



Hobsons Bay City Council

Transport Modelling and Analysis

Final Transport Modelling Report

July 2016

Executive summary

A strategic level analysis for the Hobsons Bay area has been undertaken using the Victorian Integrated Transport Model (VITM) to estimate future traffic growth on the main corridors and associated road networks within the City of Hobson Bay. A number of scenarios, with a mix of no development, half development and full development of the following precincts, have been tested:

- The former Don Smallgoods site, Altona North (Precinct 15)
- The former Caltex Terminal, South Kingsville (Precinct 16)
- The remainder of the precinct around the former Caltex Terminal, South Kingsville (Precinct 16)
- Former Port Phillip Woollen Mills - 57 Nelson Place, Williamstown (Precinct 20)

The analysis has found that most of the increase in volumes due to the development would be on Blackshaws Road and other roads around the precincts. Including the full development of Precincts 15, 16 and 20, the model forecasts the following net increases of vehicles at 7-9am in 2031 compared to 2015:

- 800 vehicles northbound on Millers Road south of West Gate Freeway
- 500 vehicles northbound on Melbourne Road south of West Gate Freeway
- 700 vehicles eastbound on Blackshaws Road west of New Street

Apart from the above locations, the model forecasts the development would have a minor impact on the traffic in most of the road network in Hobsons Bay. The development would however have some impact on congestion levels at some locations. The following locations in Hobsons Bay may become more congested with the full development of Precincts 15, 16 and 20:

- Melbourne Road south of West Gate Freeway
- Melbourne Road south of Ferguson Street
- Blackshaws Road near the junction with Melbourne Road
- Blackshaws Road west of Mills Street

Millers Road south of West Gate Freeway would remain congested with or without the full development. However, for most of the road network, the development would have little impact on traffic conditions, which remain relatively uncongested.

The following mitigation measures are expected therefore to assist to manage congestion resulting from the future development of Precincts 15, 16 and 20 in Hobsons Bay.

- Capacity upgrades on Blackshaws Road near the junction with Melbourne Road
- Capacity upgrades on Melbourne Road between Parker Street and Ferguson Street

This study has also identified the following additional modelling activities:

- Mesoscopic modelling – the West Gate Freeway between Williamstown Road and Western Ring Road is now a managed motorway. As VITM does not have junction and signal data, it is not a suitable platform to model a managed motorway. To model a managed motorway, it is recommended to extract a subarea from VITM comprising the study area and use the subarea demand matrices in a mesoscopic model. Ramp

metering and other junction and signal data can then be coded in the network to model the managed motorway and other parts of the network.

- Calibration of the Freight Movement Model (FMM) – it is recommended that the FMM to be calibrated with truck traffic counts for the Melbourne metropolitan area.
- Test for local projects – Projects of local interest, such as extension of New Street to Francis Street, can be tested with the strategic model to assess the traffic impact of these local projects.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout the report.

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Glossary of key terms

Four-step model	A model structure commonly used in a strategic model to derive travel demand and assigned it to a network. The four steps comprise trip generation, trip distribution, mode choice and trip assignment.
Induced traffic	Increase in traffic levels resulting from infrastructure improvement with people changing route, destination, mode or time of travel, relocating trips or making additional journeys.
Link class	Road classification which defines the capacity and speed-flow relationship in a transport model
Managed motorway	Freeway or tollway with electronic traffic management and control, such as incident detection, variable speed limit, tidal flow and reversible lanes and ramp metering
Matrix estimation	Adjustment of the trips in an origin-destination matrix to produce modelled volumes that match surveyed volumes within a confident interval.
Melbourne Statistical Division	An Australian Standard Geographical Classification used by the Australian Bureau of Statistics to cover the Greater Melbourne metropolitan area.
Mesoscopic model	A mesoscopic model generally covers areas smaller than those in a strategic model and includes intersection details to more accurately reflect intersection delay.
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.
Reference case	Future networks, demographics and other model parameters assumed in a strategic model
Screenline	Represents a collection of strategic locations for which traffic volumes are summed for comparison with model results. The locations generally capture competing parallel routes in a given corridor.
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.
Victorian Integrated Transport Model (VITM)	A strategic model developed by the Department of Economic Development, Jobs, Transport and Resources covering the whole of Victoria.

Volume/capacity ratio Ratio of traffic volume to the capacity, indicating the congestion level of a road. Table 4 shows the relationship between volume/capacity ratio and traffic flow characteristics.

1. Introduction

1.1 Background

Hobsons Bay has limited north-south road linkages; Melbourne Road and Millers Road are the key north-south road linkages with Blackshaws Road providing an important east-west link. Melbourne Road and Millers Road have an interchange with the Westgate Freeway which is the major high capacity corridor servicing the municipality.

Apart from being the main north-south road linkages, Melbourne Road and Millers road will need to accommodate a significant amount of growth due to the pending development of a number of sites. The largest development includes:

- The former Don Smallgoods site, Altona North (Precinct 15)
- The former Caltex Terminal, South Kingsville (Precinct 16)
- The remainder of the precinct around the former Caltex Terminal, South Kingsville (Precinct 16)
- Former Port Phillip Woollen Mills - 57 Nelson Place, Williamstown (Precinct 20)

The purpose of the assignment has been to undertake a strategic level analysis for the Hobsons Bay area using the Victorian Integrated Transport Model (VITM) to estimate future traffic growth on the road network associated with the proposed development. The results of the model will help to assess the likely cumulative impact on Melbourne Road and Blackshaws Road, which may constrain development in the Williamstown/Newport corridor. A number of scenarios, with a mix of no, half and full development of Precincts 15, 16 and 20 have been tested.

1.2 Purpose of this report

The purpose of this report is to summarise the results and findings from the modelling. The results covered include the following for the study area:

- plots of modelled volumes for 7-9am 1-way all vehicles and trucks
- plots of modelled peak direction volume/capacity for 7-9am all vehicles
- plots of volume difference between the base and scenario for 7-9am all vehicles and trucks
- proportion of daily travel attributed to public transport, segregated into train, bus and tram travel in the study area
- percentage of daily public transport trips to/from major development areas (namely, Precincts 15, 16 and 20)
- travel time along key road corridors (namely, Melbourne Road, Blackshaws Road, Millers Road and Kororoit Creek Road) for 7-9am peak direction

Although the model covers the whole of Melbourne Statistical Division, only results around the study area are presented in this report. The full extent of the outputs from the model can be found in the geographic information system (GIS) delivered to the Hobsons Bay City Council (HBCC) and VicRoads.

1.3 Report structure

The report is broadly divided into the following sections:

- Section 2 describes the methodology used for modelling the different years and scenarios

- Section 3 presents the model results for mode share
- Section 4 presents the model results for all vehicle volumes
- Section 5 presents the model results for truck volumes
- Section 6 presents the model results on key roads
- Section 7 presents the model results for volume/capacity ratio
- Section 8 concludes the report in terms of the impact of the development on the road network and provides recommendations in mitigation measures and further model development.
- Glossary of key terms defines the key terms used in the report.

In addition, the Appendices contain GHD's responses to HBCC and VicRoads' comments on the inception report, network and demographic report, calibration and validation report, preliminary scenario modelling results and draft final report for this study.

1.4 Scope and limitations

This report has been prepared by GHD for HBCC and VicRoads and may only be used and relied on by HBCC and VicRoads for the purpose agreed between GHD, the HBCC and VicRoads.

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1.5 Assumptions

The following assumptions have been made in undertaking the analysis:

- Traffic volume outputs from VITM are based mostly on the demographic and network assumptions inherent in the in the VITM reference case model. The reference case represents a set of standard data to model future volumes developed over time by various organisations. It does not represent certainty in future conditions and volumes.
- Induced traffic from the development in changing time of travel, relocated trips and taking fewer journeys (see Section 2.1) would not be significant and need not be considered in modelling the traffic impact of the proposed development in Hobsons Bay.
- The existing speed flow curves in VITM for modelling freeways are also applicable for managed motorways.
- No junction modelling and ramp metering are carried out as VITM does not include junction geometry and signal data.

2. Methodology

VITM has been used to estimate future traffic growth in Hobsons Bay for the cumulative assessment. The model estimates traffic volumes based on current and future demographic, network and other modelling data. However, the model is not able to replicate the complex behaviour of individual households and other local conditions that may affect the traffic volumes in the area. Hence, there is generally some variation between surveyed and modelled volumes on individual road sections, with some sections validated better than other sections (see the Calibration and Validation Report of this project).

Despite the above limitation, VITM is still suitable for assessing the general traffic patterns and trends when comparing the results of different forecast years and scenarios. However, the model includes only some local roads (some of which are selected by HBCC), it should not be relied on to assess impact on local roads, many of which are not included in the model.

The cumulative assessment involved running the model for the following conditions:

- 2015 existing conditions
- Future-years the base run and each scenario to be modelled (2021 and 2031)
- Seven scenarios (as specified in Table 1)
- Time periods: AM peak, inter-peak, PM peak, off-peak and 24-hour
- Type of vehicles: all vehicles and heavy vehicles

Table 1 Scenarios to be modelled

Scenario	Description	Household growth				Year	
		Precinct 15	Precinct 16	Precinct 20	Total	2021	2031
Base	Do Nothing (no development)	0	0	0	0	✓	✓
Scen1	All developments with half development of Precincts 15 and 20 only	1500	0	400	1900	✓	✓
Scen2	All developments with half development Precinct 16 only	0	635	0	635	✓	✓
Scen3	All developments with half development Precincts 15, 16 and 20	1500	635	400	2535	✓	✓
Scen4	All developments with full development of Precincts 15 and 20 only	3000	0	800	3800	✗	✓
Scen5	All developments with full development of Precinct 16 only	0	1270	0	1270	✗	✓
Scen6	All developments with full development of Precincts 15, 16 and 20	3000	1270	800	5070	✗	✓

- Precinct 15: the former Dons site, Altona North
- Precinct 16: the former Caltex terminal and the adjacent area, South Kingsville
- Precinct 20: the former Port Phillip Woollen Mills, Williamstown

The derivation of demographic data for 2021 and 2031 has been covered in the “Network and Demographic Report” delivered to HBCC and VicRoads as part of this project. Note that although the base case assumes no development in Precincts 15, 16 and 20, it includes growth in other areas based on the reference case of VITM and other data from HBCC. The three crossed scenarios identified in Table 1 have not been run because they were viewed by HBCC and VicRoads as not being realistic.

Although the model was run for all time periods, only results for AM peak are presented in this report. The results for 24-hour, which are derived by combining the results of the AM peak, inter-peak, PM peak, off-peak periods, can be found in the spreadsheets and GIS delivered to HBCC and VicRoads. Also, results of not all scenarios are presented in this report.

Results for all vehicles and trucks are presented. Volumes of all vehicles are measured in passenger car unit (PCU). The PCU for car is 1, rigid truck 1.3 and articulated truck 2.3. Truck volumes are measured in number of trucks. Note that buses are modelled as part of public transport in VITM, independent of heavy vehicles or trucks.

In presenting the model results in bar graphs, the scenarios are arranged in order of increasing number of households to help discern the trend of model results with household growth.

As the options involved different land use scenarios, all model runs needed to start from the trip generation step. In other words, all model runs were four step runs. In addition, the following options were chosen for all model runs:

- Crowd model in public transport, which constrains the number of passengers to its capacity
- Full toll model, which considers toll cap and distributed value of time in modelling the toll cost
- Assign airport trips, which models trips from/to the Melbourne Airport separately

2.1 Induced Traffic

The following induced traffic was modelled in the four step runs:

- Changing route — drivers travel to the same destinations but use a different route due to a more congested condition in the existing route from the development
- Changing destination — drivers decide to travel to nearer destinations because the traffic congestion caused by the development makes the journey time unacceptable for the original destinations
- Changing mode — car users switch to public transport because the traffic congestion caused by the development makes rail travel more attractive than road

However, the following induced traffic was not considered due to the limitation of the four step model

- Changing time of travel — drivers decide to travel in the commuting non-peak period because the traffic congestion caused by the development increases journey times to an unacceptable level
- Relocated trip — people and businesses relocate to avoid the traffic congestion caused by the development and so make journeys that are new to another area
- Taking fewer journeys — people are taking fewer car journeys because of the traffic congestion caused by the development

In VicRoads’ Transport Modelling Guidelines, there are broadly two methods to deal with induced traffic: fixed trip matrix method and variable trip matrix method. However, these

methods are only applicable for evaluating new infrastructure project. As we are dealing with different land use scenarios, only a single 4-step run is required for each scenario. No fixed trip matrix or variable trip matrix methods need to be applied for this assessment.

2.2 Managed Motorways

VITM uses the following link classes to model freeways:

- Inner freeway
- Outer freeway
- Ramp
- Terminal

Each link class has a characteristic speed flow curve to determine the travel speed at a given traffic flow. Currently, the existing speed flow curves in VITM are used for modelling both freeways and managed motorways.

As VITM does not include junction geometry and signal data, no junction modelling and ramp metering can be carried out in VITM. Hence, VITM is not a suitable platform to model a managed motorway. A mesoscopic model is recommended for modelling a managed motorway. This is discussed further in Section 8.2.3.

3. Mode Share

The mode share considered in this report includes the mode share to and from the precincts defined in the HBCC proposed strategic redevelopment sites and Hobsons Bay Industrial Land Management Strategy 2008, and the average mode share in the study area. Figure 1 shows the VITM zones comprising the precincts considered in this report and the extent of the study area. Precincts 15, 16 and 20 are the most significant redevelopment sites in the HBCC strategy.

The mode share from/to a precinct is defined by number of trips from/to the VITM zone where the precinct is located; whereas the mode share in the study area is defined by passenger kilometres travelled within the study area. Note that the mode share from/to a precinct cannot be split into train, tram and bus as these trips are not defined until they are assigned to the network.

The following sections discuss the mode share from/to precincts and in the study area. The scenarios presented in the charts are arranged in order of increasing household growth as listed in Table 1.

3.1 Mode Share from/to Precincts

Figure 2 shows the public transport share travelling from the precincts to other places in the Melbourne Statistical Division for the base cases. Precinct 20 has a high public transport share as it is near a train station. For Precincts 15 and 16, it is expected many public transport trips would involve park and ride due to longer distance of travel to the train stations. However, Precinct 16 is closer to train stations than Precinct 15, and other local roads can be used to access the train stations from Precinct 16. Hence, Precinct 16 generally has a higher public transport mode share, even though the two precincts are in close proximity. For all precincts, the public transport share is forecast to increase over the years, due to increased road congestion and higher frequency of public transport services with the completion of Melbourne Metro, as assumed in the reference case of VITM.

Figure 3 and Figure 4 show the public transport share from the precincts for the 2021 and 2031 scenarios respectively. For Precinct 16, the public transport share is similar for the different scenarios and increases only slightly with household growth. For Precincts 15 and 20, the public transport share is similar for the lower growth scenarios but increases by over 2% for the higher growth scenarios. The increase in the public transport share indicates a preference for public transport travel as the road traffic increases with household growth. Note that congestion has less impact on Precinct 16, where other local roads can be used to access the train stations and the change of public transport share with household growth is small.

Figure 5 shows the public transport share travelling to the precincts from other places in the Melbourne Statistical Division for the base cases. Similar to the public transport share from the precincts, Precinct 20 has a high public transport share and the public share is forecast to increase over the years for all precincts.

Figure 6 and Figure 7 show the public transport share to the precincts for the 2021 and 2031 scenarios respectively. For Precinct 16, the public transport share is similar for the different scenarios but tends to decrease slightly with household growth. For Precincts 15 and 20, the public transport share is similar for the lower growth scenarios but decreases significantly for the higher growth scenarios. The decrease in the public transport share indicates a preference for car travel in the contra-peak direction as the number of households grows. Note that congestion is less in the contra-peak direction and so is less affected by the household growth. The total number of trips to the precincts would still increase with the household growth but with more people travel by cars to the precincts than by public transport.

