



**Pakenham East Interchange Comparative Traffic
Modelling Assessment
Report**

EXECUTIVE SUMMARY

The Cardinia Shire Council seeks to investigate possible future options for improving the connectivity of the arterial road network around Pakenham across the Princes Freeway and the railway corridor to the south of Pakenham using the most up to date traffic and transport modeling tools.

Currently, a new interchange on the Princes Freeway is being proposed about midway between the Koo Wee Rup Road Interchange and the Princes Highway Interchange (near Nar Nar Goon Road) in the east.

For the purposes of this comparative assessment:

- + Option 1 was defined to INCLUDE the interchange and associated road links.
- + Option 2 did NOT INCLUDE the interchange and immediate road network links. Other relatively minor changes were made to individual road links to reflect more recent planning.

The Victorian Integrated Transport Model (VITM) has been used to compare the highway assignments of these two alternative road networks.

The assessment is limited to a comparison of traffic modelling results only. The results of this analysis have been displayed using a series of maps.

Travel Time and Vehicle Hours

Without the proposed interchange (option 2), trips generally spend a longer time on the Princes Highway and other arterial roads. That is, until they are able to join the Princes Freeway. The net result is a small increase in the total vehicle kilometres travelled and in the total travel time on the highway network.

Overall, average travel speeds are reduced by about 3km/hr without the proposed interchange. The interchange impacts primarily on McGregor Road, Racecourse Road, the Princes Highway and Princes Freeway.

Trip Diversion

At the extreme east of the modeled area, trips that would normally use the proposed new arterial road connection and the new interchange under option 2 would use the Nar Nar Goon Road Interchange to access or exit the Princes Freeway. This would result in larger traffic volumes on the freeway and the highway east of the proposed interchange.

West of the proposed interchange, volumes on the Princes Freeway would be lower without the interchange as far as the Cardinia Road interchange.

On the Princes Highway west of Dore Road, traffic volumes would be higher without the interchange. Traffic that would have travelled southwards to join the Princes Freeway would now do so at a point further west. Traffic would access the Princes Freeway via Racecourse Road, McGregor Road and Cardinia Road.

Traffic Volumes and Level of Service

For option 2:

- + there would be a small decrease in level of service on the Princes Highway due to an increase in traffic volumes;
- + the Princes Freeway west of Cardinia Road would operate satisfactorily and at a better level of service;
- + McGregor Road between Henry Road and The Princes Freeway and Racecourse Road between Bald Hill Road and Princes Freeway would operate at lower level of service;
- + Level of service along short lengths of the Princes Highway at the Nar Nar Goon Road interchange would drop significantly;
- + east of McGregor Road, significant sections of the Princes Highway would operate at lower levels of service.

The forecast daily volumes show that McGregor Road and Racecourse Road will carry higher volumes in Option 2 than in Option 1. For Option 1, McGregor Road will carry about 32,300 vehicles per day, while for option 2 (without the new interchange); it will carry about 36,100 vehicles per day. Daily volumes on racecourse Road for Option 1 will reach around 27,000 vehicles but for Option 2 this would increase to 32,000 vehicles per day. The cause of the increase is the additional trips accessing the Princes Freeway from The Princes Highway.

On both roads, volumes for Option 1 and Option 2 are substantially lower than the 40,000 vehicles per day threshold capacity specified by MPA.

Travel Speeds

For option 2:

- + speeds on the Princes Highway east of Dore Road would increase;
- + speeds on the Princes Freeway, between McGregor Road and the South Gippsland Highway would increase;
- + speeds on the Princes Highway between Dore Road and McGregor Road would decrease;
- + speeds on McGregor Road and Racecourse Road south of the railway line would decrease;

Conclusion

Examination of the VITM strategic modelling results shows that the provision of the proposed interchange at Pakenham East has relatively minor impact on the arterial road network in the Pakenham area. The Princes Highway, Racecourse Road and McGregor Road all operate within the thresholds for divided arterial roads (option 1).

The results of this exercise show that the interchange has only a localised impact, with the most obvious benefits being limited to the highway network in the immediate vicinity of the proposed interchange. Without the proposed interchange, levels of service, which drop by at least one category and travel speeds would be on average 3km/hour lower.

Under Option 2, however, The Princes Freeway would operate at a higher level of service, ie better, with higher speeds and lower traffic demands east of Cardinia Road. The need for the interchange should therefore be more closely examined to determine whether the benefits would deliver would warrant the cost of its provision, relative to other priorities for the road network in the Pakenham and Cardinia's Urban Growth Area.

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1 Introduction

1.1 Background

Currently, options are being developed to service future residential development in the area east of Pakenham. Option 1 proposes an additional interchange on the Princes Freeway interchange, approximately 3.6km east of the Racecourse Road/Koo Wee Rup Road interchange and 3.1km west of the Princes Highway Nar Nar Goon Road. If constructed, the interchange will serve the Pakenham East development and will connect to a yet to be established north-south road corridor (a southward extension of Dore Road) linking up with the Princes Highway in the north.

The location of the proposed interchange is shown in **Figure 1**.

Option 2 proposes that the development of Pakenham East does not include any new connections to the Princes Freeway.

1.2 Purpose

This document reports on the impact of providing versus not providing an interchange at the proposed location based on the future traffic characteristics of the highway network and the associated lessor road links within the Pakenham and Pakenham East area. The purpose of this report is to document only the findings of VITM modelling of alternative options.

1.3 Limitations

VITM is a strategic transport demand model. The model uses standard algorithms and techniques that are deterministic and rely on assumptions and algorithms that are not behavioural. In particular, the assignment of trips onto highway networks is not constrained to the capacity of individual road links. Traffic volumes and traffic delays on highly congested roads may therefore be overstated.

The report is limited to assessing modelling results only. It does not take into account important factors in the decision making process such as urban design impact, construction costs or implications on the future urban structure of Pakenham East PSP.

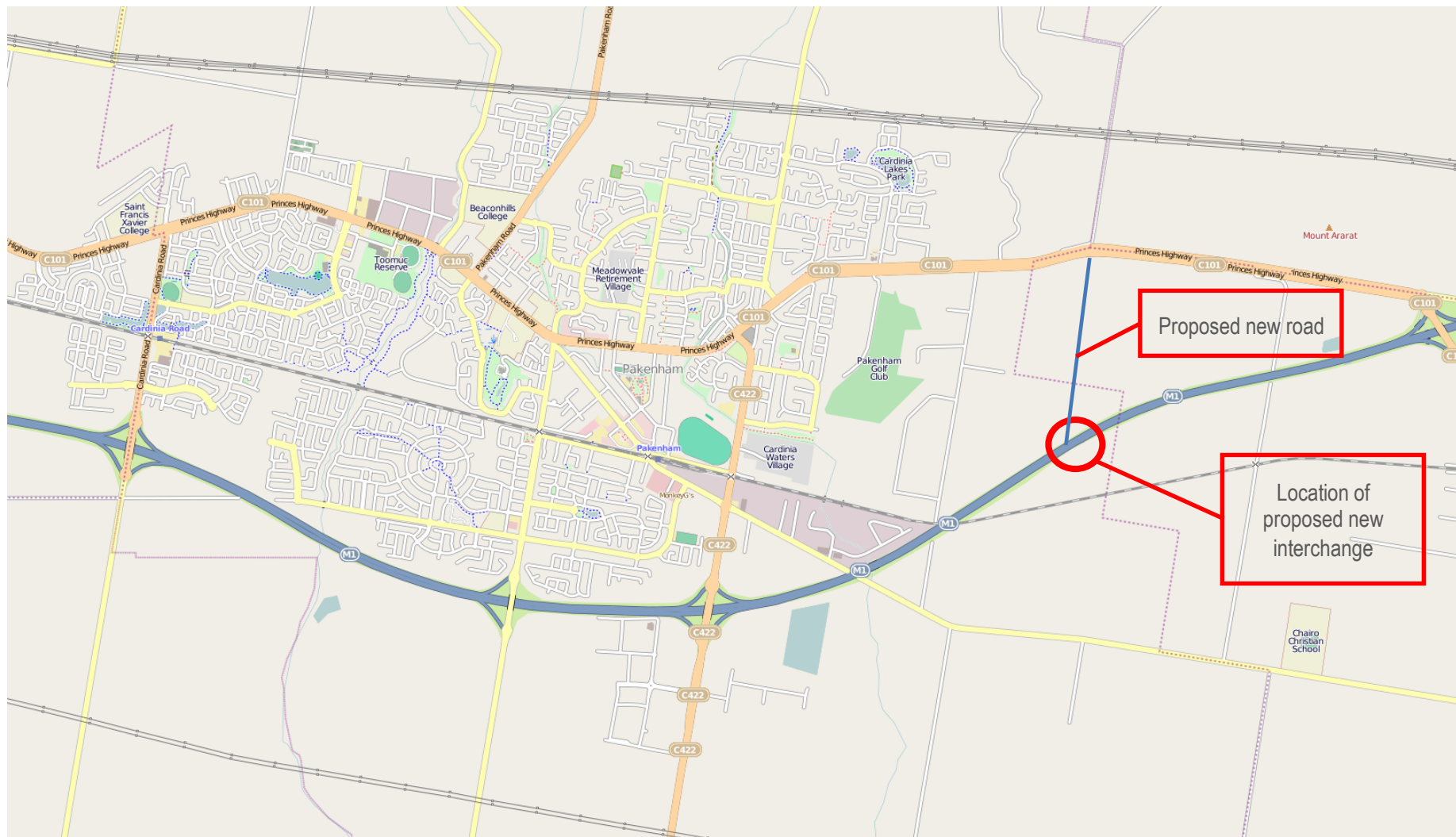


Figure 1 - Locality Plan

Source: OpenStreetMap

2 Methodology

The Victorian Integrated Transport Model (VITM) has been used to compare the highway assignments of two alternative road networks. For the purposes of this comparative assessment, Option 1 was assumed to INCLUDE the interchange and associated road links. Option 2 did NOT INCLUDE the interchange and immediate road network links. The results of the comparative analysis have been displayed using a series of maps.

Integral to the process of the development of the model and analysis of its results is engagement with VicRoads and the MPA. Input and advice from these agencies form an important part of the development of the model and the resulting analysis.

2.1 The Transport Network

The VITM strategic model includes transport demand forecasts prepared by the Department of Transport at five yearly intervals from 2016 through to 2051. In each case, the transport network that is expected to be in place at that time is represented in the model as road and public transport networks. Because the purpose of this exercise is to look at the impact of changes to the networks when the Pakenham area is fully developed, the study has used the 2046 model year as representative of the ultimate development scenario.

There are several versions of the VITM in circulation at the present time. The version we have used for this project is the South-East Corridor model developed by the MPA for planning and development of the outer growth areas of Melbourne in the south east. This model is a version of the original VITM but with the south-eastern corridor transport network and land use forecasts refined to better represent the growth areas in the south eastern corridor and allow for more detailed planning work. **Appendix A** presents a comparison of the land use data from the VITM that this study is based on and those used by the MPA for the Casey Clyde sub-region.

For this study, Racecourse Road was assumed to be a 4-lane divided primary arterial with a posted speed limit of 80km/hour as included in the South-East Corridor model.

It is important to note that we have not changed the Base Year (2009) networks or demography, so that the calibration of the model is maintained. To test the impact of the interchange, we created an alternative network for 2046 in which the interchange and connecting roads were removed. The full list of changes made to the network is listed in **Table 1**.

2.2 The Travel Zones

The travel zones for the original VITM were refined as part of the development of the MPA south corridor version of the VITM and provide a good level of detail for a strategic model. The zones in the study area are shown in **Figure 2**.

The outline of the original VITM zones are shown, while the individual zone numbers show how many zones they were disaggregated for the South East Corridor model. Boundaries for the new zones were not defined; the primary aim of the new zones was for more precise definition of settlement patterns and loading of trips onto the model network. Each new zone was connected to the network with a separate zone connector or two. For convenience of reporting, the area was divided into regions, which are shown in **Figure 3**.

The demographic data input for the South East Corridor Model was reviewed by Council in the context of its current long term plans and population growth estimates. A summary of the demographic data for this model is contained in **Table 2**.

A record of the changes made by Council is provided in **Appendix B**.

