Officer South Employment PSP – Transport Modelling Assessment

Final Report

Victorian Planning Authority

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→ The Power of Commitment

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Contents

Table index

Figure index

1. Introduction

1.1 Background

GHD has been engaged by the Victorian Planning Authority (VPA) to undertake strategic transport modelling to inform the preparation of the Officer South Employment Precinct Structure Plan (PSP).

The PSP is located 45km south-east of Melbourne's CBD, at the edge of Melbourne's Urban Growth Boundary in Cardinia Shire Council. The PSP encompasses an area of 1,069ha, bounded by Cardinia Creek to the west, Princes Freeway to the north, Lower Gum Scrub Creek to the east and the Urban Growth Boundary to the south.

The PSP is being planned as a State Significant Industrial Precinct and a Regionally Significant Commercial Area and will include a residential community. At full build out it is anticipated the precinct will generate approximately 18,000-22,000 jobs and 1600 dwellings.

GHD has used the State Government's Victorian Integrated Transport Model (VITM) for this project, which is a recognised tool for forecasting future traffic volumes across Victoria. This model was previously developed by GHD as part of the Major Road Projects Victoria (MRPV) Thompsons Road Extension Business Case (TREBC).

This model assesses future transport demands using land use and infrastructure upgrade predictions to arrive at an estimate of future traffic volumes under different scenarios.

1.2 Purpose of this report

This report summarises the strategic transport model review, details the update of road network and demographic data in the VITM and discusses the modelled base and future traffic conditions around the study area of this project. The road network and demographic data have been refined to ensure they are consistent with land use forecasts supplied by the VPA, DoT and Councils. Maps of the demographic data and network, including centroid connectors, and base and future traffic volumes have been provided to and reviewed by VPA and other stakeholders prior to the preparation of this report. This report documents the data with updates suggested by VPA and other stakeholders.

The purpose of the report is to:

– Establish a reference base line of existing traffic conditions in the Officer South Employment Precinct and surrounding south east growth corridor precincts.
– Develop a model to test traffic conditions in the Officer South Employment Precinct and surrounding precincts at full development of the south east growth corridor
– Generate traffic forecast outputs that can be used to inform transport infrastructure provision in the Officer South Employment precinct.

In particular, the following items are addressed in this report:

– Review and update the zone inputs where appropriate and within Officer South Employment PSP and disaggregate the zones to reflect the proposed land use form and any barriers to movement, etc that should be accounted for in the model.
– Recommend adjustments/refinements to better reflect the proposed PSP urban structure and ensure the surrounding land uses and road network reflects actual and proposed conditions as far as possible.
– Nominate PSP centroid connectors to provide appropriate connectivity for the new networks.

Although the VITM covers the whole of Victoria, only data and results around the study area are presented in this report.

1.3 Scope and limitations

This report has been prepared by GHD for VPA and may only be used and relied on by VPA for the purpose agreed between GHD and VPA as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than VPA arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by VPA and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.4 Glossary of terms

The key terms and abbreviations used in this report are provided in Table 1.

Table 1 Key terms and abbreviations

Term	Description
Centroid connector	A connection in which traffic is loaded from a model zone to a network
Four-step model	A model structure commonly used in a strategic model to derive travel demand and assign it to a transport network. The four steps comprise trip generation, trip distribution, mode choice and trip assignment.
Free flow speed	The measured mean speed of traffic in low traffic flow conditions.
Model calibration	Calibration involves estimating the model parameters so that the modelled output, such as traffic volumes and patronage estimates, replicate the surveyed data.
Model validation	Validation is the process of comparing model output against independently measured data that was not used during the calibration process. The purpose of validation is to verify that a model has been correctly calibrated and is therefore capable of producing valid forecasts for proposed scenarios.
Model zone	An area in a transport model where the demographic data are defined, and trips are estimated.
MRPV	Major Road Projects Victoria, the government authority that was responsible for the Thompsons Road Extension Business Case.
Reference case	Future networks, demographics and other model parameters assumed in a strategic model
Strategic model	A strategic model covers large areas generally with limited detail. They use analytical techniques to determine delay and travel time. Strategic models are generally multi-modal models that examine broad transport demands.
TREBC	Thompsons Road Extension Business Case, the project where the VITM was sourced for the Officer South Employment PSP Transport Modelling Assessment
Victorian Integrated Transport Model (VITM)	A strategic model developed by the Department of Transport covering the whole of Victoria.
Volume/capacity ratio	Ratio of traffic volume to the capacity, indicating the congestion level of a road. Table 2 shows the relationship between volume/capacity ratio and traffic flow characteristics.

Table 2 Volume/capacity ratio and traffic flow characteristics

V/C ratio	Traffic Flow Characteristics
≤ 0.6	Virtually free flow; completely unimpeded
0.6-0.7	Stable flow with slight delays; reasonably unimpeded
0.7-0.8	Stable flow with delays; less freedom to manoeuvre
0.8-0.9	High Density, but stable flow
0.9-1.0	Operating conditions at or near capacity; unstable flow
> 1.0	Forced flow, breakdown conditions

2. Strategic Transport Model Review

The VITM previously developed for the MRPV TREBC was refined, calibrated and validated for a study area around the extension corridor (Major Road Projects Victoria 2021). A review of this model was presented to the VPA, Cardinia Shire Council and Department of Transport (DoT) on Friday 20 August 2021. This included:

– Background of the MRPV TREBC project.
– Description of the existing network.
– Model validation.
– Future land use and network for the MRPV TREBC project.
– Model outputs.
– Model limitations.
– Model suitability and deficiencies.

The last two items are discussed further in the Sections 2.2 and 2.3.

2.1 The Victorian Integrated Transport Model

The VITM is a tool developed by the DoT to assist in the planning of road and public transport infrastructure for Victoria. The model provides forecasts of future traffic volumes on roads and public transport in Victoria.

The original model, known as Melbourne Integrated Transport Model or MITM, was based on travel data collected during the 1990s. It has since been progressively developed and enhanced over the years to the current form by the DoT (Transport for Victoria 2017).

The VITM is based on the common four-step process used by many strategic transport models around the world:

1. Trip Generation: sub-divides the area being studied into zones and calculates the number of a journeys that begin and end in each zone, depending on its land use, household and car ownership characteristics;
2. Trip Distribution: estimates the number of journeys between each pair of zones in the study area, depending on the separation between the zones (in terms of time and distance) and their relative generation and attraction potential;
3. Mode Choice: apportions the journeys between each pair of zones to different modes of travel, according to the relative attractiveness of using the alternative modes of travel (road and public transport); and
4. Assignment: allocates the journeys between each pair of zones to one or more routes between the zones, using the appropriate mode of travel.

In addition to these four main steps, there are a number of sub-models that provide further inputs to the process. For example, a freight movement model uses travel time and freight inputs from the model and outputs heavy vehicle demand matrices.

Features of the VITM include:

– Ten trip purposes (white collar work, blue collar work, shopping, social, primary education, secondary education, tertiary education, other home-based trips, employer-based and other non-home-based trips).
– Four time periods (AM peak, inter-peak, PM peak and off peak).
– Three vehicle types (car, light commercial vehicles and heavy vehicles).
– Three public transport modes (train, tram and bus).
– Base year of 2018 and seven forecast years (2021, 2026, 2031, 2036, 2041, 2046 and 2051).

For this Officer South project, the forecast year of 2051 is used for modelling the Officer South Precinct at full development.

2.2 Model limitations

There are limitations to the application of a strategic transport model (i.e., the VITM) in the assessment of transport scenarios. These limitations can be classified into the following broad groups:

– Scale limitations – Strategic models cannot model or provide insight to transport questions that are of a smaller scale than the model. For example, the VITM does not include individual driveways or detailed intersection geometry. Similarly, the VITM does not include all local roads or walkways (planned or existing). Therefore, care should be taken when interpreting results at individual road sections. Additionally, strategic models such as the VITM cannot be used to test queue lengths, signal timings or other operational requirements.
– Accuracy of the input assumptions – Strategic models cannot provide forecasts that are more accurate than the input data being relied upon. For example, the number of home-based work trips travelling to a particular zone is dependent on the number of jobs in that zone. Inaccuracies in the estimates of employment data will necessarily be passed through to the trip attraction model and hence total vehicle demand.
– Estimation of real-world behaviours – The mathematical relationships used by the model to estimate real world behaviours are necessarily simplifications of complex real world phenomena and are calibrated against a relatively small sample of observations. This qualification should be considered when interpreting and extrapolating model results.
– Future events are inherently uncertain – Regardless of the comprehensiveness and sophistication of the methodology used in the strategic modelling, the actual traffic or patronage outcomes will differ from the forecast. Moreover, the model does not take into account change of technologies, such as autonomous vehicles, on future traffic or recent changes in society such as COVID.

2.3 Summary of review of TREBC Model

Despite the limitations, the VITM is a still useful tool to evaluate future traffic conditions, which otherwise would be hard to obtain objectively by other means. The following is a summary of the review of the MPRV TREBC model:

– Validation: Model was well-validated, and of a scale generally fit to be used for the Officer South modelling.
– Zoning: The existing zoning in the VITM would be suitable for use for the Officer South modelling, with a resolution compatible to the density of the PSP connector road network.
– Land use: VITM land use assumptions are based on the Victoria in Future population projections produced by the Department of Environment, Land, Water and Planning. For the MRPV TREBC project, the 2051 employment data for the Officer South Employment Precinct was updated to align with Plan Melbourne. For the Officer South modeling, update would be required to align with PSP land use around the precinct.
– Network: The MRPV TREBC model would be the basis of Officer South modelling including the refined network and updated reference cases. For the Officer South modelling, update would be required to align with the planned PSP arterial and connector road network to be tested.

3. Zoning and Network

3.1 Study area

The study area of this project is the Officer South Employment PSP, although model outputs around the PSP have also been included. The PSP area is located to the south of Officer and encompasses an area of 1,069 hectares, bounded by Cardinia Creek to the west, Princes Freeway to the north, Lower Gum Scrub Creek to the east and the Urban Growth Boundary to the south. The PSP aligns closely with the VITM zone boundaries. Figure 1 shows extent of the PSP and the associated VITM zones. Centroid connectors and other details of the map are discussed in the following sections.

3.2 Modelling scenarios

Section 2.1 introduces the main features and the base and forecast years of the VITM. For each model year, there is a set of assumed network, demographic data and other model parameters used in the model. These assumed data and parameters form the Reference Case of the model. All modelling scenarios in this study and the TREBC project are based on the VITM Reference Case with modifications specific to the study area of the projects.

The following two scenarios are modelled in this study:

– **2018 Base**: the 2018 Base Case from the TREBC project with zoning modified to be compatible with the 2051 Option 1 scenario. It is included to gauge the growth of traffic in the 2051 Option 1 scenario.
– **2051 Option 1**: the ultimate network and land use based on the 2051 Base Case in the TREBC project but with updated land use and network for the Officer South Employment and surrounding PSPs as described in Section 4.

3.3 Transport zones

Figure 1 shows the VITM zones around Officer South Employment PSP. Also shown in Figure 1 are centroid connectors, indicating where traffic is loaded onto the network. Note the following about the centroid connectors:

– The centroid connectors are generally the same as those used for the TREBC project. However, the centroid connectors in the Officer South Employment PSP were relocated from the arterial road network to the PSP connector streets.
– Some VITM zones span both sides of Thompsons Road, as these zones were defined before the proposed alignment of the Thompsons Road extension was determined.
– A centroid connector is an imaginary line and may cross an arterial road or a creek, as long as the zone occupies both sides of the road or creek.
– The number of centroid connectors is considered appropriate for the density of the connector road network in the Officer South Employment PSP. This indicates the existing zoning in the VITM is suitable for use for the Officer South modelling. The existing zoning was also used for other PSPs in the MRPV TREBC project.

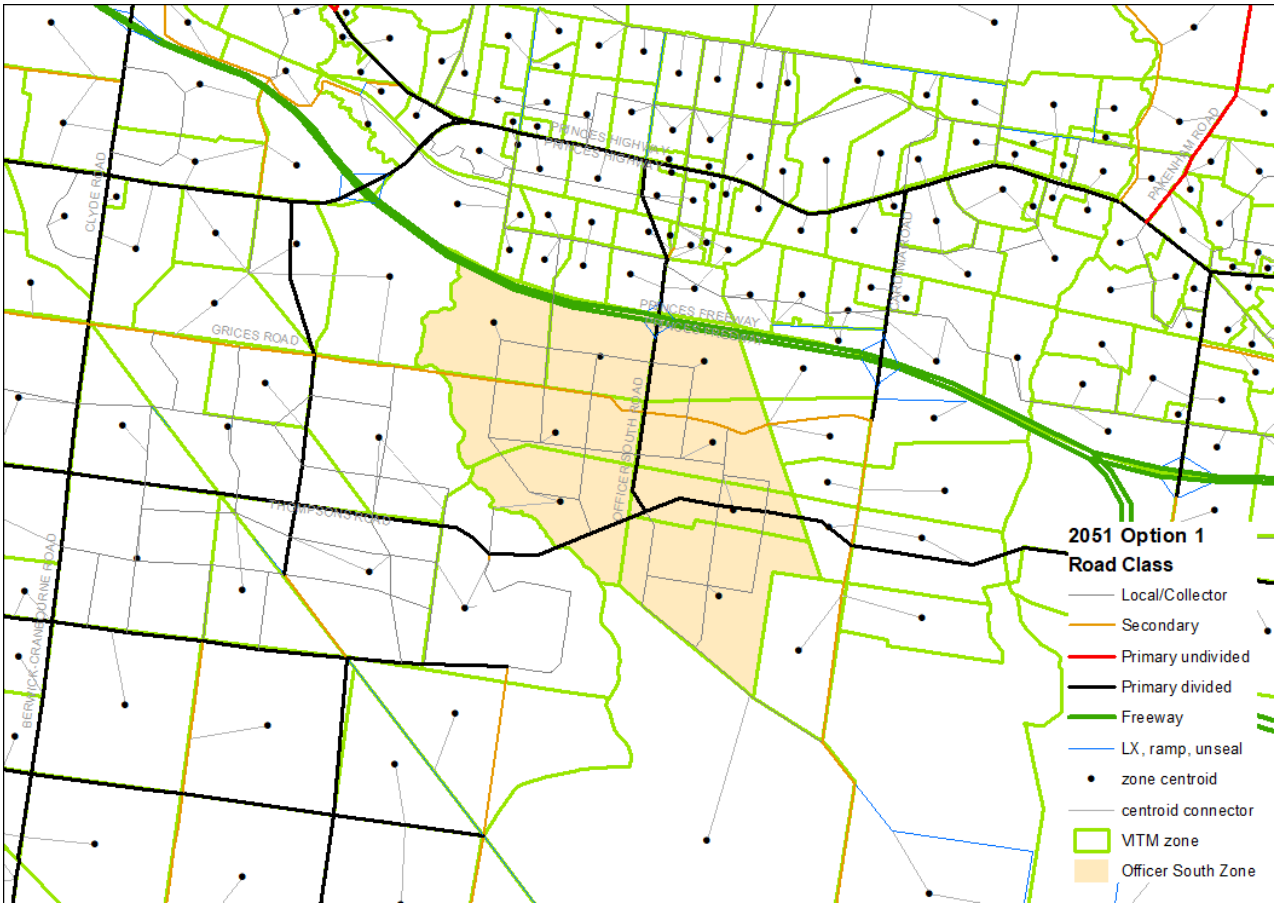

Figure 1 VITM zones and centroid connectors

3.4 Road network

The 2051 VITM Reference Case forms the basis of the road network adopted for the 2051 Option 1 assessment. Refinements have been made to reflect existing and planned network improvements in the south east growth corridor identified by VPA, DoT and Cardinia Shire Council. VPA has provided information to GHD about the proposed connector and access streets, and the surrounding arterials and freeways for the Officer South Employment PSP. The connector streets were added to the VITM network. Access streets would generally be too detailed to be modelled by the VITM and were not added. As the VITM does not contain geometry and signal data, intersection improvement projects are not included in the model.

Figure 2 show the connector streets in the Officer South Employment PSP and the surrounding network. Note that the connector streets in the following PSPs were included in the MRPV TREBC project and carried through to this project:

– Thompsons Road PSP.
– Clyde North PSP.
– Cardinia Creek South PSP.
– Cardinia Road Employment PSP.

None of these connector streets were in the VITM Reference Case.

The VPA, DoT and Cardinia Shire Council have reviewed the classification, number of lanes and posted speed of the 2051 Option 1 network, which are updated and shown in Figure 2 to Figure 4 respectively. Note the '4' lane section at the end of a ramp represents the terminal of the ramp and is two lanes in one direction.

