



Fyans – West Fyans Precinct Structure Plan Parking and Traffic Study

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1. Introduction to the Study Area

Introduction

During 2009, the Fyans-West Fyans Precinct Structure Plan (PSP) was prepared, including a detailed traffic and parking study, outlining the existing conditions at the time and what traffic management and parking measures would be required to mitigate the impacts of future development within the area.

Since 2009 planning has evolved, including but not limited to the introduction of and changes to VicRoads' Movement & Place, Safe Systems and SafeRoads frameworks. Another major change is the implementation of Council's community led 30-year vision for A Clever and Creative Future which outlines ambitious mode share targets for sustainable transport and seeks to create a fast, reliable and connected transport network.

Further, since the preparation of the previous PSP for the area, the majority of the land has also been rezoned and some land use has begun to change, in particular around Pakington Street where there has been a change from commercial to office land uses. Despite this, there has been minimal mixed use residential development, however interest is beginning to increase due to the proximity and appeal to the city and land value in the surrounding suburbs.

In light of the above changes, a review of the Fyans-West Fyans PSP is required to ensure future development of the area will meet strategic objectives from both movement and place perspectives.

GTA Consultants were engaged during January 2018 to undertake a traffic and parking study, in preparation of the updated Fyans-West Fyans PSP.

Maps of the defined study area are shown on pages 5 and 6.

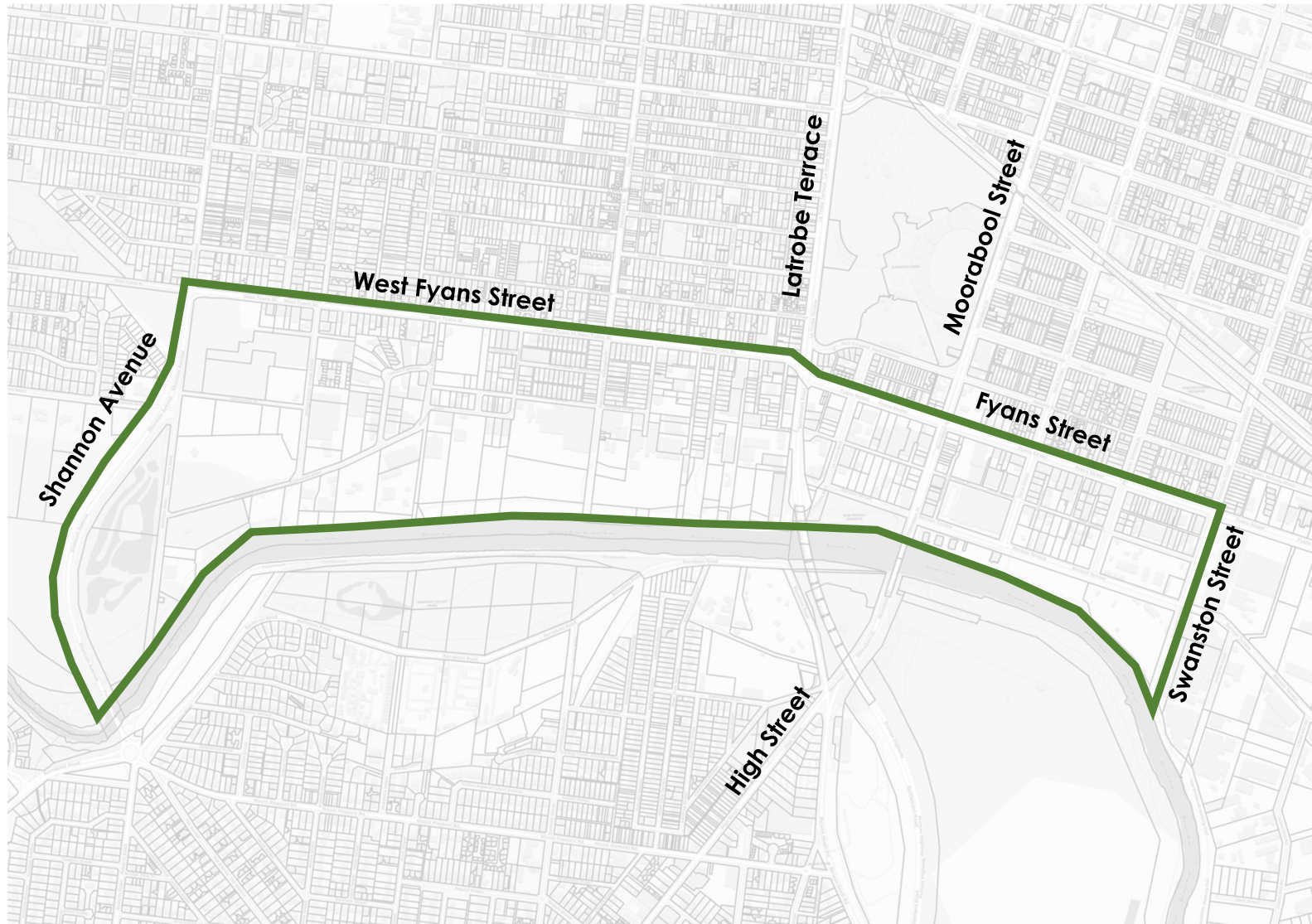


Pakington Street (looking north)



Swanston Street (looking north)

PSP Study Area



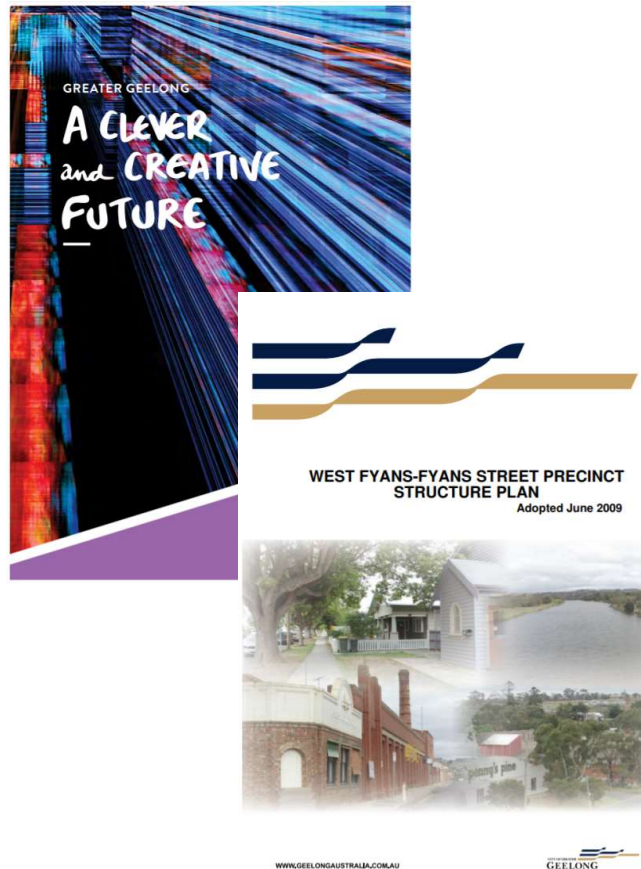
PSP Study Area



Source: nearmap
Image date: 17 February 2018

2. Background and Context

Background



The Fyans-West Fyans PSP covers the area bounded by the Barwon River, Fyans Street and West Fyans Street, Shannon Avenue and Swanston Street. The PSP area is located approximately 2km to the south and south-west of the Geelong CBD.

The study area has a diverse mix of land uses. However both historically and to this date, the majority of land use within the PSP area is commercial and industrial. There are pockets of residential, retail and other specialty uses throughout the area, generally along the arterial roads on the fringe of the study area.

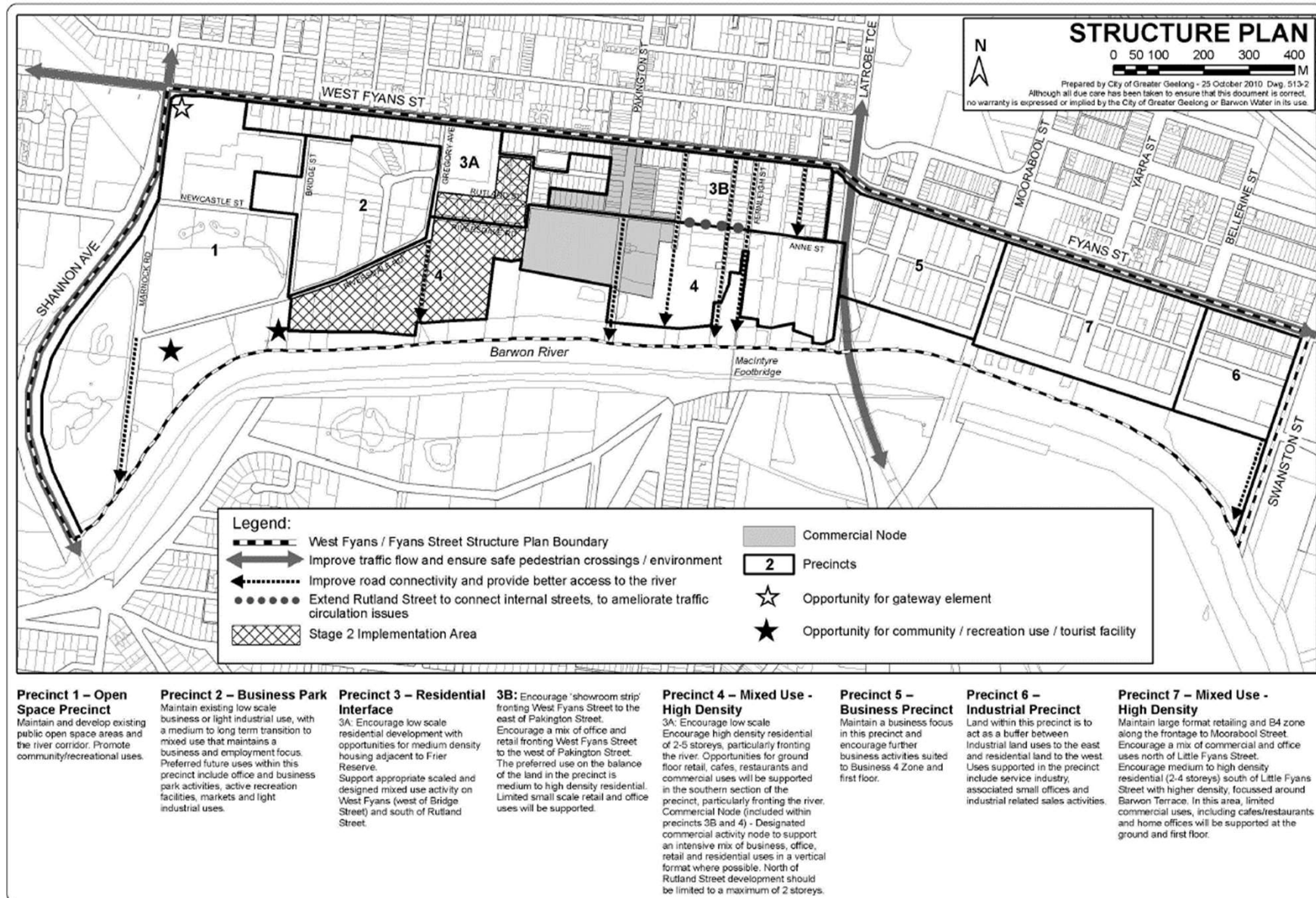
Due to the lack of residential and mixed use development since the inclusion of the PSP, there has been minimal progress in implementing the recommendations. Any works which have been completed appear to have been undertaken as part of infrastructure rehabilitation or reconstruction capital works programs.

The existing precinct structure plan, access and amenities improvement plans are shown on page 6 and 7 respectively.

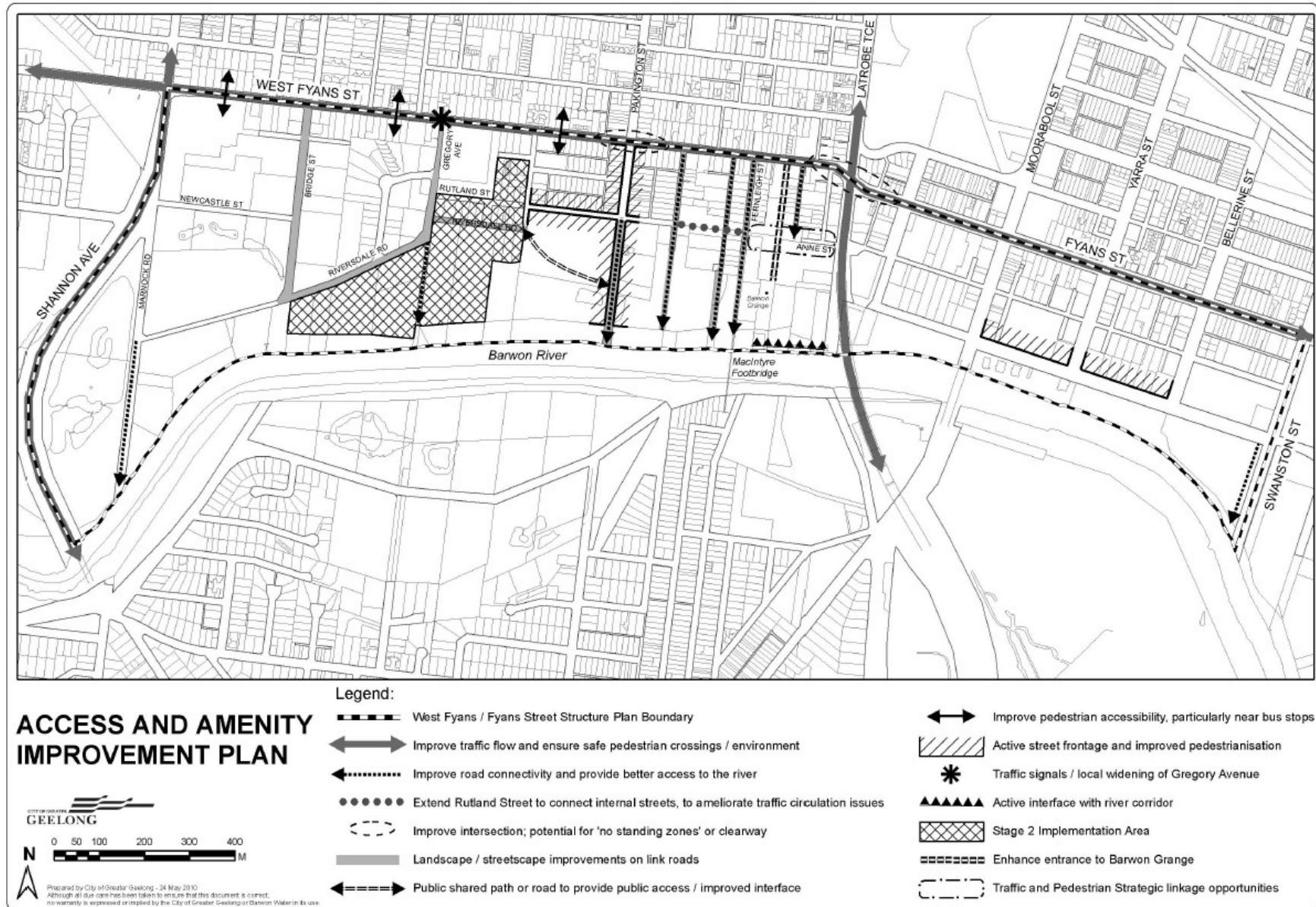
As the transport network is already defined within the study area, this study will focus on identifying gaps and how the existing roads can be augmented to better fit existing and future desire lines based on land use modelling undertaken by Council.

Initially, this issues and opportunities summary provides a high level assessment of the existing conditions in determining barriers and gaps in the transport network, for discussion with Council.

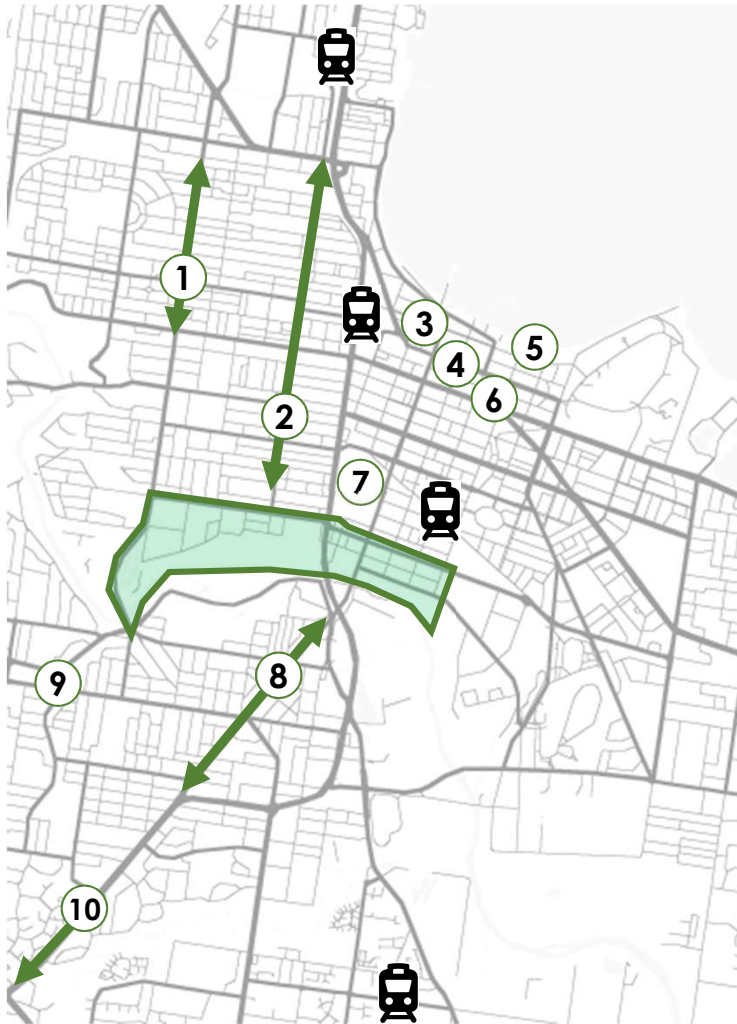
Fyans-West Fyans PSP (2009)



Access and Amenity Improvement Plan (2009)



Local Context



The study area is situated close to several other activity centres, recreation facilities, public transport and other community infrastructure, connected by the arterial and public transport networks.

South Geelong Railway Station captures almost all properties within the study area east of Latrobe Terrace within a reasonable walking or cycling distance. There are also several bus routes which operate primarily along the arterial roads on the fringe of the study area, as well as through Moorabool Street, providing access to the CBD and other activity centres to the south of the study area.

As with many early settlements across the country, industrial uses were primarily situated along rivers, long before these areas were seen as places to be preserved and enjoyed. Despite its size and proximity to Central Geelong, there is a major opportunity to reinvigorate this area with increased mixed use residential developments, as was identified in the existing PSP.

Legend



= Railway Station

1. Shannon Ave Activity Centre
2. Pakington St Activity Centre
3. Deakin University Waterfront Campus
4. Central Geelong
5. Waterfront
6. University Hospital
7. Kardinia Park
8. High Street Activity Centre
9. Highton Village
10. Towards Wauran Ponds Shopping Centre, Deakin University and Epworth Hospital

3. Issues & Opportunities

Trip Attractors and Generators

It is important to understand where the trip generation occurs and to what extent, to determine if there is adequate infrastructure for both current and future conditions.

Land uses generate different levels of traffic, and therefore generate different demand characteristics for parking, depending on several factors including but not limited to the service offerings and number of staff. The way these land uses interact has an accumulative effect on traffic which can impact access in and out of the area.

When designing transport infrastructure, it is of greater importance to understand the peak traffic volumes in short periods of time (i.e. 15 minute – 1 hour windows in the AM / PM peak periods).

In areas of high demand during peak periods, it is assumed that up to 15% of daily traffic is generated during the peak periods, while other streets with a higher proportion of visitor and through traffic generate around 8% of the daily demands during peak periods.

In order to understand if the current road network can accommodate the amount of traffic which will be generated in the future based on the current land zoning (as shown on page 11), the locations and types of trip attractors and generators must be determined. A summary of key trip attractors and current precincts of high generating land uses is shown in the table opposite and on the map on page 14.

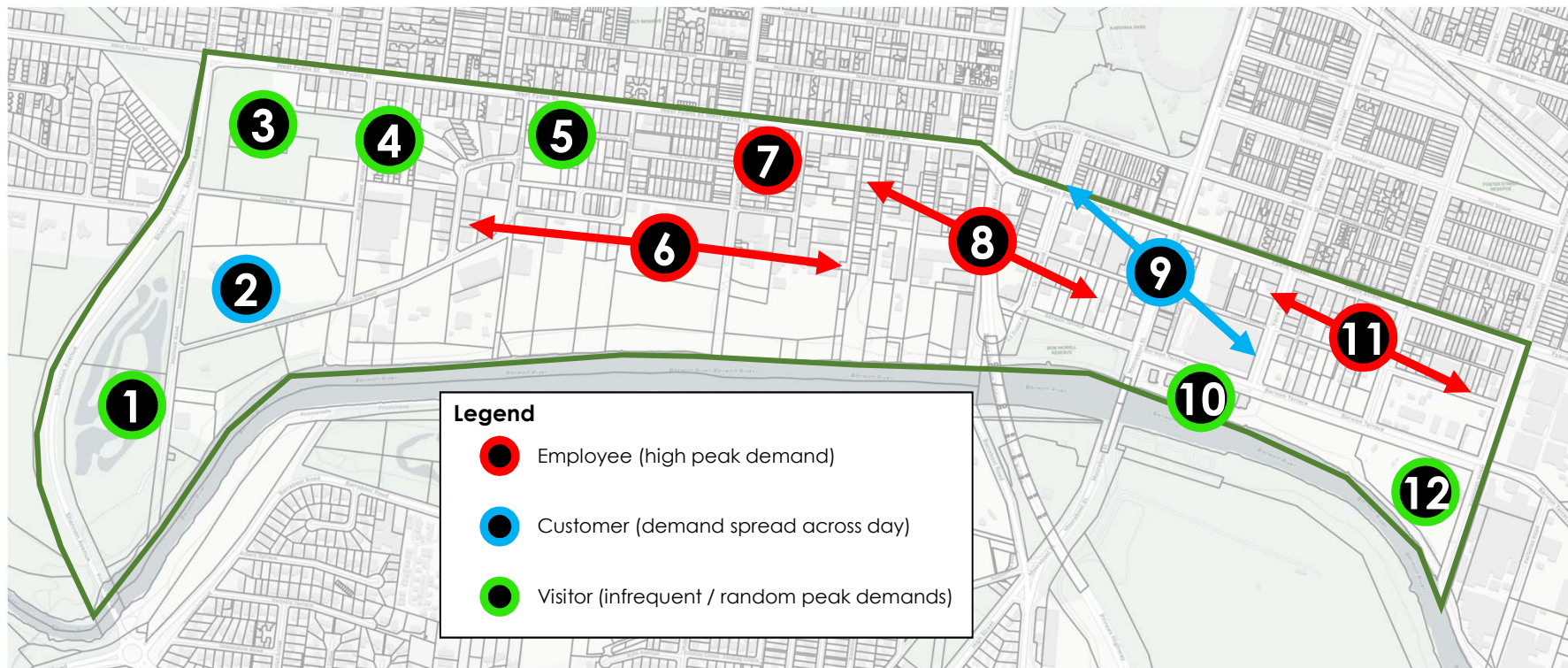
Name	Land Use	Predominant User
1. Balyang Sanctuary	Recreation	Visitor
2. Balyang Par 3 Golf Course	Recreation	Visitor
3. The Hill Mountain Bike Park	Recreation	Visitor
4. Aquatic Centre	Recreation	Customer
5. Frier Reserve	Recreation	Visitor
6. Light / Heavy Industrial	Industrial	Employee
7. Commercial Retail	Commercial	Customer
8. Automotive Sales and Servicing	Commercial	Employee
9. Retail Precinct	Commercial	Visitor
10. Rowing Clubs	Recreation	Visitor
11. Commercial / Light Industrial	Commercial	Employee
12. John Landy Field	Recreation	Visitor

Trip Attractors and Generators cont.

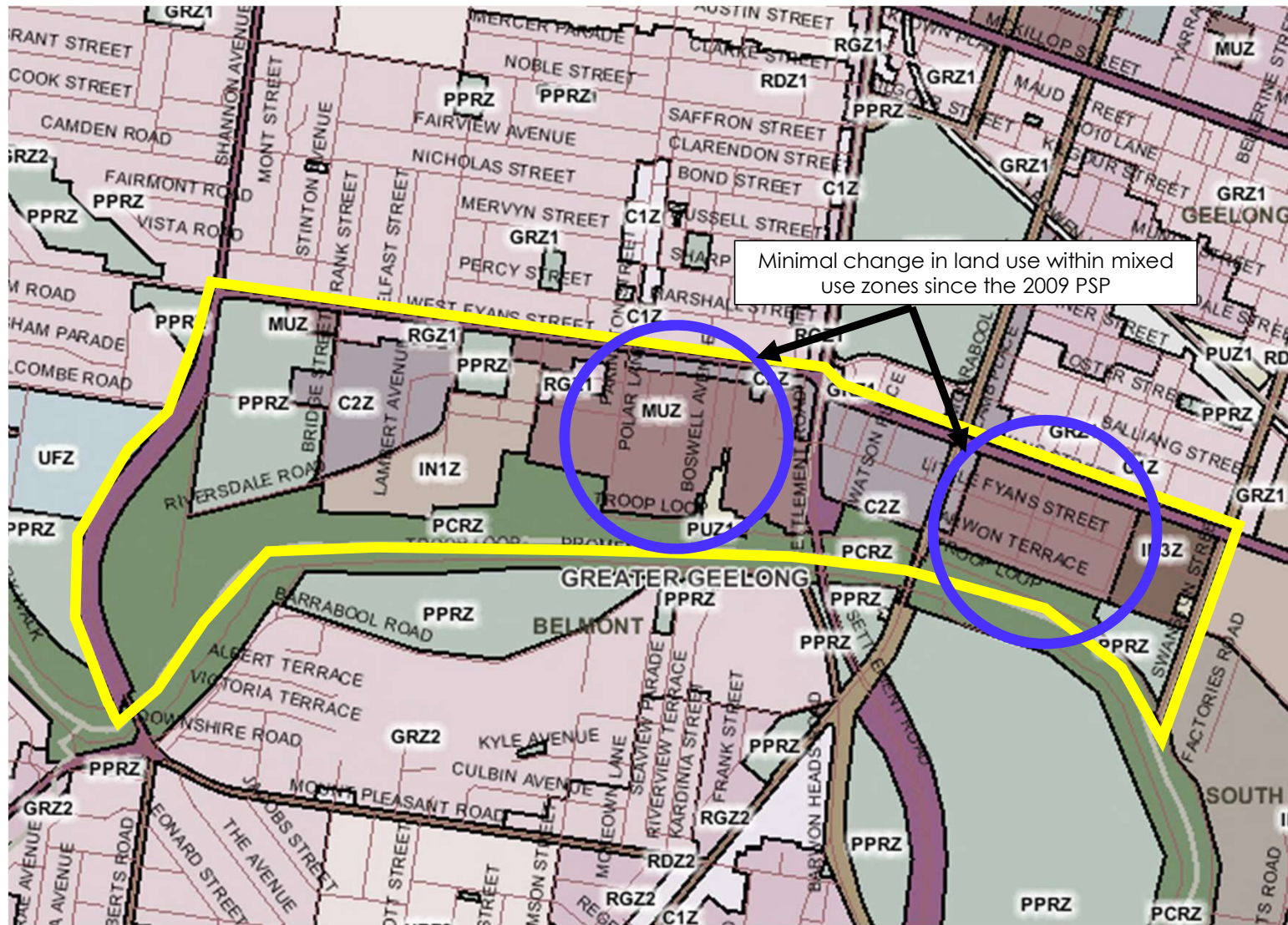
The below map shows that commercial and industrial land uses are focused primarily along Fyans Street to the east of the study area, and around Pakington Street and Latrobe Terrace which is generally in accordance with the current land zoning (see page 11).

The only major difference between the existing land uses and land zonings are the mixed use zones around Pakington Street and east of Yarra Street which are still mainly commercial uses with some low density residential dwellings.

While it is noted that there are many recreational land uses, these have infrequent occurrences of high traffic generating events and will often be seasonal or be related to time of the week traffic.