Table 1 - Amendments to the South East Corridor Model Road Network

Road Link Description	Change From	Change To
Peck Road from Thewlis to Brown	Local/Collector	Secondary
Thewlis Road from Peck to Princes Highway	Local/Collector	Secondary
Brown Road from Peck to Bayview Road	Local/Collector	Secondary
Bayview Road from Brown to Princes Highway	Local/Collector	Secondary
Tivendale Road from Brown to Princes Highway	Local/Collector	Secondary
New Link from Bayview to Officer South Road	Primary Undivided	Primary Divided
New Link, Extension of Rix Road from Officer South to McGregor Road	Local/Collector	Primary Divided
Webster Way	Local/Collector	Secondary
Lecky Road from Stephens to Cardinia Road	Local/Collector	Primary Divided
Ryan Road, Princes Highway to Pakenham Bypass	Local/Collector	Secondary
Dore Road and its southern extension		Deleted
East west connector Racecourse Road to Ryan Road		Deleted
Interchange at Pakenham East		Deleted
Princes Highway from Starling to Whiteside Road	4-lane	6-lane
Officer Road South from north of Paterson Road	4-lane	6-lane
New Link from Officer Road South to Cardinia Road	2-lane	4-lane

Table 2 - Summary of Demographic Data Inputs

Study Area Region *	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments
Pakenham East	18,850	6,500	467	870	900	1,200
Pakenham South	0	0	0	18,400	0	0
Centre East	5,046	1,851	11	374	0	0
Centre North	10,617	4,034	49	1,167	1,761	1,100
Centre South	10,724	3,817	79	1,025	399	0
Centre West	2,314	928	33	897	649	1,100
Far East	13	5	0	85	0	0
North East	192	75	0	49	0	0
South East	145	57	11	409	450	220
Town Centre	5,522	2,356	2,167	4,080	0	0
West	18,202	6,874	634	13,164	1,305	1,652
Total	71,625	26,496	3,450	40,520	5,465	5,272

*Refer to Figure 3 for the boundaries of the region.

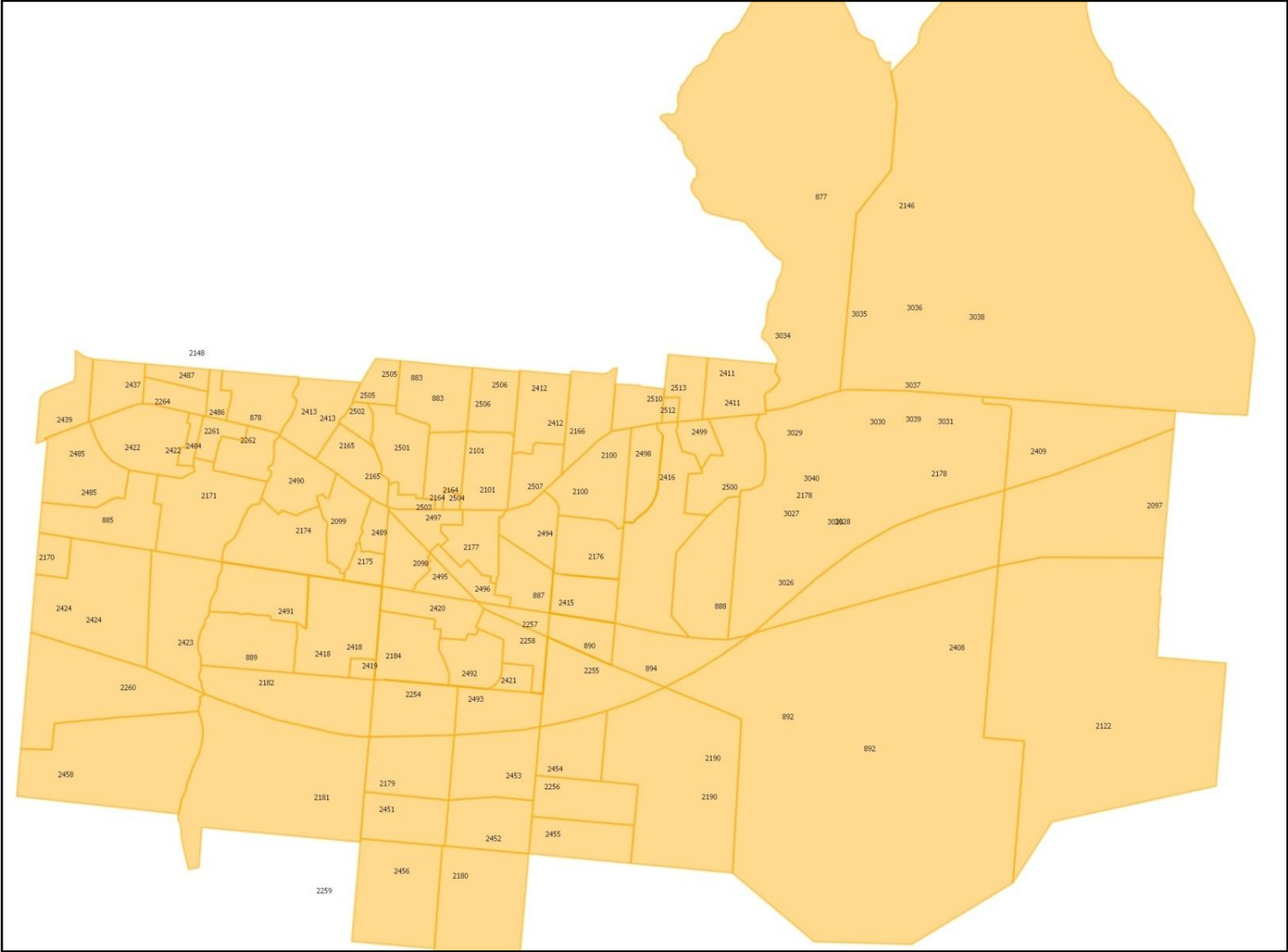


Figure 2 - Study Area Zones

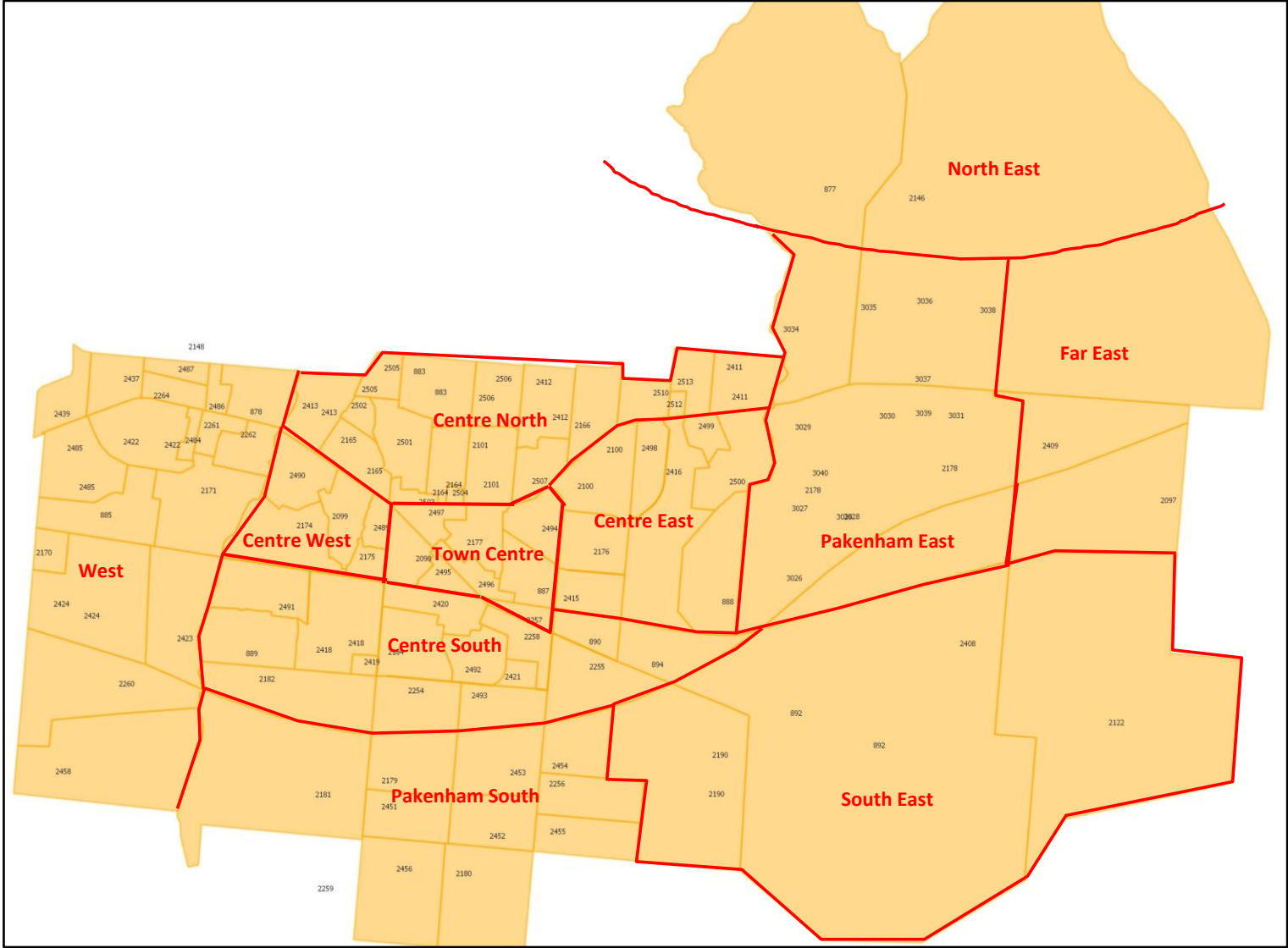


Figure 3 - Study Area Regions

3 Travel Time and Vehicle Hours

During the morning peak, the majority of trips using the highway network around Pakenham and Pakenham East are towards the west. The Princes Freeway generally provides the fastest travel time for all trips through the area. Consequently, trips aim to join the freeway as early as possible. In Option 1, the proposed new interchange provides an additional opportunity for those trips to join the freeway earlier.

For Option 2, without the proposed interchange, trips generally spend a longer time on the Princes Highway and other arterial roads. That is, until they are able to join the freeway at the earliest point. The net result is a small increase in the total vehicle kilometres travelled and the total travel time on the highway network.

Table 2 shows a summary of the total travel distance and total travel time on the highway network in the modeled area.

It shows that without the new interchange in option 2, there is a small increase in the vehicle kilometres travelled (i.e. an increase in the order of 0.5% in the morning peak and 0.7% in the afternoon peak).

In both peaks, the total travel time increases by about 5.5%. This increase is as a result of the slightly longer travel distances involved as well as the impact of increased congestion on the highway network.

In both peak periods, the impact of not providing the interchange is primarily on roads McGregor Road, Racecourse Road, The Princes Highway and Princes Freeway.

Overall, in each of the peak periods, average travel speeds for option 2 are about 3km/hr slower than in Option 1. However, in a practical sense, this reduction in speed would result in additional travel time of only about 1 minute in a 15km journey from the east side of the modeled network to the west.

Table 2: Traffic Summary Statistics for AM and PM Peak Period Travel with and without the proposed interchange

	Total Vehicle Kms Travelled	Total Vehicle Hours Travelled	Average Vehicle Speed (Km/Hr)
AM PEAK:			
Option 1 (With Interchange)	455,270	8,580	53
Option 2 (No Interchange)	457,570	9,070	50
PM PEAK:			
Option 1 (With Interchange)	510,990	9,900	52
Option 2 (No Interchange)	514,590	10,450	49

4 Trip Diversion

Volumes on modeled road links on the highway network for option 1 (with the proposed interchange included) were compared with those of Option 2 (without the interchange). These comparisons were made for the morning peak period and the afternoon peak period.

The results were categorized into five classes:

- + No difference, where the difference in peak period traffic volume is less than 50 vehicles;
- + Small difference, where the difference in peak period traffic volume is in the range 50-150 vehicles (increase and decrease);
- + Fair difference, where the difference in peak period traffic volume is in the range 150-500 vehicles (increase and decrease);
- + Large difference, where the difference in peak period traffic volume is in the range 500-1,000 vehicles (increase and decrease);
- + Very Large difference, where the difference in peak period traffic volume is greater than 1,000 vehicles (increase and decrease).