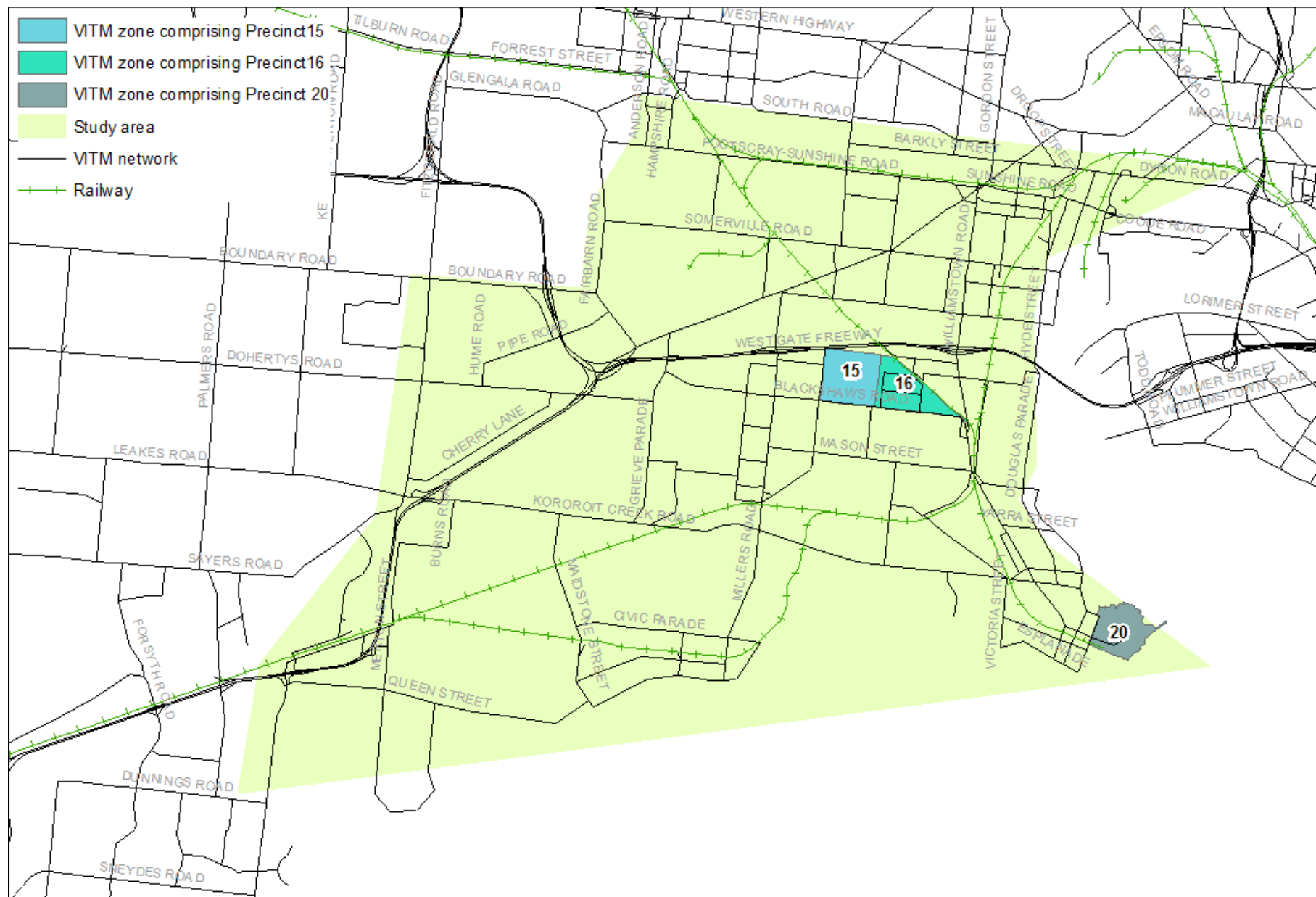


Figure 1 VITM zones comprising precincts of HBCC major redevelopment sites

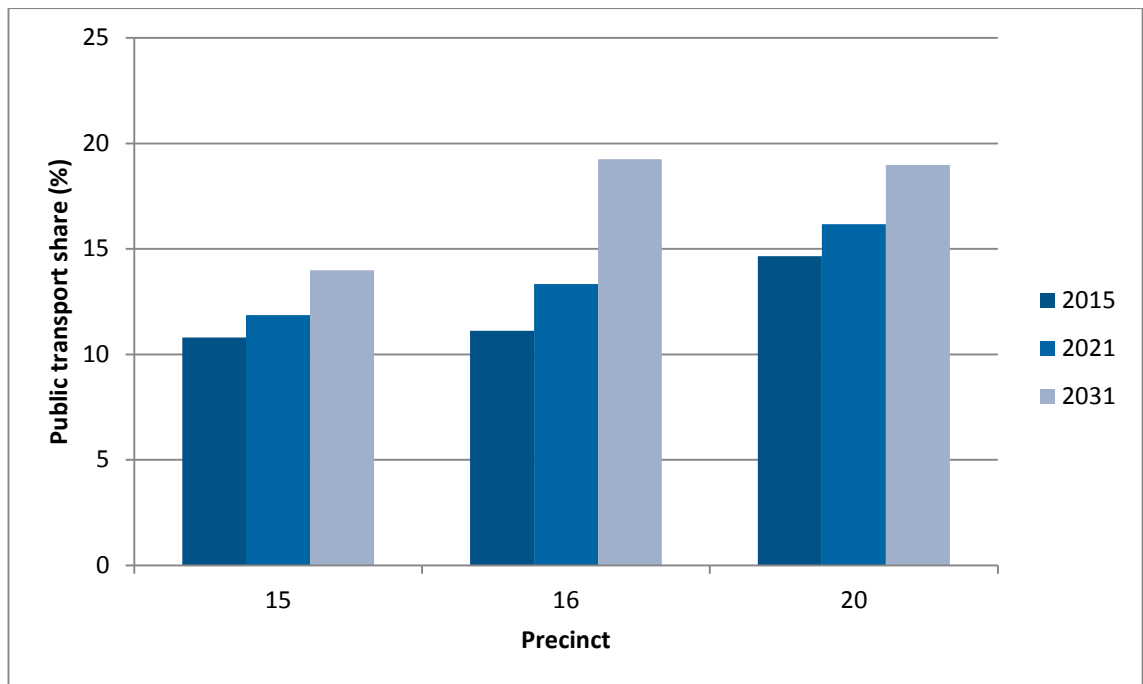


Figure 2 Public transport share from precincts, 7-9am base cases

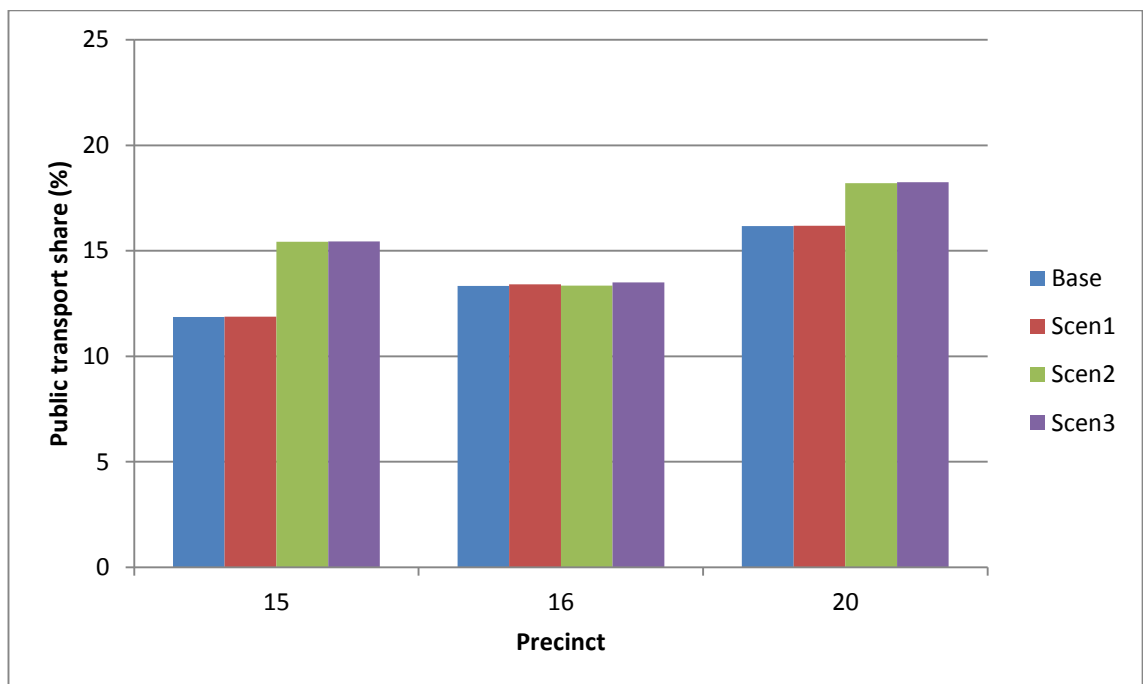


Figure 3 Public transport share from precincts, 7-9am 2021 scenarios

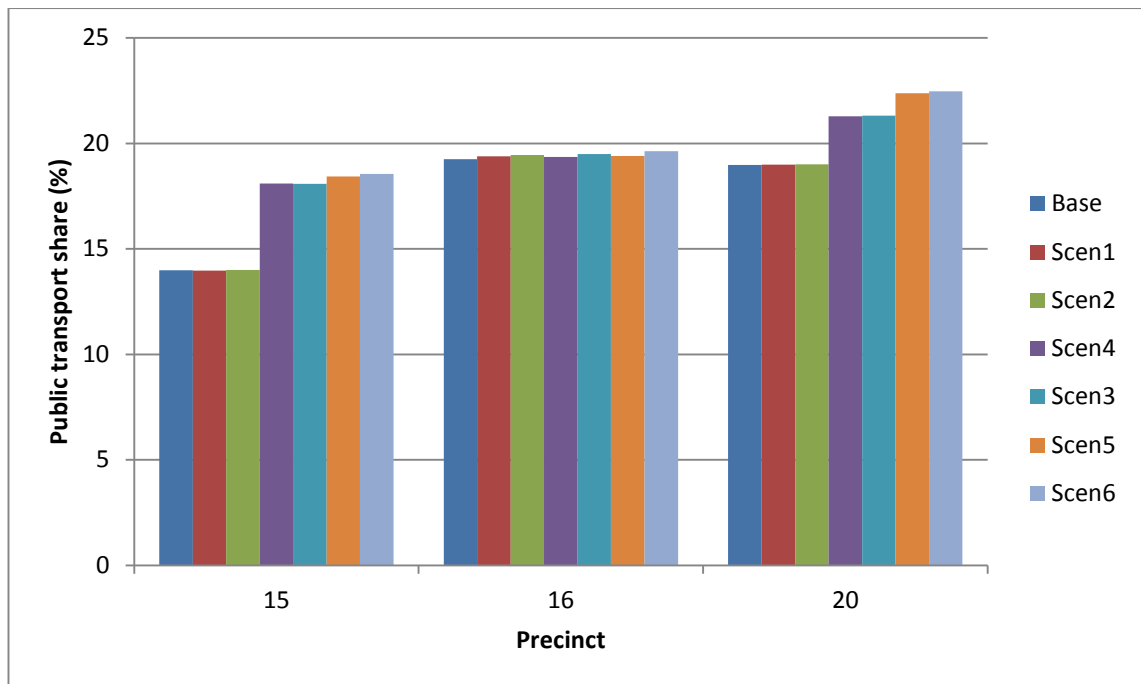


Figure 4 Public transport share from precincts, 7-9am 2031 scenarios

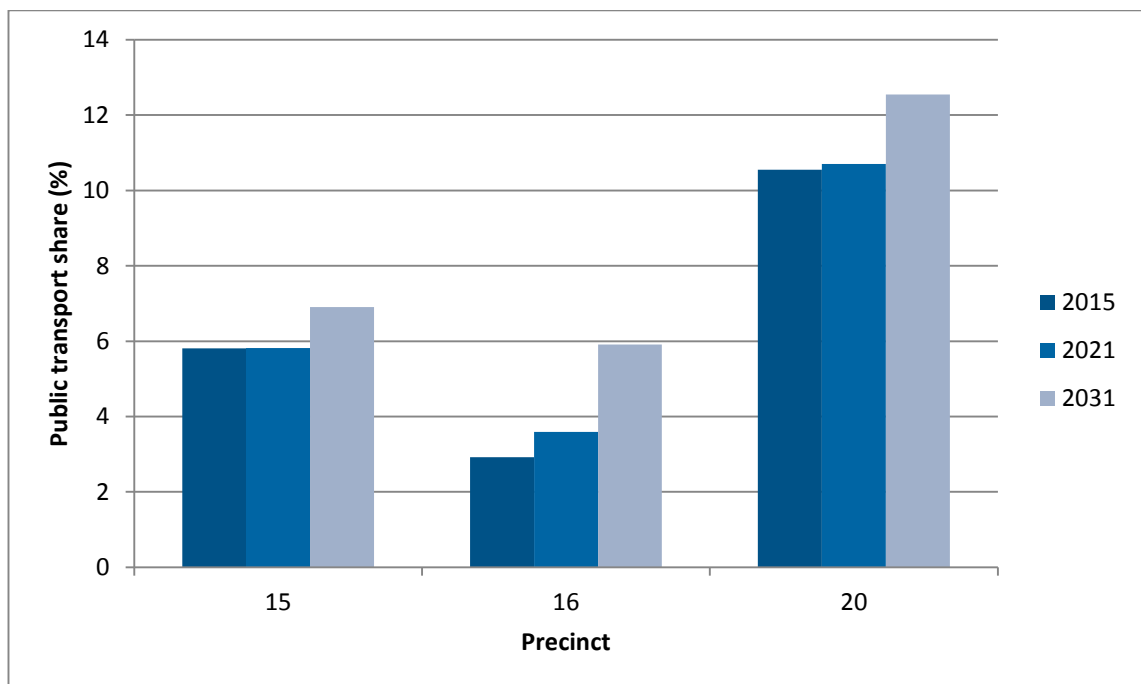


Figure 5 Public transport share to precincts, 7-9am base cases

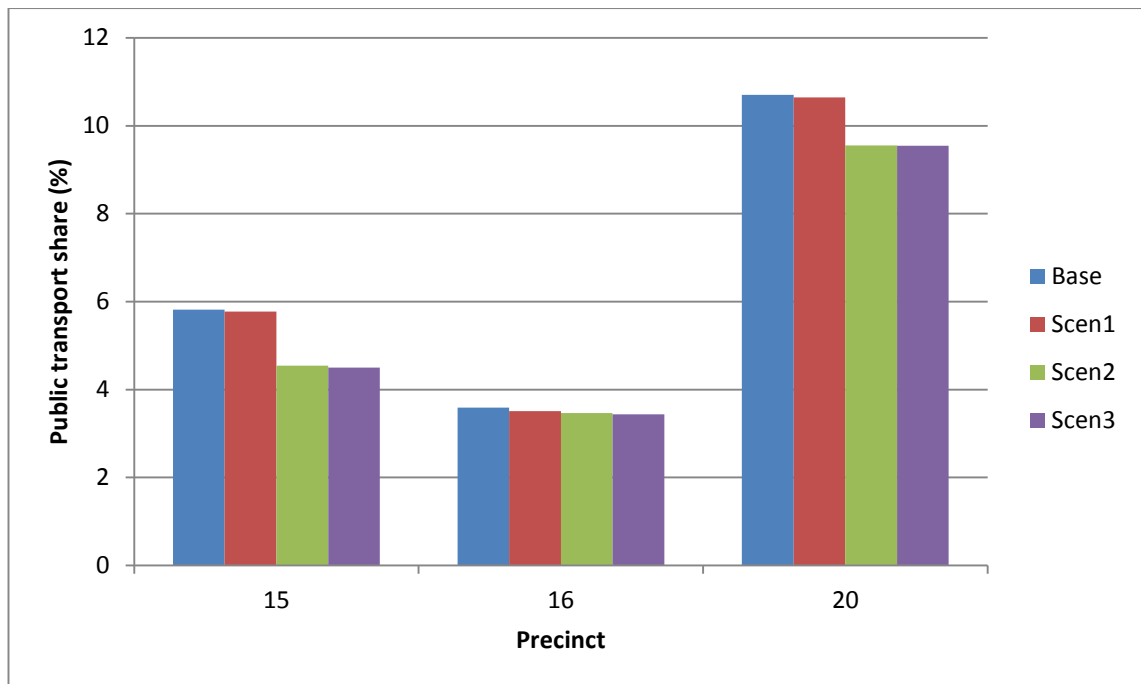


Figure 6 Public transport share to precincts, 7-9am 2021 scenarios

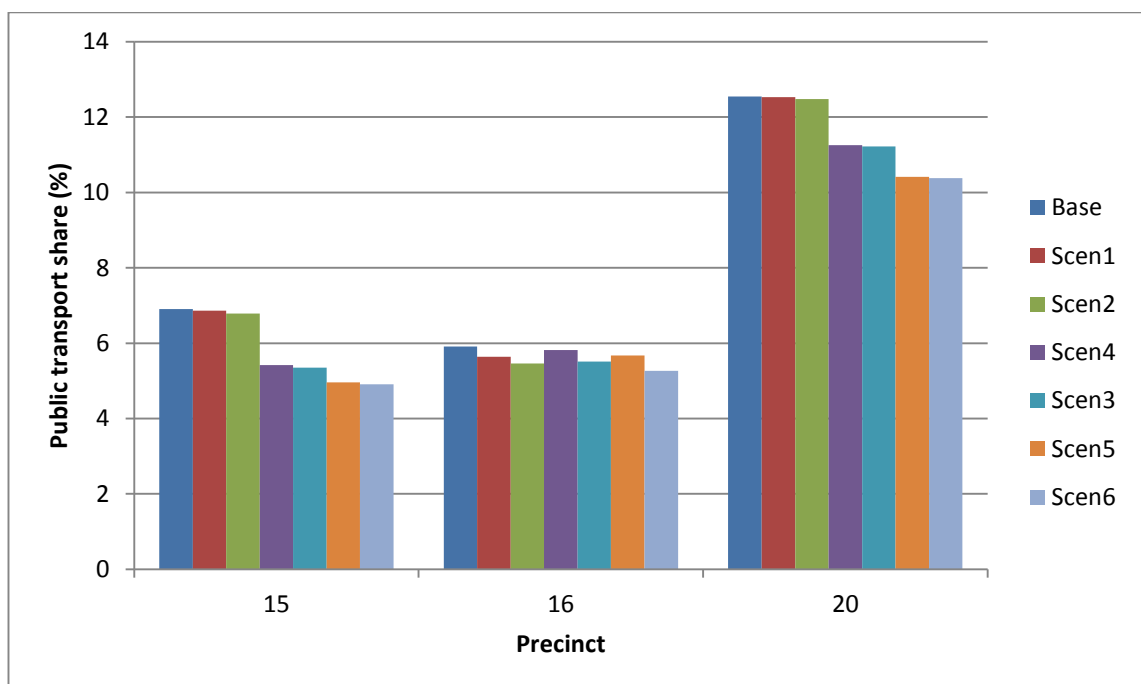


Figure 7 Public transport share to precincts, 7-9am 2031 scenarios

3.2 Mode Share in Study Area

Figure 8 shows the mode share in the study area, which includes trips from Wyndham and other areas crossing the study area, for the base cases. For all public transport modes, the shares are forecast to increase over the years, although the mode share of bus would increase only slightly.

Figure 9 and Figure 10 show the mode share in the study area for the 2021 and 2031 scenarios respectively. The mode share is similar for the different scenarios indicating the average mode share in the study area would not be significantly affected by the household growth in the precincts. Note that the mode share covers all trips crossing the study area, including trips from

Wyndham and other areas. The trips from the precincts are small in comparison and so there is negligible change in the mode share.

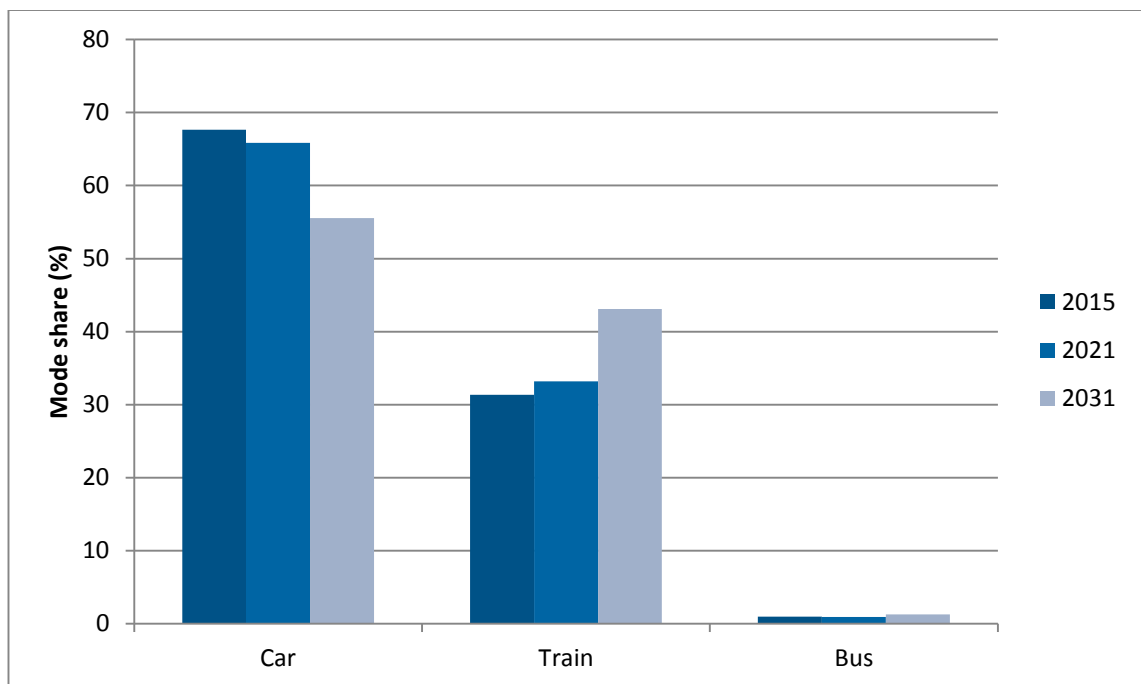


Figure 8 Mode share in study area, 7-9am base cases

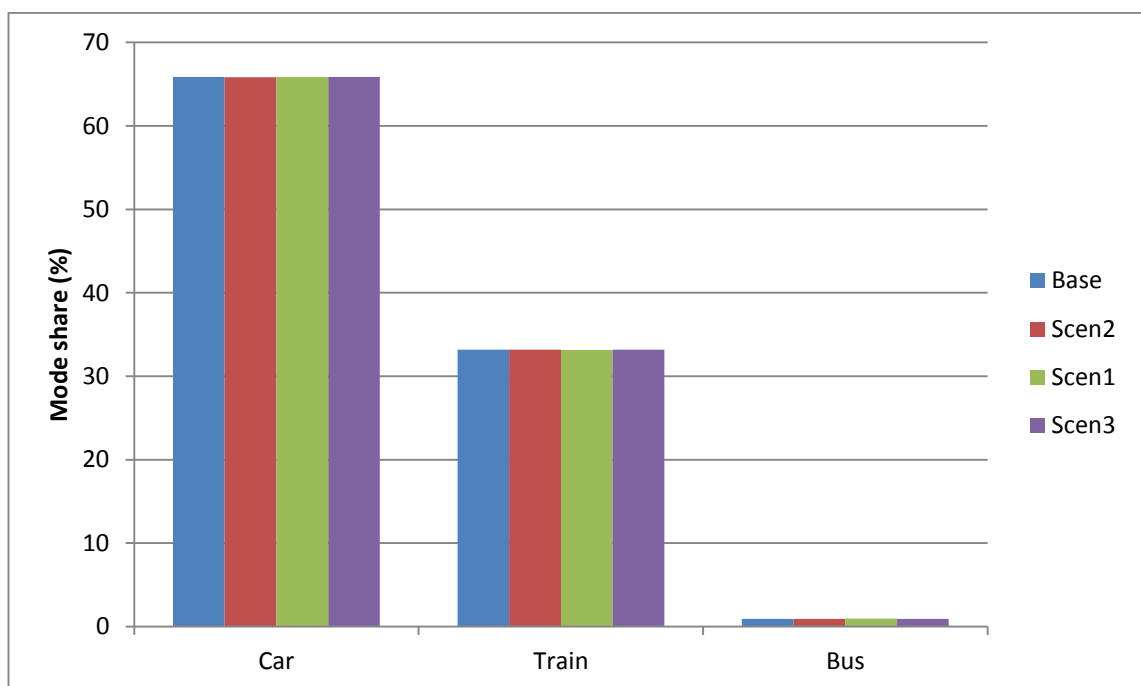


Figure 9 Mode share in study area, 7-9am 2021 scenarios

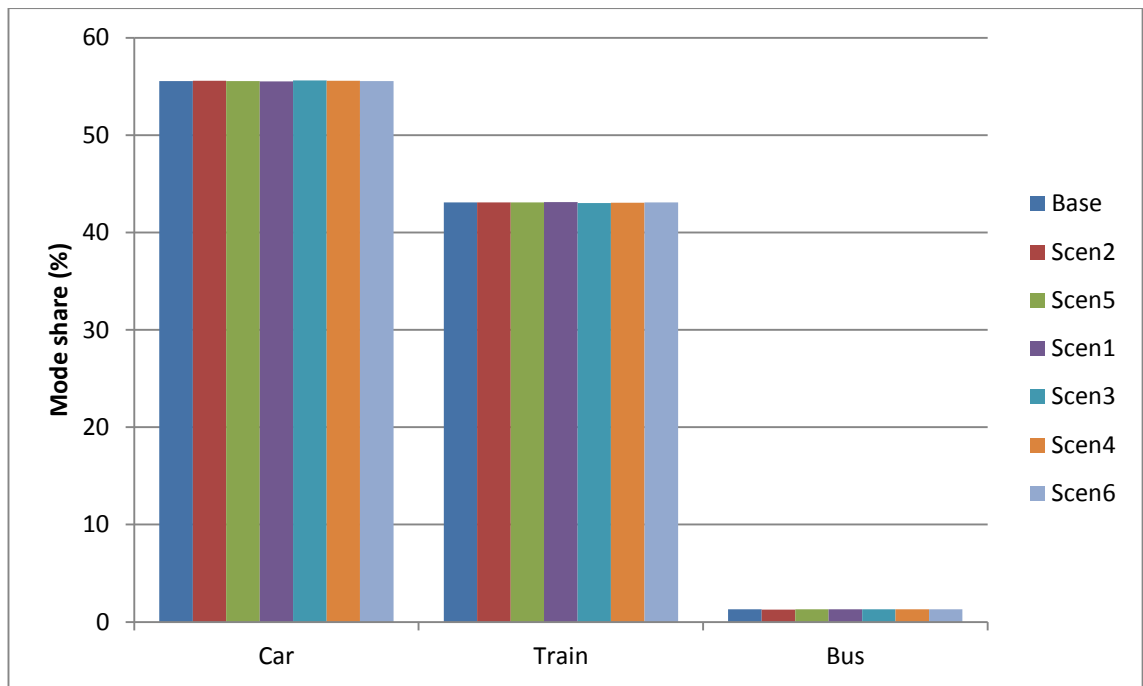


Figure 10 Mode share in study area, 7-9am 2031 scenarios

4. All Vehicles Volumes

The model results are analysed by comparing the vehicle volumes for the base cases between the current and forecast years to see where the demands would be in future. The vehicle volumes of the base and scenarios are then compared to see the impact of the household growth in the major redevelopment sites on the surrounding traffic. The following scenarios are chosen to illustrate the impact:

- 2021 Scenario 3, half development of Precincts 15, 16 and 20 (see Table 1)
- 2031 Scenario 6, full development of Precincts 15, 16 and 20

The results of other scenarios are generally similar to these scenarios but with less of an impact on traffic. Although the 2015 volumes on some parts of the arterial and local roads have been underestimated (see the Calibration and Validation Report of this project), it should not affect the relative changes when the results of different years and scenarios are compared in the following sections.

Figure 11 shows the VITM road network that is used to illustrate the model results.

4.1 Base Forecast

Figure 12 shows the 2015 Base volumes around the study area. As expected, apart from the freeways, most of the traffic in Hobsons Bay is carried by Millers Road, Melbourne Road and Kororoit Creek Road.

Figure 13 shows the difference in volumes between the 2015 and 2021 Base. The most significant increases in volumes would be in the addition of Western Distributor and widening of West Gate Freeway, City Link, Leakes Road and Palmers Road. Note the apparent increase of volume on West Gate Freeway west of CityLink is due to a reconfiguration of West Gate Freeway and CityLink near the interchange.

Figure 14 shows the difference in volumes between the 2021 and 2031 Base. There would be significant increases in volumes in Western Ring Road and Boundary Road due to widening of the roads. The widening of Western Ring Road would divert some traffic from the Western Distributor, particularly traffic travelling to the north. This results in a reduction of traffic on Western Distributor.

4.2 Scenarios

Figure 15 shows the difference in volumes between 2021 Base and Scenario 3. As expected, most of the increase in volumes would be on Blackshaws Road and other roads around Precincts 15, 16 and 20. There would also be some increase in volumes eastbound on Western Distributor and West Gate Freeway, southbound on CityLink and northbound on Western Ring Road, which are the main routes to/from Hobsons Bay. There would also be some increase in volumes westbound on Kororoit Creek Road, which would be one of the main access routes to and from Hobsons Bay when Millers Road, Melbourne and Blackshaws Road become congested.

Figure 16 shows the difference in volumes between 2031 Base and Scenario 6. As in the 2021 scenario, most of the increase in volumes would be on Blackshaws Road and other roads around Precincts 15, 16 and 20. However, the increase in volumes would be larger than that in 2021. The increase in volumes on Blackshaws Road west of New Street would be higher than that east of New Street. This is because Blackshaws Road is only two lanes east of Schutt Street, which constrains the traffic going to Melbourne Road.

The development of Precinct 20 would increase the local traffic around Williamstown. The model forecasts significant increase of traffic in Nelson Place, which is the main local distributor for traffic from Precinct 20. The traffic would then disperse through Melbourne Road, Kororoit Creek Road, Ferguson Street and The Strand.

The volumes on Blackshaws Road, Millers Road and Melbourne Road for the different scenarios will be examined in more detail in Section 6.