Existing Planning Scheme Zoning



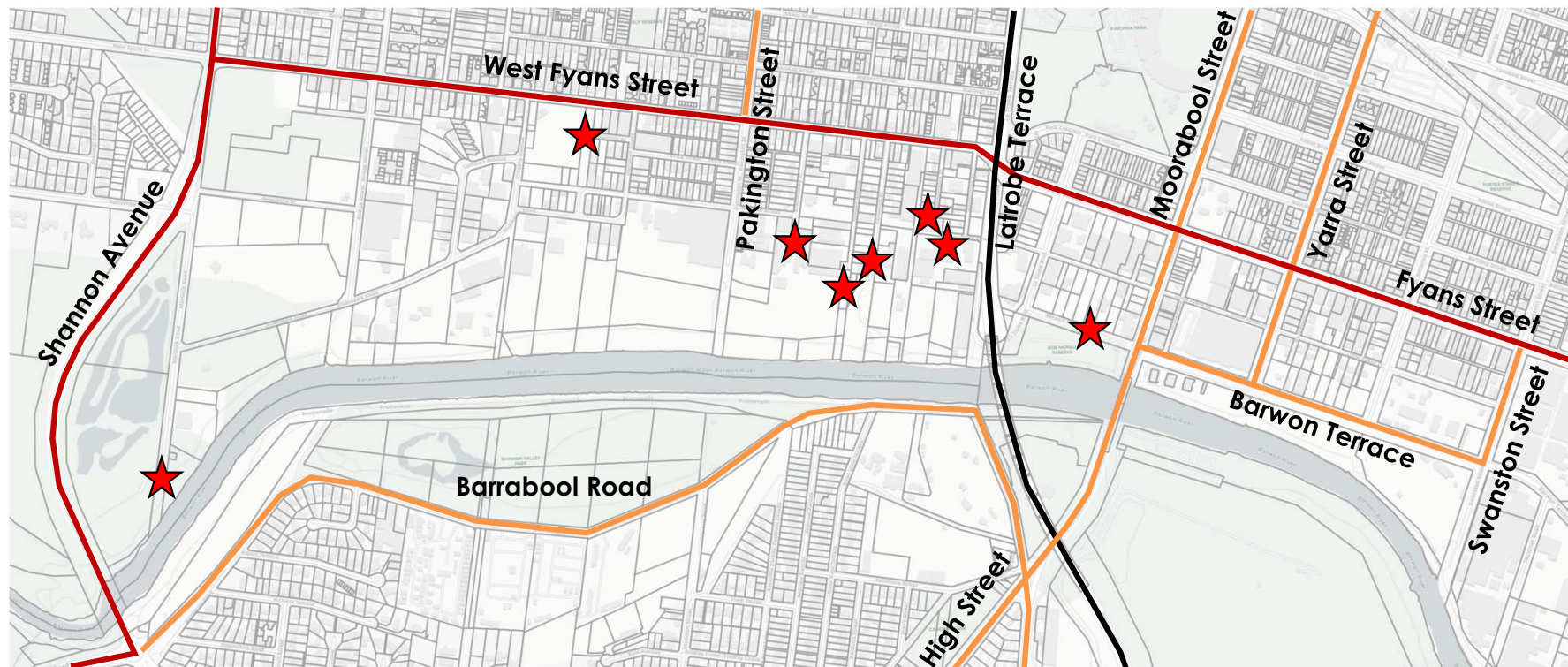
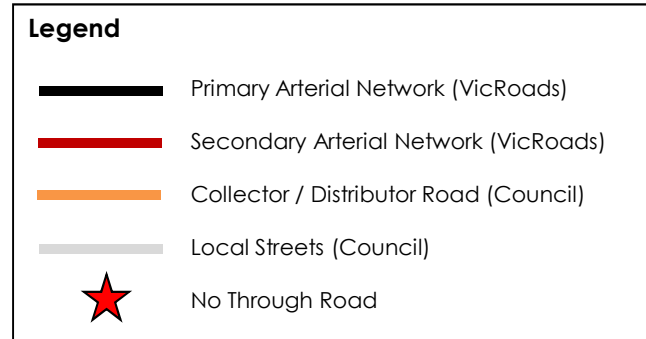
Source: services.land.vic.gov.au
Accessed 19 March 2018

Road Network

The permeability of the road network both within and surrounding the study area has a major impact on how people access and move within the study area. As shown, there is a large difference between the permeability of the road network in the areas to the east and west of Latrobe Terrace.

Barwon River provides a major barrier for movement in a north south direction as crossing the Barwon River to access areas to the south can only be done by the few river crossings at Shannon Avenue, Latrobe Terrace and Moorabool Street.

The section of the study area west of Latrobe Terrace has poor road connectivity due to multiple dead-end streets without side road access while the area to the east has good connectivity.



Existing Traffic Volumes

The existing traffic volumes were determined using both VicRoads SCATS data and turning movement counts conducted on 22 February 2018.

As expected, the data showed that the prevailing movements were inbound towards the CBD in the AM and outbound in a southerly direction during the PM peak periods. More vehicles were also travelling eastbound during the AM peak and westbound in the PM peak periods. Details of volumes and split in direction on key roads surrounding and within the study area are shown in Appendix A.

As per clause 56.06 of the Greater Geelong Planning Scheme, most local streets within the study area can be classified as either an Access Street Level 1 or 2, with recommended traffic volumes less than 2,000 and 3,000 vehicles per day respectively.

The table shows estimated peak hour factors and subsequent estimated daily traffic volumes (AADT). It also indicates roads which are approaching the acceptable limits of daily traffic volumes, highlighted in orange.

Using the assumptions made earlier that approximately 8% - 15% of daily traffic volumes are generated within the peak periods (1 hour) depending on the land use, both Gregory Avenue and Marnock Road are approaching the limits of acceptable traffic volumes. Pakington Street also is approaching the limits of acceptable traffic volumes, however it functions more like a collector road given its connectivity to the collector road network north of West Fyans Street which indicates its capacity to carry higher volumes of traffic.

Inspections on site did not indicate any major queuing or congestion issues on the approach to West Fyans Street from any intersecting local roads, including Gregory Avenue and Marnock Road.



Queuing on Moorabool Street looking north at Fyans Street

Road Name	AM Peak (vph)	PM Peak (vph)	Peak Average (vph)	Estimated peak hour factor (PHF)	Estimated Daily Volume (vpd)
Latrobe Terrace	2,657	3,000	2,829	8%	35,363
Shannon Avenue	1,895	1,887	1,891	8%	23,638
West Fyans Street	1,139	1,261	1,200	8%	15,000
Fyans Street	1,282	1,638	1,460	8%	18,250
Moorabool Street	2,242	2,821	2,532	8%	31,650
Yarra Street	508	459	484	15%	3,227
Swanston Street	502	360	431	8%	5,388
Barwon Terrace	928	594	761	15%	5,073
Pakington Street	198	222	210	8%	2,625
Marnock Road	125	196	161	8%	2,013
Bridge Road	59	129	94	15%	627
Gregory Avenue	164	278	221	15%	1,473
Fernleigh Street	66	52	59	8%	738
Bellerine Street	112	76	94	8%	1,175

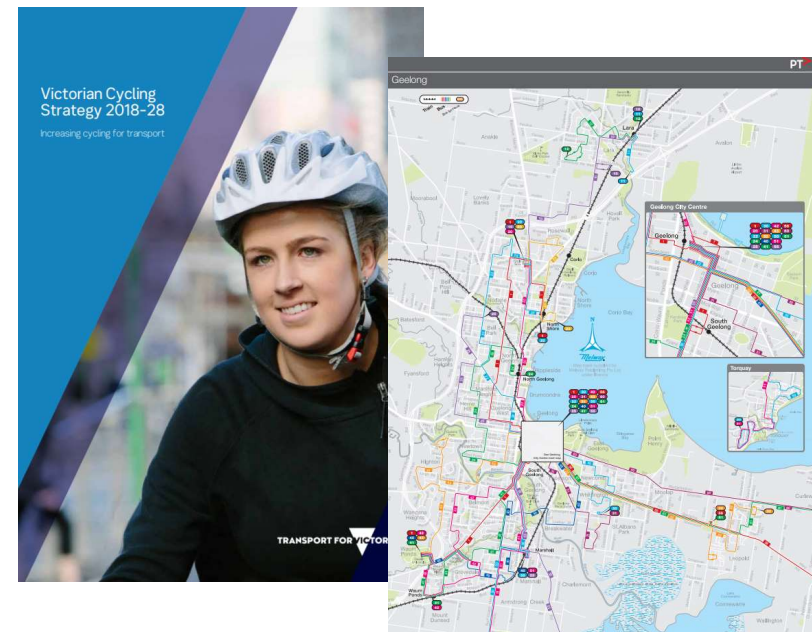
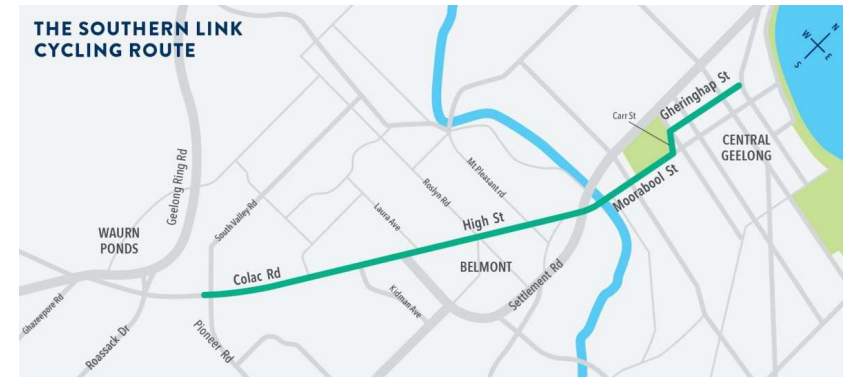
Active and Public Transport – Overview

It is estimated that currently up to 40,000 trips into Central Geelong are made by workers alone, and that only 5% of these trips are made by public transport, 6% by walking and only 2% by cycling. A key target of Council's Clever and Creative Future vision is that 50% of all journey to work into Central Geelong are made by active and public transport modes by the year 2030.

The recently released Victorian Cycling Strategy 2018-2028 found that up to 60% of Victorians are interested in cycling but are deterred by safety concerns. Considering that up to 70% of all trips to work in Central Geelong are from within 10km, this represents a potential uptake of over 16,000 cyclists in ideal conditions.

While works are underway to construct the new southern bicycle link connecting Belmont to Central Geelong, consideration must also be given to trips from the surrounding local area where protected bicycle lanes are not currently available or planned.

The following analysis shows gaps and barriers in the bicycle, walking and public transport network which may be preventing residents, workers and visitors from using active and public transport.



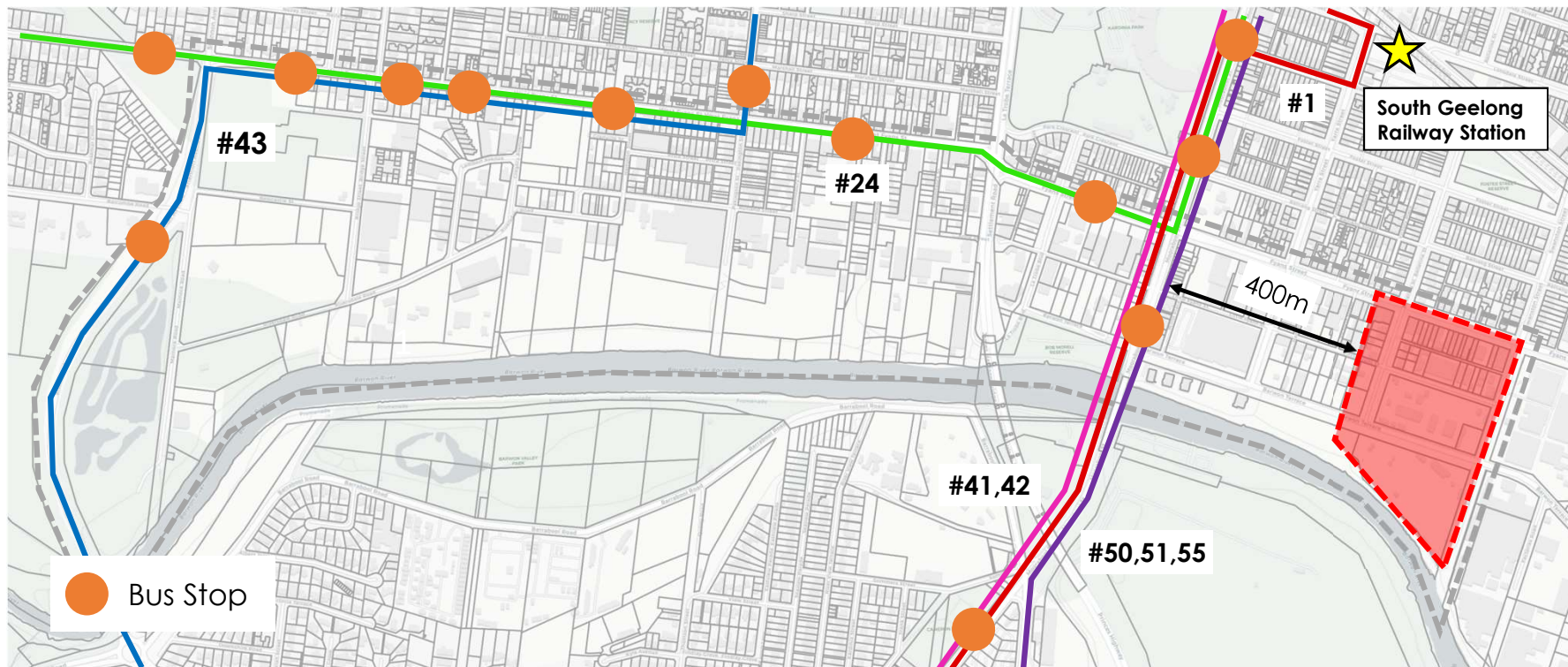
Public Transport

Bus routes in the vicinity of the study area are shown on the map below. The bus network provides adequate access to properties in the study area within reasonable walking distance, with the exception of the area east of Bellerine Street.

Applying a walking distance of 400m shows that all properties, except those east of Yarra Street are within a reasonable walking distance to a bus service; however it is noted that this area will remain zoned as industrial to act as a buffer between existing industrial uses to the east and new residential mixed use developments.

The study area east of Latrobe Terrace also has good accessibility to South Geelong Station which provides both access to Waurn Ponds, Central Geelong and beyond towards Melbourne.

Bus Route	From	To	Via
1	Waurn Ponds (Deakin)	Geelong	Belmont / South Geelong Station
24	North Geelong Station	Geelong	Herne Hill / Newtown
41/42	Waurn Ponds (Deakin)	Geelong	Grovedale / Belmont
43	Waurn Ponds (Deakin)	Geelong	Highton / Newtown
50/51	Jan Juc / Torquay	Geelong	Marshall Station
55	Ocean Grove	Geelong	Barwon Heads / Marshall Station



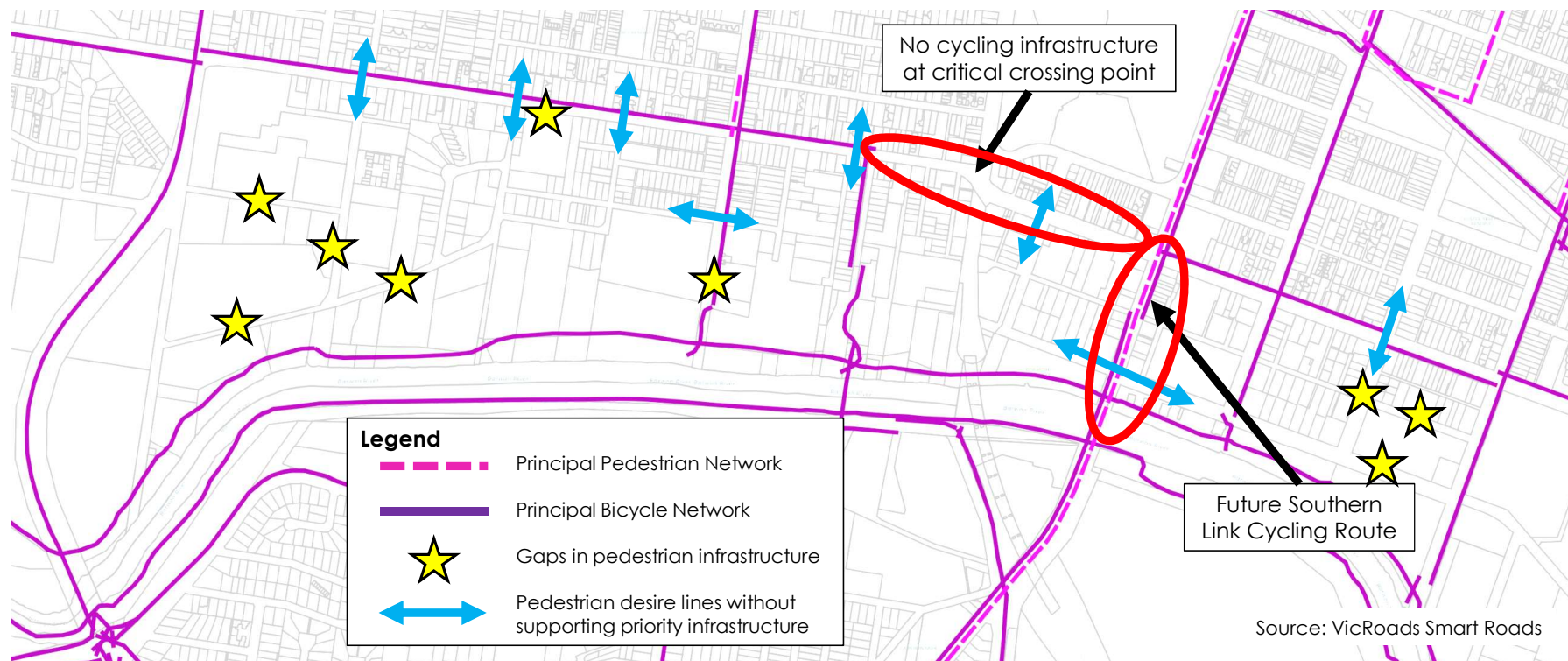
Pedestrian / Cycling Network

The current principal pedestrian and cycling networks (PPN and PBN, VicRoads), are shown on the map below.

There are a number of on-street and off-street bicycle paths throughout the study area. However, there are several gaps in bicycle infrastructure and Latrobe Terrace creates a major barrier for cycling and pedestrians crossing from Newtown to South Geelong, given the shared path along the river is not easily accessible or appealing for all users.

While most of the roads in the area have footpaths, there are still some locations which do not have accessible pedestrian facilities. Furthermore, there are very few priority pedestrian crossing points throughout the area, restricting access to and from sites within the area.

During site observations, the frequency of cyclists and pedestrians was low during the peak period, with the exception of around Pakington Street and Moorabool Street.



Parking Overview

The demand for car parking can be directly attributed to both vehicle ownership and travel characteristics of those who live, work and visit the study area.

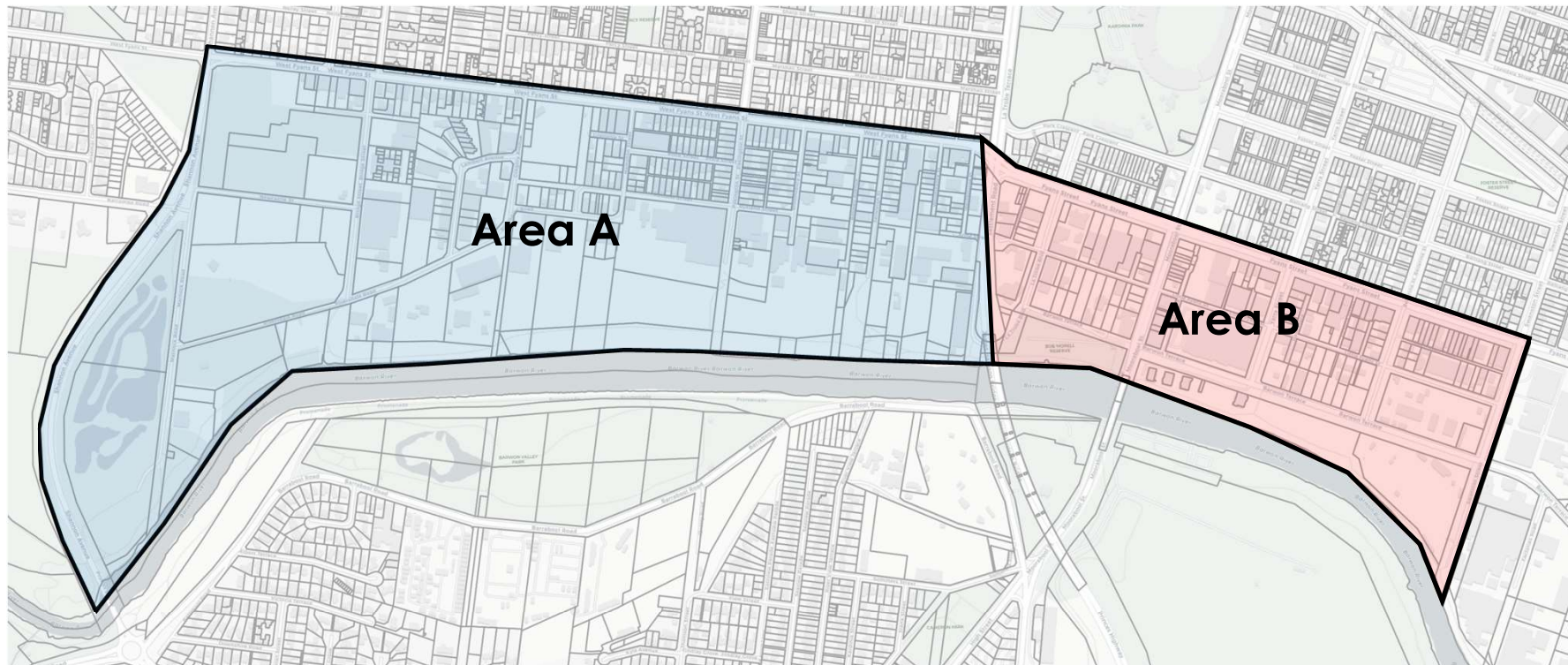
To demonstrate the parking characteristics effectively, the study area has been divided into two areas, west (Area A) and east (Area B) of Latrobe Terrace.

The analysis of the road characteristics as shown in Appendix B showed that most streets have kerbside parking available.

To the east of Latrobe Terrace, the streets are wider, and in some cases support angled parking due to the carriageway width, while streets to the west are narrower which in some cases allow for parking on one side of the street only, which forces vehicles onto footpaths, restricting pedestrian access.



Parking in narrow streets – one side 'No Stopping'



Parking Characteristics - Supply

A high level review of parking supply characteristics throughout both areas of the study area showed that the majority of parking restrictions were unrestricted. Some parking was restricted with short term (1P-2P) restrictions along active retail and commercial frontages, to increase turnover and discourage long-stay parking by employees.

Short term parking restrictions were focused in the commercial area east of Latrobe Terrace, as well as along retail and frontages requiring increased turnover, generally on arterial and collector roads.

There are limited loading zones across the study area due to the availability of off-street loading bays at industrial premises, however some loading activities were witnessed on street in the area west of Latrobe Terrace. Furthermore, while some businesses have off-street customer and employee parking, there are no Council owned or operated off-street parking facilities in the study area.

It was noted on site that there was up to 70 vehicles parked at Frier Reserve which was not accounted for in the calculation of parking supply, as the vehicles were both parked illegally and outside of the road reserve in many instances.

Full results of the parking surveys are attached at Appendix C.

	Area A (No. / % total)	Area B (No. / % total)
Total Supply	866 (100%)	698 (100%)
Unrestricted	714 (82%)	449 (64%)
1P – 2P	122 (14%)	187 (27%)
0 – P30min	20 (2%)	60 (9%)
Special Use (i.e. Loading / Bus)	10 (1%)	2 (<1%)



Parking on nature strip / footpath



Parking at Frier Reserve

Parking Characteristics - Demand

Analysis of the parking data based on time restriction and location showed that while short term parking was well utilised across the study area, long term on-street parking had low average and peak occupancies across both areas.

Given the low number of residential properties currently in the area, there is minimal competition for parking spaces and the majority of vehicles belong to employees who park on a first come first serve basis in long term areas.

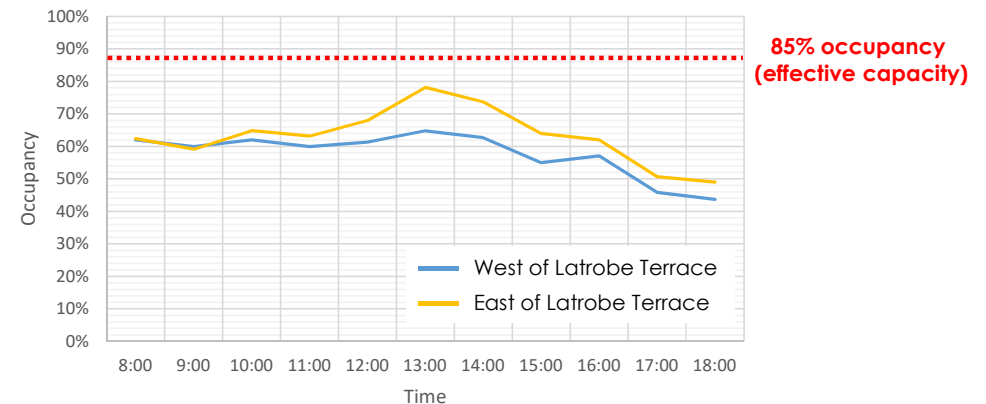
Overall, at all times during the survey period, the data analysis suggests that there is capacity to meet existing demands for car parking within the study area, noting that 85% occupancy is considered to be the effective capacity.

In some locations, parking is prioritised over pedestrian movement, where parking appears to be permitted on footpaths and nature strips, as observed in Little Fyans Street and other narrow streets throughout the study area. Future development and prioritisation of pedestrians would potentially reduce the supply of on-street parking spaces.

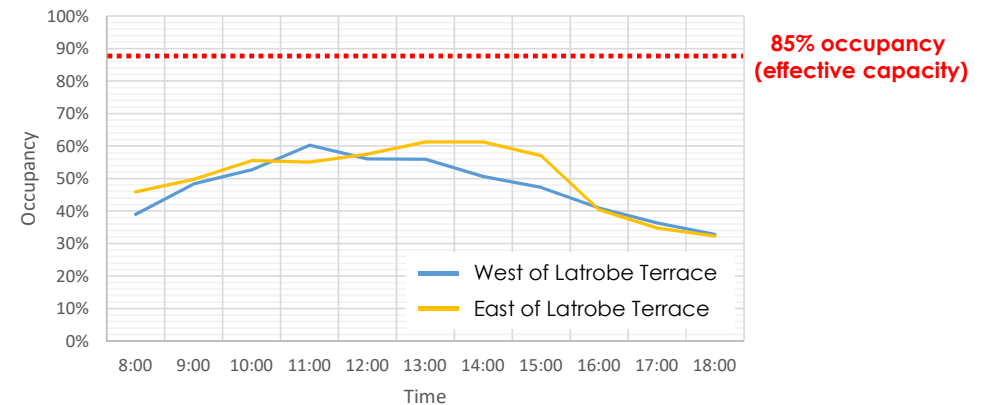
The data shows that long-term parking has different demand profiles in each of the areas, which can be attributed to the earlier starting times (and hence earlier finishing time), of employees at industrial related businesses. The change for demand for parking is shown within the two graphs which are separated into short and long term stay parking within each section of the study area.

Parking demands outside of business hours was low across the study area given the lack of activity associated with the commercial land use at night.

Short-term parking demand



Long-term parking demand



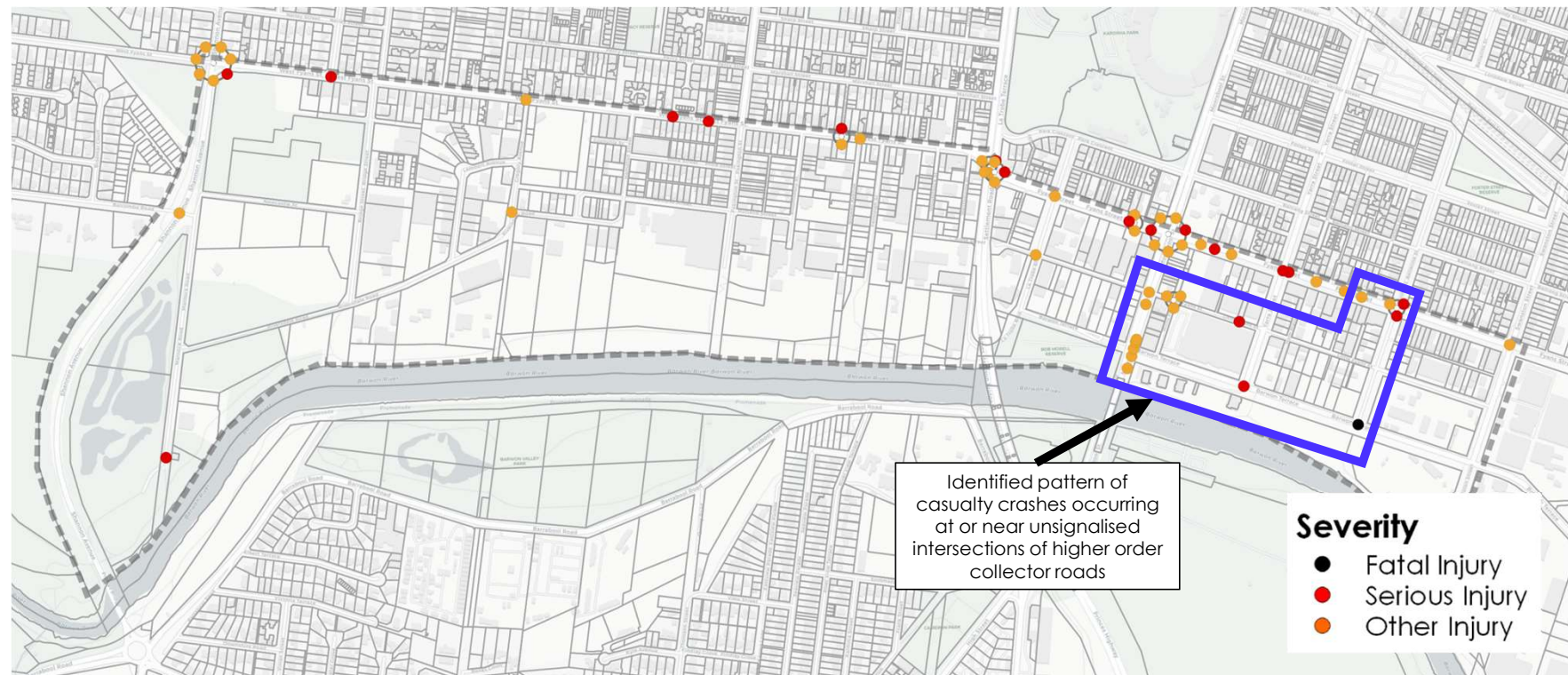
Crash History Summary

Analysis of the crash history within the study area was undertaken to understand any problem locations which may be exacerbated with a future increase in traffic volumes. All casualty crashes which have occurred within the study area in the past 5 years (2013 - 2017) are shown on the map below.