4.1 Morning Peak Period

Figure 4 shows a plot of the differences in volumes on the highway network during the morning peak period. It shows graphically how traffic would divert when the proposed interchange is not provided.

At the extreme east of the modeled area in Option 2, trips that would have used the proposed new arterial road connection and the new interchange to access the freeway would now travel eastwards to access the Princes Freeway at the interchange near Nar Nar Goon Road. This would result in larger traffic volumes on the freeway and the highway east of the proposed interchange. With the new interchange in Option 1, around 200 vehicles in the morning peak and 100 vehicles in the afternoon peak would access the Princes Freeway at Nar Nar Goon Road. Without the new interchange, these volumes increase to 1,100 vehicles in the morning peak and 1,400 in the afternoon peak.

West of the proposed interchange volumes on the freeway would be lower in Option 2 (without the interchange). Differences in traffic volumes between the two cases would decrease past each of the interchanges travelling west. There would be minimal difference between the two cases west of the Cardinia Road interchange.

On the Princes Highway west of Dore Road, traffic volumes would be higher in option 2 (without the proposed interchange). Traffic that would have travelled southwards to join the Princes Freeway, will do so at a point further west accessing the freeway via Racecourse Road, McGregor Road and Cardinia Road. West of Dore Road, westbound traffic in the morning peak period reach around 1,800 vehicles in Option 2 without the interchange, whereas in Option 1, the road would carry around 1,200 vehicles in the morning peak. Volumes in the afternoon peak in the eastbound direction are similar to the westbound morning peak volumes.

West of Cardinia Road, the differences in the traffic volumes on the Princes Freeway between the two cases would be small. In both cases, the Princes Freeway will carry approximately 20,000 vehicles in the morning peak period (both directions) and 21,000 vehicles in the afternoon peak period.

4.2 Afternoon Peak Period

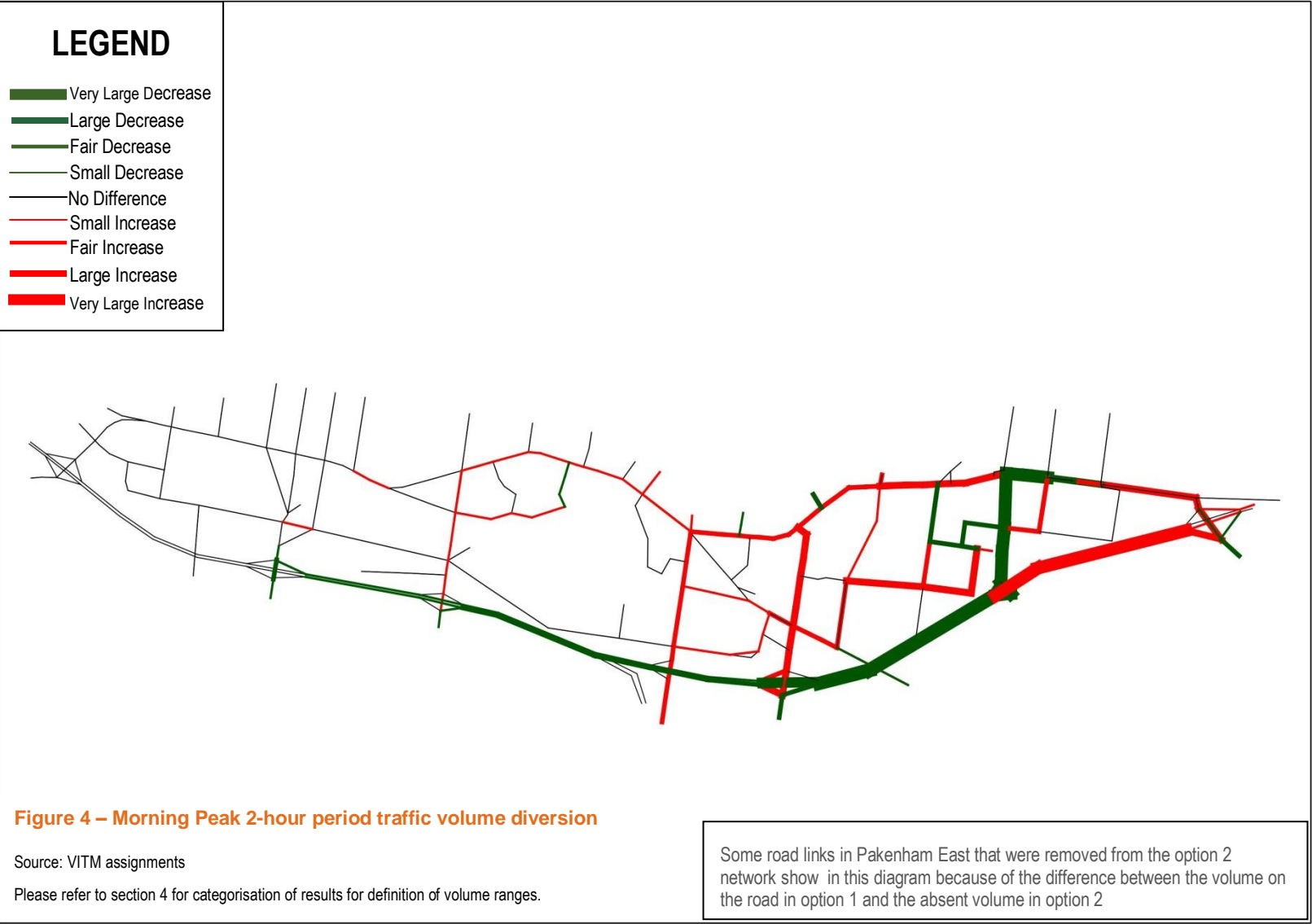
Figure 5 shows a plot of the differences in volumes on the highway network during the afternoon peak period. The map shows graphically how traffic would divert if the proposed interchange were not provided. The situation is a mirror image of the morning peak.

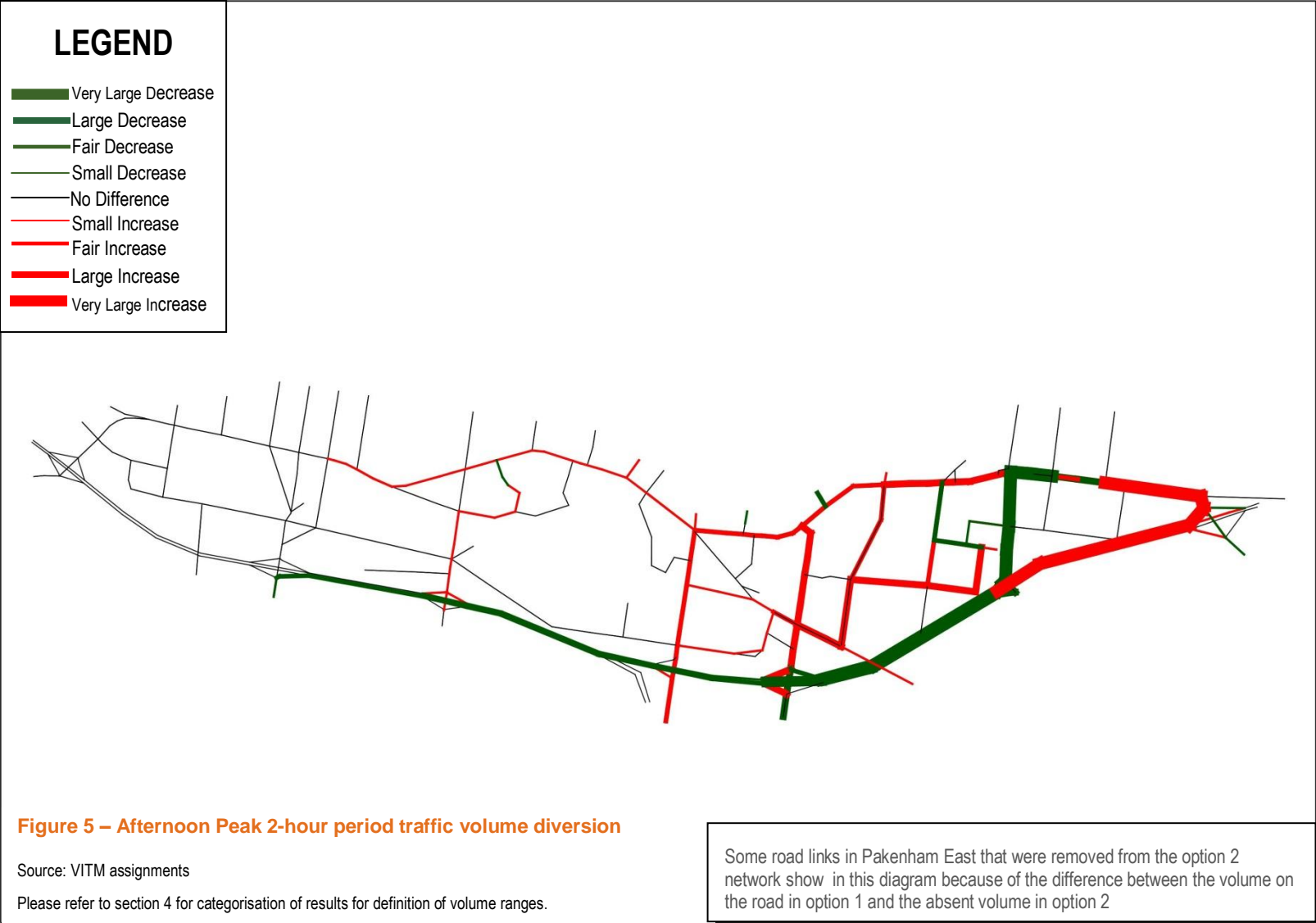
At the extreme east of the modeled area, trips in Option 2, that would have used the proposed new arterial road connection and the new interchange would travel further eastwards and exit the freeway at the interchange near Nar Nar

Goon Road. This would result in larger traffic volumes on the Princes Freeway and the Princes Highway the east of the proposed interchange.

West of the proposed interchange, volumes on the Princes Freeway would be lower than would be the case if the interchange was provided. West of the Cardinia Road interchange, there would be only small differences between the two cases. However, differences in the traffic volumes would increase eastwards past each of the interchanges.

On the Princes Highway, west of Dore Road, traffic volumes would be higher for Option 2, with traffic that would have travelled northwards from the freeway exiting at a point further west. They would exit the Princes Freeway via Racecourse Road, McGregor Road and Cardinia Road.





5 Traffic Volumes and Levels of Service

5.1 Volume/capacity Ratio

To study the effect of capacity on the impact of the interchange, we used the calculated volume/capacity ratio (v/c) from the model to separate road links into categories representing the six levels of service. These correspond closely to the Highway Capacity Manual's level of service definitions for uninterrupted flow. The categories were defined as follows:

- + Level of Service A: v/c less than 0.6;
- + Level of Service B: v/c higher than 0.6, less than 0.7;
- + Level of Service C: v/c higher than 0.7, less than 0.8;
- + Level of Service D: v/c higher than 0.8, less than 0.9;
- + Level of Service E: v/c higher than 0.9, less than 1;
- + Level of Service F: v/c higher than 1.

LOS A describes the highest quality of traffic service, when motorists are able to travel at their desired speed. Passing demand is well below passing capacity, and platoons of three or more vehicles are rare.

LOS B characterizes a traffic flow where the demand for passing to maintain a desired speed first becomes noticeable. Drivers are delayed in platoons and speeds may fall, but motorists will not be unduly delayed in terms of their overall travel time.

LOS C describes further increases in flow, resulting in noticeable increases in platoon formation, platoon size, and frequency of passing impediments. High average vehicle speed can be maintained on level-terrain. At higher volumes there are chaining of platoons and significant reductions in passing capacity occur. Traffic flow is stable, but is susceptible to congestion due to turning traffic and slow-moving vehicles.

LOS D describes unstable traffic flow. The two opposing traffic streams begin to operate separately at higher volume levels, as passing becomes extremely difficult. Passing demand is high, with passing capacity reaching zero. Mean platoon sizes of 5 to 10 vehicles are common. Turning vehicles and roadside distractions cause major shock waves in the traffic stream.

At LOS E, traffic flow conditions are dense and very slow. Under these base conditions, passing is virtually impossible and platooning becomes intense, as slower vehicles or other interruptions are encountered. Operating conditions at capacity are unstable and difficult to predict.

LOS F represents heavily congested flow with traffic demand exceeding capacity. Volumes are lower than capacity and speeds are highly variable.