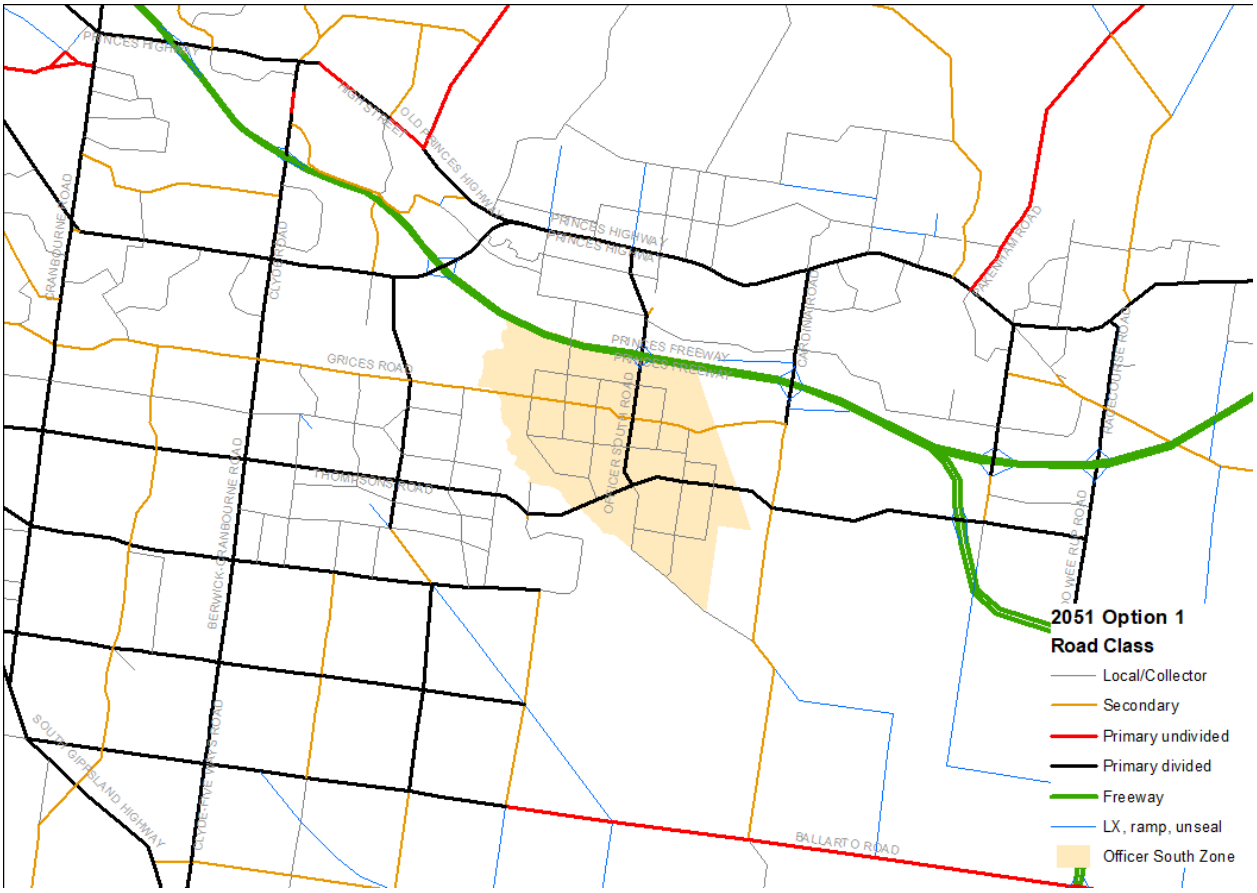

Figure 2 *2051 Option 1 network – road classification*

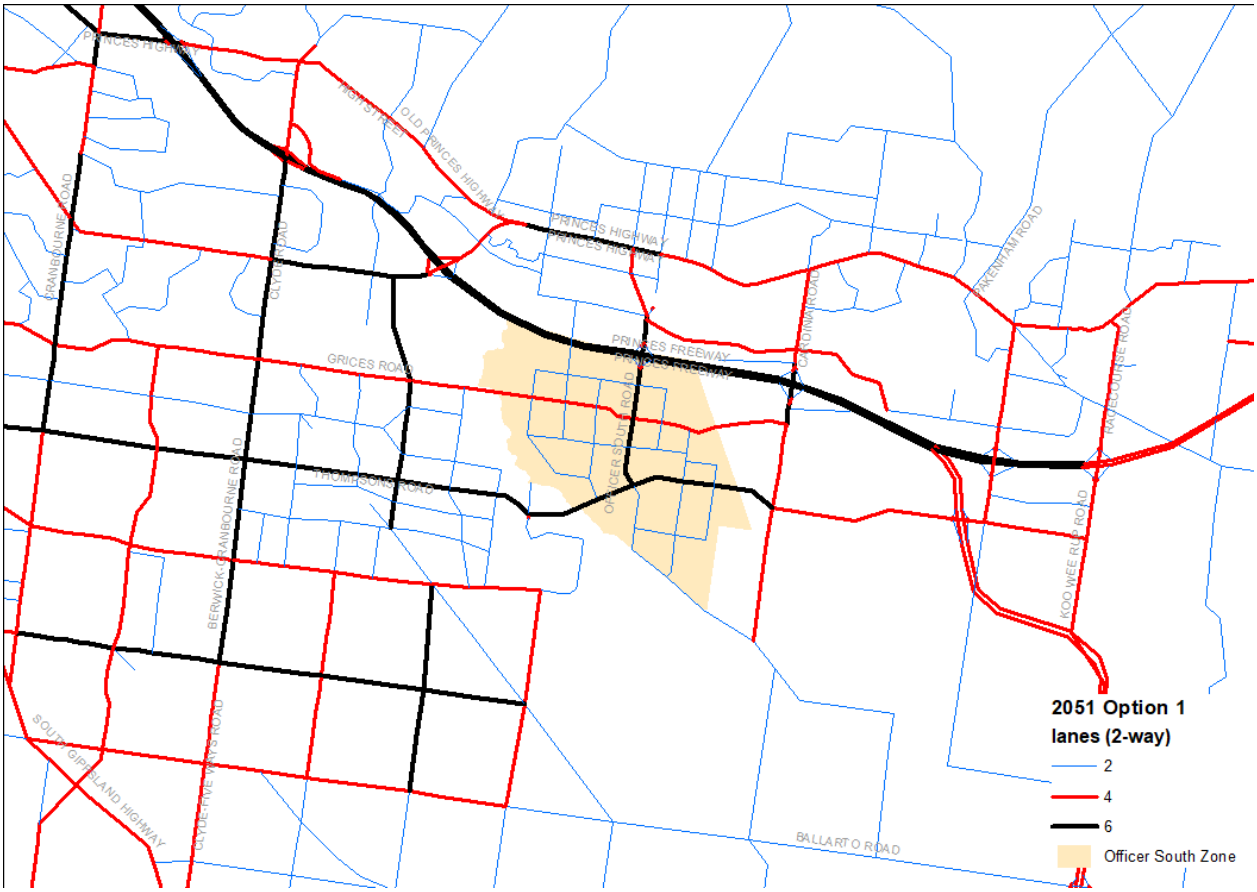

Figure 3 *2051 Option 1 network – number of lanes*

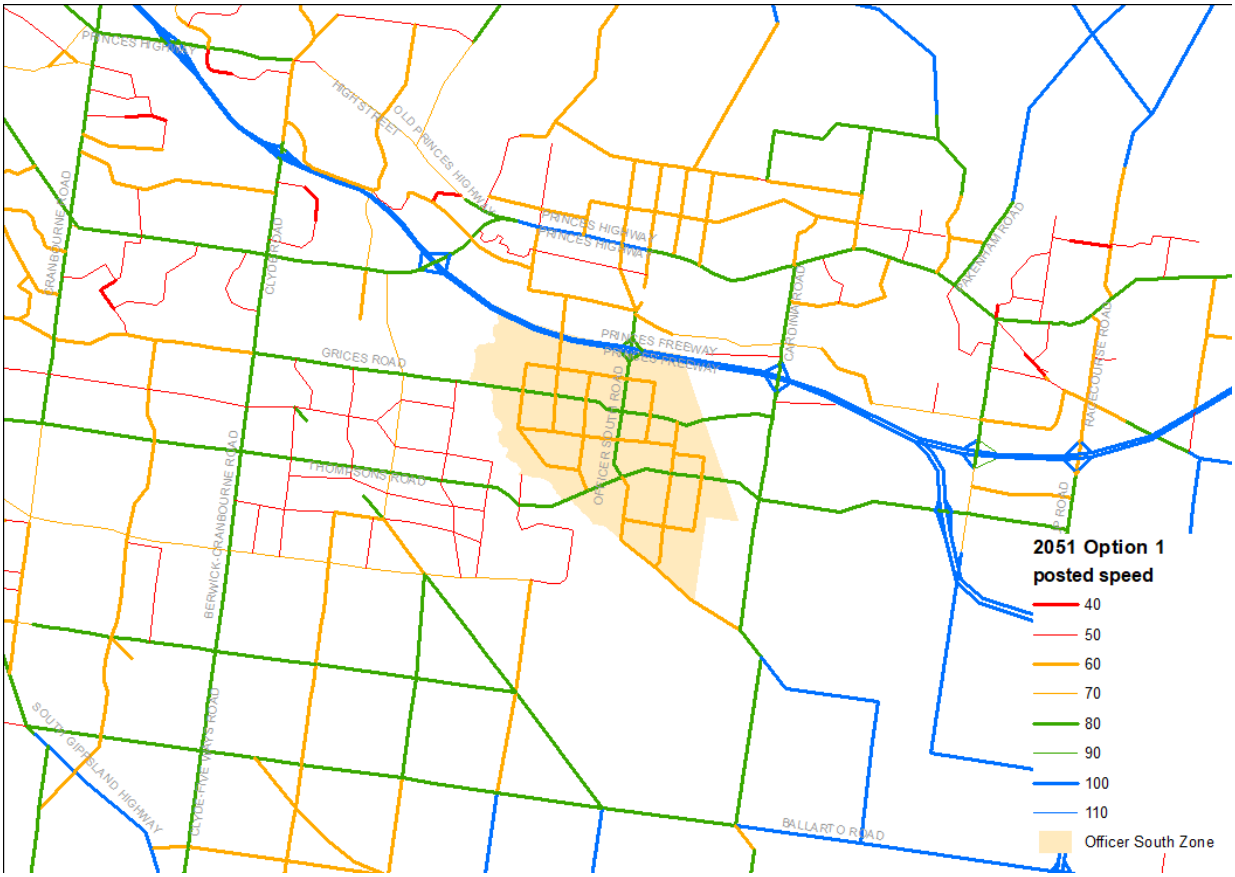

Figure 4 *2051 Option 1 network – posted speed*

4. Demographic data

The VITM uses a set of demographic data to estimate the number of car and public transport trips generated from each model zone. The demographic data used in the VITM include:

– Total population and number of households
– Population classified by age group (0-4, 5-11, 12-17, 18-25, 26-64, 65+)
– Number of dependents classified by age group (0-4, 5-11, 12-17, 18-25, 26-64, 65+)
– Total and retail employment
– Employment by industrial classification and white/blue collar and
– School enrolments (primary, secondary and tertiary)

Truck trips, on the other hand, are derived from a freight movement model based on the movement of commodities across the state.

The VITM contains demographic data for 2018, 2021, 2026, 2031, 2036, 2041, 2046 and 2051. Only data for 2018 and 2051 are used for this study.

Population, employment and enrolment data are updated with PSP data provided by the VPA for this project.

4.1 Population and households

The VPA provided forecast population for Officer South Employment and nearby PSPs to update the demographic data in the VITM. Table 3 shows the population data provided for the precincts and compares them with the 2018 and 2051 VITM population. Figure 5 shows the location of the PSPs overlaying with the VITM zones. Note that the Pound Road PSP is included in the Clyde North PSP in the analysis.

The PSP forecast population is generally lower than the 2051 VITM population, except in Officer South Employment, Cardinia Creek South and Thompsons Road PSPs.

Table 3 Comparison of population data in VITM within PSPs

Precinct	VITM 2018 population	VITM 2051 forecast population	PSP forecast population
Office South Employment	437	2,656	5,132
Cardinia Creek South	2,327	24,167	31,102
Cardinia Road Employment	728	12,283	6,305
Clyde Creek	4,458	48,346	42,191
Clyde North	5,713	23,622	20,460
Cranbourne North 2	5,474	12,492	5,821
Minta Farm	911	17,079	9,433
Thompsons Road	1,751	19,071	20,150
Officer	8,395	36,982	32,475
Cardinia Road	21,543	54,037	27,546

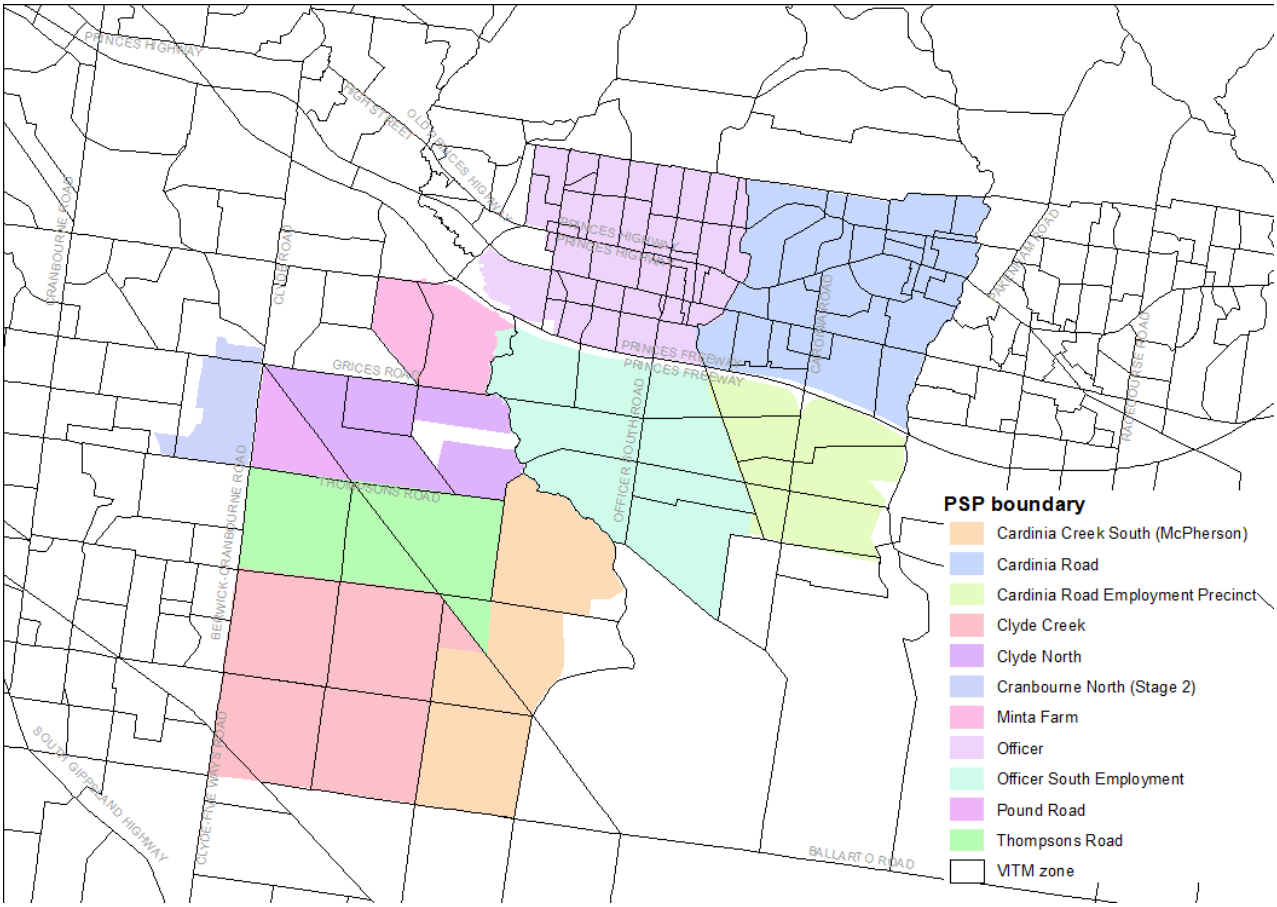

Figure 5 PSPs around Officer South Employment Precinct

The VPA also provided the forecast population by VITM zone for the following PSPs:

- Officer South Employment
- Cardinia Creek South
- Cardinia Road Employment
- Clyde North
- Minta Farm
- Thompsons Road
- Officer
- Cardinia Road

For these precincts, the PSP population was used to update the VITM.

Figure 6 shows spatially the updated population in the VITM. There are only two VITM zones with residential land use in the Officer South Employment PSP and the entire residential population of 5,132 is assigned to these two zones. Most of the population growth is forecast to the southwest of the Officer South Employment PSP in the wider area.

