Report

Transport and Access Study for the Waterfront Place Precinct, Port Melbourne

13 MARCH 2013

Prepared for

City of Port Phillip

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Introduction

URS Australia Pty Ltd (URS) has been engaged by the City of Port Phillip (CoPP) to investigate the current performance of the road network in the vicinity of Waterfront Place, Port Melbourne, and the impact of future development at 1-7 Waterfront Place. Figure 1-1 shows the study area and its key intersections:

- Beach Street/Bay Street;
- Waterfront Place/Princes Street/Beach Street;
- Beach Street/Canberra Parade;
- Beach Street/Park Square; and
- Beach Street/Beacon Road.

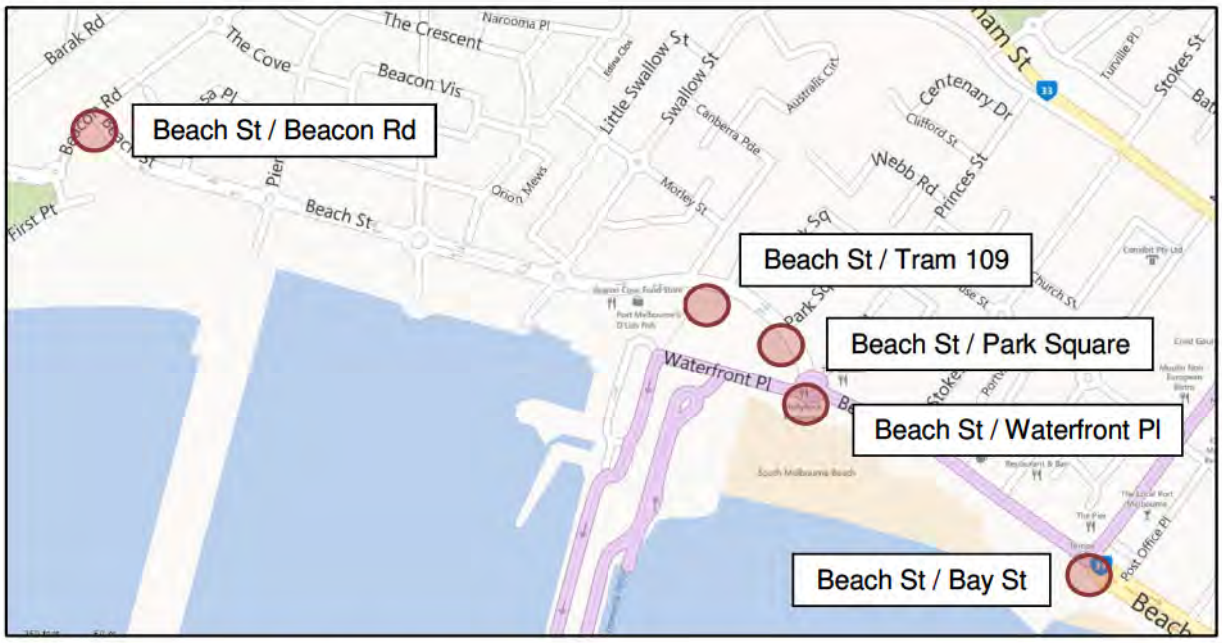


Figure 1-1 Study Area and Key Intersections

To undertake this study the following approach was used:

- agree key intersections in the study area;
- undertake traffic counts at the five key intersections - Monday 19th November 2012 and Sunday 25th November 2012 were selected as they represented two peak days in the study area as they corresponded with a cruise ship visit to Station Pier (Monday) and a fine weather day attracting lots of visits to the area (Sunday);
- undertake a parking occupancy survey of the study area and extending 500 m from the study area boundary shown in Figure 7-1;
- undertake SIDRA traffic modelling to determine the existing performance of the key intersections, based on the existing intersection geometry, control and surveyed am and pm peak hour traffic volumes;
- compare existing parking supply and demand in the study area and beyond, to identify any shortfall or other issues;
- estimate future background traffic volumes, taking into account on-going traffic growth in the study area and use the SIDRA models to determine future "base case" performance of the key intersections;

1 Introduction

- estimate additional traffic generated by the redevelopment of 1 – 7 Waterfront Place, based on development scenarios provided by City of Port Phillip;
- use the SIDRA models to determine the intersection performance for these development scenarios without modification to the intersections;
- identify improvements required to the intersections for them to achieve an acceptable performance in the future with the various development scenarios; and
- determine supporting improvements for cycling and pedestrians.

Information for the study was collected through site visits, a review of background policy and studies, consultation with stakeholders and traffic and parking surveys.

2

Background Information

This section provides background information on the study area that is relevant to traffic and transport planning.

2.1 Port Melbourne Waterfront – Urban Design Framework (Dec 2011)

The Port Melbourne Waterfront – Urban Design Framework (UDF) provides a vision for Port Melbourne Waterfront, catering for its role as a residential, retail and tourist destination. The draft of this plan has been prepared in consultation with the community and aims to preserve the history of the area and its unique character.

The 'Waterfront' area comprises Princes Pier, Beacon Cove Promenade, Waterfront Place (the focus of this study), and Beach St as far west as Bay St. The study area and its five precincts defined for the Urban Design Framework (UDF) are shown in Figure 2-1 below.

Port Melbourne Waterfront Study Area and Precincts

(Source: Port Melbourne Waterfront – UDF)

Figure 2-1 UDF Study Area

There are a variety of different land uses in the study area and as such conflicting pressures on the road network and public open space. The UDF sets a direction to address these conflicting needs so that they are integrated and the area meets the needs of all users and becomes not only a gateway to Melbourne but a destination that visitors to Melbourne and locals want to visit.

Currently the UDF is in draft form and is at the point of having an Implementation Strategy developed, which will outline the costs, possible funding sources and necessary changes to the planning scheme. The result will be changes to the land use and built form controls as a Planning Scheme Amendment, which will be put to the public for final consultation and revised based on community feedback.

2 Background Information

Some of the key design opportunities relevant to the Waterfront Place Transport and Access Study that need to be considered to achieve the outcomes of the UDF include:

- Land Use Opportunities:
  - Enhancing the existing and proposed pedestrian environment and public spaces and enhancing links between differing land use;
- Built Form Opportunities:
  - Incorporating a range of building heights and more slender forms to ensure bulk and scale are minimised;
  - Activating surrounding public spaces and providing welcoming, comfortable and safe areas for pedestrian activity;
- Access and Mobility Issues:
  - Build upon the existing Promenade and Bay Trail as the central spine of movement along the Waterfront;
  - Reducing conflict between pedestrians and cyclists through the Bay Trail;
- Traffic Opportunities (see Figure 2-2 below):
  - Providing a local traffic system that is able to operate during the port's peak sailing periods;
  - Developing a traffic system that caters for seasonal variation in demand;
  - Discouraging the use of Beach St as a thoroughfare for commuting traffic;
- Car Parking Opportunities (see Figure 2-3 below):
  - Providing opportunities to manage car parking and access during peak activities of Station Pier to maximise use of available car spaces;
  - Investigating car parking provision that is less dependent on Waterfront Place;
- Open Space Opportunities:
  - Minimising pedestrian conflicts with other modes of transport abutting residential interfaces;
  - Improving cross connectivity by providing safe links.

Specific traffic and car parking opportunities are shown in Figures 2-2 and 2-3.

2 Background Information

Figure 12 - Proposed Traffic Circulation

The proposed design:

(A) Reduces impact of public car parking and frees up circulation space.

(B) Introduces traffic signals to provide for a clear intersection and encourages traffic to take alternative routes.

(C) Introduces a queueing lane to improve access to Waterfront Place during peak periods.

(D) Introduces a pedestrian crossing to the eastern side of Beach Street / Bay Street.

(Source: Port Melbourne Waterfront – UDF)

Figure 2-2 UDF - Traffic Opportunities

2 Background Information

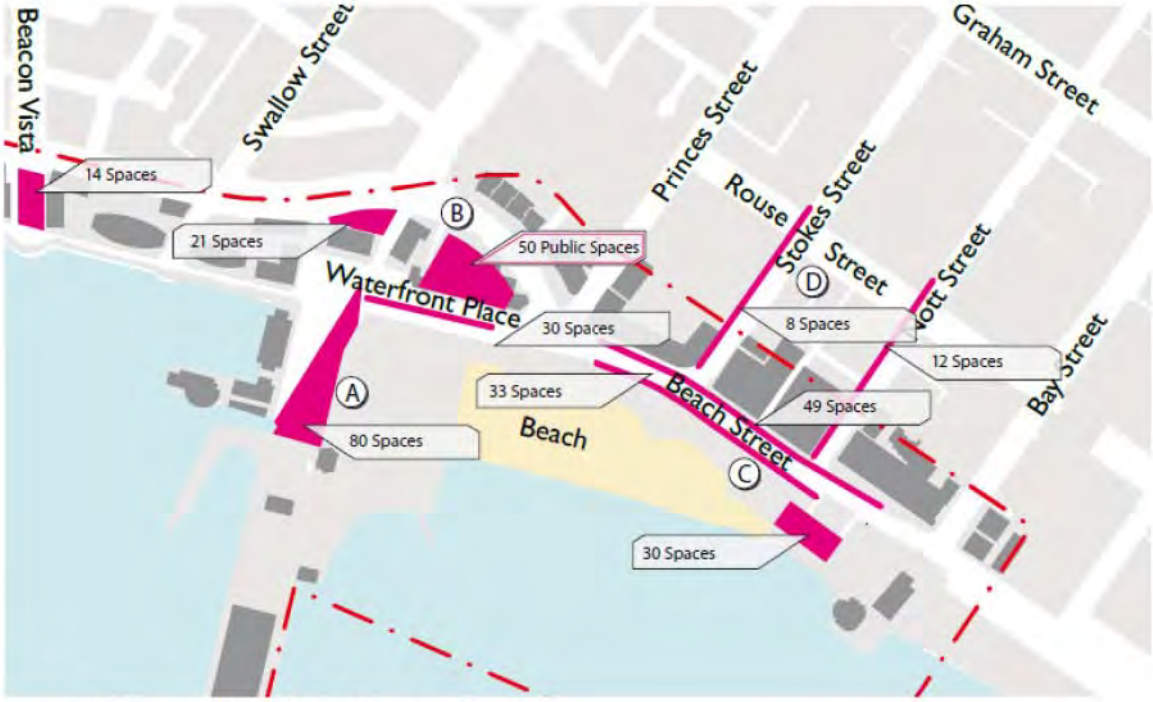


Figure 13 - Proposed Car Parking Opportunities

(A) Reconfigure the car park to create more public space and improve access to Station Pier.

(B) Investigate opportunities to provide for public car parking at 1-11 Waterfront Place.

(C) Reconstruct Beach Street to improve the public realm and efficient use of the road. Relocate angle parking to the north of Beach Street.

(D) Investigate opportunities to provide improved streetscapes and on street parking.

(Source: Port Melbourne Waterfront – UDF)

Figure 2-3 UDF - Parking Opportunities

2.2 Port of Melbourne Corporation's Trial Traffic Management Plans

The Port of Melbourne Corporation (PoMC) are trialling two traffic management plans (TMP) during the 2012/2013 cruise ship season. Figure 2-4 below shows TMP 1, the arrangement to be trialled for smaller cruise ship arrivals, this TMP will be used more often than TMP 2.

2 Background Information

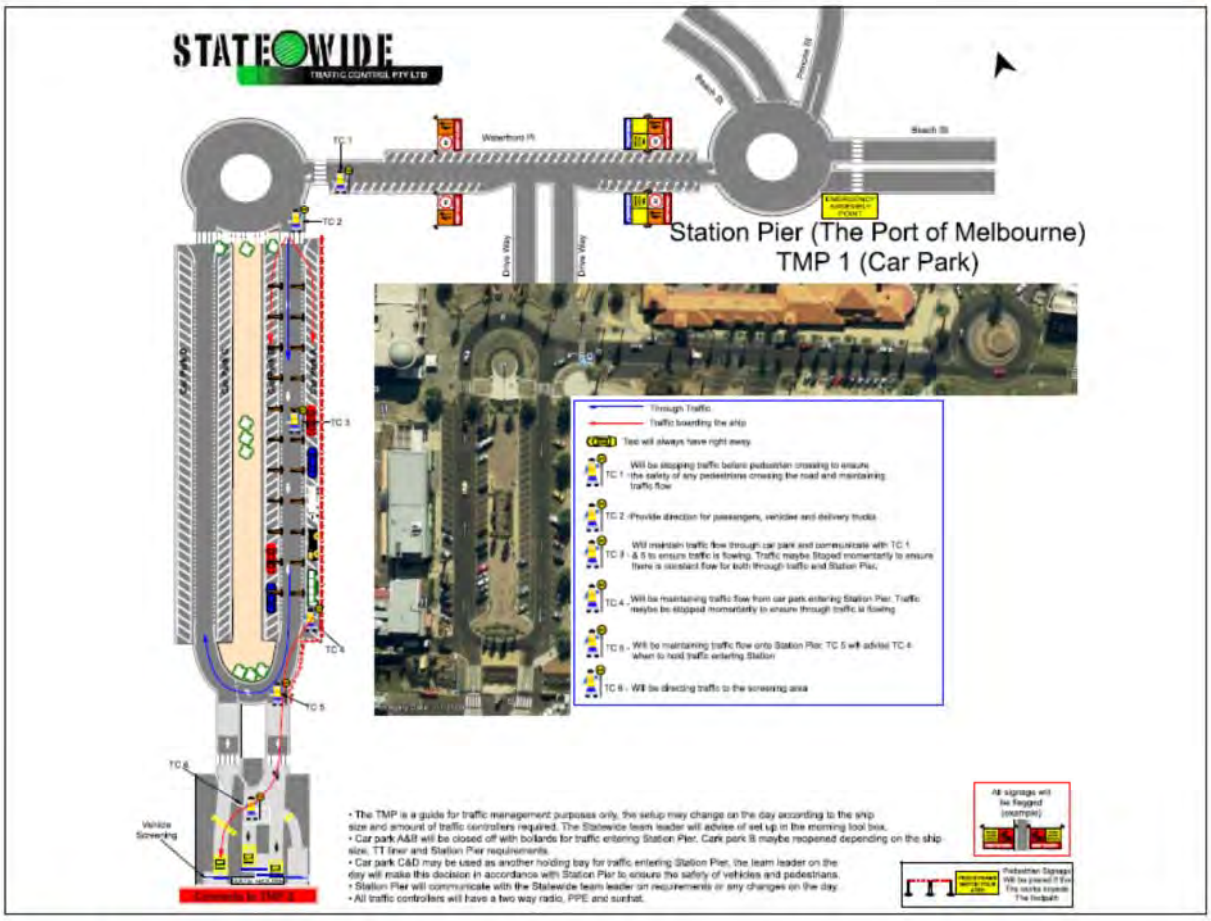


Figure 2-4 TMP 1 - For Smaller Cruise Ship Arrivals

TMP 2 is shown below in Figure 2-5 and will be trialled during larger cruise ship arrivals. For this TMP, additional parking is removed on Waterfront Place to allow for a contraflow traffic arrangement and higher traffic flow associated with arrivals and departures from the ship. It is designed to ease traffic flow from Beach Street and Princes Street.