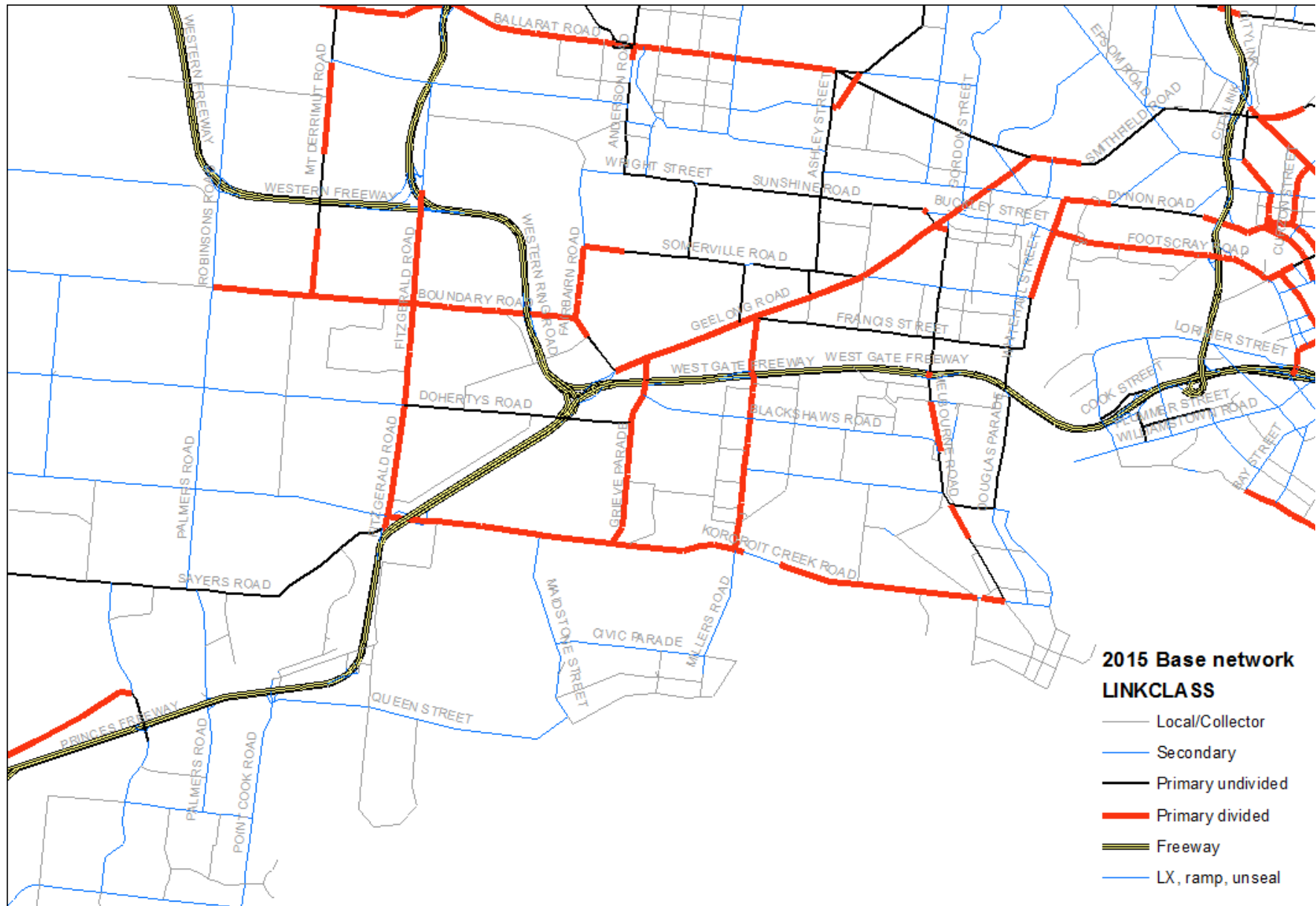


Figure 11 VITM 2015 road network linkclass

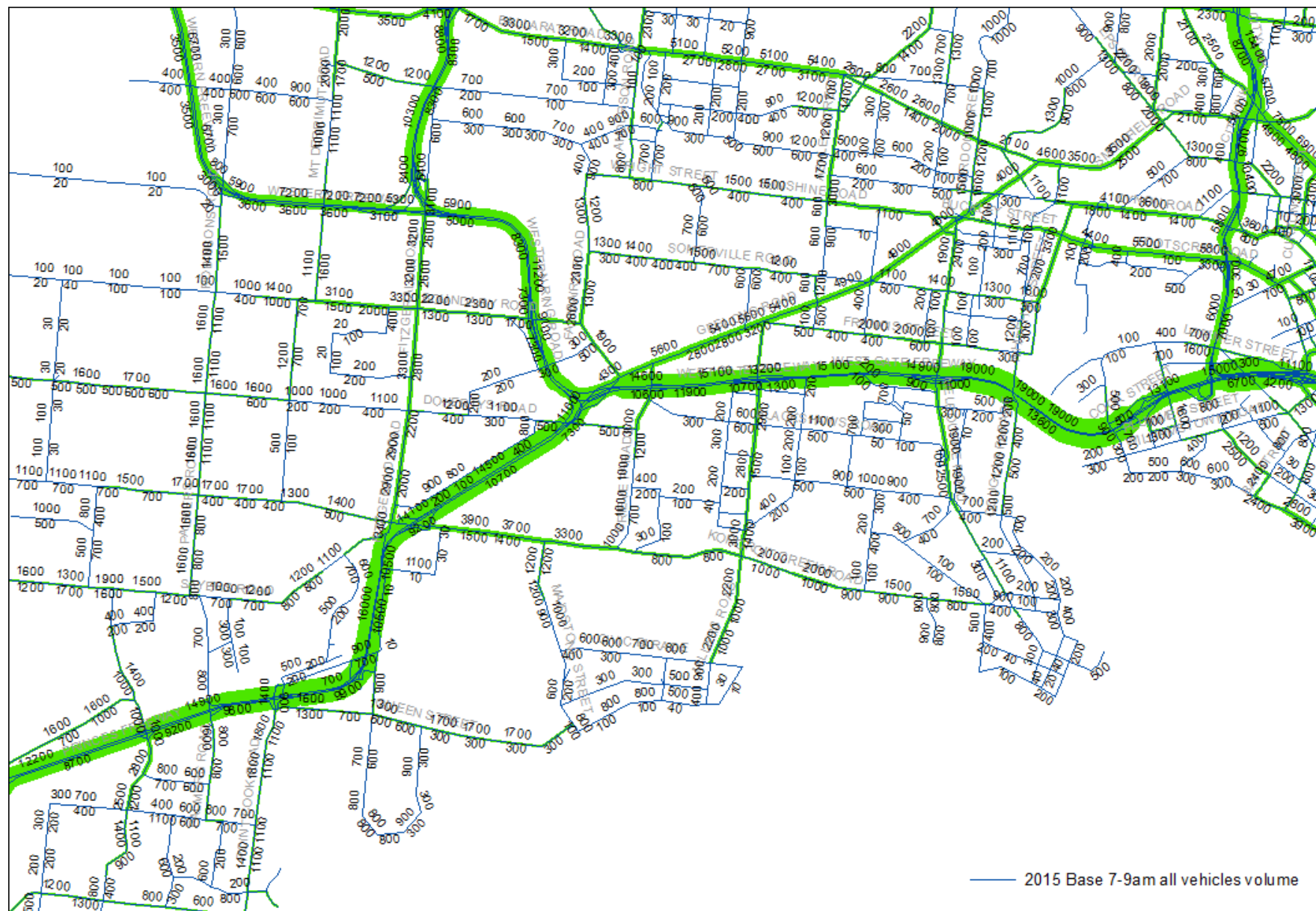


Figure 12 2015 Base volumes, 7-9am all vehicles

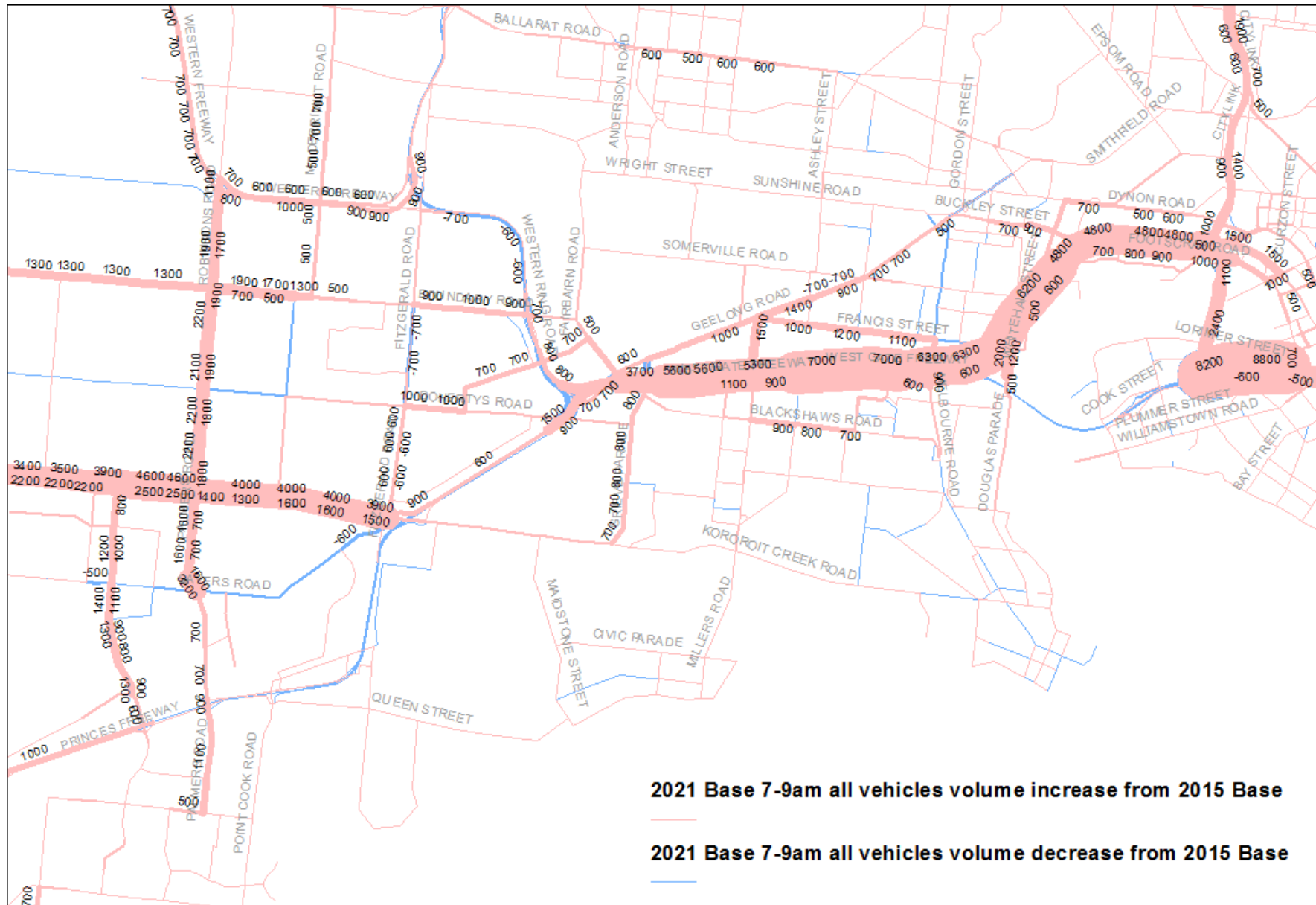


Figure 13 Difference in volumes between 2021 Base and 2015 Base, 7-9am all vehicles

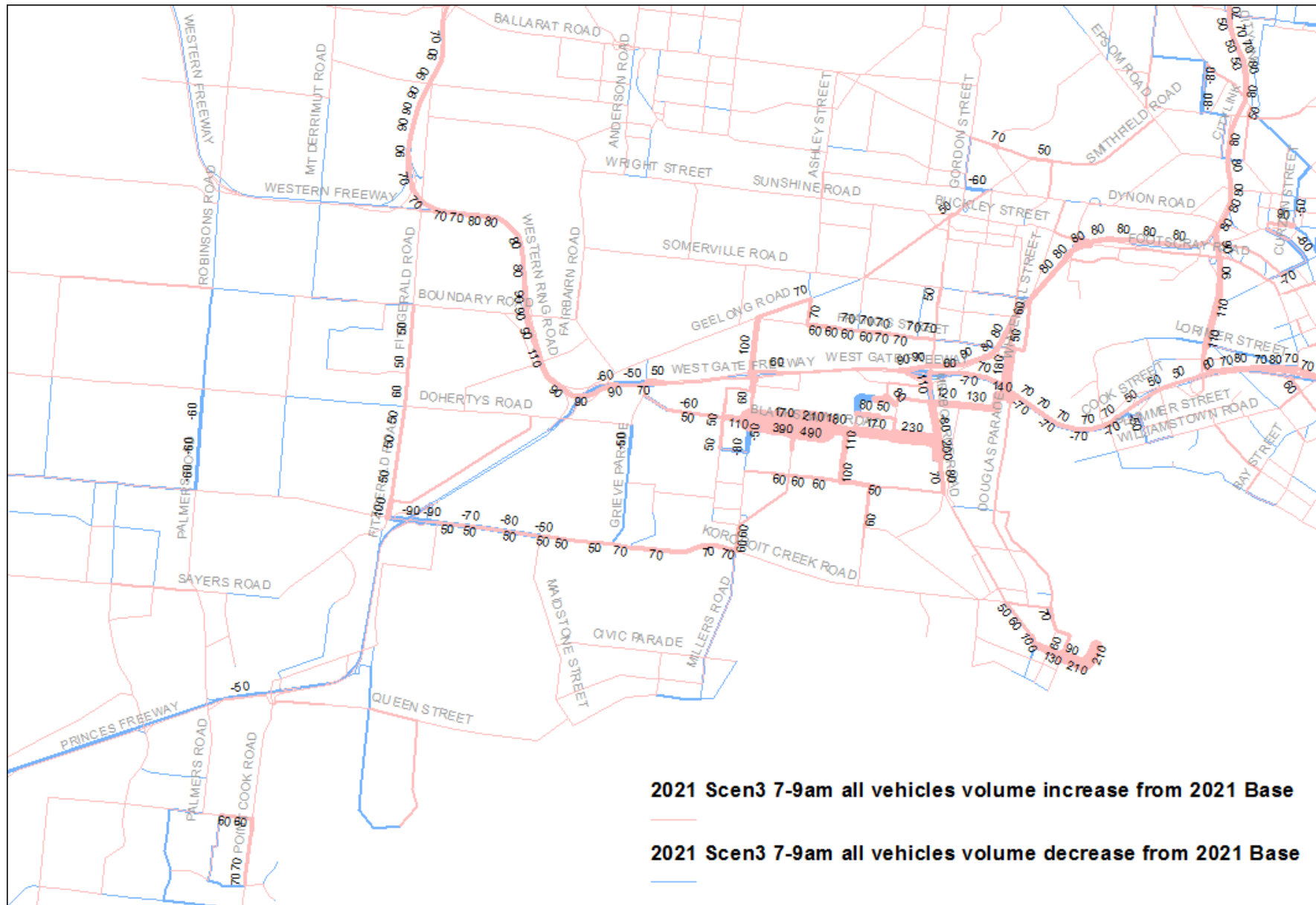


Figure 15 Difference in volumes between 2021 Scenario 3 and 2021 Base, 7-9am all vehicles

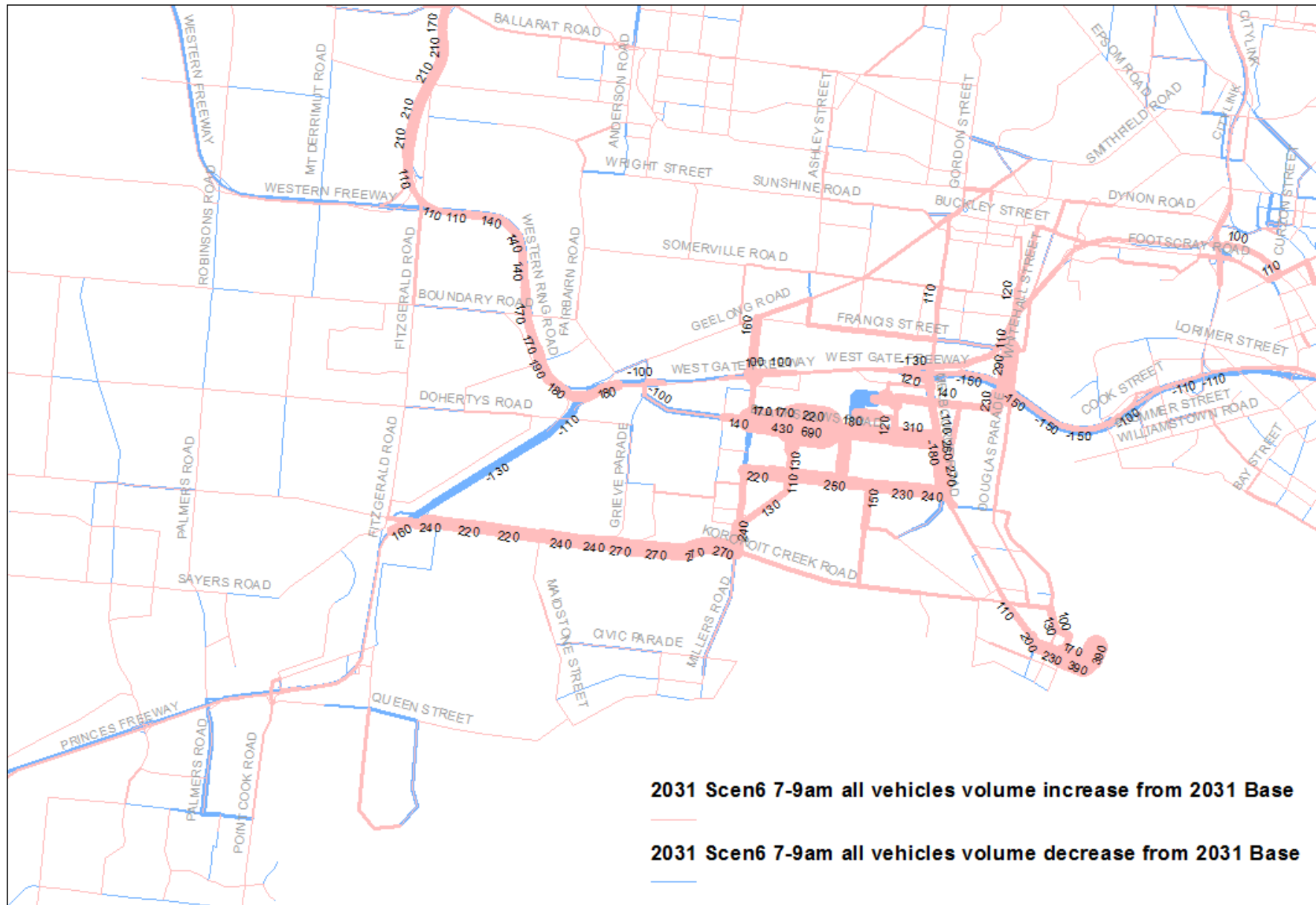


Figure 16 Difference in volumes between 2031 Scenario 6 and 2031 Base, 7-9am all vehicles

5. Truck Volumes

Truck volumes are presented separately from all vehicles in this report as the travel pattern of trucks is very different from that of all vehicles. Although the 2015 truck volumes have been underestimated in the modelling, this should not affect the relative changes when the results of different years and scenarios are compared.

5.1 Base Forecast

Figure 17 shows the 2015 Base truck volumes around the study area. Truck volumes are carried predominantly by freeways in the study area. The truck volumes are significant on some parts of the arterial road, such as Grieve Parade south of the West Gate Freeway, Dohertys Road east of the West Gate Freeway and Kororoit Creek Road east of Princes Freeway West. For most parts of the arterial and other roads in Hobsons Bay, the truck volumes are generally low.

Figure 18 shows the difference in truck volumes between 2015 and 2021 Base. Although a significant number of trucks would use Western Distributor, truck volumes on West Gate Freeway, CityLink and Western Ring Road are forecast to decrease due to the significant increase in car traffic on those roads. Instead, trucks use alternative routes, such as Geelong Road, Francis Street and Blackshaws Road to access Western Distributor.

Figure 19 shows the difference in truck volumes between 2021 and 2031 Base. The model forecasts some increase in truck volumes in most of the freeway corridors. In Hobsons Bay, there would also be some increase in truck volumes on Blackshaws Road, Melbourne Road and Kororoit Creek Road.

5.2 Scenarios

Figure 20 shows the difference in truck volumes between 2021 Base and Scenario 3. The development in Precincts 15, 16 and 20 would have a tendency to drive away truck traffic from Millers Road and West Gate Freeway. Most truck traffic would be diverted to Francis Street.

Figure 21 shows the difference in truck volumes between 2031 Base and Scenario 6. The results are similar to those between 2021 Base and Scenario 3 but generally with larger volume difference. In addition to Francis Street, some truck traffic would be diverted to Mason Street and Kororoit Creek Road.

The truck volumes on Blackshaws Road, Millers Road and Melbourne Road for the different scenarios will be examined in more detailed in Section 6.2.

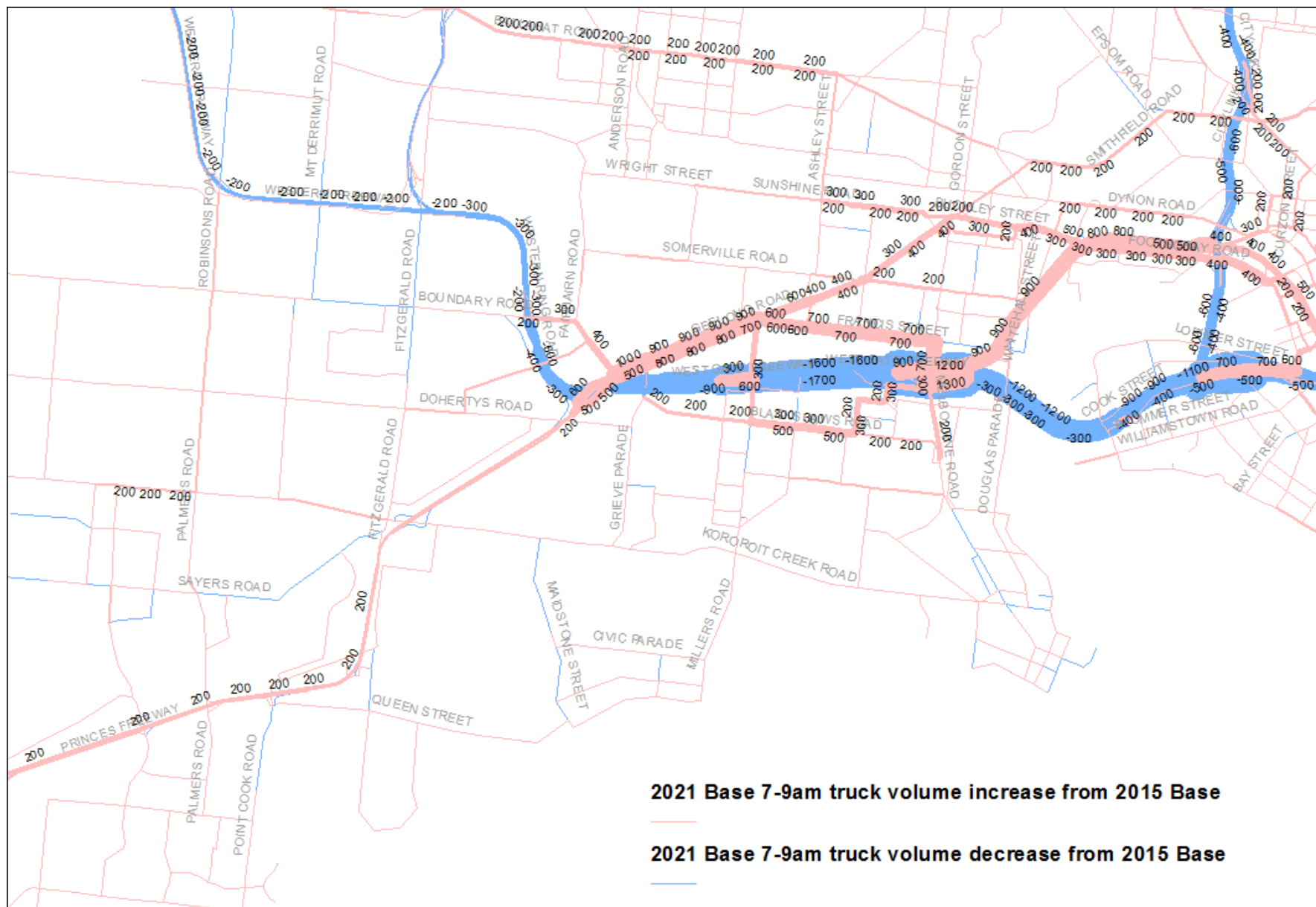


Figure 18 Difference in volumes between 2021 Base and 2015 Base, 7-9am trucks

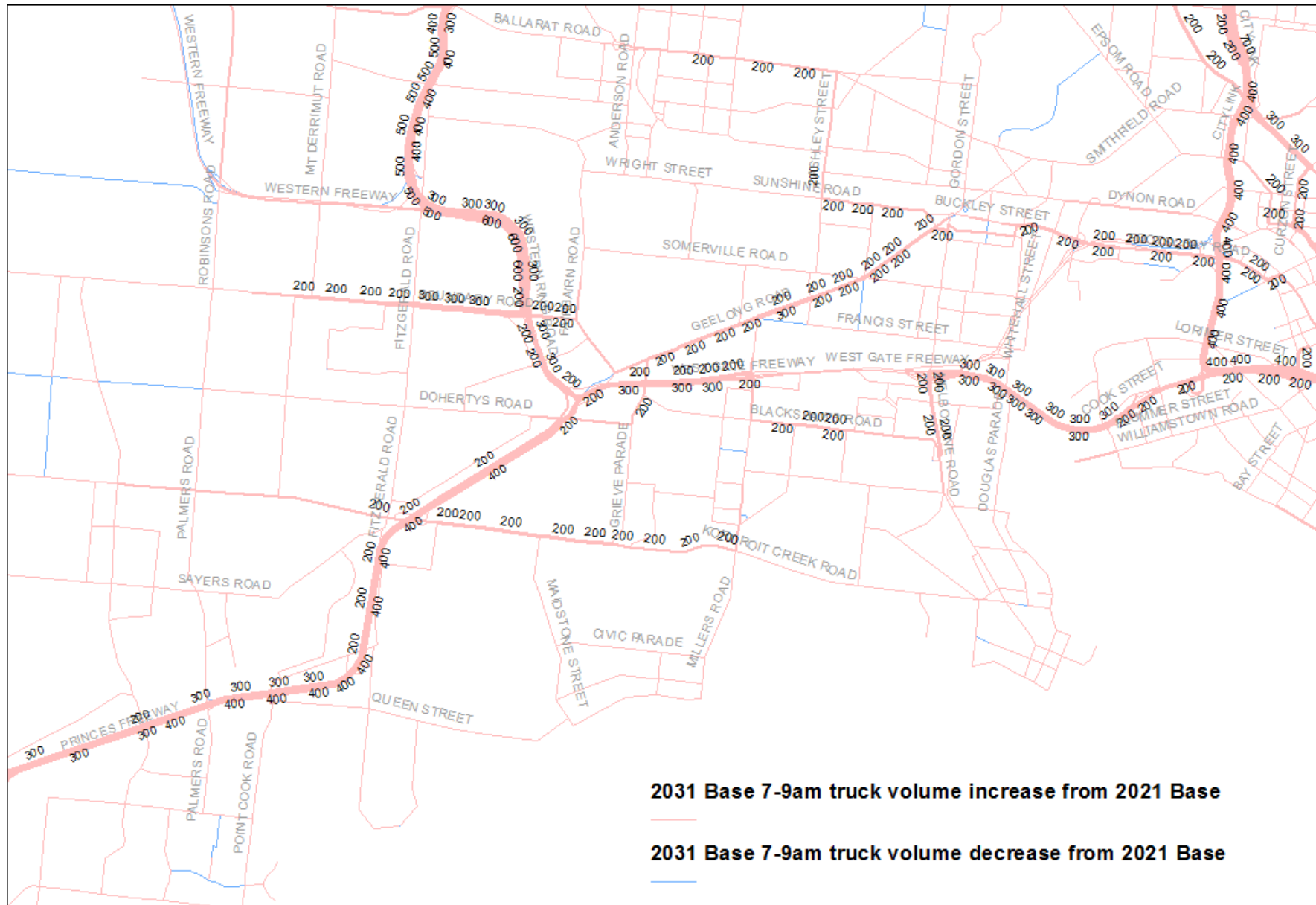


Figure 19 Difference in volumes between 2031 Base and 2021 Base, 7-9am trucks

6. Key Road Volumes and Travel Time

The key road volumes are analysed by comparing the vehicle volumes for the base cases between the current and forecast years to see the future demands on the roads. The vehicle volumes of the base and scenarios are then compared to see the impact of the household growth in the major redevelopment sites on the road traffic.

The following key road volumes in the 7-9am period are examined:

- Millers Road northbound from Esplanade to West Gate Freeway
- Melbourne Road northbound from Parker Street to West Gate Freeway
- Blackshaws Road eastbound from Grieve Parade to Melbourne Road

6.1 All Vehicles Volumes

6.1.1 Millers Road

Figure 22 shows the model volumes on Millers Road for the base cases. There is a general increase in volumes over the years due to the growth of population, employment and other activities in Hobsons Bay and the surrounding areas. The model forecasts an increase of about 700 vehicles on Millers Road south of West Gate Freeway between 2015 and 2031.

Figure 23 and Figure 24 show the model volumes on Millers Road for the 2021 and 2031 scenarios respectively. The volumes would be similar for the different scenarios although there would be a slight increase in volumes with household growth north of Blackshaws Road. The model forecasts an addition of about 100 vehicles on Millers Road south of West Gate Freeway with the full development of Precincts 15, 16 and 20 (compared to no development of the precincts) in 2031. So there would be a net increase of about 800 vehicles compared to 2015. Table 2 summaries the change of volumes at the key location of this road and other roads in Hobsons Bay.