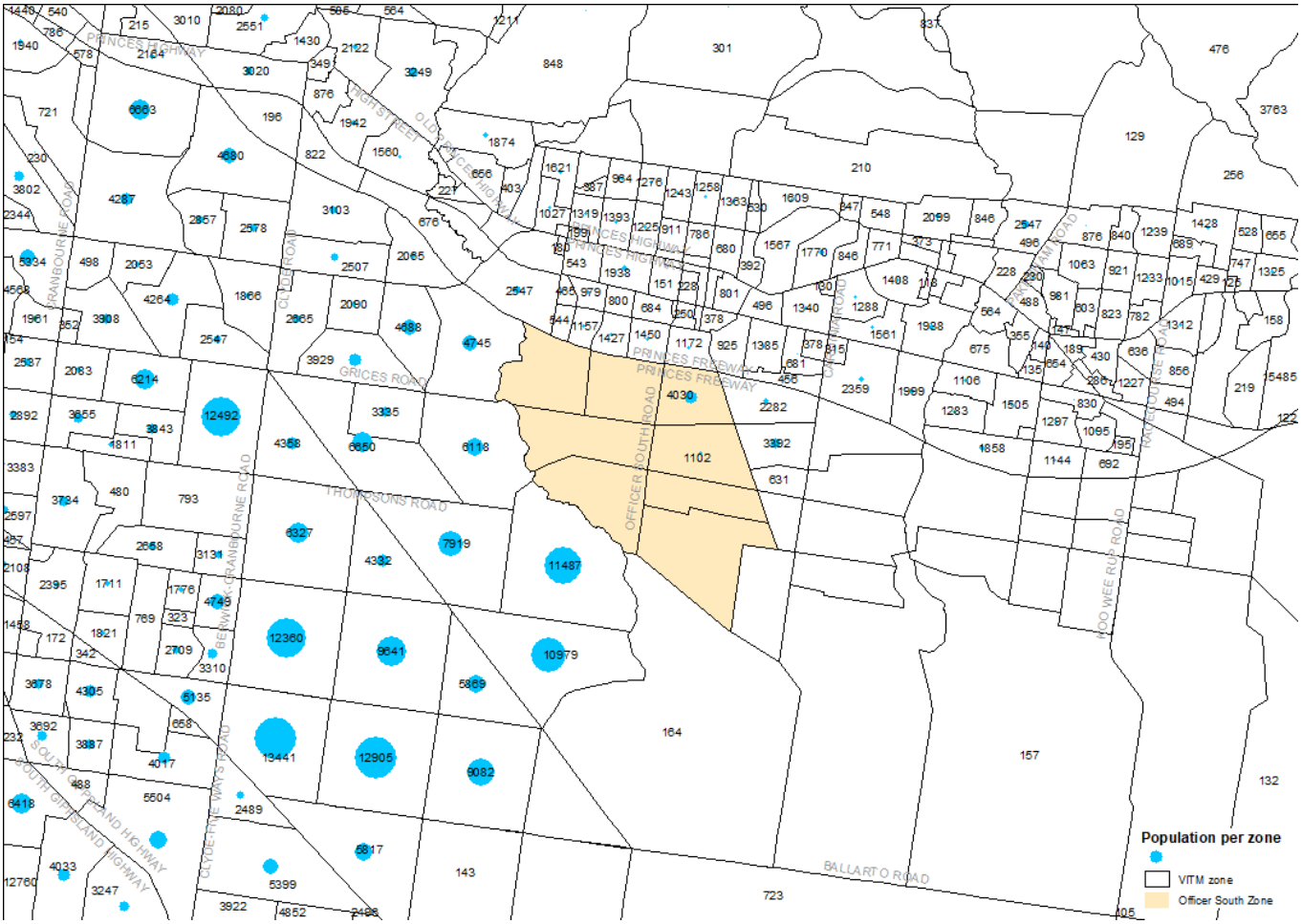

Figure 6 Updated 2051 VITM population

In addition to population data, the VPA provided forecast households/dwellings information for the PSPs. Table 4 compares the VITM and PSP households/dwellings and average household size. The PSP dwellings are generally lower than the VITM households, except for Officer South Employment, Cardinia Creek South and Thompsons Road PSPs. Also, the average household size is generally higher in the VITM, except for the Officer South Employment, Officer and Cardinia Road PSPs. To update the number of households in each VITM zone, the PSP population (see Figure 6) was divided by the corresponding PSP household size (see Table 4), so that the population and household data was consistent with each other.

Table 4 Comparison of household data in VITM with PSPs

Precinct	VITM households	PSP dwellings	VITM household size	PSP household size
Office South Employment	1,010	1,640	2.6	3.1
Cardinia Creek South	8,075	10,030	3.0	2.8
Cardinia Road Employment	4,354	2,034	2.8	2.1
Clyde Creek	17,046	13,600	2.8	2.8
Clyde North	7,753	6,605	3.0	2.8
Cranbourne North 2	4,260	2,034	2.9	2.8
Minta Farm	5,712	3,050	3.0	2.8
Thompsons Road	6,256	6,500	3.0	2.8
Officer	14,130	11,598	2.6	2.8
Cardinia Road	19,952	9,838	2.7	2.8

For population and dependants by age group, the composition from the 2051 VITM Reference Case was used to update the model.

4.2 Employment

The VPA provided forecast employment for Officer South Employment and nearby PSPs to update the demographic data in the VITM. Table 5 shows the employment data provided for the precincts and compare them with the 2018 and 2051 VITM employment.

The PSP forecast employment is generally higher than the 2051 VITM employment, except in Cranbourne North Stage 2, Officer and Cardinia Road PSPs.

Table 5 Comparison of employment data in VITM and PSPs

Precinct	VITM 2018 employment	VITM 2051 employment	PSP employment
Officer South Employment	396	18,731	18,903
Cardinia Creek South	186	1,177	1,615
Cardinia Road Employment	98	8,468	18,735
Clyde Creek	289	3,724	7,471
Clyde North	330	1,511	1,832
Cranbourne North 2	193	579	490
Minta Farm	123	771	11,436
Thompsons Road	226	2,426	8,920
Officer	2,108	6,715	5,824
Cardinia Road	3,715	8,588	1,968

The VPA also provided the forecast employment by VITM zone for the same PSPs that were provided with the forecast population data (see Section 4.1). For these precincts, the PSP employment data was used to update the VITM.

For the Officer South Employment PSP, the VPA provided the following additional information:

– Breakdown of employment by industrial and commercial (including mixed use and town centre) precincts for each VITM zone (see Table 6).
– Breakdown of employment by industry classification for the entire PSP (see Table 7).

Table 6 Officer South Employment PSP employment by VITM zone

VITM zone	Industrial	Commercial	Total employment	Adjusted to match forecast by industry class
891	1,622	0	1,622	1,753
2158	1,602	0	1,602	4,273
2186	2,705	0	2,705	2,955
2269	471	3,133	3,603	3,615
2270	1,635	1,786	3,420	2,175
2271	0	215	215	497
2457	1,186	0	1,186	1,238
2459	496	4,083	4,579	5,038
Total	**9,716**	**9,216**	**18,932**	**21,544**

Table 7 Officer South Employment PSP employment by industry class

Industry	Type	Industrial	Commercial	Total
Agriculture, Forestry and Fishing	Production/Consumption	358	35	393
Mining	Production/Consumption	13	1	14
Manufacturing	Production/Consumption	799	53	851
Electricity, Gas, Water and Waste Services	Consumption	281	11	292
Construction	Consumption	1,000	992	1,992
Wholesale Trade	Redistribution	856	42	899
Retail Trade	Consumption	692	1,236	1,929
Accommodation and Food Services	Consumption	355	634	989
Transport, Postal and Warehousing	Redistribution	2,014	99	2,113
Information Media and Telecommunications	Consumption	20	44	64
Financial and Insurance Services	Consumption	161	351	511
Rental, Hiring and Real Estate Services	Consumption	205	448	653
Professional, Scientific and Technical Services	Consumption	609	1,330	1,939
Administrative and Support Services	Consumption	211	461	673
Public Administration and Safety	Consumption	299	652	951
Education and Training	Consumption	801	1,666	2,467
Health Care and Social Assistance	Consumption	1,380	2,869	4,249
Arts and Recreation Services	Consumption	93	166	258
Other Services	Consumption	110	197	307
Total		**10,256**	**11,288**	**21,544**

The employment in Table 7 is based on the ultimate forecast for 2061 and was advised by the VPA to be used for updating the VITM for the Officer South precinct. It is important to note therefore that 2051 forecasts are used for other precincts in the model. As the total employment in Table 6 is lower than that in Table 7, the employment in each VITM zone is scaled up to match the forecast by industry classification.

Figure 7 shows spatially the updated employment in the VITM. Most of the employment growth is forecast to be in the Officer South Employment, Minta Farm and Cardinia Road Employment PSPs.

In addition, the following assumptions are made in estimating the employment by industrial and blue/white collar classification in all the surrounding PSPs:

– Employment by industrial classification: GHD has assumed the same proportions as provided for the Officer South Employment Precinct.
– Employment by blue/white collar classification: GHD has assumed the average proportion of industrial and commercial jobs as provided for the Officer South Employment Precinct.

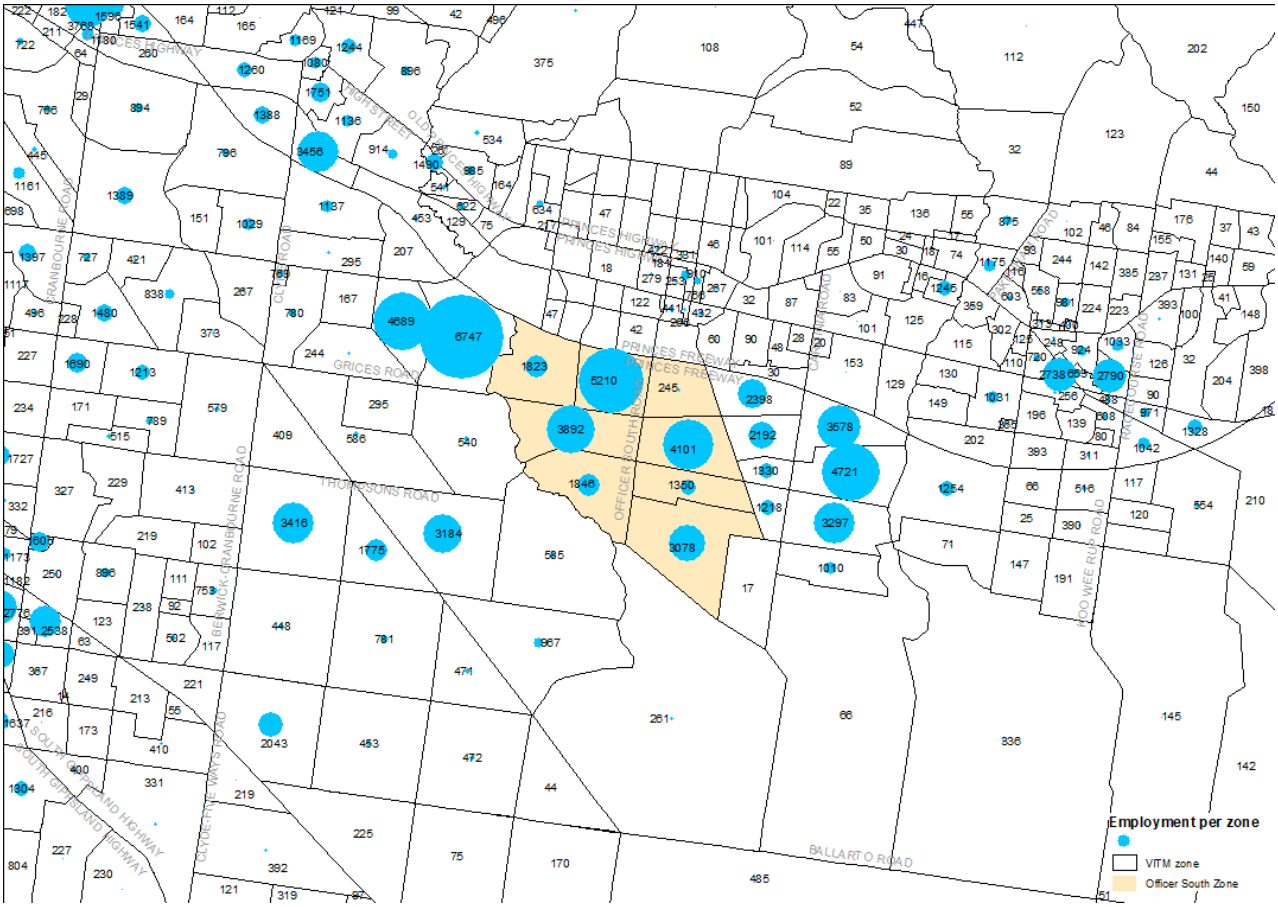

Figure 7 *Updated 2051 VITM employment*

4.3 Education enrolments

VPA provided future primary school enrolment data, which was assigned to VITM zone 2271 (see Table 8). This is the only VITM zone planned to have any future education enrolment within Officer South. For surrounding precincts, the default VITM Reference Case values are used.

Table 8 *Officer South primary school enrolments*

VITM zone	Government	Non-government	Total
2271	753	300	1053

5. Base traffic conditions

This section examines the base 2018 traffic conditions in terms of vehicle volumes, volume/capacity ratio and travel speed. The base conditions are then used to compare the future conditions to determine where traffic growth would be and change in traffic conditions (volume/capacity ratio and travel speed).

5.1 Traffic volumes

Figure 8, Figure 9 and Figure 10 show the model volumes in the 2018 Base AM, PM and 24-hour periods respectively. The results are summarised as follow:

– Princes Freeway carries most of the traffic through the study area, with about 80,000 vehicles per day (vpd) (two way) north of Officer South.
– Other roads with significant traffic include:
  - Princes Highway (about 35,000 vpd west of Officer South Road) and
  - Berwick-Cranbourne Road (about 40,000 vpd north of Thompsons Road).
– There is little traffic through Officer South with about 300 vpd on Officer South Road.
– The peak direction of travel is westbound or northbound during AM peak and eastbound or southbound during PM peak.