With the exception of Moorabool Street, the majority of crashes have occurred on the arterial road network. The data also shows that the majority of crashes occurred at the intersection of major / arterial roads, as well as unsignalled intersections with local roads.

The stretches of road along Moorabool Street between the Barwon River and Fyans Street, and Barwon Terrace experience large amounts of turning movements during the peak periods. These movements, mixed with higher conflicting through traffic volumes, are a likely contributing factor to the high instances of casualty crashes.

Although there were several crashes involving vulnerable road users recorded (i.e. cyclists and pedestrians), there was no identified pattern of crashes.



Site Observations Summary

In order to verify the desktop analysis of the gaps and barriers within the transport networks, site observations were carried out on a typical weekday during April 2018 in both the AM (7:30-9:30am) and PM (3:00-5:00pm) peaks. Additionally, the observations were used to observe road user behaviour and traffic conditions within the study area, to identify any further issues or opportunities.

In general, the transport network operated effectively, with the exception of the arterial road network which experienced short periods (15-30 minutes) of high congestion where queuing occurred on the approaches to Latrobe Terrace.

During the observations, the frequency of cyclists and pedestrians was low. Furthermore, vehicle volumes appeared to be generally light throughout both peak periods within the local road network and vehicles were able to enter and exit the arterial road network without delay.

Parking behaviour to the west of Latrobe Terrace in the industrial use area was poor, with vehicles parked on footpaths and nature strips throughout, even though road widths were sufficient for vehicles parked on both sides and one lane of through traffic. This may have occurred for many reasons however it is likely that given the industrial use in the area, vehicles parking illegally to avoid damage to their vehicles by truck movements due to the tight corners and narrow roads.

Observations around high-activity areas on both sides of the study area found that there was a high demand for on-street parking with many areas reaching capacity, however it was noted that there were many areas with no demand for parking. These observations were generally in accordance with the data analysis.



Bridge Road – drains present major hazard to vulnerable road users



Pakington Street – looking towards West Fyans Street

Issues and Opportunities Summary

Issues

- The arterial road network (VicRoads), in the vicinity of the study area regularly experiences congestion during peak times, which delays public transport and increases the potential conflict between vehicles with cyclists / pedestrians.
- The permeability of the established road network to the west of Latrobe Terrace is poor, including the presence of several no through roads, therefore restricting the efficient flow of traffic and restricting direct bicycle access between properties and the PBN, in particular the Barwon River.
- In addition to the poor permeability of the transport network, the restricted widths and lack of footpath in many locations reduces the ability to achieve a mode shift towards active transport modes as safety concerns often deter users from making trips or part thereof by cycling and walking.
- A pattern of casualty crashes at unsignalised collector road intersections within the study area east of Latrobe Terrace will potentially be exacerbated with additional traffic associated with mixed use development, impacting the safety of all road users.
- With the exception of signalised intersections, there are minimal opportunities for pedestrians to cross arterial and collector roads safely which have higher speed limits and volumes of traffic, restricting the movement of pedestrians.
- The poor parking behaviours observed in the study area west of Latrobe Terrace increases the constrained capacity for parking demand, and formalisation of road cross sections to include pedestrian priority with new development will decrease the availability of kerbside parking.

Opportunities

- To increase bicycle usage and capitalise on the Building Better Bike Connections program, create safe and direct routes within the study area to connect to existing and future PBN including the southern link cycling route.
- To reduce the reliance on the motor vehicle to make short distance trips, improve pedestrian connections to both the Barwon River and across arterial roads by increasing pedestrian priority and implementing pedestrian infrastructure such as footpaths where they do not currently exist.
- To improve the safety of all road users, carefully consider the implications of additional traffic at unsignalised intersections of collector roads and implement suitable treatments to eliminate or reduce road safety hazards.
- To increase the number of trips into Central Geelong by public transport, in particular buses, take measures to increase the bus priority in locations where congestion is currently experienced to provide a safer, more efficient and comfortable journey.
- To improve mode shift towards all active transport modes and achieve Council's vision of 50% of all trips by commuters to Central Geelong, utilise parking as a travel demand management tool by creating streets which give priority to people over vehicles which may require the removal of on-street parking.

4. Future Land Use

Key Assumptions

The following key assumptions were developed with Council in order to effectively calculate the future parking and trip generation characteristics of the area. Please note that this list represents the key considerations. Further discussion of the assumptions made to complete the study are presented throughout the report.



Greater Geelong: A Clever and Creative Vision

As per Council's clever and creative vision, a 50% mode split for non-car trips is being aimed for within a 30-year period. Although the 20-year scenario is being utilised, a 50% mode split is achievable given the future type of residential land uses being proposed and nearby access to key active and public transport networks. As such, in the 20-year scenario, 50% of all trips (including both to work and non-work) will be made by modes other than passenger vehicles (including both driver and passenger) has been assumed.



Residential Parking

There will be no on-street parking provided for future residents in the area. Existing residential areas within and surrounding the PSP area will be provided with protection to maintain the existing amenity of the area. Further details regarding the allocation of parking are presented in the next section.



Population Density and Development Locations

All details regarding location, size and type of dwellings is taken from the 20-year scenario from the document titled "*West Fyans residential, population and level ground commercial assumptions*" provided by Council. An assumption has been made that new properties will be primarily 2 bedroom apartments with an average population density of 2.4 residents per dwelling.



Future Public Transport Networks

It will be assumed that there will not be a bus route required through the study area within the 20-year scenario however the key routes identified were tested to establish if access by a bus in accordance with the PTV land use development guidelines. The study area to the west of Latrobe Terrace was found to be unsuitable for a public bus service.



Retail and Commercial Visitor Generation

Although the exact nature of commercial land use has not yet been determined, the assumption has been made that it will be generally convenience or targeted at local residents (e.g. cafés, restaurants, convenience, local services), and as such around 75% of visits will be generated from within the study area, with the balance from outside.

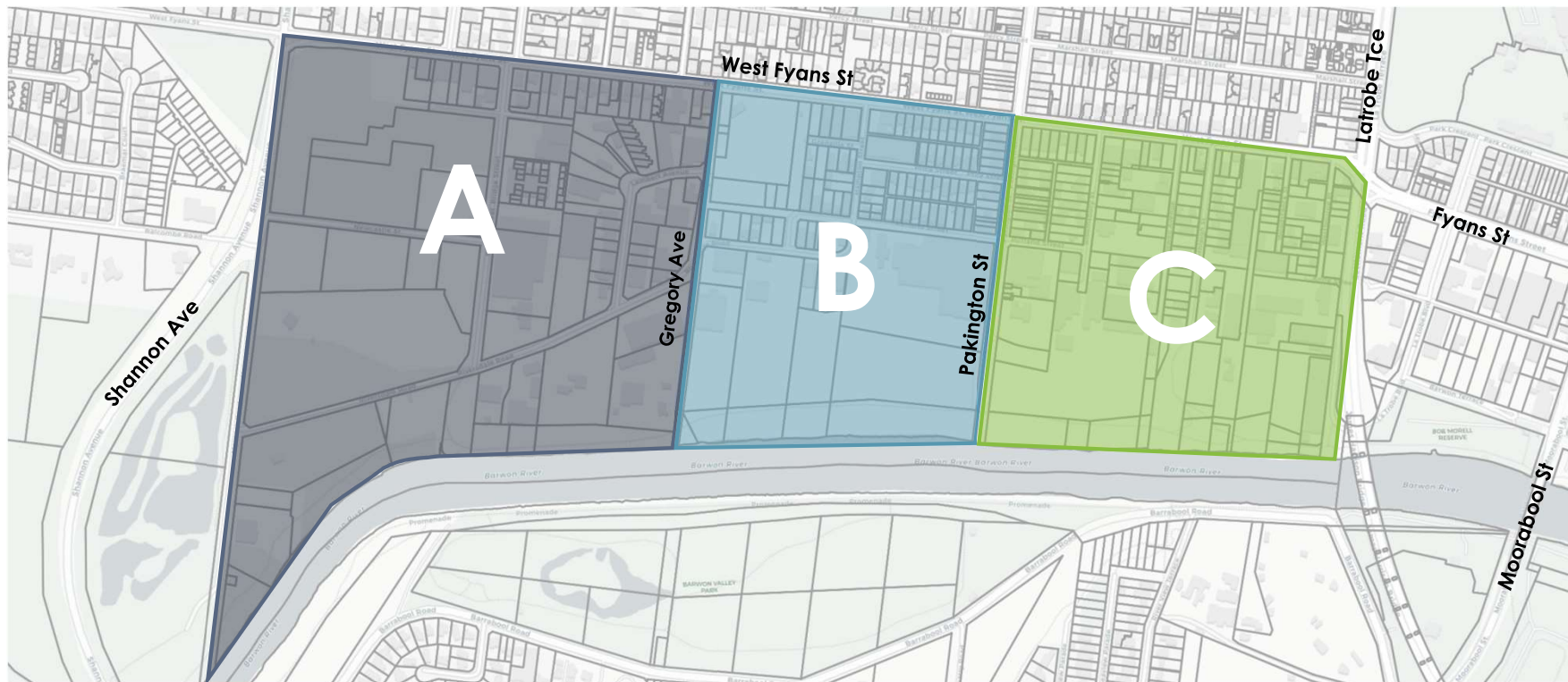
Land Modelling

To calculate the expected additional trips generated by the 20-year scenario for the various modes of transport, the study area west of Latrobe Terrace was broken up into three precincts as shown below. This method is consistent with the previous land modelling scenario document provided by Council.

The breakdown of the sub-precincts used for the purpose of this study are shown in the figure below.

It is noted that similar land use modelling was not provided for the study area to the east of Latrobe Terrace.

As such for the purposes of this study, policy outcomes will be primarily derived for the areas west of Latrobe Terrace. Where appropriate policy outcomes from the western portion of the study area may also be recommended at a conceptual level for application to the areas east of Latrobe Terrace even though land use growth has not been considered for the eastern area as part of this study.



Land Modelling – West of Latrobe Terrace

Existing Land Uses

As mentioned earlier, the existing land uses within the study area west of Latrobe Terrace are industrial and commercial, with limited low density residential and some recently created office and small warehouse uses.

A trend appears to be appearing which is the retrofitting of existing buildings with minimal new development. In streets such as Rutland Street (see below), buildings which are likely to retain their existing façades will limit the opportunities to acquire land to widen the road reserve.



Existing land use in Rutland Street (looking east)

The 20-year Scenario

Future Dwellings

The number of future dwellings were provided by Council as 10, 20 and 30-year scenarios. A summary of the additional and total future dwelling numbers in the 20-year scenario is shown below

	Precinct A	Precinct B	Precinct C	Total
Future Dwellings	152	768	586	1506
Existing Dwellings	53	276	270	599
Net Additional Dwellings	99	492	316	907

Additional Commercial Floor Space

The future commercial / retail floor spaces contained within mixed use developments was also provided and is displayed in the attached spreadsheet model. A summary by precinct (A, B and C) is provided in the table below. Please note that this relates to new commercial land use only and does not factor in the existing land use or floor space.

Type	Precinct A	Precinct B	Precinct C
Additional Floor Area (Commercial Use)	nil	5705 sqm	5788 sqm

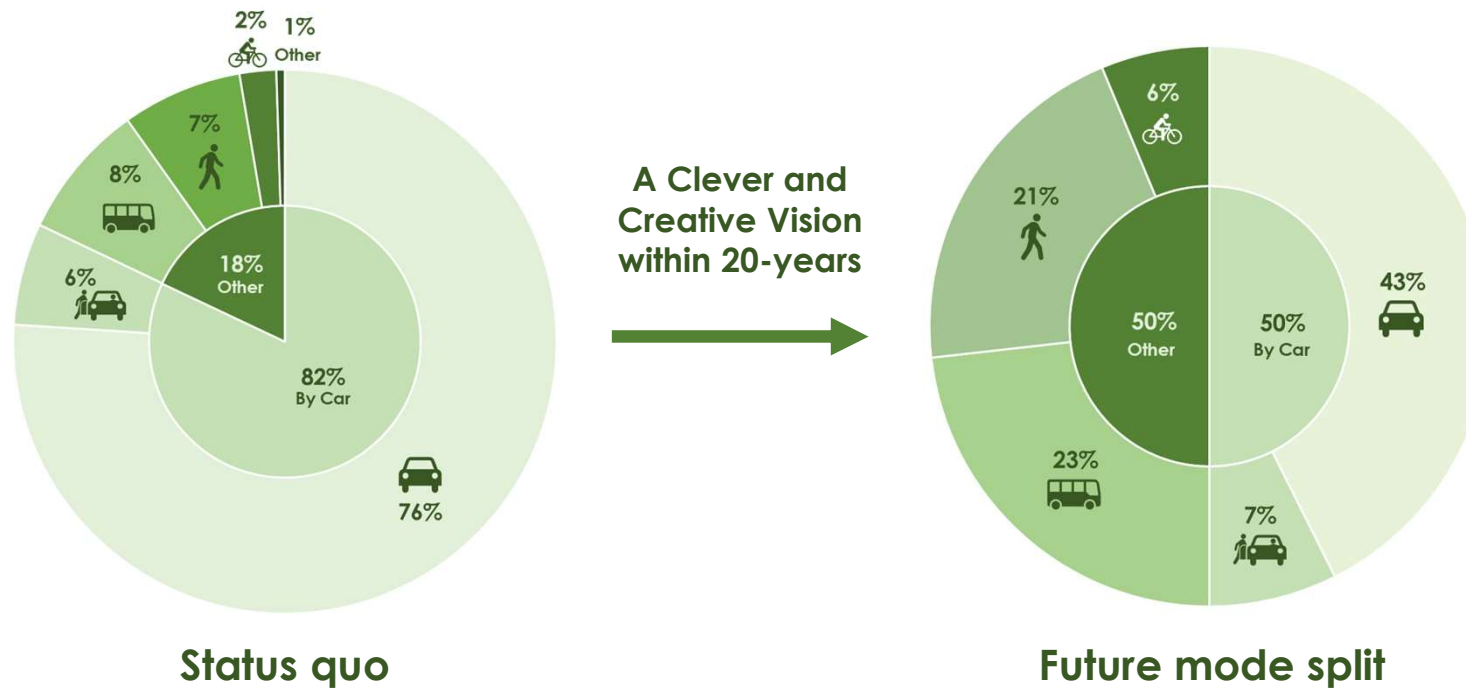
5. Future Trip Generation

Travel Characteristics – Mode Split

The mode split of future trips to and within the area have been calculated using the aspirations detailed within the 30-year clever and creative vision being achieved within 20-years. This was done by adjusting existing proportions of trips made by each mode to match a 50/50 split of trips by car and non-car modes.

While the Clever and Create Vision outlines a 50% target for non-car trips within 30-years, the 20-year scenario is achievable given the proximity to existing public and active transport networks, and the future land use which will be primarily medium and high density residential developments.

The existing and future mode splits for the study area (Newtown and South Geelong combined) are shown in the figures below.



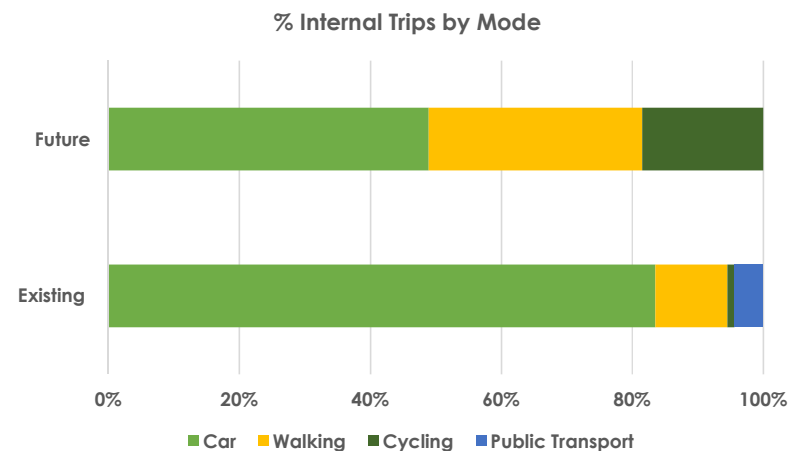
Trip Generation – Residential

The future trip generation for residential land uses was calculated by applying the assumed mode splits (shown on the previous page) to the existing trip generation characteristics for dwellings within Greater Geelong. The figure used for existing number of trips per dwelling was taken from VISTA trip generation database, developed in 2010. This is the currently the most accurate source of data for household trip generation as the Journey to Work data only relates to the working population.

Based on the assumption that there will be no future public transport route through the internal road network of the study area, further assumptions were made regarding the way people will travel to the public transport nodes (e.g. bus stops and the railway station). For the purposes of this study, it is assumed that 50% will walk and 50% will ride to bus stop / railway station. Noting that a larger proportion of people will walk to the bus stop and the opposite for railway stations.

The future number of trips by mode / per dwelling within the study area and a visual representation are shown in the table and figure respectively.

Mode	VISTA (2010) – Greater Geelong	20-year scenario	
		Estimated	Adjusted
Car (as driver)	5.4	4.5	4.5
Car (as passenger)	2.2		
Public Transport	0.4	2.2	N/A
Walking	1.0	1.9	3.0
Cycling	0.1	0.6	1.7
Total Trips	9.2 trips / household / day		



Trip Generation – Commercial

The future trip generation for future commercial land uses was determined using a typical empirical shop rate of 4.6 movements per hour per 100 sqm of floor space (Source: RTA NSW Guide to Traffic Generating Developments).

An assumption was made that 75% of trips would be generated from local residents, and as such, attributable to the trip generation determined for residential land uses on the previous page.

The remaining 25% was attributed to trips from outside of the study area. All trips from outside of the area were attributed to vehicles, mostly employees given this is the time of arrival or departure of work, with limited customers.

As such, a rate of 1.15 (or 25% of 4.6) trips per hour was used to determine the future trip generation for commercial land uses.

Trip Generation Rate (all modes)	4.6	trips / 100m ² / hr
External (driving)	25%	of trips
Internal (walking and cycling)	75%	of trips
Trip Generation Rate (Commercial)	1.15	trips / 100sqm / hr

Trip Generation by Mode

Applying the trip generation rates to the future commercial and residential land uses determined previously, the total number of additional trips by mode within the study area was calculated.

It is estimated that a total of 967 additional trips (all modes), including 541 movements by car will occur within the study area in the peak hour.

The number of trips by mode within the study area to the west of Latrobe Terrace, based on the available land modelling data, is shown in the adjacent tables.

Distribution of the vehicular traffic within the study area is shown on the following page. It is noted that these figures account for new uses only, including where uses change on land due to redevelopment.

[1] To establish the additional peak hour movements for future residential land uses, a typical peak to daily ratio of 10% has been adopted.

[2] To establish the total number of additional trips daily for future commercial land uses, a peak factor of 25% was used, to reflect that 50% of all trips made from outside of the area could be attributed to employees arriving for work from outside the study area during the two peak periods combined.

Residential Trip Generation by Mode

Mode	Future Trip Generation Rate (per household / day)	Additional Dwellings	Additional Daily Trips	Additional Peak Hour Trips [1]
Car	4.5	907 additional dwellings	4,086	409
Walking	3.0		2,721	272
Cycling	1.7		1,542	154
Total Trips	9.2		8,349	835

Commercial Trip Generation by Mode

Mode	Future Trip Generation Rate (per 100 sqm / peak hour)	Additional Commercial Floor Space	Additional Daily Trips [2]	Additional Peak Hour Trips
Car	1.15	11,493 sqm	529	132

Total Additional Peak Hour Trips by Mode

Mode	Car	Walking	Cycling	Total
Peak Hour Trips	541	272	154	967

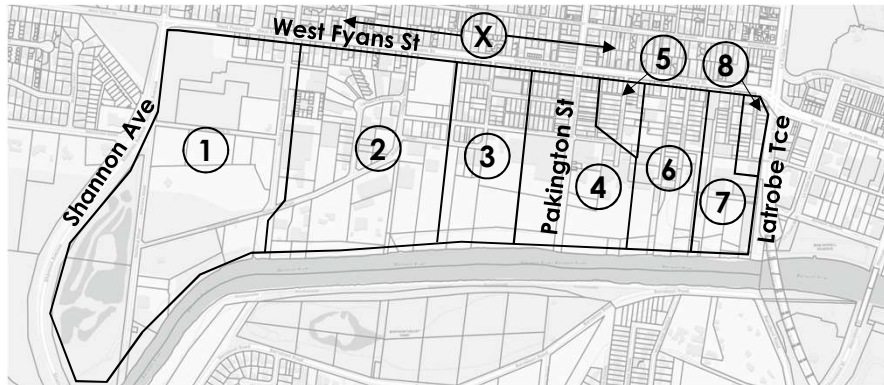
Traffic Distribution

A total of 541 additional vehicle movements are expected to be generated by the developments within the study area west of Latrobe Terrace during the peak hour and a total of 4,615 additional movements are expected across the weekday.

An assumption was made that all traffic generated will enter or leave from West Fyans Street, due to the nature of the surrounding arterial road network. Traffic entering from Shannon Avenue or Latrobe Terrace is likely, however it is expected to be negligible for the purposes of this study.

The study area was separated into sub precincts in order to understand the likely traffic generation to the nearby intersections of West Fyans Street. This was done using the spreadsheet model shown at Appendix D. This analysis is shown in the table, and the sub-precincts are shown in the figure below.

Note that this does not consider vehicle movements which are associated with existing developments which will be replaced. As such this assessment should be considered conservative on the high side. This is discussed in further detail later in this report.



Sub Precinct	Intersection West Fyans St and...	Peak Hour Traffic Increase (veh / hr)	Daily Traffic Increase (veh / day)
1	Bridge Rd ^[1]	N/A	N/A
2	Gregory Ave	67	667
3	Hampton St	170	1404
4	Pakington St	178	1386
5	Bloomsbury St	5	54
6	Boswell Ave	23	234
7	Woodstock St	17	155
8	Westbourne Pl	31	232
X	West Fyans St (frontages)	42	482
Total Additional Movements on West Fyans Street		541	4614

[1] No new development is expected in the next 20 years, however it is acknowledged that there may be some existing northbound traffic from Shannon Avenue which will use Marnock Road to avoid the intersection at West Fyans

6. Internal Road Network

Overview

Road Hierarchy

The road hierarchy for the internal road network was established by balancing the existing and future land uses with the known and predicted desire lines and capacities based on the existing characteristics.

The developed road hierarchy reflects the preferred movement of people throughout the network and guides objectives for the physical road characteristics and other design elements.

The road hierarchy also reflects the streets which are intended to give greater priority to particular users and recognises the varying levels of activity within different land uses of the overall structure plan area.

To the west of the study area there is a key focus on improving connectivity and permeability of the road network. In the area east of Latrobe Terrace, many of the roads exist on road reserves which are up to 30m wide, with good connection between roads as well as several access lanes (or Right-of-ways) which have resulted in minimal vehicle access points from property frontages.

As such, the achievable road cross sections differ between the areas on either side of Latrobe Terrace, resulting in different responses to the setting of road hierarchies.

Local Area Traffic Management

Given the implementation of the PSP will occur over an extended period of time, there will be consideration required to be given to the continuing needs of larger vehicle access to the area, both for construction and existing / continuing commercial and industrial uses. Given the existing future constraints of the study area to the west of Latrobe Terrace and lack of permeability of the road network, traffic volumes and speeds are unlikely to warrant local area traffic management treatments however should be considered to ensure a low speed environment to enable shared use of roads between vehicles and cyclists.

Furthermore, loading and delivery vehicle sizes for new mixed use and commercial developments should be specified in planning permits conditions.

Cross Sections

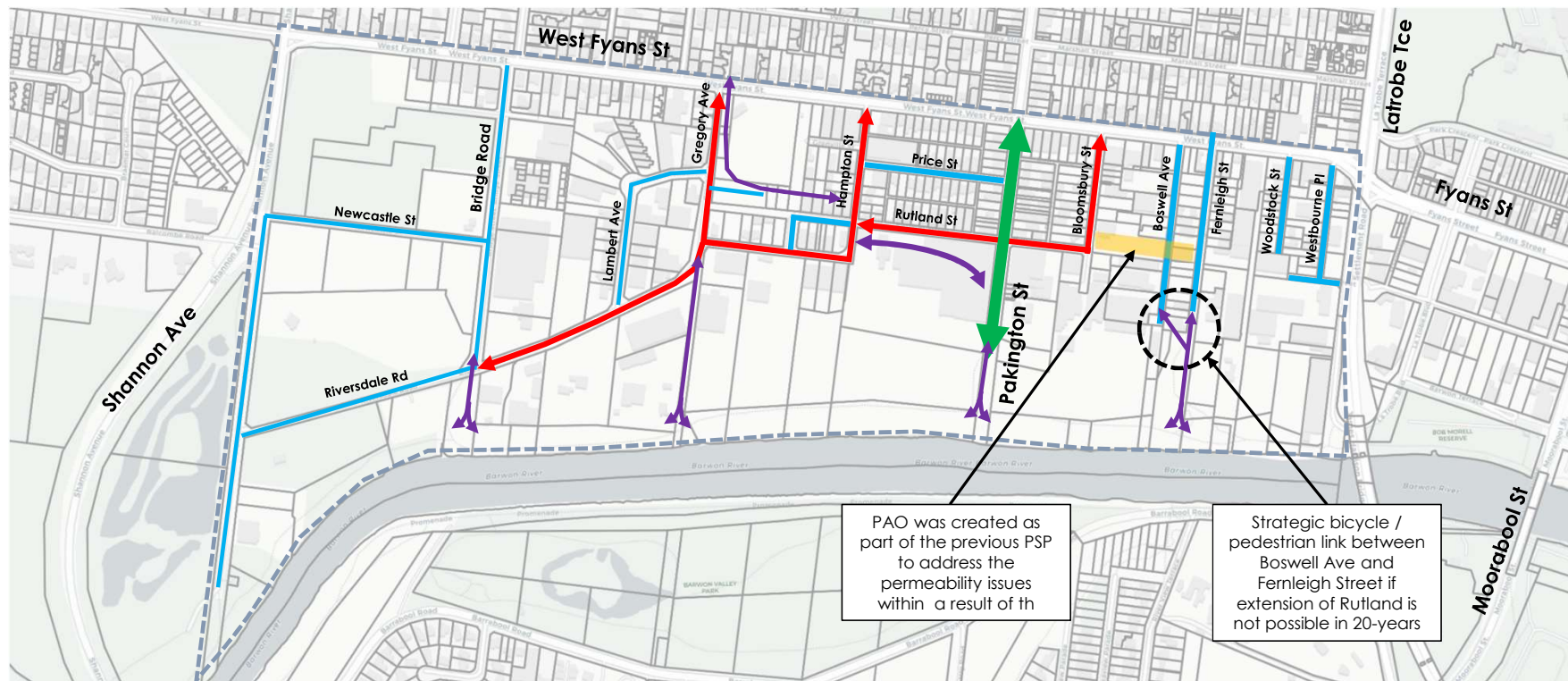
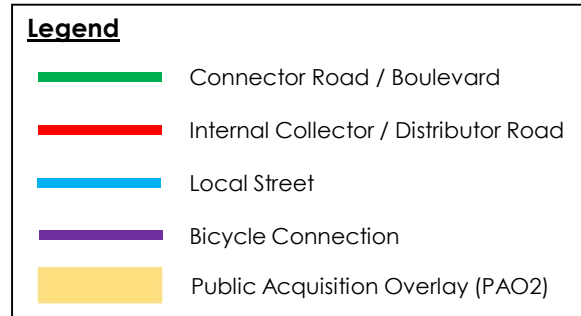
To inform the development of the cross sections (shown in Appendix E), a set of principles and objectives were developed using Austroads and VicRoads guidelines in conjunction with Precinct Structure Planning Guidelines developed by the Victorian Planning Authority and Growth Areas Authority. Given the existing constraints of the road reserve and limited opportunities to widen, the cross section seek to where possible address the modal priorities. As part of the development, there is identified need to remove parking to accommodate these changes. Further discussion regarding the cross sections, their objectives and impacts, is presented throughout the rest of this report.

Road Hierarchy – West of Latrobe Terrace

The future road network in the study area to the west of Latrobe Terrace will focus largely around Pakington Street given the concentration of future mixed-use developments which will generate trips throughout the day being located on Rutland Street. Vehicular traffic will likely travel on the arterial road network (West Fyans) as long as possible before entering the study area via Gregory Avenue, Hampton Street or Pakington Street and then into Rutland Street to reach their destination.

The future road network will provide permeable access to both pedestrians and cyclists through improved connections to the Barwon River.

It is noted that the existing PSP recommended signalisation of the intersection of West Fyans Street and Gregory Avenue. The existing and predicted volumes at this intersection would not currently justify signalisation and it is understood that VicRoads was also not supportive of such a proposal.

