epping Rd south of Donnybrook Rd 6L

6L

4L

NILLUMBI

N

0 1 2 3 4 5 km

SKM

growth areas AUTHORITY

Transit Lanes Remove connection to MBO - refer GCPs.

Updated VITM Road Network

Legend

2046 VITM Network

- Local/collector
- 2 Lane Arterial
- 4 Lane Arterial
- 6 Lane Arterial
- Train Line

HUME

WHITTLESEA

NILLUMBI

N

0 1 2 3 4 5 km

SKM

growth areas AUTHORITY

Updated 2046 VITM Road Network

Legend

2046 VITM Network

- Freeway
- Local/collector
- 2 Lane Arterial
- 4 Lane Arterial
- 6 Lane Arterial
- Train Line

HUME

WHITTLESEA

NILLUMBI

N

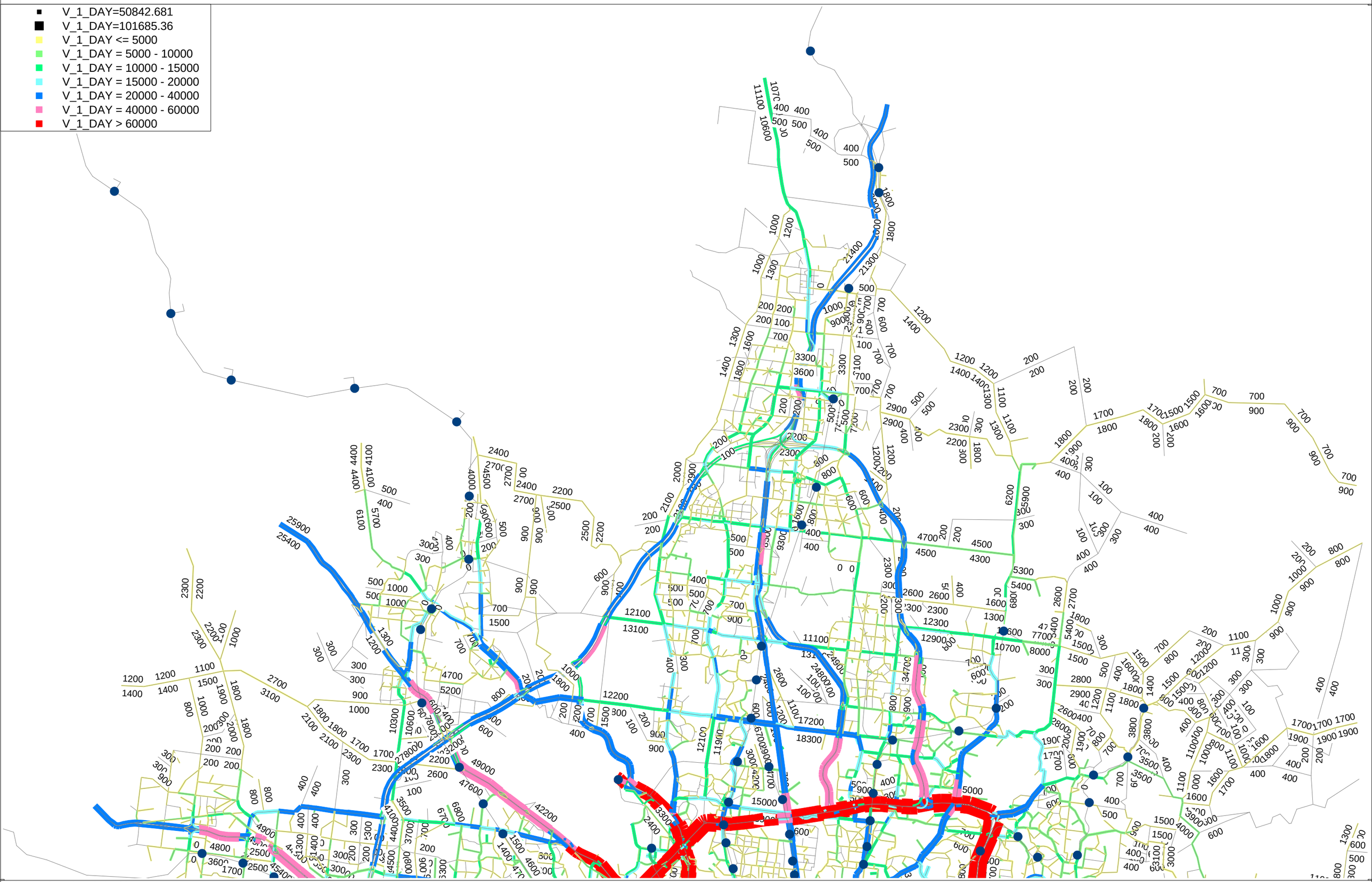
0 1 2 3 4 5 km

SKM

growth areas AUTHORITY

Updated 2046 VITM Road Network

Daily Traffic Volumes (24 hours)
Northern Growth Corridor



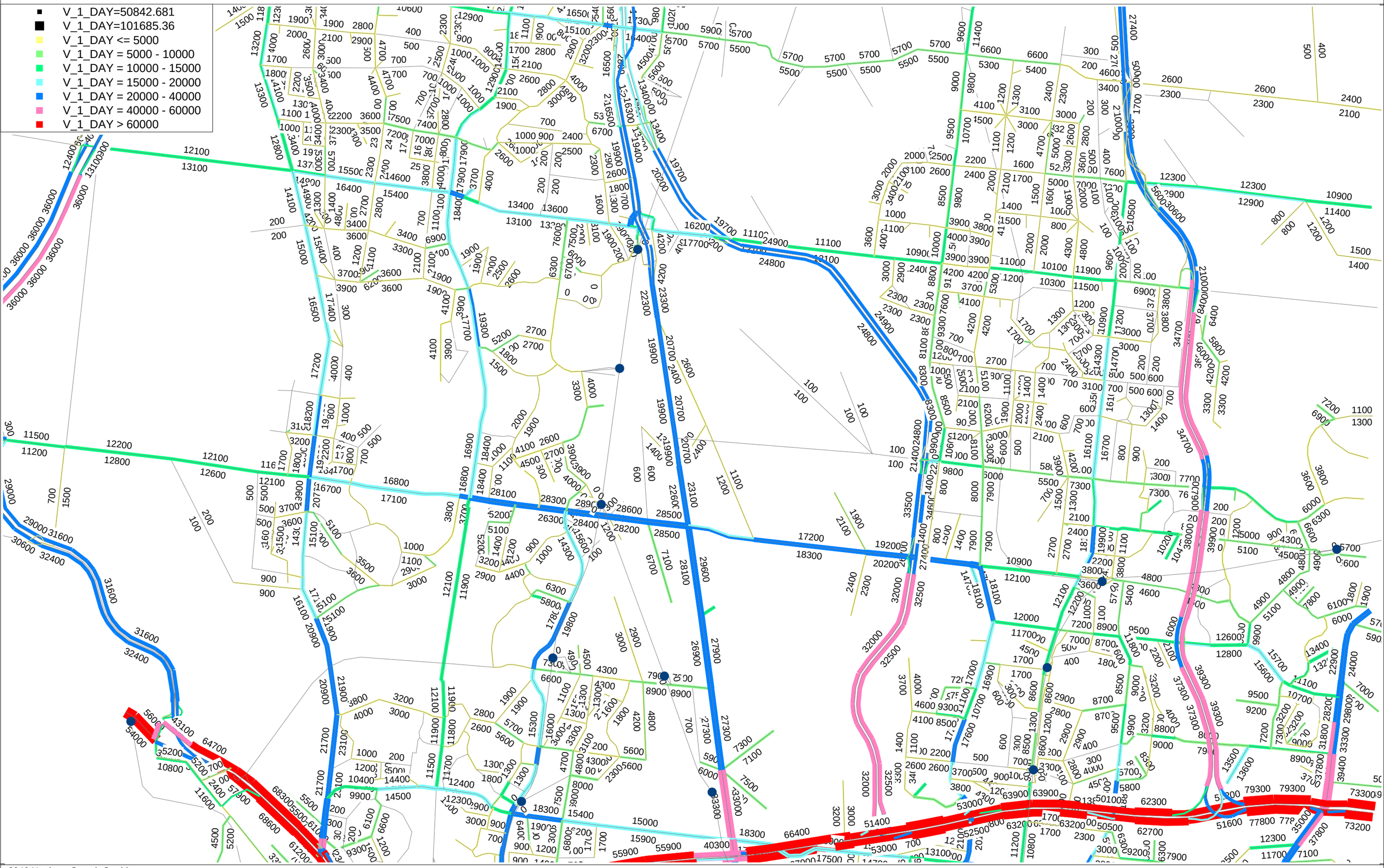
2046 Northern Growth Corridor
Blue circles represent train stations