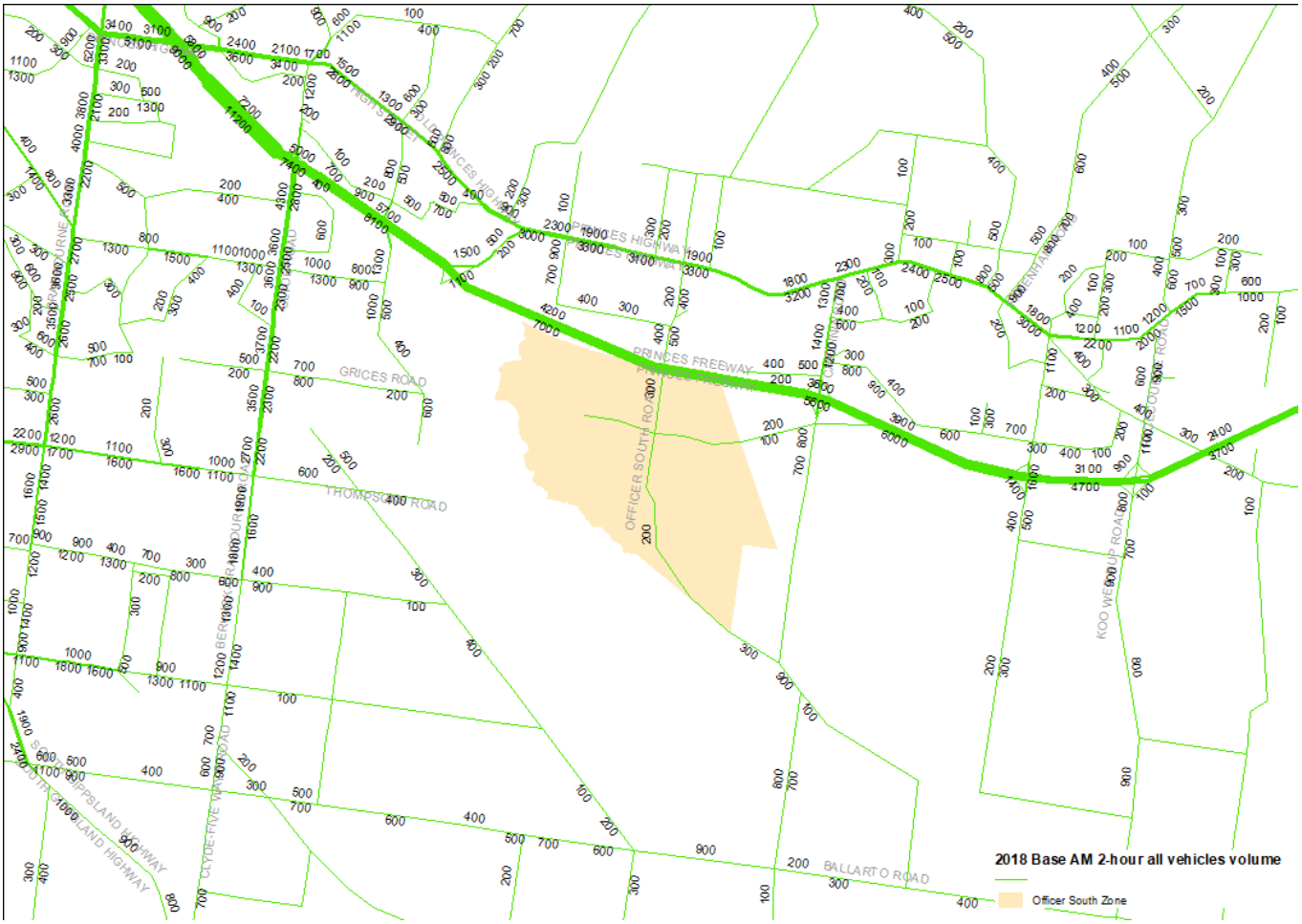

Figure 8 2018 Base 2-hour AM peak volumes

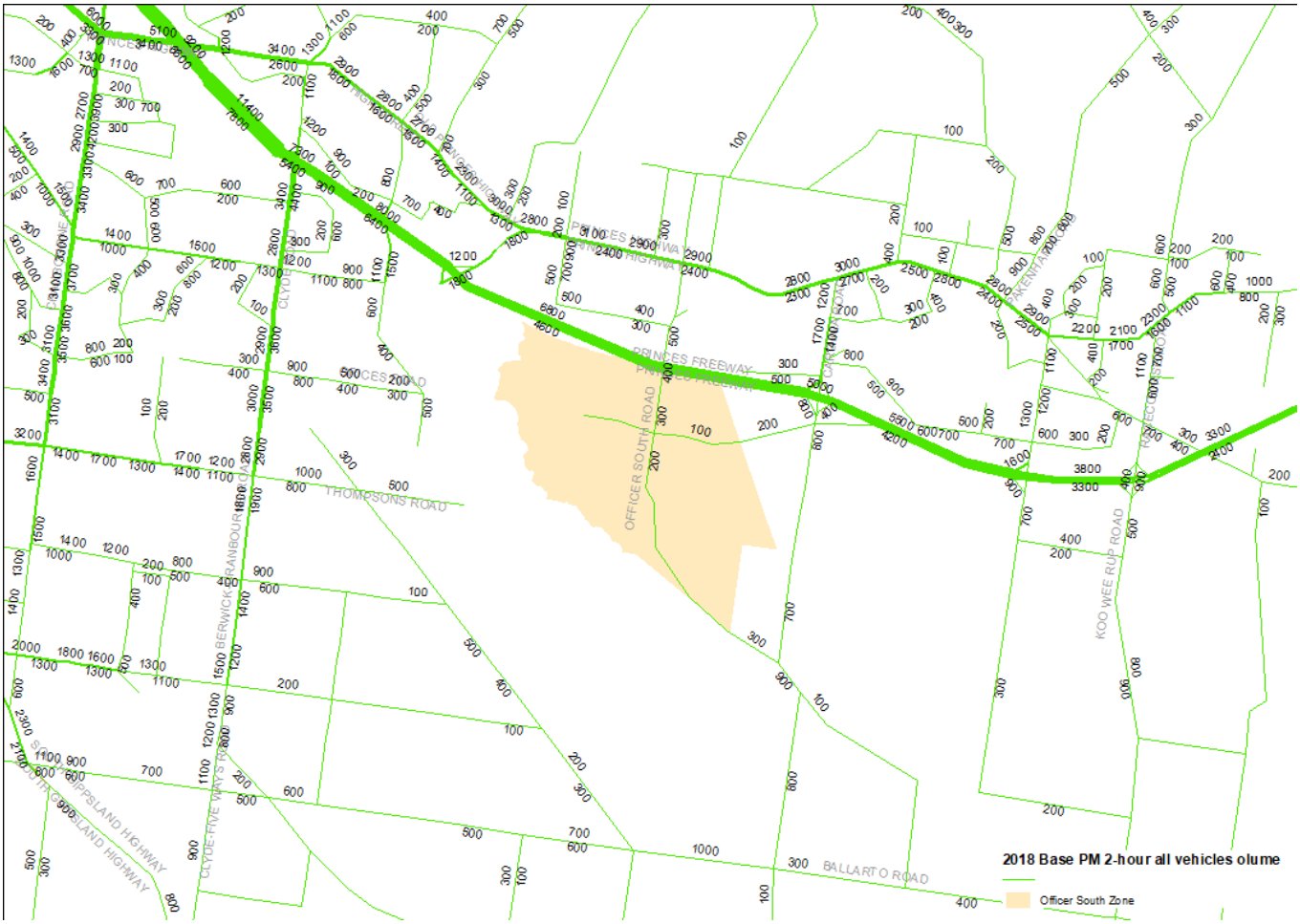

Figure 9 2018 Base 2-hour PM peak volumes

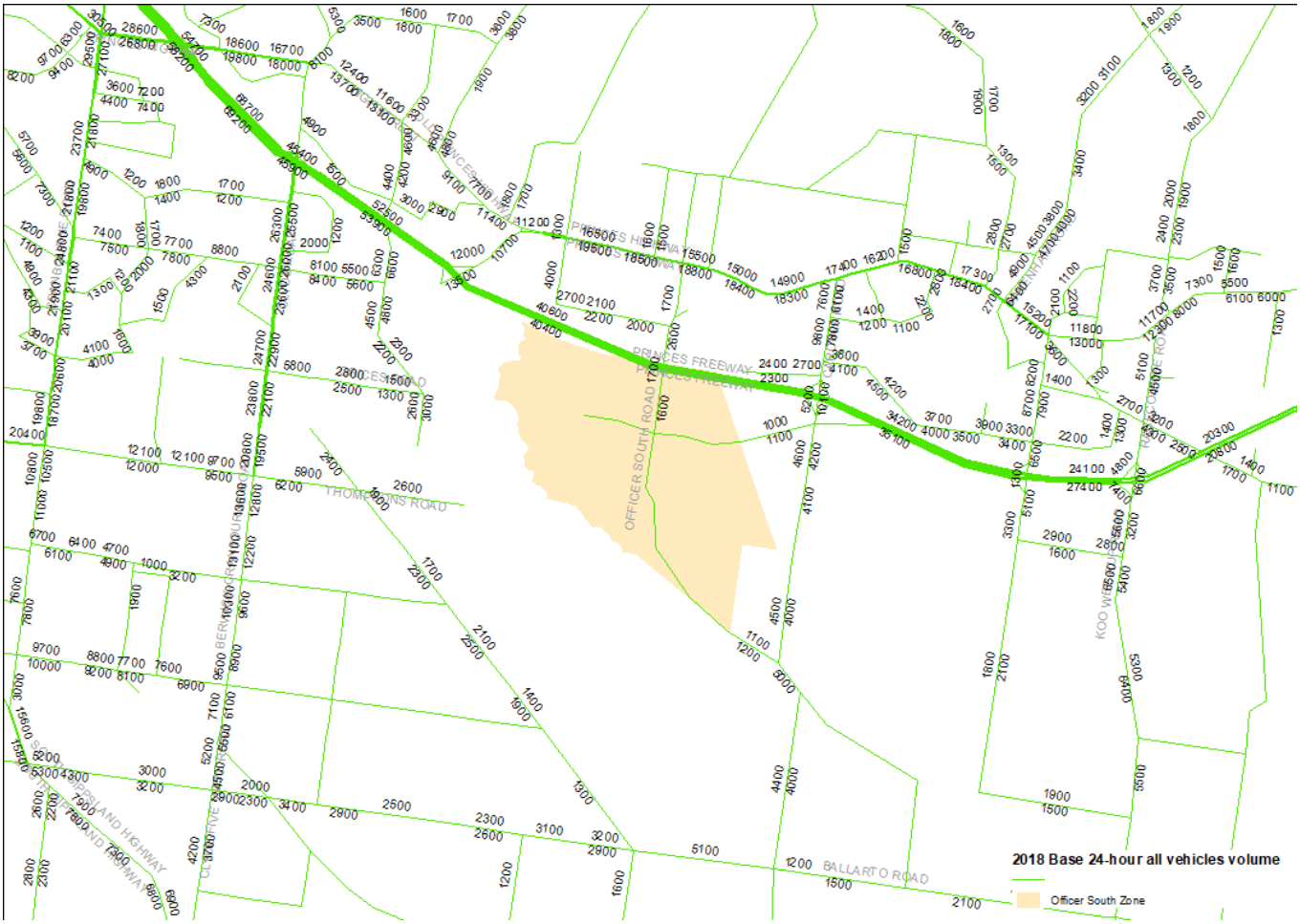

Figure 10 2018 Base 24-hour volumes

5.2 Volume/capacity ratio

Figure 11 and Figure 12 shows the peak direction volume/capacity ratio in the 2018 Base AM and PM periods respectively. In a strategic model, a volume/capacity ratio of over one indicates congested road conditions. The results are summarised as follows:

– Congestion is shown to be not a large issue in Officer South relative to other parts of the study area.
– Around the study area, locations with the highest volume/capacity ratio are:
  - Berwick -Cranbourne Road, south of Princes Freeway (1.2 in both AM and PM periods) and
  - Soldiers Road north of Princes Freeway (1.1 in AM period).

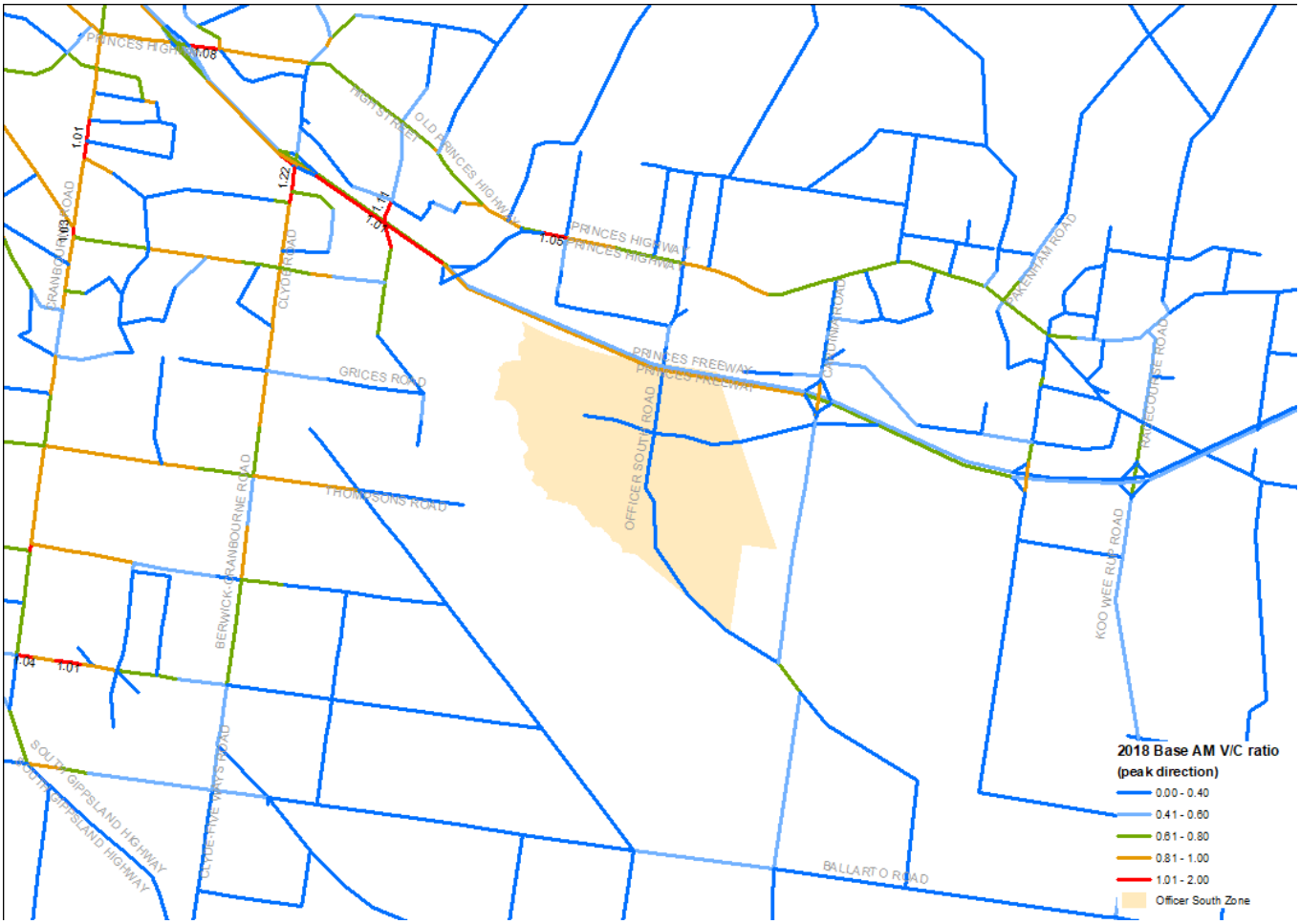

Figure 11 2018 Base AM peak direction volume/capacity ratio

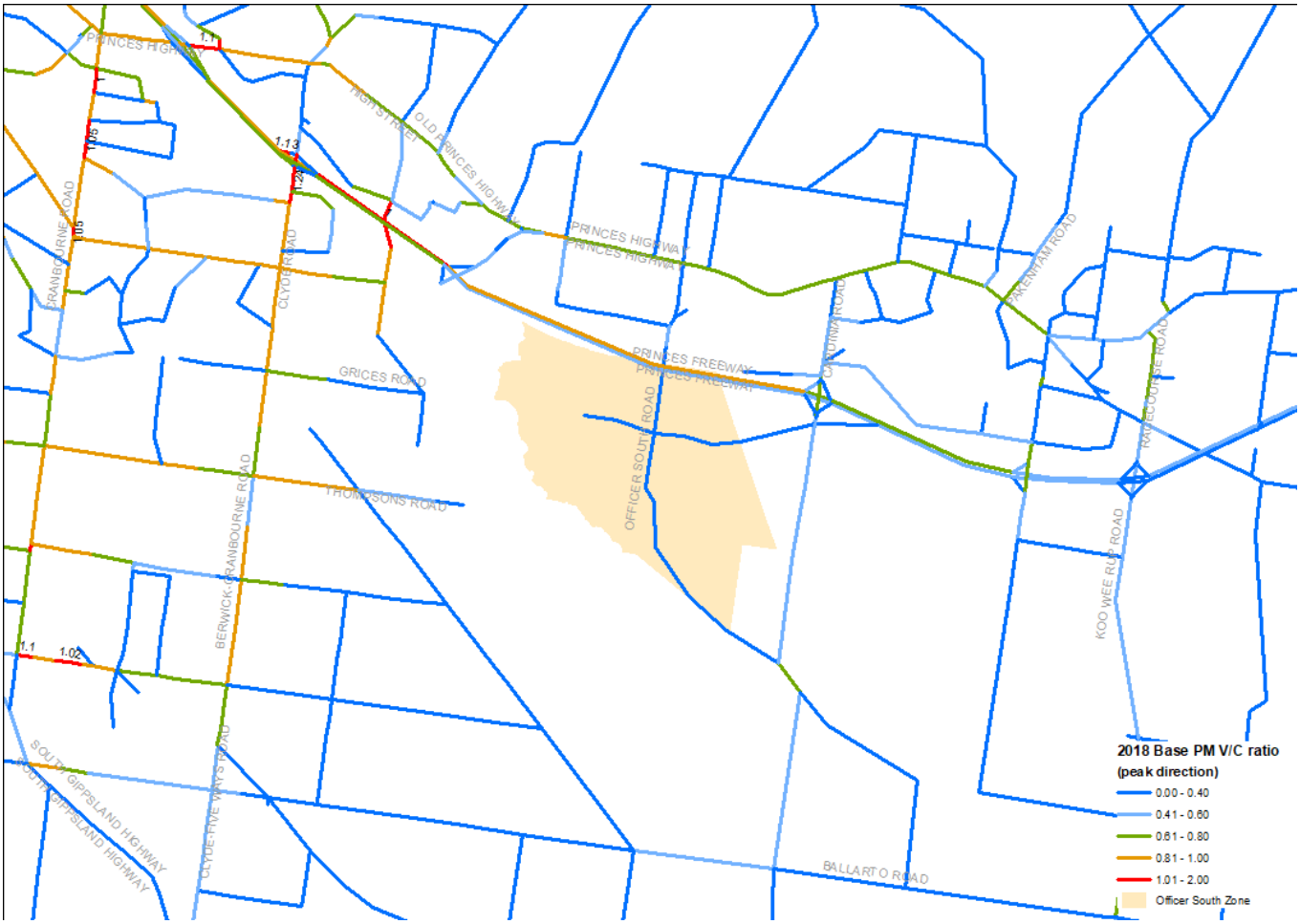

Figure 12 2018 Base PM peak direction volume/capacity ratio

5.3 Travel speed

Figure 13 and Figure 14 show the peak direction vehicle speed in the 2018 Base AM and PM periods respectively. The results are summarised as follows:

– Average travel speed is generally low (below 40 km/h) in built-up areas, such as north of Princes Freeway and west of Berwick-Cranbourne Road.

– However, average travel speed is higher (over 40 km/h) on arterial roads (such as Princes Freeway, Princes Highway and Berwick-Cranbourne Road) and in less built-up area in and around Officer South.