2 Background Information

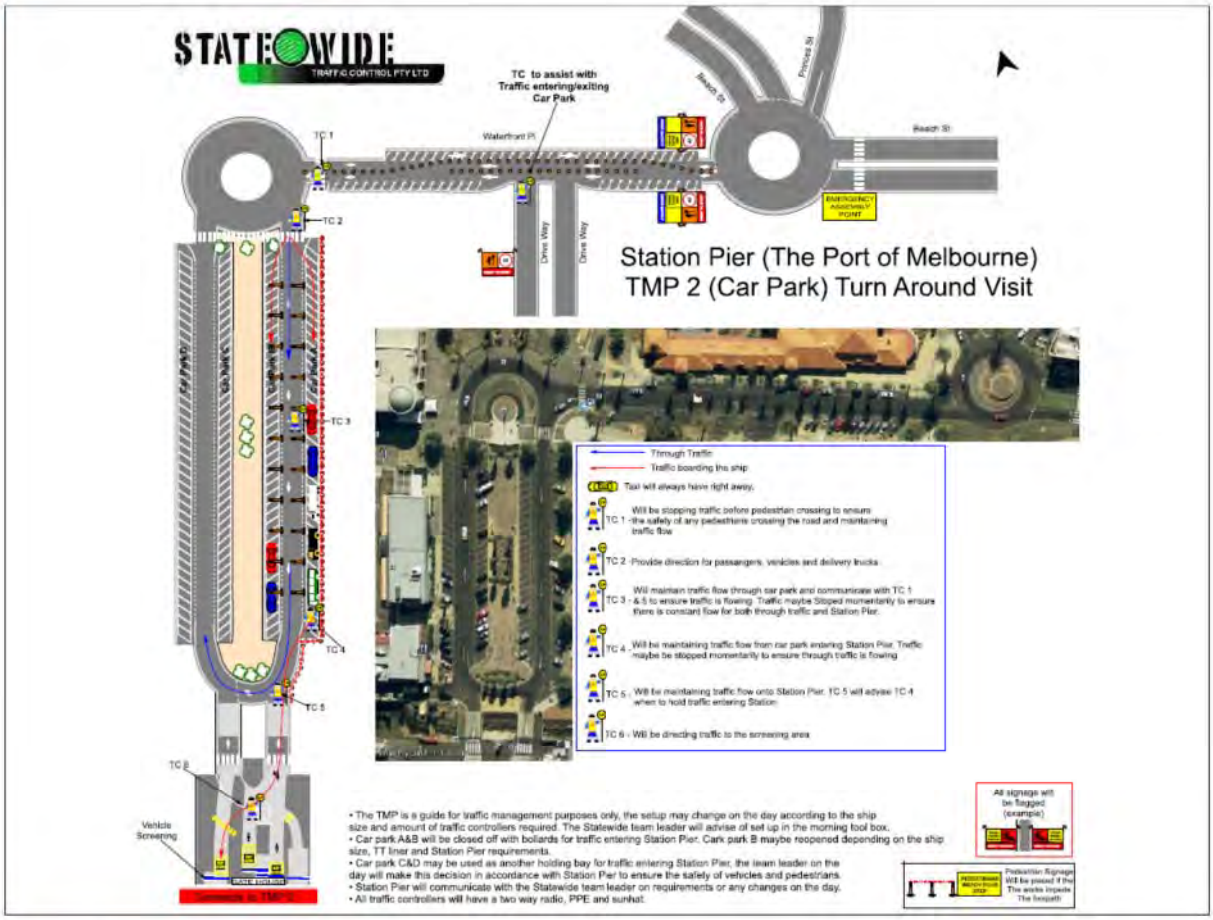


Figure 2-5 TMP 2 - For Larger Cruise Ship Arrivals

2.3 Feet First, City of Port Phillip Walk Plan 2011 – 2015

The Feet First Walk Plan for the City of Port Philip follows on from the first Walk Plan 2005 – 2012, which was the first walking plan launched in Australia.

The Feet First Walk Plan covers the period 2011 – 2015 and sets out to build on the achievements of the first plan. Its focus is on improving walking infrastructure across Port Phillip while continuing to motivate people to walk more often and to more places.

2.3.1 Wider Policy Context

The Feet First Walk Plan is part of a wider effort to increase sustainable transport use across Port Phillip and the metropolitan region. At a State level, Victoria's Transport Integration Act 2010 indicates that the State's transport system must be integrated and economically, environmentally and socially sustainable. The Act requires all Victorian transport and land use agencies to work together to achieve this goal.

The State Government also has a Pedestrian Access Strategy that sets strategic policy directions for walking and guides future investment in walking and infrastructure development programs. Included within this is integrating walking with public transport infrastructure.

2 Background Information

In addition to the above, VicRoads' Smart Roads Strategy provides an approach to managing competing interests for limited road space by giving priority to different transport modes at particular times of the day.

2.3.2 Local Policy Context

Increasing walking across Port Phillip is a high priority for the Council. This is reflected in the Council's other policies, strategies and plans.

The Port Phillip Community Plan lists priorities for action to improve walking paths and bike lanes and to develop incentives for non-car transport by providing car-free streets, reducing speed limits, improving infrastructure and spaces for bikes and pedestrians as well as providing community bus services and shuttles and improving safety and enforcement.

The Port Phillip Sustainable Transport Strategy aims to create a connected and liveable city where residents, visitors and workers can live and travel without a car by improving the convenience, safety, accessibility and range of sustainable transport choices across Port Phillip. It makes walking and biking the priority, with targets to increase walking and bike riding for short trips (less than 5 kilometres) by 50% and for middle distances (between 5–15 kilometres) by 15% by 2020 (based on 2007 levels).

2.3.3 Feet First Walk Plan Strategies and Actions

The Walk Plan has four key goals and sets out a series of 12 strategies and actions to achieve them.

Goal 1: Create a destination-based walking network that connects destinations and neighbourhoods across Port Phillip.

- Strategy 1. Develop a Principal Pedestrian Network (PPN)
- Strategy 2. Prioritise the crossing of roads and local streets
- Strategy 3. Improve the walking environment at key destinations

Goal 2: Provide a high quality local walking environment.

- Strategy 4. Improve walking directions
- Strategy 5. Improve the accessibility and safety of our streets

Goal 3: Better integrate walking with the transport network

- Strategy 6. Create places for people
- Strategy 7. Integrate walking with public transport

Goal 4: Build a culture of walking in Port Phillip

- Strategy 8. Advocate for walking improvements
- Strategy 9. Improve coordination across Council
- Strategy 10. Promote and raise the profile of walking
- Strategy 11. Improving walking through behaviour change
- Strategy 12. Measure and monitor walking levels

2.3.4 Waterfront Place Precinct Policy Implications

Consideration of the Walk Plan is particularly important with regards to the Waterfront Place Precinct as this location is identified within the Plan as a key destination for residents and visitors. The Plan states that creating a walking network between key destinations will encourage people to walk more often and help reduce congestion.

The following strategies have therefore been identified for consideration within Waterfront Place Precinct Transport and Access Study:

Strategy 2: Prioritise the crossing of roads and local streets

Strategy 2 relates to the Walk Plan's goal to create a destination-based walking network that connects destinations and neighbourhoods across Port Phillip. The following actions identified to achieve Strategy 2 and which relate to the Waterfront Place Precinct Study include:

- The implementation of pedestrian priority treatments at intersections on streets around local destinations, including retrofitting roundabouts with raised zebra crossings (Action ID 2.1)
- Working with VicRoads to ensure identified traffic signals on major roads provide greater priority for pedestrians by being more responsive to them and providing more time to cross (Action ID 2.2)
- Working with VicRoads to ensure and install traffic signals on major roads to help pedestrians cross on their desired route to key destinations (Action ID 2.3)
- Incorporating treatments over the intersections along local streets as part of implementing local bike routes network to make these routes more convenient for people walking (Action ID 2.4)

Strategy 3: Improve the walking environment at key destinations

Strategy 3 also relates to the Walk Plan's goal to create a destination-based walking network that connects destinations and neighbourhoods across Port Phillip. The following actions identified to achieve Strategy 3 and which relate to the Waterfront Place Precinct Study include:

- Ensuring the provision for walking in Port Phillip's foreshore area is the priority when designing paths, other infrastructure and building (Action ID 3.2)
- Ensuring area regeneration schemes accommodate the needs of walkers and provide links to public transport and other public spaces (Action ID 3.6)

Strategy 5: Improve the accessibility and safety of our streets

Strategy 5 relates to the Walk Plan's goal to provide a high quality local walking environment and seeks to improve the accessibility and safety of streets within the city of Port Phillip. The following actions identified to achieve Strategy 5 and which relate to the Waterfront Place Precinct Study include:

- Ensuring the design of any local area traffic management measures also improve walking infrastructure (Action ID 5.4)

2.4 Pedal Power, City of Port Phillip Bike Plan 2011 - 2020

The Pedal Power Bike Plan 2011 – 2020 follows on from the City of Port Phillip Bike Plan 2005 – 2010 which was the first Bike Plan launch in Australia.

2 Background Information

The goals and strategies set down within Pedal Power focus on improving bike riding infrastructure and networks across Port Phillip while continuing to motivate more people to ride more often and to more places.

2.4.1 Wider Policy Context

The Pedal Power Bike Plan is part of a wider effort to increase bike riding across Australia and throughout Melbourne.

At the national level, The National Cycling Strategy 2011–2016 aims to double the number of bike riders in Australia by 2016. It sets out a framework of six key priorities which include helping create bike-friendly workplaces, improving end-of-trip facilities, considering bike riding in transport and land use planning, developing national processes for investing in bike riding and sharing best practice.

At a State level, Victoria's Transport Integration Act 2010 makes it clear that the State's transport system must be integrated and economically, environmentally and socially sustainable. The Act requires all Victorian transport and land use agencies to work together to achieve this goal. To complement this the State Government's Victorian Cycling Strategy aims to promote bikes as a viable and attractive alternative transport option to cars, and better integrate riding with trains, trams and buses. It sets standards for bike riding policies and guides future investment in bike riding infrastructure development programs and activities.

In addition to the above, the VicRoads' Smart Roads Strategy aims to manage competing interests for limited road space by giving priority to different transport modes at particular times of the day.

2.4.2 Local Policy Context

Increasing bike riding across Port Phillip is a high priority for the Council. This is reflected in the Council's other policies, strategies and plans.

The Port Phillip Community Plan lists priorities for action to improve walking paths and bike lanes and to develop incentives for non-car transport by providing car-free streets, reducing speed limits, improving infrastructure and spaces for bikes and pedestrians as well as providing community bus services and shuttles and improving safety and enforcement.

The Port Phillip Sustainable Transport Strategy aims to create a connected and liveable city where residents, visitors and workers can live and travel without a car by improving the convenience, safety, accessibility and range of sustainable transport choices across Port Phillip. It makes walking and biking the priority, with targets to increase walking and bike riding for short trips (less than 5 kilometres) by 50% and for middle distances (between 5–15 kilometres) by 15% by 2020 (based on 2007 levels).

2.4.3 Pedal Power Bike Plan Strategies and Actions

The Bike Plan has four key goals and sets out a series of 111 strategies and actions to achieve them.

Goal 1: Enhanced bike riding infrastructure

- Strategy 1. Improve the network of on-road bike lanes
- Strategy 2. Improve the network of off-road bike paths

- Strategy 3. Link off-road and on-road bike infrastructure

Goal 2: Integrating bike riding

- Strategy 4. Provide for bike riding at origins and destinations
- Strategy 5. Improve integration across sustainable transport modes

Goal 3: Changing travel behaviour

- Strategy 6. Educate the community around bike riding
- Strategy 7. Ensure bike riders have adequate information

Goal 4: Creating a bike riding culture

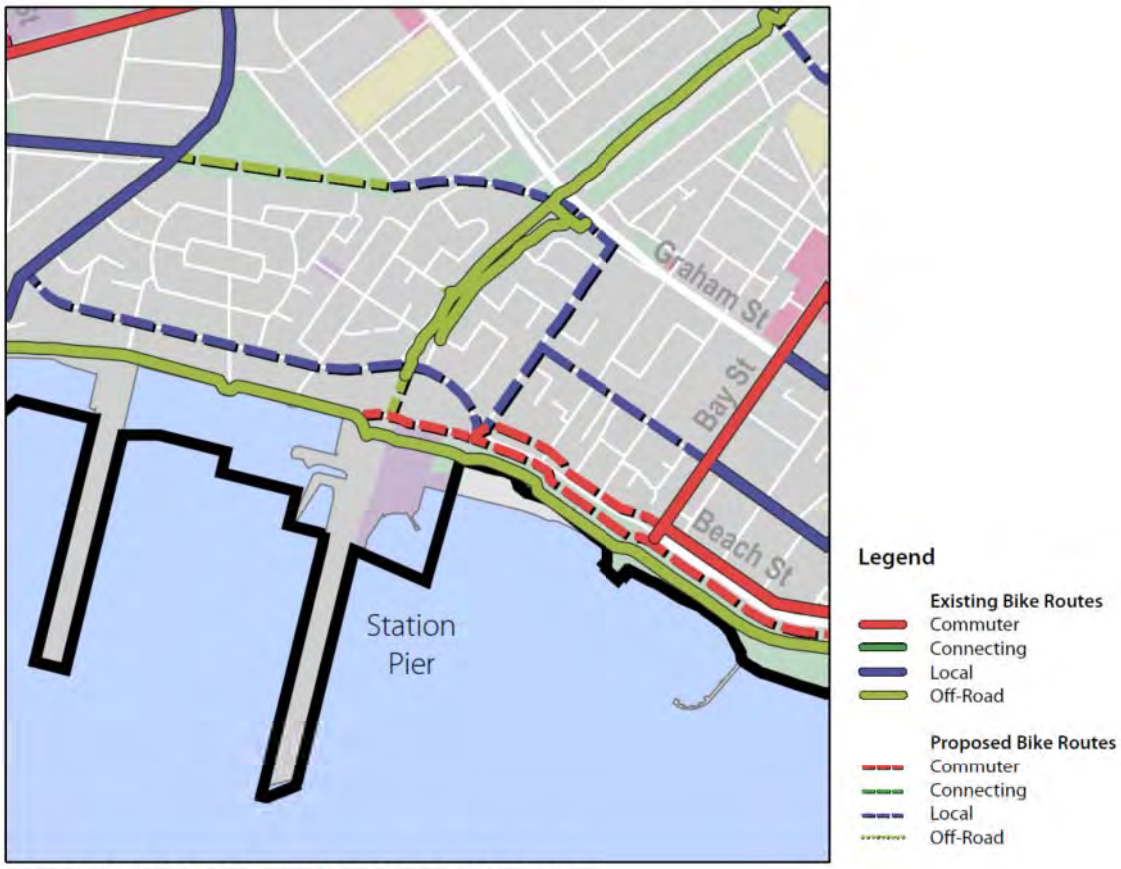
- Strategy 8. Advocate and collaborate with key stakeholders for bike
- riding improvements
- Strategy 9. Improve coordination across Council
- Strategy 10. Promote and raise the profile of bike riding

2.4.4 Waterfront Place Precinct Policy Implications

The Waterfront Pace Precinct is served by the existing City of Port Phillip bike network, as shown in Figure 2-6. Existing off-road routes run along the foreshore and northbound from the Precinct, alongside the light rail railway line.

The Pedal Power Bike Plan proposes that a new commuter bike route be provided, linking the Waterfront Place Precinct area with the existing commuter bike route on Bay Street to the east. A local bike route is also proposed on Beach Street and Princes Street, providing access to the local area.

2 Background Information



Source: City of Port Phillip Bike Plan 2011 - 2020

Figure 2-6 Bike Plans for Study Area

The following strategies from the Pedal Power Bike Plan have been identified for consideration within Waterfront Place Precinct Transport and Access Study:

Strategy 2: Improve the network of off-road bike paths

Strategy 2 aims to improve the safety and accessibility of the off-road bicycle path network and minimise conflict between users, including commuters, children as well as recreational riders. The following actions identified to achieve Strategy 2 and which relate to the Waterfront Place Precinct Study include:

- Minimising conflict on shared paths between different types of bike riders as well as between pedestrians and bike riders. Measures to reduce conflict include widening paths and introducing coloured surfacing and signage (Action ID 2.1)

Strategy 3: Link off-road and on-road bike infrastructure

Strategy 3 aims to ensure sufficient space for bike riders at intersections and to overcome the barrier effect caused by some of the larger roads which run through Port Phillip.

The following actions identified to achieve Strategy 3 and which relate to the Waterfront Place Precinct Study include:

- Connecting existing bike infrastructure by introducing new bike paths or way-finding signage (Action ID 3.1)
- Facilitating continuous bike routes by introducing signalised bike crossings at key intersections (Action ID 3.2)

Strategy 4: Provide for bike riding at origins and destinations

Strategy 4 aims to provide bicycle parking throughout Port Phillip in all public locations where a need is identified. The following actions identified to achieve Strategy 4 and which relate to the Waterfront Place Precinct Study include:

- Providing bike parking at key locations including as part of any park or community facility development (Action ID 4.1)

Strategy 5: Improve integration across sustainable transport modes

Strategy 5 aims to ensure seamless integration and effective transfer between bike riding and other sustainable transport modes where appropriate. The following actions identified to achieve Strategy 4 and which relate to the Waterfront Place Precinct Study include:

- Consider the needs of pedestrians and bike riders together when improving bike infrastructure (Action ID 5.1)
- Consider integrating bike riding with other transport modes such as public transport and car sharing pods (Action ID 5.2)

2.5 Sustainable Transport Strategy

The City of Port Phillip's vision is for a connected and liveable city where residents, visitors and workers can live and travel car free by improving the convenience, safety, accessibility and range of sustainable travel choices across our City. The Sustainable Transport Strategy aims to provide a framework to enable Council to make decisions within the context of this long term vision. To achieve this vision, Council is committed to making decisions based on a hierarchy that prioritises walking, bike riding and public transport above private car use.

This strategy sets out plans to achieve:

- An aspirational 50% reduction in community greenhouse gas emissions per person by 2020 (based on 2006 levels)
- Reduced private vehicle travel by residents from 78% to 53% of total distance travelled
- Increased travel by residents using walking and bike riding from 9% to 20% of total distance travelled
- Increased travel by residents catching public transport from 13% to 28% of total distance travelled.

The strategy also aims to provide a strategic context for pursuing sustainable transport improvements through advocacy to other bodies, notably the State Government who has responsibility for the provision and servicing of public transport and declared roads that run through Port Phillip.

2 Background Information

2.5.1 Guiding Principles

The Sustainable Transport Plan set out four guiding principles for progressing sustainable transport.