Table 3 shows the percentage of the length of highway network that operates well during the peak periods (better than LOS D) and poorly (worse than LOS D). It shows that for Option 2, without the proposed interchange, there is a small decrease in level of service on the Princes Highway. The percentage of the highway operating well decreases and the percentage of the highway operating poorly increases slightly.

Part of this can be attributed to the fact that the arterial road connected to the proposed interchange operates at a high level of service. This arterial is not included in the Option 2 road network and as a result, the length of highway and the length of highway operating well decrease. Both of these factors tend to lower the overall level of service.

Table 3: Percentage of highway network length operating at good and bad Levels of Service

	% of Road Network Better than LOS D	% of Road Network Operating at LOS D	% of Road Network Worse than LOS D
AM PEAK:			
Option 1 (With Interchange)	94.5%	2.9%	2.6%
Option 2 (No Interchange)	94.1%	2.1%	3.8%
PM PEAK:			
Option 1 (With Interchange)	92.0%	5.0%	3.0%
Option 2 (No Interchange)	90.6%	5.0%	4.4%

5.2 Morning Peak Period

Figure 6 and **Figure 7** show the levels of service on the highway network for the morning peak period for Option 1 and Option 2, i.e. the inclusion of the proposed interchange and the exclusion of the proposed interchange respectively. When comparing the two plots, it can be seen that for the case without the proposed interchange:

- + The Princes Freeway would operate satisfactorily along most of its length within the study area and at a better level of service;
- + Short sections of McGregor Road and Racecourse Road would operate at a lower level of service;
- + Level of service on the short lengths of the arterial roads closest to the east-most interchange on the Princes Freeway with the Princes Highway would drop significantly;
- + East of McGregor Road, significant sections of the Princes Highway would operate at a lower level of service.

It should be noted though, that where the levels of service for an individual link has changed, it is most likely that the change has been caused by a small difference close to the boundary between the two LOS classifications. For example, a change in v/c from 0.79 to 0.81 would show a change in level of service. However, operating conditions would not be very noticeably different.

The primary impact of not providing the interchange will be on the demand for trips to areas north and west of Pakenham. These trips will then use McGregor Road to access the freeway or The Princes Freeway to access the freeway at the Nar Nar Goon interchange.

Figure 8 shows a comparison of the volumes at selected locations on the road network with the interchange and without the interchange (volume with/volume without). These diagrams show that without the interchange, McGregor Road will carry approximately 900 additional vehicles in both directions in the morning peak period. The additional volumes are split equally in each direction. At its junction with Princes Highway, McGregor Road volumes will be around 1330 vehicles northbound and 1750 southbound. These will increase without the interchange to 1850 and 2250 vehicles respectively. Northbound volumes remain static further south along McGregor Road, but southbound volumes increase to 2,750 without the new interchange and 3,200 vehicles without it and Henty Road and at the interchange with the Princes Freeway, the road will carry around 3,200 vehicles with the new interchange in the network and 3,900 without it. The increase in volumes along McGregor Road reflects the increasing catchment of traffic destined for areas north of Pakenham. The increase in traffic with no new interchange is the result of additional demand accessing the freeway, diverted from accessing the interchange at Ryan Road.

On the Princes Highway east of Ryan Road, the impact is more complex. Here, trips that had travelled westwards along the Princes Highway to access the Freeway via the proposed new arterial, would travel eastwards along the Princes Highway to access the freeway at the Nar Nar Goon interchange. This would result in around 1,000 fewer vehicles travelling westwards and 1000 more vehicles travelling eastwards along the Princes Highway. At Ryan Road, Dore Road and Mt Ararat Road, more vehicles would turn eastwards without the interchange and fewer would turn to the west. **Figures 9 and 10** show these travel patterns with bandwidth plots of volumes for option1 and option 2.



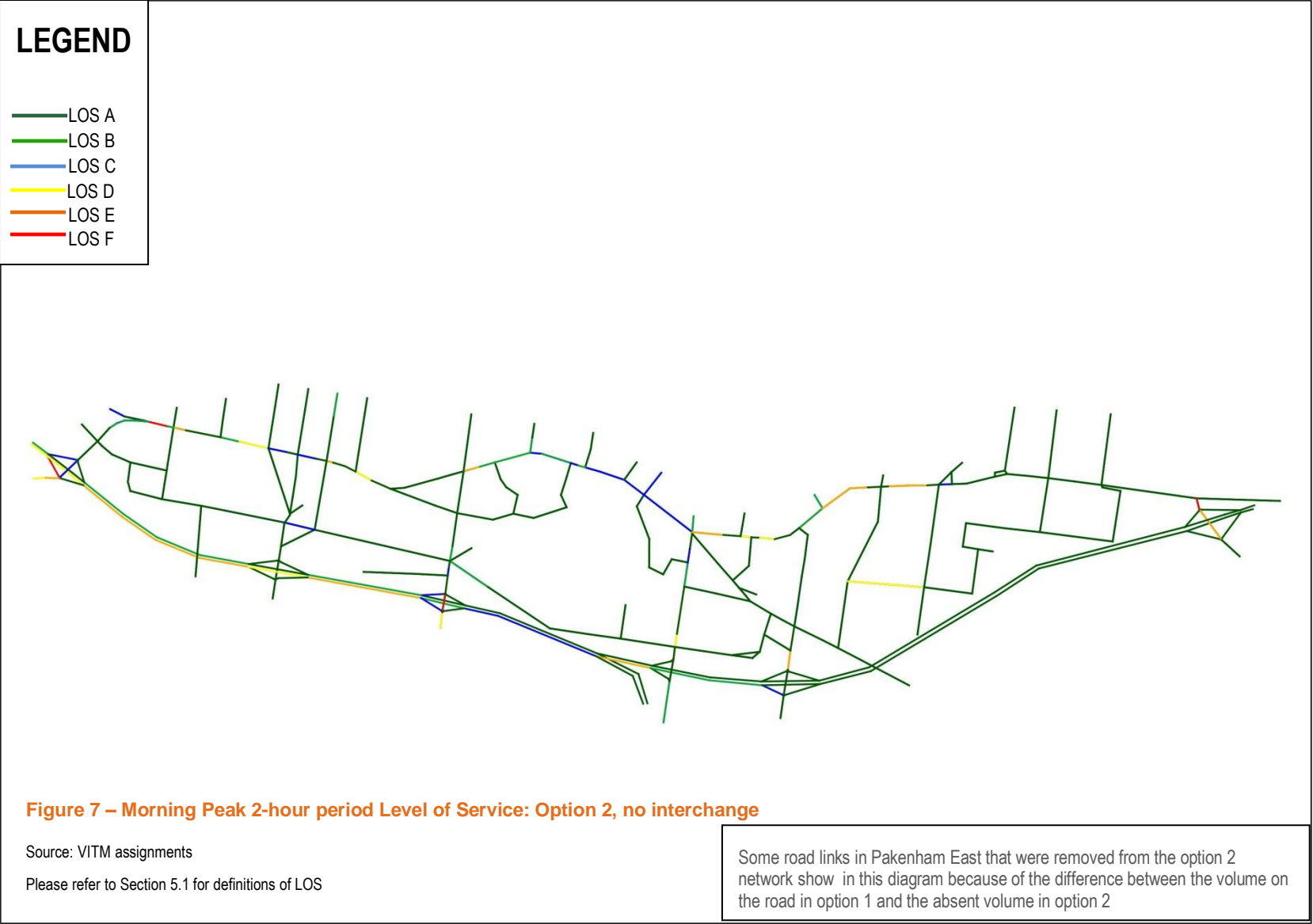




Figure 8 – Morning Peak 2-hour period Comparative Volumes (Option 1/Option 2)

Source: VITM assignments

Some road links in Pakenham East that were removed from the option 2 network show in this diagram because of the difference between the volume on the road in option 1 and the absent volume in option 2

Some road links in Pakenham East that were removed from the option 2 network show in this diagram because of the difference between the volume on the

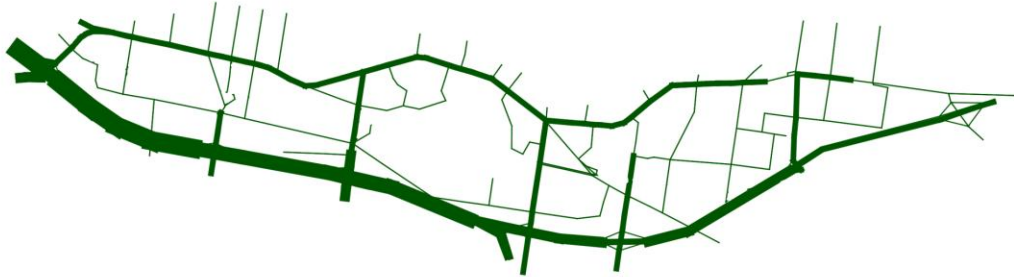


Figure 9 – Morning Peak 2-hour period volume bandwidths for Option 1, with new interchange

Source: VITM assignments

Some road links in Pakenham East that were removed from the option 2 network show in this diagram because of the difference between the volume on the

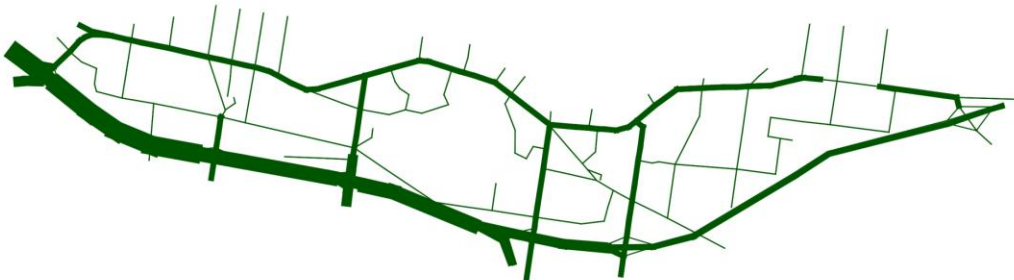


Figure 10 – Morning Peak 2-hour period volume bandwidths for Option 2 with no new interchange

5.3 Afternoon Peak Period

Morning peak period Levels of service are mirrored in the evening peak period. **Figure 11 and Figure 12** show the levels of service on the highway network for the morning peak period for the two options, inclusion of the proposed interchange and exclusion of the proposed interchange respectively. When comparing the two options, it can be seen that without the interchange, Option2:

- + The Princes Freeway would operate along most of the length of the study area at the same or at a better level of service;
- + Sections of McGregor Road and Racecourse Road would operate at a lower level of service;
- + East of McGregor Road, significant lengths of the Princes Highway would operate at a lower level of service;
- + Short sections of the Princes Highway west of McGregor Road would operate at a lower level of service.