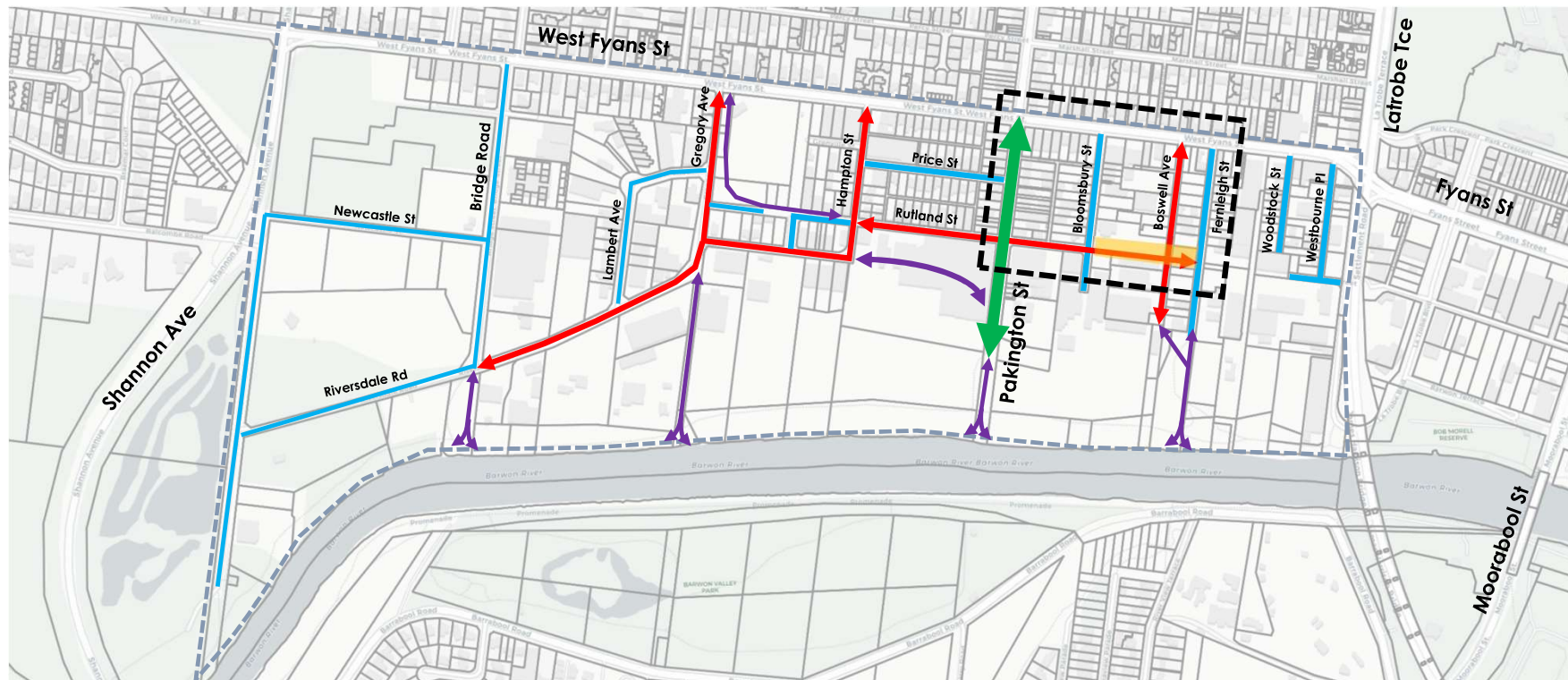
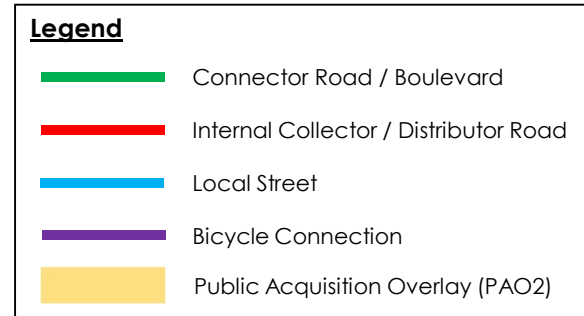


Rutland Street Extension

A Public Acquisition Overlay (PAO) currently existing over land which enables the extension of Rutland Street to the east between Bloomsbury Street where it currently ends, up to Fernleigh Street. The extension would significantly improve the permeability of the road network as there is currently insufficient space to turnaround in these streets.

It is noted that the 20-year land modelling scenario does not include any new development which would require access from Fernleigh Street. As such, it would be acceptable to develop the first section only between Bloomsbury Street and Boswell Avenue noting that this would not improve access towards the river for pedestrians and cyclists.

A full assessment of measures to improve accessibility to properties in this part of the PSP area is shown on the next page.



Options Assessment

The presence of the PAO and proposed land development scenarios requires consideration to be given to the permeability of the road network in the eastern section of the West Fyans part of the PSP. There are many possible combinations of new road connections, either allowed for under the existing PAO, or requiring a new PAO to be created. These can be limited to 3 major alternatives: the connection of Anne Street to Woodstock Street, the connection of Rutland Street from Bloomsbury Street to Fernleigh Street, and the full connection of Rutland Street to Latrobe Terrace.

The following outlines a broad assessment of the 3 options, including the advantages and potential disadvantages of each.

Option	Advantages	Disadvantages	Outcome
1. Connect Anne Street to Woodstock Street	- Improved permeability for residents of the area bounded by Woodstock Street, Westbourne Street and Anne Street - Crossing of the Barwon Grange driveway not required	- This connection alone would not have any benefit to other constrained areas of the PSP - It is noted that limited development is proposed for this area within the PSP - May encourage non-local through trips and the implementation of traffic management would like restrict residents too	The connection of Anne Street to Woodstock Street would create a limited benefit for a small number of residents.
2. Extension of Rutland Street to Fernleigh Street (existing PAO)	- Improved permeability for residents of Boswell Avenue and Fernleigh Street - Significantly improve pedestrian and cyclist access to the area via Fernleigh Street	- Crossing of Barwon Grange driveway required 'Dead-end' sections of Boswell Ave and Fernleigh Street will continue to provide a constraint to larger vehicles given lack of turning space	The connection of Rutland Street to Fernleigh Street would significantly improve permeability for residents to the east of Pakington Street.
3. Extension of Rutland Street through to Latrobe Terrace	- Provides accessibility for vehicles, cyclists and pedestrians available in all areas - Improved permeability may improve performance of arterial road network	- As per Option 2 plus; - Likely to encourage non-local through trips from Latrobe Terrace	The full connection of Rutland Street from Bloomsbury Street to Latrobe Terrace would enable full accessibility to the area from Latrobe Terrace, however this may create additional challenges with regards to non-local through trips.

Having regard to the above assessment, the implementation of both Option 1 and 2 would improve accessibility for residents while limiting non-local through trips. The implementation of option 3 would only marginally increase the benefits of Options 1 and 2, however this would likely result in unwanted traffic.

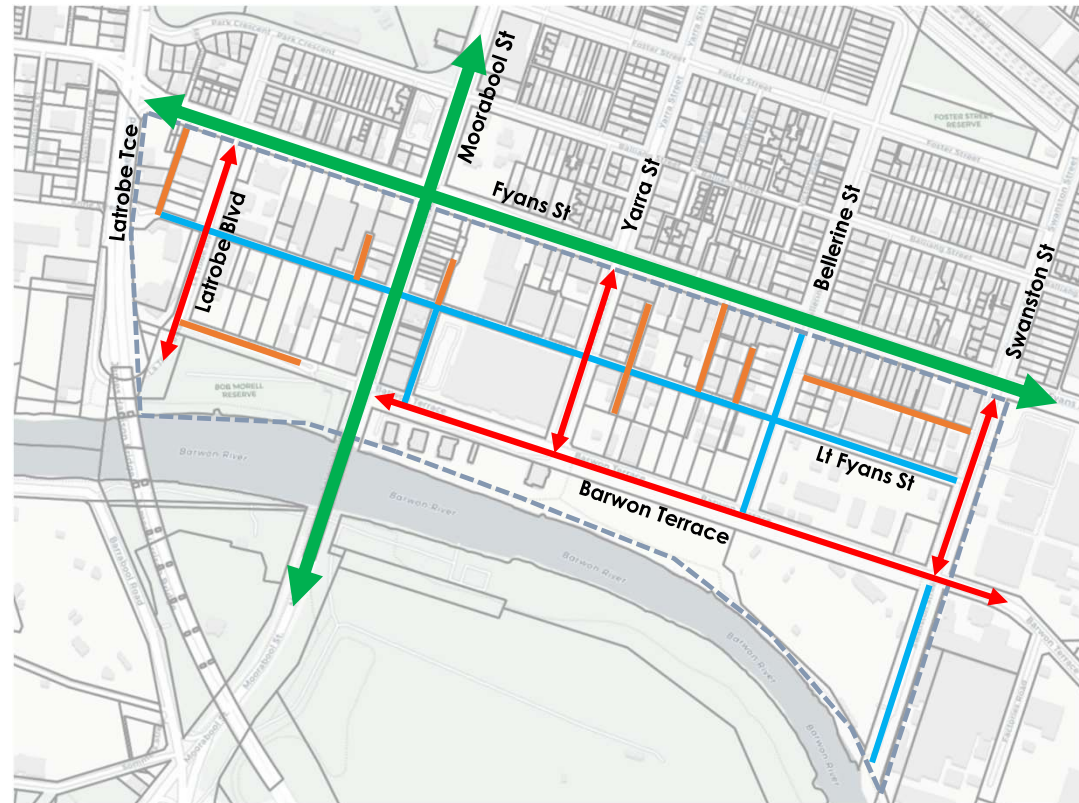
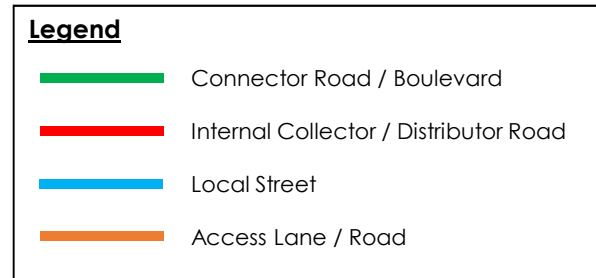
Road Hierarchy – East of Latrobe Terrace

The future road hierarchy to the east of the study area is generally consistent with existing conditions, noting that there was no land use modelling information provided. As such, the hierarchy and subsequent road cross sections were developed using an assumption that trip generation will not significantly change (noting that the south eastern corner of the study area is largely in a flood zone, therefore the majority of development would occur on higher ground to the west of Moorabool Street and towards Fyans Street on the east side of Moorabool Street).

The key changes to the existing road network include greater pedestrian and cyclist infrastructure on the connector and distributor roads to assist with access to Moorabool Street which will house the future southern cycling link from Wearn Ponds to Central Geelong.

A key issue and consideration will be the intersection of Barwon Terrace and Moorabool Street which is heavily utilised in the AM peak to filter traffic into Yarra Street and Swanston Street in the northbound direction. Although not related to future development in the study area, there is an identified crash history at this location which should be addressed. Any changes to the intersection should consider the permeability for residents to access the area from the south given the limited river crossings and impacts on the intersection of Fyans Street.

Pedestrian access routes are outlined on page 47.



Road Space Allocation

Overview

A set of cross sections were developed to address the needs of road users based on the land modelling in the 20-year scenario. As part of the process in determining the relevant allocation of road space, both Austroads guidelines and Australian Standards were utilised.

Given the existing layout and size of the road reserve within the study area, there were several constraints in allocating space to the relevant modes to ensure the principles of the network as determined in the road hierarchy. One option which may be available is to acquire land abutting the road reserve during subdivision however this would require all properties to be developed before the new road cross sections have been developed.

In developing the cross sections, both the movement and place characteristics were considered, as well as the future trip generation. The road hierarchy developed in the previous sections provides guidance on the movement function for each street based on trip generation, while the future land use modelling assists in understanding the required footpath.

Overall, the future road network can meet the requirements of all users based on the proposed cross sections which are presented throughout this section. In order to achieve this, there will be a trade-off required in some narrow streets to lose on-street car parking on one side of the street to allow efficient traffic flow and bicycle safety.

Cross sections for key roads incorporating the principles and objectives for the PSP are shown at Appendix E. These cross sections are to be read and used in conjunction with the road and modal hierarchy plans shown throughout this report.

Principles / Objectives

Pedestrians

- DDA footpaths provided on both sides of all streets
- Minimum 1.5m wide pedestrian paths, and 1.8m where there is no opportunity for a landscaping buffer
- On high volume roads, minimum 2.4m wide pedestrian paths where there is no opportunity for landscaping buffer
- Absolute minimum 1m clearance at obstructions such as utility and lighting poles

Bicycles

In accordance with Austroads Guidelines:

- Desirable width for on-road bicycle lanes is 1.5m, reduced to 1.2m where there are road width constraints
- Off-road shared paths to be a minimum 3m with a directional split
- Where a segregated on-road bicycle path cannot be provided, vehicle speeds should be reduced to 20-30km/h through the use of traffic calming devices

Carriageways

- Local access streets – minimum 5.5m wide carriageway with parking on one side only
- Internal collector / distributor road – 7.3m with parking on both sides and designated passing opportunity areas where there are lack of side roads or property access.
- Connector roads – 3.5m lanes in each direction with bicycle lane, or 4.2 shared lanes

7. Sustainable Transport Network

Active Transport

Walking

The walkability of the future study area will be constrained mostly by the existing road network. However, there are several opportunities to improve pedestrian connections in larger developments.

As was identified, West Fyans and Fyans Street are both barriers to pedestrian movements to access public transport stops and other facilities. The implementation of pedestrian crossing infrastructure will assist in improving the uptake of walking trips in the future by improving perceived and real safety issues along the arterial road network.

It is anticipated that the majority of trips made by walking will be contained within the study area towards the retail and eatery establishments. Other trips outside of the study area may be undertaken to the railway station and central Geelong, or Pakington Street shopping precinct from the east and west sides of Latrobe Terrace respectively.

Improvements to pedestrian infrastructure within the study area are shown in the following section.

Accessibility

Accessibility within the study area, in particular to the west of Latrobe Terrace is very poor. This is compounded by the steep embankments which make it difficult for mobility restricted people to reach Fyans or West Fyans Street.

Given that sightlines are also poor in the area to the west of Latrobe Terrace, additional consideration should be given to ensuring that streets are well lit in the evening, including the Barwon River path, given its inclusion as a key pedestrian and cycling route.

Cycling

It is expected that the majority of the trips which are generated from within the area will be towards central Geelong or the railway stations. There may also be an opportunity for school-aged children to cycle to school but this would be dependant on the uptake for families.

As such, key consideration in the future cycling network within the study area should be given to getting residents to the surrounding Principal Bicycle Network which includes the Barwon River, Swanston Street and Moorabool Street, including sections of Fyans Street and West Fyans Street.

It is not expected that cycling volumes will exceed more than 100 movements in one day on any of the interior roads in the study area (not including the principal bicycle network).

Given the low speed environment and estimated vehicular traffic, in most occasions it will be appropriate for bicycles to share with vehicles on the road in accordance with the Austroads Guidelines.

Improvements and infrastructure for cycling in the study area are shown within the following section.

Access to Public Transport

Bus Network

The Public Transport Victoria Guidelines to Land Use and Development were reviewed with regards to the potential inclusion of a new bus route through the study area in the future land use scenarios.

In the study area west of Latrobe Terrace existing road reservation widths, which are shown in Appendix B are not suitable to accommodate bus movements and as such, a bus route in the future is not appropriate. It was noted earlier that all the existing land use within the area is within 400m of the nearest bus stop. However, it is noted that due to the gradient of some of the roads, in particular Bridge Road and Gregory Avenue, the bus stops along West Fyans Street may not be DDA compliant with regards to the gradient of footpaths between the future residential dwelling near the river end, and the bus stops.

It is noted that while there is a gap within the bus network in the area between Bellerine Street and Swanston Street, the existing PSP regards this as being a buffer between future residential to the west and the existing industrial / commercial land uses to the east. However, consideration should still be given to advocating for a future bus route which connects Fyans Street to Central Geelong and the eastern suburbs, which would also improve access to South Geelong Railway Station for residents and workers in the east.

Bus Stops

Although the current practices are to place shelters in the 'city-bound' directions, it is recommended that bus stops on both sides of the street are fitted with shelters in order to encourage travel towards Highton, Belmont and Waurn Ponds (Deakin University) activity centre areas. The existing location and spacings of bus stops are currently sufficient however there is opportunity to improve access by locating stops closer to pedestrian linkages from the study area, noting there is need to consider the existing locations with regards to occupants to the north of Fyans Street. The existing pedestrian network is shown on page 20.

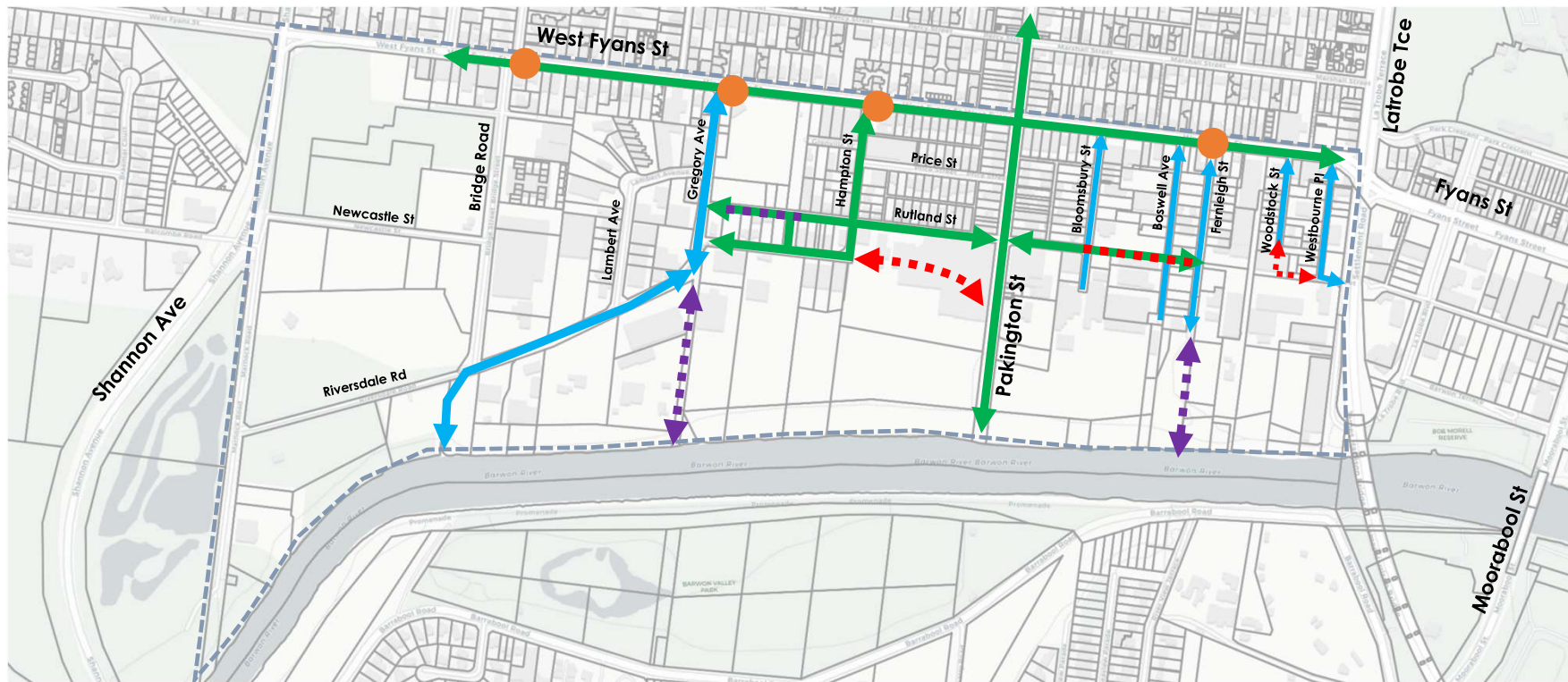
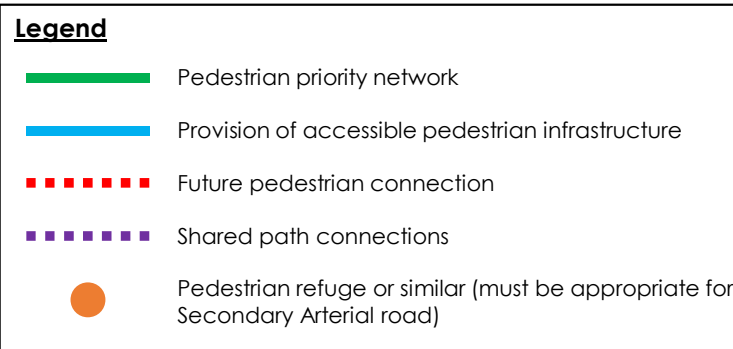
South Geelong Railway Station

Particularly in the study area to the east of Latrobe Terrace, pedestrian and cyclist access to South Geelong Railway Station should be prioritised with regards to safe and amenable access. While South Geelong is currently a park and ride station, car parking is already at capacity and walking and cycling infrastructure must be future proofed to ensure this service is maximised and vehicle ownership rates decrease.

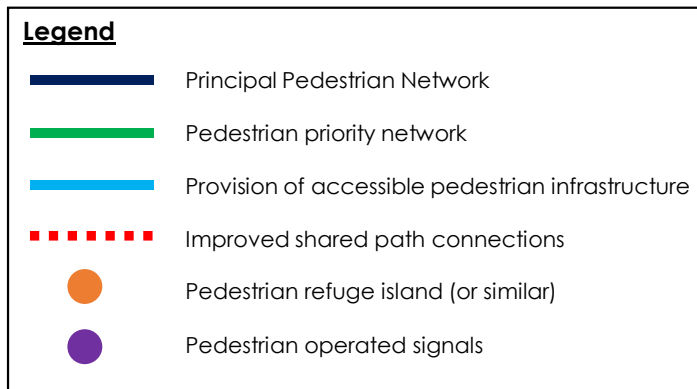
It is also noted that the Regional Network Development Plan (TfV, 2017) aspires to run trains on a 20-minute frequency between Melbourne and Waurn Ponds, including duplication of the existing section of railway between South Geelong and Waurn Ponds. This will allow more frequent bus services to operate on the network as services will be able to terminate at other stations.

Details of the proposed access and amenity improvements for pedestrian and cyclist access are shown in the following section.

Pedestrians – West of Latrobe Terrace



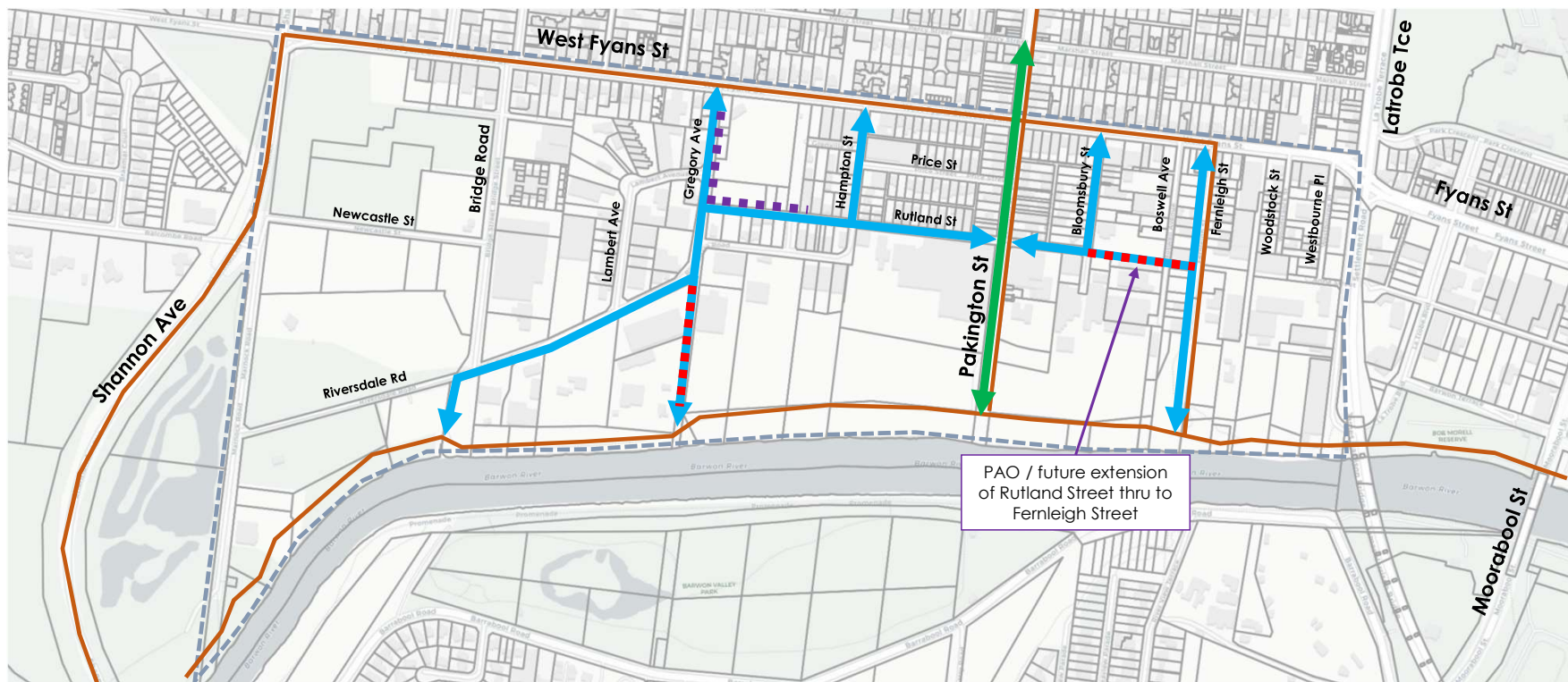
Pedestrians – East of Latrobe Terrace



Cycling – West of Latrobe Terrace

Legend

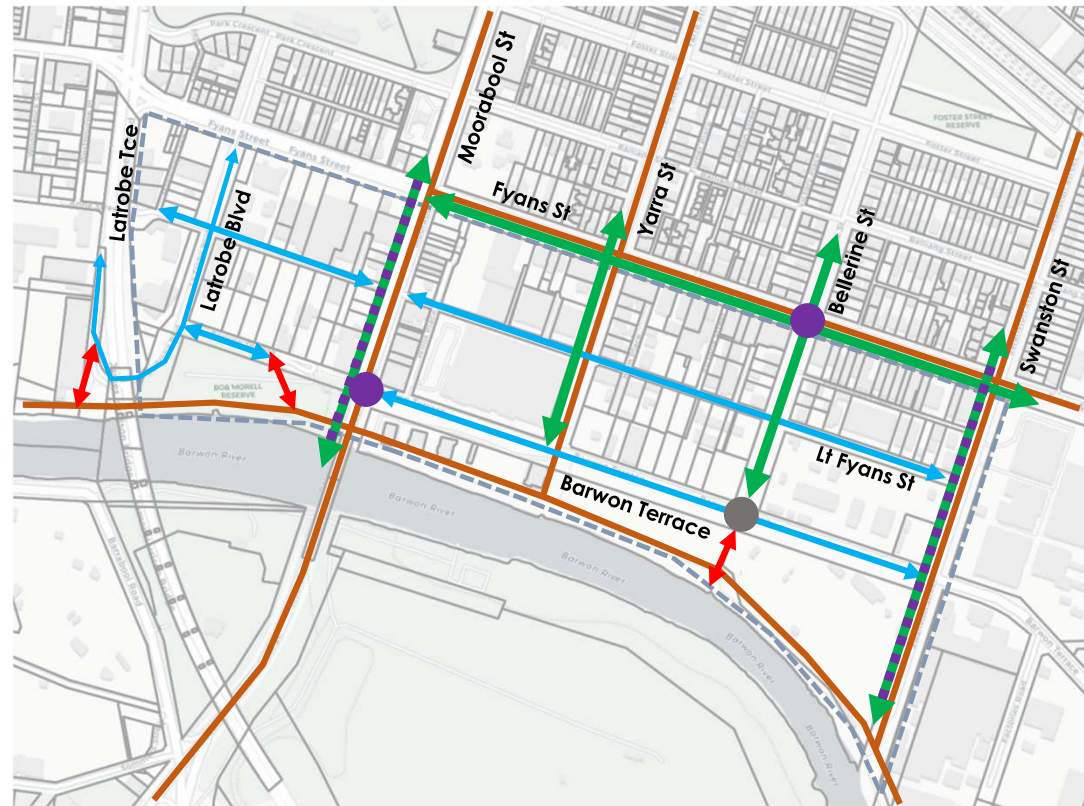
- Principal Bicycle Network
- Separated bicycle lanes
- Shared bicycle / vehicle roads
- - - Future road connection
- - - Bicycle priority / shared path



Cycling – East of Latrobe Terrace

Legend

- Principal Bicycle Network
- Separated bicycle lanes
- Shared bicycle / vehicle roads
- Bicycle priority / shared path
- Signalised bicycle crossing point
- Unsignalised bicycle priority crossing
- Improved connection to river path



8. Traffic Impacts

Traffic Impacts

Introduction

Based on the earlier identified distributions of additional traffic across the study area, further consideration (and traffic modelling) has been focussed to roads where a more significant change could be expected to occur being:

- Hampton Street (additional 170 vehicle movements in the peak hour)
- Gregory Street (additional 67 vehicle movement in the peak hour)
- Pakington Street (additional 178 vehicle movements in the peak hour).

All other roads are expected to experience minor growth of less than 50 vehicle movements per hour. When considering such volumes across entry and egress movements and left and right turn movements the level of change to anyone movement would be expected to be low and able to be accommodated within the road network.

Traffic analysis undertaken in the following must also be considered in the context that traffic volumes currently on the road network associated with existing development that will be replaced in the future (by new residential and commercial development within the precinct) has not been removed from the base traffic flows. As such an element of double counting exists in the following analysis making the analysis conservative on the high side.

In regard to the above listed intersections the following further commentary is provided.

Hampton Street

This intersection is likely to experience the largest impact (of the 3 listed) given its unsignalised nature and the level of additional traffic that may be generated through it. It is however noted that existing base traffic volumes were not collected of the intersection of Hampton Street with West Fyans Street. Volumes were however collected of the intersection of Gregory Street and West Fyans Street which is understood to carry higher traffic flows of the two intersections. As such the higher levels of traffic generation of Hampton Street will be overlayed with the higher base traffic flows of Gregory Street to provide a work case outcome.