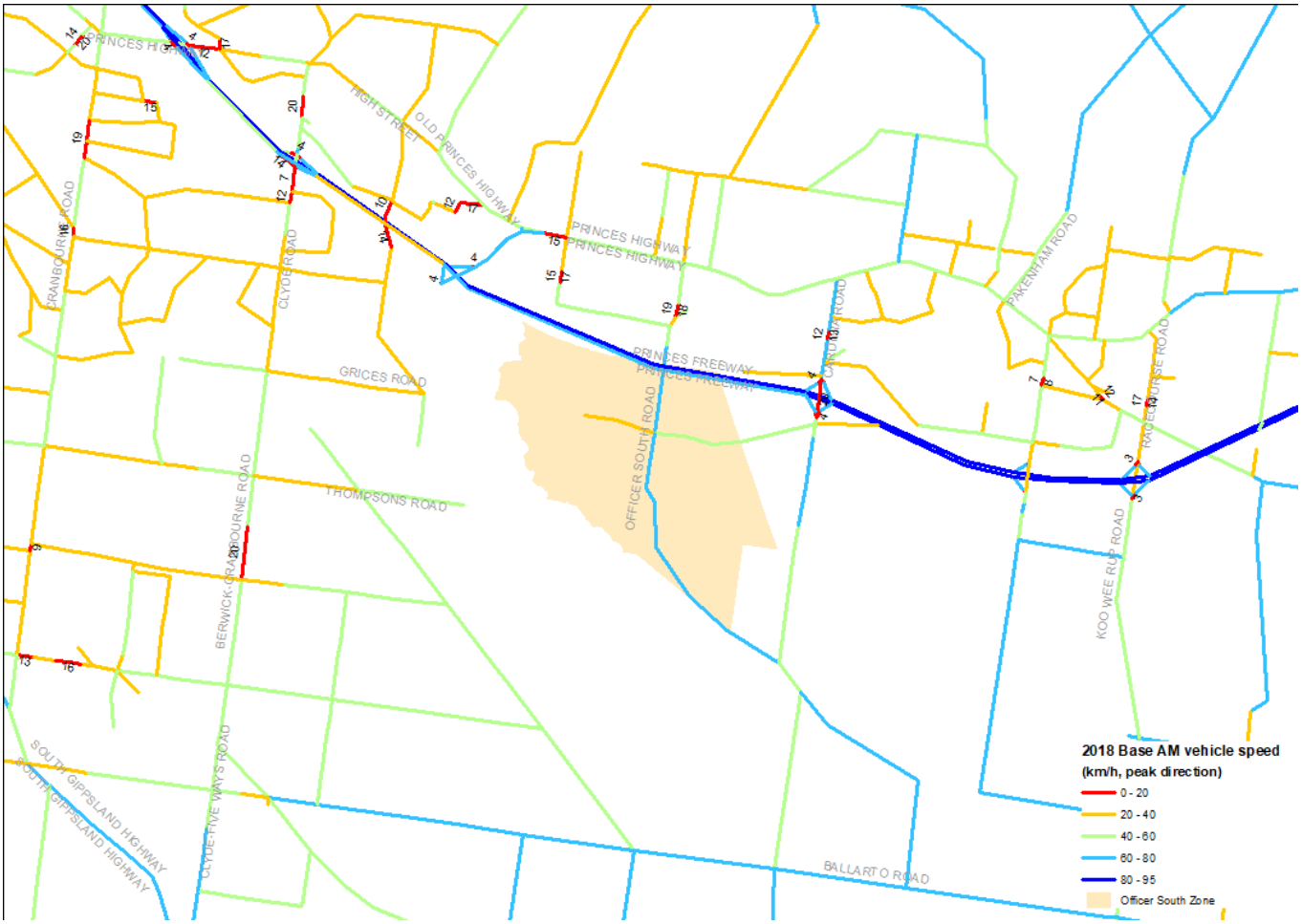

Figure 13 2018 Base AM peak direction travel speed

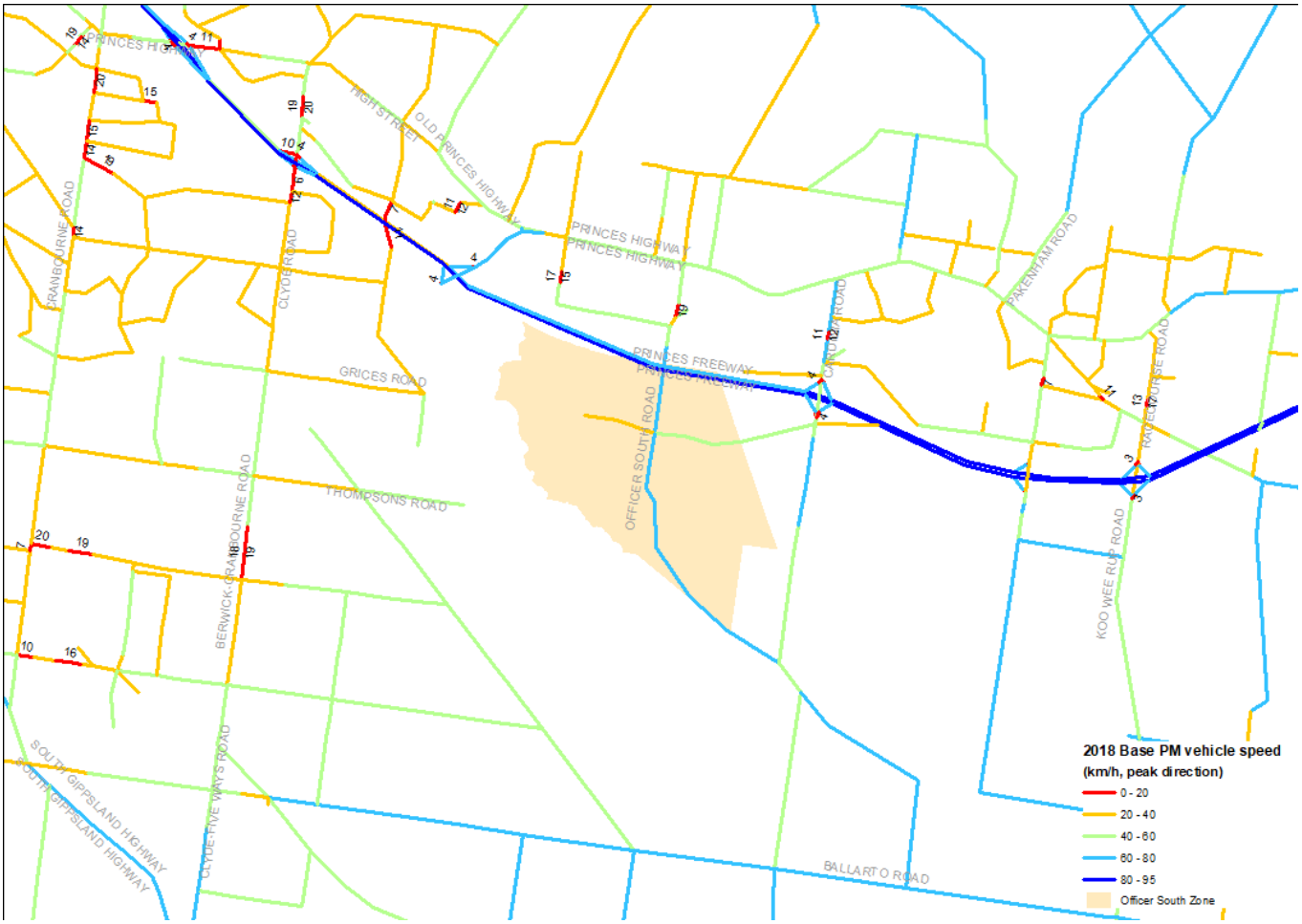

Figure 14 2018 Base PM peak direction travel speed

6. Future traffic conditions

This section examines the future traffic conditions based on the 2051 Option 1 network and demographic data provided by VPA around the study area (see Sections 3 and 4). The future traffic conditions are examined in terms of traffic volumes, trip generation, traffic growth, volume/capacity ratio and travel speed.

6.1 Traffic volumes

Figure 18, Figure 19 and Figure 20 show the model volumes in the 2051 Option 1 AM, PM and 24-hour periods respectively. The results are summarised as follow:

- Thompsons Road is forecast to carry significant amount of traffic (75,000 vpd east of Berwick Cranbourne Road) due to its extension and widening (see Figure 3).
- In Officer South, in addition to Thompsons Road, Officer South Road (39,000 vpd north of Grices Road) would carry most of the traffic through the area.
- Grices Road (13,000 vpd east of Officer South Road) is also forecast to carry significant amount of traffic in Officer South.
- Traffic volumes on connector roads in Officer South would generally be low, with the highest being 1,000 vehicles per two hours. This is well within the road capacity and is discussed further in Section 6.4.
- As in 2018 Base, Princes Freeway would still carry most of the traffic through the study area, with about 140,000 vpd (two way) north of Officer South in 2051.
- O'Shea Road is also forecast to carry significant amount of traffic (69,000 vpd east of Berwick-Cranbourne Road) due to the significant employment growth in Minta Farm and its proximity to the Princes Freeway interchange.
- The peak direction of travel would generally be westbound or northbound during AM peak and eastbound or southbound during PM peak. However, the peak direction would be reverse on Thompsons Road and Grices Road west of Officer South as most traffic would be attracted to the employment precinct in the area.