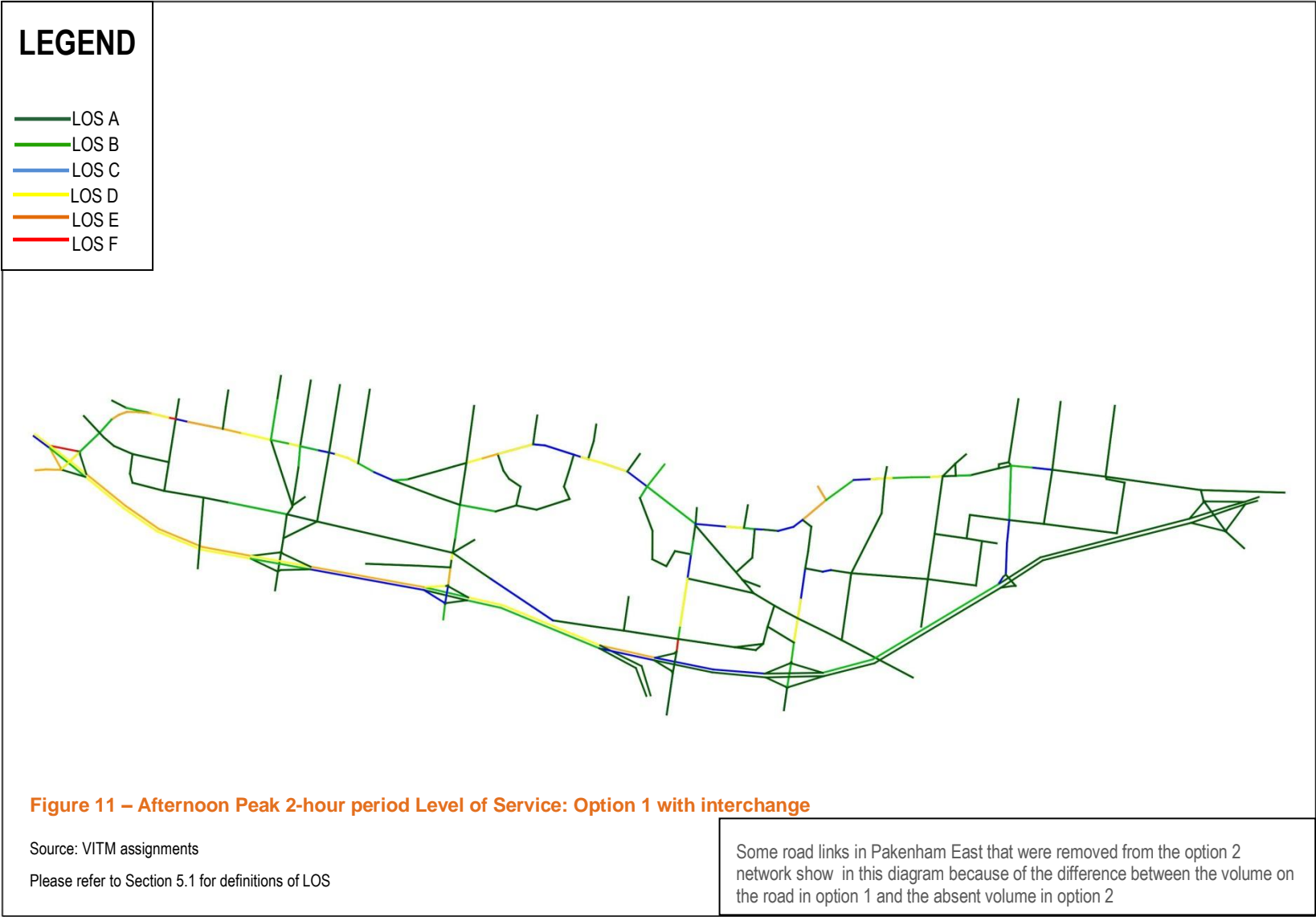
Figure 13 shows a comparison of the volumes at selected locations on the road network with the interchange and without the interchange (volume with/volume without). It shows that without the interchange, McGregor Road will carry between 600 and 800 additional vehicles in the afternoon peak period in both directions. As in the morning peak period, volumes in both cases increase towards the south.

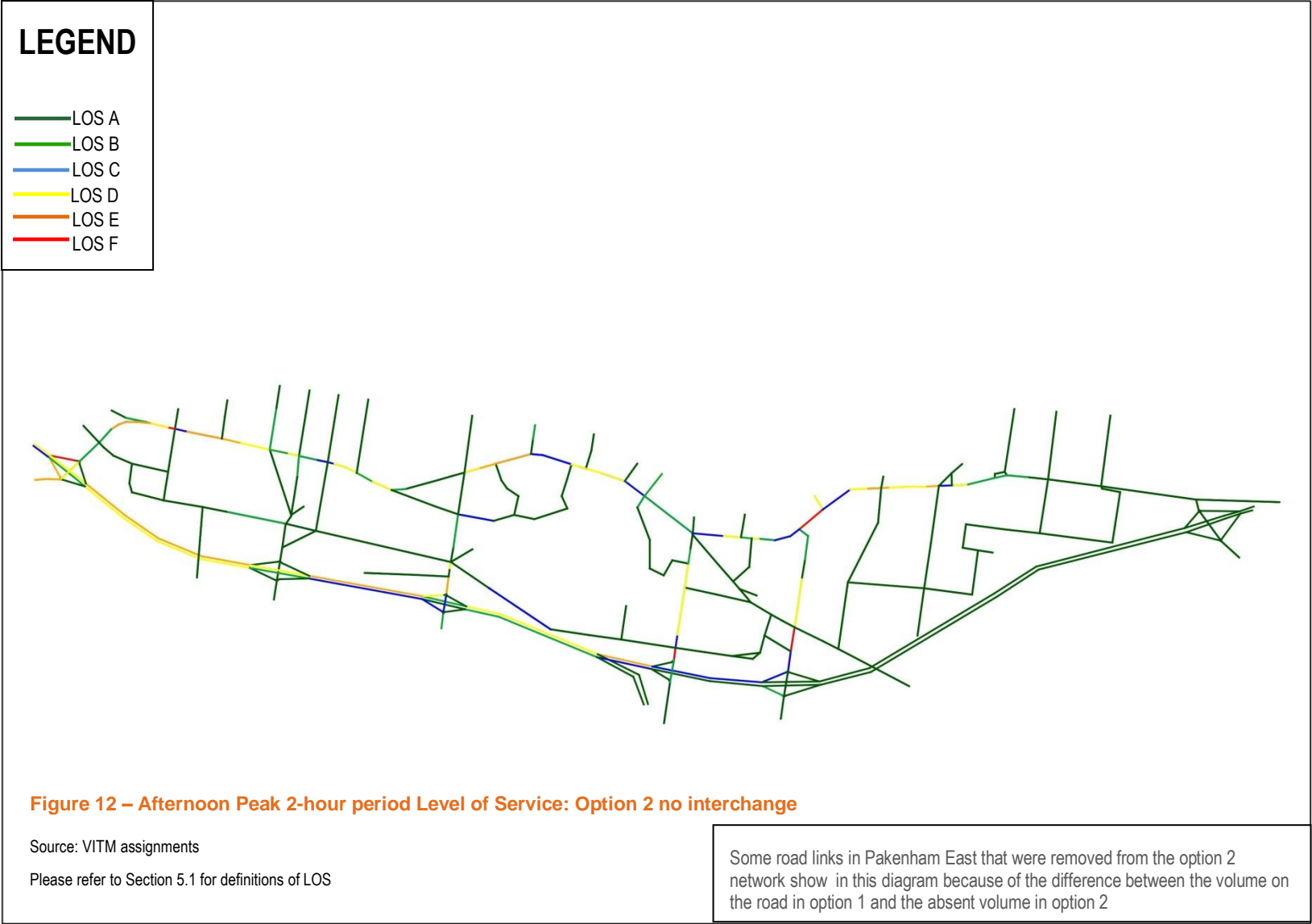
In the afternoon peak, travel demand patterns reflect roughly a mirror image of the morning peak patterns, with some small additional changes. Trips from areas north and west of Pakenham would now use the McGregor Road interchange to access the road network serving East Pakenham or would travel to Nar Nar Goon interchange and then westwards along the Princes Highway. **Figures 14 and 15** show these travel patterns with bandwidth plots of volumes on the road network with and without the new interchange.

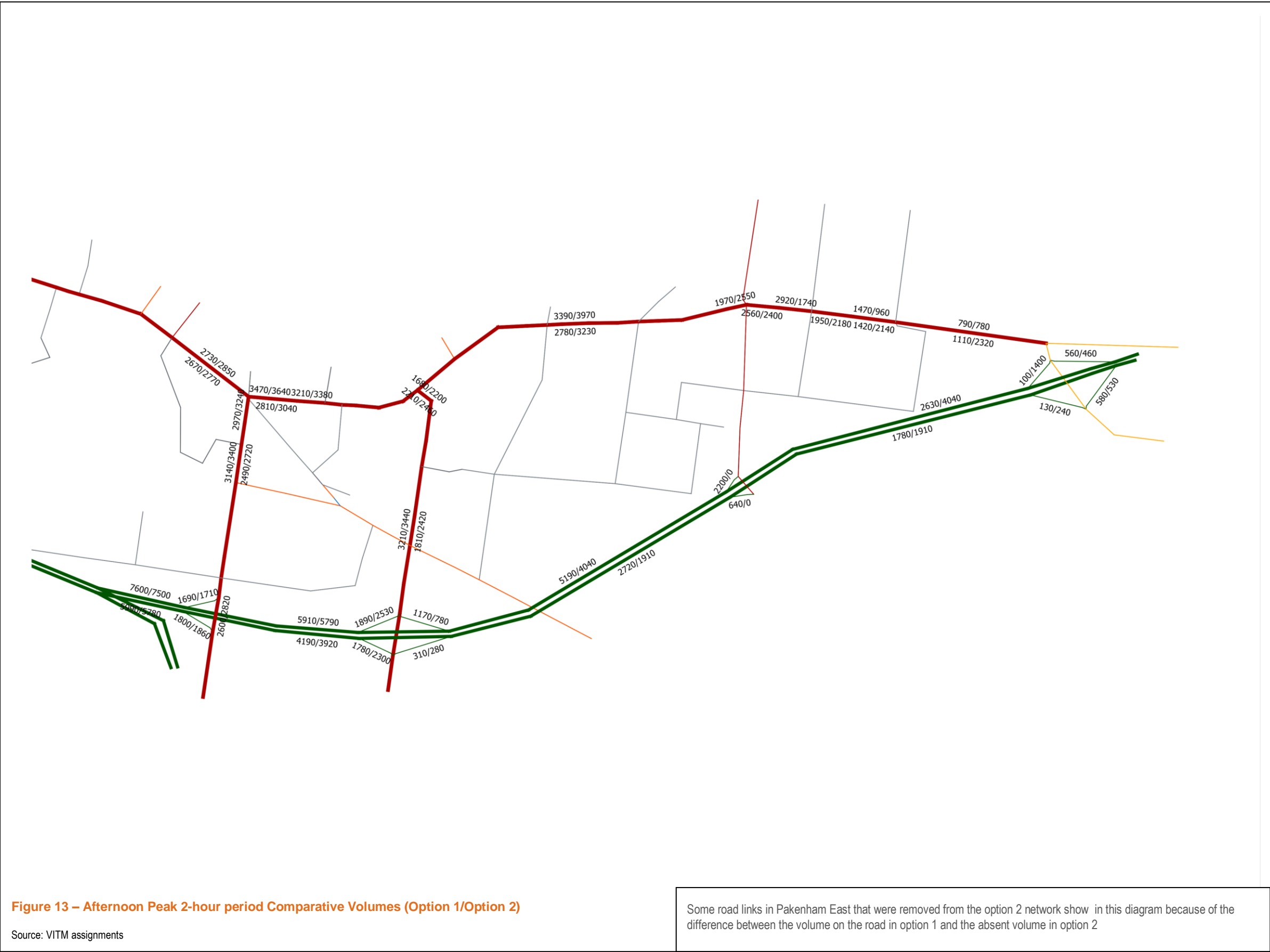
At the McGregor Road interchange, the number of vehicles accessing the freeway westbound or leaving the freeway east bound will each increase by around 600 vehicles. This volume change will be carried along the length of McGregor Road.

On the Princes Highway, east of Ryan Road, the eastbound volumes would increase substantially as a result of the additional trips leaving the eastbound freeway at the Nar Nar Goon interchange and accessing local road networks along the Princes Highway Westbound. There would be fewer turns from the west into Ryan Road, Dore Road and Mt Ararat Road and more turns into the roads from the east.

There may be a smaller impact on Cardinia Road but the modelled differences in volume are small enough to be within the margins of error of forecasting over 30 years with the strategic model and no definitive conclusions can be made from the results.