Gregory Street

Given that the higher generation of additional traffic on Hampton Street will be imposed on the base Gregory Street traffic flows (as discussed above), further consideration of this intersection would not specifically be required.

Pakington Street

The Pakington Street intersection with West Fyans Street currently forms a signalised cross intersection. Having regard to the distribution of traffic volumes between entry and egress movements and left, through and right turn movements, on average an additional 30 vehicle movements could be expected to be generated on any one movement at the intersection across the peak hour. Assuming a 120 second cycle time for the intersection this would equate to an additional one vehicle movement per signal cycle being generated to intersection turning movements. On this basis and having regard existing volumes that may be removed from this intersection, the already signalised nature of the intersection and the limited ability to augment the intersection design, further intersection analysis would not be considered required.

Hampton Street – Existing Conditions

As discussed, the intersection of Hampton Street and West Fyans Street is expected to have the largest growth and impact of any of the intersections with West Fyans Street within the study area.

The intersection is currently controlled with a give-way sign with West Fyans Street being the major road. A bus stop exists on the northern side of the intersection which currently allows traffic to pass waiting right turn traffic in the east bound direction, except for when the bus stop is occupied.

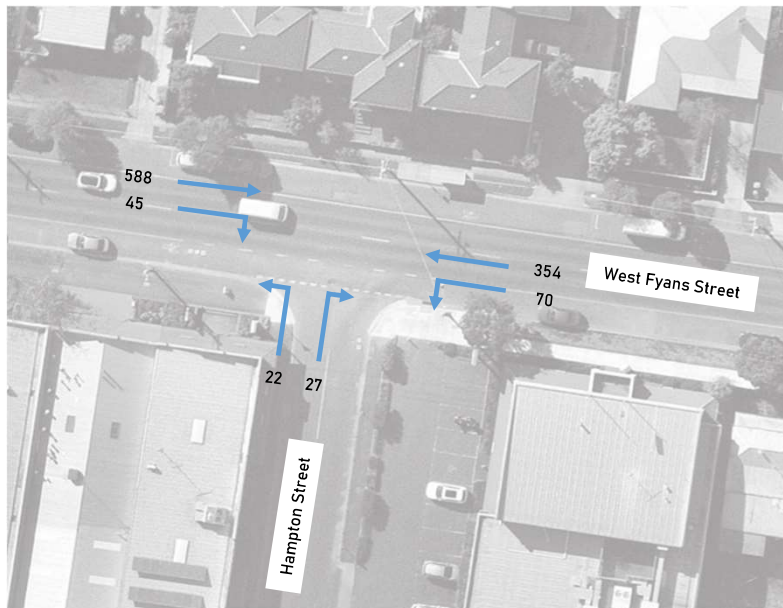
As discussed, the volumes shown in the below figures were taken from Gregory Avenue, which is understood to currently carry high volumes of traffic than Hampton Street.

Observations in the AM and PM peaks found the intersection to function satisfactorily on all approaches.

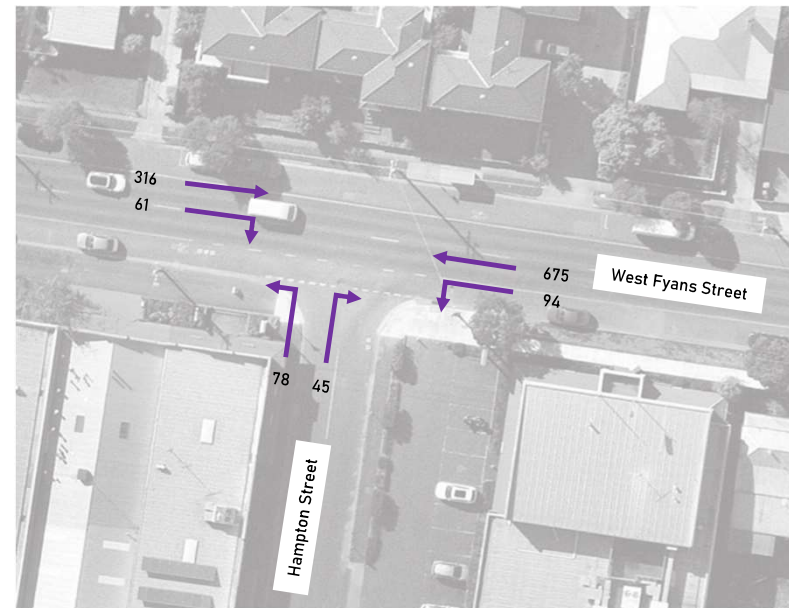


Hampton Street looking north towards West Fyans St

AM Peak – Existing



PM Peak – Existing



Hampton Street – Traffic Impacts

20-year scenario volumes

As established using the traffic generation rates determined in the previous sections, and the land modelling data provided by Council, the intersection of Hampton Street and West Fyans Street is expected to generate an additional 170 vehicle movements within the AM / PM peak periods with a total of 1404 vehicle movements expected over the day.

During the peak period, it is expected that the 170 additional vehicle movements will comprise of 120 movements associated with new residential land uses and 50 from additional commercial land uses.

Additionally, there will be traffic placed on West Fyans Street due to the increase in land uses throughout the entire study area. However it is noted again that these increases do not account for the reduction in traffic movements associated with existing land use which is redeveloped. As such for the purpose of this analysis and to avoid excessive conservatism, it has been assumed that such increases along West Fyans Street may be balanced by reductions in existing traffic generation. As such, growth has not been applied to through traffic volumes on West Fyans Street.

Volume distribution

Further developing the assumptions made earlier in the study with regards to the expected trip generation characteristics, the in / out splits for vehicular traffic within the AM and PM peaks are shown within the table below.

	% AM in	% AM out	% PM in	% PM out
Residential	20%	80%	60%	40%
Commercial	100%	0%	0%	100%

Applying these in / out splits to the expected traffic generation is shown within the table below:

	Total	% AM in	% AM out	% PM in	% PM out
Residential	120	24	96	72	48
Commercial	50	50	-	-	50
Total	170	74	96	72	98

Directional Split

Based on existing traffic volumes of vehicles entering and exiting the study area at Gregory Street and Pakington Street, it has been considered appropriate that a 50/50 east west split be assumed for all movements approaching and leaving Hampton Street.

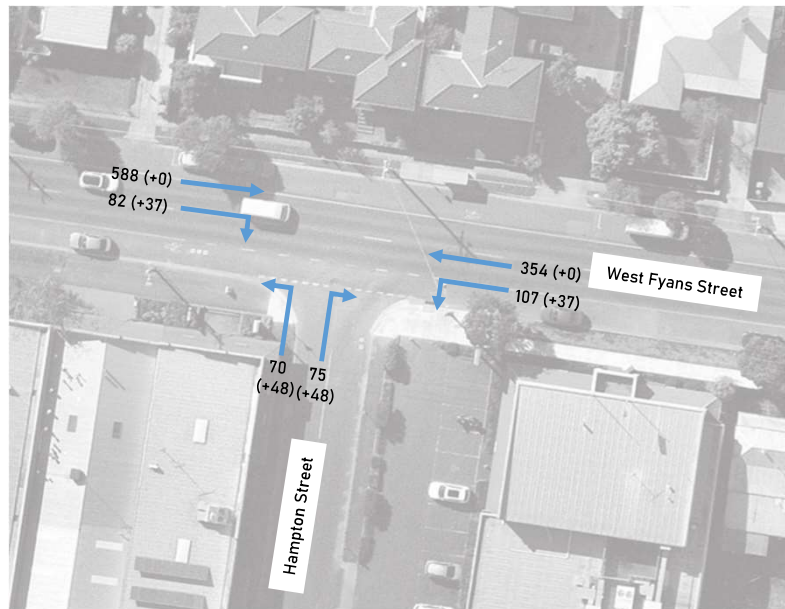
	AM	PM
East	50%	50%
West	50%	50%

Hampton Street – Post-Development Conditions

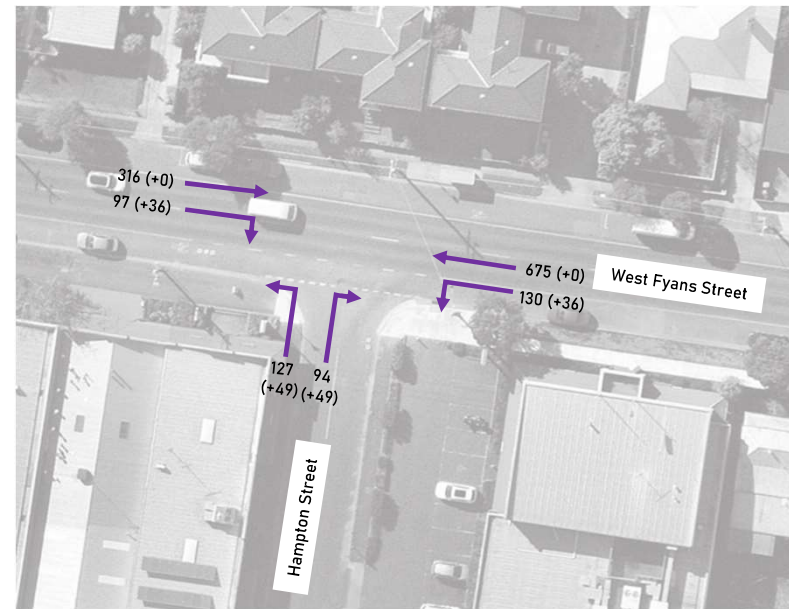
Applying the volumes and assumed directional splits outlined on the previous page, the following figures outline the expected future traffic volumes in the 20-year scenario post development conditions based on:

- Existing base volumes at the intersection of Gregory St and West Fyans Street
- Additional in and out traffic volumes based on the traffic generation rates of new land uses based on land modelling data provided by Council for the 20-year scenario

AM Peak



PM Peak



Hampton Street – SIDRA Results

As discussed, the intersection of Hampton Street and West Fyans Street is expected to have the largest growth and impact of any of the intersection with West Fyans Street within the study area.

The impact of the development traffic upon the proposed site access points was assessed using *SIDRA INTERSECTION 7^[1]* (traffic modelling software tool). On the basis of the turning movement estimates presented on the previous page, the following tables present a summary of the anticipated future operation of the intersection of Hampton Street and West Fyans Street in the 20-year scenario post development case. Detailed results of this analysis are provided in Appendix F of this report.

Existing Conditions – AM/PM Peak

Peak Hour	Approach	DOS	Average Delay (sec)	95 th Percentile Queue (m)
AM	Hampton St (South)	0.10	11 sec	2 m
	West Fyans St (East)	0.24	1 sec	0 m
	West Fyans St (West)	# 0.37	1 sec	5 m
PM	Hampton St (South)	0.27	13 sec	7 m
	West Fyans St (East)	# 0.43	1 sec	0 m
	West Fyans St (West)	0.27	4 sec	10 m

DOS = Degree of Saturation, # = Intersection DOS

20-Year Scenario – AM/PM Peak

Peak Hour	Approach	DOS	Average Delay (sec)	95 th Percentile Queue (m)
AM	Hampton St (South)	0.31	13 sec	9 m
	West Fyans St (East)	0.25	1 sec	0 m
	West Fyans St (West)	# 0.41	2 sec	11 m
PM	Hampton St (South)	# 0.55	17 sec	19 m
	West Fyans St (East)	0.45	1 sec	0 m
	West Fyans St (West)	0.34	6 sec	17 m

DOS = Degree of Saturation, # = Intersection DOS

[1] Program used under license from Akcelik & Associates Pty Ltd.

[2] SIDRA INTERSECTION adopts the following criteria for Level of Service assessment:

Level of Service		Intersection Degree of Saturation (DOS)		
		Unsignalised Intersection	Signalised Intersection	Roundabout
A	Excellent	<=0.60	<=0.60	<=0.60
B	Very Good	0.60-0.70	0.60-0.70	0.60-0.70
C	Good	0.70-0.80	0.70-0.90	0.70-0.85
D	Acceptable	0.80-0.90	0.90-0.95	0.85-0.95
E	Poor	0.90-1.00	0.95-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0	>=1.0

Traffic Impacts – Findings

Hampton Street and West Fyans Street

With regards to the SIDRA analysis of the intersection of Hampton Street and West Fyans Street, a DOS of around 0.95 for signalised intersections and 0.90 for unsignalised intersections has traditionally been considered the practical limit beyond which intersection performance is unsatisfactory, as beyond this value queues and delays increase disproportionately.

On this criterion, the calculated intersection DOS of 0.41 and 0.55 in the AM and PM peaks respectively, suggests that the intersection can be expected to operate satisfactorily following full development of the study area in the 20-year scenario.

While the analysis indicates the intersection will operate satisfactorily, if demand warranted, Council and VicRoads could in the future consider implementing localised parking bans along West Fyans Street to facilitate the provision of a more formal right turn lane in Hampton Street. Such a facility would provide capacity improvements at limited cost and without the need for land acquisition.

As was established at the beginning of this section, the intersection of Hampton Street with West Fyans Street was considered to be the intersection with the highest likelihood of performing unsatisfactorily in the future, based on the existing traffic volumes and additional traffic generated by new land uses.

It is noted that the analysis conducted was very conservative given that existing traffic volumes at the intersection of Gregory Avenue were used to establish the base case, although much of this traffic will disappear as the land uses are removed and replaced with the future developments. A look at the land modelling data provided by Council suggests that this could be in the order of up to 80% of existing land use redeveloped in this sub-section within the 20-year scenario.

Other Intersections

As such, it is expected that the existing traffic management within the study area and intersections with West Fyans Street should be able to function satisfactorily with regards to a capacity and efficiency perspective into the future in the 20-year scenario.

Potential Future Signalisations

It was noted that in VicRoads response to the previous parking and traffic study for the area that the signalisation of the intersection of Gregory Avenue and West Fyans Street was rejected due to the proximity between other signalised intersections at Pakington Street and Shannon Avenue.

It is noted that Hampton Street is closer to Pakington Street than Gregory Avenue and as such, it would be unlikely to gather any support, especially noting that the assessments undertaken in this section show that the intersections will be able to continue functioning satisfactorily in the future.

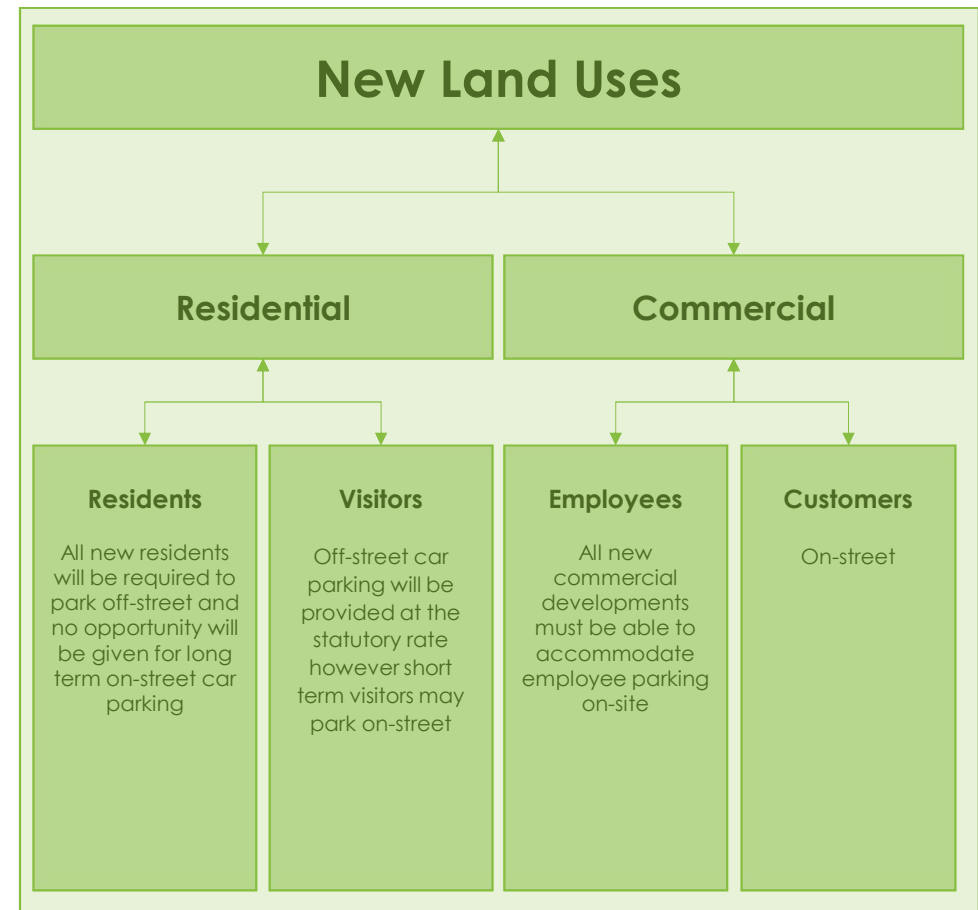
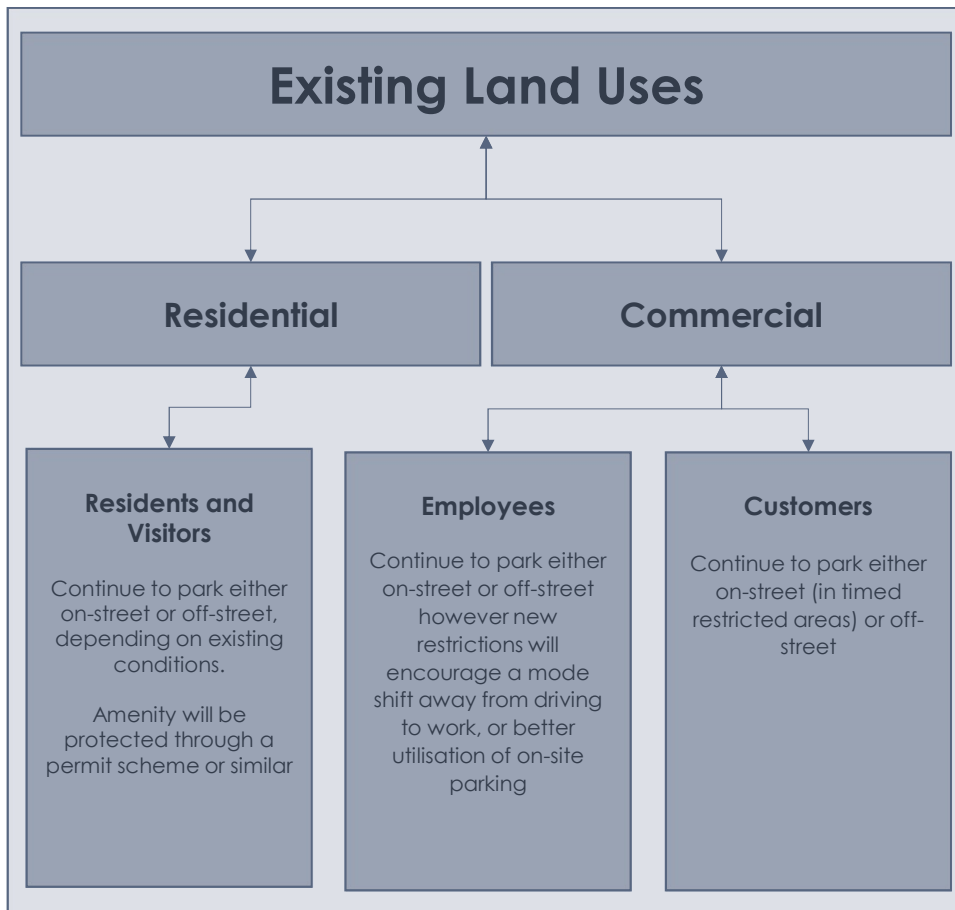
The PSP should be updated to reflect that the signalisation of Gregory Avenue is no longer required.

9. Car Parking

Parking Allocation

In order to consider future parking provisions for the study area, a number of fundamental car parking allocation principles should be established. These principles relate to both existing and new land uses and are described below.

The allocation of car parking is relevant for the study area on both the eastern and western sides of Latrobe Terrace.



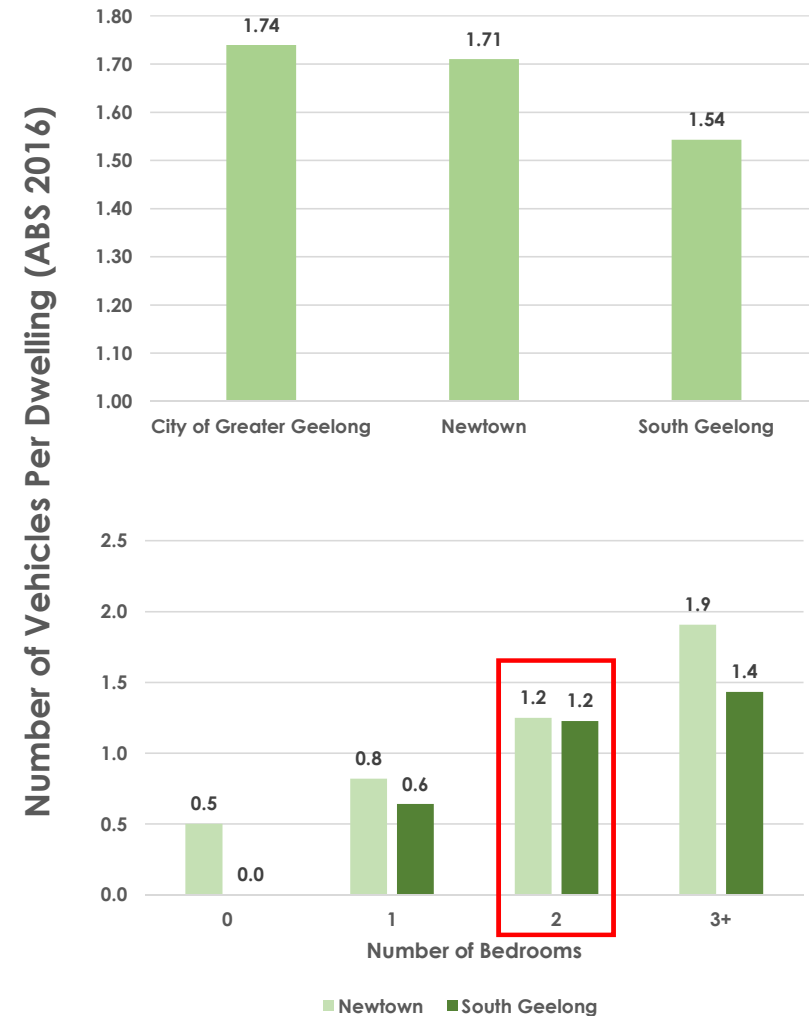
Travel Characteristics – Vehicle Ownership

The existing vehicle ownerships for the whole of Greater Geelong and the study area are shown in the adjacent figures.

For 2-bedroom dwellings within Newtown and South Geelong, which represent the west and east areas of the study area respectively, the existing vehicle ownership rate is 1.2 vehicles per dwelling. The existing areas of Newtown and South Geelong have abundant access to on-street parking and in areas closer to the South Geelong Railway Station, there are timed restrictions to discourage non-residents.

As noted in the earlier section, there is a high rate of car trips made by driver or passenger highlighting the reliance of the private motor vehicle in Geelong. The future mode shift aspirations of Geelong will largely require car parking to act as a travel demand management tool, in conjunction with public and active transport links.

As such, a vehicle ownership rate which aligns with, or is lower than the statutory rate of 1 car space to each 1 and 2 bedroom dwelling and 2 car spaces to each 3 or more bedroom dwelling, should be targeted and is expected to be achievable by management of parking provisions and allocation for both residential and commercial uses.



Car Parking Provisions

Residential

As mentioned previously, future residents in the area will not have an opportunity to park on-street and all car parking will be restricted to on-site. For the purposes of this assessment, the existing statutory rates were utilised. Further discussion about the future parking provision rates will be included in the parking study report.

The existing statutory parking requirements for the future residential dwellings are set out below in Table 5.

A rate of 0.1 car parking spaces per dwelling was used for on-street car parking based on empirical data.

Description	Use	Statutory Parking Rate
Apartments	Dwelling (Residents)	1 space per one or two bedroom dwelling 2 spaces per three+ bedroom dwelling
	Dwelling (Visitors)	1 space per five dwellings

Commercial

The empirical car parking rates used in the model for future commercial land uses are based on the details provided by Council. A rate of 1.2 space per 100 sqm was used to determine the future parking generation, as shown in the adjacent table

	Staff Parking	Customer Parking	Unit
Statutory Rate	4		/100 sqm
% of total	20%	80%	of vehicles
Portion of Statutory Rate	0.8	3.2	/100 sqm
Mode (Car)	50% [1]	25% [2]	arriving by car
Mode (Other)	50%	75%	arriving by mode other than car
Resultant Empirical Rate	0.4	0.8	/100 sqm
Overall Empirical Rate	1.2		/100 sqm

[1] Based on Clever and Creative Future vision of 50% of all trips made by mode other than car

[2] Based on 25% of customers and visitors arriving from outside of the area, all by car and 75% being walk up from within the study area and nearby locations.

Results – Car Parking

A spreadsheet model was developed to calculate the additional future car parking demands using empirical and statutory data. A copy of the spreadsheet model is attached to this report at Appendix D.

The future additional visitor and customer demands generated by the increase in the number of dwellings and commercial land uses were added to the existing demands to quantify the future shortfall or surplus of on-street car parking in the future, based on existing supply and demand characteristics. The 'supply' figures do not include the loss of parking spaces from formalising the street cross-section as this will be dependent on the detailed design.

As per the earlier identified parking allocation principles, it is assumed that resident and staff parking would be provided on individual development sites.

A summary of the future demands and surplus / shortfalls are shown in the table below.

	Precinct A	Precinct B	Precinct C	West Fyans (frontages)
Total on-street car parking supply	368	204	162	129
Existing available on-street car parking (peak time)	215	51	45	23
Future visitor demand	5	44	31	11
Future customer demand	0	46	46	0
Difference	+210	-39	-32	+12
Total				+151 (surplus)

The analysis showed that in both Precinct B and Precinct C there would be a potential shortfall of on-street car parking of 39 and 32 spaces respectively. Across the entire study area west of Latrobe Terrace there would be an expected surplus of 151 car parking spaces, noting that the majority of these would occur to the west, where there is currently minimal development. Despite this, there is still an opportunity for vehicles to spill over into the surrounding parking precincts and then walk to their destination. People are generally willing to park on-street and walk up to 300m to reach their final destination, although this is dependant on a number of variables.

Furthermore, the above model does not include possible credits for existing on-street car parking associated with land uses which will be redeveloped from commercial to residential and thus increasing the availability of on-street parking when these uses disappear. This analysis is considered in the following page.

A Changing Land Use and Car Parking Demand

The existing land uses and floor areas for the study area were provided by Council in GIS format. It is noted that there will be significant reduction of existing commercial floor space within the study area, for which demand will also decrease for car parking as these uses cease. In order to determine the reduction in car parking demand associated with the changing land use and activities, an existing empirical rate for on-street car parking in the study area was estimated.

Utilising the existing on-street car parking demands and commercial land use floor areas, a rate of 0.39 spaces / 100m² was calculated for on-street car parking. Empirical rates for similar land uses (light industrial) from the GTA database are in the order of 0.8 – 1.2 spaces / 100m². As such, the existing on-street parking generation rates appears to be 1/3 to 1/2 of the total demand for parking (both on and off-street) which is consistent with our expectations and observations of on-site parking within the study area.

A key assumption in developing this rate was that existing dwellings in the area were storing vehicles off-street during the day and on-street demand was likely to occur outside of the peak period, which was determined to be 11am across the study area west of Latrobe Terrace.

This on-street rate of 0.39 spaces / 100m² was then applied to the land uses which are expected to be redeveloped in the future. Assuming a total floor space of approximately 50,000m², it could be expected that there would be a reduced demand of 195 car parking spaces in the future scenario, before new land uses were applied.

Existing Commercial / Industrial Floor Area	130,627 sqm
Existing Car Parking Demand	510 vehicles (@ 11am Thurs)
Existing on-street parking demand rate	0.39 vehicles / 100 sqm
Reduction in existing land uses (20 year scenario)	49,786 sqm
Reduction in future on-street parking demand	195 spaces

	Precinct A	Precinct B	Precinct C	West Fyans (frontages)
Status quo scenario	+210	-39	-32	+12
Reduction in future on-street parking demand	-19	-122	-53	-0
Estimated surplus / shortfall	+229	+83	+21	+12

Proposed Cross Sections: Impact on Parking

The implementation of cross sections as outlined in Appendix E, will result in a loss of on-street car parking within the study area. Formalisation of kerbing and roadside areas (including Fryers Reserve) may have significant impact on parking supply. While these demands have been included in existing demands, much of this could be considered as currently illegal parking. Notwithstanding, consideration must be given to these demands and subsequent loss of parking under future conditions. The removal of car parking in these areas will be critical to ensure that streets are able to be places in their own right (rather than just for the movement of cars), with adequate infrastructure to support a connected and walkable neighbourhood.

The removal of parking on one side of the road in various areas will result in a loss of approximately 50% of car parking in these streets. Three (3) streets were identified in the proposed cross sections as having on-street parking removed from one side to facilitate other modal priorities including: Pakington Street, Rutland Street, and Hampton Street.

A broad level assessment of the number of spaces which could be lost was undertaken, and is shown in the adjacent tables. The application of the cross sections to these three streets found that there will be adequate car parking supply to accommodate for the future estimated demands.