Table 2 Change of all vehicle volumes at key locations

Location	Direction	Volume change between 2015 Base and 2031 Base	Volume change between 2031 Base and 2031 Scenario 6	Net volume change between 2015 Base and 2031 Scenario 6
Millers Road south of West Gate Freeway	Northbound	700	100	800
Melbourne Road south of West Gate Freeway	Northbound	300	200	500
Melbourne Road south of Ferguson Street	Northbound	-50	110	60
Blackshaws Road east of Mills Street	Eastbound	500	200	700

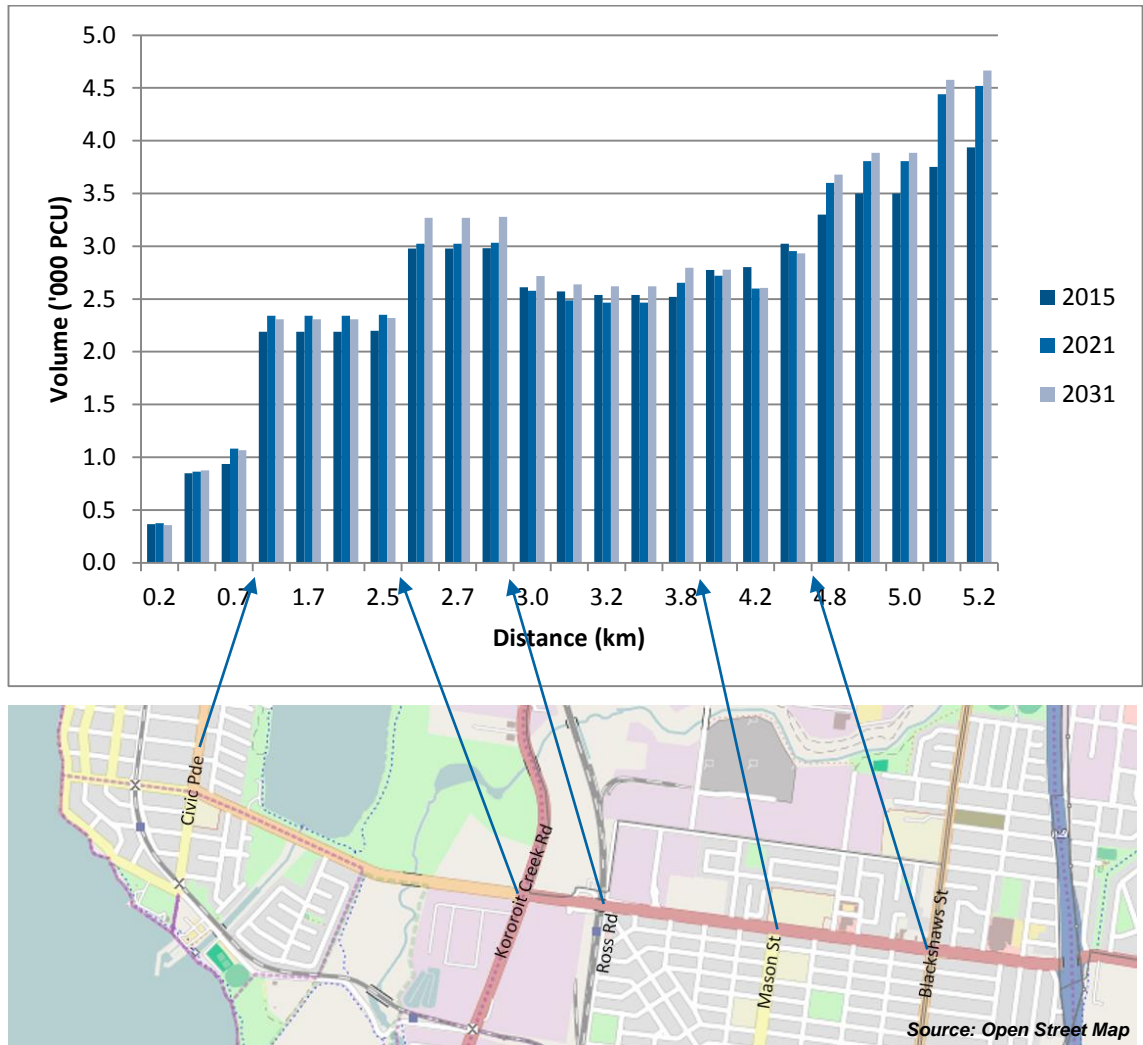


Figure 22 Model volumes on Millers Road, 7-9am northbound all vehicles base cases

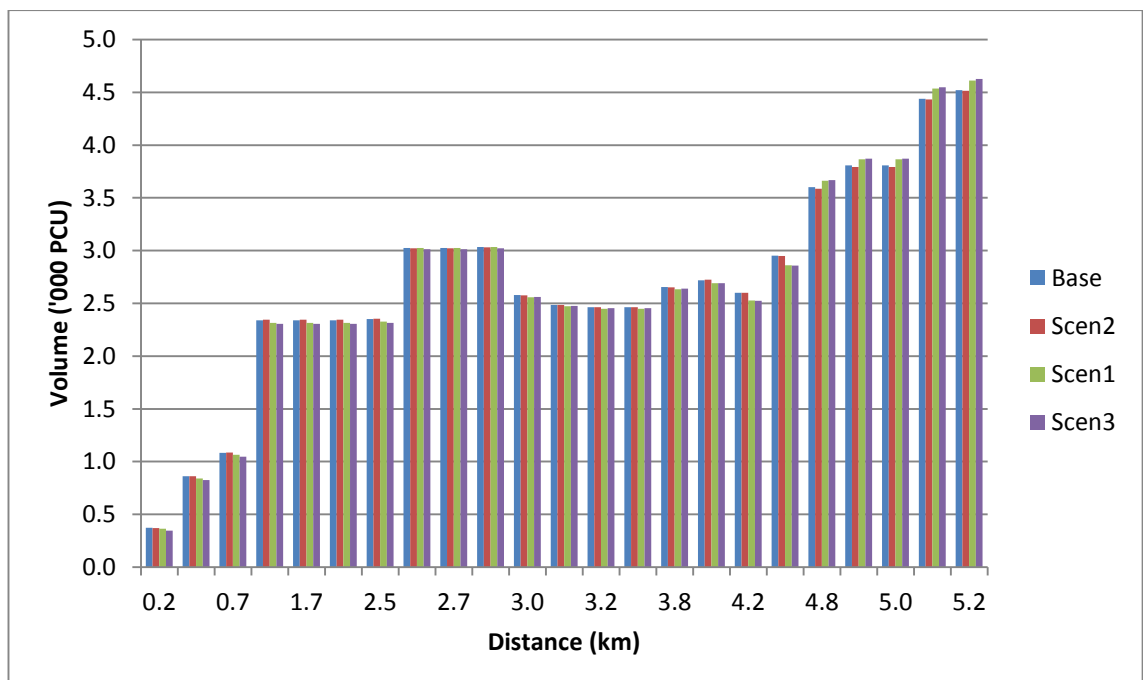


Figure 23 Model volumes on Millers Road, 7-9am northbound all vehicles 2021 scenarios

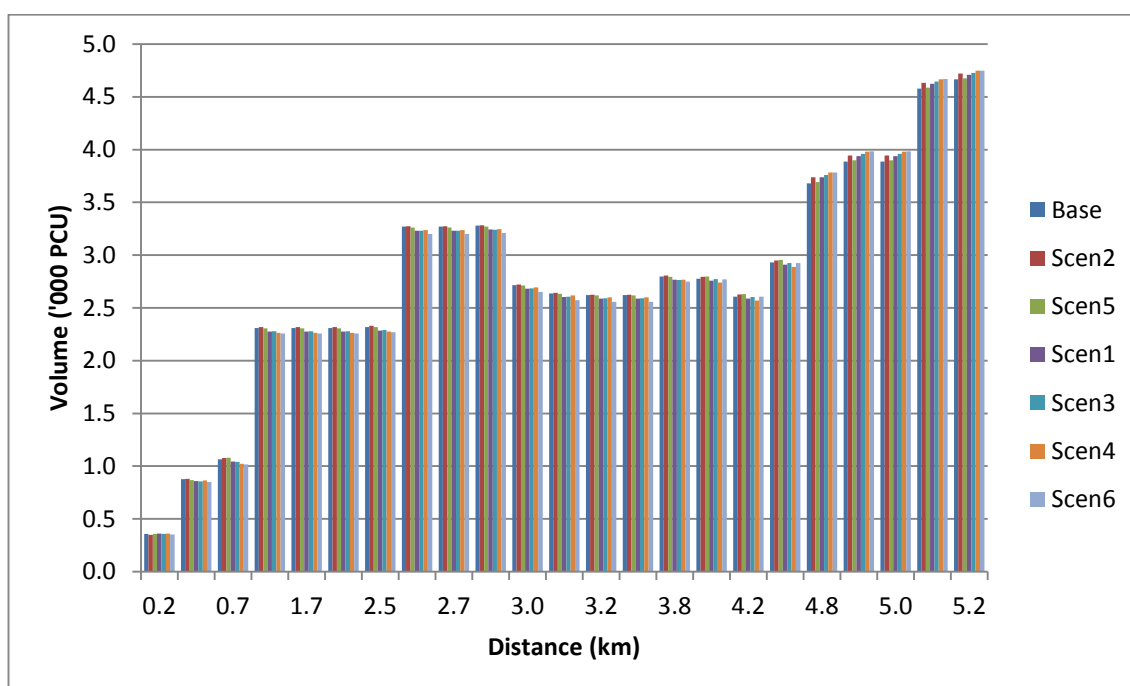


Figure 24 Model volumes on Millers Road, 7-9am northbound all vehicles 2031 scenarios

The increase in vehicles is less than the trip generation expected from the development. Note that Millers Road is already congested toward the West Gate Freeway with the growth of population, employment and other activities in Hobsons Bay. It has limited capacity to allow for more traffic. Traffic external to the precincts using the road previously would redistribute to alternative routes due to the congestion. This decrease in traffic offsets much of the traffic generated by development. Hence, the increase in traffic on Millers Road is less than what would have been expected than if development traffic were to be added to base case traffic volumes.

6.1.2 Melbourne Road

Figure 25 shows the model volumes on Melbourne Road for the base cases. There would be a small increase in volumes north of Blackshaws Road over the years due to the growth of population, employment and other activities in Hobsons Bay and the surrounding areas. The model forecasts an increase of about 300 vehicles on Melbourne Road south of West Gate Freeway between 2015 and 2031. However, the model forecasts a reduction of about 50 vehicles on Melbourne Road south of Ferguson Street between 2015 and 2031 due to a decrease of employment around Precinct 20 (see the Network and Demographic Report of this project).

Figure 26 and Figure 27 show the model volumes on Melbourne Road for the 2021 and 2031 scenarios respectively. There would be a slight increase in volumes along the road with the growth of households in the development. The model forecasts an addition of about 200 vehicles on Melbourne Road south of West Gate Freeway and 110 vehicles south of Ferguson Street with the full development of Precincts 15, 16 and 20 (compared to no development of the precincts) in 2031. So there would be a net increase of about 500 vehicles south of West Gate Freeway and 60 vehicles south Ferguson Street compare to 2015. Table 2 summaries the change of volumes at the key locations of this road and other roads in Hobsons Bay.

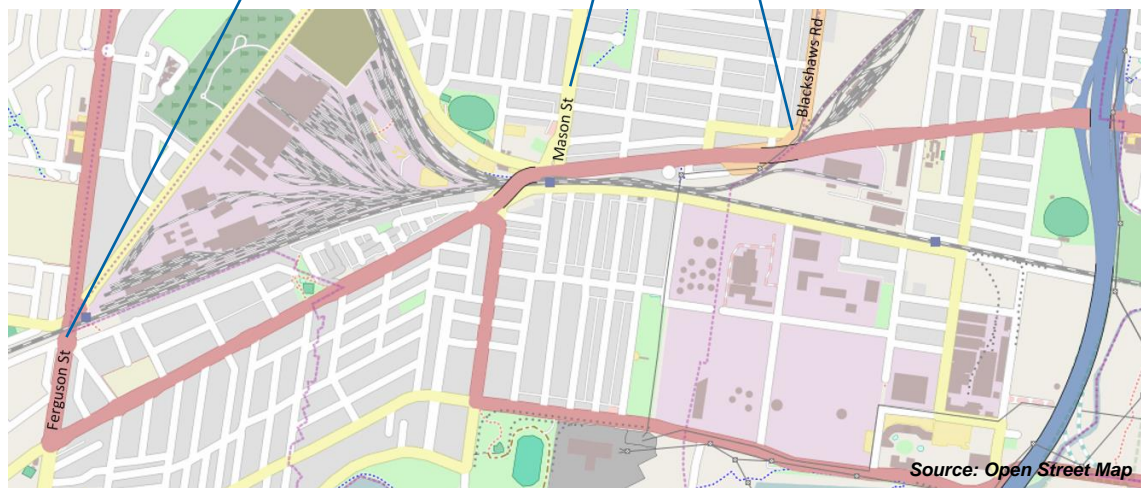
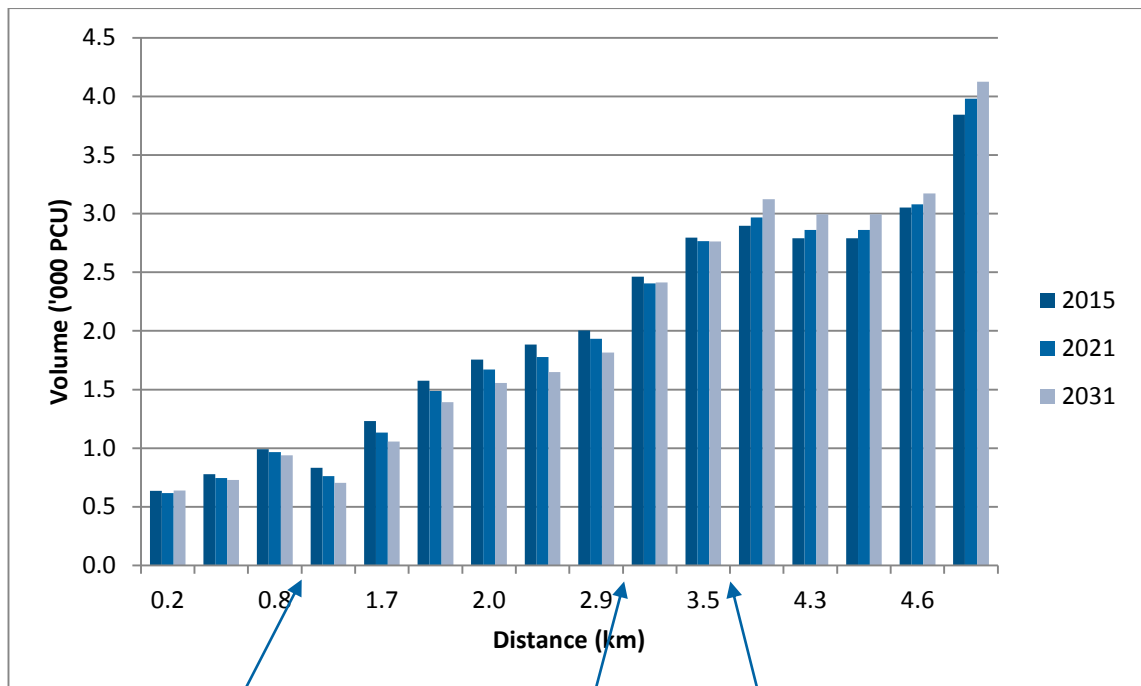


Figure 25 Model volumes on Melbourne Road, 7-9am northbound all vehicles base cases

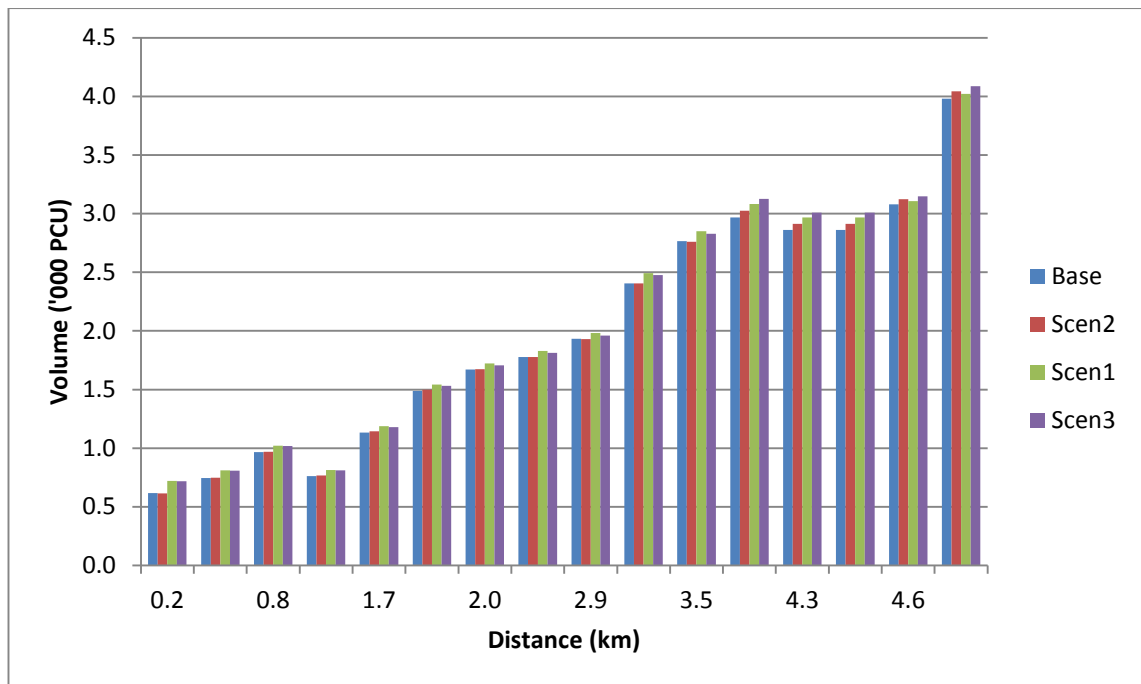


Figure 26 Model volumes on Melbourne Road, 7-9am northbound all vehicles 2021 scenarios

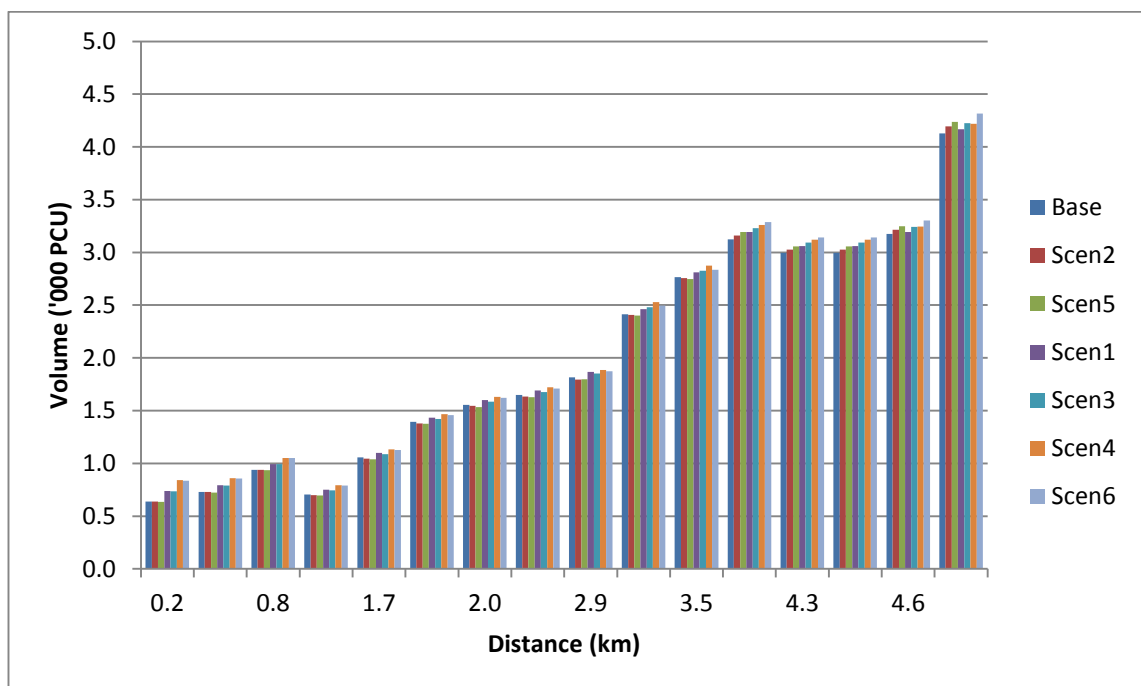


Figure 27 Model volumes on Melbourne Road, 7-9am northbound all vehicles 2031 scenarios

The increase in vehicles is less than the trip generation expected from the development. Note that Melbourne Road is already congested toward the West Gate Freeway with the growth of population, employment and other activities in Hobsons Bay. It has limited capacity to allow for more traffic. Traffic external to the precincts using the road previously would redistribute to alternative routes due to the congestion. This decrease in traffic offsets much of the traffic generated by development. Hence, the increase in traffic on Melbourne Road is less than what would have been expected than if development traffic were to be added to base case traffic volumes.

6.1.3 Blackshaws Road

Figure 28 shows the model volumes on Blackshaws Road for the base cases. There would be a general increase in volumes over the years due to the growth of population, employment and other activities in Hobsons Bay and the surrounding areas. However, the model forecasts a decrease in volumes on Blackshaws Road west of New Street in 2021. This would mainly be due to the widening of West Gate Freeway and opening of Western Distributor in 2021, which attract traffic away from Blackshaws Road. The model forecasts an increase of about 500 vehicles on Blackshaws Road east of Mills Street between 2015 and 2031.

Figure 29 and Figure 30 show the model volumes on Blackshaws Road for the 2021 and 2031 scenarios respectively. There would be a general increase in volumes on Blackshaws Road east of Millers Road with the growth of households in the development. With the full development of Precincts 15, 16 and 20, the model forecasts an addition of about 200 vehicles in 2031 on Blackshaws Road east of Mills Street (compared to no development of the precincts). So there would be a net increase of about 700 vehicles in 2031 compared to 2015. Table 2 summaries the change of volumes at the key location of this road and other roads in Hobsons Bay.

The increase in vehicles is less than the trip generation expected from the development. Note that traffic in Blackshaws Road would increase with the growth of population, employment and other activities in Hobsons Bay. Traffic external to the precincts previously uses the road would seek alternative routes due to the increased traffic. This decrease in external traffic offsets much of the traffic generated by the development. Hence, the increase in traffic on Blackshaws Road is less than what would have been expected than if development traffic were to be added to base case traffic volumes.

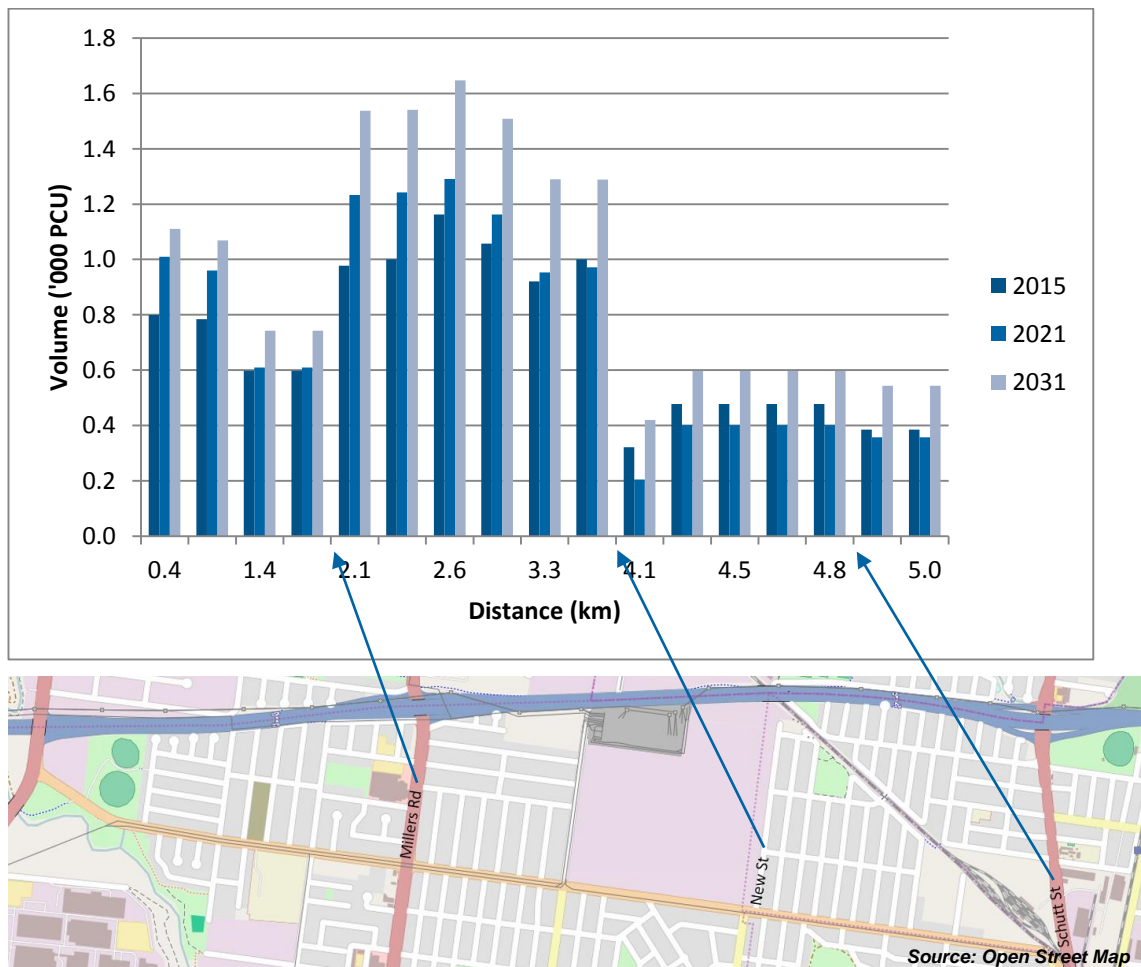


Figure 28 Model volumes on Blackshaws Road, 7-9am eastbound all vehicles base cases

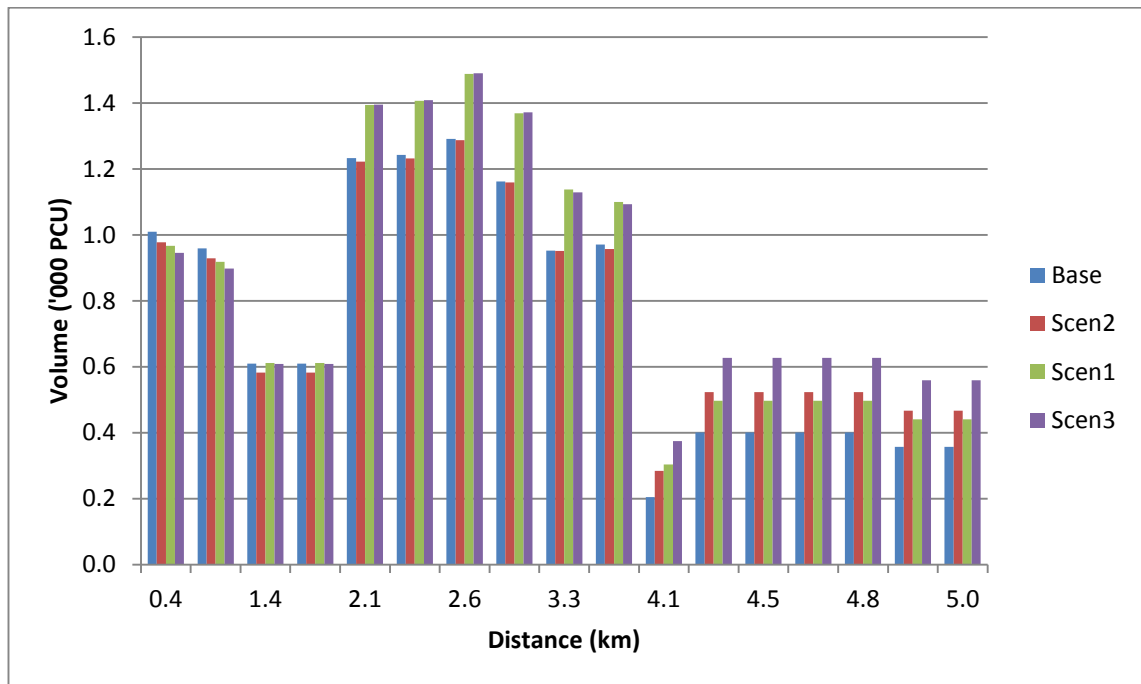


Figure 29 Model volumes on Blackshaws Road, 7-9am eastbound all vehicles 2021 scenarios