Some road links in Pakenham East that were removed from the option 2 network show in this diagram because of the difference between the volume on the

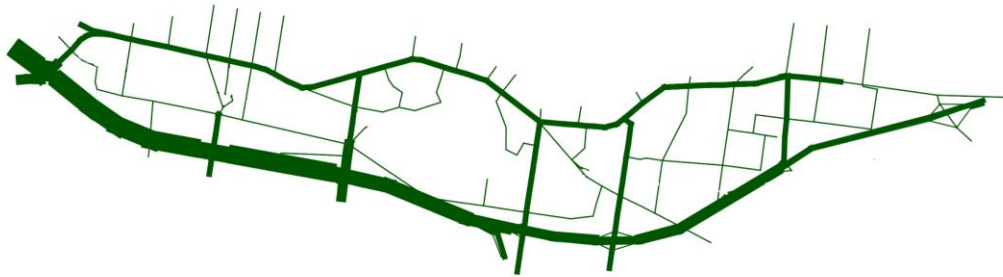


Figure 14 – Afternoon Peak 2-hour period volume bandwidths for Option 1 with new interchange

Source: VITM assignments

Some road links in Pakenham East that were removed from the option 2 network show in this diagram because of the difference between the

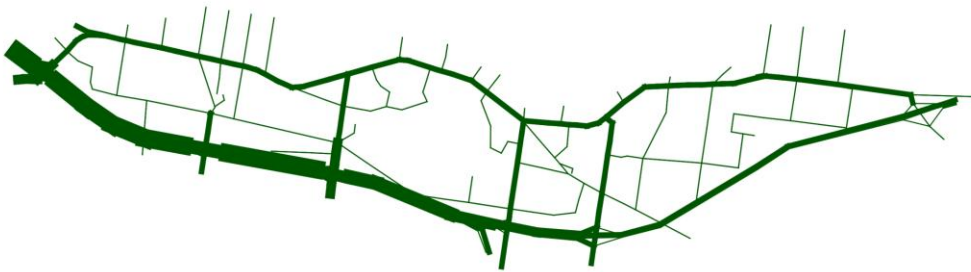


Figure 15 – Afternoon Peak 2-hour period volume bandwidths for option 2 with no new interchange

Source: VITM assignments

5.4 Daily Volumes on Roads

VITM produces volumes for the morning 2 hour peak period and an afternoon 3 hour peak period expressed as an average over 2 hours. It also produces daily volumes. The comparison of the daily volumes for Option 1 and option 2 are shown in **Figure 16**.

The forecast daily volumes show that McGregor Road and Racecourse Road will carry higher volumes in Option 2 than in Option 1. The cause of the increase is the additional trips accessing the Princes Freeway from The Princes Highway. Specifically:

- + McGregor Road will carry about 32,300 vehicles per day, while for option 2 (without the new interchange, it will carry about 36,100 vehicles per day.
- + Daily volumes on racecourse Road for Option 1 will reach around 27,000 vehicles but for Option 2 this would increase to 32,000 vehicles per day.

On both roads, volumes for Option 1 and Option 2 would be substantially lower than the 40,000 vehicles per day threshold capacity specified by MPA.

The forecasts show that east of the proposed new arterial road and interchange, around 10,000 trips per day in Option 1 would divert from the Princes Freeway to the Princes Highway in Option 2.

The daily volumes gradually equalize towards the west so that west of McGregor Road, there is little difference between the daily volumes for Option 1 and Option 2.

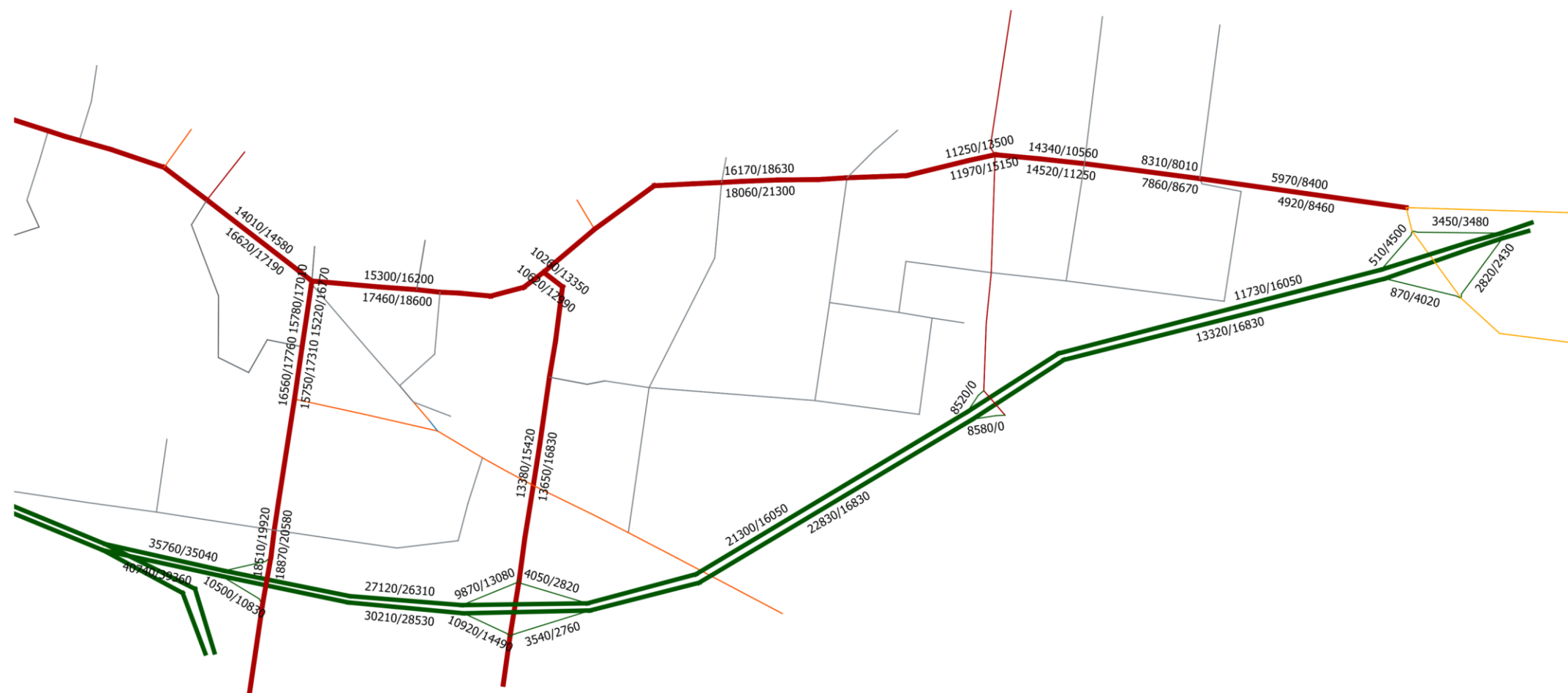


Figure 16 – Directional Daily Comparative Volumes (Option 1/Option 2)

Source: VITM assignments

Some road links in Pakenham East that were removed from the option 2 network show in this diagram because of the difference between the volume on the road in option 1 and the absent volume in option 2

6 Travel Speeds

To examine the effect of changes in levels of service in more detail, the travel speed on each road link in the highway network with and without the interchange were compared. Differences were categorised into five separate bands:

- + No difference: less than 3km/hr difference;
- + Small difference: between 3km/hr and 6km/hr difference (faster and slower);
- + Fair difference: between 6km/hr and 9km/hr difference (faster and slower);
- + Large difference: between 9km/hr and 12km/hr difference (faster and slower);
- + Very Large difference: more than 12km/hr difference (faster and slower).

6.1 Morning Peak Period

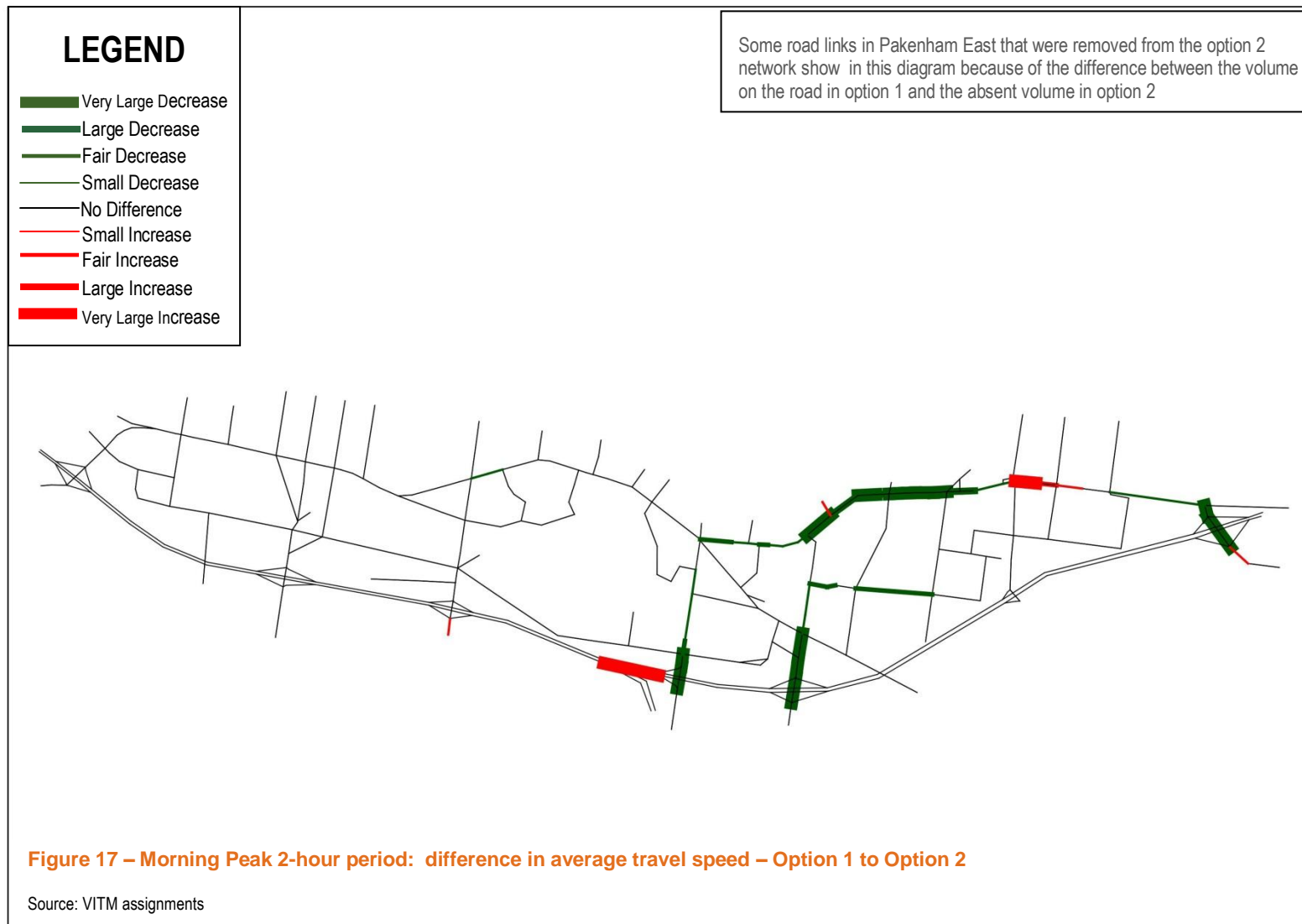
A plot of the difference in travel speeds on the links is shown in **Figure 17**. It shows that speeds on most links would not be significantly affected by the presence or absence of the proposed interchange. For option 2 without the interchange, the exceptions are:

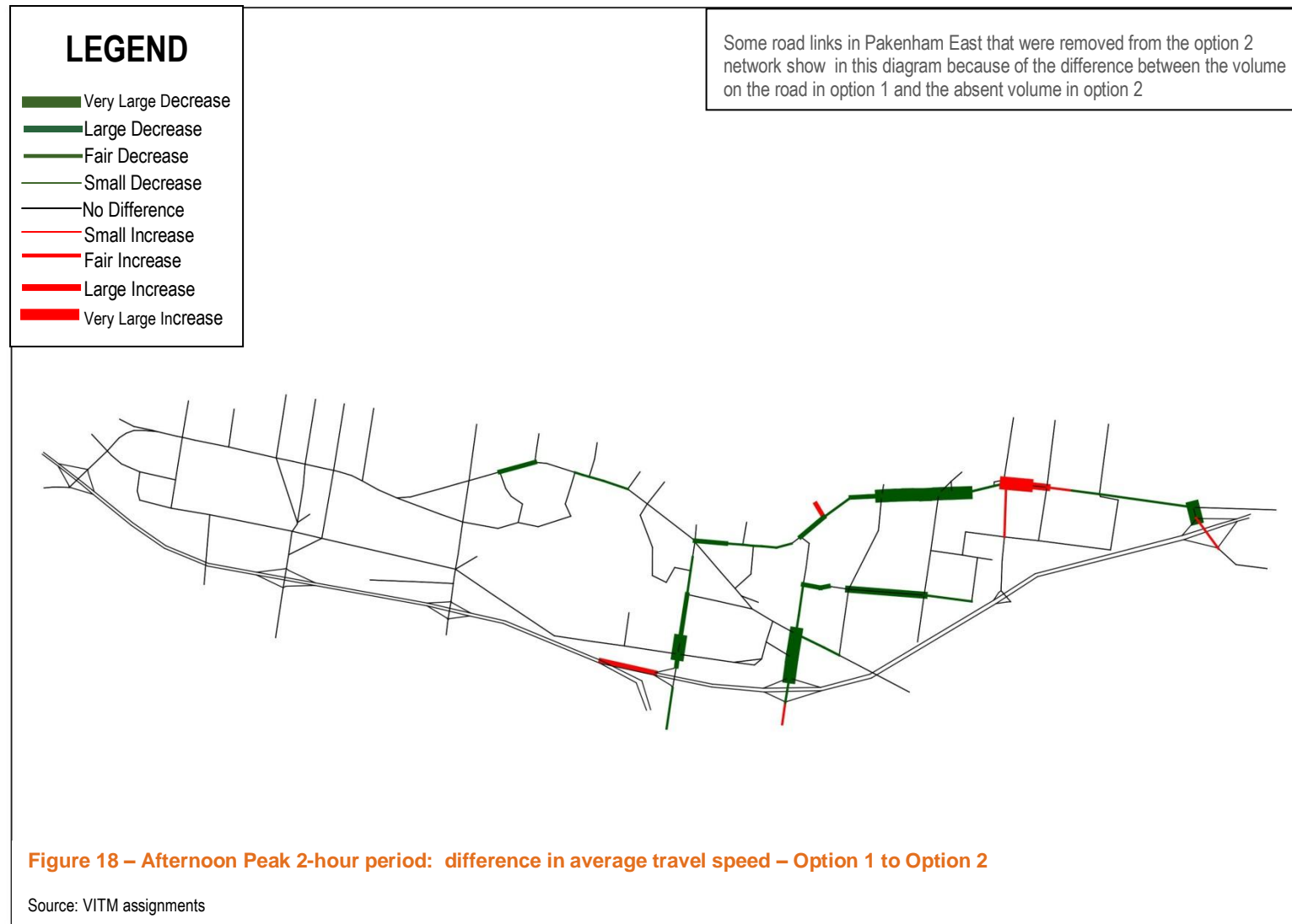
- + The Princes Highway east of Dore Road, where speeds would increase;
- + The Princes Freeway, westbound, between McGregor Road and the South Gippsland Highway, where speeds would increase;
- + Lower speeds on the Princes Highway between Dore Road and McGregor Road;
- + Lower speeds on Racecourse Road south of the railway line;
- + Lower speeds on McGregor Road south of the railway line; and
- + Lower speeds at interchange of the Princes Freeway with the Princes Highway near Nar Nar Goon Road.

6.2 Afternoon Peak Period

A plot of the difference in travel speeds on the links during the afternoon peak period is shown in **Figure 18**. Results are similar to the morning peak period in that speeds on most links are not affected by the presence or absence of the proposed interchange. For Option 2, without the interchange, the exceptions are:

- + The Princes Highway east of Dore Road, where speeds would increase;
- + The Princes Freeway, eastbound, between McGregor Road and the South Gippsland Highway;
- + Lower speeds on the Princes Highway between Dore Road and McGregor Road;
- + Lower speeds on Racecourse Road south of the railway line;
- + Lower speeds on McGregor Road south of the railway line; and
- + Lower speeds on the link north of the Princes Freeway with the Princes Highway near Nar Nar Goon Road.





7 Conclusion

The traffic modelling undertaken as part of the preparation of this report indicates that there is marginal difference between Option 1 and Option 2, being with and without a new freeway interchange at Pakenham East respectively. With the freeway interchange (Option 1), the travel speeds are approximately 3km/hr higher across the network than for Option 2, with a slightly reduced total travel distance. However in practical terms, these differences between Option 1 and Option 2 in travel time are approximately 1 minute. Traffic volumes are higher on the Freeway east of McGregor Road with the freeway interchange, while under Option 2 the absence of the freeway interchange results in vehicles accessing the freeway predominantly via Racecourse and McGregor Roads.

Duplication of Racecourse and McGregor Road will enable both existing arterials to cater for traffic demand generated by Pakenham East with minor impacts on travel time, levels of service and travel speeds for the Pakenham area. As both Racecourse Road and McGregor Road will operate within the capacity of a four lane arterial if the interchange is not provided, further investigations should be undertaken to determine whether the benefits of providing the interchange justify the cost.

Appendix A – Land Use Input Comparison: PEICA Inputs compared to VITM South East Corridor Inputs

Greater Pakenham Traffic Model										MPA South Eastern Corridor Model						
Legend: 1234 – No change; 1234 – lower than MPA; 1234 – higher than MPA																
Reference Area	General Description	ZONE	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments
Pakenham East	Land within UGB east of Deep Creek / Ryan Road	2178														
		3026														
		3027														
		3028														
		3029														
		3030														
		3031	18,850	6,500	467	870	900	1,200	0	18,850	6,500	467	870	900	1,200	0
		3034														
		3035														
		3036														
		3037														
		3038														
		3039														
		3040														
		TOTAL	18,850	6,500	467	870	900	1,200	0							
Pakenham South	All Industrial south of Princes Freeway, east of Toomuc Creek	2179	0	0	0	1,600	0	0	0	0	0	0	1600	0	0	0
		2180	0	0	0	2,000	0	0	0	0	0	0	2000	0	0	0
		2181	0	0	0	4,000	0	0	0	0	0	0	4000	0	0	0
		2256	0	0	0	1,000	0	0	0	0	0	0	1000	0	0	0
		2259	0	0	0	2,000	0	0	0	0	0	0	2000	0	0	0
		2451	0	0	0	1,600	0	0	0	0	0	0	1600	0	0	0
		2452	0	0	0	1,600	0	0	0	0	0	0	1600	0	0	0
		2453	0	0	0	1,600	0	0	0	0	0	0	1600	0	0	0
		2454	0	0	0	1,000	0	0	0	0	0	0	1000	0	0	0
		2455	0	0	0	1,000	0	0	0	0	0	0	1000	0	0	0
		2456	0	0	0	1,000	0	0	0	0	0	0	1000	0	0	0
		TOTAL	0	0	0	18,400	0	0	0	0	0	0	18,400	0	0	0
Centre East	Land bound by Racecourse Road, railway line, Ryan Road and Princes Highway	888	248	80	0	11	0	0	0	983	322	0	11	0	0	0
		2100	1,827	739	5	149	0	0	0	1827	739	5	149	150	0	0
		2176	915	345	3	106	0	0	0	915	345	3	106	0	0	0
		2415	1,568	514	0	4	0	0	0	1568	514	0	4	0	0	0
		2416	41	14	0	15	0	0	0	41	14	0	15	0	0	0

Greater Pakenham Traffic Model										MPA South Eastern Corridor Model						
Legend: 1234 – No change; 1234 – lower than MPA; 1234 – higher than MPA																
Reference Area	General Description	ZONE	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments
Centre North	Land north of Princes Highway between Toomuc Creek and Deep Creek	2498	70	25	2	78	0	0	0	546	207	2	78	0	0	0
		2499	222	85	0	2	0	0	0	222	85	0	2	0	0	0
		2500	155	50	0	8	0	0	0	403	132	0	8	0	0	0
		TOTAL	5,046	1,851	11	374	0	0	0	6505	2357	11	374	150	0	0
		883	1,192	495	7	162	0	0	0	1192	495	7	162	398	1100	0
		2101	1,341	477	3	80	0	0	0	1341	477	3	80	0	0	0
		2164	638	254	3	81	0	0	0	638	254	3	81	0	0	0
		2165	608	243	6	111	401	0	0	608	243	6	111	401	0	0
		2166	663	252	3	79	0	0	0	663	252	3	79	0	0	0
		2411	756	287	1	2	0	0	0	756	287	1	2	0	0	0
		2412	1,012	362	3	83	511	0	0	1012	362	3	83	511	0	0
		2413	138	55	3	117	398	1,100	0	302	127	3	117	398	1100	0
		2501	1,059	425	7	143	0	0	0	1059	425	7	143	0	383	0
		2502	264	105	2	33	0	0	0	264	105	2	33	0	0	0
		2503	152	46	1	25	0	0	0	152	46	1	25	0	0	0
		2504	16	0	0	7	0	0	0	16	0	0	7	0	0	0
		2505	398	156	3	58	0	0	0	398	156	3	58	0	0	0
		2506	834	303	2	64	0	0	0	834	303	2	64	0	0	0
		2507	700	251	2	55	0	0	0	700	251	2	55	0	0	0
		2510	398	151	1	25	0	0	0	398	151	1	25	0	0	0
		2512	68	26	0	0	0	0	0	68	26	0	0	0	0	0
		2513	382	145	1	42	450	0	0	382	145	1	2	0	0	0
		TOTAL	10,617	4,034	49	1,167	1,761	1,100	0	10,781	4106	49	1127	1710	2583	0
Centre South	Land north of the Princes Freeway between Toomuc Creek and the intersection of the Princes Freeway and the	889	1,211	385	0	9	0	0	0	1211	385	0	9	0	0	0
		890	0	0	29	500	0	0	0	1	0	29	290	0	0	0
		894	0	0	1	23	0	0	0	4	1	1	23	0	0	0
		2182	2,034	671	0	14	0	0	0	2034	671	0	14	0	0	0

Greater Pakenham Traffic Model										MPA South Eastern Corridor Model							
Legend: 1234 – No change; 1234 – lower than MPA; 1234 – higher than MPA																	
Reference Area	General Description	ZONE	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	
		2184	1,226	458	14	126	0	0	0	1226	458	14	126	0	0	0	
		2254	949	364	0	8	0	0	0	949	364	0	8	0	0	0	
		2255	0	0	3	47	0	0	0	0	0	3	47	0	0	0	
		2258	8	3	8	73	0	0	0	8	3	8	73	0	0	0	
		2418	1,424	478	0	12	0	0	0	1424	478	0	12	0	0	0	
		2419	0	0	0	0	399	0	0	0	0	0	0	0	399	0	0
		2420	1,265	486	10	88	0	0	0	1265	486	10	88	0	0	0	
		2421	211	86	3	26	0	0	0	211	86	3	26	0	0	0	
		2491	1,007	331	0	8	0	0	0	1007	331	0	8	0	0	0	
		2492	787	322	10	85	0	0	0	787	322	10	85	0	0	0	
		2493	601	231	0	6	0	0	0	601	231	0	6	0	0	0	
		TOTAL	10,724	3,817	79	1,025	399	0	0	10,724	3,817	79	815	399	0	0	
Centre West	Land bound by McGregor Road, Princes Highway, Toomuc Creek and the rail line	2099	0	0	13	316	0	1,100	0	0	0	13	316	0	1100	0	
		2174	700	280	6	193	0	0	0	700	280	6	193	0	0	0	
		2175	384	154	5	118	0	0	0	384	154	5	118	0	0	0	
		2489	462	186	5	124	0	0	0	462	186	5	124	0	0	0	
		2490	768	308	5	146	649	0	0	768	308	5	146	649	0	0	
		TOTAL	2,314	928	33	897	649	1,100	0	2,314	928	33	897	649	1100	0	
Far East	East of Mt Ararat Road																
		2097	5	2	0	54	0	0	0	5	2	0	54	0	0	0	
		2409	8	3	0	31	0	0	0	8	3	0	31	0	0	0	
		TOTAL	13	5	0	85	0	0	0	13	5	0	85	0	0	0	
North East	North of Pakenham East Precinct																
		877	68	27	0	31	0	0	0	68	27	0	31	0	0	0	
		2146	123	48	0	17	0	0	0	123	48	0	17	0	0	0	
		TOTAL	192	75	0	49	0	0	0	192	75	0	48	0	0	0	
South East	East of Pakenham South	892	72	28	0	63	0	0	0	72	28	0	63	0	0	0	