	Pakington Street	Rutland Street		Hampton Street
Precinct	B	B	C	B
Current on-street supply (spaces)	78	42	19	25
Future on-street car parking supply - 50% reduction (spaces)	39	21	9.5	12.5

	Precinct A	Precinct B	Precinct C	West Fyans (frontages)
Estimated surplus / shortfall (after land credits)	+229	+83	+21	+12
Reduction in on-street supply	No change	-73	-10	No change
Adjusted estimated surplus / shortfall	+229	+10	+11	+12

Car Parking – East of Latrobe Terrace

The parking supply characteristics of the study area east of Latrobe Terrace are greatly different to the west of area, mainly due to the wider road reserves and more efficient layout of the road network. However, the same principles for the allocation of car parking should apply to both areas as they are based on the mode split aspirations, rather than the existing supply characteristics.

On the basis of the existing PSP, there does not appear to be any major increases in floor area. The existing on-street car parking supply is expected to be sufficient to accommodate for future growth or redevelopment. Furthermore, in contrast to the study area to the west of Latrobe Terrace, it is unlikely that there will be any loss of on-street car parking to accommodate future pedestrian or cycling links through the area, with the exception of Barwon Terrace between Moorabool Street and Yarra Street. The existing supply and demand characteristics during the peak time of the day are shown in the table below.

Further to the above, given the proximity to Central Geelong and South Geelong Railway Station, there is a greater opportunity to reduce car usage and ownership for new residents based on existing travel characteristics of the area. The future southern bicycle link which will connect Moorabool Street to Central Geelong will also encourage a greater uptake in active transport usage, including employees from both new and existing commercial land uses.

	Latrobe Terrace to Moorabool Street	Moorabool Street to Bellerine Street	Bellerine Street to Swanston Street	Fyans Street
Total on-street car parking supply	221	348	265	210
Existing on-street car parking demand (peak time)	180	270	183	205
Existing available on-street car parking (peak time)	41	78	82	5

Car Parking Strategy – Recommendations

Having regard to the above discussions, the following strategic directions can be established with respect of the provision of car parking within the study area.

- i. On street parking should over time throughout the study area be controlled with short stay time restrictions to prioritise this parking to customer and visitor parking. A precinct parking management plan could be implemented street by street as new developments commence use.
- ii. To maintain access for existing residents of the area that do not historically have access to on-site parking, a permit policy should be applied to provide exemptions for these users from short term restrictions.
- iii. Access to on-street parking permits for new residents should not be allowed with the responsibility of new developments to provide for their own parking needs.
- iv. The existing on-street demands indicate currently some parking capacity which would be expected to increase over time as existing land uses which currently rely on on-street parking are replaced. It is noted that the availability of on-street parking may also reduce over time as street cross sections are further formalised with pedestrian and cycle facilities enhanced in preference to parking opportunities.
- v. It is noted that having regard to the availability of on-street parking and the future demands for public parking (residential visitor and retail customer) there does not appear to be a significant warrant for Council to invest in developing parking options to accommodate future development demands that could be funded by cash contributions.
- vi. New developments should therefore be responsible for providing parking within their own development, particularly for long stay users.
- vii. Reductions from statutory requirements could be considered on a case by case application based on the availability of on-street parking and any credits which exist from the existing land use. It should however be noted that reliance on on-street parking to support long stay parking users (such as staff and residents) should not be supported given the expectation of future time restrictions being applied.
- viii. Reductions in resident car parking provisions could be considered by Council on the basis that:
 - i. On-street parking restrictions would be expected to be time restricted, limiting the ability for residents to use this parking
 - ii. Residents are not able to obtain access to an on-street parking permit.
 - iii. It aligns with the aspirational mode-share targets (50% of all journey-to-work trips into Central Geelong by non-car modes) outlined in *A Clever and Creative Future*.
- ix. In order to transition parking in the area away from commuter and future resident parking (to support shorter term stays by visitors and customers), the planning scheme should include this strategy as a policy direction.

10. Conclusions and Recommendations

Conclusions

Having regard to the above discussions, the following summarises key conclusions drawn from this study:

- i. Future development of the overall study area is likely, however land use predictions and growth is currently focussed on areas west of Latrobe Terrace.
- ii. Predicted land use growth for the study area is expected to generate in the order of 1,000 additional trips in the peak hour, being made up of a mix of car, walking and cycling trips.
- iii. The City of Greater Geelong's "A Clever and Creative Future" provides a key guide as to the mix of trips by mode that should be targeted for the study area.
- iv. Various network connections and road space allocations are identified throughout this report with a particular focus on enhancing pedestrian and cycle connections throughout the precinct and with adjacent areas.
- v. Analysis of study area generated traffic volumes indicates that the level of growth for the precinct is expected to be accommodated within the existing road network connections with the arterial road network.
- vi. A parking management approach should be adopted across the study area including introducing short stay on-street parking restrictions and implementing a permit policy which protects existing residents however restricts access for new residents.
- vii. Having regard to the availability of on-street parking and the future demands for public parking (residential visitor and retail customer) there does not appear to be a significant warrant for Council to invest in developing parking options to accommodate future development demands that could be funded by cash contributions.
- viii. New developments should therefore be responsible for providing parking within their own development, particularly for long stay users.
- ix. Reductions from statutory requirements could be considered on a case by case application based on the availability of on-street parking and any credits which exist from the existing land use. It should however be noted that reliance on on-street parking to support long stay parking users (such as staff and residents) should not be supported given the expectation of future time restrictions being applied.

Other Recommendations

A number of recommendations are presented throughout the report, which are summarised in the table below, including reference to the relevant section and page number. The table is not inclusive of proposed cross sections changes or modal hierarchies including supporting infrastructure. These plans are shown at the relevant sections of the report.

No.	Recommendation	Section / Page Ref.
1	Where appropriate policy outcomes from the western portion of the study area may also be recommended at a conceptual level for application to the areas east of Latrobe Terrace even though land use growth has not been considered for the eastern area as part of this study.	Section 4 / Pg. 29
2	Local Area Traffic Management treatments should be considered to ensure a low speed environment to enable shared use of roads between vehicles and cyclists	Section 6 / Pg. 38
3	Loading and delivery vehicle sizes for new mixed use and commercial developments should be specified in planning permits conditions	Section 6 / Pg. 38
4	The existing and predicted volumes at the intersection of Gregory Avenue and West Fyans Street would not currently justify signalisation (as outlined in the previous PSP). Furthermore, the location would be too close to the intersection of Pakington Street.	Section 6 / Pg. 39 & Section 8 / Pg. 57
5	It would be acceptable to develop the first section only (of Rutland Street) between Bloomsbury Street and Boswell Avenue having regard to the 20-year land use modelling scenario.	Section 6 / Pg. 40
6	The implementation of both Option 1 and 2 (Rutland Street extension to Fernleigh Street and Anne Street to Woodstock Street) would improve accessibility for residents while limiting non-local through trips.	Section 6 / Pg. 41
7	Any changes to the intersection of Barwon Terrace and Moorabool Street should consider the permeability for residents and other vehicles accessing the area from the south given the limited river crossing and impacts on the intersection of Fyans Street	Section 6 / Pg. 42
8	Although the current practices are to place shelters in the 'city-bound' directions, it is recommended that bus stops on both sides of the street are fitted with shelters in order to encourage travel towards Highton, Belmont and Waurin Ponds (Deakin University) activity centre areas.	Section 7 / Pg. 46
9	To improve accessibility within the transport network, on-street areas should be well lit, including the Barwon River Path given its inclusion as a key pedestrian and cycling route.	Section 7 / Pg. 46

Appendices

A: Existing Traffic Volumes

B: Road Characteristics

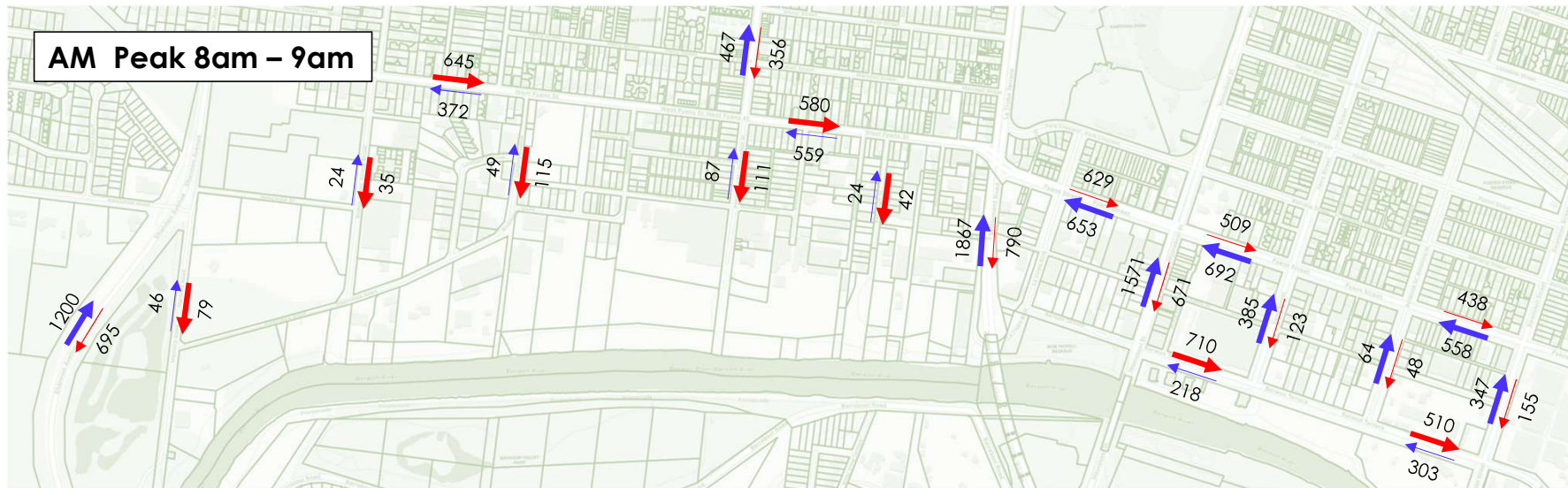
C: Car Parking Inventory and Survey Results

D: Future Parking and Trip Generation Spreadsheet Model

E: Road Cross Sections

F: SIDRA Intersection Results

Appendix A – Existing Traffic Volumes



Appendix B – Road Characteristics

Analysis of the existing road characteristics in key locations is shown below. Applying standard road cross sections based on the current and future likely movement and place characteristics as identified in the previous PSP, the following gaps and barriers in the transport network have been identified. The characteristics highlighted in red are generally referenced throughout this document, and form the basis for the analysis of future land use modelling.

Road Name	Road Classification	Authority	Alignment	Carriageway Width (approx.)	Footpath	Bicycles Facilities	Parking	Road Reserve Width (approx.)
Latrobe Terrace	Arterial	VicRoads	North-South	22.5m	Yes	No	Kerbside (limited)	30m (divided)
Shannon Avenue	Arterial	VicRoads	North-South	12m (varies)	Yes	Yes, off road	None	Varies
West Fyans Street	Arterial	VicRoads	East-West	12.5m	Yes	Yes, on road	Kerbside	20m
Fyans Street	Arterial	VicRoads	East-West	22.5m	Yes	Yes, on road	Kerbside	30m
Moorabool Street	Collector	Council	North-South	21.5m	Yes	Yes, bridge only	Kerbside	30m
Yarra Street	Collector	Council	North-South	23m	Yes	Yes, on road	Kerbside	30m
Swanston Street	Collector	Council	North-South	19m	Yes	Yes, off road	Kerbside	30m
Barwon Terrace	Collector	Council	East-West	11m	Limited	No	Kerbside	15m
Pakington Street	Local	Council	North-South	13m	Yes	No	Kerbside	20m
Marnock Road	Local	Council	North-South	7.5m	Yes	Yes, off road	Kerbside	Varies
Riversdale Road	Local	Council	East-West	7m	No	No	Kerbside	Varies
Bridge Road	Local	Council	North-South	10m	No	No	Kerbside	18m
Gregory Avenue	Local	Council	North-South	7.5m	Yes	No	Kerbside	15m
Fernleigh Street	Local	Council	North-South	8m	Yes	No	Kerbside	12m
Rutland Street	Local	Council	East-West	8m	Yes	No	Kerbside	17m
Bellerine Street	Local	Council	North-South	16.5m	Limited	No	Kerbside	30m
Little Fyans Street	Local	Council	East-West	7m	Yes	No	Kerbside	10m
Latrobe Boulevard	Local	Council	North-South	9m	Limited	No	Kerbside	20m

Note: The above characteristics have only been determined for key roads within the study area, or roads which may be of higher importance within the road hierarchy in both existing and future scenarios.

Appendix C

Car Parking Occupancy Surveys - Results

Client	GTA
Date	Thu, 22nd Feb 2018
Description	Newtown Parking Survey

[illegible]

Client GTA
Date Thu, 22nd Feb 2018
Description Newtown Parking Survey



Street Name	Between	Side of Street	Restriction	Applicable Hours	Supply	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Rutland St	Gregory to the end	North			5	1	1	1	1	1	1	1	1	1	1	1
Rutland St	The end to Gregory Ave	South														
Total					61	35	32	34	38	34	33	38	32	31	27	24
% Capacity						57%	52%	56%	62%	56%	54%	62%	52%	51%	44%	39%
Grenville St	Hampton St to the end	South	No Restriction		6	6	6	6	6	6	6	6	3	3	3	3
Grenville St	The end to Hampton St	North	No Restriction		7	6	6	6	6	6	6	6	6	6	6	6
Total					13	12	12	12	12	12	12	12	9	9	9	9
% Capacity						92%	92%	92%	92%	92%	92%	92%	69%	69%	69%	69%
Hampton St	Rutland St to W Fyans St	West	No Stopping													
Hampton St	Rutland St to W Fyans St	West	No Restriction		14	2	2	4	6	2	2	2	2	3	3	2
Hampton St	W Fyans St to Rutland St	East	No Stopping													
Hampton St	W Fyans St to Rutland St	East	No Restriction		11	6	6	9	9	9	6	8	6	6	6	4
Total					25	8	8	13	15	11	8	10	8	9	9	6
% Capacity						32%	32%	52%	60%	44%	32%	40%	32%	36%	36%	24%
Price St	Pakington St to Hampton St	North	No Restriction		17	8	9	9	9	10	10	9	9	7	7	7
Price St	Hampton St to Pakington St	South	No Restriction		13	9	9	9	9	9	6	8	6	7	7	6
Total					30	17	18	18	18	19	16	17	15	14	14	13
% Capacity						57%	60%	60%	60%	63%	53%	57%	50%	47%	47%	43%
Parkington St	The end to W Fyans St	West	Loading Zone(15min)		1	0	0	0	0	1	0	0	1	0	0	0
Parkington St	The end to W Fyans St	West	P		41	9	26	28	34	40	41	37	37	18	14	14
Parkington St	The end to W Fyans St	West	Loading Zone(15min)		1	1	0	1	0	0	0	0	0	0	0	0
Parkington St	W Fyans St to the end	East	1/2P	9am-5:30pm(Mon-Sat) 9am-12:30(Sat)	20	10	10	9	4	11	11	11	4	4	4	4
Parkington St	W Fyans St to the end	East	Disabled		2	1	1	0	0	2	0	0	0	0	0	0
Parkington St	W Fyans St to the end	East	P		13	10	10	12	13	13	13	13	10	11	11	10
Total					78	31	47	50	51	67	65	61	52	33	29	28
% Capacity						40%	60%	64%	65%	86%	83%	78%	67%	42%	37%	36%
Dairy Lane	Bloomsbury St to Pakington St	South	No Stopping													
Dairy Lane	Pakington St to Bloomsbury St	North	No Stopping													
Total					0	0	0	0	0	0	0	0	0	0	0	0
% Capacity						0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bloomsbury St	The end to W Fyans St	West	No Stopping													
Bloomsbury St	The end to W Fyans St	West	2P	9am-5:30pm	11	11	11	7	8	8	6	6	8	6	6	6
Bloomsbury St	The end to W Fyans St	West	No Stopping													
Bloomsbury St	W Fyans St to The end	East	Loading Zone		2	0	0	1	0	0	0	0	0	0	0	0

Client GTA
Date Thu, 22nd Feb 2018
Description Newtown Parking Survey



Street Name	Between	Side of Street	Restriction	Applicable Hours	Supply	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Bloomsbury St	W Fyans St to The end	East	No Stopping													
Bloomsbury St	W Fyans St to The end	East	2P		16	13	13	14	13	9	10	9	9	10	2	2
Total					29	24	24	22	21	17	16	15	17	16	8	8
% Capacity						83%	83%	76%	72%	59%	55%	52%	59%	55%	28%	28%
Boswell Ave	The end to W Fyans St	West	No Restriction		15	15	15	15	10	5	6	5	5	2	0	0
Boswell Ave	W Fyans St to the end	East	No Parking													
Total					15	15	15	15	10	5	6	5	5	2	0	0
% Capacity						100%	100%	100%	67%	33%	40%	33%	33%	13%	0%	0%
Fernleigh St	The end to W Fyans St	West	No Restriction		17	17	17	17	17	15	10	10	8	8	3	3
Fernleigh St	W Fyans St to the end	East	No Restriction		19	18	19	19	19	15	15	10	12	10	10	8
Total					36	35	36	36	36	30	25	20	20	18	13	11
% Capacity						97%	100%	100%	100%	83%	69%	56%	56%	50%	36%	31%
Woodstock St	The end to W Fyans St	West	2P	9am-5:30pm(Mon-Fri)	9	8	4	4	5	5	6	5	4	5	3	3
Woodstock St	W Fyans St to the end	East	No Parking													
Total					9	8	4	4	5	5	6	5	4	5	3	3
% Capacity						89%	44%	44%	56%	56%	67%	56%	44%	56%	33%	33%
Westbourne Pl	Anne St to W Fyans St	West	2P	9am-5:30pm(Mon-Fri)	10	3	4	6	4	7	8	4	6	6	4	4
Westbourne Pl	W Fyans St to Anne St	East	No Stopping													
Total					10	3	4	6	4	7	8	4	6	6	4	4
% Capacity						30%	40%	60%	40%	70%	80%	40%	60%	60%	40%	40%
Anne St	Prince Fwy to the end	South	No Stopping													
Anne St	The end to Princes Hwy	North	No Stopping													
Total					0	0	0	0	0	0	0	0	0	0	0	0
% Capacity						0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Latrobe Blvd	W Fyans St to Princes Hwy	East to West	2P(60°angle)	9am-5:30pm(Mon-Fri)	36	24	21	23	22	26	36	36	20	22	20	21
Latrobe Blvd	W Fyans St to Princes Hwy	East to West	Loading Zone(15min)	9am-5:30pm(Mon-Fri)	1	0	0	0	0	1	0	0	0	1	0	0
Latrobe Blvd	Princes Hwy to W Fyans St	West to East	1P(60°angle)	8:30am-5:30pm	21	14	16	19	19	13	16	13	9	10	8	9
Latrobe Blvd	Princes Hwy to W Fyans St	West to East	1/4P	9:30am-5:30pm(Mon-Fri)	2	2	2	2	2	2	2	2	2	2	2	2
Latrobe Blvd	Princes Hwy to W Fyans St	West to East	No Restriction		12	6	6	7	7	7	6	6	7	8	6	7
Total					72	46	45	51	50	49	60	57	38	43	36	39
% Capacity						64%	63%	71%	69%	68%	83%	79%	53%	60%	50%	54%
Macaulay Lane	Little Fyans St to W Fyans St	West	No Restriction		3	3	3	2	2	2	2	2	1	0	0	0
Macaulay Lane	W Fyans St to Little Fyans St	East	No Restriction		4	4	4	4	4	4	4	4	4	0	0	0
Total					7	7	7	6	6	6	6	6	5	0	0	0

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Street Name	Between	Side of Street	Restriction	Applicable Hours	Supply	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
% Capacity						100%	100%	86%	86%	86%	86%	86%	71%	0%	0%	0%
Little Fyans St	Princes Hwy to Swanston St	North	No Restriction		58	20	25	22	24	45	58	58	58	18	14	14
Little Fyans St	Swanston St to Princes Hwy	South	No Restriction		48	26	26	42	45	48	31	20	18	18	18	17
Total					106	46	51	64	69	93	89	78	76	36	32	31
% Capacity						43%	48%	60%	65%	88%	84%	74%	72%	34%	30%	29%
Watson Pl	Little Fyans St to W Fyans St	West	No Restriction		5	2	2	2	4	5	5	5	5	5	0	0
Watson Pl	W Fyans St to Little Fyans St	East	No Restriction		1	1	1	1	1	1	1	1	1	1	1	1
Total					6	3	3	3	5	6	6	6	6	6	1	1
% Capacity						50%	50%	50%	83%	100%	100%	100%	100%	100%	17%	17%
Maiters Pl	Little Fyans to the end	West	No Restriction		5	4	5	4	4	5	5	5	4	0	0	0
Maiters Pl	The end to Little Fyans	East	No Restriction		8	4	4	4	4	3	3	3	3	0	0	0
Total					13	8	9	8	8	8	8	8	7	0	0	0
% Capacity						62%	69%	62%	62%	62%	62%	62%	54%	0%	0%	0%
Moorabool St	Barwon Terrace to W Fyans St	West	1/4P		18	0	2	0	0	2	2	0	2	1	1	2
Moorabool St	W Fyans St to Barwon Terrace	East	1/4P		11	10	5	2	7	8	9	8	6	5	10	3
Moorabool St	W Fyans St to Barwon Terrace	East	1P		4	4	4	4	4	4	4	4	4	4	4	4
Total					33	14	11	6	11	14	15	12	12	10	15	9
% Capacity						42%	33%	18%	33%	42%	45%	36%	36%	30%	45%	27%
Wills Pl	Barwon Terrace to The end	West	No Restriction		10	10	8	9	9	6	10	10	8	6	6	6
Wills Pl	The end to Barwon Terrace	East	2P		14	12	10	14	8	9	13	12	12	10	8	6
Total					24	22	18	23	17	15	23	22	20	16	14	12
% Capacity						92%	75%	96%	71%	63%	96%	92%	83%	67%	58%	50%
Myles Pl	Little Fyans to The end	West	No Restriction		5	5	4	5	4	5	5	5	5	3	2	0
Myles Pl	The end to Little Fyans	East	No Parking													
Total					5	5	4	5	4	5	5	5	5	3	2	0
% Capacity						100%	80%	100%	80%	100%	100%	100%	100%	60%	40%	0%
Yarra St	Barwon Terrace to W Fyans St	West	P(35°Angle)		29	15	14	20	23	16	16	19	20	18	18	18
Yarra St	Barwon Terrace to W Fyans St	West	P		25	19	24	20	24	9	16	19	10	6	6	6
Yarra St	Barwon Terrace to W Fyans St	West	2P		9	8	8	9	9	2	2	2	2	2	0	0
Yarra St	W Fyans St to Barwon Terrace	East	P(45°Angle)		21	20	20	18	16	19	21	21	21	16	16	15
Yarra St	W Fyans St to Barwon Terrace	East	2P		8	8	8	8	8	8	8	8	8	4	4	4
Total					92	70	74	75	80	54	63	69	61	46	44	43
% Capacity						76%	80%	82%	87%	59%	68%	75%	66%	50%	48%	47%
Ham Pl	Little Fyans to W Fyans St	West	No Restriction		13	10	2	8	3	2	6	9	4	4	0	0

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Street Name	Between	Side of Street	Restriction	Applicable Hours	Supply	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Ham Pl	W Fyans St to Little Fyans St	East	No Parking													
Total					13	10	2	8	3	2	6	9	4	4	0	0
% Capacity						77%	15%	62%	23%	15%	46%	69%	31%	31%	0%	0%
Victoria St	Little Fyans to W Fyans St	West	No Restriction		7	3	4	4	4	0	0	0	0	0	0	0
Victoria St	W Fyans St to Little Fyans St	East	No Parking													
Total					7	3	4	4	4	0	0	0	0	0	0	0
% Capacity						43%	57%	57%	57%	0%	0%	0%	0%	0%	0%	0%
McGilvray Pl	Little Fyans St to the end	West	No Parking													
McGilvray Pl	The end to Little fyans St	East	No Parking													
Total					0	0	0	0	0	0	0	0	0	0	0	0
% Capacity						0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bellerine St	Barwon Terrace to Fyans St	West	P(35°Angle)		19	14	19	19	19	19	19	19	19	17	16	16
Bellerine St	Barwon Terrace to Fyans St	West	P(45°Angle)		13	10	11	13	13	10	13	12	13	13	10	10
Bellerine St	Barwon Terrace to Fyans St	West	2P		11	10	11	11	11	10	13	12	10	10	9	8
Bellerine St	Fyans St to Barwon Terrace	East	P		15	10	12	16	10	10	10	15	14	14	8	0
Bellerine St	Fyans St to Barwon Terrace	East	2P	9am-5:30pm	8	6	8	8	0	4	8	8	8	8	0	0
Bellerine St	Fyans St to Barwon Terrace	East	2P(30°Angle)	9am-5:30pm	9	3	6	4	0	3	2	3	6	8	0	0
Total					75	53	67	71	53	56	65	69	70	70	43	34
% Capacity						71%	89%	95%	71%	75%	87%	92%	93%	93%	57%	45%
South Cape Pl	Swanston St to Bellerine St	South	No Parking													
South Cape Pl	Bellerine St to Swanston St	North	No Parking													
Total					0	0	0	0	0	0	0	0	0	0	0	0
% Capacity						0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Swanston St	Barwon Terrace to Fyans St	West	2P	9am-5:30pm(Mon-Fri)	6	8	10	10	11	9	9	9	9	9	9	9
Swanston St	Barwon Terrace to Fyans St	West	P		45	12	16	16	16	18	18	19	19	15	16	15
Swanston St	Fyans St to Barwon Terrace	East	2P(35°Angle)	9am-5:30pm(Mon-Fri)	6	2	0	0	0	0	0	0	0	0	0	0
Swanston St	Fyans St to Barwon Terrace	East	P(35°Angle)		42	6	6	6	6	12	12	12	12	10	8	10
Swanston St	Fyans St to Barwon Terrace	East	1/2P		29	10	11	12	18	25	26	22	20	20	20	20
Total					128	38	43	44	51	64	65	62	60	54	53	54
% Capacity						30%	34%	34%	40%	50%	51%	48%	47%	42%	41%	42%
Barwon Terrace	Swanston St to Moorabool St	South	P		24	0	0	0	0	1	1	0	0	1	1	0
Barwon Terrace	Swanston St to Moorabool St	South	No Stopping	7:30am-5:30pm												17
Barwon Terrace	Moorabool St to Swanston St	North	No Restriction		20	8	10	10	10	15	16	15	14	13	13	13
Total					44	8	10	10	10	16	17	15	14	14	14	30

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Street Name	Between	Side of Street	Restriction	Applicable Hours	Supply	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
% Capacity						18%	23%	23%	23%	36%	39%	34%	32%	32%	32%	68%
Fyans St	Swanston St to Settlement Rd	South	2P(60°Angle)	9am-5:30pm(Mon-Sat)	8									7		
Fyans St	Swanston St to Settlement Rd	South	P(60°Angle)		10	8	8	9	9	8	9	8	10	10	8	7
Fyans St	Swanston St to Settlement Rd	South	2P(60°Angle)	9am-5:30pm(Mon-Sat)	8	4	6	8	8	8	8	8	8	8	7	7
Fyans St	Swanston St to Settlement Rd	South	P(60°Angle)		7	2	5	6	6	7	5	5	6	4	4	2
Fyans St	Swanston St to Settlement Rd	South	2P(60°Angle)	9am-5:30pm(Mon-Sat)	8	5	4	7	7	8	8	6	6	6	6	5
Fyans St	Swanston St to Settlement Rd	South	Disable (2P)		1	0	0	0	0	1	1	1	0	0	0	0
Fyans St	Swanston St to Settlement Rd	South	2P(60°Angle)	9am-5:30pm(Mon-Sat)	8	5	8	8	7	7	7	7	8	7	6	6
Fyans St	Swanston St to Settlement Rd	South	P(60°Angle)	9am-5:30pm(Mon-Fri), 9am-12 noon (Sat)	4	2	1	2	3	2	3	2	2	1	1	2
Fyans St	Swanston St to Settlement Rd	South	Loading zone		1	0	0	0	0	0	0	0	0	0	1	0
Fyans St	Swanston St to Settlement Rd	South	1/4 P	7:30am-5:00pm(Mon-Sat)	4	2	1	1	3	4	4	3	1	1	2	1
Fyans St	Swanston St to Settlement Rd	South	2P(60°Angle)	7:30am-5:00pm(Mon-Sat)	5	4	4	3	2	5	5	5	3	2	2	4
Fyans St	Swanston St to Settlement Rd	South	2P(60°Angle)	7:30am-5:00pm(Mon-Sat)	4	4	3	2	2	4	3	3	4	2	2	2
Fyans St	Swanston St to Settlement Rd	South	P (15 min)	7:30am-5:00pm(Mon-Sat)	2	1	0	0	2	1	2	1	1	1	2	2
Fyans St	Swanston St to Settlement Rd	South	2P(45°Angle)	9am-5:30pm(Mon-Sat)	8	4	4	5	3	6	5	7	6	6	8	8
Fyans St	Swanston St to Settlement Rd	South	2P Disable	9am-5:30pm(Mon-Sat)	2	0	1	0	0	1	1	1	0	0	1	1
Fyans St	Swanston St to Settlement Rd	South	2P(45°Angle)	9am-5:30pm(Mon-Sat)	10	5	5	5	1	2	4	3	1	0	0	1
Fyans St	Swanston St to Settlement Rd	South	2P (Parallel)	9am-5:30pm(Mon-Sat)	3	0	1	2	3	1	2	0	1	1	1	1
Fyans St	Swanston St to Settlement Rd	South	2P	9am-5:30pm(Mon-Sat)	4	2	2	3	3	2	2	3	4	4	4	4
Fyans St	Swanston St to Settlement Rd	South	2P	9am-5:30pm(Mon-Sat)	10	3	6	6	7	7	8	9	9	8	7	6
Fyans St	Swanston St to Settlement Rd	South	Bus Zone		1	0	0	0	0	0	0	0	0	0	0	0
Fyans St	Swanston St to Settlement Rd	South	P Parallel		5	1	3	3	1	3	2	5	4	4	3	3
W Fyans St	Settlement Rd to Shannon Ave	South	No Restriction		10	6	6	6	8	8	4	4	4	4	4	4
W Fyans St	Settlement Rd to Shannon Ave	South	No Stopping													
W Fyans St	Settlement Rd to Shannon Ave	South	No Restriction		38	15	19	20	38	38	38	32	34	34	33	33
W Fyans St	Settlement Rd to Shannon Ave	South	No Stopping													
W Fyans St	Settlement Rd to Shannon Ave	South	2P		18	10	15	18	18	18	18	18	10	11	11	11
Fyans St	Settlement Rd to Swanston St	North	NS													
Fyans St	Settlement Rd to Swanston St	North	2P	9am-5:30pm(Mon-Sat)	4	0	0	2	3	2	1	2	3	1	1	0
Fyans St	Settlement Rd to Swanston St	North	Bus Zone		1	0	0	0	0	0	0	0	0	0	0	0
Fyans St	Settlement Rd to Swanston St	North	2P	9am-5:30pm(Mon-Fri)	14	3	2	6	4	5	4	6	7	8	9	9
Fyans St	Settlement Rd to Swanston St	North	NS			0	0	0	0	0	0	0	0	0	0	0
Fyans St	Settlement Rd to Swanston St	North	P Parallel		3	0	0	0	0	1	1	1	0	2	1	1
Fyans St	Settlement Rd to Swanston St	North	1P Parallel	9am-5:30pm(Mon-Fri)	2	0	0	1	2	2	1	2	1	1	0	0
Fyans St	Settlement Rd to Swanston St	North	P Parallel		3	1	1	0	0	0	1	1	2	2	1	1