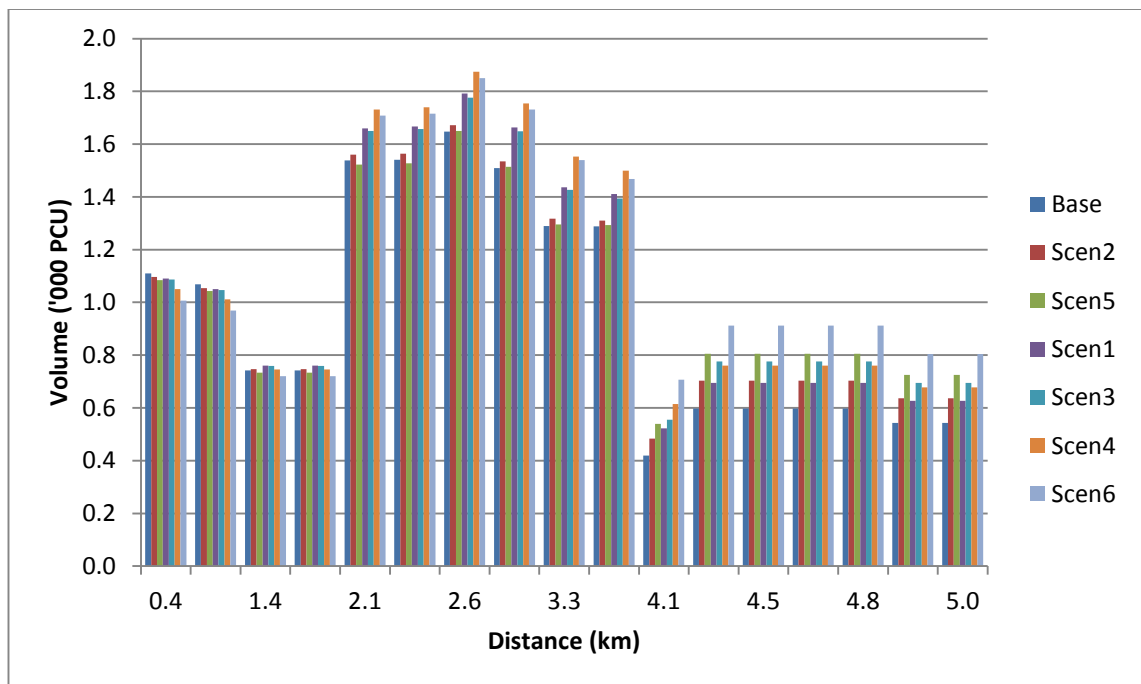


Figure 30 Model volumes on Blackshaws Road, 7-9am eastbound all vehicles 2031 scenarios

6.2 Truck Volumes

6.2.1 Millers Road

Figure 31 shows the model truck volumes on Millers Road for the base cases. The increase and decrease of volumes in the different sections of Millers Road are due to the diversion of traffic at various points of the road. For example, the truck volume decrease in the middle of Millers Road

as some trucks divert to Ross Road and McIntosh Road, leaving less trucks travel north on Millers Road. There would be a general increase in truck volumes on Millers Road over the years. However, the model forecasts the truck volumes to decrease in 2021 on Millers Road between Mason Street and Blackshaws Road, which may be due to trucks diverted to Mason Street (see Figure 18). Overall, the model forecasts an increase of about 400 trucks on Millers Road south of West Gate Freeway between 2015 and 2031.

Figure 32 and Figure 33 show the model truck volumes on Millers Road for the 2021 and 2031 scenarios respectively. There would be a general decrease in truck volumes with the growth of households in the development north of Blackshaws Road. So the growth of households would drive trucks away from the development. Note that the development in Precincts 15 and 16 would significantly increase the car traffic on the roads around the precincts, which would become congested. As most truck traffic are external to the precincts, they do not need to use these congested roads. As the trucks divert to use other routes, the truck volume on the roads around the precincts decreases.

The model forecasts a reduction of about 200 trucks on Millers Road south of West Gate Freeway with the full development of Precincts 15, 16 and 20 (compared to no development of the precincts) in 2031. So there would be a net increase of about 200 trucks compared to 2015. Table 3 summaries the change of truck volumes at the key location of this road and other roads in Hobsons Bay.

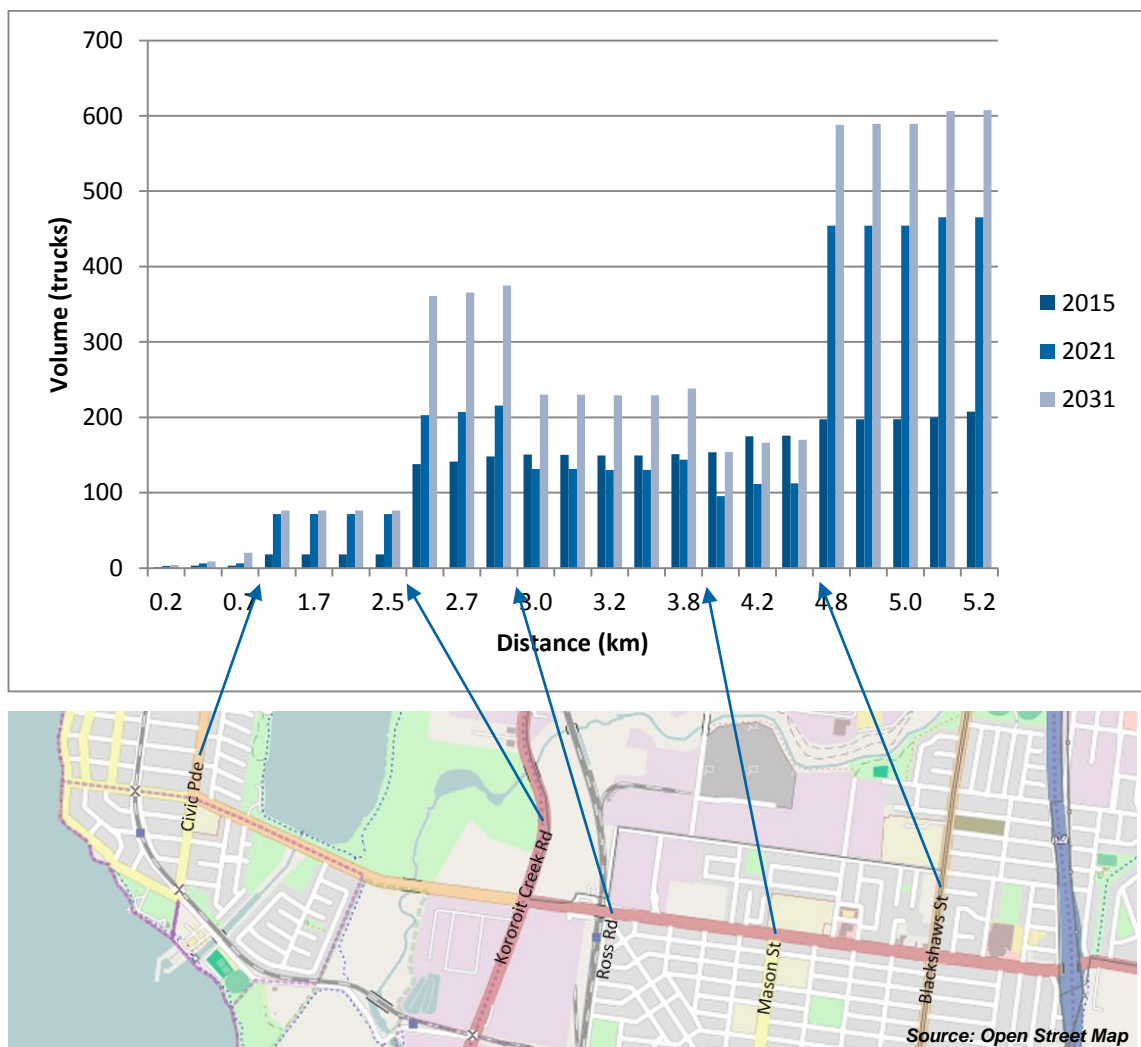


Figure 31 Model volumes on Millers Road, 7-9am northbound trucks base cases

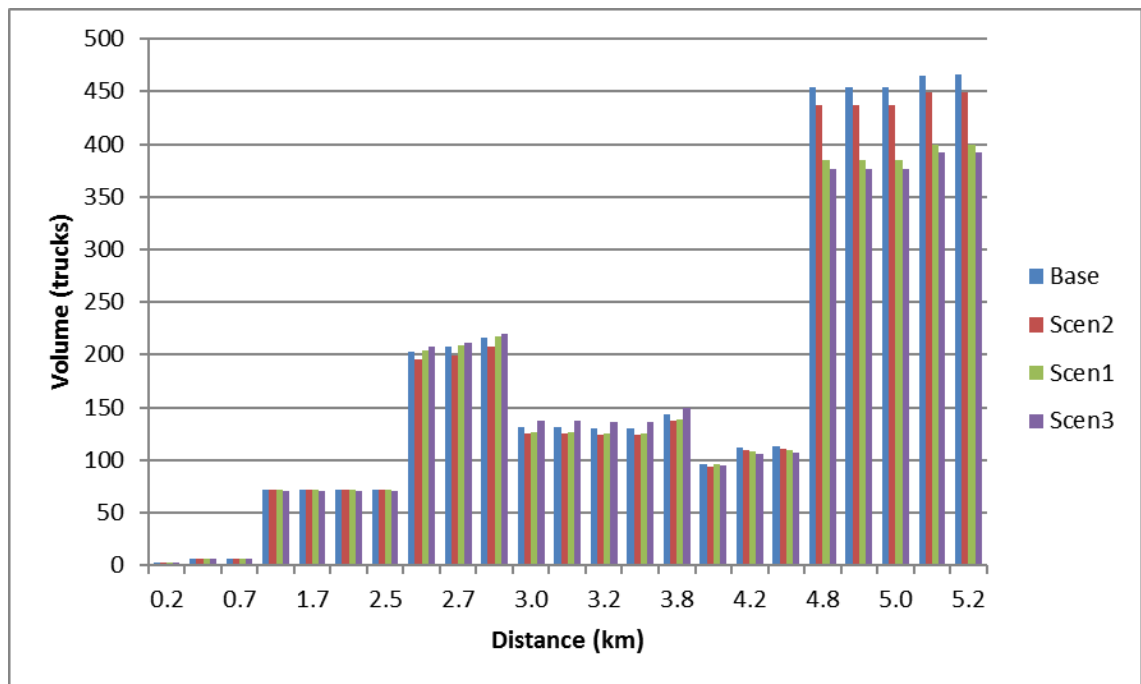


Figure 32 Model volumes on Millers Road, 7-9am northbound trucks 2021 scenarios

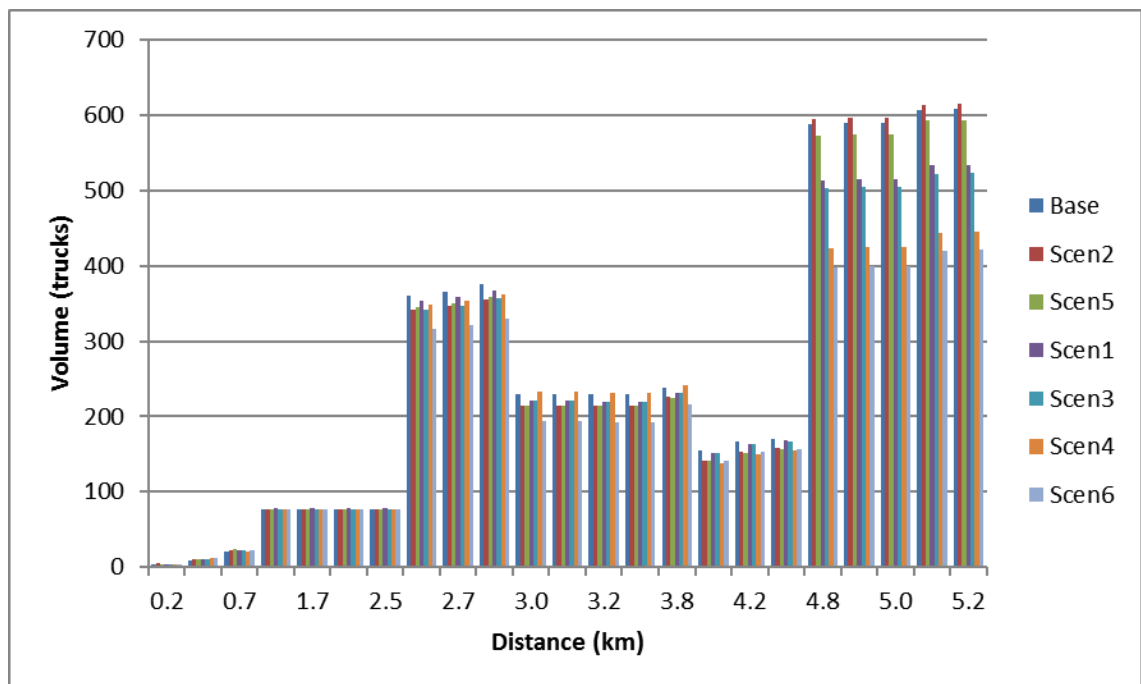


Figure 33 Model volumes on Millers Road, 7-9am northbound trucks 2031 scenarios

Table 3 Change in truck volumes at key locations

Location	Direction	Volume change between 2015 Base and 2031 Base	Volume change between 2031 Base and 2031 Scenario 6	Net volume change between 2015 Base and 2031 Scenario 6
Millers Road south of West Gate Freeway	Northbound	400	-200	200
Melbourne Road south of West Gate Freeway	Northbound	500	-100	400
Melbourne Road south of Ferguson Street	Northbound	-10	0	-10
Blackshaws Road east of Mills Street	Eastbound	400	-200	200

6.2.2 Melbourne Road

Figure 34 shows the model truck volumes on Melbourne Road for the base cases. There would be a general increase in truck volumes on Melbourne Road north of Blackshaws Road over the years. South of Blackshaws Road, the truck volumes are forecast to change little on Melbourne Road. Overall, the model forecasts an increase of about 500 trucks on Melbourne Road south of West Gate Freeway between 2015 and 2031. However, the model forecasts a reduction of about 10 trucks on Melbourne Road south of Ferguson Street between 2015 and 2031 due to a decrease of employment around Precinct 20.

Figure 35 and Figure 36 show the model truck volumes on Melbourne Road for the 2021 and 2031 scenarios respectively. The volumes would be similar for the different scenarios although the volumes tend to decrease with household growth approaching West Gate Freeway. So the growth of households would drive away trucks if the development is significant. Note that the development in Precincts 15, 16 and 20 would significantly increase the car traffic on the roads around the precincts, which would become congested. As most truck traffic is external to the precincts, they do not need to use these roads. As the trucks divert to use other routes, the truck volume on the roads around the precincts decreases.

The model forecasts a reduction of about 100 trucks on Melbourne Road south of West Gate Freeway with the full development of Precincts 15, 16 and 20 (compared to no development of the precincts) in 2031. So there would be a net increase of about 400 trucks compared to 2015. The model forecast little change in truck volumes on Melbourne Road south of Ferguson Street due to the development. Table 3 summaries the change of truck volumes at the key locations of this road and other roads in Hobsons Bay.

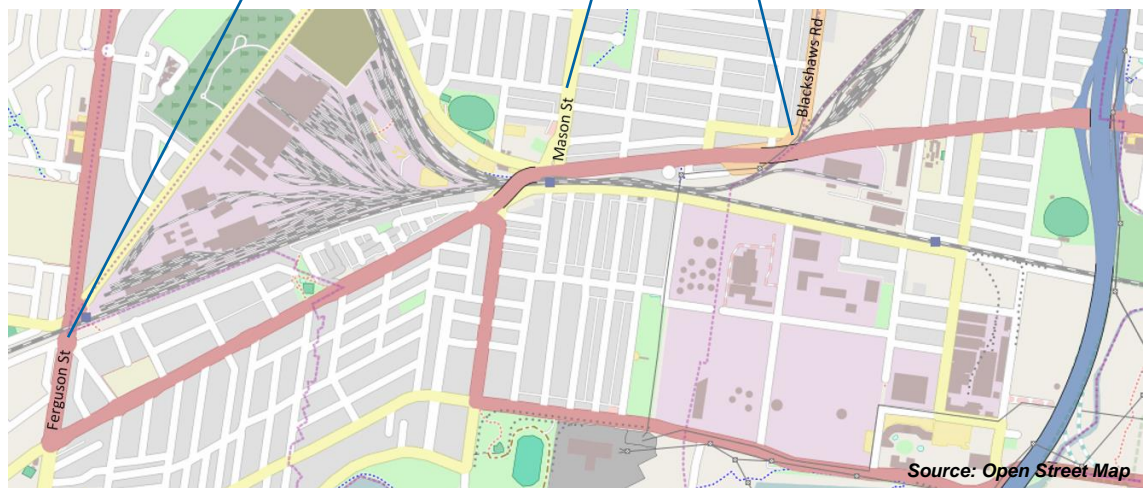
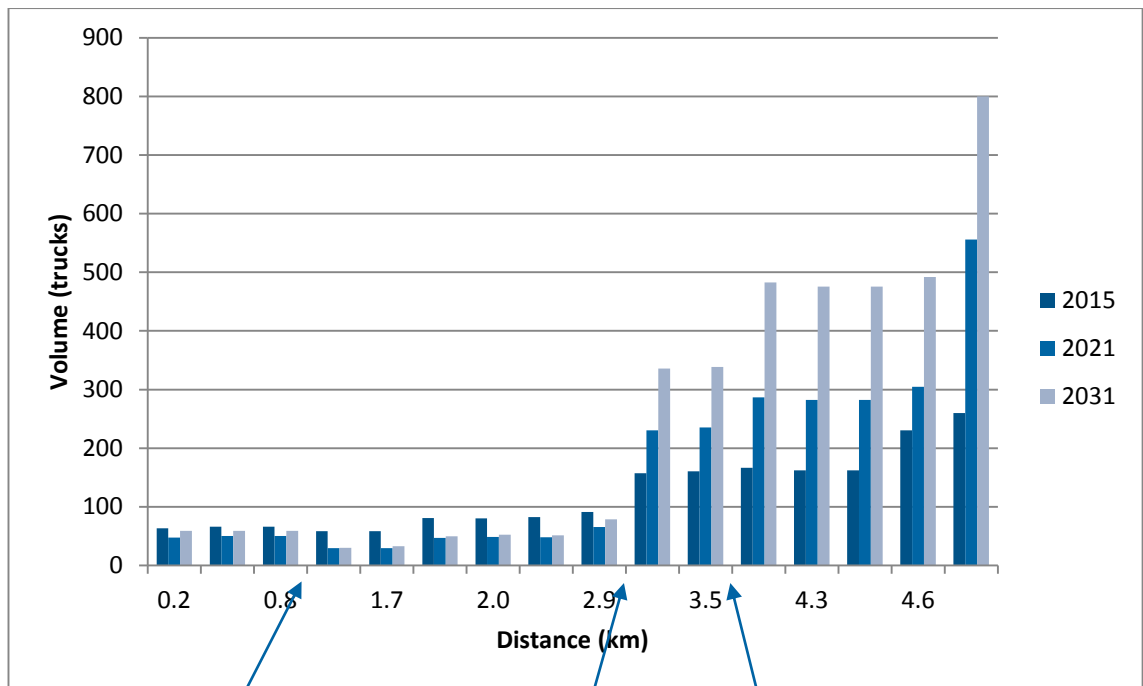


Figure 34 Model volumes on Melbourne Road, 7-9am northbound trucks base cases

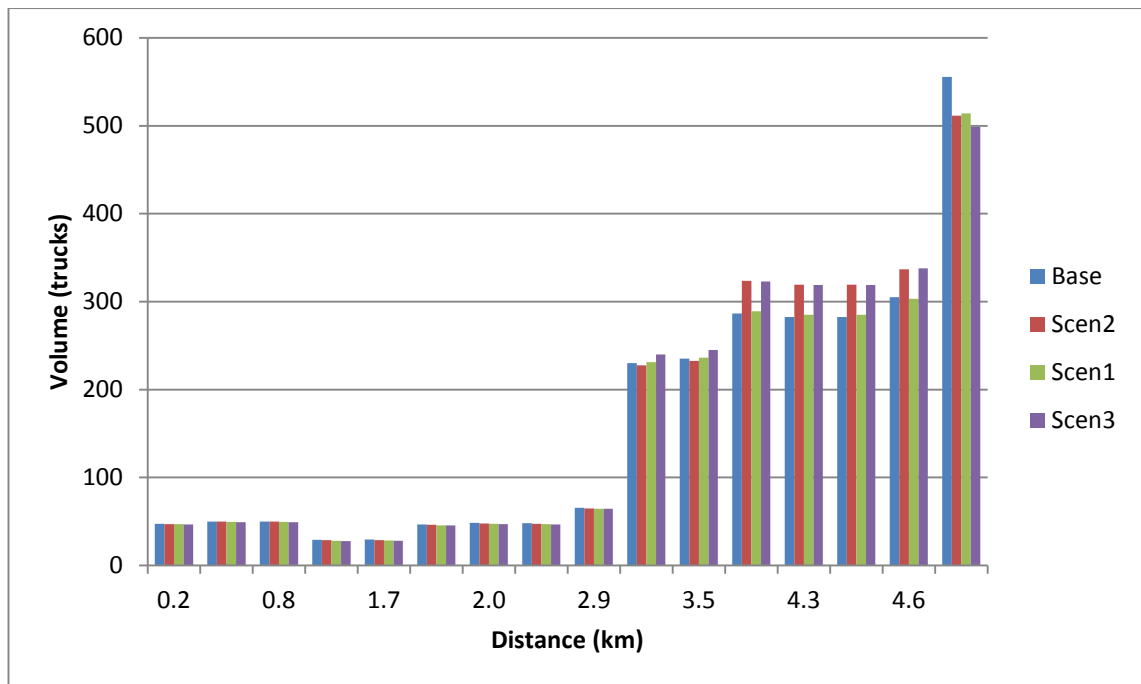


Figure 35 Model volumes on Melbourne Road, 7-9am northbound trucks 2021 scenarios

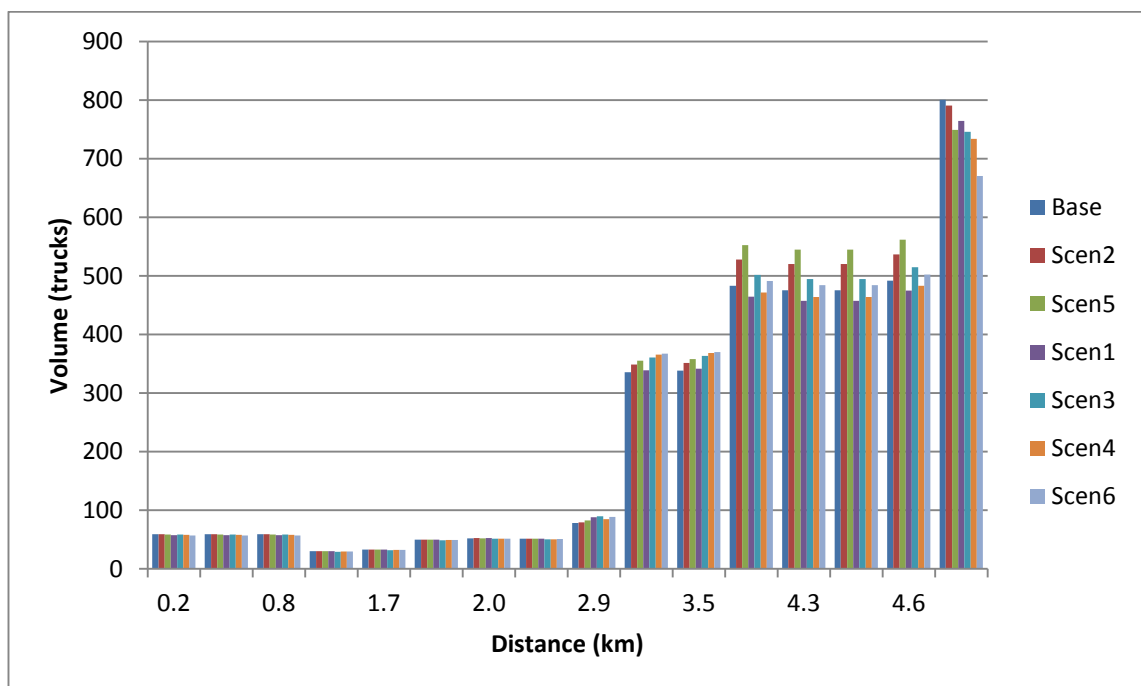


Figure 36 Model volumes on Melbourne Road, 7-9am northbound trucks 2031 scenarios

6.2.3 Blackshaws Road

Figure 37 shows the model truck volumes on Blackshaws Road for the base cases. The truck volumes are highest between Millers Road and New Street. East of New Street, the truck volumes are limited by the two lane, two-way configuration approaching Melbourne Road. West of Millers Road, the truck volumes would reduce as significant number of trucks would turn to Millers Road. There would be a general increase in truck volumes on Blackshaws Road over the years. Overall, the model forecasts an increase of about 400 trucks on Blackshaws Road east of Mills Street between 2015 and 2031.