These principles form the basis of Council's sustainable transport policies and give clear direction in how Council will make decisions that balance competing demands on-street, with a strong focus on pursuing increases in people using sustainable transport modes to fulfil Council's vision of a connected and liveable city.

2.5.2 Water Front Place Precinct Policy Implications

Each guiding principle is made up of a number of different components. The components relevant to the Waterfront Place Precinct Transport and Access Study are highlighted below:

1. Ensure Priority – The Council will give preference to, and right of way to sustainable transport modes in terms of allocating time, space and facilities, guided by Council's Road User Hierarchy.

- The Council will give priority to transport modes in the following order: walking, bike riding, public transport, freight, multi-occupancy vehicles and single-occupancy vehicles
- Improve the directness of travel for walking, bike riding and public transport modes by working to reduce the physical barriers to their movement consistent with the road user hierarchy.
- Allocate on-street space for parking based on the hierarchy of parking need that ensures the safety of all road users whilst accommodating the parking needs of residents, businesses and visitors and promotes sustainable solutions that reinforce the road user hierarchy.
- Widen footpaths and bike facilities on identified walking and bike riding routes by reallocating road space in favour of pedestrians and bike riders over cars.

2. Increased Integration – The Council will strive to achieve a City where places are interlinked through walking, bike riding and public transport routes that are efficient, direct, attractive and competitive.

- Focus more intensive commercial, residential and mixed-use development in the most accessible and connected locations (i.e. activity centres, fixed rail and light rail lines and close to rail and tram stops and interchanges) subject to heritage and character considerations.
- Ensure the design of streets and land uses reflects the needs of people walking, bike riding including the linking of these to public transport services and other public and open spaces.
- Discourage car use and longer term parking in the most accessible and connected areas and locations in the City.
- Use connections between walking, bike riding and public transport routes to deliver improved transport interchanges, enhance the public realm and create people places in coordination with key partners.
- Implement walking infrastructure improvements through an area based approach centred in and around destinations.

3. Improve Safety and Accessibility – Council will work to provide conditions which allow people of all abilities to feel safer using our streets and sustainable transport options.

- Encourage walking and bike riding in local streets, activity centres and local shopping strips by reducing speed limits using an area based approach
- Increase road user safety based upon a hierarchy of vulnerability in the following order of priority: Pedestrians, Bike Riders, Motorcyclists and then Motor Vehicles, which reflects Council's road user hierarchy.

- Employ local area traffic management measures that reflect the road user hierarchy, influences driver behaviour and reduces the convenience of car use to provide safer streets for everyone.

2.6 Road Hierarchy

Within the study area there are two roads, Waterfront Place and Beach Street. They meet at the Waterfront Place/Beach Street/Princes Street Roundabout, shown in Figure 2-7 below.

Figure 2-7 Waterfront Place/Beach Street/Princes Street Roundabout

2.6.1 Beach Street

Beach Street is a local distributor road with a speed limit of 50km/h. It distributes local Port Melbourne traffic to Bay Street, Princes Street and Beacon Road and is used by bus route 253. It can be divided into two segments, east of the Waterfront Place/Princes Street roundabout and west of this roundabout. Both segments are divided roads with one lane in each direction, however east of the roundabout the carriageway on both sides is wider, suggesting space for 2 lanes, but these are unmarked. There is parking on both sides of the road. Its intersection with Bay Street is heavily congested in morning and afternoon peak times due to city bound/returning traffic. Beach Street west of Bay Street is an undeclared road and it is intended that city bound and longer distance traffic passing through Port Melbourne turn off Beach Street at Bay Street, as shown in the figure below.

Figure 2-8 Beach Street/Bay Street Intersection

2 Background Information

West of the roundabout there is also parking on both sides of Beach Street and the area is highly landscaped (see Figure 2-9 below), with some provision for right turns. There are only a small number of driveways, mainly accessing the medium density residential carparks and the Beacon Cove shops. The speed humps and their 20km/h warning signs along with the landscaping indicate that it is intended to operate more as a local access road rather than a local distributor road. However it functions more like that of a local distributor road as it used by medium distance traffic to distribute local area traffic to Beacon Road and Princes Street. It has also been reported by the community that a lot of traffic 'rat runs' through here to access the West Gate Bridge.

Figure 2-9 Beach Street west of Waterfront Place roundabout

2.6.2 Waterfront Place

Waterfront Place is a short length of road undivided road bounded by Station Pier and a roundabout with Princes Street and Beach Street. It has one lane in each direction and parking on both sides, see Figure 2-10 below. It provides access to Station Pier, cafes in the area and the cruise ship delivery area. Waterfront Place has the characteristics of an access road, where walking, vehicle access, delivery of goods and services and slow moving vehicles are prominent, however during cruise loading and unloading times, vehicle movements become much higher and the road becomes less accessible for pedestrians and cyclists. Access roads are usually expected to provide considerable freedom for crossing, which makes this a safety issue during cruise ship times. Access roads generally have a speed limit of up to 30km/h.

2 Background Information

Figure 2-10 Waterfront Place

In all cases, the Austroads Guide to Traffic Engineering suggests that the mid-block one-way capacity should be 900 vehicles per hour (vph).

3

Land Use Projections

This section provides the land use projections for the study area, in the context of wider Port Melbourne land use forecasts, used to determine background traffic growth and traffic generation for the development scenarios for 1 – 7 Waterfront Place.

3.1 Development Scenarios for 1 – 7 Waterfront Place

City of Port Phillip provided the development scenarios for 1 – 7 Waterfront Place, shown in Tables 3-1 – 3-3 below.

Table 3-1 Low Density Scenario

SCENARIO 1- Low Rise

Type		1st Floor	2nd Floor	3rd Floor	TOTAL	*Total Bedrooms*
Residential	1 Bed	3	6	6	15	*15*
	2 Bed	7	12	12	31	*62*
	3 Bed	3	6	6	15	*45*
	Total	**13**	**24**	**24**	**61**	***122***
Retail (m2)		2,400			2,400	

Table 3-2 Medium Density Scenario

SCENARIO 2- Mid Rise

Type		1st Floor	2nd Floor	3rd Floor	4th Floor	5th Floor	6th Floor	7th Floor	8th Floor	TOTAL	*Total Bedrooms*
Residential	1 Bed	3	6	6	6	6	6	6	6	45	*45*
	2 Bed	7	12	12	12	12	12	12	12	91	*182*
	3 Bed	3	6	6	6	6	6	6	6	45	*135*
	Total	**13**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**181**	***362***
Retail (m2)		2,400								2,400	

Table 3-3 High Density Scenario

SCENARIO 3- High Rise

Type		1st Floor	2nd Floor	3rd Floor	4th Floor	5th Floor	6th Floor	7th Floor	8th Floor	9th Floor	10th Floor	11th Floor	12th Floor	TOTAL	*Total Bedrooms**
Residential	1 Bed	3	6	6	6	6	6	6	6	6	6	6	6	69	*69*
	2 Bed	7	12	12	12	12	12	12	12	12	12	12	12	139	*278*
	3 Bed	3	6	6	6	6	6	6	6	6	6	6	6	69	*207*
	Total	**13**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**277**	***554***
Retail (m2)		2,400												2,400	

* Total bedrooms shown in Action Group's planning application is 538, plus 38 serviced apartments

3.2 Land Use Scenarios

Population growth was determined for the next 5 and 10 years to determine its impact on how the road network in the vicinity to Waterfront Place will perform in the future. In addition, growth expected from a new development at 1-7 Waterfront Place was added to these land use projections for a low, medium and high level of development.

The following is a description of the methodology used to determine the population projections.

3 Land Use Projections

The number of floors for the low, medium and high growth scenarios for 1-7 Waterfront Place, Port Melbourne was provided by Council based on the Action Group's planning permit application which is 538 bedrooms plus 38 serviced apartments. The height limits for each scenario are outlined below:

- Low Density – 3 storeys
- Mid Density – 8 storeys
- High Density – 12 storeys

The configuration of the number of bedrooms for each floor and the total retail floorspace of 2,400m2 for all three scenarios was also provided by Council. Appendix A outlines these.

The traffic modelling required a total population number for each of the three scenarios for the resident population once the apartments were fully developed, i.e. in 5 years.

A review of recent census data was undertaken to understand changes over time and determine trends and growth patterns.

From 2006 to 2011, City of Port Phillip's population increased by 6,301 people (7.4%). This represents an average annual population change of 1.44% per year over the period.

For Port Melbourne, the forecast net population for 5 years between 2012 to 2017 is expected to be 797 people taking into consideration the number of births, deaths and net migration.

For Port Melbourne, Forecast data (for next 5 years) was used rather than actual.

3.2.1 Port Melbourne

- Population in 2011 = 14,660
- Population Forecast in 2016 = 15,456
- Average annual population change in 5 year period between 2011-2016 = 1.06%
- Average annual population change in 5 year period between 2016-2021 = 0.41%

(source: forecast2.id.com.au)

The average annual population change rates above were applied to the background traffic volumes to determine the growth in traffic in the future scenarios.

According to recent ABS Census data and the Profile i.d website, for Port Melbourne, the average household size was forecast to be 2.16 persons/ dwelling in 2011 but the actual household size was 1.93 persons/ dwelling in 2011.

Based on the above and in addition applying discretion to account for relevant demographic indicators, a reduced average population/dwelling was determined.

Actual and forecast demographic data was reviewed such as household type with a larger than average proportion being apartments rather than detached houses and taking into account household structure data such as the high proportion of lone person households (34.7% in 2017 and 35.3% in 2022) and couples without dependents (children) (31.5% in 2017 and 31.7% in 2022) in the Port Melbourne area.

The population per dwelling is assumed to increase based on the number of bedrooms each dwelling will contain. This was calculated by multiplying the number of bedrooms for each floor by the average population per dwelling for that bedroom type.

3 Land Use Projections

The modelling assumed the following scenarios:

- 1 bedroom apartment = average of 1.3 persons
- 2 bedroom apartment = average of 1.8 persons
- 3 bedroom apartment = average of 2.2 persons

This is an average assumption of 1.76 persons per dwelling for the Waterfront Place development.

3.2.2 Land Use Yield Scenarios

For each of the scenarios a total population was derived:

- Low Density (3 storeys) – 109 persons
- Mid Density (8 storeys) – 322 persons
- High Density (12 storeys) – 492 persons

4 Development Parking and Traffic

This section describes the parking provision and traffic generation adopted for the development scenarios for 1 – 7 Waterfront Place.

4.1 Parking Demand and Traffic Generation Assumptions

Separate assessments of parking demand and traffic generation by land use type, as detailed in Section 3, have been developed as described below.

The parking provision and traffic generation rates have been developed based on experience with similar developments and appropriate guidelines.

4.1.1 Retail

As detailed in Section 3, a total of 2,400 m² of retail floor space has been adopted for all scenarios. The following assumptions have been adopted to convert this floor space into parking demand and traffic generation, resulting in the following traffic generation:

- 100 m²/shop and 1 employee/shop, therefore 24 employees;
- 40% of employees drive, therefore 10 carparking spaces are required for employees;
- no customer parking is provided, as all customers are either nearby residents who walk to the shops or visitors to the area who have parked elsewhere;
- In the AM peak hour, all employees with parking spaces drive to work: 10 vehicles per hour (vph) inbound, giving a traffic generation of: 0 vph outbound, 10 vph two-way;
- In the PM peak hour, 80% of employees with parking spaces depart (with the balance departing after the pm peak hour), giving a traffic generation of: 0 vph inbound, 8 vph outbound, 8 vph two-way; and
- no deliveries during the peak hours.

4.1.2 Residential Scenarios

The following assumptions have been adopted to convert the apartment numbers of each development scenario into parking demand and traffic generation, resulting

- 0.7 car spaces/apartment, therefore 43 spaces for low, 127 for medium, and 194 for high;
- AM Peak: 80% of these apartments depart, 60% of these departures by car / 20% of the number of outgoing vehicles arrive, therefore 22 vph depart and 6 vph arrive for the low scenario, 61 vph leave and 16 vph arrive in the medium scenario and 94 vph depart and 24 vph arrive in the high scenario;
- PM Peak: Opposite to AM Peak;
- No deliveries required during the peak hour period;
- Distribution of left turning and right turning vehicles arriving and departing the development is based on current east bound and west bound movements along Beach street during the relevant peak period; and
- There is one access point to the development on Beach Street, therefore all traffic generated by the development will be entering and exiting from this location;

The rates above are in line with the goals of the City of Port Phillip's Sustainable Transport Strategy, they take into account the local area demographics described in the Land Use Scenario section above and a number of sustainable travel behaviours expected for a development in the inner city suburbs.

4 Development Parking and Traffic

Such sustainable travel behaviours include a proportion of residents having no car, a car share scheme being in place, access to public transport, bike and walking tracks. Based on a review of car parking rates at other developments in similar areas of Melbourne, this is the typical rate for 1-2 bedroom apartments. In the development at 1-7 Waterfront Place, 75% of the apartments will be 1-2 bedrooms for any of the scenarios. However it has been discussed with council that a higher parking rate (double) should also be tested in the traffic modelling to determine what impact this would have on the road network. This is currently being discussed with council as to whether this modelling will be undertaken.

4.1.3 Comparison to Traffic Generation Guidelines

The relevant guideline generally and widely used for traffic generation is the "RTA Guide to Traffic Generating Developments".

These guidelines recommend for a high density residential flat building a traffic generation rate of 0.29 peak hour vehicle trips per dwelling and for a shopping centre 11 peak hour vehicle trips per shop (100 m^2).

The adopted traffic generation rates for 1 – 7 Waterfront Place are:

- for the retail development: 0.42 vph/shop;
- for the low scenario: 0.5 vph/apartment;
- for the medium scenario: 0.43 vph/apartment; and
- for the high scenario: 0.43 vph/apartment.

The rates above vary to the guidelines for the following reasons. The higher rates for the apartments were selected for this development because the recommended rate per dwelling is considered too low for the demographics of the area. On the other hand, the rate per shop for a shopping centre is considered too high for the nature of shops in the area. This has been reduced due to the fact that the shops are expected to service mainly locals and transit passengers, who will arrive by foot.

The same guidelines recommend that for high density residential developments the following off-street parking should be provided:

- 0.6 spaces per 1 bedroom unit
- 0.9 spaces per 2 bedroom unit
- 1.40 spaces per 3 bedroom unit
- 1 space per 5 units (visitor parking)

Similarly the City of Port Phillip Parking Policy requires the following reduced car parking ratios for a residential development:

- 0-0.8 spaces per 1 bedroom unit;
- 1+ spaces for units of 3 or more bedrooms

Whilst most of these are higher than the 0.7 spaces/apartment specified for Waterfront Place, specific assumptions for traffic generation and car parking requirements were made for this development, which took the above guidelines into consideration along with the local area factors, such as access to public transport, car share and demographics.

4.2 Parking and Traffic Volumes for 1-7 Waterfront Place Scenarios

The traffic generation assumptions described above have been assigned to the road network based on the existing trip distribution in the area, Section 5.3 describes this in further detail. The following are the volumes generated by each of the Development Scenarios in the AM and PM peak.

4.2.1 Low Scenario:

- 61 apartments
- Therefore 43 car spaces are required (53 including retail)
- Traffic volumes generated in and out of the building are shown in Table 4-1 below.

Table 4-1 Low Scenario Traffic Movements

	Inbound		Outbound		Two Way	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Left in/out	10	9	13	6	23	15
Right in/out	6	13	9	8	15	21
Total vph*	16	22	22	14	38	36

*Total includes residential and retail movements

4.2.2 Medium Scenario:

- 181 apartments
- Therefore 127 car spaces are required (137 including retail)
- Traffic volumes generated in and out of the building are shown in Table 4-2 below.

Table 4-2 Medium Scenario Traffic Movements

	Inbound		Outbound		Two Way	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Left in/out	16	26	36	9	52	35
Right in/out	10	35	25	15	35	50
Total vph*	26	61	61	24	87	85

*Total includes residential and retail movements

4.2.3 High Scenario Residential:

- 277 apartments
- Therefore 194 car spaces are required (204 including retail)
- Traffic volumes generated in and out of the building are shown in Table 4-3 below.

Table 4-3 High Scenario Traffic Movements

	Inbound		Outbound		Two Way	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Left in/out	21	39	55	12	76	51
Right in/out	13	55	39	20	52	75
Total vph*	34	94	94	32	128	126

*Total includes residential and retail movements

4 Development Parking and Traffic

4.2.4 Impact of Development on Nearby Intersections

The figures below show the impact the new development will have on traffic volumes to four of the key intersections along Beach Street near the proposed Waterfront Place development. Figure 4-1 shows the AM and PM peak volumes coming to and from the development which can be up to 39 vehicles per hour in the AM and up to 55 vehicles per hour in the PM. Figures 4-2 shows the Waterfront Place/Princes Street/Bay Street intersection, Figure 4-3 the Beach Street and tram 109 crossing, and Figure 4-4 the Beach Street/Bay Street signalised intersection. The figures show the expected volumes entering the intersections in 2022 without the development and the percentage increase in traffic with the development in a high density scenario for AM and PM peak hours. They show that the volumes generated by the development represent only a small proportional increase to the overall traffic in the area.