Daily Traffic Volumes (24 hours)
Northern Growth Corridor
Hume Corridor North

2046 Northern Growth Corridor
Blue circles represent train stations

cube

Daily Traffic Volumes (24 hours)
Northern Growth Corridor
Hume Corridor South



2046 Northern Growth Corridor
Blue circles represent train stations

cube

Daily Traffic Volumes (24 hours)
Northern Growth Corridor
Sunbury

2046 Northern Growth Corridor
Blue circles represent train stations

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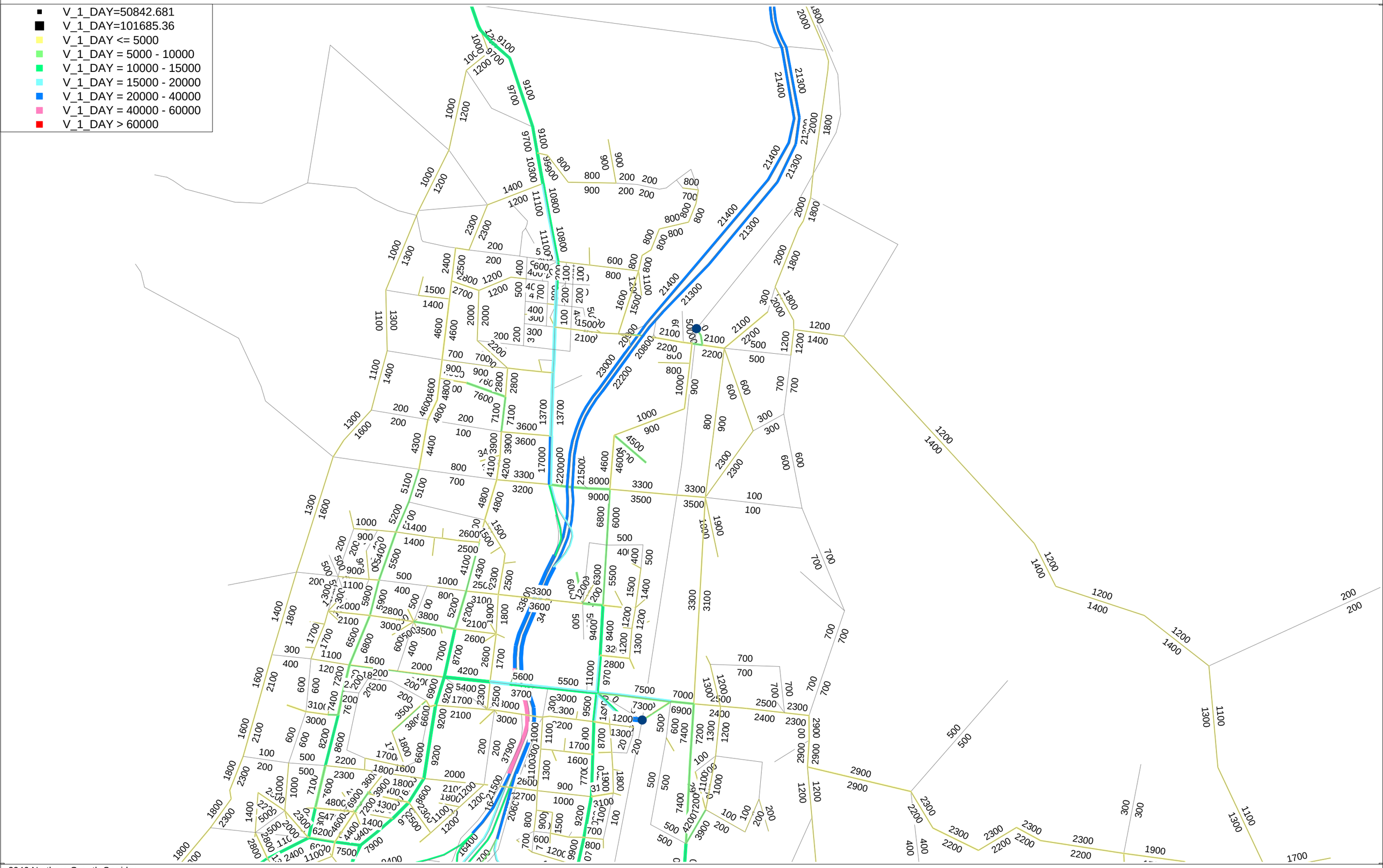
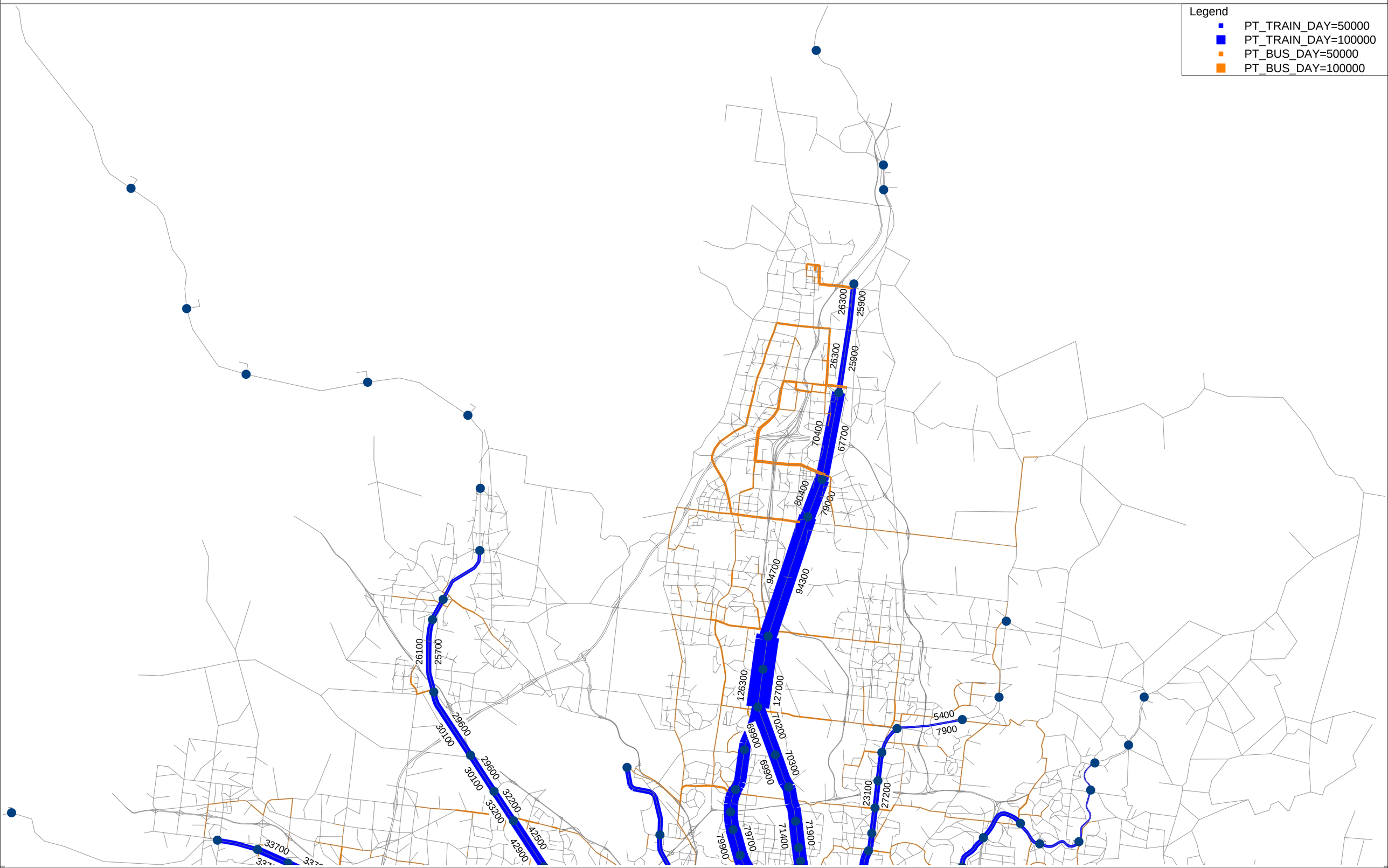
Daily Traffic Volumes (24 hours)
Northern Growth Corridor
Wallan