Figure 38 and Figure 39 show the model truck volumes on Blackshaws Road for the 2021 and 2031 scenarios respectively. There would be a general decrease in truck volumes on Blackshaws Road west of New Street with the growth of households in the development. However, east of New Street, the truck volumes would decrease only if the development is significant. So the growth of households would drive trucks away if the development is significant. Note that the development in Precincts 15 and 16 would significantly increase the car traffic on the roads around the precincts, which would become more congested. As most truck traffic is external to the precincts, they do not need to use these congested roads. As the trucks divert to use other routes, the truck volume on the roads around the precincts decreases.

The model forecasts a reduction of about 200 trucks on Blackshaws Road east of Mills Street with the full development of Precincts 15, 16 and 20 (compared to no development of the precincts) in 2031. So there would be a net increase of about 200 trucks compared to 2015. Table 3 summaries the change of truck volumes at the key location of this road and other roads in Hobsons Bay.

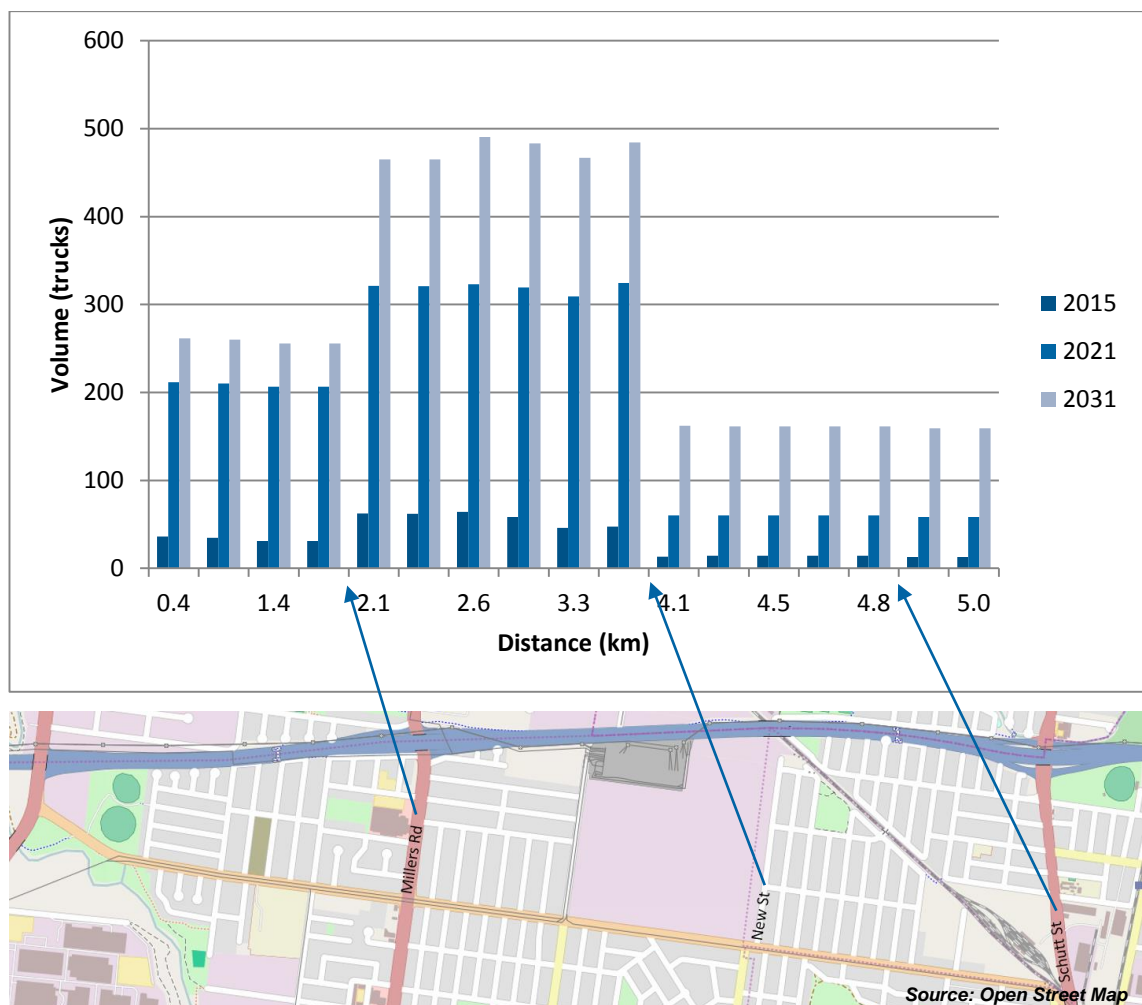


Figure 37 Model volumes on Blackshaws Road, 7-9am eastbound trucks base cases

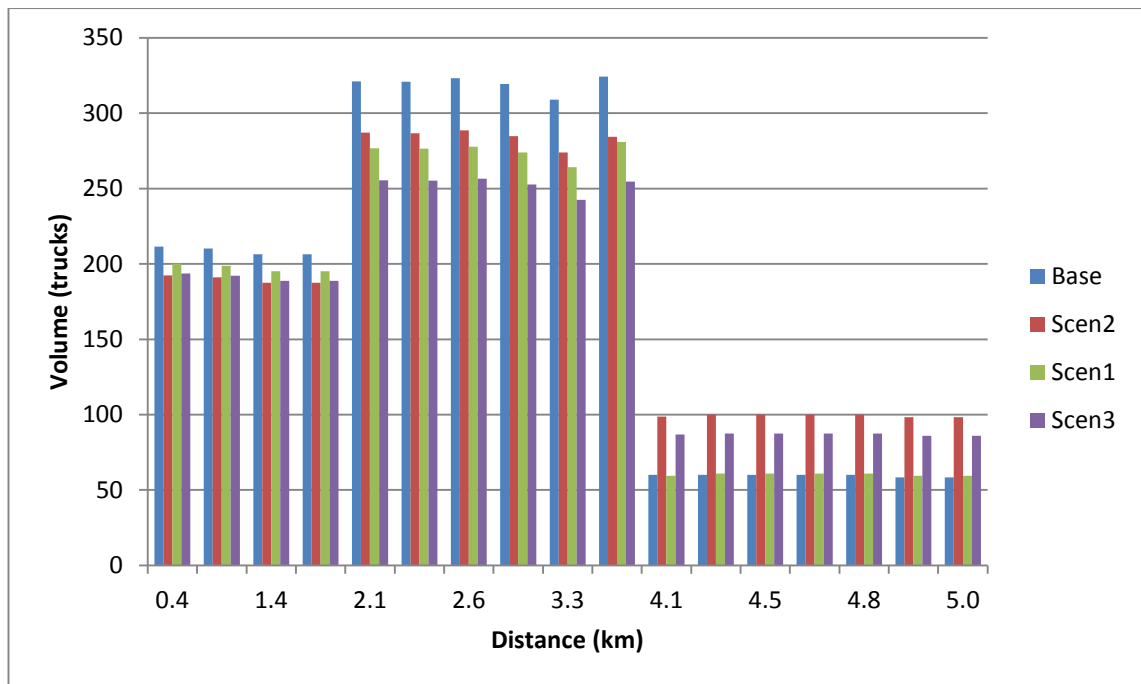


Figure 38 Model volumes on Blackshaws Road, 7-9am eastbound trucks 2021 scenarios

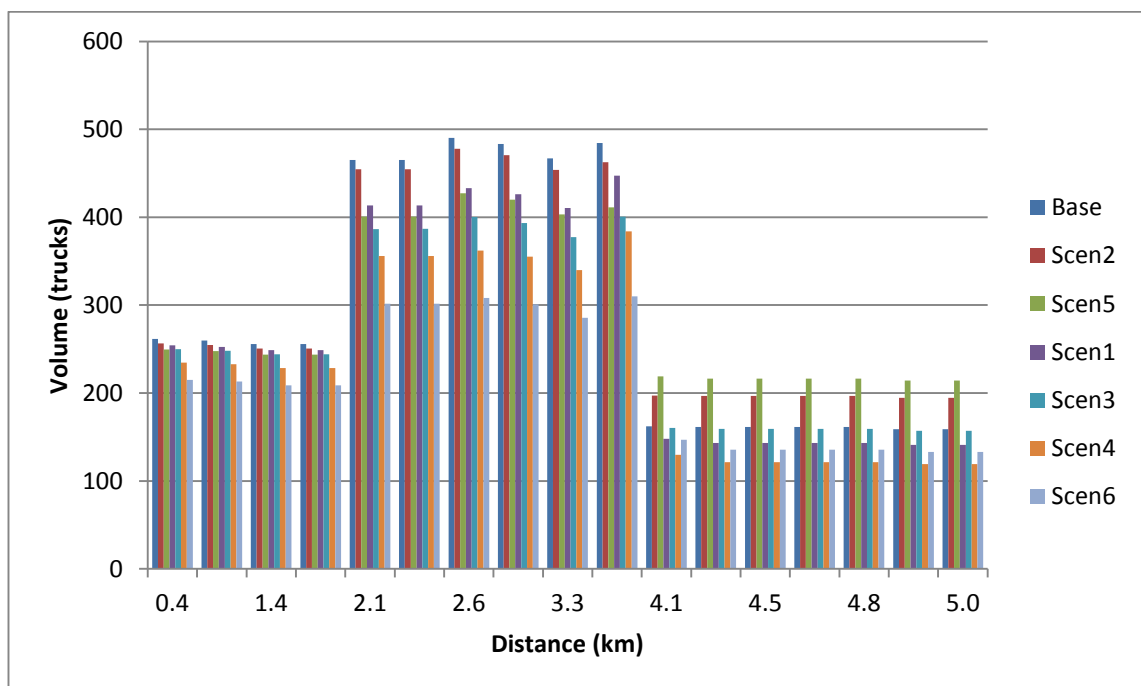


Figure 39 Model volumes on Blackshaws Road, 7-9am eastbound trucks 2031 scenarios

6.3 Travel Time

Travel time is analysed by comparing the travel time on key roads for the base cases between the current and forecast years to see the general change of travel time in the future. The travel time of the base and scenarios are then compared to see the impact of the household growth in the major redevelopment sites on the travel time.

The travel time of following key roads in the 7-9am period is examined:

- Millers Road northbound from Esplanade to West Gate Freeway

- Melbourne Road northbound from Parker Street to West Gate Freeway
- Blackshaws Road eastbound from Grieve Parade to Melbourne Road
- Kororoit Creek Road eastbound from Princes Freeway to Melbourne Road

Figure 40 shows the model travel time for the base cases. There would be a general increase in travel time on Millers Road, Melbourne Road, Blackshaws Road and Kororoit Creek Road over the years due to increasing volumes on the roads (see Section 6.1). The increase in travel time on Millers Road, Melbourne Road and Blackshaws Road would be small as the model forecasts only a small change in congestion level on these roads (see Section 7). Kororoit Creek Road would have the most significant increase in travel time, mostly due to the increased congestion east of Princes Freeway. Overall, the model forecasts an increase of travel time of about 5 minutes on Kororoit Creek Road between 2015 and 2031.

Figure 41 and Figure 42 show the travel time for the 2021 and 2031 scenarios respectively. There would be a slight increase in travel time (of less than a minute) on Millers Road, Melbourne Road and Blackshaws Road with the growth of households in the development. This is consistent with the increasing traffic with the growth of households in the development. However, there is no clear trend of travel time increase or decrease on Kororoit Creek Road with the growth of households in the development, which may be too far to influence the traffic on Kororoit Creek Road. Overall, with the full development of Precincts 15, 16 and 20 in 2031, there would be net increases of travel time of about 130 seconds on Millers Road, 50 seconds on Melbourne Road, 70 seconds on Blackshaws Road, and 340 seconds on Kororoit Road compared to 2015.

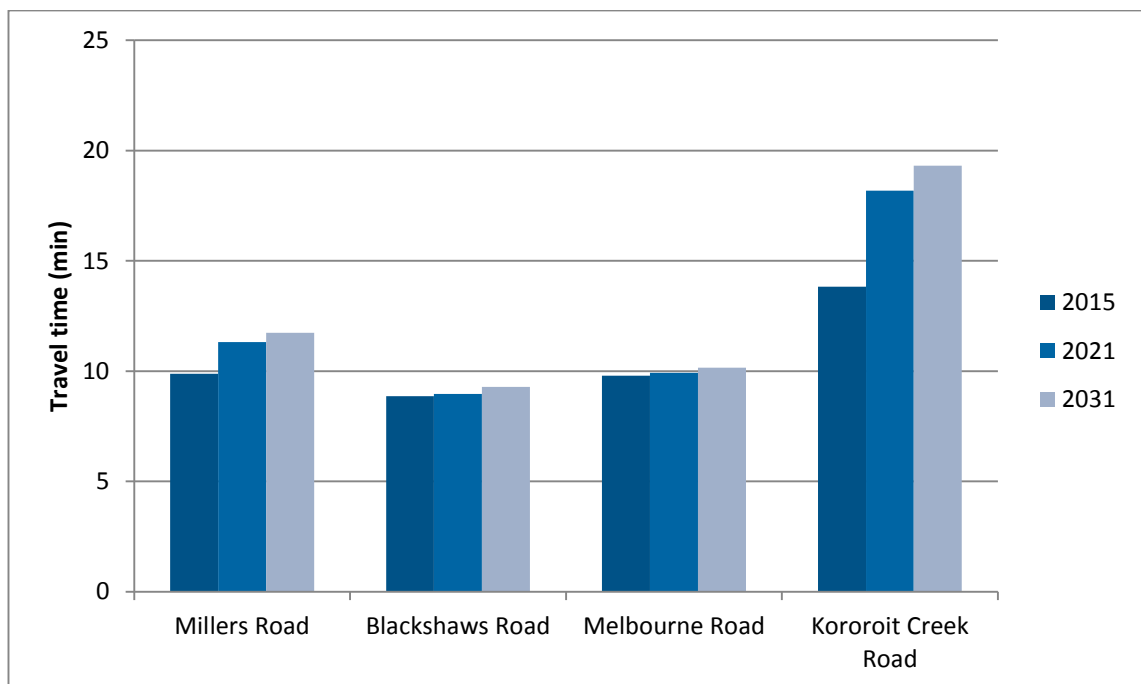


Figure 40 Model travel time on key roads, 7-9am north or east bound base cases

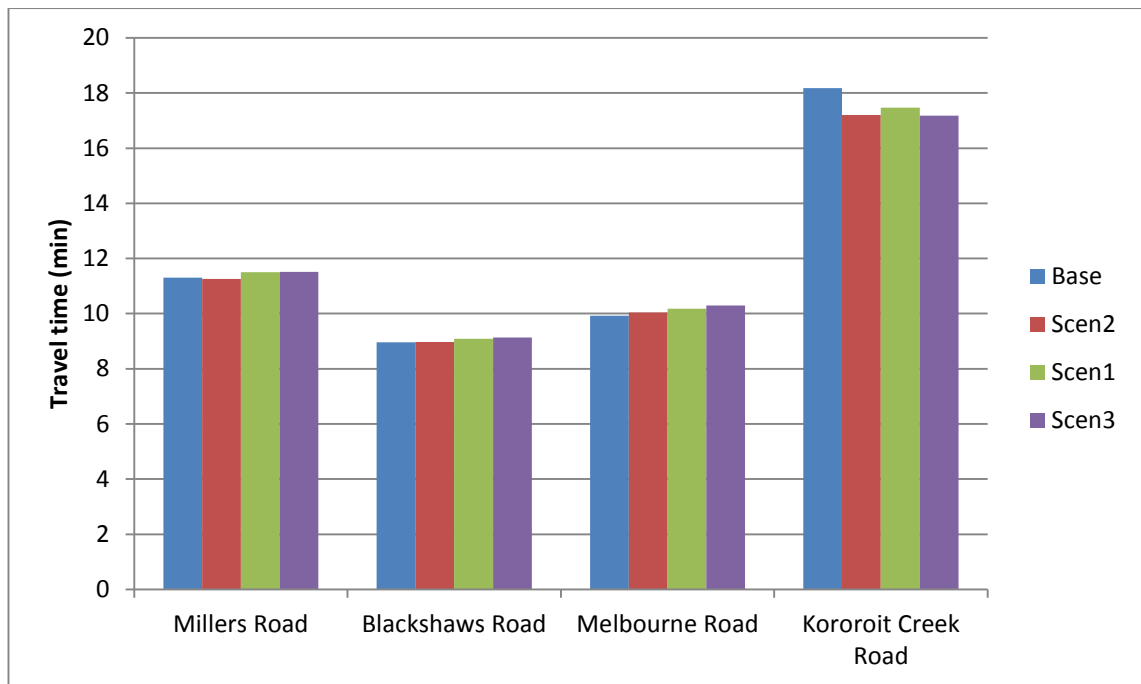


Figure 41 Model travel time on key roads, 7-9am north or east bound 2021 scenarios

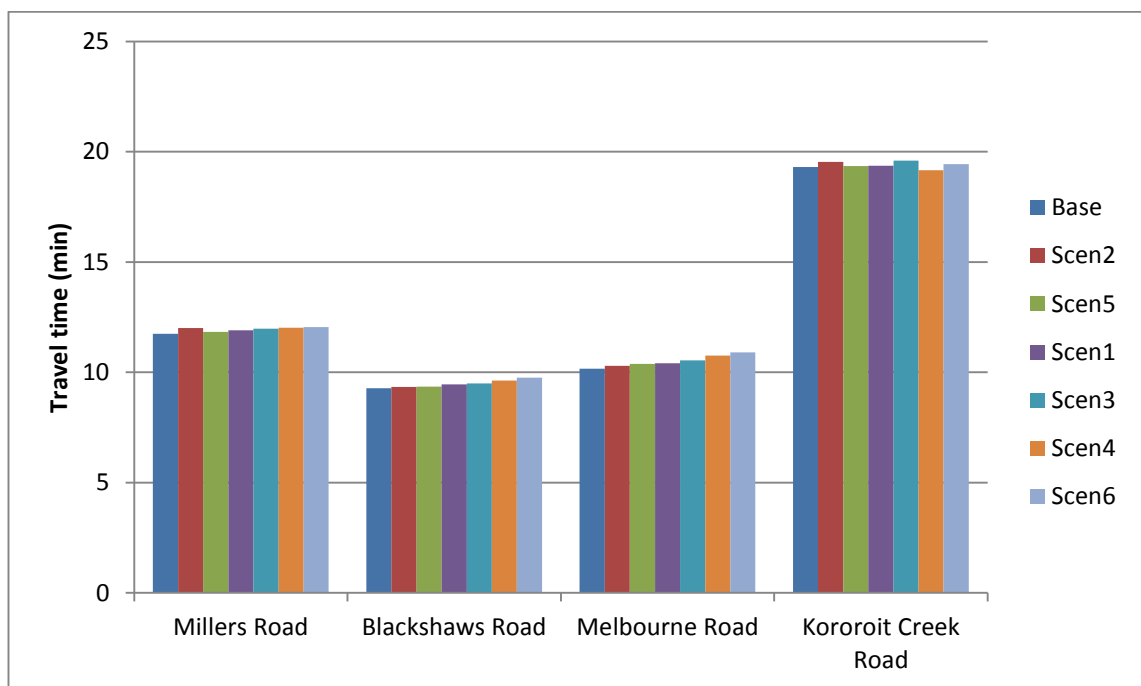


Figure 42 Model travel time on key roads, 7-9am north or east bound 2031 scenarios

7. Volume/Capacity Ratio

Volume/capacity ratio is analysed to check whether congestion is an issue for Hobsons Bay in future and to assess the impact of the development on the surrounding roads. Key roads (Millers Road, Melbourne Road and Blackshaws Road) are examined in more detail. Note that no junction modelling and ramp metering (used on a managed motorway) has been carried out in VITM as it does not include junction geometry and signal data. This would impact the amount of congestion produced by the model on a particular road segment. However, it should not affect the relative changes when the results of different years and scenarios are compared below.

Figure 43 shows the 2015 Base AM peak direction volume/capacity ratio around the study area. As expected, most of the congestion occurs in West Gate Freeway and Princes Freeway. Congestion also occurs at some locations in Hobsons Bay, such as West Gate Freeway interchanges, Queen Street, Merton Street and Kororoit Creek Road.

Figure 44 and Figure 45 show the 2021 and 2031 Base peak direction volume/capacity ratio respectively. Congestion would increase around a few locations near Princes Freeway interchanges. For most of the network, the model indicates that congestion in Hobsons Bay would not worsen significantly in the future. The model results suggest that the bottlenecks at various freeway interchanges would discourage external traffic getting through the local roads in Hobsons Bay. This results in relatively uncongested conditions on the local roads within the municipality.

Figure 46 and Figure 47 show the 2021 and 2031 Scenario 6 peak direction volume/capacity ratio respectively. Comparing to the base cases (see Figure 44 and Figure 45), the full development of Precincts 15, 16 and 20 would mainly impact on the roads around the precincts, (i.e. Hudsons Road and Brunel Street). As discussed in Section 2 of this report, many local roads are not included in the model and the model should not be relied on to assess impact on local roads. For most of the road network, the development would have little impact on the traffic conditions.

7.1 Millers Road

Figure 48 shows the volume/capacity ratio on Millers Road for the base cases. There would be a small increase in the volume/capacity ratio over the years. Congestion appears to mainly be an issue immediately south of the West Gate Freeway in the future.

Figure 49 and Figure 50 show the volume/capacity ratio on Millers Road for the 2021 and 2031 scenarios respectively. There would be little change in volume/capacity ratio (or level of congestion) on Millers Road with the growth of households in the development, with the section of road immediately south of West Gate Freeway remaining congested. The small change in volume/capacity ratio is expected to be due to the redistribution of traffic.