As an example the first image in Figure 4-2 below shows the AM peak hour traffic volumes entering the Waterfront Place/Princes Street/Beach Street roundabout, both with the development and without the development in 2022 for the high density scenario. This shows there is an only a minimal increase in traffic entering the roundabout due to the development during a typical AM peak, up to 10.7%. The PM peak is the second image in Figure 4-2; in this case the traffic generated by the development represents an increase of up to 12.5% of traffic entering the roundabout.

4 Development Parking and Traffic

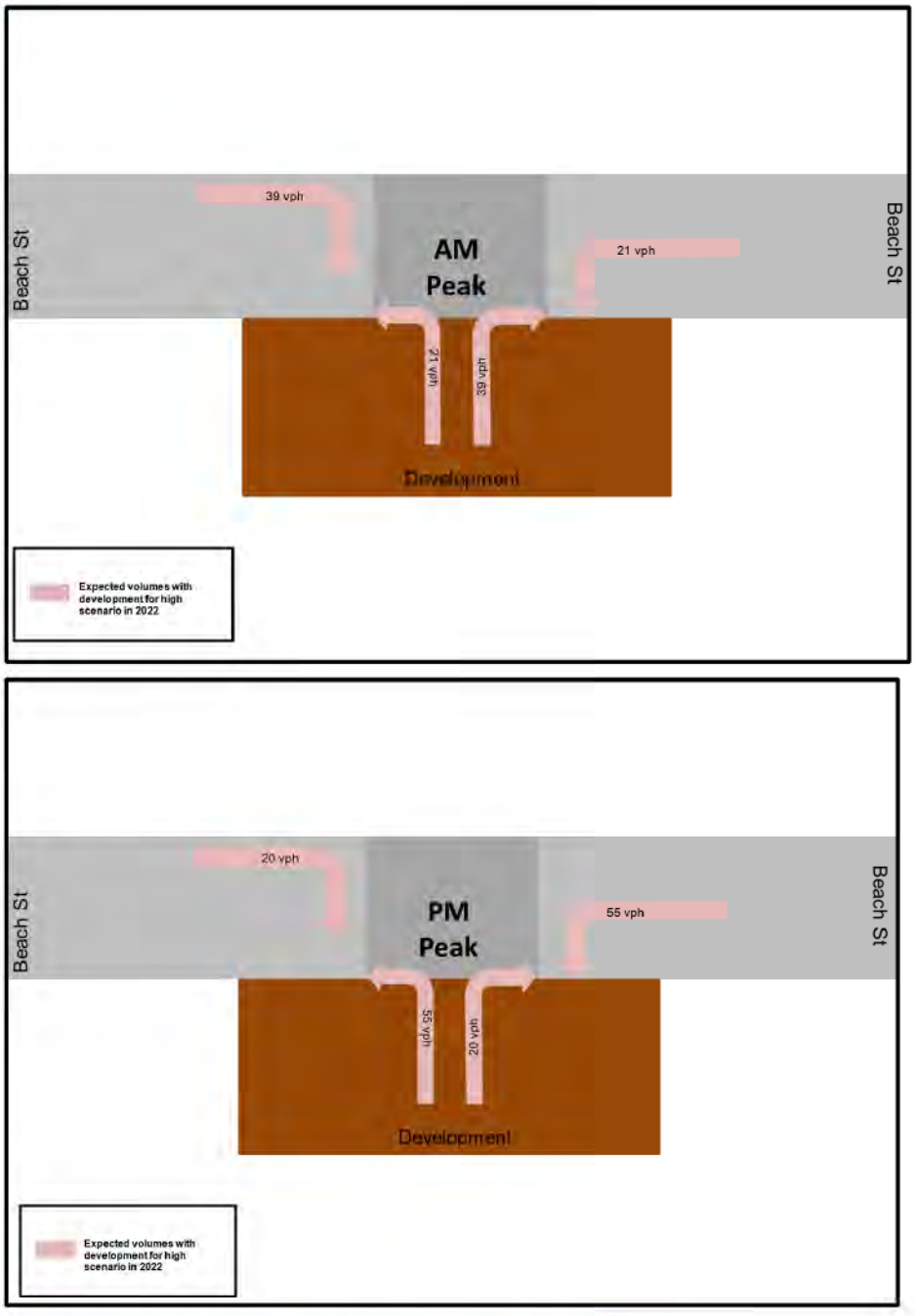


Figure 4-1 Waterfront Place Development in AM and PM peak

4 Development Parking and Traffic

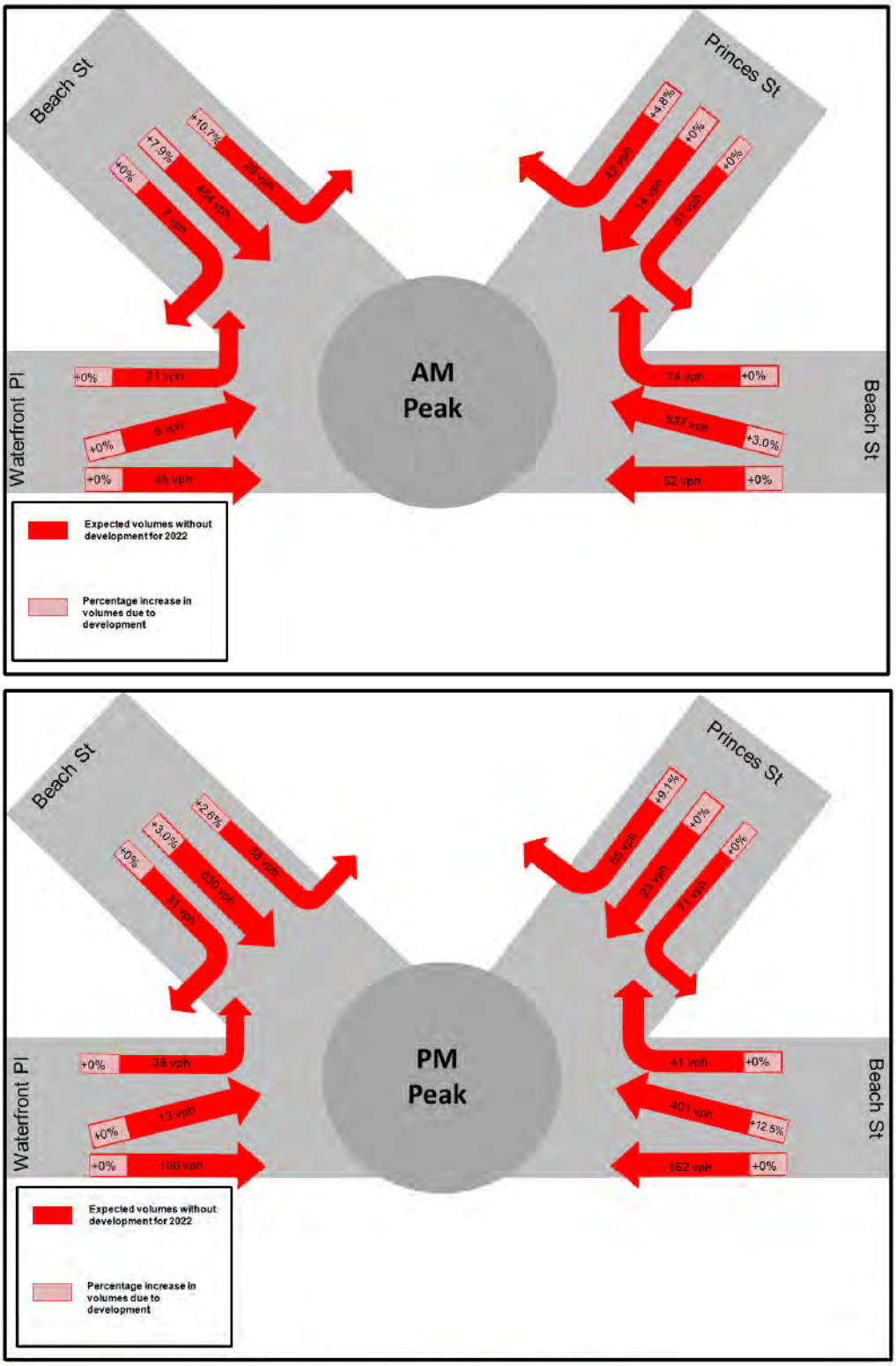


Figure 4-2 Waterfront Place Roundabout in AM and PM peak

4 Development Parking and Traffic

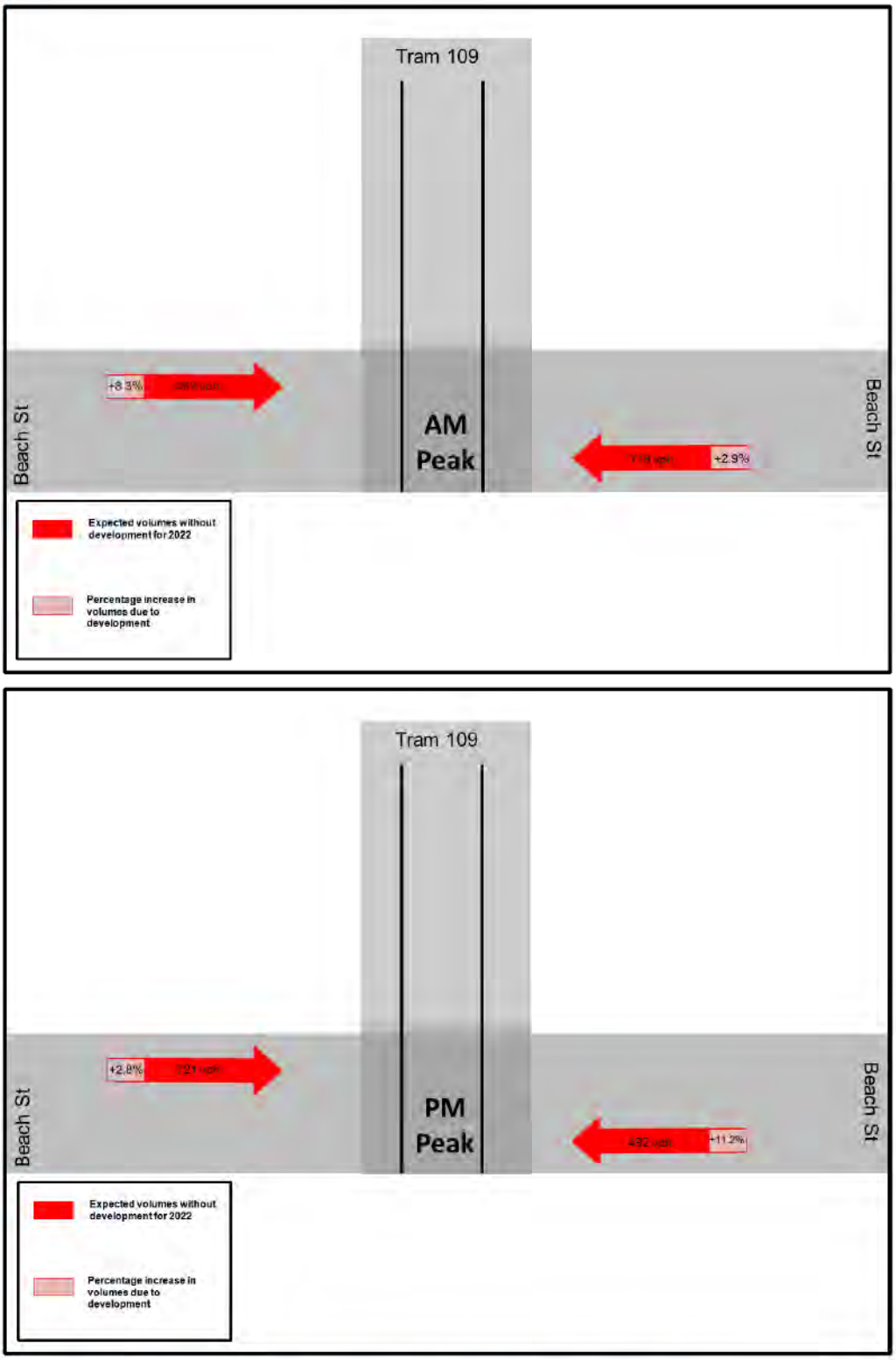


Figure 4-3 Beach Street and Tram 109 Intersection in AM and PM peak

4 Development Parking and Traffic

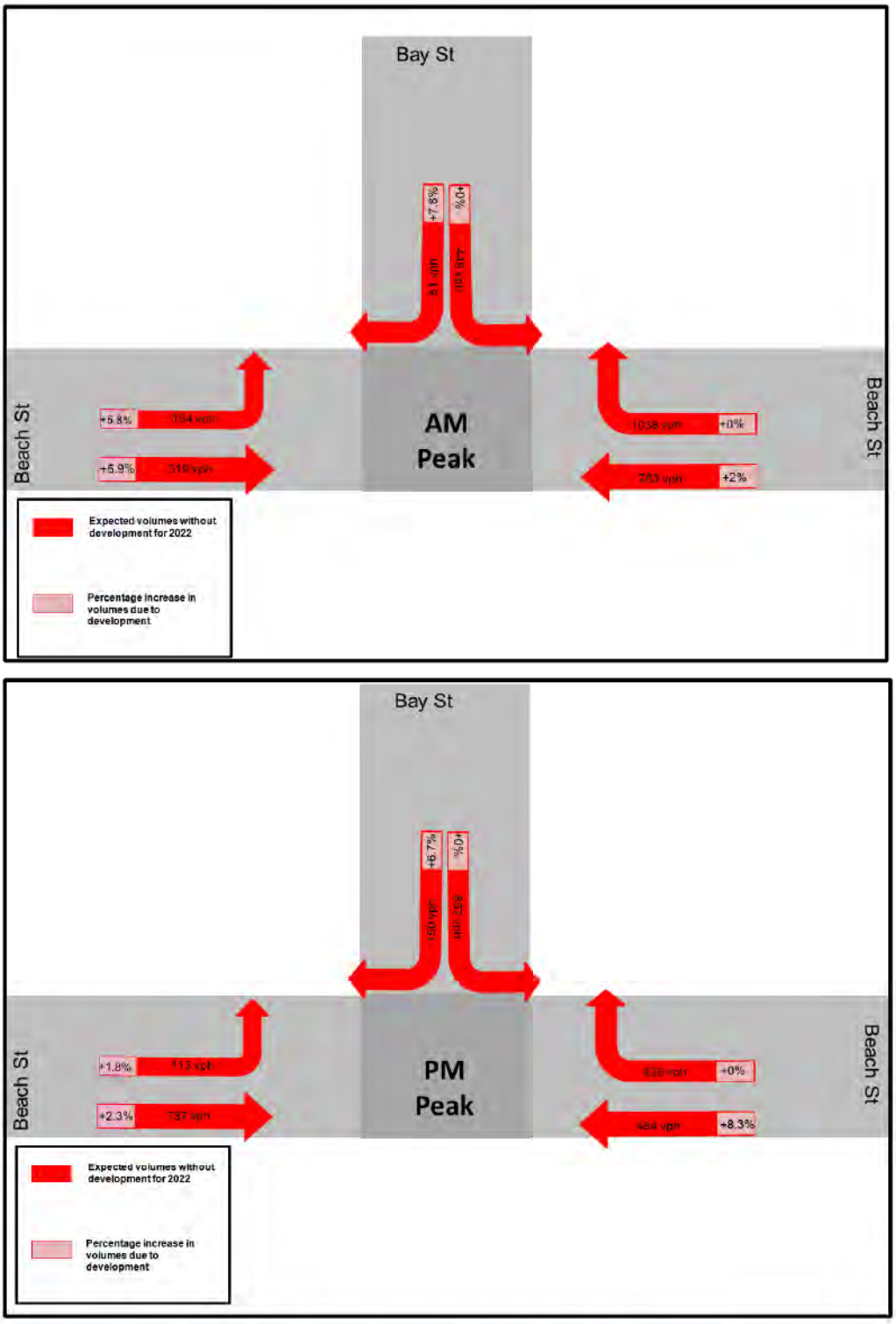


Figure 4-4 Beach Street and Bay Street Intersection in AM and PM peak

5

Traffic and Modelling Results

5.1 Traffic Survey Data Used

The traffic counts from Monday 19th November were higher than the counts from Sunday 25th November as there was a cruise ship docked at Station Pier on this day. Therefore these counts were used as the base case counts for the 2012 traffic models, as they were considered the worst case scenario from the information collected. See Appendix B for full set of traffic count data.

5.2 The Model Years

Land use projections were modelled to be used in the traffic modelling. The following scenarios were modelled for the AM and PM peak:

- Existing Conditions 2012;
- 5 Year Scenarios – Base Case 2017, Low/Medium/High Scenario Development at 1-7 Waterfront Pl; and
- 10 Year Scenarios – Base Case 2022, Low/Medium/High Scenario Development at 1-7 Waterfront Pl.