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[illegible]

Appendix D

Future Parking Demand and Trip Generation Spreadsheet Model

											Traffic Generation (car)				Cycling		Pedestrians		Parking Demand							
											Residential		Commercial*						Residential Parking (Status Quo)				Retail / Commercial Parking			
ID	Type	Precinct	Sub	Street A	Street B	Dwellings	1-2 bed	3+ bed	Pop	LG (m2)	Daily	AM/PM Peak	Daily	AM/PM Peak	Daily	AM/PM Peak	Daily	AM/PM Peak	Resi Stat.	Empirical	Visitor Stat.	Visitor Emp.	Stat.	Empirical	Staff (Off-St)	Cust. (On-St)
1	A	X	X	West Fyans St		16	16		38	0	72	7	0	0	27	3	48	5	16.0	16.5	3.2	1.6	0.0	0.0	0.0	0.0
2	A	X	X	West Fyans St		33	33		79	0	149	15	0	0	55	6	100	10	33.0	34.0	6.6	3.3	0.0	0.0	0.0	0.0
3	A	A	2	West Fyans St	Gregory Ave	9	9		21	0	41	4	0	0	15	2	27	3	9.0	9.3	1.8	0.9	0.0	0.0	0.0	0.0
4	A	A	2	Riversdale Rd		41	41		98	0	185	18	0	0	69	7	124	12	41.0	42.2	8.2	4.1	0.0	0.0	0.0	0.0
5	T	B	2	Gregory Ave	Riversdale Rd	4		4	10	0	18	2	0	0	7	1	12	1	4.0	4.1	0.0	0.4	0.0	0.0	0.0	0.0
6	A	B	2	Riversdale Rd		20	20		48	0	90	9	0	0	34	3	60	6	20.0	20.6	4.0	2.0	0.0	0.0	0.0	0.0
7	A	B	2	Riversdale Rd	Rathmines St	20	20		48	0	90	9	0	0	34	3	60	6	20.0	20.6	4.0	2.0	0.0	0.0	0.0	0.0
8	A	B	2	Rutland St		54	54		129	0	243	24	0	0	91	9	163	16	54.0	55.6	10.8	5.4	0.0	0.0	0.0	0.0
9	A	B	3	Riversdale Rd		90	90		216	0	405	41	0	0	151	15	272	27	90.0	92.7	18.0	9.0	0.0	0.0	0.0	0.0
10	M	B	3	Riversdale Rd	Hampton St	31	31		74	1580	140	14	73	18	52	5	94	9	31.0	31.9	6.2	3.1	63.2	19.0	6.3	12.6
11	A	B	3	Hampton St	Rutland St	10	10		24	0	45	5	0	0	17	2	30	3	10.0	10.3	2.0	1.0	0.0	0.0	0.0	0.0
12	A	B	3	Hampton St	Grenville St	30	30		72	0	135	14	0	0	50	5	91	9	30.0	30.9	6.0	3.0	0.0	0.0	0.0	0.0
13	A	B	3	West Fyans St	Hampton St	15	15		36	0	68	7	0	0	25	3	45	5	15.0	15.5	3.0	1.5	0.0	0.0	0.0	0.0
14	A	X	X	West Fyans St	Grenville St	49	49		117	0	221	22	0	0	82	8	148	15	49.0	50.5	9.8	4.9	0.0	0.0	0.0	0.0
15	A	B	3	West Fyans St	Hampton St	13	13		31	0	59	6	0	0	22	2	39	4	13.0	13.4	2.6	1.3	0.0	0.0	0.0	0.0
16	A	B	3	Hampton St	Price St	21	21		50	0	95	9	0	0	35	4	63	6	21.0	21.6	4.2	2.1	0.0	0.0	0.0	0.0
17	T	B	3	Rutland St		3		3	7	0	14	1	0	0	5	1	9	1	3.0	3.1	0.0	0.3	0.0	0.0	0.0	0.0
18	M	B	3	Rutland St	Hampton St	49	49		117	2515	221	22	116	29	82	8	148	15	49.0	50.5	9.8	4.9	100.6	30.2	10.1	20.1
19	M	B	3	Rutland St		5	5		12	270	23	2	12	3	8	1	15	2	5.0	5.2	0.0	0.5	10.8	3.2	1.1	2.2
20	M	B	4	Rutland St		13	13		31	535	59	6	25	6	22	2	39	4	13.0	13.4	2.6	1.3	21.4	6.4	2.1	4.3
21	M	B	4	Rutland St		13	13		31	535	59	6	25	6	22	2	39	4	13.0	13.4	2.6	1.3	21.4	6.4	2.1	4.3
22	M	B	4	Rutland St		5	5		12	270	23	2	12	3	8	1	15	2	5.0	5.2	0.0	0.5	10.8	3.2	1.1	2.2
23	T	B	4	Pakington St	Price St	38		38	91	0	171	17	0	0	64	6	115	11	38.0	39.1	7.6	3.8	0.0	0.0	0.0	0.0
24	A	B	4	Pakington St	West Fyans St	9	9		21	0	41	4	0	0	15	2	27	3	9.0	9.3	1.8	0.9	0.0	0.0	0.0	0.0
25	A	C	4	Pakington St	West Fyans St	19	19		45	0	86	9	0	0	32	3	57	6	19.0	19.6	3.8	1.9	0.0	0.0	0.0	0.0
26	A	X	X	West Fyans St		9	9		21	0	41	4	0	0	15	2	27	3	9.0	9.3	1.8	0.9	0.0	0.0	0.0	0.0
27	A	C	5	West Fyans St	Bloomsbury St	9	9		21	0	41	4	0	0	15	2	27	3	9.0	9.3	1.8	0.9	0.0	0.0	0.0	0.0
28	A	C	6	West Fyans St		7	7		16	0	32	3	0	0	12	1	21	2	7.0	7.2	1.4	0.7	0.0	0.0	0.0	0.0
29	A	C	6	West Fyans St	Boswell Ave	18	18		43	0	81	8	0	0	30	3	54	5	18.0	18.5	3.6	1.8	0.0	0.0	0.0	0.0
30	A	C	6	Boswell Ave	Bloomsbury St	27	27		64	0	122	12	0	0	45	5	81	8	27.0	27.8	5.4	2.7	0.0	0.0	0.0	0.0
31	A	C	5	Pakington St	Rutland St	3	3		7	0	14	1	0	0	5	1	9	1	3.0	3.1	0.0	0.3	0.0	0.0	0.0	0.0
32	M	C	4	Pakington St	Rutland St	15	15		36	460	68	7	21	5	25	3	45	5	15.0	15.5	3.0	1.5	18.4	5.5	1.8	3.7
33	M	C	4	Pakington St	Rutland St	122	122		292	2980	550	55	137	34	205	20	368	37	122.0	125.7	24.4	12.2	119.2	35.8	11.9	23.8
34	M	C	4	Rutland St	Bloomsbury St	15	15		36	460	68	7	21	5	25	3	45	5	15.0	15.5	3.0	1.5	18.4	5.5	1.8	3.7
35	M	C	4	Rutland St	Bloomsbury St	0	0		0	513	0	0	24	6	0	0	0	0	0.0	0.0	0.0	0.0	20.5	6.2	2.1	4.1
36	M	C	7	West Fyans St	Woodstock St	6	6		14	245	27	3	11	3	10	1	18	2	6.0	6.2	1.2	0.6	9.8	2.9	1.0	2.0
37	M	C	8	West Fyans St	Woodstock St	16	16		38	1130	72	7	52	13	27	3	48	5	16.0	16.5	3.2	1.6	45.2	13.6	4.5	9.0
38	T	C	7	Woodstock St		6		6	14	0	27	3	0	0	10	1	18	2	6.0	6.2	1.2	0.6	0.0	0.0	0.0	0.0
39	A	C	7	Woodstock St	Westbourne Pl	20	20		48	0	90	9	0	0	34	3	60	6	20.0	20.6	4.0	2.0	0.0	0.0	0.0	0.0
40	A	C	8	Woodstock St	Westbourne Pl	24	24		57	0	108	11	0	0	40	4	72	7	24.0	24.7	4.8	2.4	0.0	0.0	0.0	0.0

Sub-totals	907	856	51	2165	11493	4086	409	529	132	1522	152	2737	274	907	934	177	91	460	138	46.0	91.9
	Dwellings	1-2 bed	3+ bed	Pop	LG (m2)	Daily	AM/PM Peak	Daily	AM/PM Peak	Daily	Peak	Daily	Peak	Resi Stat.	Empirical	Visitor Stat.	Visitor Emp.	Stat.	Empirical	Staff (Off-St)	Cust. (On-St)
										Cycling		Pedestrians		Residential				Retail / Commercial			

Appendix E

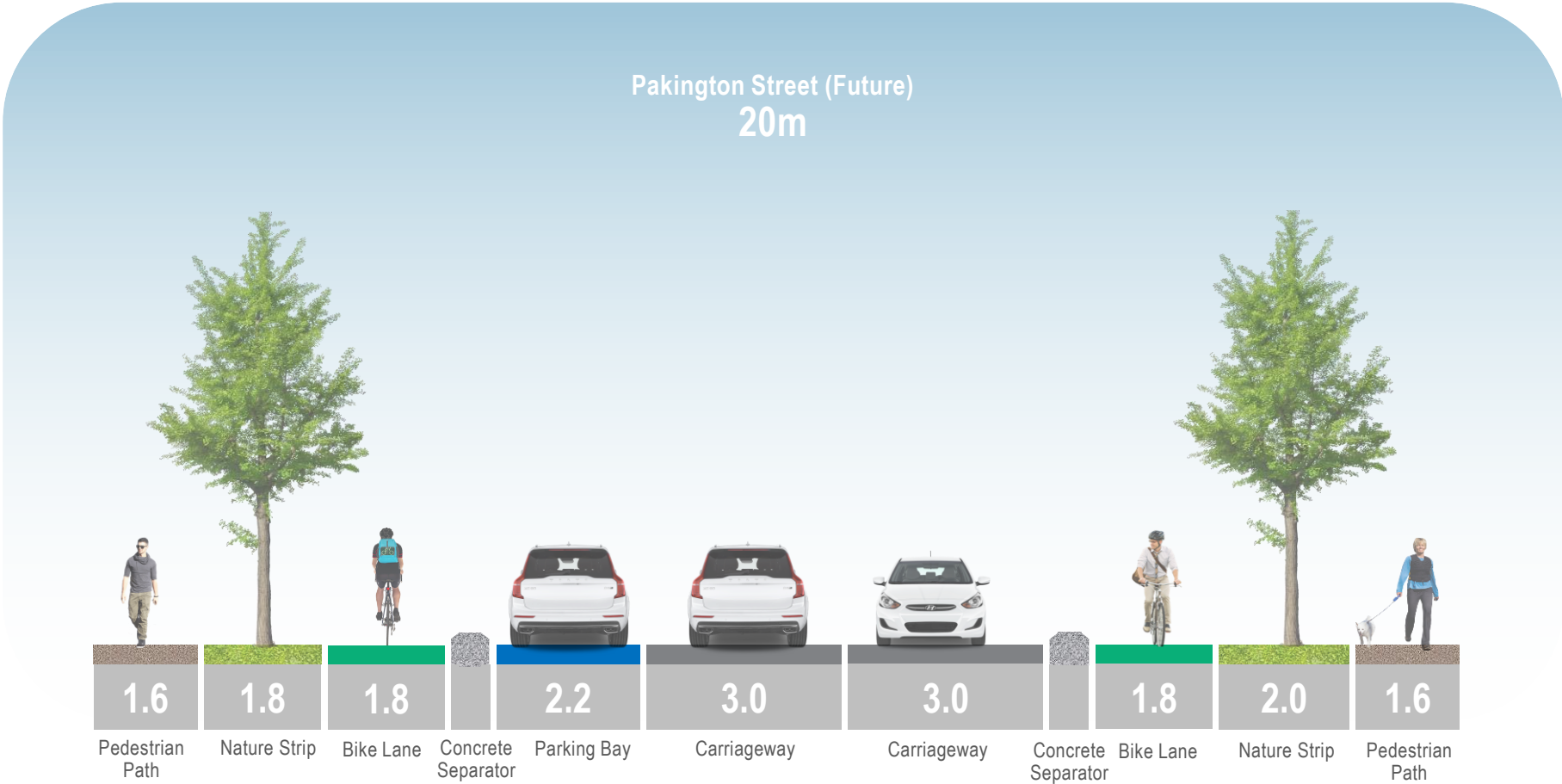
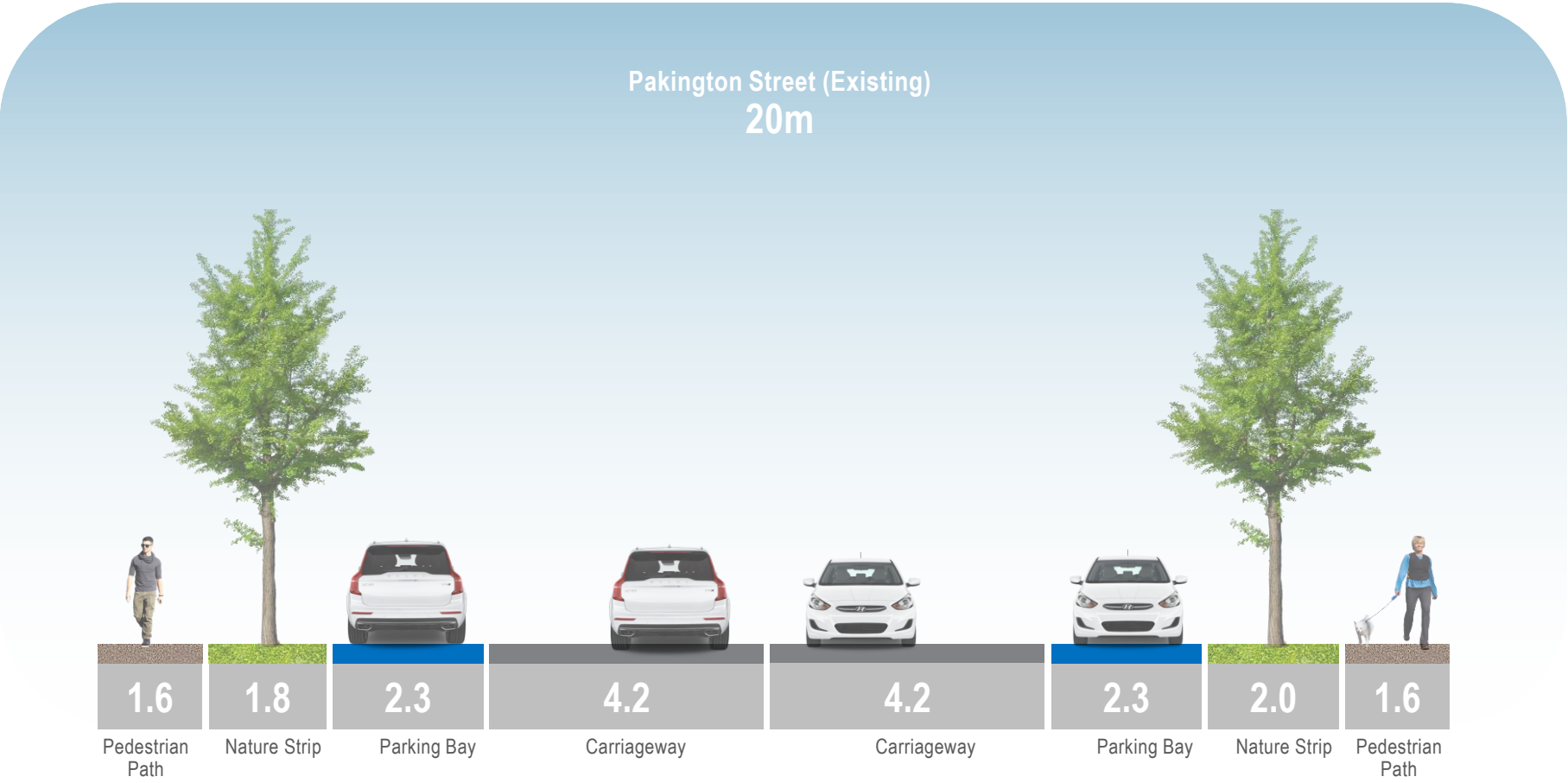
Road Cross Sections

Appendix E – Overview Map

- A – Pakington Street
- B – Gregory Avenue
- C – Rutland Street
- D – Hampton Street
- E – Fernleigh Street / Bloomsbury Street
- F – Barwon Terrace East
- G – Bellerine Street
- H – Little Fyans Street

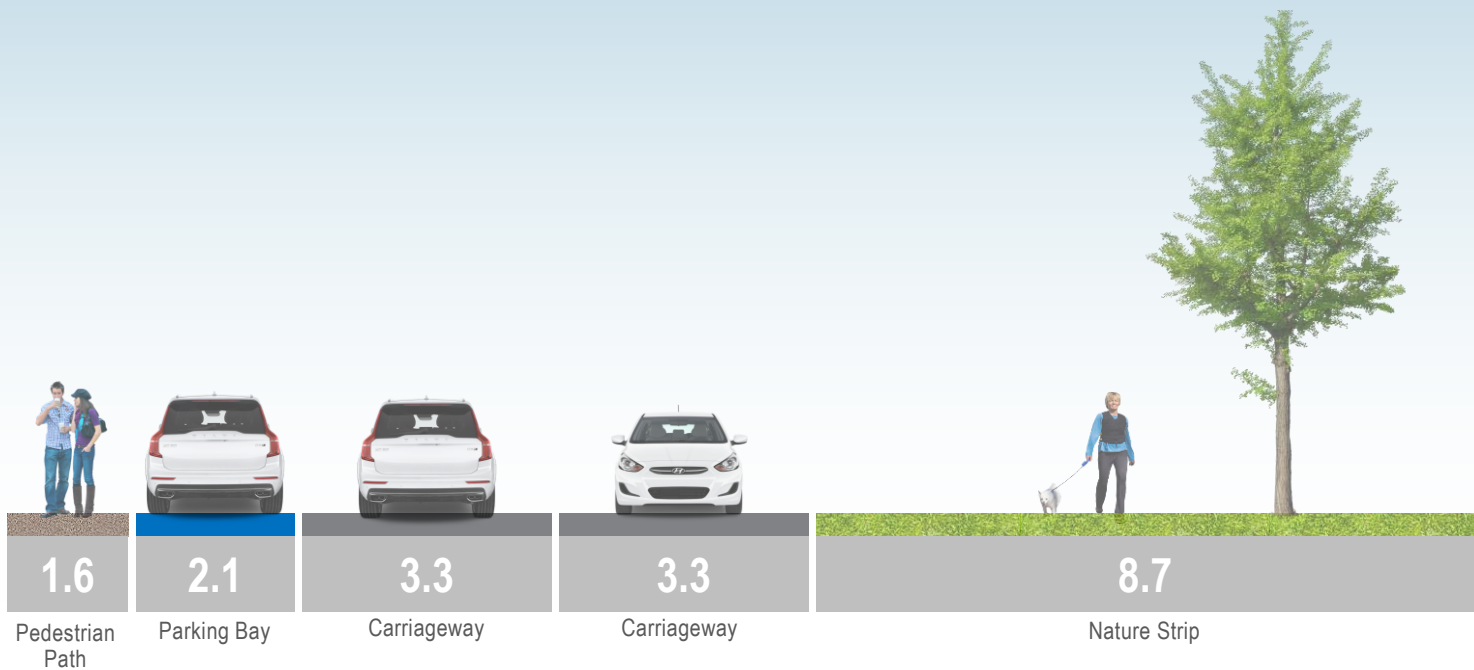


A – Pakington Street (north of Rutland Street)