2046 Northern Growth Corridor
Blue circles represent train stations

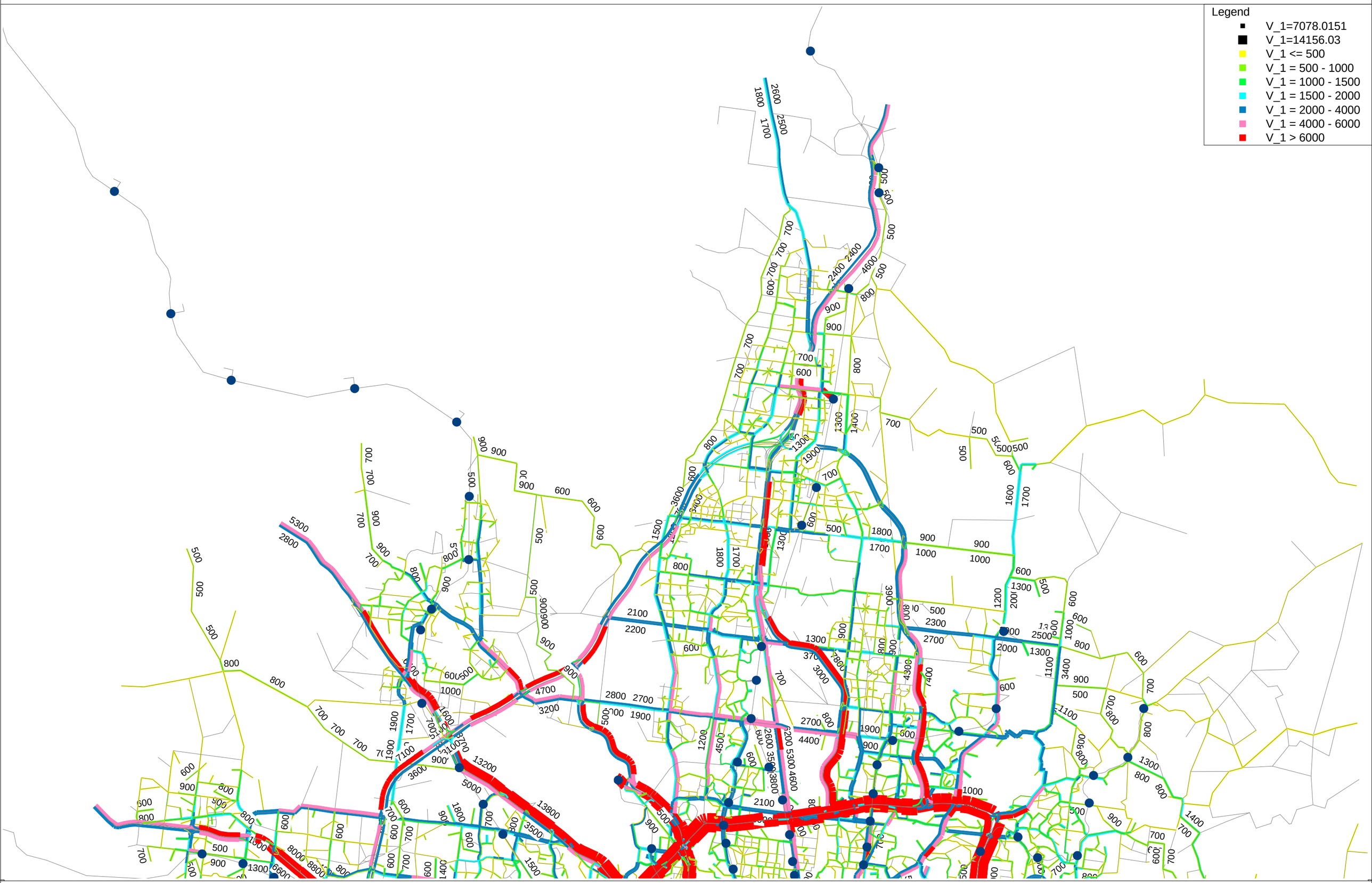
Daily Public Transport Patronage (24 hours)
Northern Growth Corridor