5.3 Trip Distribution

Access to the development is assumed to be via Beach Street and all movements at the entrance are assumed to be allowed.

The left/right/through movements from the proposed development were distributed using the existing proportion of turning movements at the nearby intersections. For example, in the AM peak, at the Beach St / Beacon Rd intersection, 91% of westbound traffic on Beach St turn left, 8% turn right and 1% make a U-turn. It was assumed that 91% of development traffic that reaches Beacon Rd turns left, 8% turns right and 1% make a U-turn.

Included in Appendix F are the volumes used in the modelling.

5.4 Consultation with Yarra Trams

Yarra Trams were consulted on whether any changes were expected for the Tram 109 terminus adjacent to the proposed development at 1-7 Waterfront Place. Ideally they would like to extend the Tram 109 terminus to Station Pier and reconfigure the terminus to be 2 tracks, which would allow for a tram layover area and hence increased route frequency. However there is currently no plans or budget for this to happen, therefore it has been assumed in the modelling undertaken that no increased frequency will occur to Tram 109 within the future scenarios.

5.5 Traffic Modelling Outputs

The traffic modelling package SIDRA was used to analyse the performance of the key intersections in the study area to identify the traffic characteristics for the scenarios described in Section 5.2.

The 'degree of saturation' (DoS) and '95% queue length' were used to compare the results of the models. The DoS refers to the ratio of an intersection between the traffic demand at the intersection compared to its total capacity. An intersection with a DoS approaching 0.90 to 0.95 is considered to be at capacity.

5 Traffic and Modelling Results

Table 5-1 below summarises the worst Degree of Saturation (DoS) for each intersection. For the future scenarios, this always occurred with the high density scenario of development at 1-7 Waterfront Place. A full set of the SIDRA results for each of the scenarios can be viewed in Appendix D.

Table 5-1 Highest Degree of Saturation for each Intersection

	2012 – Highest DoS		2017 – Highest DoS		2022 – Highest DoS	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Beacon Rd/Beach St	0.63	0.44	0.74	0.49	0.78	0.52
Beach St/Canberra Pde	0.76	0.77	0.83	0.84	0.87	0.88
Beach St/Park Sq	0.35	0.37	0.38	0.40	0.40	0.53
Beach St/Waterfront Pl/Princes St	0.50	0.52	0.54	0.57	0.57	0.60
Beach St/Bay St	1.00	1.00	1.01	1.00	1.06	1.00

The results above show that only the intersection of Beach Street/Bay Street exceeded its critical capacity, i.e. a DoS over 0.95. A DoS under 0.9 at all other intersections indicate that they will operate well within their capacity both with the development and without it.

The 95% queue length value is used as an indication of the queue length whereby the probability of exceeding it is only 5% - often referred to as the design queue length. This can be converted to the number of equivalent cars, which is shown in the bar graphs below for each of the intersections. Note that the 95th percentile queue length means that queues are only longer than this 5% of the time – i.e. a total of 3 minutes out of a full hour.

Beacon Road/Beach Street

The intersection modelled in SIDRA is shown in Figure 5-1 below.

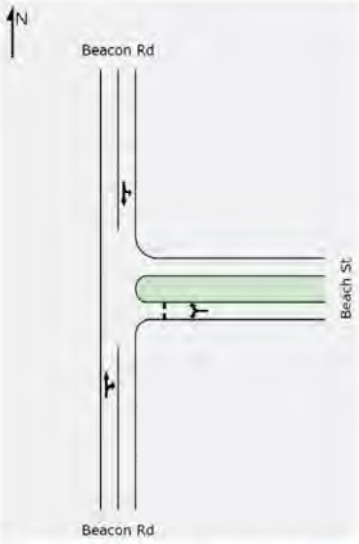


Figure 5-1 Intersection of Beacon Rd/Beach St

5 Traffic and Modelling Results

The 95% queue length for the worst leg of the intersection is shown in Chart 5-1 for the AM peak and Chart 5-2 for the PM peak.

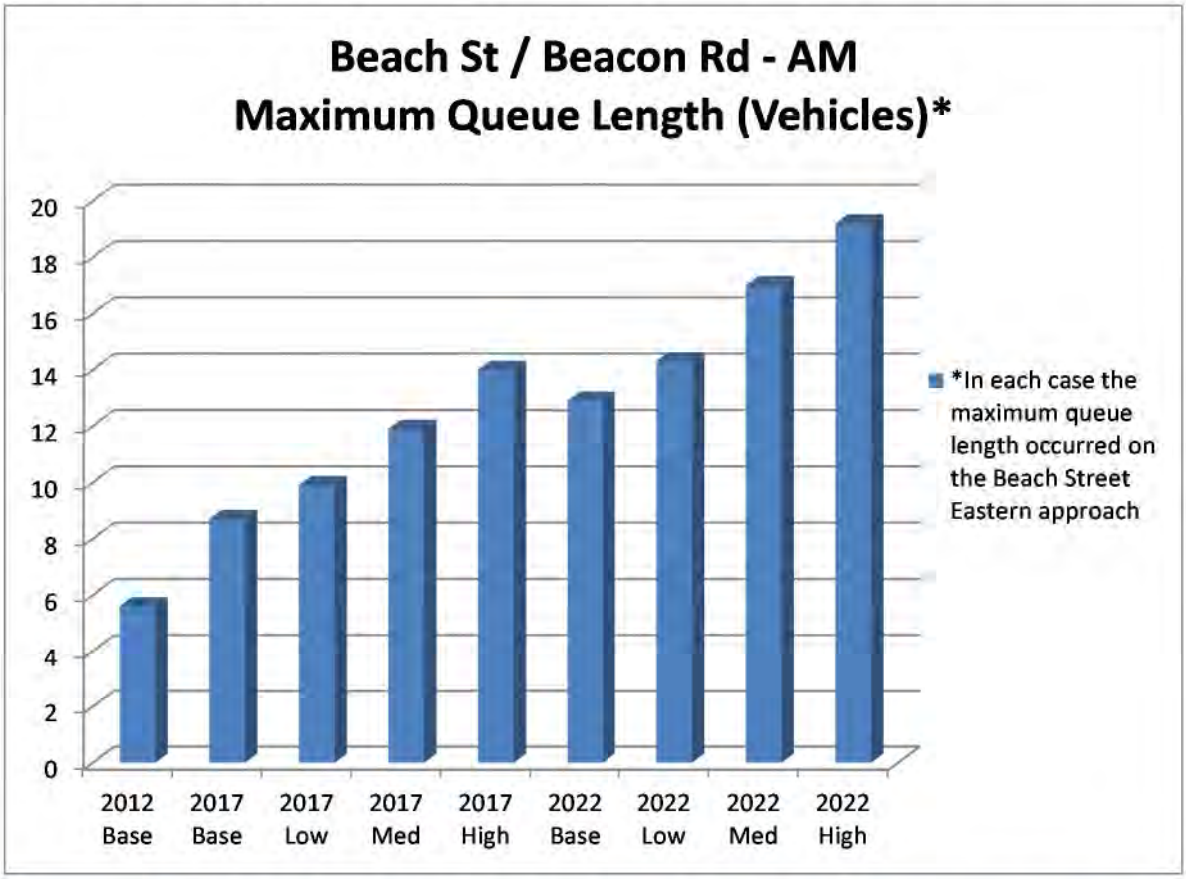


Chart 5-1 Bar chart of the maximum queue length for Beach St/Beacon Rd intersection in AM peak

5 Traffic and Modelling Results

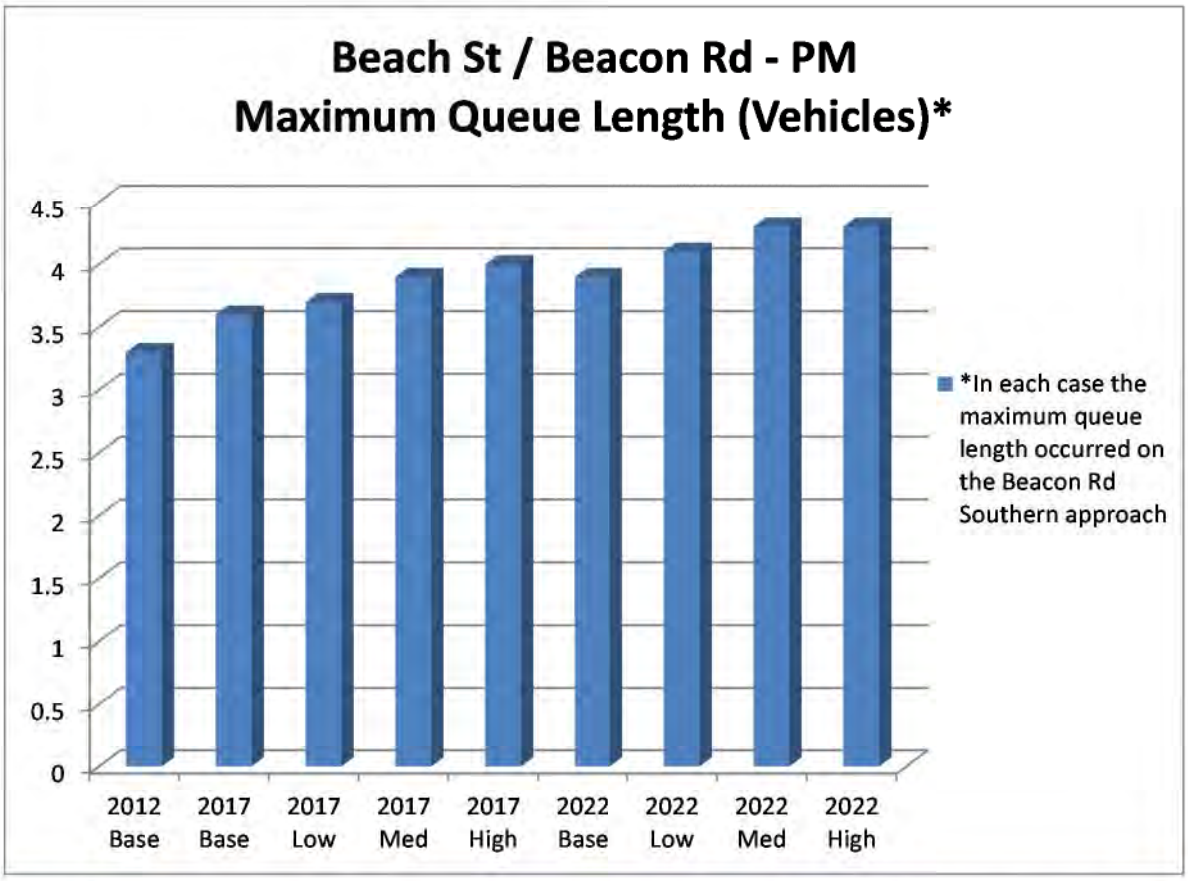


Chart 5-2 Bar chart of the maximum queue length for the Beach St/Beacon Rd intersection in PM peak

5 Traffic and Modelling Results

Beach St/Tram 109 Crossing

The intersection modelled in SIDRA is shown in Figure 5-2 below.

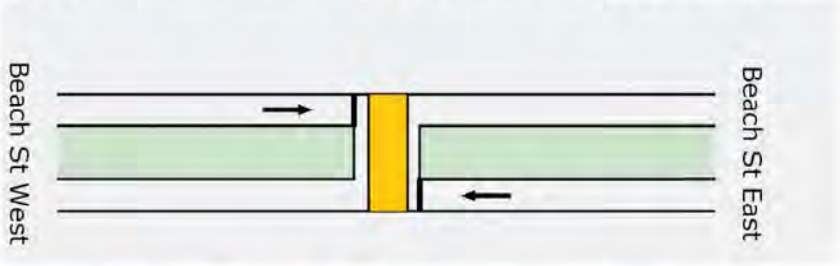


Figure 5-2 Intersection of Beach St/Tram 109 crossing

The 95% queue length for the worst leg of the intersection is shown in Chart 5-3 for the AM peak and Chart 5-4 for the PM peak.

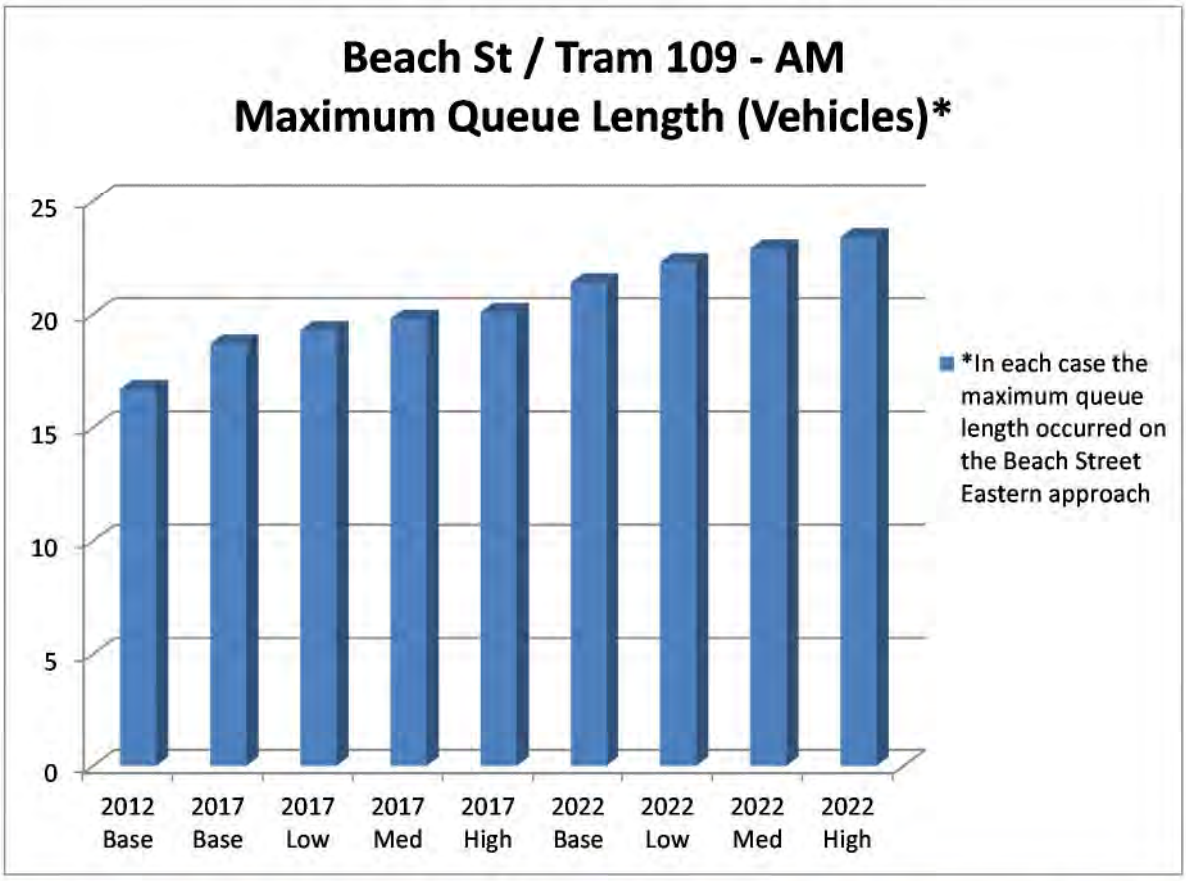


Chart 5-3 Bar chart of the maximum queue length for the Beach St/Tram 109 intersection in AM peak

5 Traffic and Modelling Results

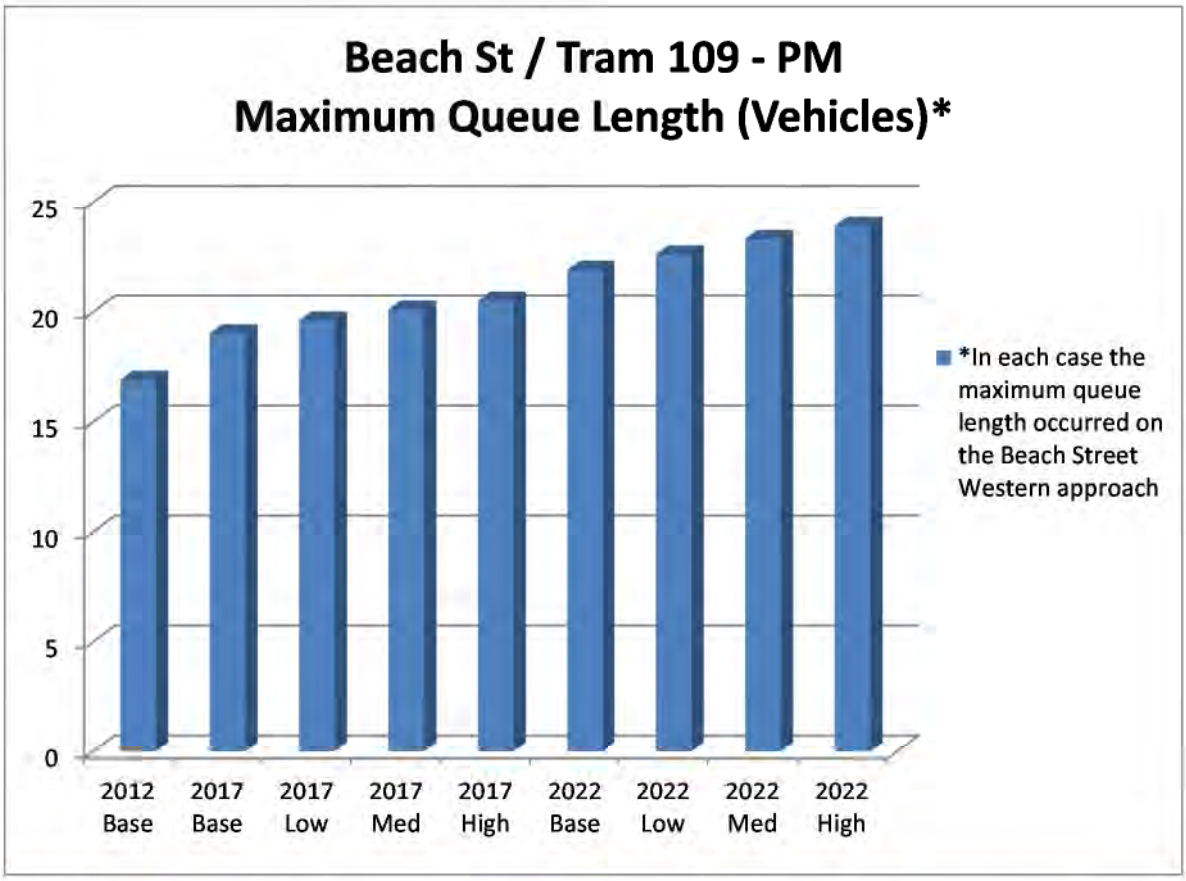


Chart 5-4 Bar chart of the maximum queue length for the Beach St/Tram 109 intersection in PM peak

Beach St/Park Sq

The intersection modelled in SIDRA is shown in Figure 5-3 below.