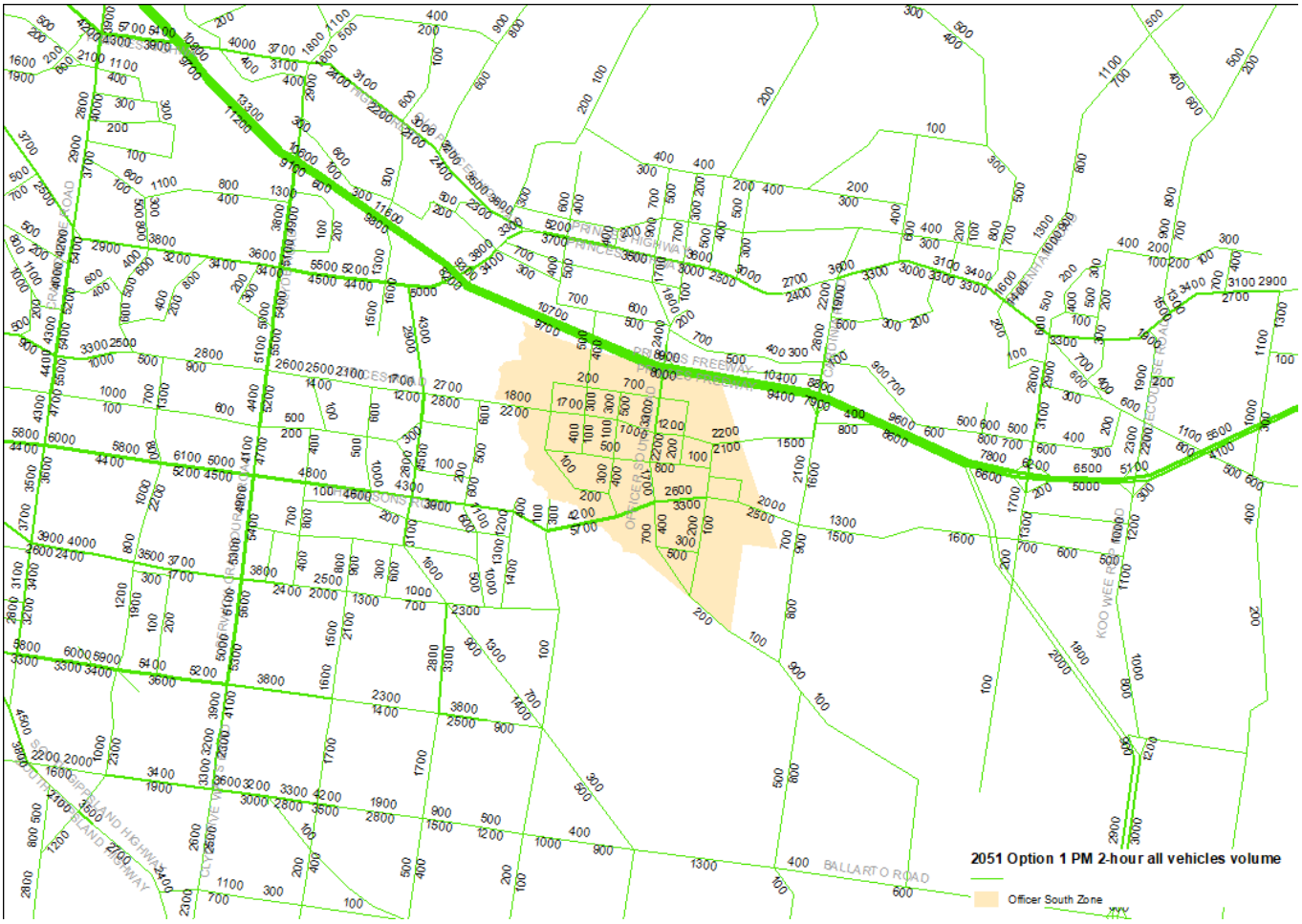

Figure 15 2051 Option 1 2-hour AM peak volumes

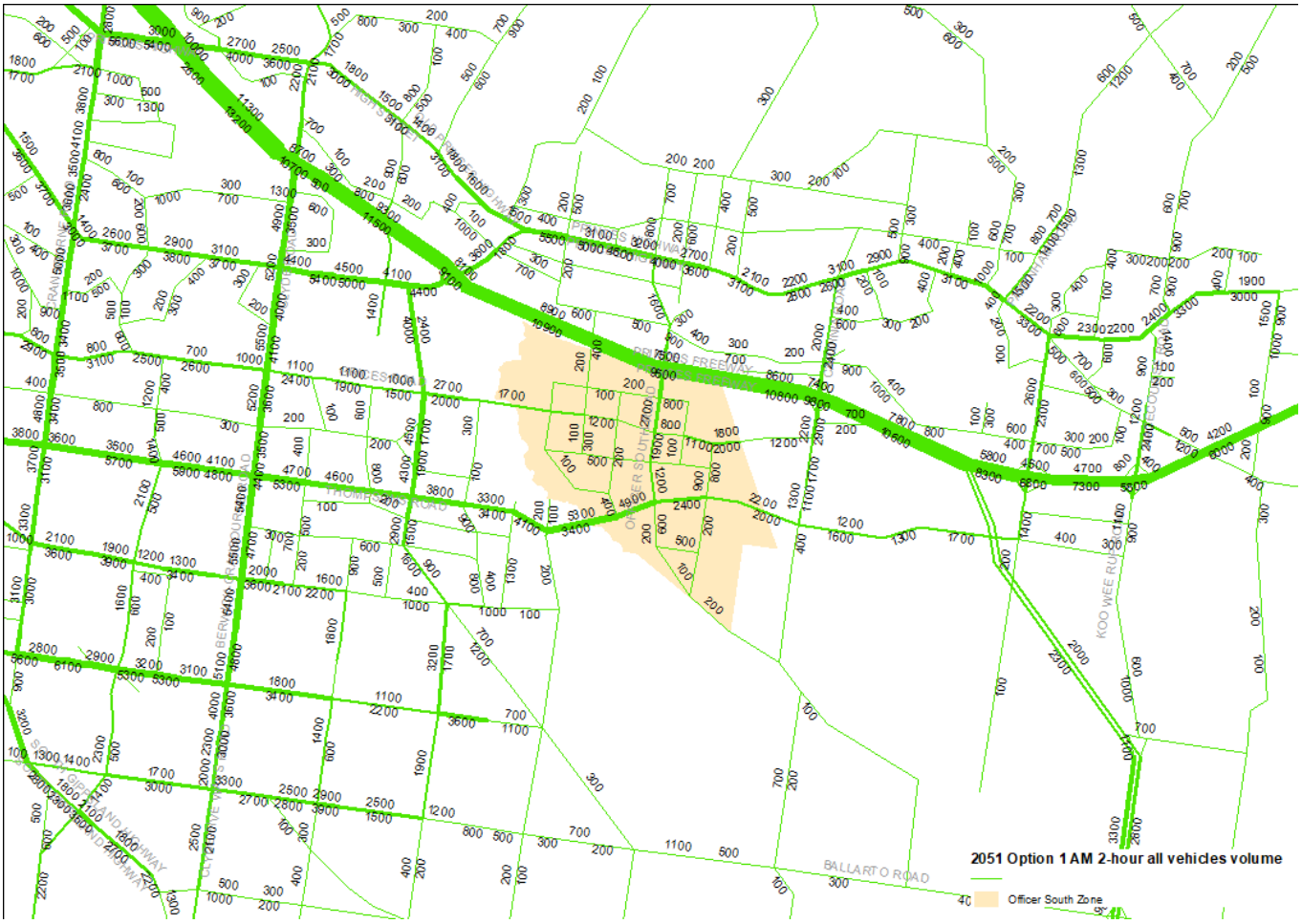

Figure 16 2051 Option 1 2-hour PM peak volumes

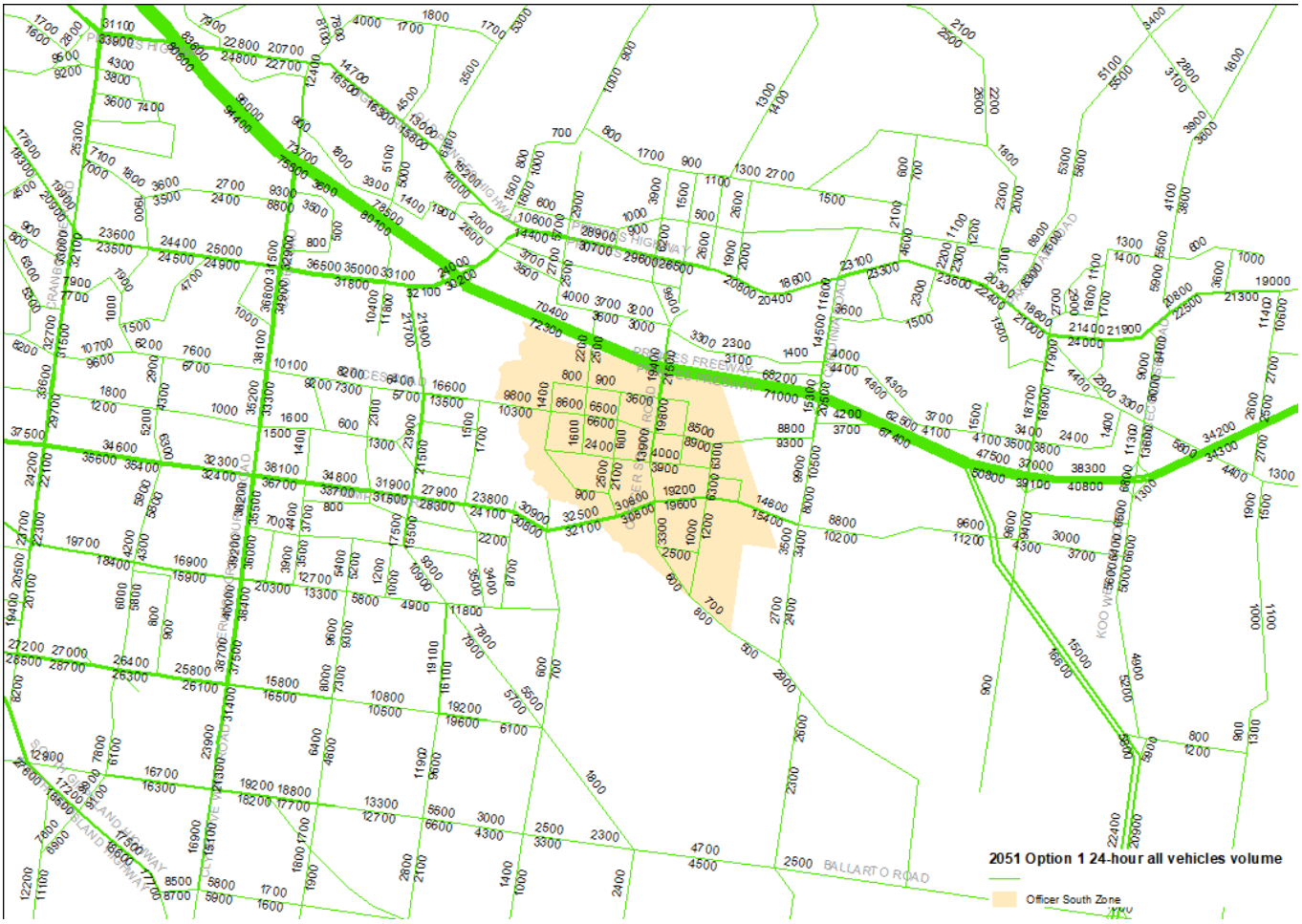

Figure 17 2051 Option 1 24-hour volumes

6.2 Traffic generation

This section examines the trip generation (i.e. traffic generated by zone) in the Officer South Employment PSP. Figure 18, Figure 19 and Figure 20 show the model volumes and trip generations in the 2051 Option 1 AM, PM and 24-hour periods respectively. The results are summarised as follow:

– There would be more trips attracted to than produced from the Officer South area in the AM peak as most of the land use are commercial and industrial. Therefore, people travel to the area to work.

– For the same reason, there would be more trips produced from than attracted to Officer South in the PM peak. Therefore, people leave the area from their employment locations to return home.

– Most trips would be generated from northern part of Officer South around Grices Road and Officer South Road, with about 11,000 trips (two-way) per day.

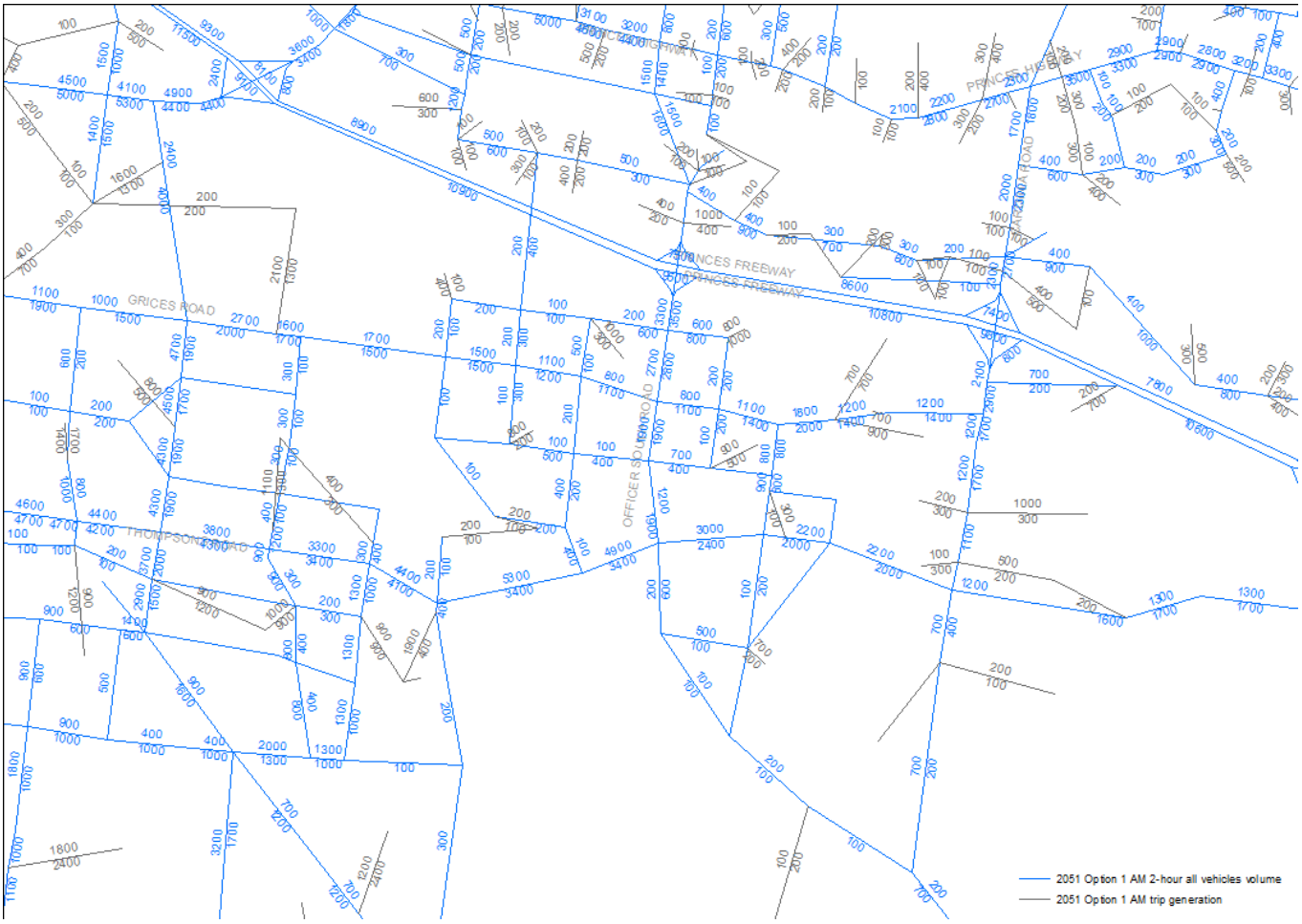

Figure 18 2051 Option 1 2-hour AM peak volumes (blue) and trip generation (grey)

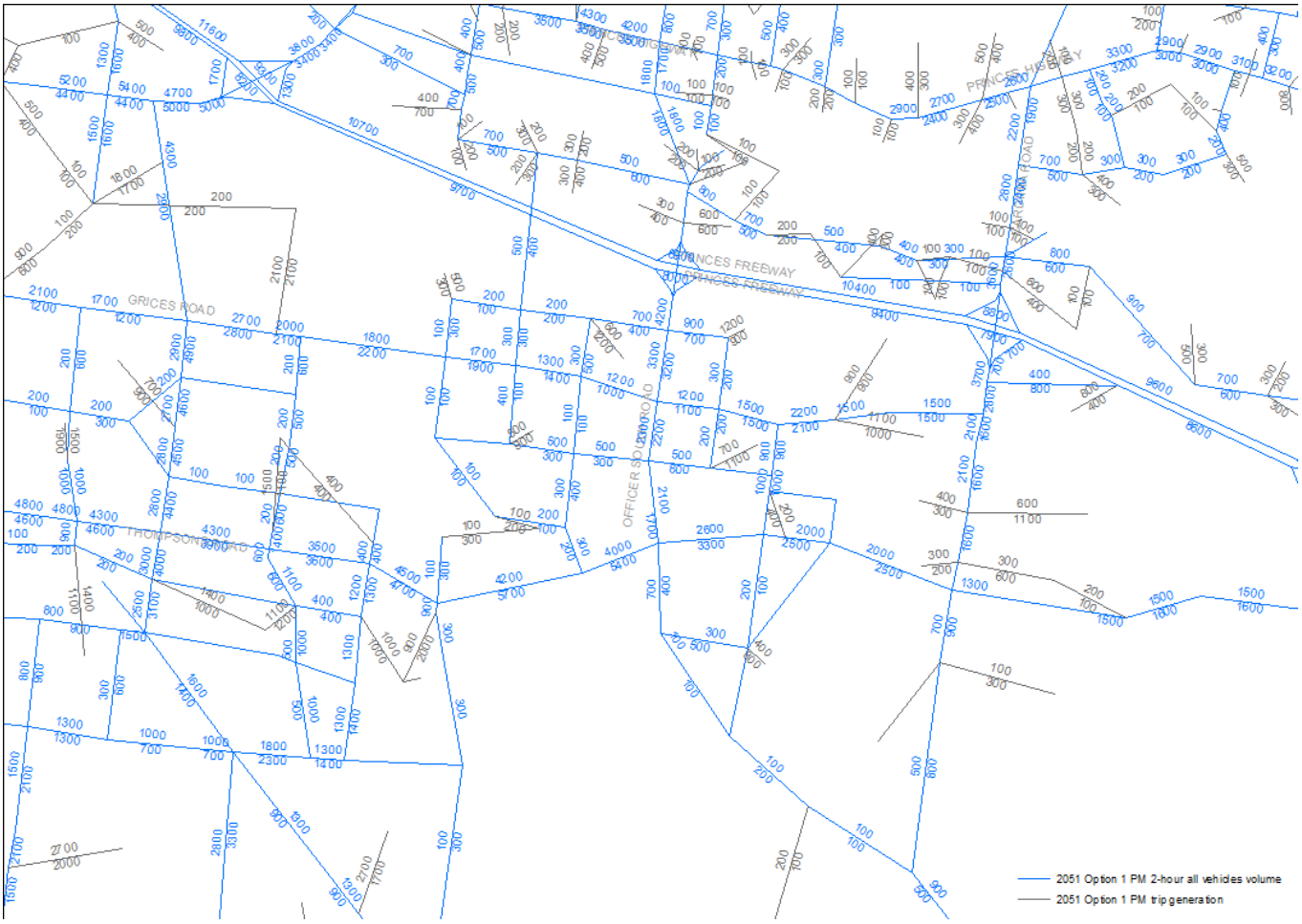

Figure 19 2051 Option 1 2-hour PM peak volumes and trip generation

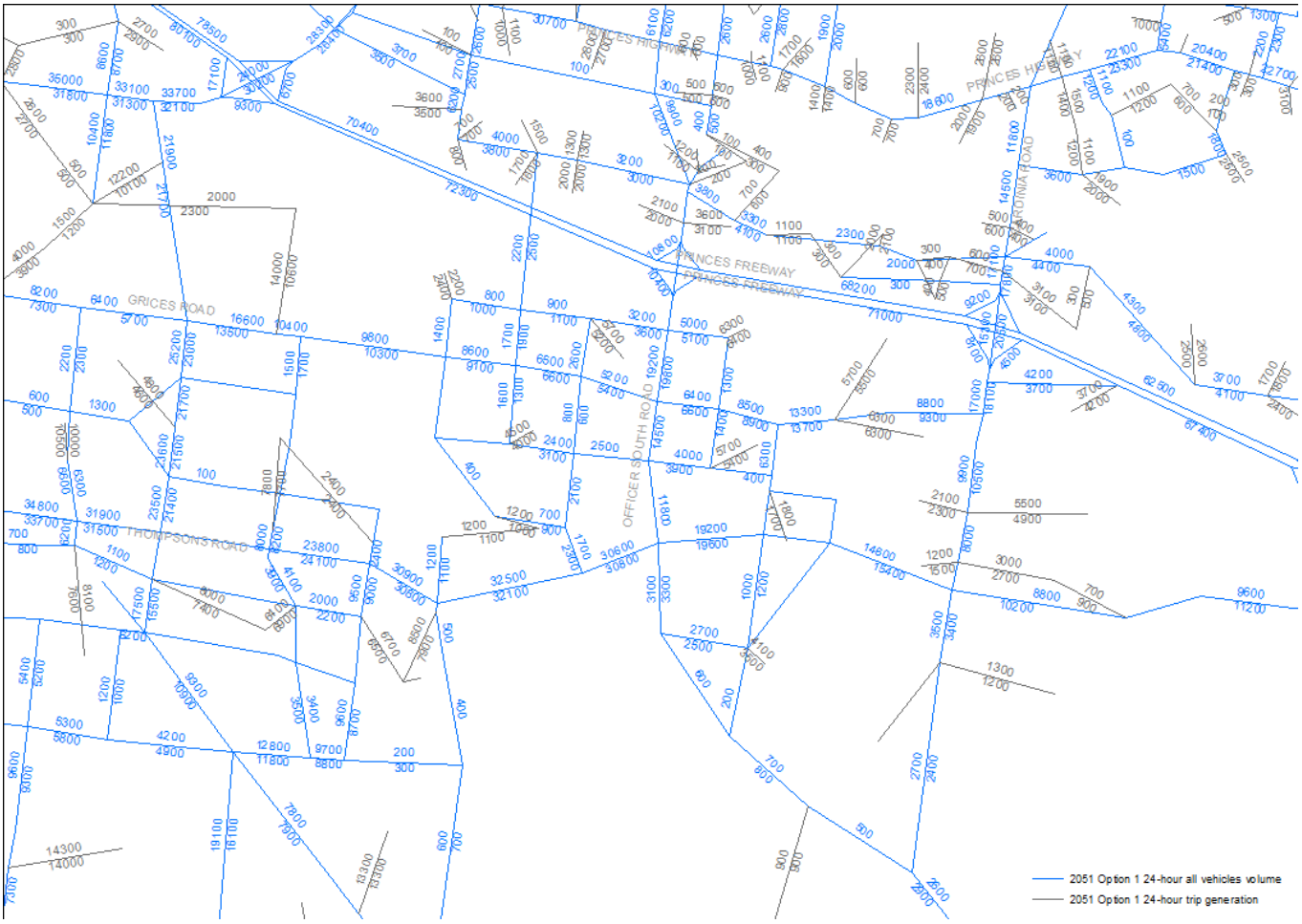

Figure 20 2051 Option 1 24-hour volumes and trip generation

6.3 Traffic growth

Figure 21, Figure 22 and Figure 23 show the growth in traffic volumes between 2018 Base and 2051 Option 1 for the AM, PM and 24-hour periods respectively. The results are summarised as follows:

– Roads forecast to have the highest growth in volumes include:
  - Princes Freeway (increase of 62,000 vpd west of Officer South Road),
  - Thompsons Road (increase of 62,000 vpd east of Berwick-Cranbourne Road),
  - O'Shea Road (increase of 64,000 vpd west of Princes Freeway) and
  - Berwick-Cranbourne Road (increase of 59,000 vpd south of Hardys Road).
– The increase of volumes of these roads would be due mainly to road widening and growth of population and employment in the study area. In the case of Thompsons Road, its extension to Koo Wee Rup Road would also attract significant traffic to this corridor.
– The growth of traffic in the AM and PM periods would be generally in the respective peak direction (i.e., west and north bound in AM, and east and south bound in PM).
– However, for Thompsons Road and Princes Freeway west of Officer South Road, the growth of traffic is forecast to be in the counter-peak direction, indicating more traffic would be attracted to the Officer South Employment Precinct.