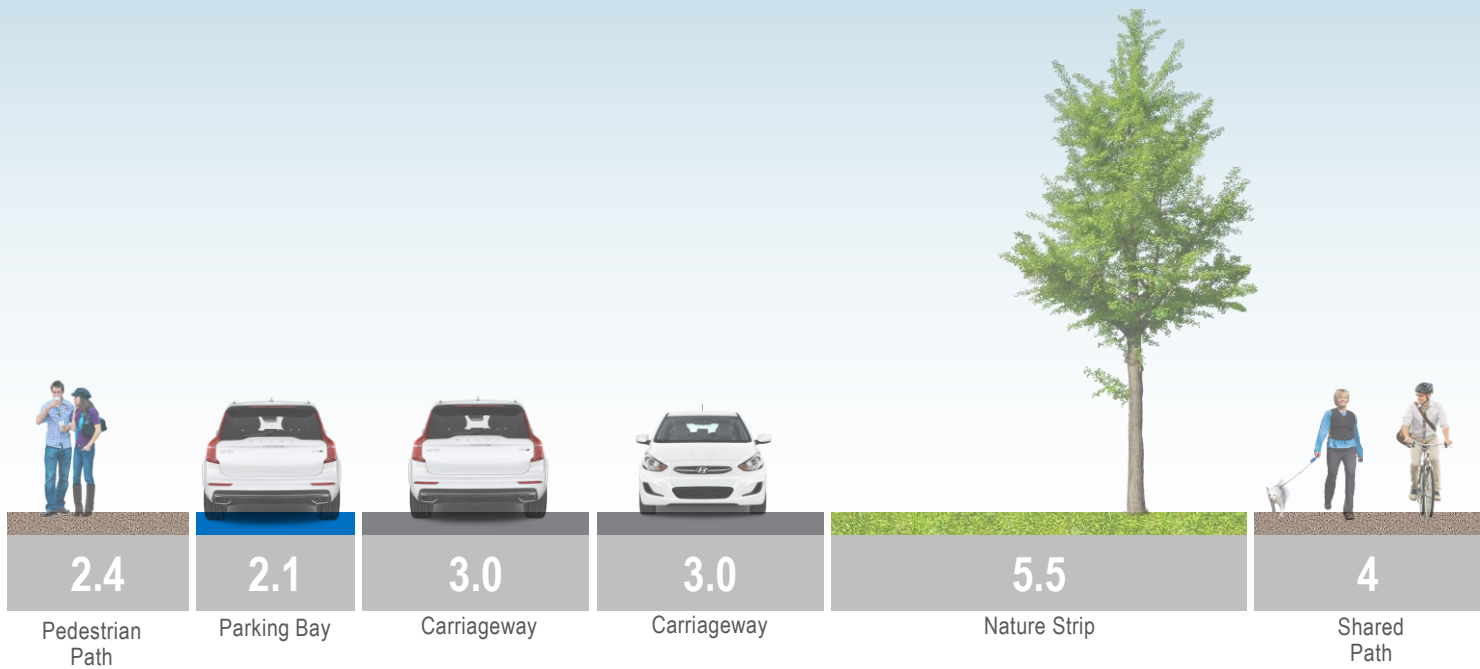


B – Gregory Avenue

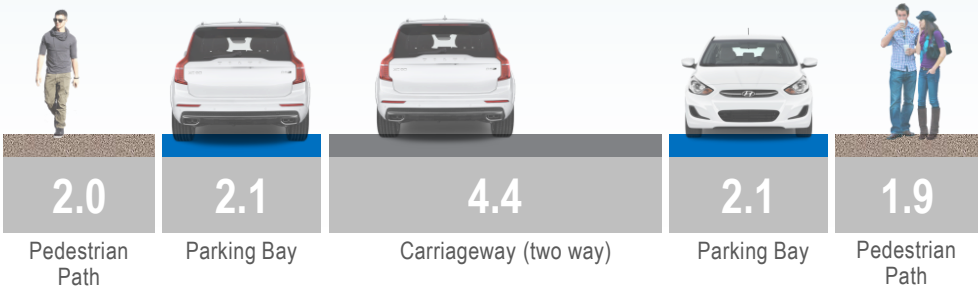
Gregory Avenue (Existing)
19m



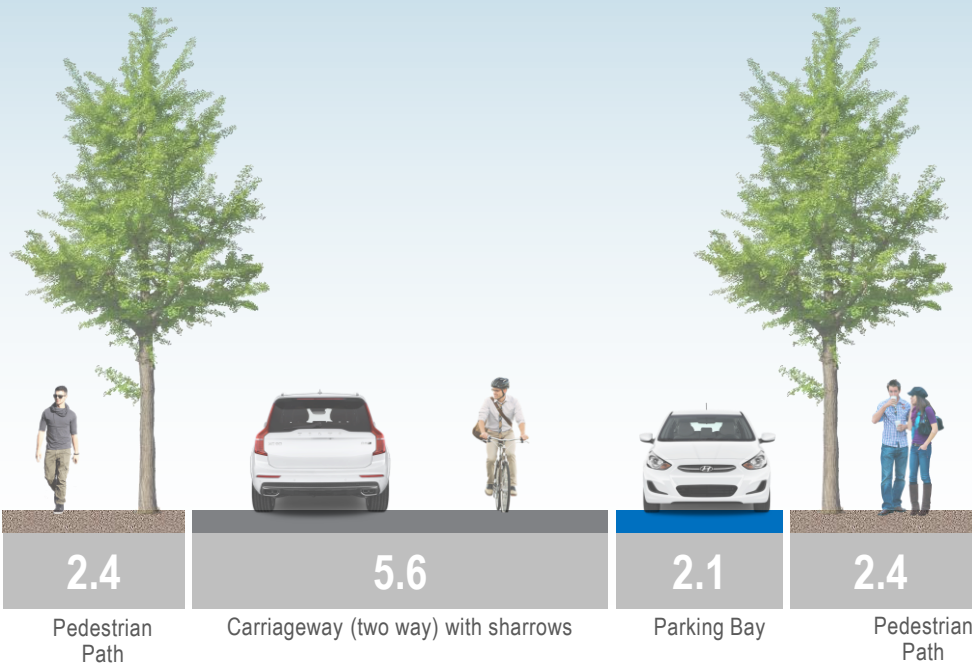
Gregory Avenue (Future)
19m



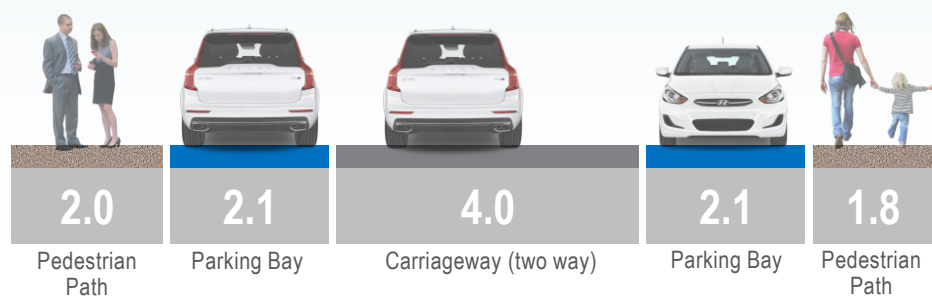
Rutland Street (Existing)
12.5m



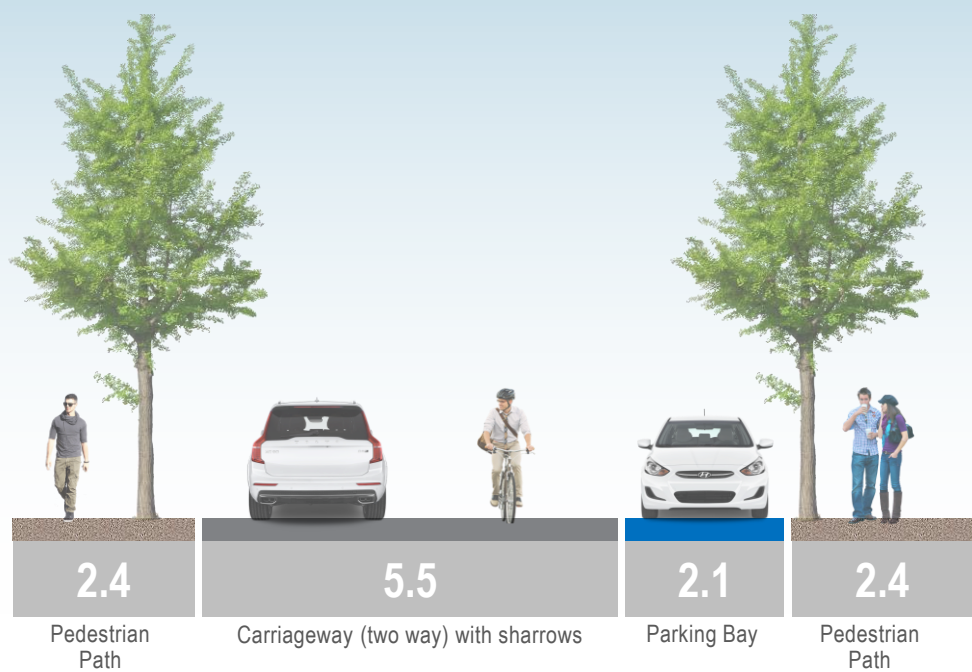
Rutland Street (Future)
12.5m



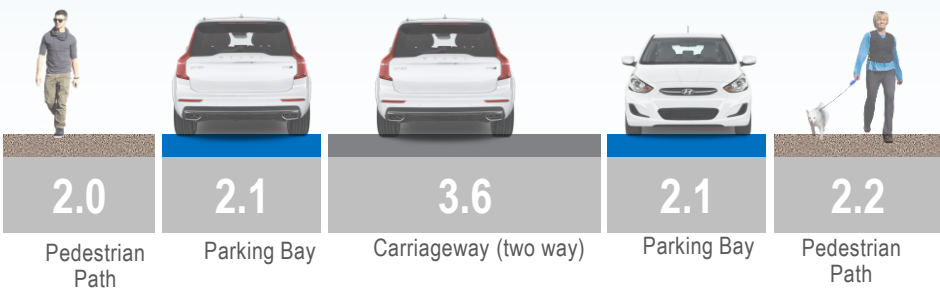
Hampton Street (Existing)
12.5m



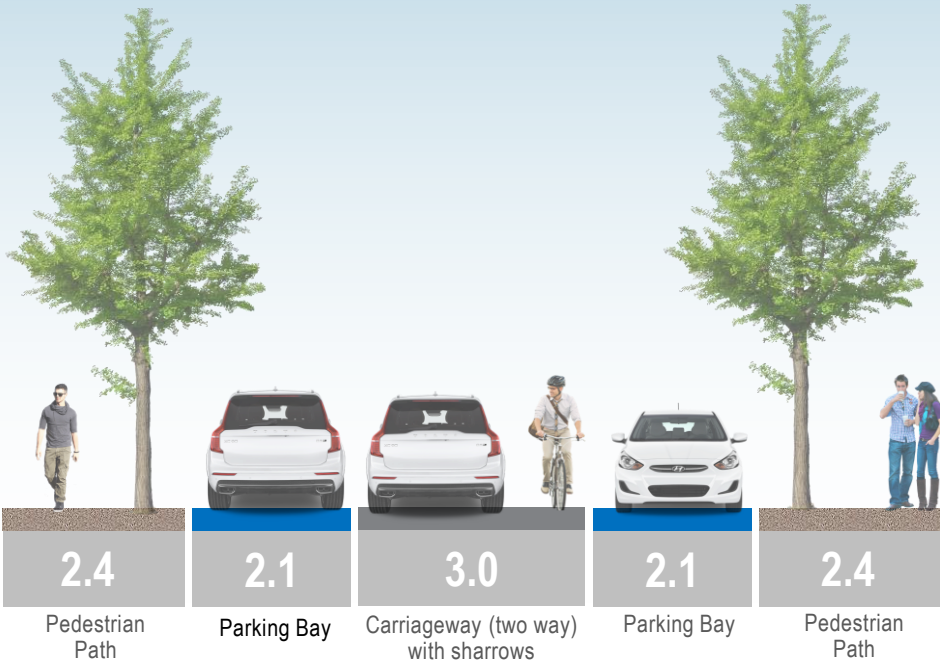
Hampton Street (Future)
12.5m



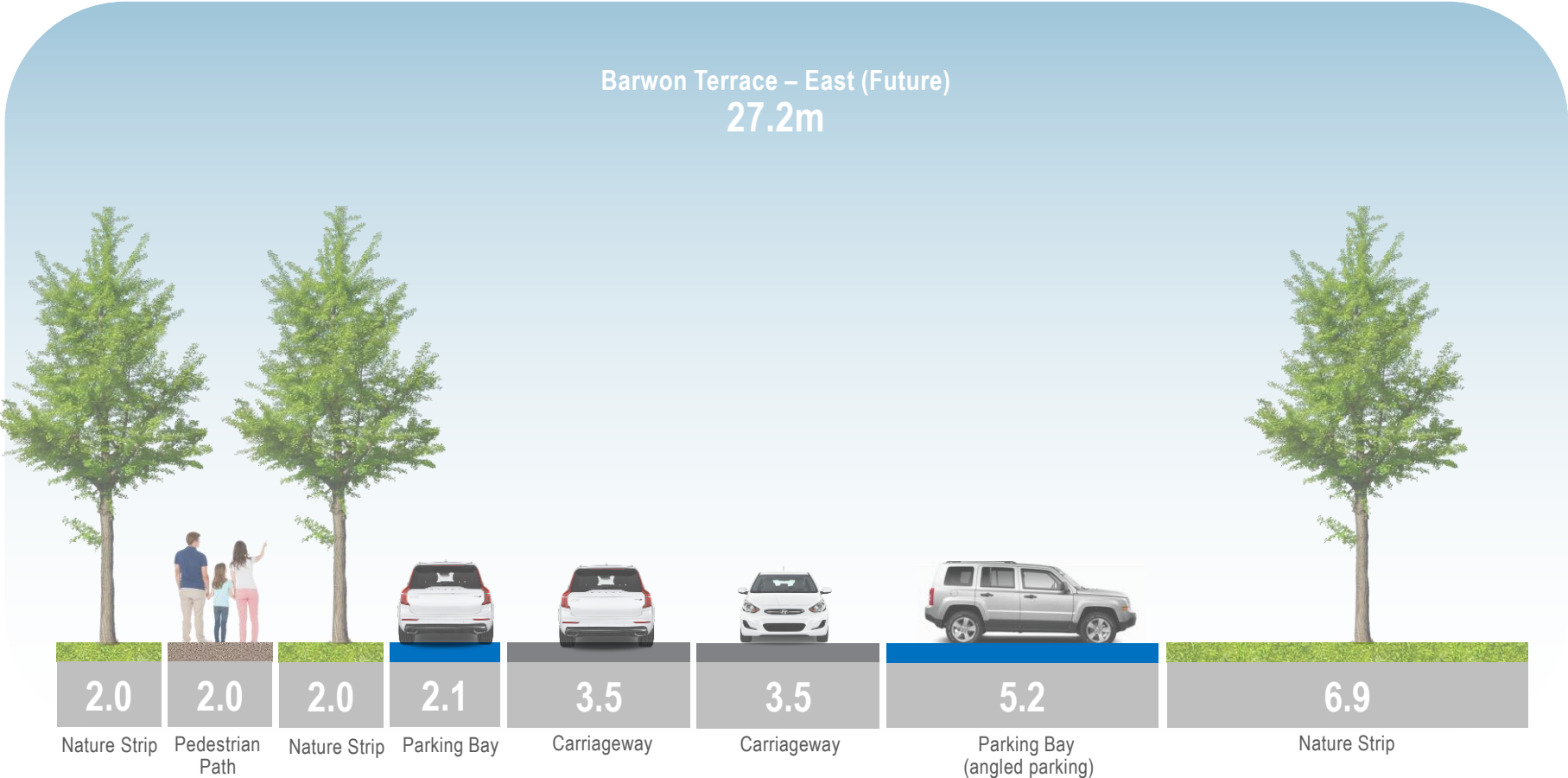
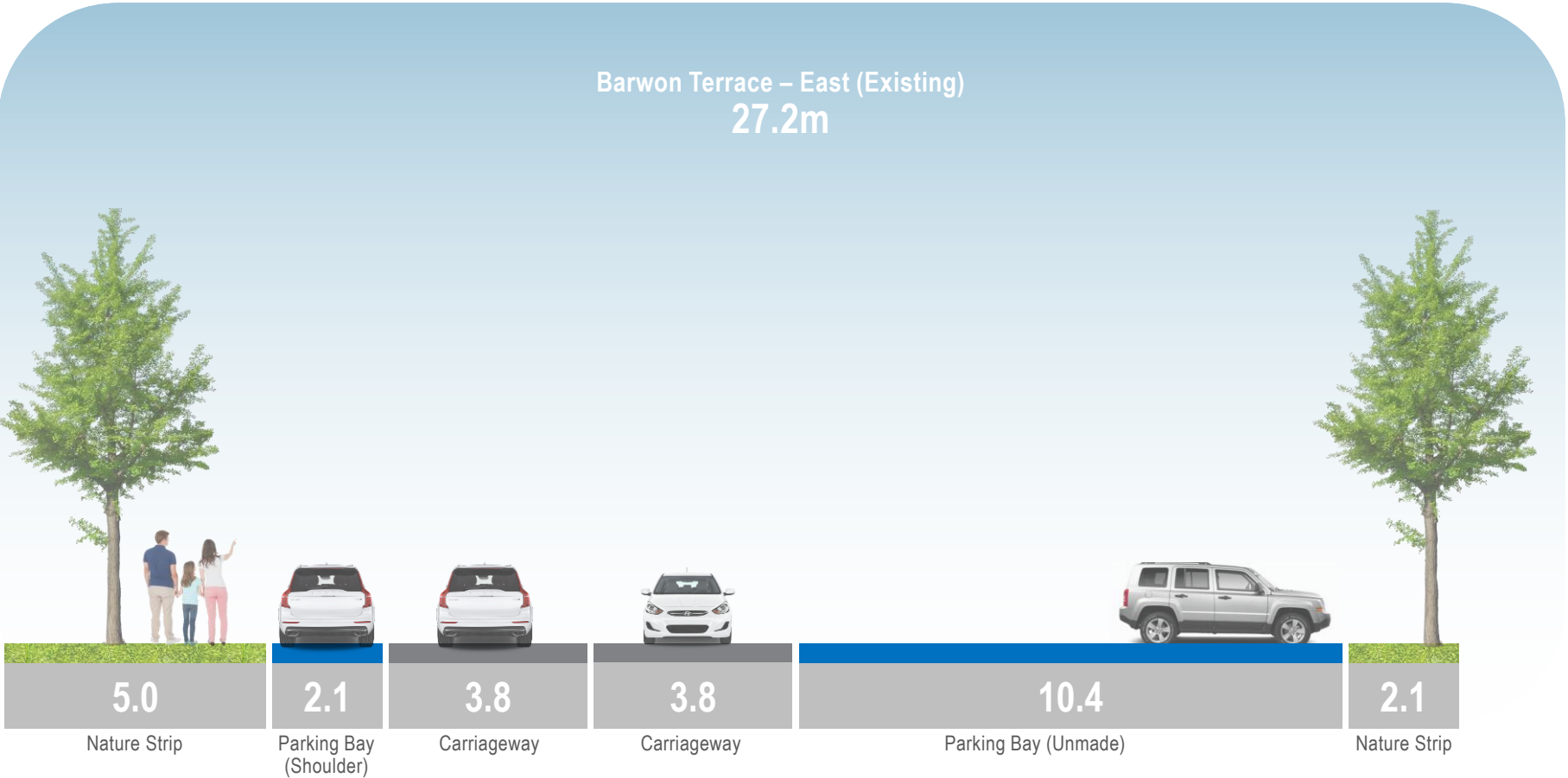
Fernleigh Street / Bloomsbury Street (Existing)
12m



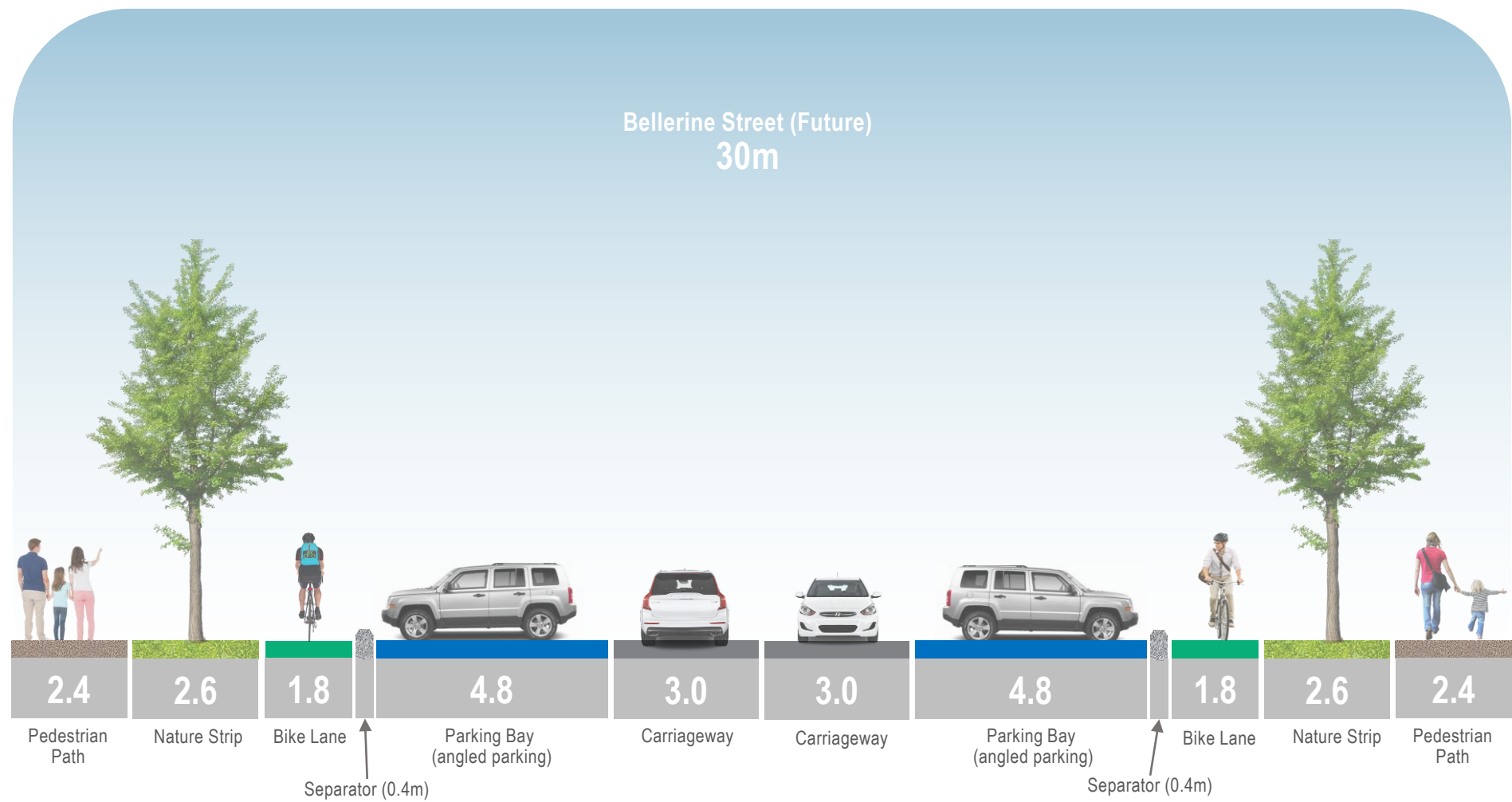
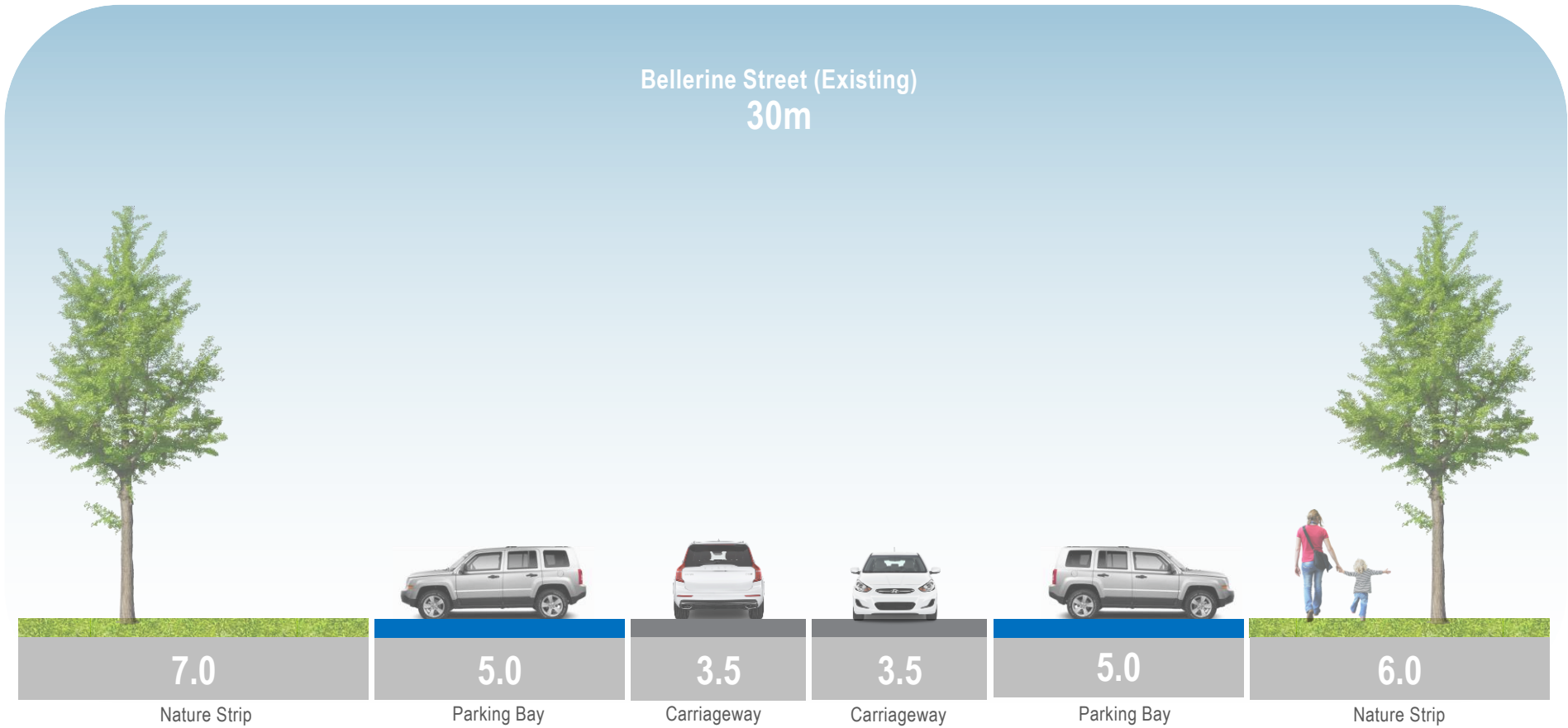
Fernleigh Street / Bloomsbury Street (Future)
12m



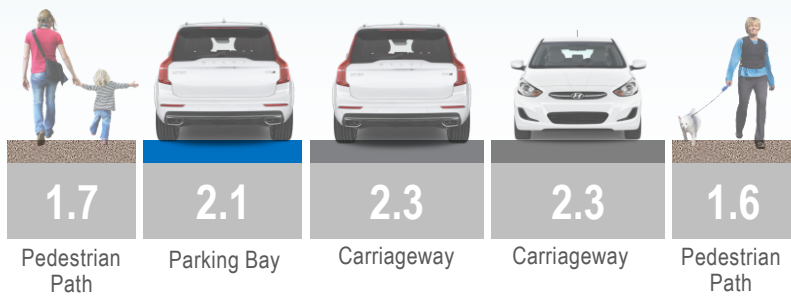
F – Barwon Terrace (between Bellerine Street and Swanston Street)



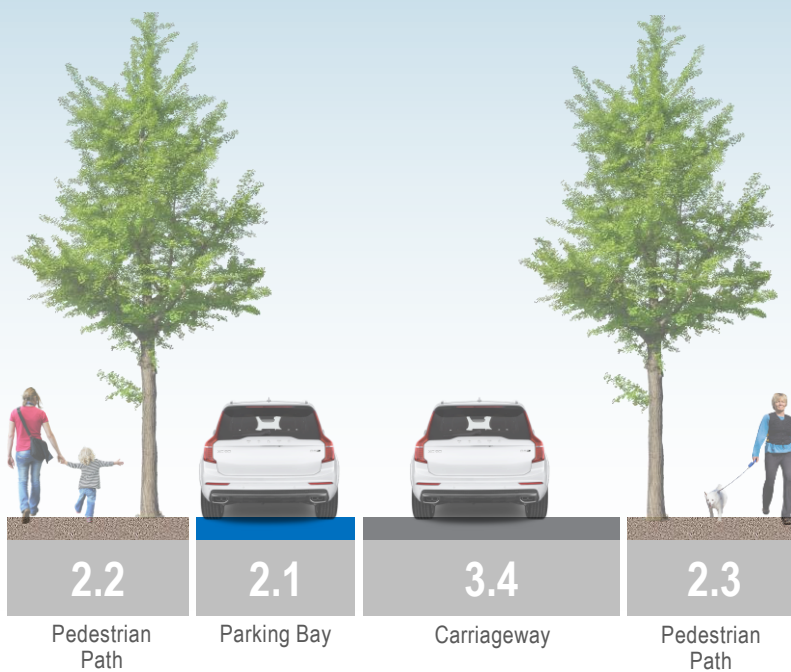
G – Bellerine Street



Little Fyans Street (Existing)
10m



Little Fyans Street (Future)
10m



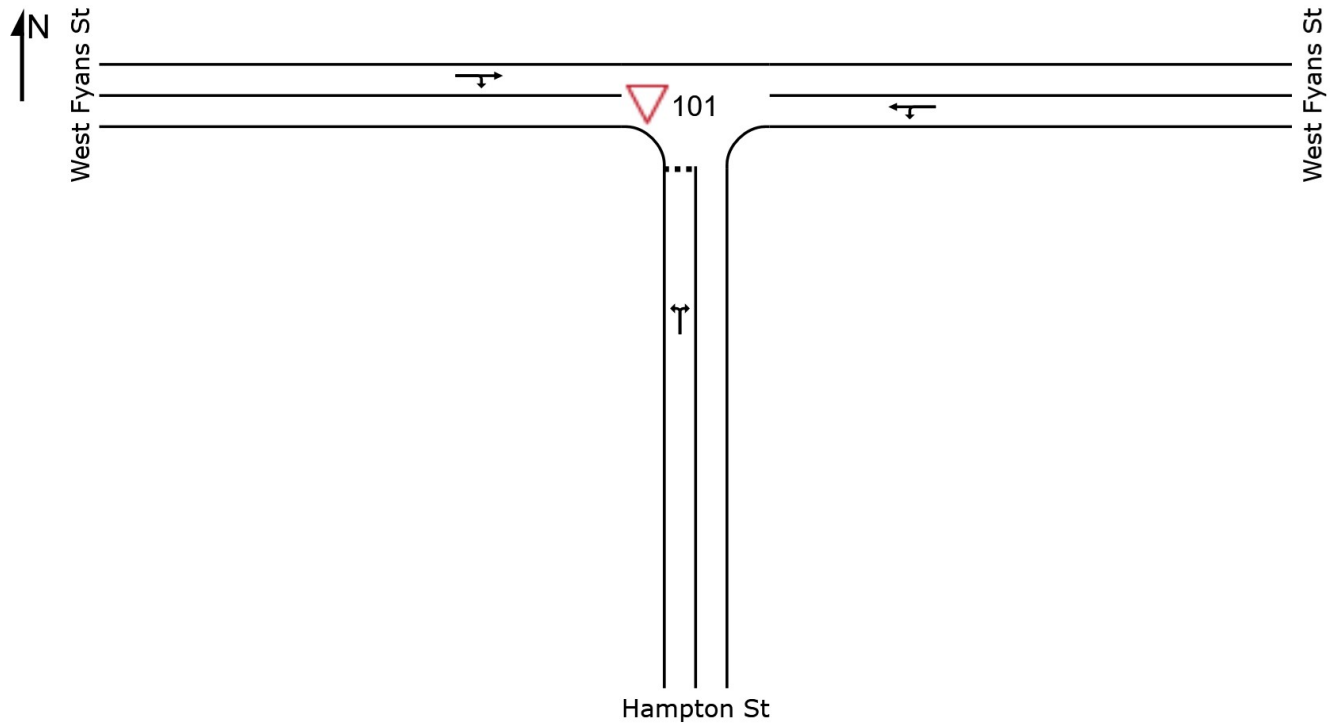
Appendix F

SIDRA Intersection Results

SITE LAYOUT

▽ Site: 101 [Existing AM]

New Site
Giveway / Yield (Two-Way)



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Project: P:\V14100-14199\V141280 Fyans-West Fyans Precinct Struct\Modelling\180911sid-V141280-West Fyans St & Hampton St.sip7

MOVEMENT SUMMARY

▽ Site: 101 [Existing AM]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hampton St											
1	L2	23	3.0	0.101	6.9	LOS A	0.3	2.3	0.56	0.76	49.6
3	R2	28	3.0	0.101	14.1	LOS B	0.3	2.3	0.56	0.76	49.1
Approach		52	3.0	0.101	10.9	LOS B	0.3	2.3	0.56	0.76	49.4
East: West Fyans St											
4	L2	74	3.0	0.235	5.6	LOS A	0.0	0.0	0.00	0.10	57.3
5	T1	373	3.0	0.235	0.0	LOS A	0.0	0.0	0.00	0.10	59.1
Approach		446	3.0	0.235	0.9	NA	0.0	0.0	0.00	0.10	58.8
West: West Fyans St											
11	T1	619	3.0	0.367	0.4	LOS A	0.7	5.3	0.12	0.05	59.1
12	R2	47	3.0	0.367	8.3	LOS A	0.7	5.3	0.12	0.05	56.7
Approach		666	3.0	0.367	1.0	NA	0.7	5.3	0.12	0.05	58.9
All Vehicles		1164	3.0	0.367	1.4	NA	0.7	5.3	0.09	0.10	58.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Existing PM]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Gregory Avenue											
1	L2	82	3.0	0.272	10.1	LOS B	1.0	7.2	0.71	0.91	48.4
3	R2	47	3.0	0.272	17.4	LOS C	1.0	7.2	0.71	0.91	47.9
Approach		129	3.0	0.272	12.8	LOS B	1.0	7.2	0.71	0.91	48.2
East: West Fyans Street											
4	L2	99	3.0	0.426	5.6	LOS A	0.0	0.0	0.00	0.07	57.5
5	T1	711	3.0	0.426	0.1	LOS A	0.0	0.0	0.00	0.07	59.2
Approach		809	3.0	0.426	0.7	NA	0.0	0.0	0.00	0.07	59.0
West: West Fyans Street											
11	T1	333	3.0	0.274	2.4	LOS A	1.4	10.0	0.37	0.13	56.4
12	R2	64	3.0	0.274	11.8	LOS B	1.4	10.0	0.37	0.13	54.2
Approach		397	3.0	0.274	3.9	NA	1.4	10.0	0.37	0.13	56.0
All Vehicles		1336	3.0	0.426	2.8	NA	1.4	10.0	0.18	0.17	56.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Post Development AM - CC Updated - Existing Included (from Gregory)]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hampton Street											
1	L2	74	3.0	0.313	7.9	LOS A	1.2	8.7	0.61	0.83	48.4
3	R2	79	3.0	0.313	17.2	LOS C	1.2	8.7	0.61	0.83	48.0
Approach		153	3.0	0.313	12.7	LOS B	1.2	8.7	0.61	0.83	48.2
East: West Fyans Street											
4	L2	113	3.0	0.257	5.6	LOS A	0.0	0.0	0.00	0.14	57.0
5	T1	373	3.0	0.257	0.0	LOS A	0.0	0.0	0.00	0.14	58.7
Approach		485	3.0	0.257	1.3	NA	0.0	0.0	0.00	0.14	58.3
West: West Fyans Street											
11	T1	619	3.0	0.407	0.8	LOS A	1.5	10.9	0.22	0.09	58.2
12	R2	86	3.0	0.407	8.9	LOS A	1.5	10.9	0.22	0.09	56.0
Approach		705	3.0	0.407	1.8	NA	1.5	10.9	0.22	0.09	58.0
All Vehicles		1343	3.0	0.407	2.9	NA	1.5	10.9	0.18	0.19	56.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Post Development PM - CC Updated - Existing Included (from Gregory)]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hampton Street											
1	L2	134	3.0	0.549	13.2	LOS B	2.6	18.9	0.81	1.06	45.6
3	R2	99	3.0	0.549	22.9	LOS C	2.6	18.9	0.81	1.06	45.2
Approach		233	3.0	0.549	17.3	LOS C	2.6	18.9	0.81	1.06	45.5
East: West Fyans Street											
4	L2	137	3.0	0.447	5.6	LOS A	0.0	0.0	0.00	0.10	57.3
5	T1	711	3.0	0.447	0.1	LOS A	0.0	0.0	0.00	0.10	59.0
Approach		847	3.0	0.447	1.0	NA	0.0	0.0	0.00	0.10	58.7
West: West Fyans Street											
11	T1	333	3.0	0.344	4.1	LOS A	2.4	17.4	0.54	0.20	54.5
12	R2	102	3.0	0.344	12.9	LOS B	2.4	17.4	0.54	0.20	52.5
Approach		435	3.0	0.344	6.2	NA	2.4	17.4	0.54	0.20	54.0
All Vehicles		1515	3.0	0.549	5.0	NA	2.6	18.9	0.28	0.28	54.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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