Greater Pakenham Traffic Model										MPA South Eastern Corridor Model						
Legend: 1234 – No change; 1234 – lower than MPA; 1234 – higher than MPA																
Reference Area	General Description	ZONE	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments
Town Centre	Land bound by Princes Highway, Racecourse Road, Bald Hills Road/rail line and McGregor Road	2122	63	25	0	166	450	220	0	63	25	0	166	450	220	0
		2190	3	1	11	158	0	0	0	3	1	11	158	0	0	0
		2408	8	3	1	21	0	0	0	8	3	1	21	0	0	0
		TOTAL	145	57	11	409	450	220	0	145	57	11	409	450	220	0
		887	2,945	950	350	525	0	0	0	27	14	2	60	0	0	0
		2098	597	333	472	697	0	0	0	597	333	225	495	0	0	0
		2177	728	414	107	100	0	0	0	728	414	107	627	0	0	0
		2257	0	0	13	300	0	0	0	26	11	13	132	0	0	0
		2494	459	240	2	58	0	0	0	459	240	2	58	0	0	0
		2495	70	29	560	922	0	0	0	70	29	113	248	0	0	0
West	Land in Cardinia Road Precinct	2496	133	76	663	1,000	0	0	0	133	76	77	440	0	0	0
		2497	591	314	0	478	0	0	0	591	314	83	478	0	0	0
		TOTAL	5,522	2,356	2,167	4,080	0	0	0	2,631	1,431	621	2,538	0	0	0
		878	0	0	18	334	0	0	0	0	0	18	334	0	0	0
		885	1,530	609	0	44	0	0	0	1530	609	0	44	0	0	0
		2148	2,076	726	0	17	0	0	0	2076	726	0	17	0	0	0
		2170	152	58	210	315	0	0	0	89	34	113	242	0	0	0
		2171	2,055	841	42	211	0	0	0	1835	751	42	211	0	0	0
		2260	0	0	0	9,929	0	0	0	0	0	0	9463	0	0	0
		2261	0	0	280	780	405	452	0	0	0	121	231	405	452	0
		2262	0	0	17	80	0	0	0	0	0	17	80	0	0	0
		2264	48	19	8	141	0	0	0	48	19	8	141	0	0	0
		2422	4,512	1,628	0	44	0	0	0	1206	435	0	44	0	0	0
		2423	2,114	811	49	70	0	0	0	2114	811	0	21	385	0	0
		2424	2,470	950	0	36	450	1,200	0	2284	877	0	36	0	0	0
		2437	901	321	0	2	0	0	0	901	321	0	2	0	0	0
		2439	829	318	0	2	0	0	0	829	318	0	2	0	0	0

Greater Pakenham Traffic Model										MPA South Eastern Corridor Model						
Legend: 1234 – No change; 1234 – lower than MPA; 1234 – higher than MPA																
Reference Area	General Description	ZONE	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments
		2458	0	0	0	922	0	0	0	0	0	0	922	0	0	0
		2484	43	15	1	8	0	0	0	43	15	1	8	0	0	0
		2485	1,102	435	0	42	450	0	0	1102	435	0	42	0	0	0
		2486	4	2	4	82	0	0	0	4	2	4	82	0	0	0
		2487	367	141	6	106	0	0	0	367	141	6	106	0	0	0
		TOTAL	18,202	6,874	634	13,164	1,305	1,652	0	14,428	5,494	329	12,027	790	451	0

Appendix B – REVISED 2046 DEMOGRAPHY

Reference Area	General Description	ZONE	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	Comment
Pakenham East	Land within UGB east of Deep Creek / Ryan Road	2178								Incorporates current estimated development outcome for Pakenham East PSP.
		3026								NOTE: Preference to consolidate into single zone for GPTM Version 1.
		3027								
		3028								
		3029								
		3030								
		3031	18,850	6,500	467	870	900	1,200	0	
		3034								
		3035								
		3036								
		3037								
		3038								
		3039								
		3040								
		TOTAL	18,850	6,500	467	870	900	1,200	0	
Pakenham South	All Industrial south of Princes Freeway, east of Toomuc Creek	2179	0	0	0	1,600	0	0	0	
		2180	0	0	0	2,000	0	0	0	
		2181	0	0	0	4,000	0	0	0	
		2256	0	0	0	1,000	0	0	0	
		2259	0	0	0	2,000	0	0	0	
		2451	0	0	0	1,600	0	0	0	
		2452	0	0	0	1,600	0	0	0	
		2453	0	0	0	1,600	0	0	0	
		2454	0	0	0	1,000	0	0	0	
		2455	0	0	0	1,000	0	0	0	
		2456	0	0	0	1,000	0	0	0	
		TOTAL	0	0	0	18,400	0	0	0	

Reference Area	General Description	ZONE	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	Comment
Centre East	Land bound by Racecourse Road, railway line, Ryan Road and Princes Highway	888	248	80	0	11	0	0	0	Maintains number of lots as presently exists (rounded to nearest 5) and allows for slight decrease in persons per household to 3.1 from 3.31
		2100	1,827	739	5	149	0	0	0	Delete Primary School enrolments at 2046. No site exists
		2176	915	345	3	106	0	0	0	
		2415	1,568	514	0	4	0	0	0	
		2416	41	14	0	15	0	0	0	
		2498	70	25	2	78	0	0	0	Maintains number of lots as presently exists (rounded to nearest 5) and allows for slight decrease in persons per household to 2.8 from 2.83
		2499	222	85	0	2	0	0	0	
		2500	155	50	0	8	0	0	0	Maintains number of lots as presently exists (rounded to nearest 5) and allows for slight decrease in persons per household to 3.1 from 3.32
		TOTAL	5,046	1,851	11	374	0	0	0	
Centre North	Land north of Princes Highway between Toomuc Creek and Deep Creek	883	1,192	495	7	162	0	0	0	Delete Primary School and Secondary School enrolments at 2046. No sites exist. No changes to job numbers for zone. Did not appear to have been taken into account.
		2101	1,341	477	3	80	0	0	0	
		2164	638	254	3	81	0	0	0	
		2165	608	243	6	111	401	0	0	
		2166	663	252	3	79	0	0	0	
		2411	756	287	1	2	0	0	0	
		2412	1,012	362	3	83	511	0	0	
		2413	138	55	3	117	398	1,100	0	Maintains number of lots as presently exists (rounded to nearest 5) and allows for slight decrease in persons per household to 2.5 from 2.58
		2501	1,059	425	7	143	0	0	0	Deleted Secondary School enrolments at 2046. No sites exist. No job allowance appeared to be made, thus no changes to job yield in zone
		2502	264	105	2	33	0	0	0	
		2503	152	46	1	25	0	0	0	
		2504	16	0	0	7	0	0	0	
		2505	398	156	3	58	0	0	0	
		2506	834	303	2	64	0	0	0	
		2507	700	251	2	55	0	0	0	
		2510	398	151	1	25	0	0	0	
		2512	68	26	0	0	0	0	0	
		2513	382	145	1	42	450	0	0	Primary School added with ultimate enrolments at 2046. Site acquired by education department. 40 jobs added to total jobs in cell

Reference Area	General Description	ZONE	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	Comment
Centre South	Land north of the Princes Freeway between Toomuc Creek and the intersection of the Princes Freeway and the rail line	TOTAL	10,617	4,034	49	1,167	1,761	1,100	0	
		889	1,211	385	0	9	0	0	0	
		890	0	0	29	500	0	0	0	Assumed current level of job provision is at least maintained in the future (anticipating redevelopment into more jobs-intensive uses), rather than significant decline. Household and Population Numbers reduced to nil at 2046. Industrial land.
		894	0	0	1	23	0	0	0	Household and Population Numbers reduced to nil at 2046. Industrial land.
		2182	2,034	671	0	14	0	0	0	No assumption changes made.
		2184	1,226	458	14	126	0	0	0	
		2254	949	364	0	8	0	0	0	
		2255	0	0	3	47	0	0	0	
		2258	8	3	8	73	0	0	0	
		2418	1,424	478	0	12	0	0	0	
		2419	0	0	0	0	399	0	0	
		2420	1,265	486	10	88	0	0	0	
		2421	211	86	3	26	0	0	0	
		2491	1,007	331	0	8	0	0	0	
		2492	787	322	10	85	0	0	0	
		2493	601	231	0	6	0	0	0	
		TOTAL	10,724	3,817	79	1,025	399	0	0	
Centre West	Land bound by McGregor Road, Princes Highway, Toomuc Creek and the rail line	2099	0	0	13	316	0	1,100	0	
		2174	700	280	6	193	0	0	0	
		2175	384	154	5	118	0	0	0	
		2489	462	186	5	124	0	0	0	
		2490	768	308	5	146	649	0	0	
		TOTAL	2,314	928	33	897	649	1,100	0	
Far East	East of Mt Ararat Road	2097	5	2	0	54	0	0	0	
		2409	8	3	0	31	0	0	0	

Reference Area	General Description	ZONE	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	Comment
North East	North of Pakenham East Precinct	TOTAL	13	5	0	85	0	0	0	
		877	68	27	0	31	0	0	0	
		2146	123	48	0	17	0	0	0	
South East	East of Pakenham South industrial area	TOTAL	192	75	0	49	0	0	0	
		892	72	28	0	63	0	0	0	
		2122	63	25	0	166	450	220	0	
		2190	3	1	11	158	0	0	0	
		2408	8	3	1	21	0	0	0	
Town Centre	Land bound by Princes Highway, Racecourse Road, Bald Hills Road/rail line and McGregor Road	TOTAL	145	57	11	409	450	220	0	
		887	2,945	950	350	525	0	0	0	Adjustment to allow for 950 households at 2046, with an average household size of 3. Retail employment numbers assume 10,000sqm retail floorspace and applied 50% additional to generate total jobs
		2098	597	333	472	697	0	0	0	Employment figures modified to allow for an additional 5000sqm of retail and 9000sqm of non-retail commercial.
		2177	728	414	107	100	0	0	0	Employment figures reduced to 100 (consistent with current estimated employment)
		2257	0	0	13	300	0	0	0	Household and population figures reduced to nil at 2046. Existing industrial site with approximately 300 jobs. If it redevelops one would expect higher yield. Conservative estimate adopts equivalent numbers as for 2011 and 2046.
		2494	459	240	2	58	0	0	0	
		2495	70	29	560	922	0	0	0	Retail and total employment figures increased to reflect existing total retail on site, maintained at 2046. 20% increase applied to accommodate upper storey development / diversification of zone.
		2496	133	76	663	1,000	0	0	0	Retail and total employment figures increased to allow for additional 16,000sqm retail from 2011 to 2046 (new Woolworths Development not taken into consideration in 2011 figures. Allowance made for additional 2000sqm retail).
		2497	591	314	0	478	0	0	0	Deletion of retail employment figures (reduced to 0 at 2046)
West	Land in Cardinia Road Precinct	TOTAL	5,522	2,356	2,167	4,080	0	0	0	
		878	0	0	18	334	0	0	0	
		885	1,530	609	0	44	0	0	0	
		2148	2,076	726	0	17	0	0	0	
		2170	152	58	210	315	0	0	0	Employment figures adjusted to allow for 6000sqm retail floorspace, plus 50% additional employment. Adjusted households in line with current figures.
		2171	2,055	841	42	211	0	0	0	Adjusted households in line with current
		2260	0	0	0	9,929	0	0	0	Adjusted employment in line with PSP land use budget

Reference Area	General Description	ZONE	Population	Households	Retail Employment	Total Employment	Primary School Enrolments	Secondary School Enrolments	Tertiary Ed. Enrolments	Comment
		2261	0	0	280	780	405	452	0	Employment figures adjusted to allow for 8000sqm retail floorspace, plus 20000 non-retail floorspace.
		2262	0	0	17	80	0	0	0	
		2264	48	19	8	141	0	0	0	
		2422	4,512	1,628	0	44	0	0	0	Adjusted households in line with current provision
		2423	2,114	811	49	70	0	0	0	Deletion of Primary School from zone. Addition of Edenbrook NCC (1400sqm retail) and associated adjustments to retail and total employment figures.
		2424	2,470	950	0	36	450	1,200	0	Addition of Primary School and Secondary School to zone. Modification of housing assumptions to provide for double the growth in Zone 2424 compared to Zone 2423 from 2011 to 2046. Application of original persons per household figure (2.6) to calculate population yield.
		2437	901	321	0	2	0	0	0	
		2439	829	318	0	2	0	0	0	
		2458	0	0	0	922	0	0	0	
		2484	43	15	1	8	0	0	0	
		2485	1,102	435	0	42	450	0	0	Addition of Primary School as per current situation.
		2486	4	2	4	82	0	0	0	
		2487	367	141	6	106	0	0	0	
		TOTAL	18,202	6,874	634	13,164	1,305	1,652	0	

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	17/07/13	A Fransos	D Hitchins	D Hitchins
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