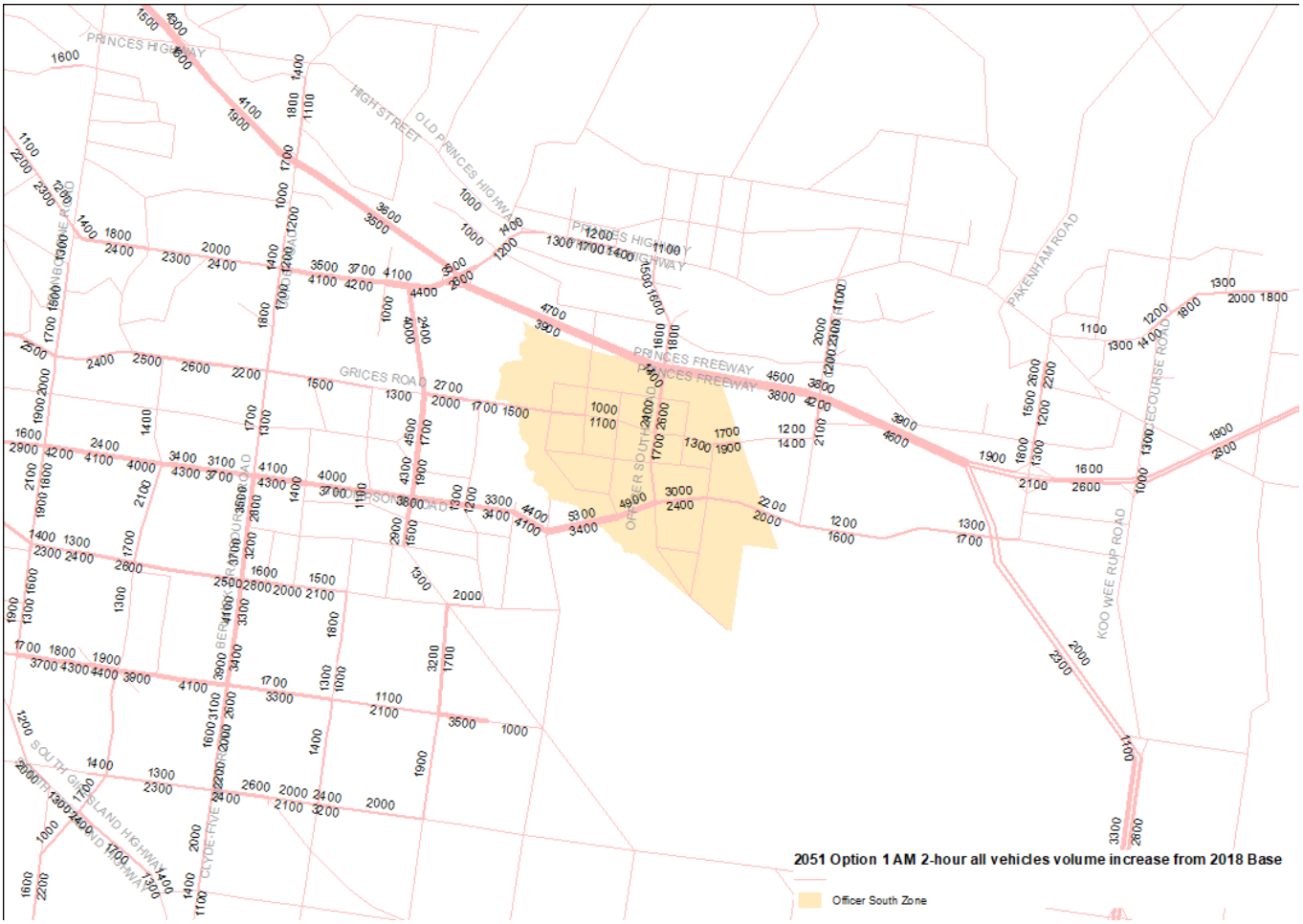

Figure 21 Growth in 2-hour AM volumes between 2018 Base and 2051 Option 1

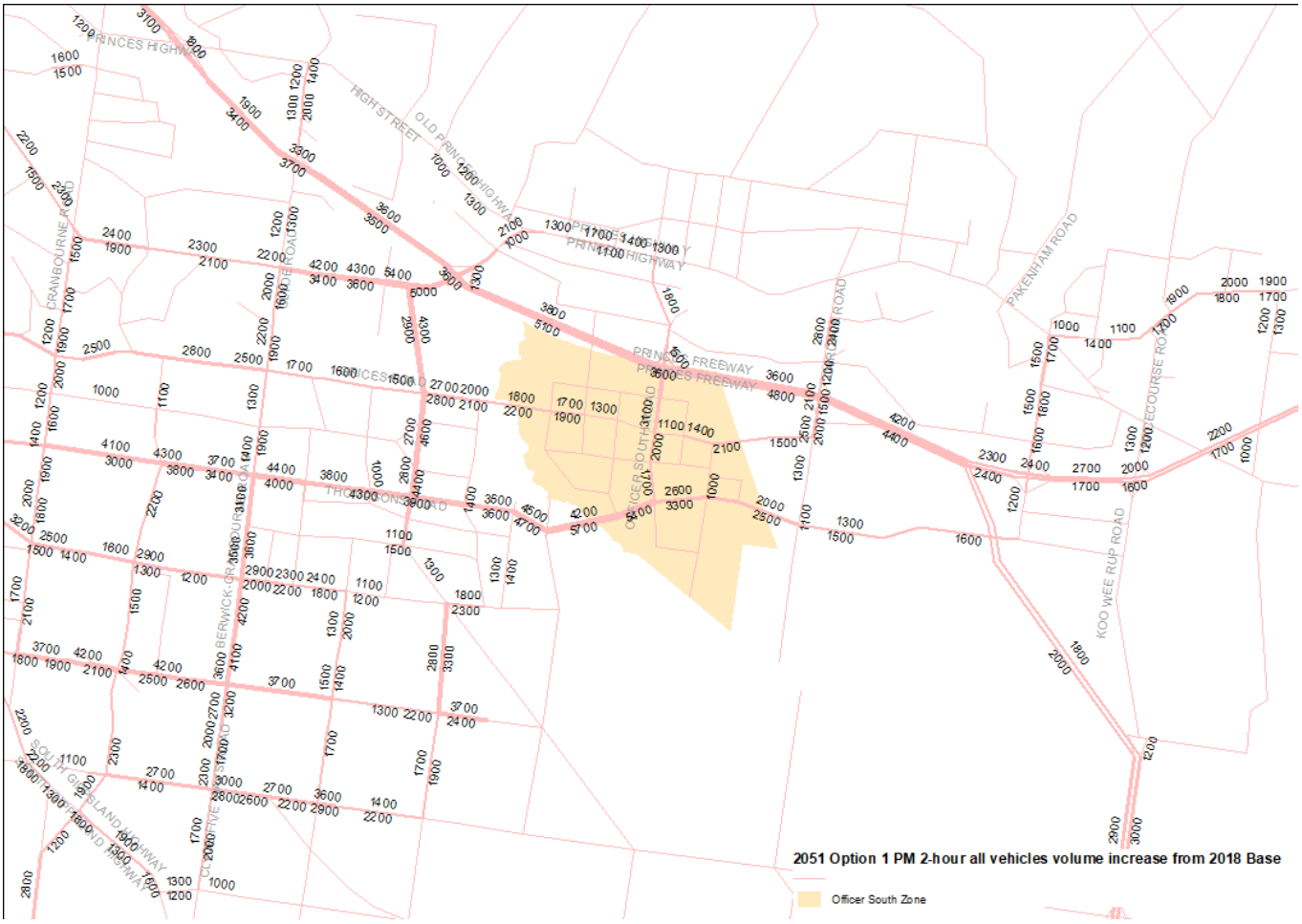

Figure 22 Growth in 2-hour PM volumes between 2018 Base and 2051 Option 1

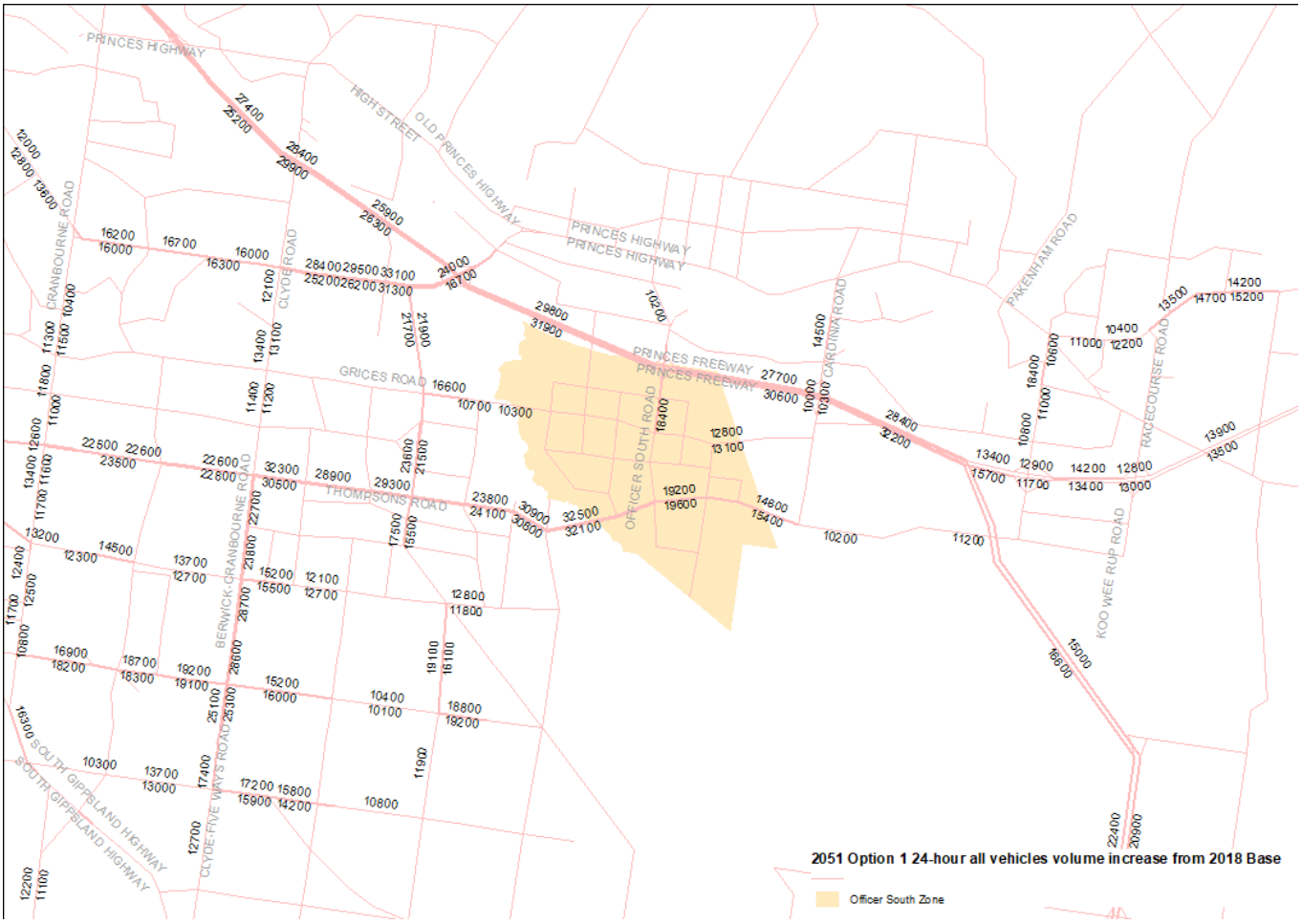

Figure 23 Growth in 24-hour volumes between 2018 Base and 2051 Option 1

6.4 Volume/capacity ratio

Figure 24 and Figure 25 shows the peak direction midblock volume/capacity ratio in the 2051 Option 1 AM and PM periods respectively. In a strategic model, a volume/capacity ratio of over one indicates congested road conditions. The results are summarised as follows:

- Midblock congestion would generally be not an issue within the Officer South Employment Precinct, with a volume/capacity ratio below 0.6 (which indicates near free flow conditions) on most roads. Note that traffic signals are not modelled in VITM.
- Thompsons Road would be the only road through Officer South which has a congestion issue, with a volume capacity ratio of 0.88 in AM peak and 0.94 in PM peak.
- Around the study area, in addition to Thompsons Road, there would be a number of roads with traffic volumes approaching capacity:
  - Princes Freeway (0.91 in AM period and 0.89 in the PM period west of Officer South Road) and
  - Princes Highway (0.89 in both AM and PM periods east of Officer South Road).
  - Berwick-Cranbourne Road (0.92 in both AM and PM periods north of Grices Road), and
  - O'Shea Road (0.90 in AM period and 0.92 in PM period east of Berwick-Cranbourne Road)
- Congestion would generally be heaviest in the inbound (west and north bound) direction in the AM peak and outbound (east and south bound) in the PM peak.
- However, on Thompsons Road west of Officer South, the peak direction of congestion would be reverse, as most traffic would be attracted to the employment precinct in the area.