2046 Northern Growth Corridor
Blue bandwidths = rail volumes
Orange bandwidths = bus volumes
Blue circles = train stations

cube

AM Peak Traffic Volumes (7-9am)
Northern Growth Corridor



2046 Northern Growth Corridor
Blue circles represent train stations

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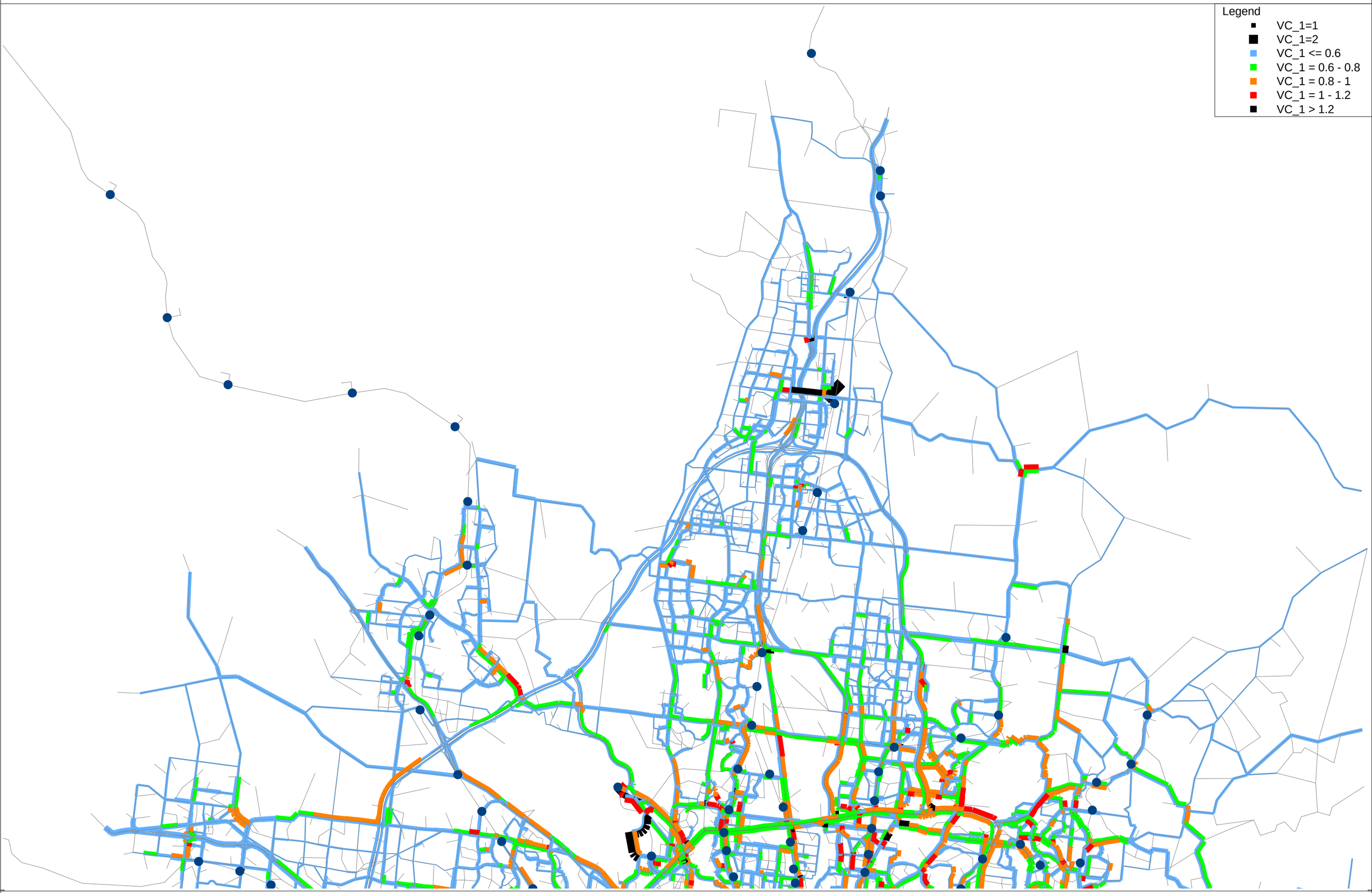
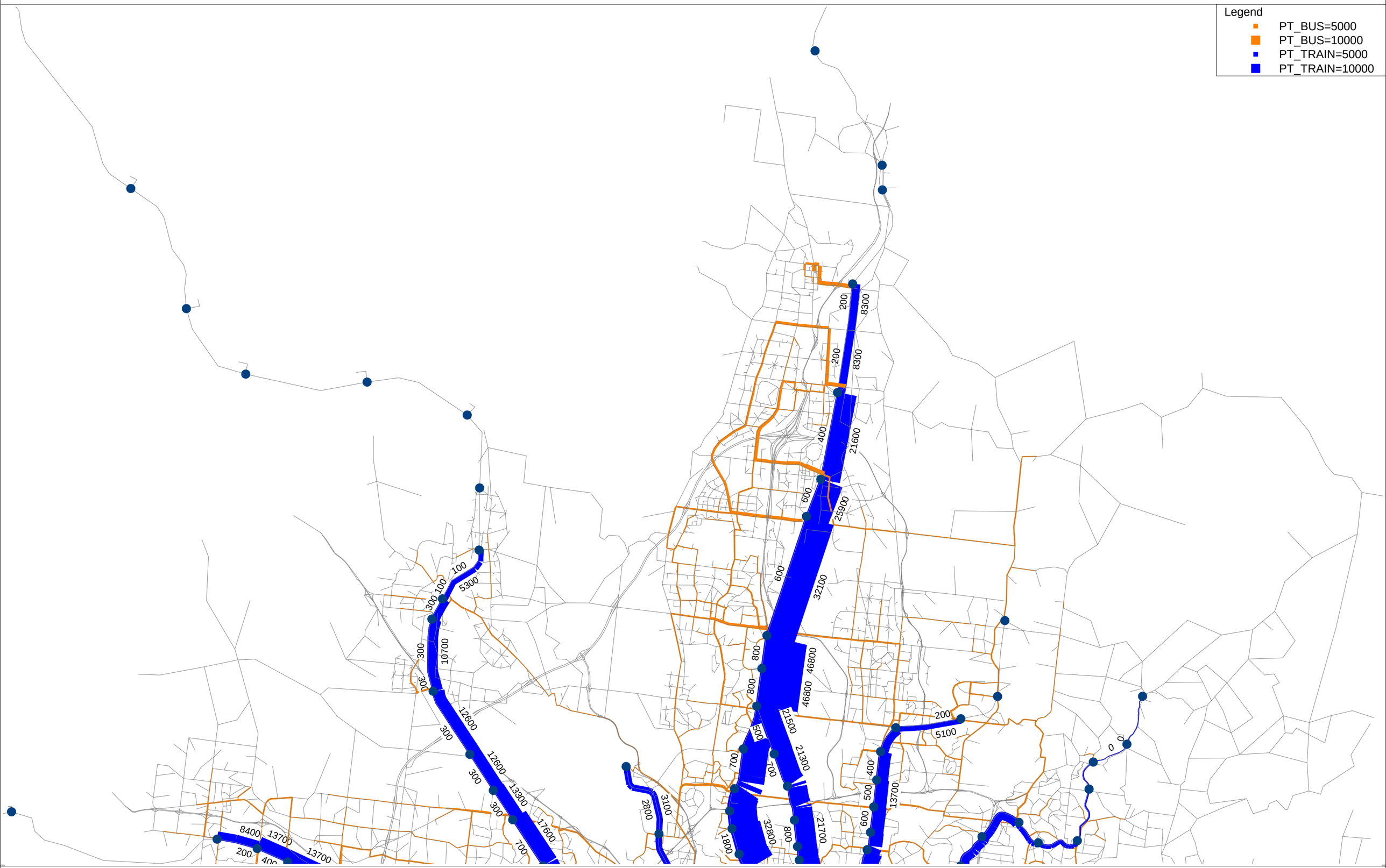
Volume/Capacity Ratios (AM Peak, 7-9am)
Northern Growth Corridor