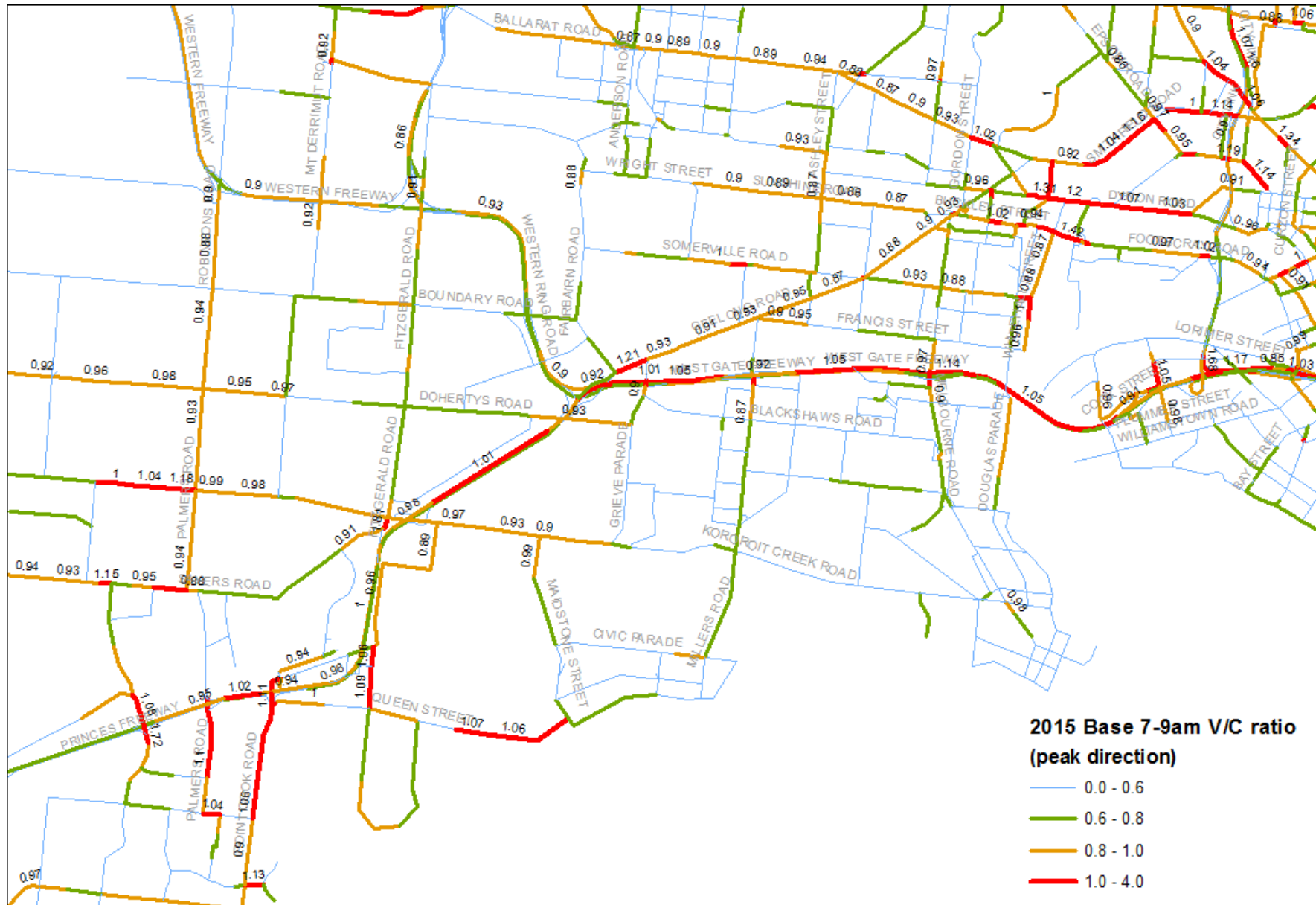


Figure 43 Peak direction volume/capacity ratio, 7-9am 2015 Base

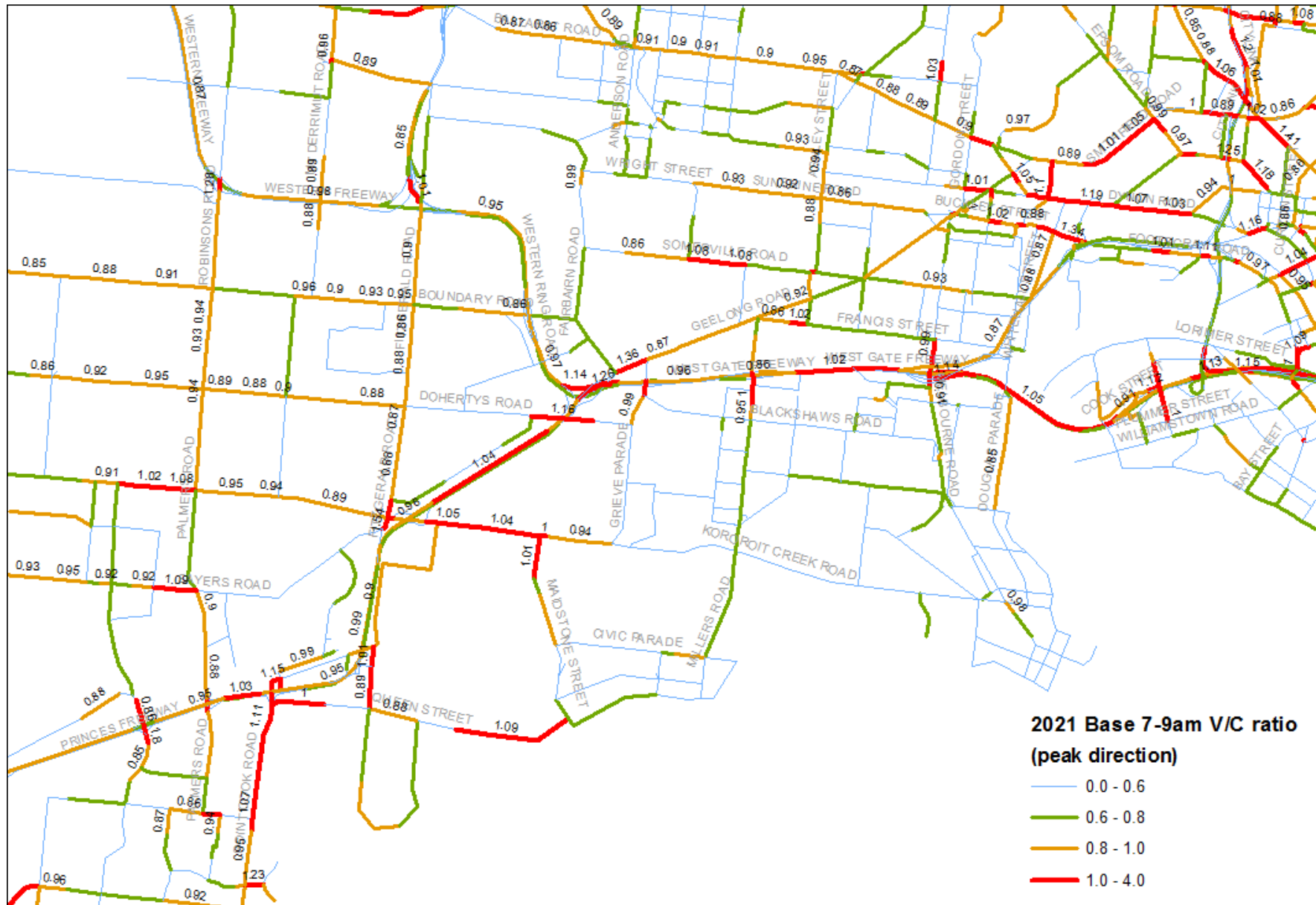


Figure 44 Peak direction volume/capacity ratio, 7-9am 2021 Base

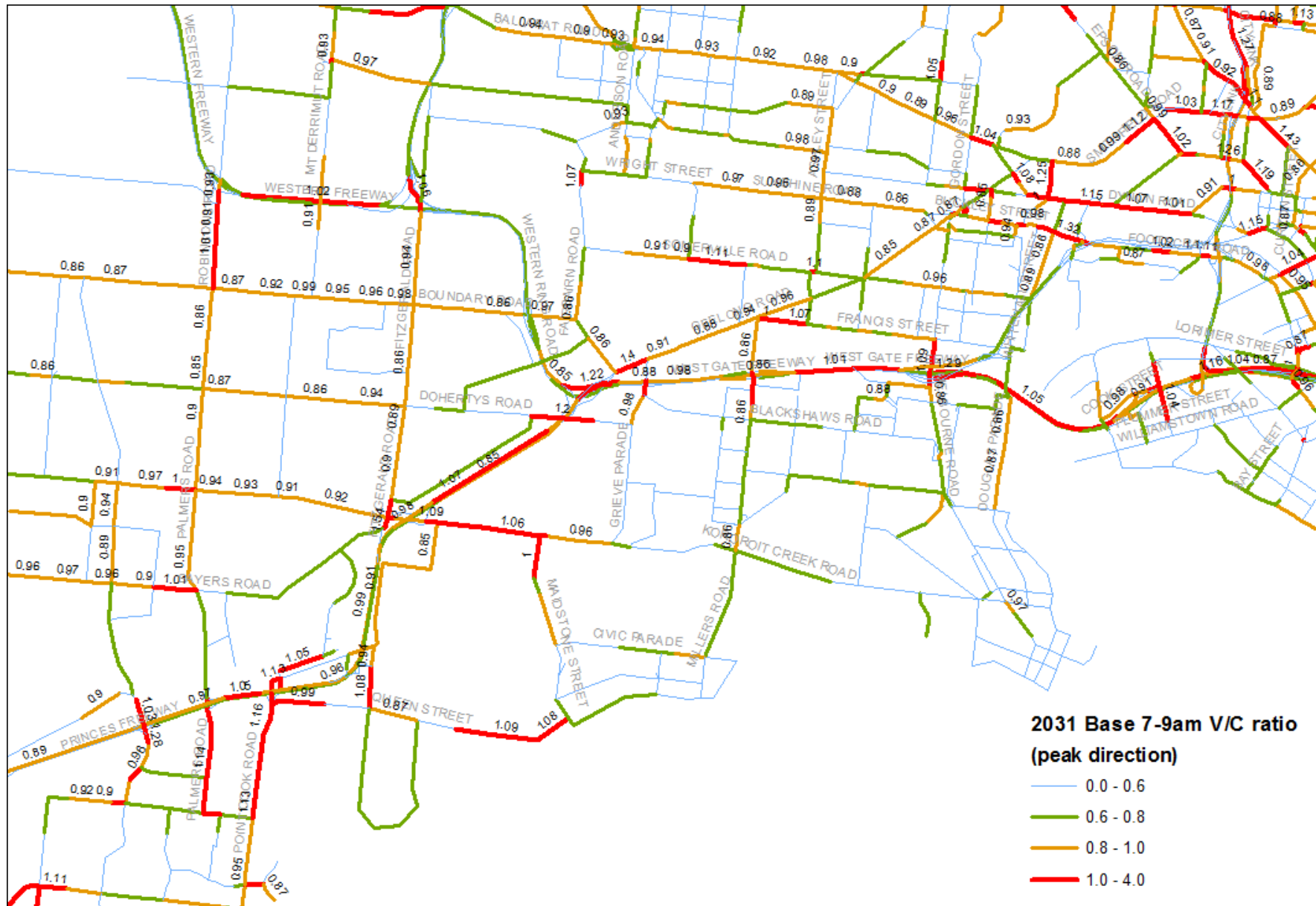


Figure 45 Peak direction volume/capacity ratio, 7-9am 2031 Base

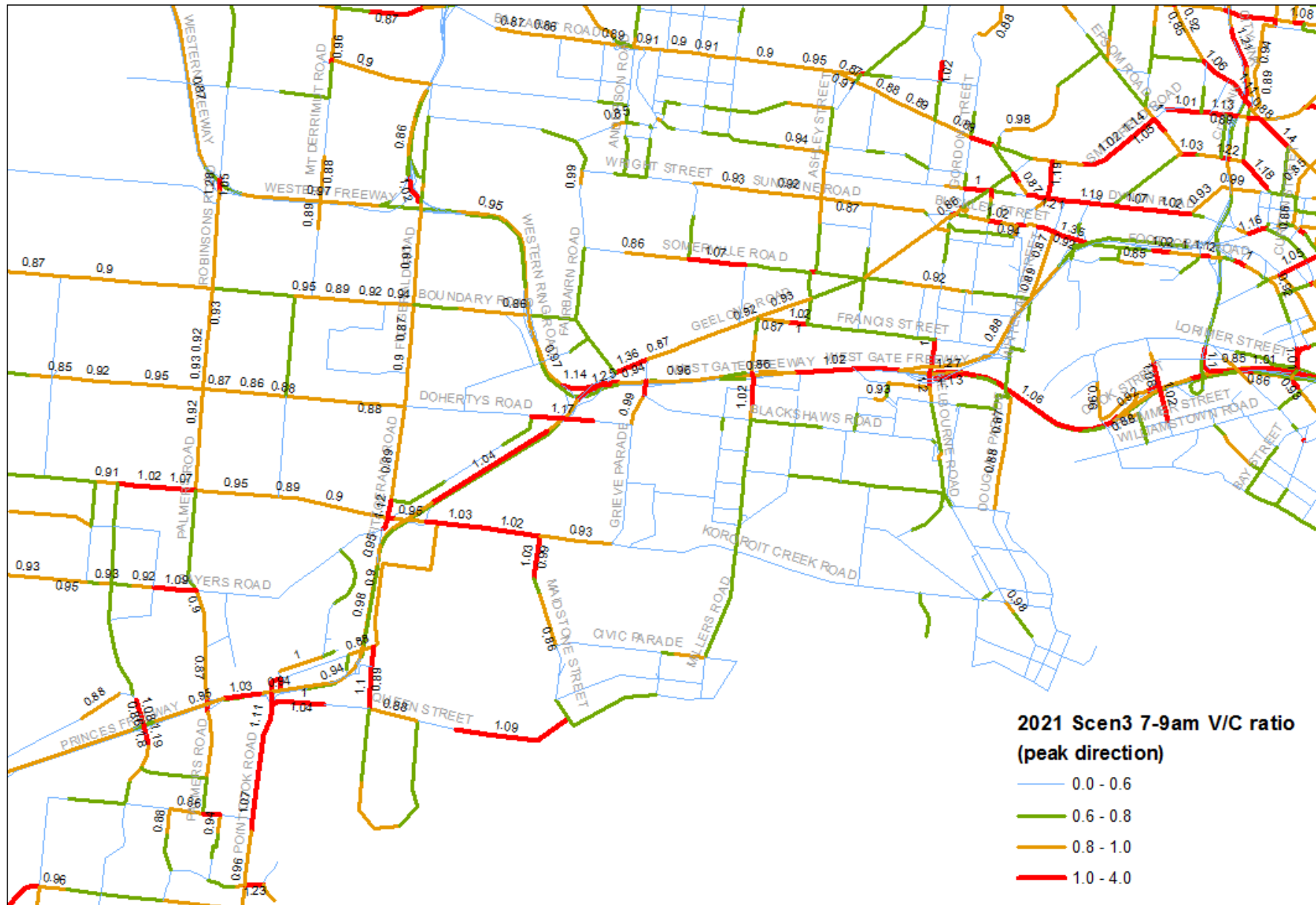


Figure 46 Peak direction volume/capacity ratio, 7-9am 2021 Scenario 3

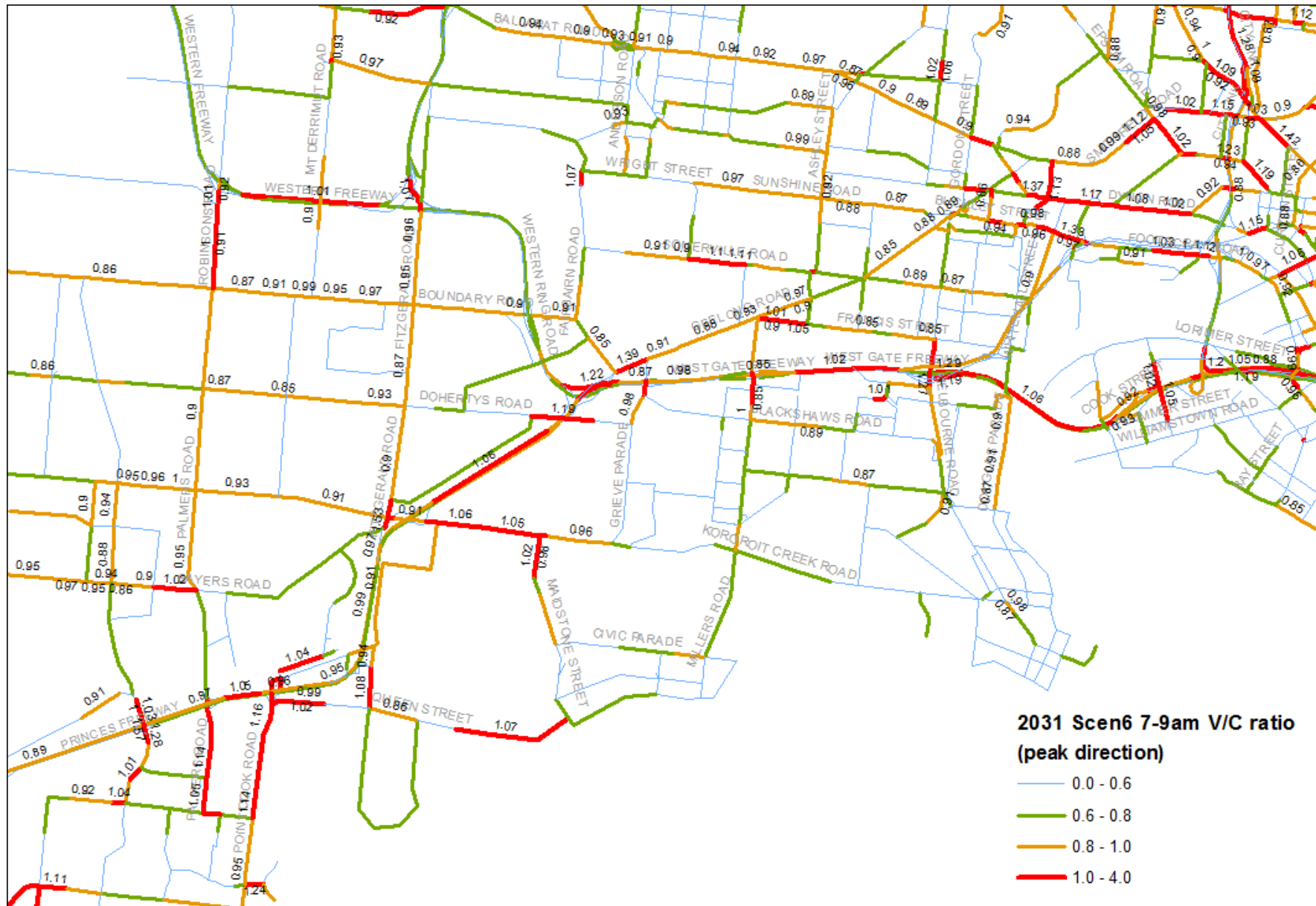


Figure 47 Peak direction volume/capacity ratio, 7-9am 2031 Scenario 6

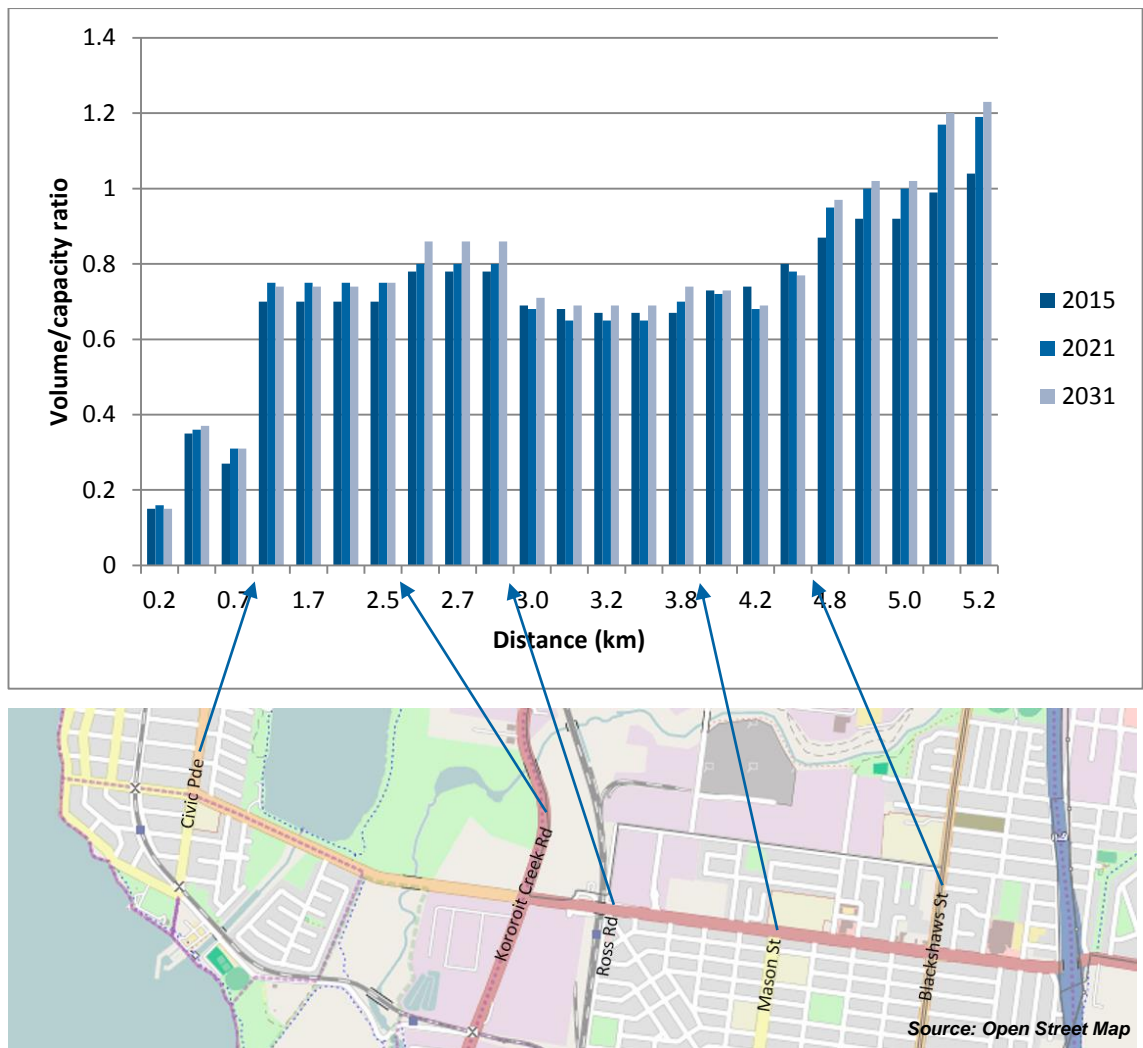


Figure 48 Volume/capacity on Millers Road, 7-9am northbound base cases

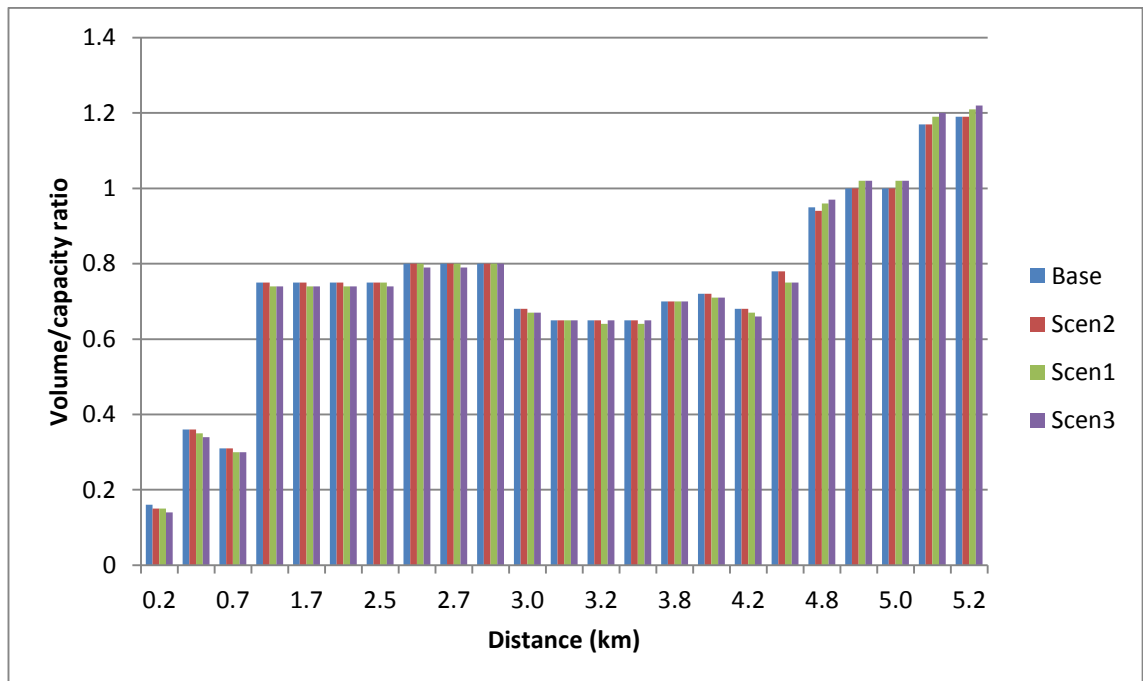


Figure 49 Volume/capacity on Millers Road, 7-9am northbound 2021 scenarios

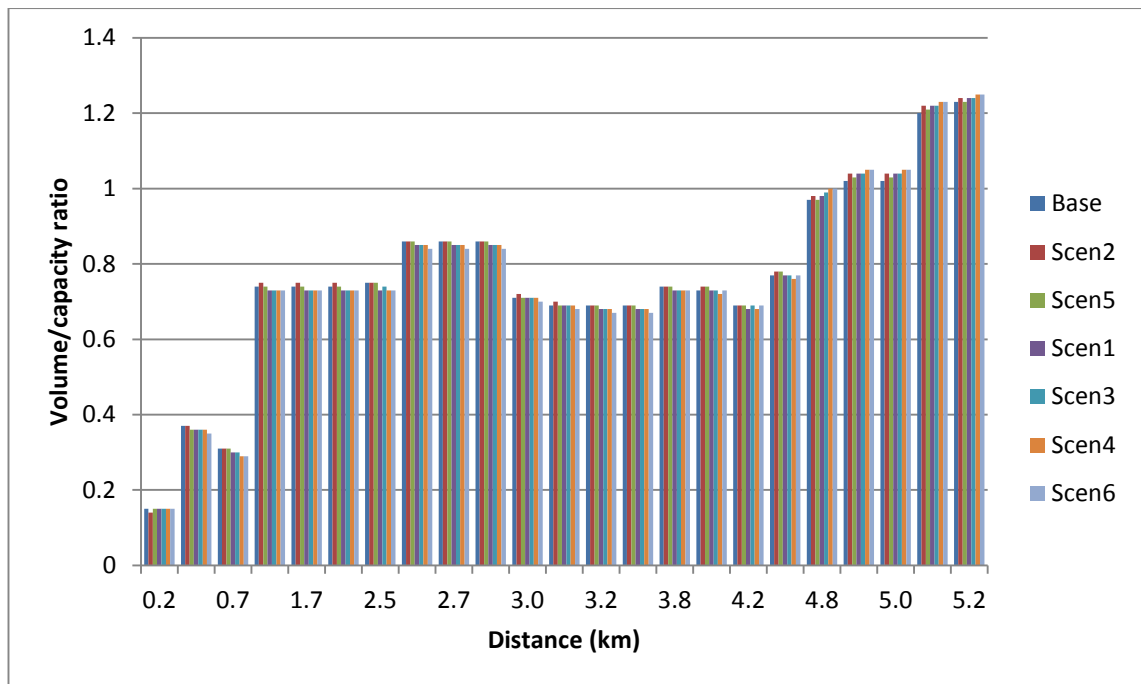


Figure 50 Volume/capacity on Millers Road, 7-9am northbound 2031 scenarios

7.2 Melbourne Road

Figure 51 shows the volume/capacity ratio on Melbourne Road for the base cases. Note there are only two lanes (one in each direction) on Melbourne Road south of Ferguson Street and hence a higher volume/capacity ratio there. There would be a small increase in the volume/capacity ratio on Melbourne Road north of Blackshaws Road over the years. Congestion appears to mainly be an issue immediately south of the West Gate Freeway in the future for the base case.

Figure 52 and Figure 53 show the volume/capacity ratio on Melbourne Road for the 2021 and 2031 scenarios respectively. There would be a small increase in volume/capacity ratio on Melbourne Road with the growth of households in the development. The small change in volume/capacity ratio is due to the redistribution of traffic. However, the increase would be more significant south of Kororoit Creek Road as there are only two lanes in this section of the road. With volume/capacity ratio over 0.8, congestion may become a problem on Melbourne Road north of Blackshaws Road and south of Kororoit Creek Road with the full development of Precincts 15, 16 and 20.