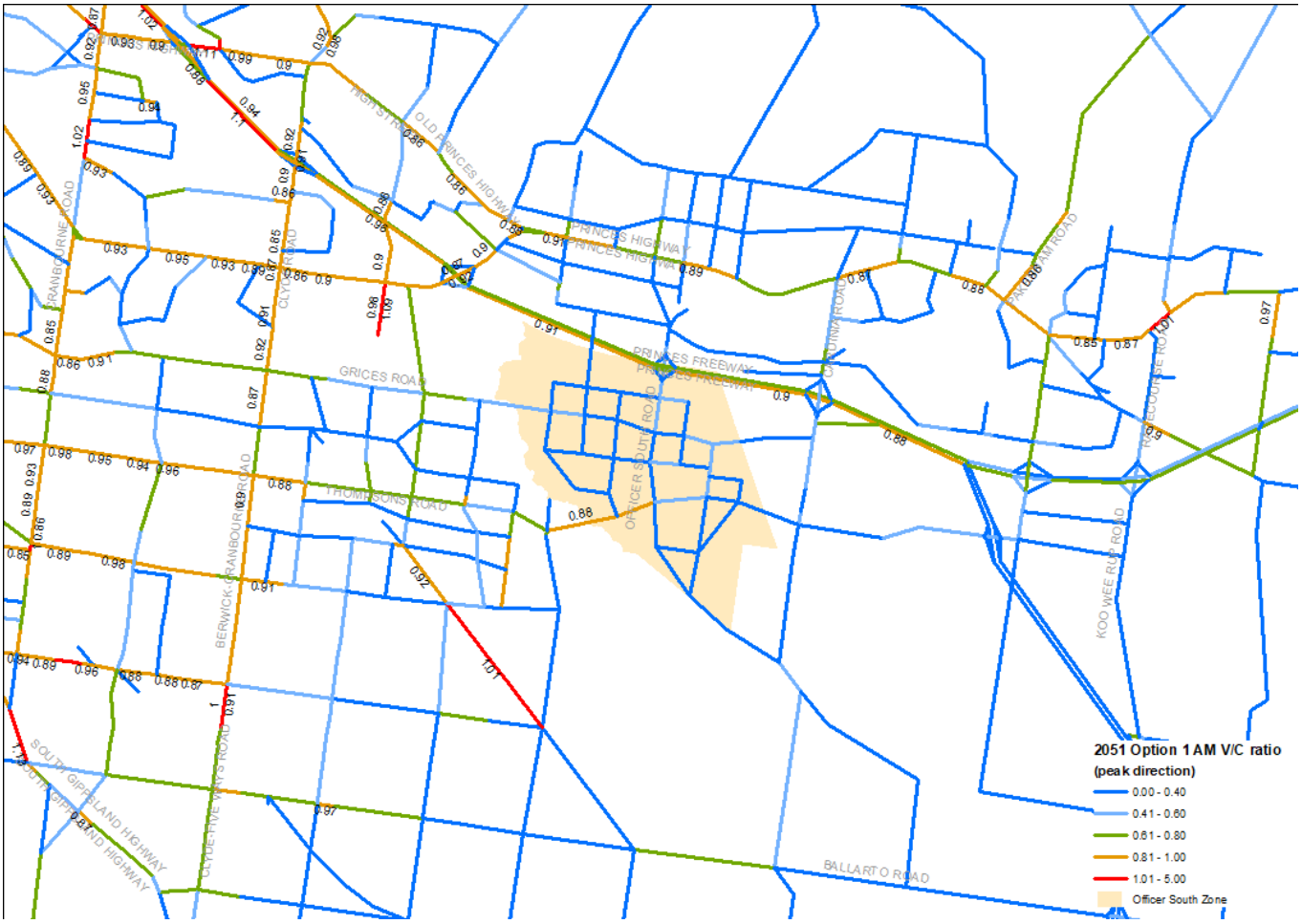

Figure 24 2051 Option 1 AM peak direction volume/capacity ratio

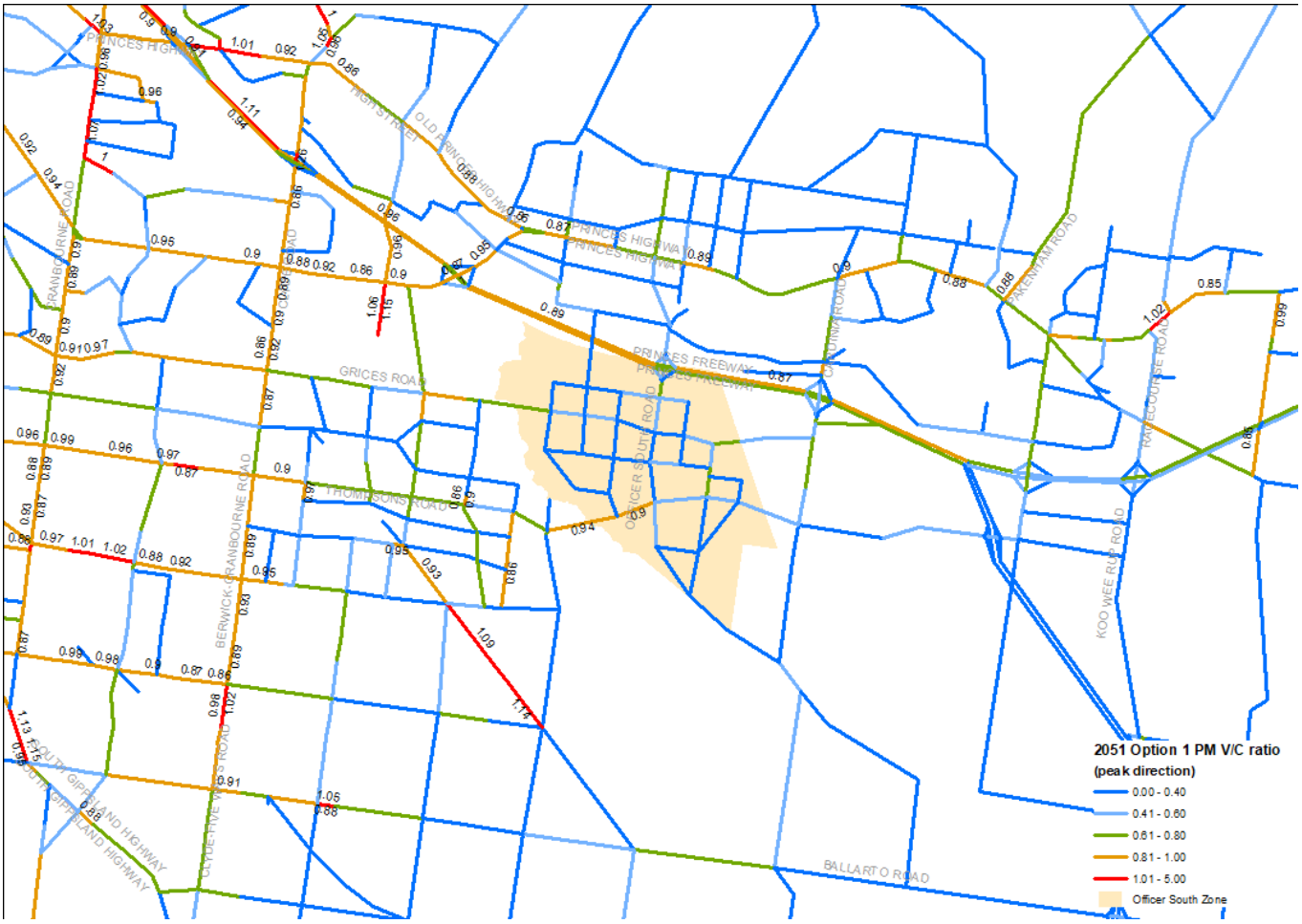

Figure 25 2051 Option 1 PM peak direction volume/capacity ratio

6.5 Travel speed

Figure 26 and Figure 27 show the peak direction vehicle speed in the 2051 Option 1 AM and PM periods respectively The results are summarised as follows:

- With increased development, traffic would generally be slower compared to 2018 Base in the study area, including arterial roads.
- Within Officer South, average travel speed would be generally between 40 and 60 km/h, with some connector roads 20 to 40 km/h around larger commercial and industrial development.
- Travel speed on Officer South Road would be lower compared to 2018 Base, with speed reduced from .60-80 km/hr to 20-60 km/hr in some sections of road.
- Travel speed on Thompsons Road through Officer South is forecast to be 40-80 km/h in the AM peak and 20-80 km/h in the PM peak, due to higher traffic volumes and congestion in the PM period (see Sections 6.1 and 6.4).

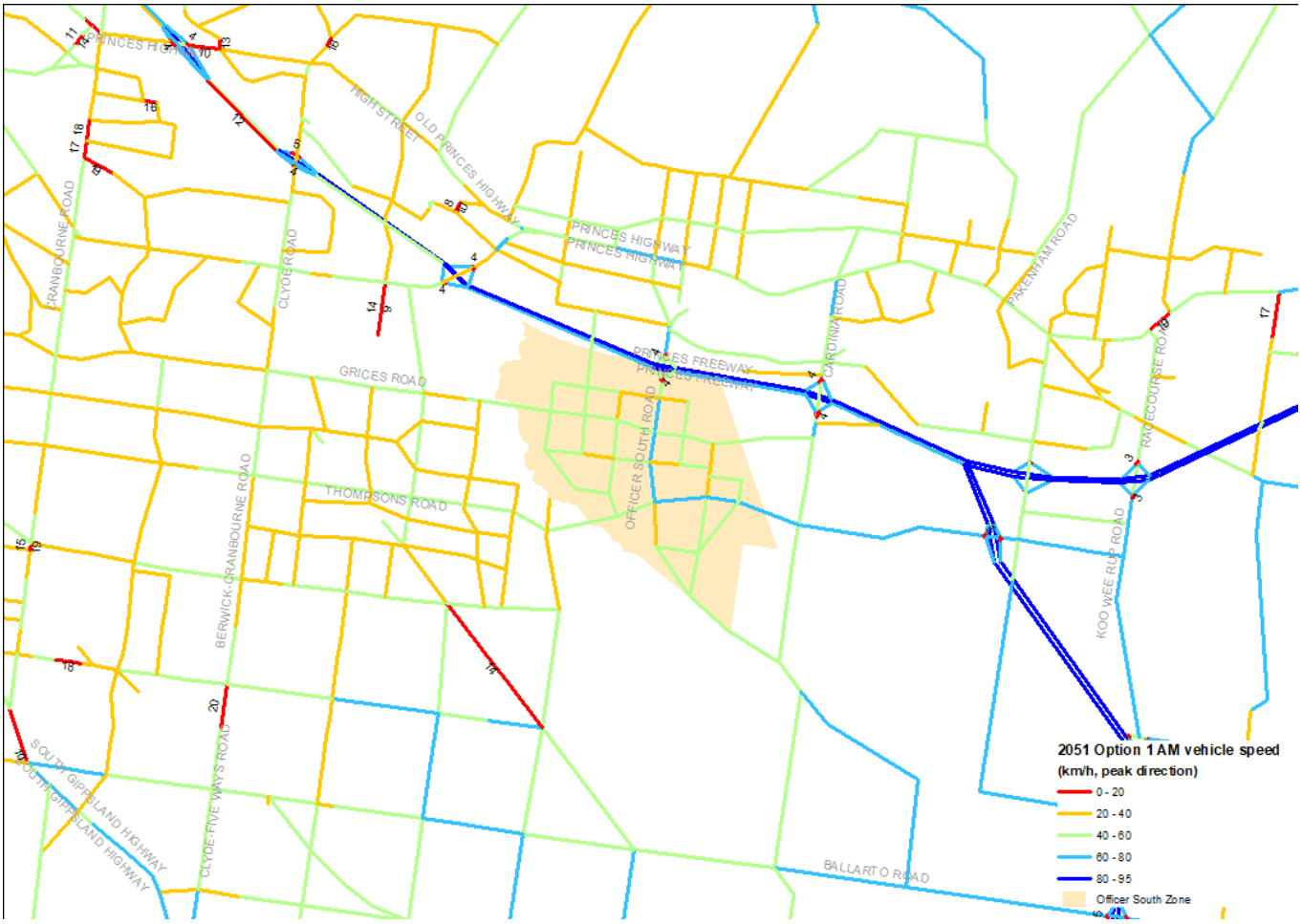

Figure 26 2051 Option 1 AM peak direction travel speed

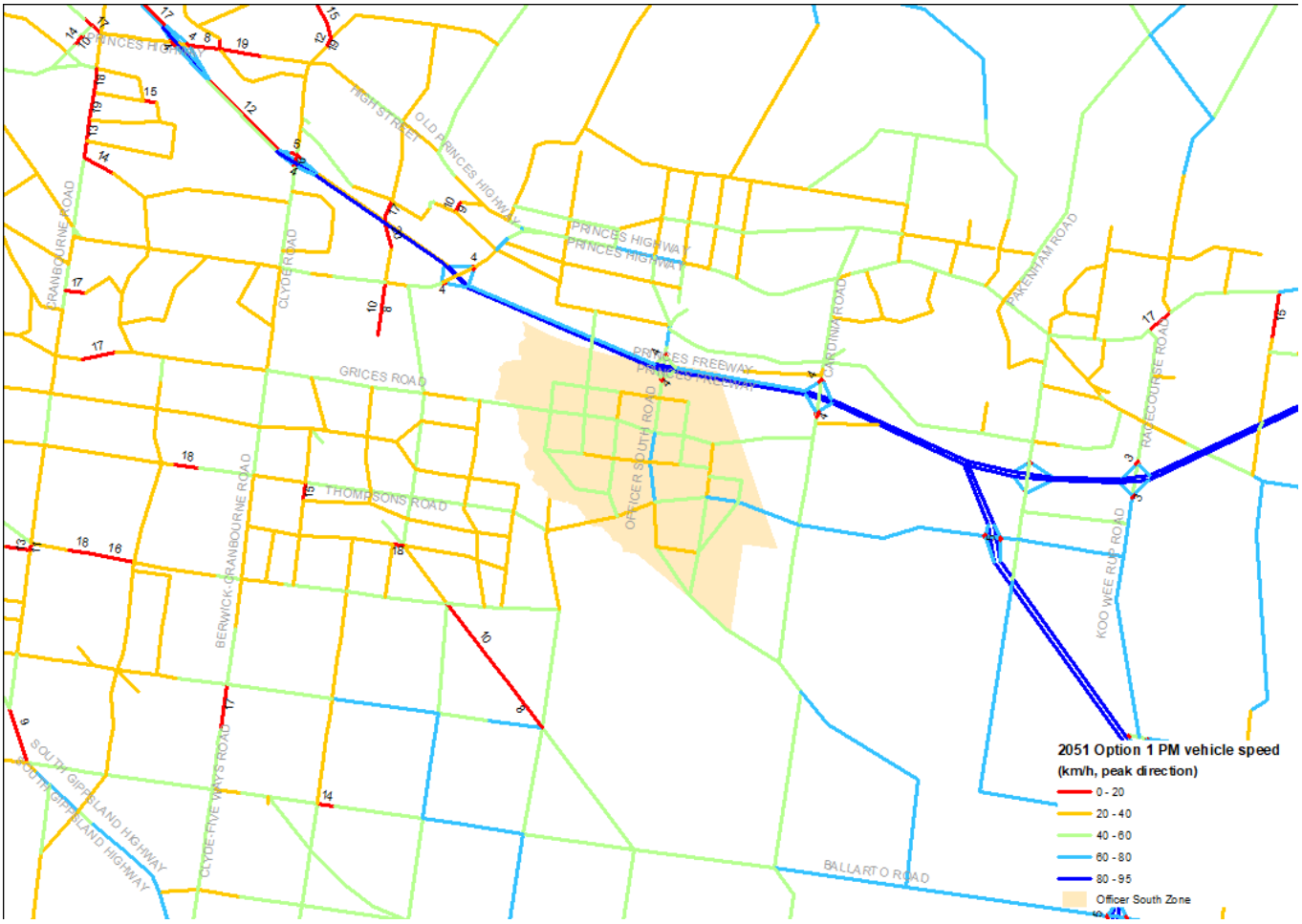

Figure 27 2051 Option 1 PM peak direction travel speed

7. Conclusions

7.1 Strategic model review

The Victorian Integrated Transport Model (VITM) that was developed for the MRPV Thompsons Road Extension Business Case (TREBC) was refined, calibrated and validated for a study area around the Thompsons Road extension corridor. A review of this model was presented to VPA, Cardinia Shire Council and the DoT. The model was deemed to be well-validated, and the existing zoning would be suitable to be used for the Officer South modelling. However, land use and network in the Officer South Employment and nearby precincts would need to be updated to align with the PSP land use and network.

7.2 Road network update

VPA provided information about the connector and access streets, and the surrounding arterials and freeways for the Officer South Employment PSP. The connector streets were added to the VITM network with the centroid connectors relocated to these connector streets. The arterial road network was also updated from comments of the VPA, DoT and Cardinia Shire Council.

7.3 Population data update

The VITM population and household data were updated for the Officer South Employment and nearby precincts with the following information provided by the VPA:

– Forecast population for Officer South Employment and nearby PSPs.
– Forecast population by VITM zone within the PSPs.
– Forecast households/dwellings and household size for the PSPs.

The PSP population was compared with those in the VITM and the spatial distribution was presented in this report.

7.4 Employment data update

The VITM employment data were updated for the Officer South Employment and nearby precincts with the following information provided by the VPA:

– Forecast employment for Officer South Employment and nearby PSPs.
– Forecast employment by VITM zone within the PSPs.
– Forecast employment by industrial and commercial precincts for each VITM zone in the Officer South Employment PSP.
– Forecast employment by industry classification for the entire Officer South Employment PSP.

The PSP employment was compared with those in the VITM and the spatial distribution was presented in this report.

7.5 Base traffic conditions

The 2018 Base traffic conditions have been examined in terms of vehicle volumes, volume/capacity ratio and travel speed. The key findings are:

– There is little traffic through Officer South with about 300 vpd on Officer South Road.
– Congestion is shown to be not a large issue in Officer South relative to other parts of the study area.
– Average travel speed is generally low (below 40 km/h) in built-up area, such as north of Princes Freeway and west of Berwick-Cranbourne Road.
– However, average travel speed is higher (over 40 km/h) on arterial roads (such as Princes Freeway, Princes Highway and Berwick-Cranbourne Road) and in less built-up area in and around Officer South.

7.6 Future traffic conditions

The 2051 Option 1 traffic conditions have been examined in terms of vehicle volumes, trip generations, traffic growth, volume/capacity ratio and travel speed. The key findings are:

– Thompsons Road is forecast to carry significant amount of traffic (75,000 vpd east of Berwick Cranbourne Road) due to its extension and widening.
– In Officer South, in addition to Thompsons Road, Grices Road (13,000 vpd east of Officer South Road) and Officer South Road (39,000 vpd north of Grices Road) would carry most of the traffic through the area.
– The peak direction of travel would generally be westbound or northbound during AM peak and eastbound or southbound during PM peak. However, the peak direction would be reverse on Thompsons Road and Grices Road west of Officer South as more traffic would be attracted to the employment precinct in the area.
– There would be more trips attracted to than produced from Officer South in the AM peak as most of the land use are commercial and industrial. For the same reason, there would be more trips produced from than attracted to Officer South in the PM peak.
– Congestion would generally be not an issue in the Officer South Employment Precinct, with a volume/capacity ratio below 0.6 (which indicates virtual free flow conditions) on most roads.
– Thompsons Road would be the only road through Officer South which has a congestion issue, with a volume capacity ratio of 0.88 in AM peak and 0.94 in PM peak.
– Within Officer South, average travel speed would be generally between 40 and 60 km/h, with some connector roads 20 to 40 km/h around larger commercial and industrial development.
– Travel speed on Thompsons Road through Officer South is forecast to be 40-80 km/h in the AM peak and 20-80 km/h in the PM peak, due to higher traffic volumes and congestion in the PM period (see Sections 6.1 and 6.4).

7.7 Findings

The modelling outputs of the 2051 Option 1 scenario indicate that most of the planned road network will operate well below capacity during peak periods, with only Thompsons Road experiencing some congestion. This indicates the assumed network would generally be adequate for the population and employment planned for the precinct.

8. References

Major Road Projects Victoria 2021, Thompsons Road Extension Business Case, Strategic transport modelling report, prepared by GHD for Major Roads Projects Victoria, Melbourne.

Transport for Victoria 2017, *Statewide version of the VITM enhancements*, prepared by AECOM for Transport for Victoria, Melbourne.

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