AM Public Transport Volumes (7-9am)
Northern Growth Corridor



2046 Northern Growth Corridor
Blue bandwidths = rail volumes
Orange bandwidths = bus volumes
Blue circles = train stations

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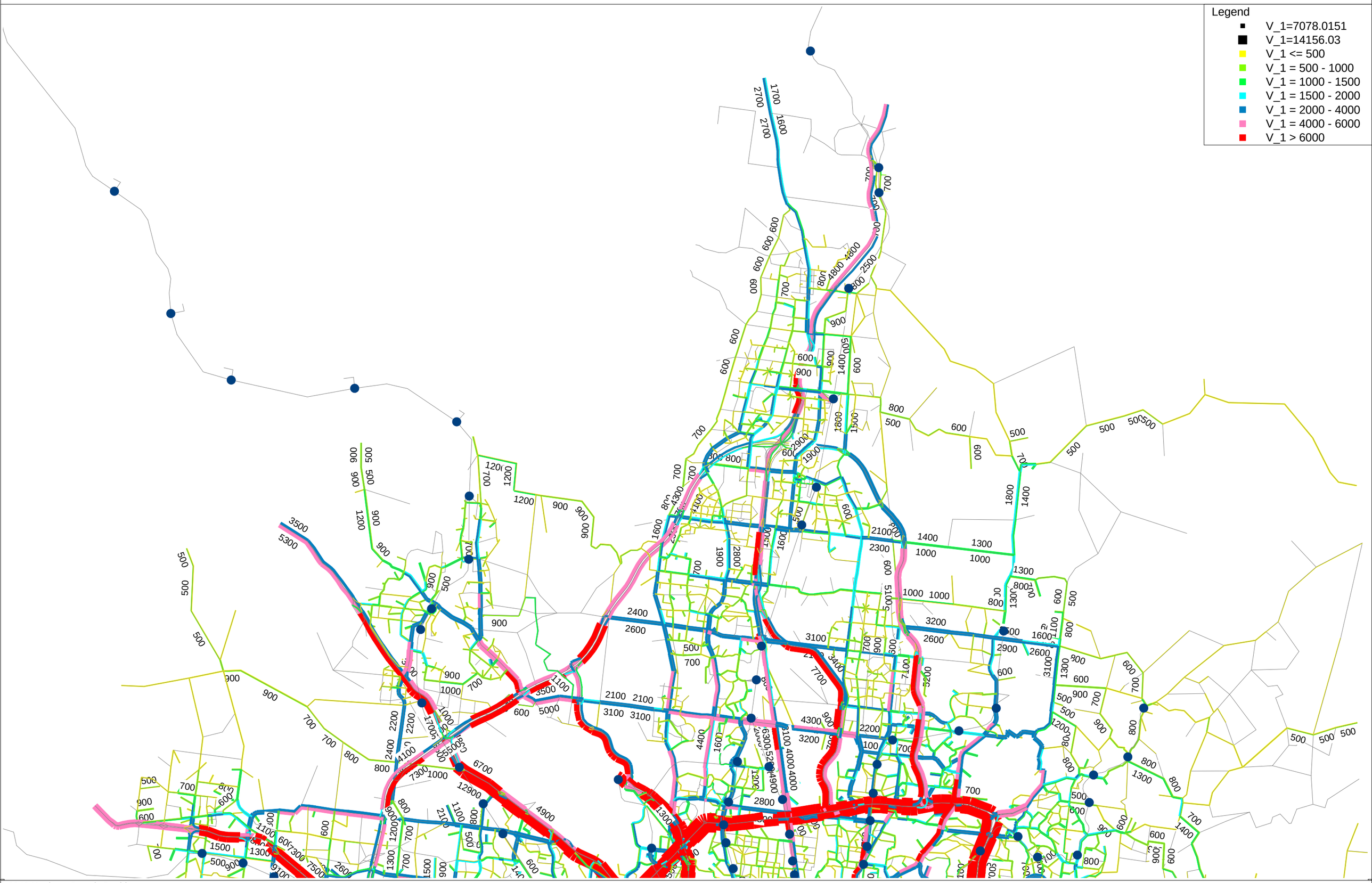
PM Peak Traffic Volumes (3-6pm)
Northern Growth Corridor



2046 Northern Growth Corridor
Blue circles represent train stations

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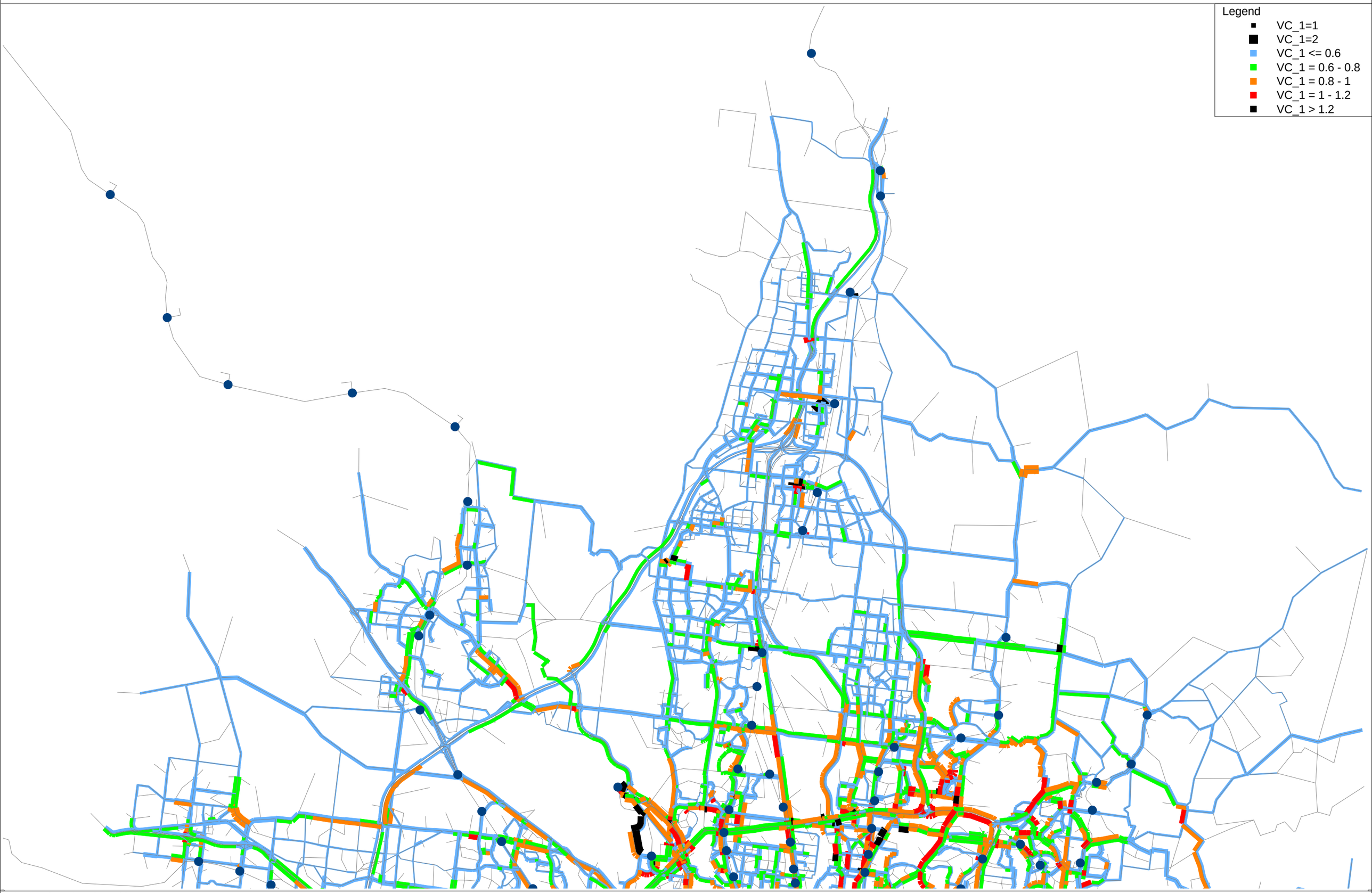
Volume/Capacity Ratios (PM Peak, 3-6pm)
Northern Growth Corridor