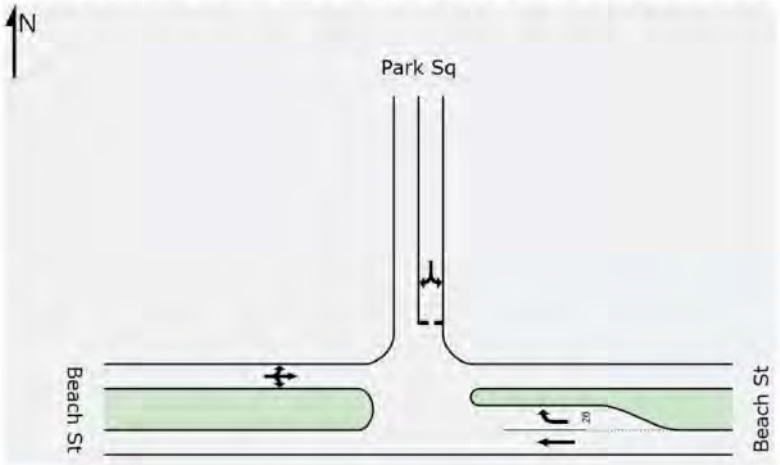


Figure 5-3 Intersection of Beach St/Park Sq

The 95% queue length for the worst leg of the intersection is shown in Chart 5-5 for the AM peak and Chart 5-6 for the PM peak.

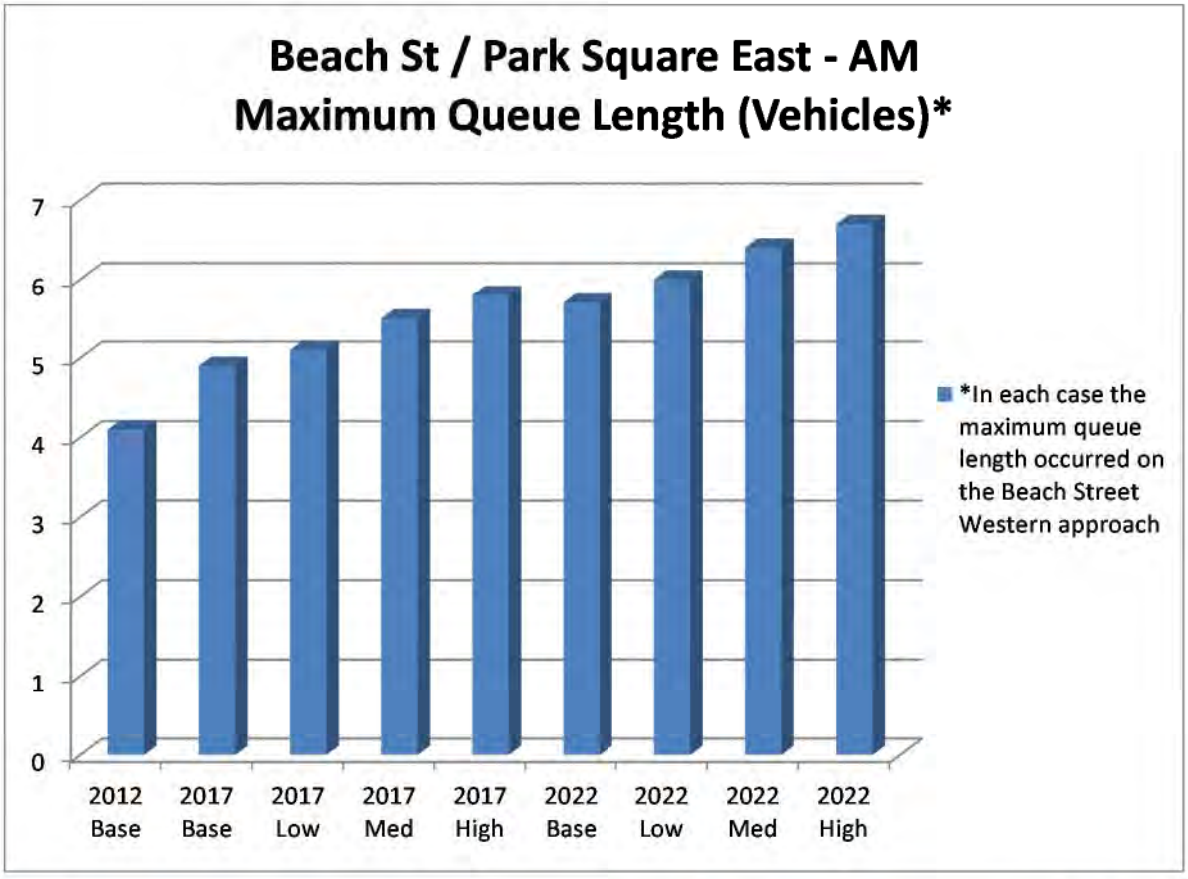


Chart 5-5 Bar chart of the maximum queue length for the Beach St/Park Sq intersection in AM peak

5 Traffic and Modelling Results

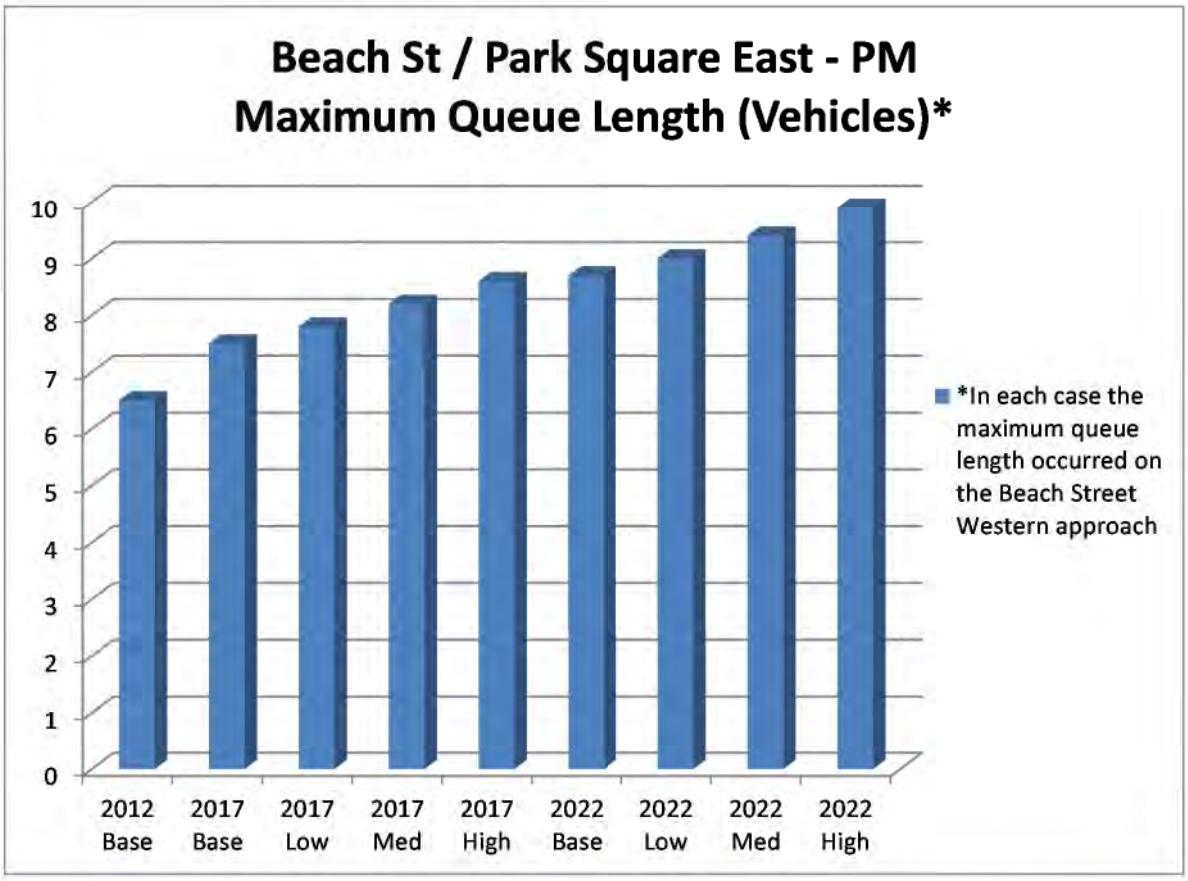


Chart 5-6 Bar chart of the maximum queue length for the Beach St/Park Sq intersection in PM peak

5 Traffic and Modelling Results

Beach St/Waterfront Pl/Princes St

The intersection modelled in SIDRA is shown in Figure 5-4 below.

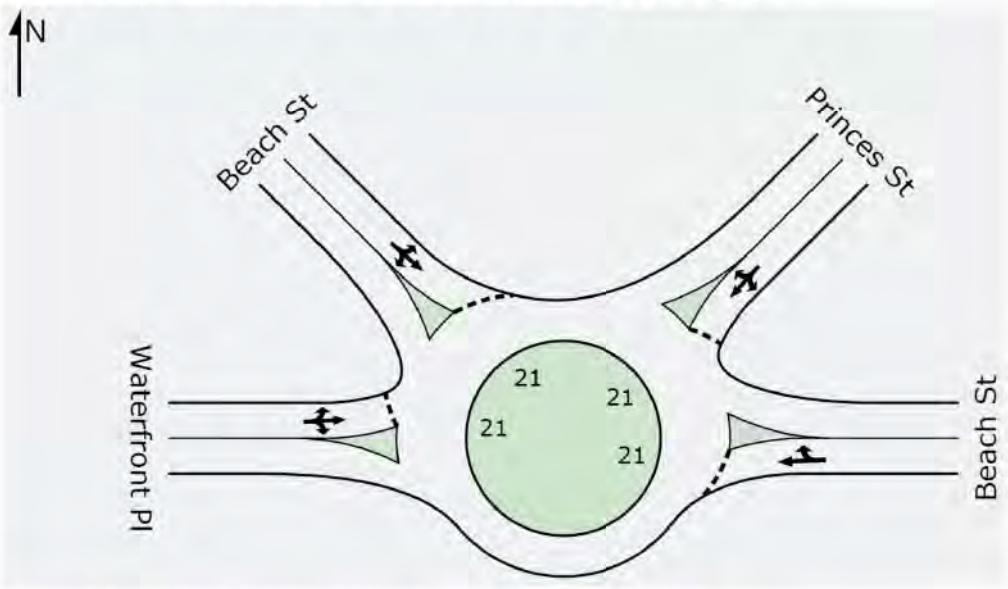


Figure 5-4 Roundabout of Beach St/Waterfront Pl/Princes St

The 95% queue length for the worst leg of the intersection is shown in Chart 5-7 for the AM peak and Chart 5-8 for the PM peak.

5 Traffic and Modelling Results

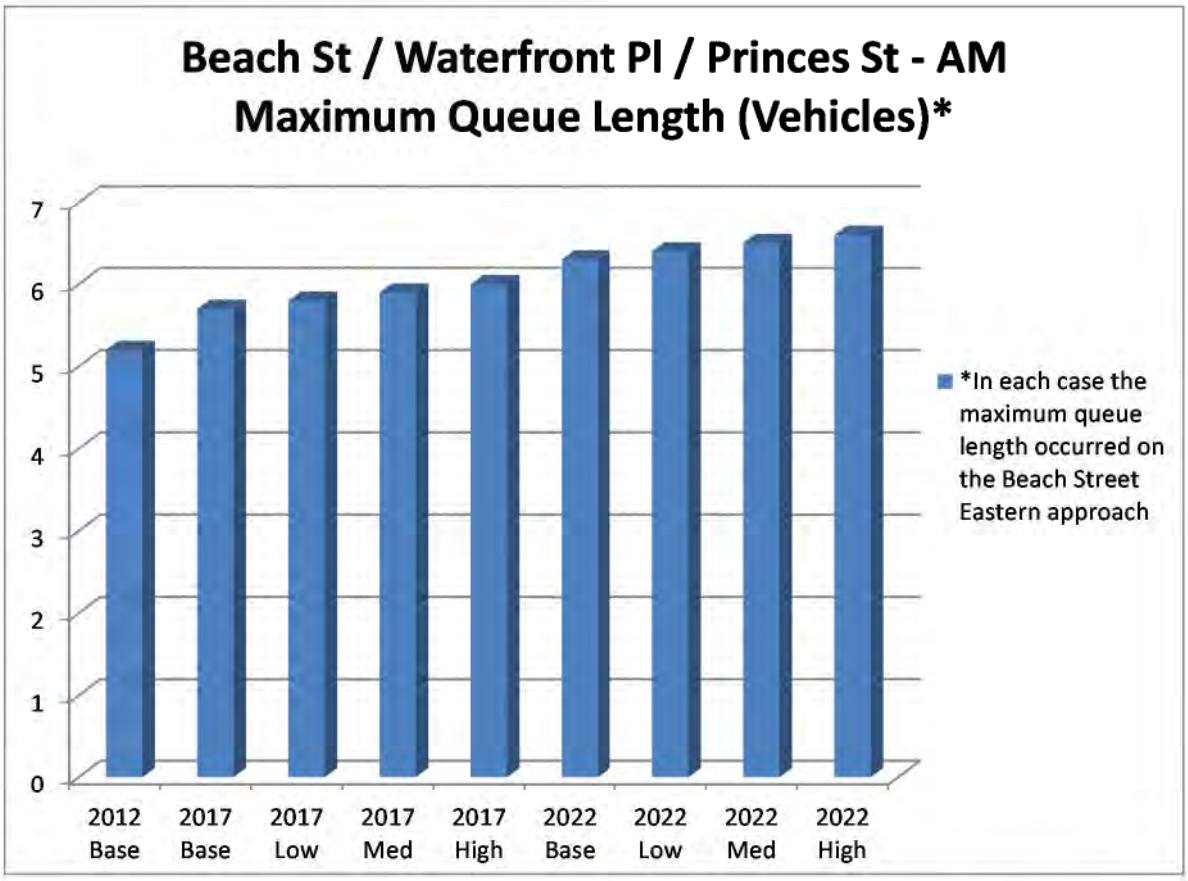


Chart 5-7 **Bar chart of the maximum queue length for the Beach St/Waterfront Pl/Princes St roundabout in AM peak**