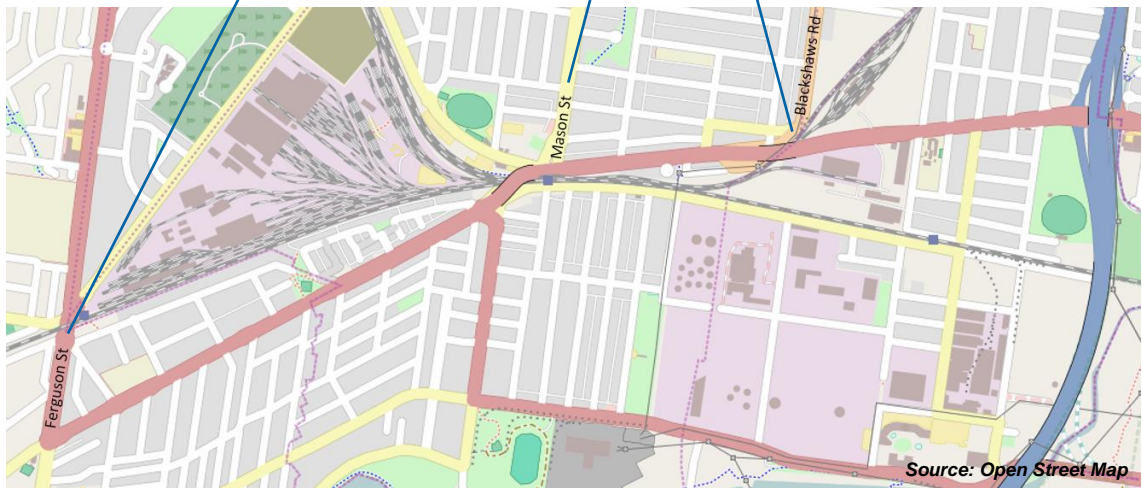
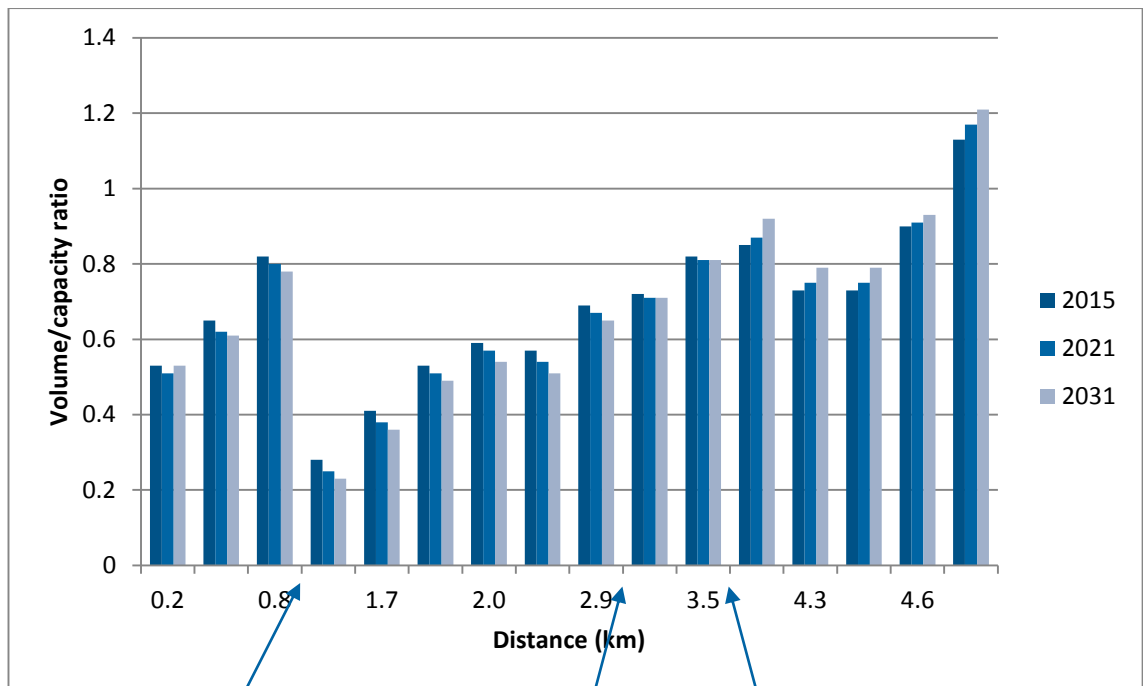


Figure 51 Volume/capacity on Melbourne Road, 7-9am northbound base cases

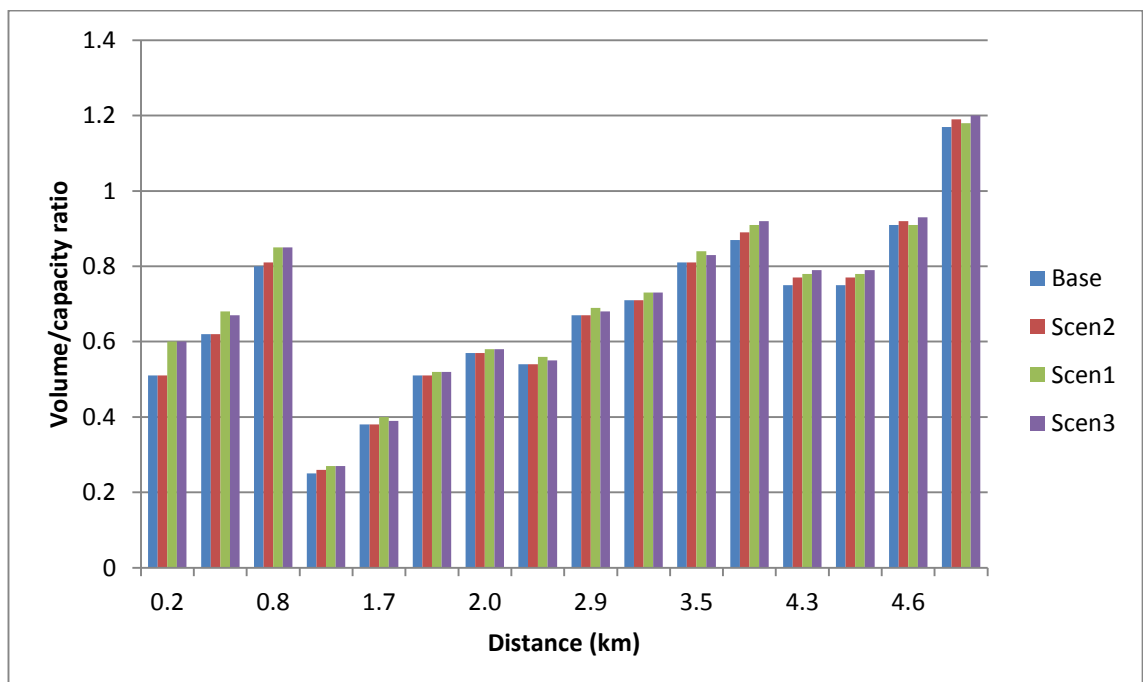


Figure 52 Volume/capacity on Melbourne Road, 7-9am northbound 2021 scenarios

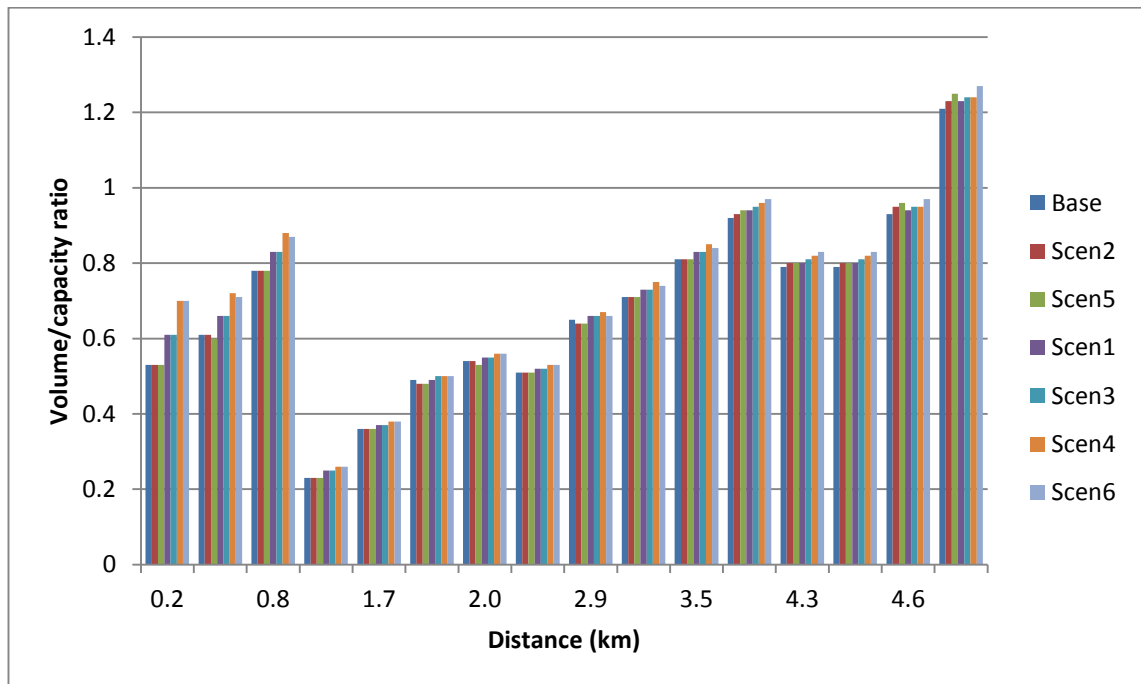


Figure 53 Volume/capacity on Melbourne Road, 7-9am northbound 2031 scenarios

7.3 Blackshaws Road

Figure 54 shows the volume/capacity ratio on Blackshaws Road for the base cases. Note there is only two lanes (one in each direction) on Blackshaws Road east of Schutt Street and hence a relatively higher volume/capacity ratio despite a lower traffic volume there. There would be a general increase in the volume/capacity ratio on Blackshaws Road over the years. However, the volume/capacity ratio would drop on Blackshaws Road west of New Street in 2021 due to widening of West Gate Freeway and opening of Western Distributor. Despite the increase of volume/capacity ratio, congestion is generally not expected to be an issue on Blackshaws Road in future for the base cases.

Figure 55 and Figure 56 show the volume/capacity ratio on Blackshaws Road for the 2021 and 2031 scenarios respectively. The volume/capacity ratio would increase significantly on Blackshaws Road east of Millers Road with the growth of households in the development. However, the volume/capacity ratio would remain below 0.8 for most part of the road, indicating relatively uncongested conditions of the road eastbound even with the full development. East of Schutt Street (a two lane, two-way road section), congestion may become a problem on Blackshaws Road with the full development of Precincts 15, 16 and 20. Note that significant traffic would travel westbound to Millers Road with the growth of household in the development. Figure 47 shows that congestion may become a problem in the westbound traffic (with volume capacity ratio of 0.89) on Blackshaws Road west of Mills Street.

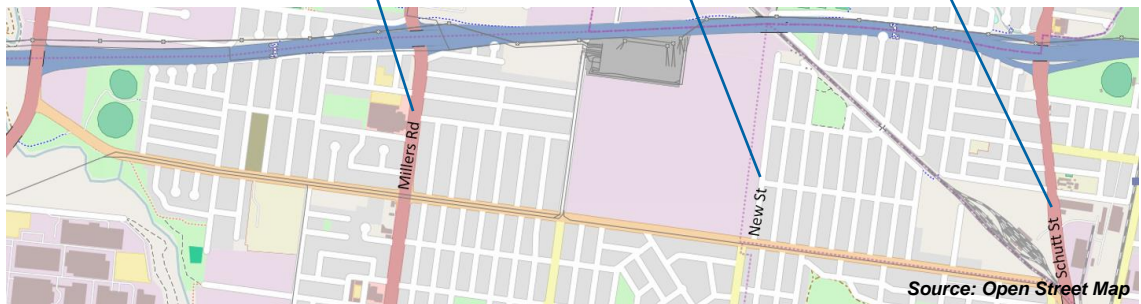
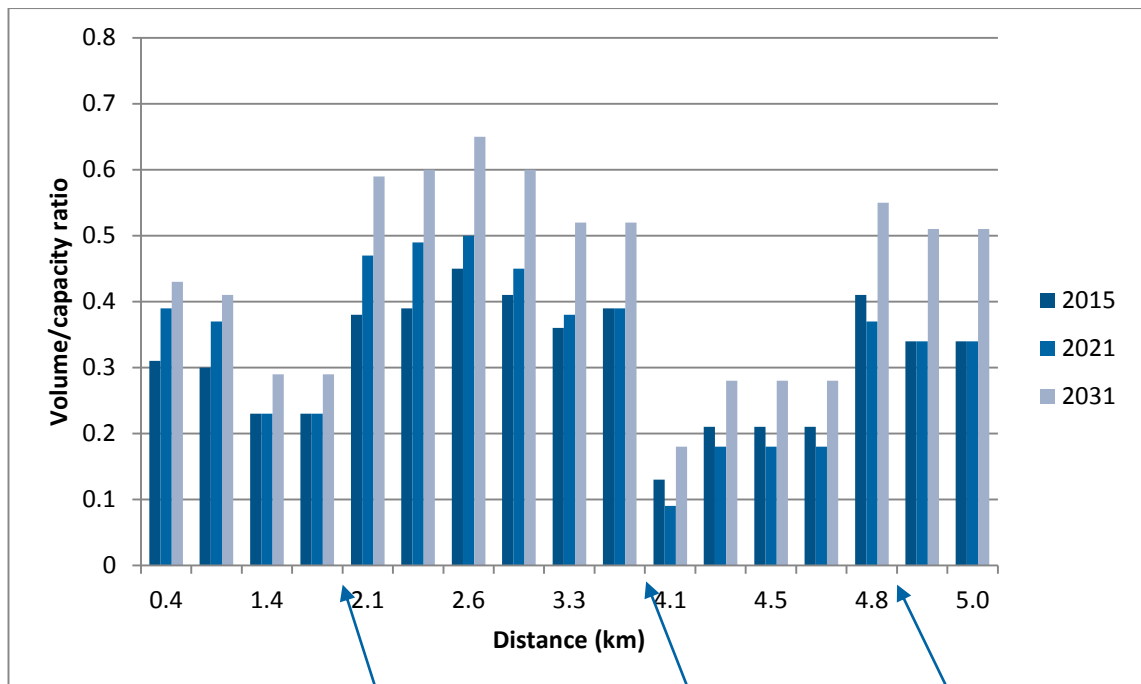


Figure 54 Volume/capacity on Blackshaws Road, 7-9am eastbound base cases

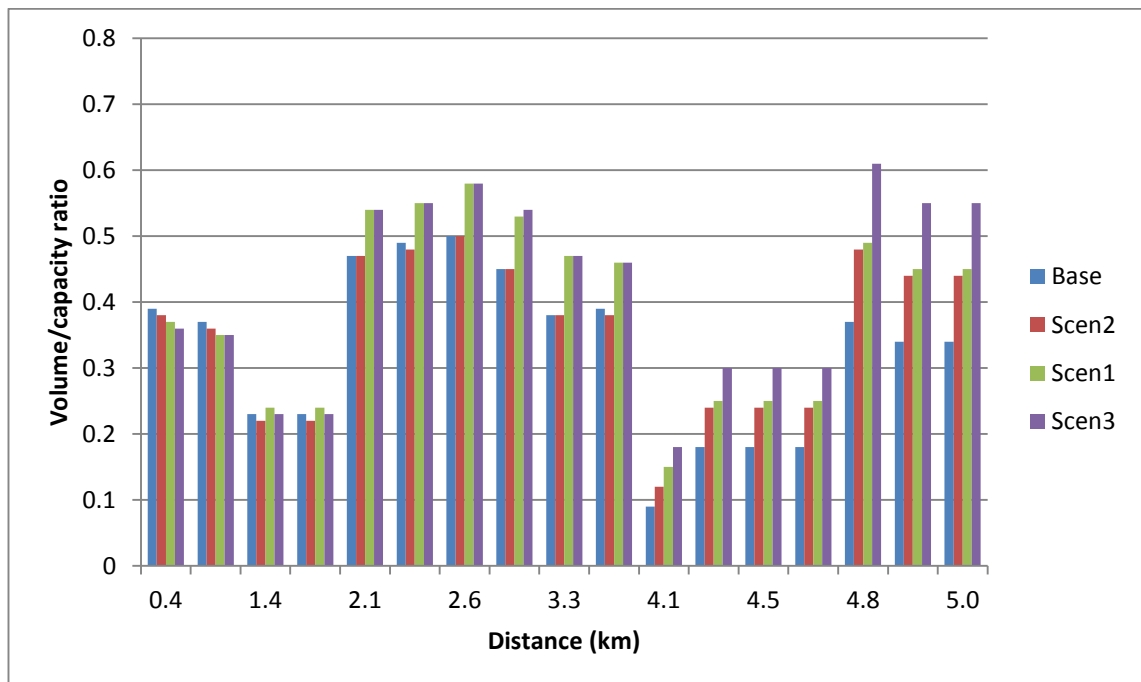


Figure 55 Volume/capacity on Blackshaws Road, 7-9am eastbound 2021 scenarios

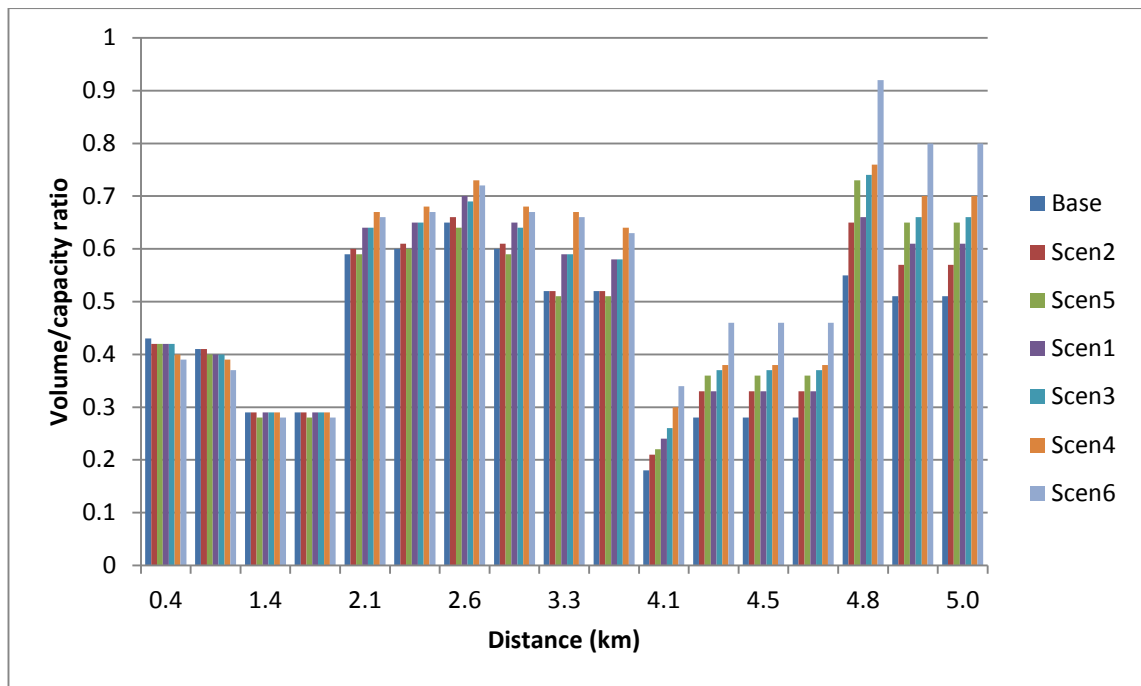


Figure 56 Volume/capacity on Blackshaws Road, 7-9am eastbound 2031 scenarios

8. Conclusions and Recommendations

8.1 Conclusions

Most of the increase in volumes due to the development would be on Blackshaws Road and other roads around the precincts. Including the full development of Precincts 15, 16 and 20, the model forecasts the following net increases of vehicles at 7-9am in 2031 compared to 2015:

- 800 vehicles northbound on Millers Road south of West Gate Freeway
- 500 vehicles northbound on Melbourne Road south of West Gate Freeway
- 700 vehicles eastbound on Blackshaws Road west of New Street

The increase in vehicles is less than the total expected trips generated from the developments as traffic external to the precincts previously using the roads would redistribute to alternate routes due to the congestion. Apart from the above locations, the developments would have little impact on the traffic in most of the road network in Hobsons Bay.

The development in Precincts 15, 16 and 20 will also have an impact on truck traffic through the municipality. However, rather than attracting more truck traffic, the growth of households would drive trucks away from the development in comparison to the 'no development' case. With the full development of Precincts 15, 16 and 20, the model forecasts the following net change of trucks at 7-9am in 2031 compared to 2015:

- Increase of 200 trucks northbound on Millers Road south of West Gate Freeway
- Increase of 400 trucks northbound on Melbourne Road south of West Gate Freeway
- Increase of 200 trucks eastbound on Blackshaws Road west of New Street

There would be slight increases in travel time (less than a minute) on Millers Road, Melbourne Road and Blackshaws Road with the full development Precincts 15, 16 and 20 compared to no development.

The developments are also shown to impact congestion levels on other areas of the road network within HBCC. The following locations may become more congested with the full development of Precincts 15, 16 and 20:

- Melbourne Road south of West Gate Freeway
- Melbourne Road south of Ferguson Street
- Blackshaws Road near the junction with Melbourne Road
- Blackshaws Road west of Mills Street

Millers Road south of West Gate Freeway would remain congested with or without the full development. However, the development is expected to have little impact on the traffic condition, which would remain relatively uncongested. The model results suggest that the bottlenecks at various freeway interchanges would discourage external traffic getting through the local roads in Hobsons Bay.

The structure and parameters inherent in the modelling completed for the assignment mean that congestion, and therefore the recommendations, are identified on a link level. Strategic modelling is not necessarily the appropriate tool to assess traffic performance at an intersection level.

8.2 Recommendations

Recommendations are made regarding the mitigation measures to manage congestion as development continues and further model development to improve model validation and performance. The improvement in model need not change the recommended mitigation measures but provides more confidence in the model results.

The recommended mitigation measures are based solely on the findings from strategic modelling. No feasibility study on the physical environment and benefit-cost analysis have been carried out.

8.2.1 Mitigation Measures

Based on the conclusions identified in see Section 8.1, the following mitigation measures are recommended to assist in managing congestion due to future development of Precincts 15, 16 and 20 in Hobsons Bay.

- Capacity upgrade on Blackshaws Road near the junction with Melbourne Road
- Capacity upgrade on Melbourne Road between Parker Street and Ferguson Street

In 2014, VicRoads upgraded the electronic management system (managed motorway) along West Gate Freeway between Williamstown Road and the Western Ring Road. This would improve the traffic flow at the Melbourne Road and Millers Road interchanges. Note that the current version of VITM does not take into account the impact of managed motorway on traffic flow and because of this, the model may have overestimated the traffic volume on Melbourne Road south of West Gate Freeway (see the Calibration and Validation Report of this project).

The proposed widening of West Gate Freeway and opening of Western Distributor in 2021 is expected to divert traffic away from Blackshaws Road and off-set some of increase of traffic due to the development. However, the impact on the traffic is small in comparison to that from the development. The capacity upgrade on Blackshaws Road as suggested above is still anticipated to be beneficial in mitigating the congestion caused by the development.

Extension of New Street to Francis Street or other similar projects may divert some traffic from Millers Road, Melbourne Road and Blackshaws Road. A strategic modelling of the project would be required to assess the traffic impact from the project.

The three precincts are relatively close to railway stations, comparing to most other areas in Melbourne. With the Melbourne Metro and other future public transport improvement as assumed in VITM, improving the connectivity and frequency of bus services in Hobsons Bay to and from railway stations would increase the uptake of public transport from these precincts. Note the improvement of road network (capacity upgrades on Blackshaws Road and Melbourne Road) would shift people from public transport to cars. Hence, improving both road network and public transport are necessary to maintain a good level of service in infrastructure in Hobsons Bay.

8.2.2 Strategic Objectives and Prioritisation of Investment

In Hobsons Bay, Melbourne Road and Millers Road are the key north-south road linkages with Blackshaws Road providing an important east-west link.

Although Blackshaws Road is classified as a secondary arterial road, the reduced capacity of the road east of Schutt Street limits its usage to access Melbourne Road. The capacity upgrade on Blackshaws Road east of Schutt Street not only improves the traffic flow on this section of the road but also diverts “rat-run” traffic from local roads, such as Hudsons Road and Brunel Street. This would make Blackshaws Road the preferred east-west route between Millers Road

and Melbourne Road in the north of Hobsons Bay. In addition, it would serve as the main access road for the future development in Precincts 15 and 16.

Melbourne Road south of Ferguson Street is classified as a collector which funnels local traffic to Melbourne Road, which is classified as a secondary arterial north of Ferguson Street. It is recommended that consideration be given to capacity upgrade on Melbourne Road south of Ferguson Street but it would still function as a collector. It would serve as the main access road for the future development in Precinct 20.

Prioritisation of investment generally requires a vigorous strategic assessment and benefit-cost analysis. Nonetheless, based on the findings from the strategic modelling, the capacity upgrade on Blackshaws Road east of Schutt Street would have a high priority. Without the project, the development is expected to result in congestion on Blackshaws Road as the limited capacity of the road east of Schutt Street would constrain the traffic flow to Melbourne Road. Also, the significantly larger development in Precincts 15 and 16 would make the project a higher priority than other areas with smaller development.

Capacity upgrade on Melbourne Road south of Ferguson Street would mainly benefit residents living locally in the area. As an alternative, the local residents can catch a train in the nearby railway station. Also, the upgraded capacity on Melbourne Road would serve a smaller future development in Precinct 20. Hence, it is considered to have a lower priority than the capacity upgrade on Blackshaws Road.

8.2.3 Further Model Development

The model was generally validated satisfactorily, meeting most of the validation criteria in VicRoads modelling guidelines. However, the validation results showed that the volumes on some parts of freeways were overestimated and some parts of the arterial and local roads were underestimated (see the Calibration and Validation Report of this project). This may be due to the limitation of the model in not being able to model a managed motorway, which would affect the distribution of traffic on it and local roads.

Also, the validation of truck volumes did not meet the validation criteria, although they do not affect the capacity assessment of this project.

The following further developments on the model are recommended.

- Mesoscopic modelling – West Gate Freeway between Williamstown Road and Western Ring Road is now a managed motorway. As VITM does not have junction and signal data, it is not a suitable platform to model a managed motorway. To model the managed motorway, it is recommended to extract a subarea from VITM comprising the study area and use the subarea demand matrices in a mesoscopic model. Ramp metering and other junction and signal data can then be coded in the network to model the managed motorway and other parts of the network. Matrix estimation can also be carried out for the subarea to refine the traffic demand in the study area.
- Calibration of the Freight Movement Model (FMM) – The FMM in the current version of VITM is newly developed and has not been calibrated and validated for the Melbourne metropolitan area. Based on the validation results of this project, the model did not validate well for Hobsons Bay. It is recommended that the FMM to be calibrated with truck traffic counts for the Melbourne metropolitan area. Note that the validation area would be significantly larger than the study area of this project. However, it is necessary to adequately calibrate the FMM before applying it for a smaller area.
- Test for local projects – The project list used for this study was based on the reference case established by the Department of Economic Development, Jobs, Transport and Resources. However, other projects or scenarios of local interest, such as extension of

New Street to Francis Street, can be tested with the strategic model to assess the traffic impact of these local projects or scenarios.

Table 4 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

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