2046 Northern Growth Corridor

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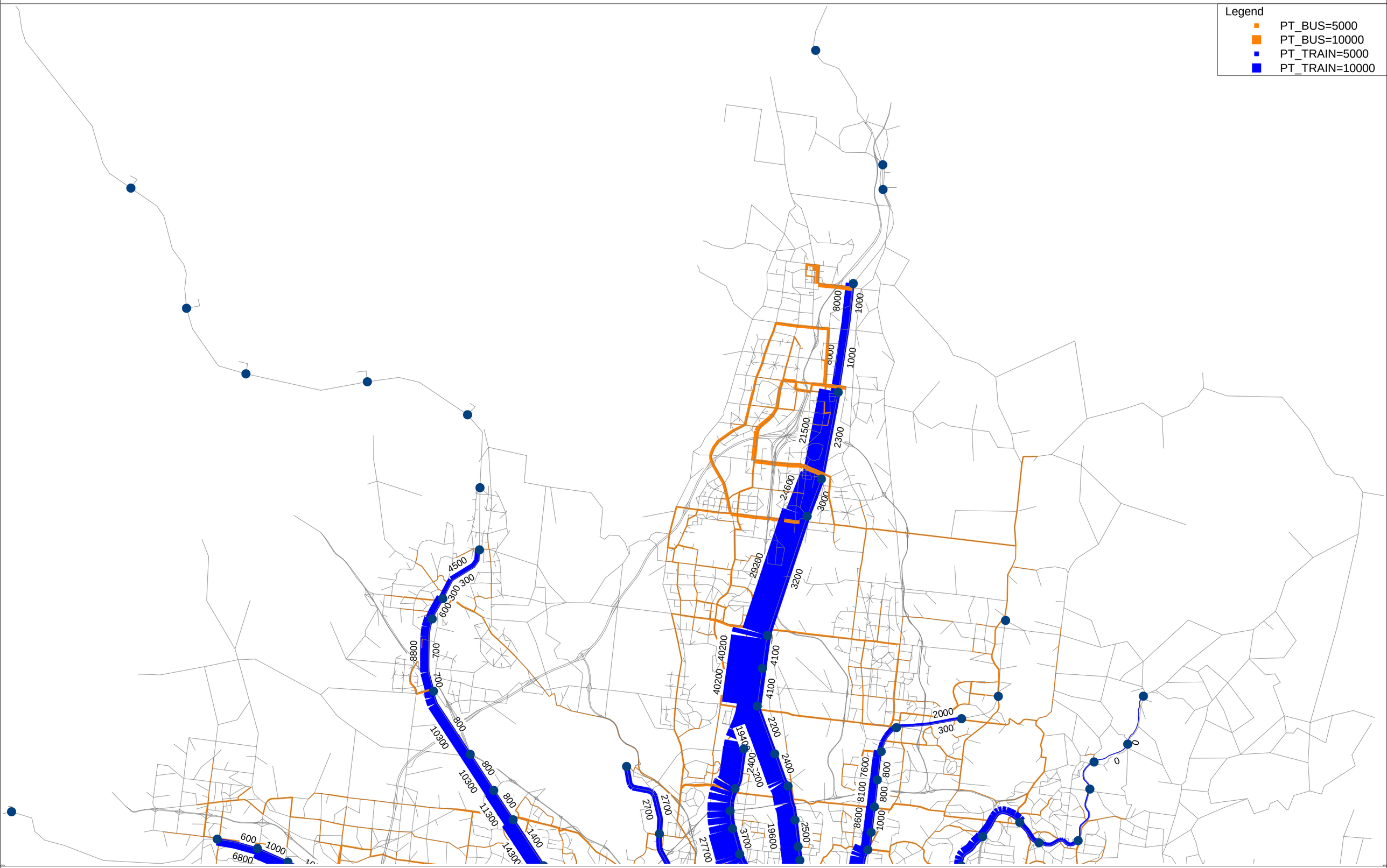
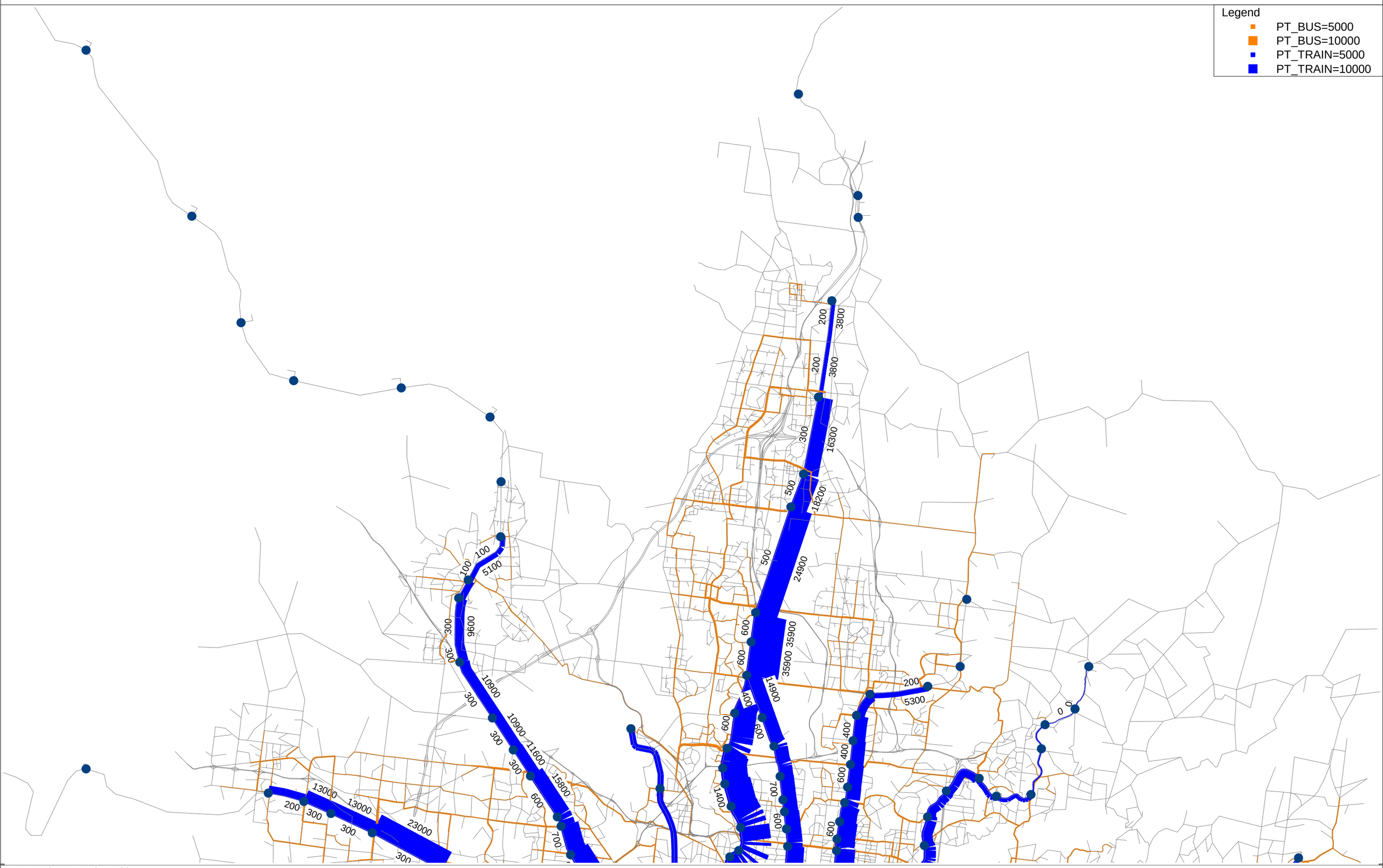
PM Public Transport Volumes (3-6pm)
Northern Growth Corridor