5 Traffic and Modelling Results

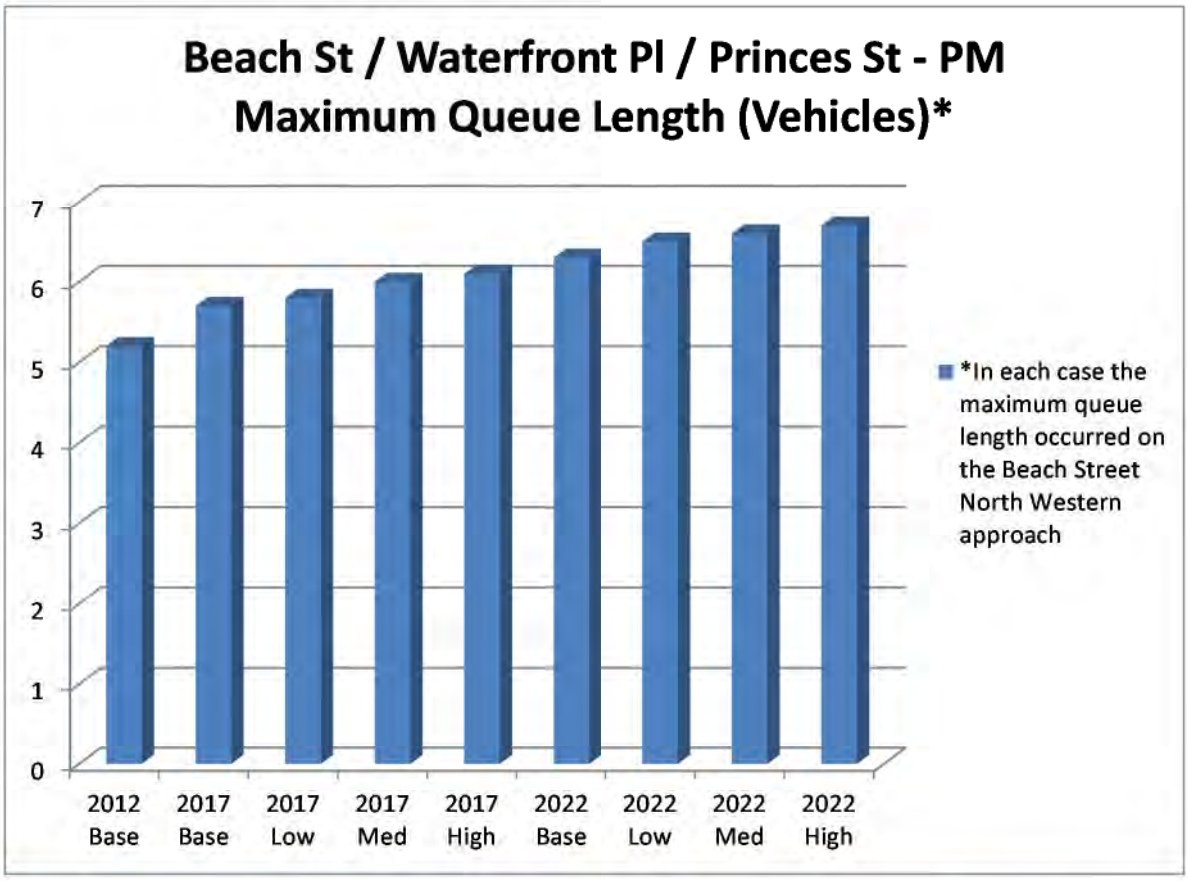


Chart 5-8 **Bar chart of the maximum queue length for the Beach St/Waterfront Pl/Princes St roundabout in PM peak**

5 Traffic and Modelling Results

Beach St/Bay St

The intersection modelled in SIDRA is shown in Figure 5-5 below.

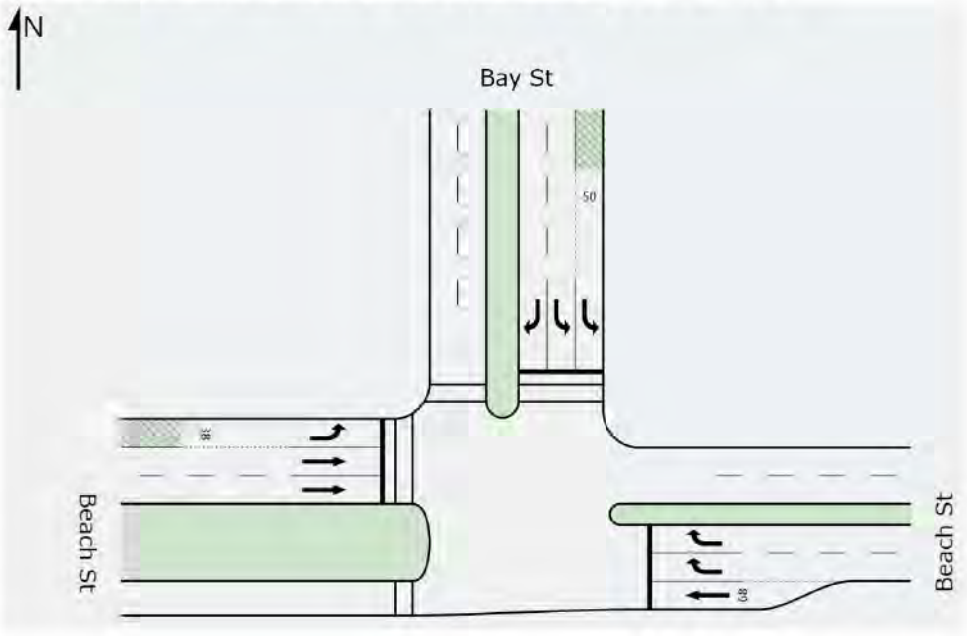


Figure 5-5 Intersection of Beach St/Bay St

The 95% queue length for the worst leg of the intersection is shown in Chart 5-9 for the AM peak and Chart 5-10 for the PM peak.

5 Traffic and Modelling Results

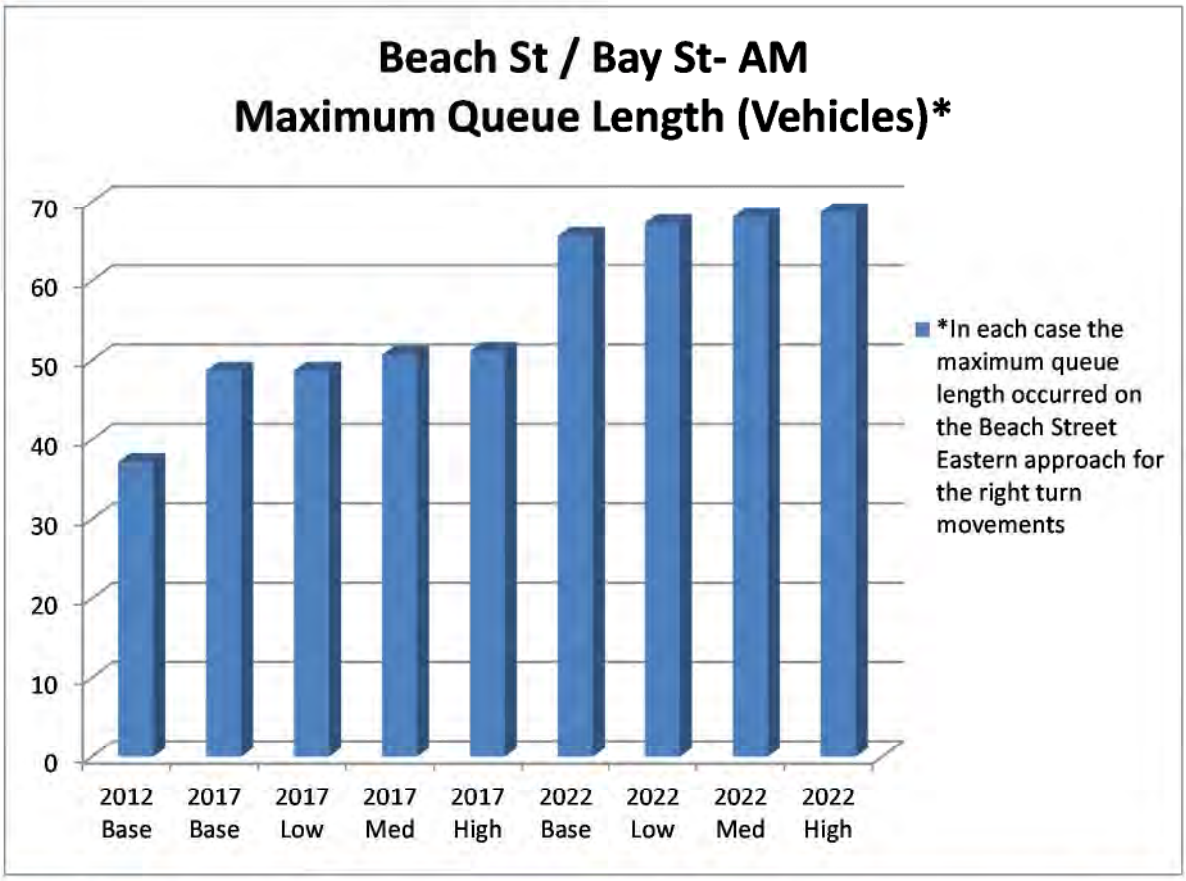


Chart 5-9 Bar chart of the maximum queue length for the Beach St/Bay St intersection in AM peak

Chart 5-10 Bar chart of the maximum queue length for the Beach St/Bay St intersection in PM peak

Similar to the DoS results, the bar charts indicate that only the Beach Street/Bay Street intersection exceeds capacity in the future, with a maximum queue length of almost 70 vehicles in 2022 for the Beach Street eastern approach, which occurred for the right turn movement heading city bound in the AM Peak.

5.6 Recommended Improvements at Beach St / Bay St Intersection

The only intersection that reached capacity in the future was the Beach St/Bay St intersection. The following tables summarise the full SIDRA results for 2012 at the intersection.

During the AM peak period (0800 – 0900hrs) the right turn movement from Beach Street (East) into Bay Street is at capacity probably due to insufficient green time to cater for the high volume of traffic.

The analysis for the PM peak period (1630-1730hr) highlight both Bay Street and Beach Street (East) are at capacity or close to capacity. This is mainly due to insufficient green time to access/ egress Bay Street and access to the flared ahead lane configuration along Beach Street (East) restricted by right turn queues.

5 Traffic and Modelling Results

Table 5-2 Table Summarising AM SIDRA Modelling

MOVEMENT SUMMARY

Site: 19th AM Beach St / Bay St

New Site
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Beach St											
5	T	339	1.0	1.000[3]	40.0	LOS D	16.9	119.6	1.00	0.85	27.3
6	R	1367	3.6	0.993	104.9	LOS F	69.6	496.6	1.00	1.12	15.6
Approach		1706	2.5	1.000	92.0	LOS F	69.6	496.6	1.00	1.07	17.1
North: Bay St											
7	L	425	16.3	0.434	37.2	LOS D	17.3	137.8	0.70	0.80	16.9
9	R	48	19.6	0.743	93.3	LOS F	5.3	43.3	1.00	0.83	8.3
Approach		474	16.7	0.743	42.9	LOS D	17.3	137.8	0.73	0.80	15.2
West: Beach St											
10	L	99	23.4	0.575	32.8	LOS C	5.5	46.0	0.60	0.74	27.4
11	T	483	0.9	0.267	25.7	LOS C	12.2	85.7	0.65	0.55	29.5
Approach		582	4.7	0.575	26.9	LOS C	12.2	85.7	0.64	0.59	29.1
All Vehicles		2762	5.4	1.000	69.9	LOS E	69.6	496.6	0.88	0.92	18.3

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

3. x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Table 5-3 Table Summarising PM SIDRA Modelling

MOVEMENT SUMMARY

Site: 19th PM Beach St / Bay St

New Site
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Beach St											
5	T	408	2.3	1.000[3]	31.5	LOS C	16.8	119.8	1.00	0.87	30.6
6	R	463	11.0	0.739	73.1	LOS E	17.9	134.9	1.00	0.86	20.1
Approach		872	6.4	1.000	53.6	LOS D	17.9	134.9	1.00	0.87	23.9
North: Bay St											
7	L	812	2.6	0.976	88.9	LOS F	58.0	415.0	0.99	0.99	8.4
9	R	142	20.7	0.732	80.7	LOS F	12.2	100.6	1.00	0.86	9.4
Approach		954	5.3	0.976	87.7	LOS F	58.0	415.0	0.99	0.97	8.5
West: Beach St											
10	L	107	20.6	0.494	23.6	LOS C	4.8	39.3	0.48	0.73	32.3
11	T	698	1.1	0.311	16.9	LOS B	14.2	100.4	0.55	0.48	35.4
Approach		805	3.7	0.493	17.8	LOS B	14.2	100.4	0.54	0.51	34.9
All Vehicles		2631	5.2	1.000	55.0	LOS E	58.0	415.0	0.86	0.80	18.9

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

The following describes a possible engineering solution to improve capacity of the intersection of Beach Street/ Bay Street and possibly the surrounding network.

5 Traffic and Modelling Results

Signal Timing Alteration

The green phase along Beach Street (West) could be sacrificed and given to the right turn green phase for right-turn movements from Beach Street (East). This in turn will lead to an increased turning throughput for left-turn traffic from Bay Street.

6 Differences to Port of Melbourne Corporation's Modelling Results

The following describes some of the reasons for the differences between the SIDRA modelling results presented above and the modelling undertaken for Port of Melbourne Corporation (PoMC) to determine the performance of the Waterfront Place/Beach Street/Princes Street intersection.

6.1 Traffic volumes

PoMC's VISSIM traffic modelling and volumes was based on traffic survey data carried out on Sunday 22nd January 2012, whereas URS's traffic analysis was based on traffic survey data undertaken later on 19th and 25th November 2012. Port records show that on the date PoMC undertook the traffic survey, a ship docked at Station Pier carrying greater passengers than ships docked on 19th and 25th November 2012 when URS undertook their surveys. The ship data below highlights a greater number of passengers and vehicles embarking/ disembarking at Station Pier when PoMC undertook their survey compared with URS.

6.1.1 PoMC survey date: Sunday 22 Jan 2012

- Double sailing of Spirit of Tasmainia, up to 1400 pax and 1000 vehicles, sailing 9:00 am and 9:00pm
- Cruise ship: Dawn Princess, 1990 pax + 900 crew
- Summer holidays
- Weather hot and sunny

6.1.2 URS survey date: Mon 19th November 2012

- Single sailing of Spirit of Tasmainia, up to 1400 pax per sailing and 1000 vehicles 7:30 pm
- Cruise ship Volendam, 1432 pax + 647 crew
- Regular weekday
- Weather warm and sunny

6.1.3 URS survey date: Sun 25th November 2012

- Single sailing of Spirit of Tasmainia, up to 1400 pax per sailing and 1000 vehicles 7:30 pm
- No cruise ship
- Regular weekend day
- Weather warm and sunny

Comparing the daily traffic profile data undertaken in January and November 2012, there is a dissimilarity in the peak periods with the January peak profile being 12pm-3pm and November peak profile being 3pm – 7pm. During these peak periods traffic levels in November are lower than January traffic volumes most probably due to the single sailing and the smaller cruise ship in port on the day the survey was undertaken. This would explain the variance in traffic modelling analysis results undertaken by both PoMC and URS.

6.2 Modelling techniques

It is understood that PoMC analysed the study area using VISSIM, micro-simulation modelling software, whereas URS used SIDRA a macro-scopic software that analyses intersections individually.

Each software has its benefits and dis-benefits, however from experience, it is most unlikely that either consultants would have similar analysis results taking into account they have used different traffic volumes (including time periods) and modelling software packages.

7

Parking Survey Results

An hourly car parking survey was undertaken on the survey days between 7am – 7pm Monday 19th November and between 11am – 5pm Sunday 25th November, for the entire study area and 500m from its border. The map below shows the parking area covered and the zones used to summarise the data.

Figure 7-1 Map of Parking Zones

The following are descriptions of the zone areas:

ZONE 1A: Waterfront Place, leading to Station Pier

ZONE 1B: Waterfront Place, extension from Beach Street

ZONE 2A: Beach Street, Bay St to Princes St

ZONE 2B: Beach Street, Princes St to Light Rail

ZONE 2C: Beach Street, Light Rail to Pier St

ZONE 3A: Bounded by Bay St (both sides), Beach St, Nott St, & Graham St

ZONE 3B: Bounded by Nott St, Beach St, Princes St & Graham St

ZONE 4: Bounded by Princes St, Beach St, Light Rail & Swallow St

ZONE 5: Bounded by Light Rail, Beach St, Pier St & Garden City Reserve

The tables 7-1 – 7-3 below summarise the parking demand per hour on each of the survey days within each of the zones above.

7 Parking Survey Results

Table 7-1 Parking Demand Per Hour on Monday 19th November

Proportion of Parking Demand Per Hour - Monday 19th Nov 7am – 7pm												
Zone	7am	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm
1A	16%	16%	18%	22%	28%	44%	55%	45%	48%	62%	33%	21%
1B	12%	17%	12%	29%	29%	29%	39%	39%	29%	66%	71%	27%
2A	30%	27%	29%	36%	30%	42%	42%	42%	39%	39%	46%	52%
2B	31%	42%	58%	62%	73%	81%	81%	77%	77%	85%	46%	35%
2C	51%	62%	69%	71%	79%	70%	66%	73%	73%	70%	61%	58%
3A	49%	49%	56%	54%	55%	59%	59%	61%	56%	58%	57%	55%
3B	79%	75%	77%	67%	78%	82%	83%	82%	79%	77%	80%	80%
4	41%	39%	42%	44%	45%	41%	41%	47%	42%	44%	43%	47%
5	36%	31%	31%	30%	32%	32%	32%	32%	29%	30%	31%	33%

On Monday 19th November, the results above show that none of the zones were being fully utilised at any point during the day. Zones 2 and 3 proportionally have the highest parking demand, at over an average of 50% throughout the day, particularly Zone 3B. On average across the study area, 4-5pm was the period of highest demand.