2046 Northern Growth Corridor
Blue bandwidths = rail volumes
Orange bandwidths = bus volumes
Blue circles = train stations

cube

AM Public Transport Volumes (7-9am)
Northern Growth Corridor - Constrained PT scenario



2046 Northern Growth Corridor
Blue bandwidths = rail volumes
Orange bandwidths = bus volumes
Blue circles = train stations

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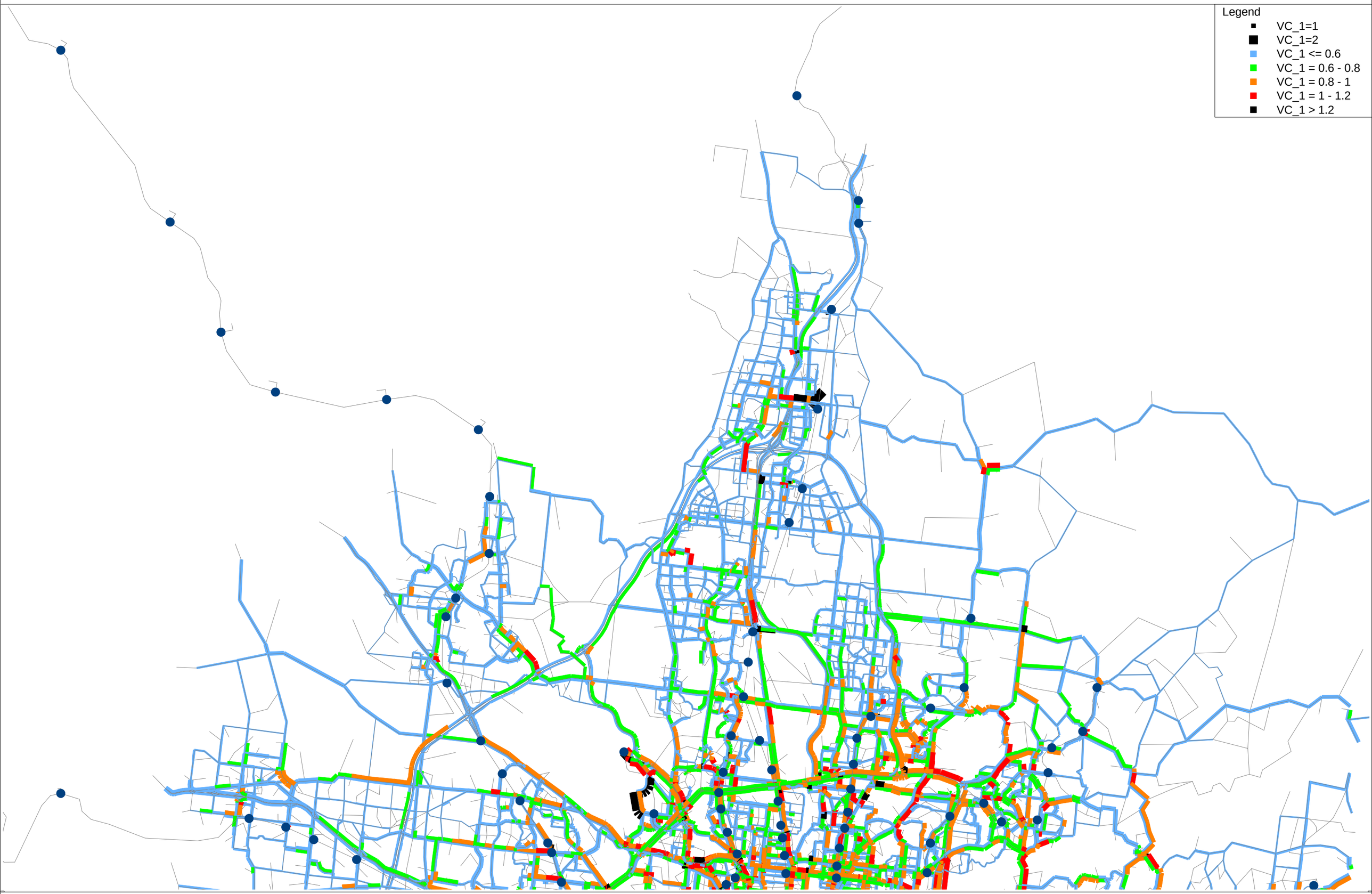
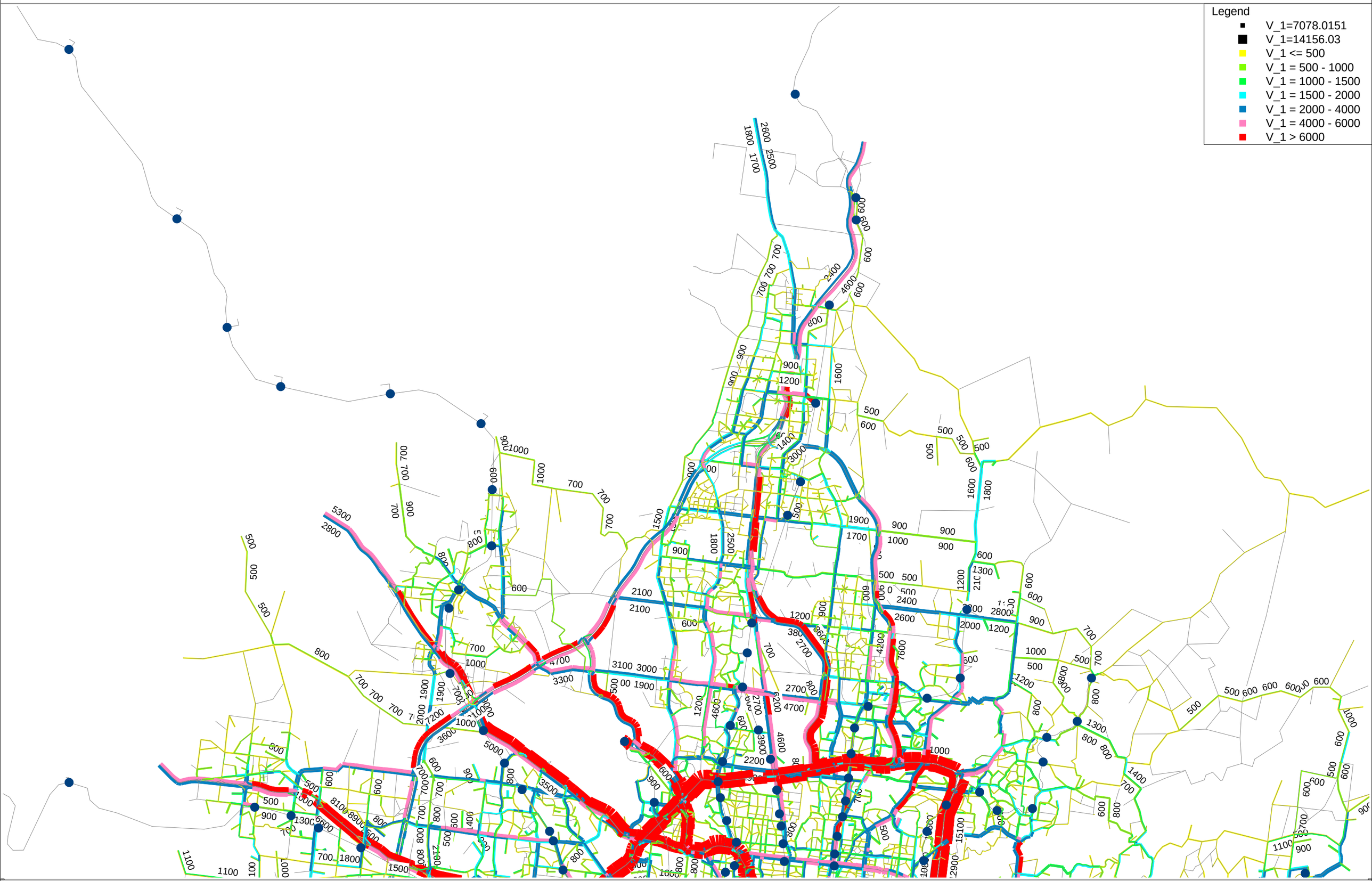
Volume/Capacity Ratios (AM Peak, 7-9am)
Northern Growth Corridor - Constrained PT scenario



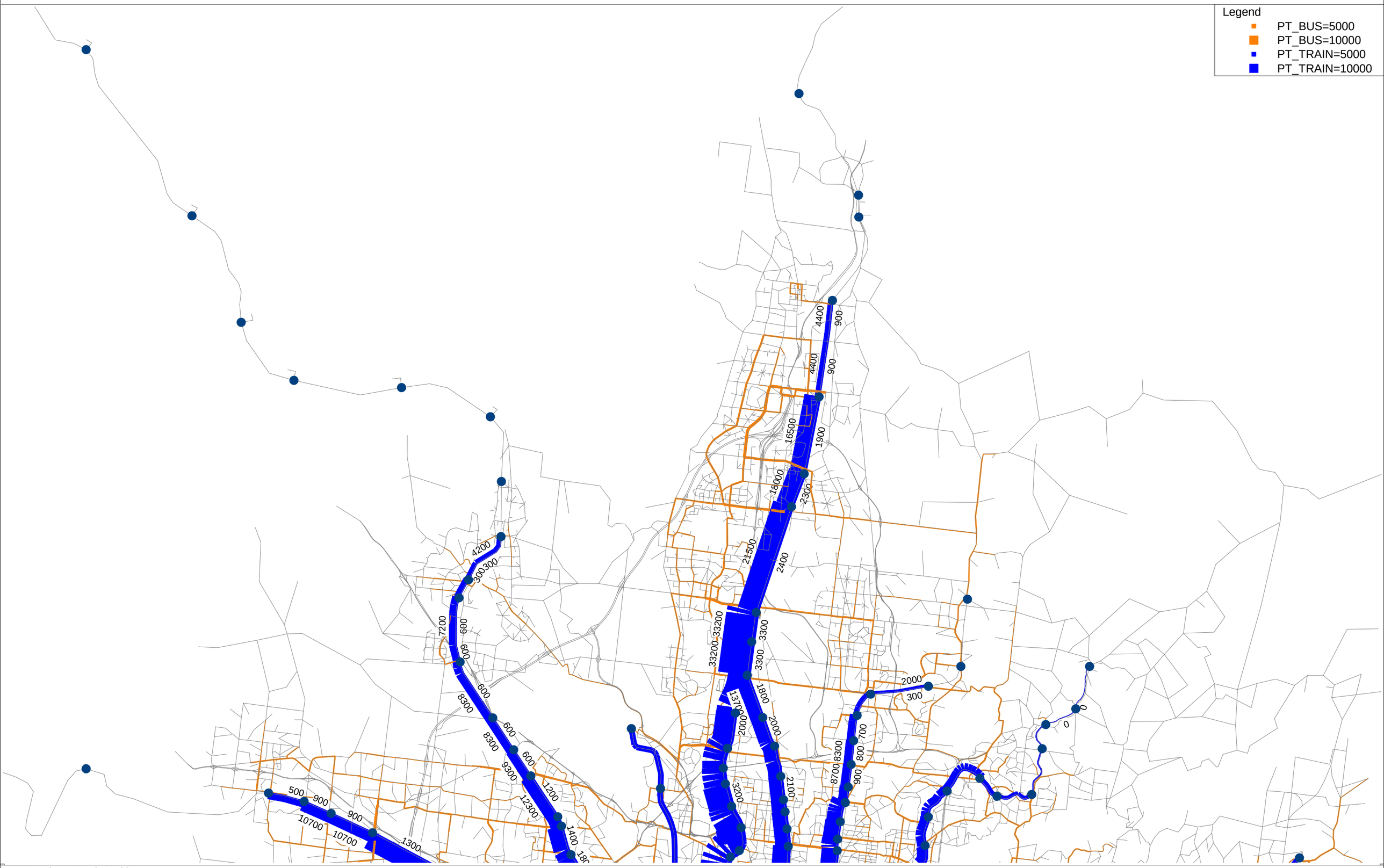
AM Peak Traffic Volumes (7-9am)
Northern Growth Corridor - Constrained PT scenario



2046 Northern Growth Corridor
Blue circles represent train stations

cube

PM Public Transport Volumes (3-6pm)
Northern Growth Corridor - Constrained PT scenario



2046 Northern Growth Corridor
Blue bandwidths = rail volumes
Orange bandwidths = bus volumes
Red circles = train stations

cube