Table 7-2 Parking Demand Per Hour on Sunday 25th November

Proportion of Parking Demand Per Hour – Sun 25th Nov 11am – 5pm						
Zone	11am	12pm	1pm	2pm	3pm	4pm
1A	17%	24%	63%	83%	89%	82%
1B	32%	32%	46%	66%	73%	78%
2A	38%	39%	53%	72%	80%	68%
2B	23%	58%	85%	54%	69%	81%
2C	69%	66%	77%	70%	70%	72%
3A	60%	62%	65%	65%	65%	66%
3B	78%	76%	81%	83%	79%	84%
4	48%	47%	47%	45%	44%	42%
5	37%	35%	39%	35%	36%	38%

On Sunday 25th November there was a higher demand for parking overall than the weekday results shown above.

7 Parking Survey Results

On average most zones had a demand over 50% throughout the day, except for Zones 4 and 5. The demand for parking gradually increases throughout the day, with 4-5pm being the period of peak demand.

The table below shows the highest parking demand and the time of day on both survey days.

Table 7-3 Peak Parking Demand

		Monday 19th Nov 7am – 7pm					Sunday 25th Nov 11am – 5pm				
Zone	Capacity	Average		Maximum		Time of Day	Average		Maximum		Time of Day
1A	109	37	34%	68	62%	4-5pm	65	59%	97	89%	3-4pm
1B	41	14	33%	29	71%	5-6pm	22	54%	32	78%	4-5pm
2A	137	52	38%	71	52%	6-7pm	80	58%	109	80%	3-4pm
2B	26	16	62%	22	85%	4-5pm	16	62%	22	85%	1-2pm
2C	128	86	67%	101	79%	11am-12pm	91	71%	99	77%	1-2pm
3A	237	132	56%	144	61%	2-3pm	151	64%	156	66%	4-5pm
3B	316	248	78%	263	83%	1-2pm	253	80%	265	84%	4-5pm
4	165	71	43%	78	47%	6-7pm	75	46%	79	48%	11am-12pm
5	481	152	32%	172	36%	7-8am	176	37%	186	39%	1-2pm

On the weekday the results were collected, parking demand was highest in Zone 3B on average, however the peak demand occurred in Zone 2B between 4-5pm. On the weekend however, Zone 1A – Station Pier peaked with the highest demand at almost 89% from 3-4pm, however Zone 3B on average had the highest demand. This suggests that there is capacity to remove some parking in the busy Waterfront Place area to allow additional vehicle queuing capacity for Station Pier.

7.1 Waterfront Place/Station Pier Parking Capacity on Cruise Ship Days

The parking survey results suggest that there is capacity to remove up to 41 parking spaces on a weekday and up to 12 parking spaces on a weekend from the carpark on Station Pier, based on the peak parking demand which occurred between 4-5pm during the Monday survey and between 3-4pm during the Sunday survey.

Also, on Waterfront Place the survey results suggest that up to 12 parking spaces could be removed on a weekday and up to 9 on a weekend, based on the peak demand.

The traffic management plans for cruise ship days that are being trialled by the Port of Melbourne Corporation (PoMC) during the 2012/2013 cruise ship season remove up to 12 parallel car parks on days when a small cruise ship is in port at Station Pier and up to 66 on days when a larger cruise ship is in port. See Section 2.2 for more detail.

Therefore there is currently insufficient parking capacity on Waterfront Place and Station Pier to cater for PoMC's TMP for larger cruise ship days, but sufficient capacity to remove parking for the smaller cruise ship days. Additional parking capacity can either be provided from Zone 2B or 2C, which peaked at different times on the survey dates and have spare capacity.

8

Crash History

The map on the following page shows the location, accident type and severity of each accident recorded in the study area over the five year period between 1 January 2007 and 31 December 2011. This information was sourced from VicRoads 'Crash Stats'. A full summary of this information is shown in Appendix D.

A number of observations can be made from the map as follows;

- 12 casualty accidents were recorded in the study area for this period;
- The 12 accidents can be broken into 10 accident categories
  - There were 2 lane side swipe accidents
  - 1 drive off the road and collision with a fixed object
  - 1 collision between a cyclist and car door
  - 1 out of control on a bend
  - 1 vehicle colliding with a pedestrian
  - 1 U-turn collision with a vehicle driving through
  - 1 cyclist who lost control on the carriageway
  - 1 cyclist who came off the footpath and collided with a vehicle on the carriageway
  - 1 right turn collision with a through movement
  - 1 collision between two right turners in opposite directions
- There were over twice as many minor injuries as there were serious injuries with 5 serious injuries and 11 minor injuries recorded. No fatalities were recorded during this period;
- 5 of the 12 accidents were recorded at night;
- All accidents except for 1 were recorded on a weekday;
- 10 accidents were in dry conditions, 1 in wet and the other unknown; and
- Only 2 accidents were recorded on Waterfront Place, the remainder were on Beach Street and 1 on Swallow Street.

Overall, the number of accidents recorded in the study area is low. However, over half of the accidents recorded involved bicycles and pedestrians. Refer to the analysis of Pedestrian and Cycle Movements in the following chapter for a discussion about the safety issues at this site.

8 Crash History

9

Cycling and Pedestrian Analysis

9.1 Overview of Pedestrian and Cycle Movements

At present, the primary pathway for cyclists and pedestrians to move along the foreshore is the Bay Trail. The Bay Trail runs from Seaford in the south all the way through Port Melbourne to the Westgate Bridge. The journey can be continued over the Yarra River via the punt that lands at Spotswood. The route is therefore used by both leisure cyclists and walkers, and by commuter cyclists who use the route to get to and from the city and the surrounding suburbs. This was evident on a variety of site visits undertaken throughout the project by the study team.

The Bay Trail runs along the foreshore to the south of Beach Street. Pedestrians and cyclists who travel on this route and wish to link with the streets inland have to cross Beach Street. The majority of cyclists / pedestrians crossed at dedicated crossing facilities, however it was observed that some crossed the road without using these facilities. The crossing manoeuvre at the dedicated crossing facilities was witnessed frequently on site visits, and was more commonly undertaken by less experienced cyclists and the majority of pedestrians. Experienced cyclists were witnessed using the road carriageway for cycling. It is envisaged that on-road facilities provide a more direct route for experienced cyclists; this enables them to travel at a higher speed. Cycling on-road is a regular sighting at weekends in the study area vicinity; cyclists that exercise in this area commonly travel together in small to large groups (up to 10+ cyclists).

Across the wider Waterfront area pedestrian connections from the urban streets through to the beaches and foreshore are interrupted by roads and development. Beach Street is seen to be a physical barrier, and in its current form prevents safe and convenient crossing at many locations along its length. The most critical of these crossing points is the Beach and Bay Street intersection. This point has increased importance as it connects the vibrant Bay Street, which is becoming more congested due to further residential and commercial development, to the foreshore. Crossing points are infrequent along this strip between Waterfront Place and Bay Street, with only two crossing facilities; one of which is a zebra crossing located just off the corner of Beach and Princes Street and the other of which is a signalised crossing located on the corner of Beach and Bay Street (as mentioned above).

Bay / Beach Street Intersection / Crossing

Zebra crossing facility on the corner of Beach / Princes Street

The pedestrian and cycle facilities are generally of good quality in the vicinity of Waterfront Place, hence the high usage levels. Road cycle paths are provided along Bay Street and the eastern portion of Beach Street. There are however a number of conflict points between pedestrians and cyclists specifically along the Beacon Cove promenade between Beacon and Swallow Streets.

9 Cycling and Pedestrian Analysis

It was also noted that pedestrians are often not prioritised within key public areas, including the area around Waterfront Place. The image (above) of the zebra crossing on the corner of Beach Street and Princes Street demonstrates this; cyclists are given priority over pedestrians at this crossing facility. The green tarmac highlights to pedestrians to watch/stop for cyclists. Signs such as at Beacon Cove (below) also highlight the need for pedestrians to watch/stop for cyclists, rather than cyclists to watch/stop for pedestrians.

Sign to warn pedestrians to watch for cycles

Pedestrian Priority at Beach / Bay Street crossing

Additionally in many instances, cyclists do not take note of the identified segregated cycle ways in place. Cyclists are often seen cycling on the dedicated walk ways along the foreshore to the south of Beach Street. Often these cyclists are those who have hired cycles from the "Bike for Hire' facility detailed below and therefore may be unaware of the local cycle etiquette.

The recent inclusion of a 30 bike 'Bikes for Hire' station along Beach Street, between Stokes and Princes Streets, allows visitors and local residents the opportunity to take advantage of the Bay Trail, or just to explore the Waterfront area. This has led to an increase in bicycle activity of those less experienced, thus encouraging and enabling those who wouldn't normally cycle to take part. This is encouraging, as it provides a great basis to promote sustainable transport in the area and potentially create long term change to people's travel behaviour and their views on cycling. It is widely known that many commuter cyclists start by cycling for leisure purposes. The cycle hire facility also enables the movement of cyclists who may not be familiar with cycling in shared spaces and on dedicated cycle routes, which can lead to unintentional misuse of such facilities and the potential for collisions. Clear signage and educational start and end facilities can assist with reducing the chances of accidents.

Cycle hire facilities on Beach Street

Cycle hire bike in use, heading to the city

9.2 Analysis of Movements

9.2.1 Cyclists

On various site visits undertaken the movements of cyclists and pedestrians were observed. The majority of cyclists in the area travel along the Bay Trail, a large percentage also travel on road. Those who travel on the Bay Trail towards Waterfront Place from Bay Street, typically carry on towards Beacon Cove. Some of these cyclists continue, many return in the direction they have come and are mainly using the route for recreation purposes. The café located at the Beacon Cove shops is a popular meeting point at weekends for cyclists A large number of cyclists travelling along the Bay Trail turn right at the 109 tram termination point and head towards the city. These are mainly commuters, however some recreational cyclists were observed. Those more experienced cyclists, who travel on-road, frequently travel from Beach Street onto Bay Street and vice versa. Large numbers of cyclists travel up and down Bay Street everyday, despite it being quite a heavily trafficked route.

9.2.2 Pedestrians

Pedestrian movements were relatively similar. The majority of pedestrians walked along the Bay Trail, some of these pedestrians continue, many return in the direction they have come and are mainly using the route for recreation purposes. Crossing facilities on Beach Street are well utilised, with many pedestrians coming from the urban centres on the north side of Beach Street. Many pedestrians use the crossing facilities at Beach and Bay Street and Beach and Princes Street, but numerous pedestrians do cross the road at various intervals between these two crossing facilities. Cars travel at a reasonably high speed along this section of road, so safety is a primary concern. Pedestrians were also witnessed walking on the dedicated cycleways oblivious to where they were walking and of the dangers of on-coming cyclists who often travel at high speeds. The green tarmac assists with making pedestrians aware of the dangers at some critical potential conflict points (i.e. at crossing facilities), however this tarmac is not along the length of the route and pedestrians don't always tend to cross at the crossing facilities, so conflict between the two is still an issue. Near misses between pedestrians and cyclists due to pedestrians walking on/crossing the Bay Trail cycleway were witnessed on site visits and are a regular occurrence in the area.

Misuse; travelling towards oncoming cycle traffic

Misuse; pedestrians walking on cycle way

9.3 Overview of Accident Data and Safety Issues

As reported in the Accident Summary, overall the number of accidents recorded in the study area between 1 January 2007 and 31 December 2011 is low. However, half of the accidents recorded involved bicycles and pedestrians. These accidents are summarised again below.

One pedestrian was hit and seriously injured when stepping into the roundabout of Beach Street and Swallow Street at the same time a car was driving through the intersection. A cyclist was hit but not seriously injured by a car door opening from a parked car travelling south east on Beach Street between Stokes Street and Donaldson Street. Another cyclist was side swiped and seriously injured by a vehicle travelling north-west on Beach Street between Nott Street and Bay Street. A right turn collision occurred between a car and a cyclist at the intersection of Beach Street and Beacon Vista where one vehicle was turning right and the other travelling through the intersection in the opposite direction. Another right turning collision occurred where both the vehicle and bicycle were turning right but in opposite directions at Beach Street and Swallow Street. A cyclist was seriously injured when they lost control on the carriageway on Swallow Street south of Beach Street, and finally on Waterfront Place a cyclist was injured when coming of the footpath and running into a car, 38m east of Station Pier.

It is therefore apparent from this recent accident history that there is currently a conflict issue between cyclists, pedestrians and vehicles along Beach Street and in the surrounding area and that future mitigation measures could potentially reduce such conflicts. Additionally, it is also noted that five of the twelve accidents were recorded at night. Therefore night lighting on walk and pedestrian routes could also assist in reducing accidents.

9.4 Future Initiatives and Mitigation Measures for Encouraging Walking and Cycling

In order to encourage and facilitate safe cycling and walking in the vicinity of Waterfront Place, and promote accessibility, the following measures for the future would be considered as appropriate:

Future Initiatives and Mitigation Measures	
1.	Activate surrounding public spaces and provide welcoming, comfortable and safe areas for pedestrian activity
2.	Enhance the existing and proposed pedestrian environment and public spaces and enhance links between differing land uses to enable and encourage walking
3.	Reduce conflict between pedestrians and cyclists in shared spaces
4.	Minimise pedestrian conflicts with other modes of transport abutting residential interfaces
5.	Improve cross connectivity by providing safe links
6.	Improve the pedestrian connection between Bay Street and Beach Street, enabling safer more convenient linkages
7.	Implement additional crossing facilities on pedestrian desire lines along the length of Beach Street, thus to enable safe permeability to the urban centres
8.	Broaden pedestrian footpaths where possible to make walking an attractive option
9.	Limit the use of cycles on pedestrian footpaths, where there is an appropriate dedicated cycle way
10.	Implementation of night lighting on walk and pedestrian routes, to enable safe use at night
11.	Calming of cycle traffic along the Bay Trail through implementation of speed restrictions (pictured below)

9 Cycling and Pedestrian Analysis

Future Initiatives and Mitigation Measures	
12.	Reduce traffic around Waterfront Place by enabling and encouraging the use of sustainable modes of travel, such as walking and cycling. Reduced traffic levels will in turn encourage more sustainable travel as the area will appear safer and more appealing
13.	Implementation of on-road cycle routes along the length of Beach Street (in both directions) to provide dedicated routes for cyclists who prefer to use on-road facilities, this may in turn reduce the speed on the Bay Trail, lessening the likelihood of conflicts
14.	Clear signage for new and experienced cyclists to understand and adhere to, which may assist in lessening pedestrian and cycle conflicts
15.	Educational start and end facilities to assist beginners and reduce the potential of conflicts
16.	Provide pedestrians (and cyclists) with additional waypoint signage (pictured below) highlighting destinations and travel times would provide local awareness of route times compared with car travel, thus promoting model shift
17.	Provide bicycle facilities at Waterfront Place in addition to the existing Bike Share, these should include good visibility and lighting, CCTV coverage and aesthetically pleasing features (pictured below)
18.	Signal controlled crossings that cater for both pedestrian and cyclists. This type of crossing would provide a safety benefit at heavy trafficked routes such as tram crossing on Beach Street and Waterfront Place (pictured below).
19.	On-crossing detectors can also help reduce the delay to drivers by reducing the pedestrian green time should the user already have reached the opposite kerb or should the crossing not be in use.
20.	Rumbles strips (below) could be provided along the continuous line between the cycle lane and main carriageway along Beach Street to alert errant drivers.

Below are some examples of the measures described above.

Wayfinding Signage (No. 16)

Distances shown using journey times : cycle and pedestrian

9 Cycling and Pedestrian Analysis

Bicycle Facilities (No. 17)

Cycling Speed Restrictions (No. 11)

Separated footpath sign

Bicycle path sign

Shared path sign

No bicycles sign

9 Cycling and Pedestrian Analysis

Rumble Strips (No. 20)

9.5 Recommended Improvements at Beach St / Waterfront Place / Princes St Roundabout

The current layout of the Beach St / Waterfront Place / Princes St intersection is shown in Figure 9-1. The community have supported the signalisation of this intersection to improve safety and traffic flow. This however, is not necessary, as the SIDRA analysis has revealed that the roundabout operates satisfactorily with a DoS reaching a maximum of 0.6 by 2022 under the highest development scenario, which is well under a critical capacity of 0.95. See 'Traffic Modelling Outputs' in Section 5.5. Instead, a few recommendations have been given below, in order to increase pedestrian and cycle safety.

9 Cycling and Pedestrian Analysis

Figure 9-1 Beach St / Waterfront Place / Princes St - Current Layout

9 Cycling and Pedestrian Analysis

Some suggested alterations are shown in Figure 9-2. Signalised crossings are recommended for Beach Street approaches and Waterfront Place. As the traffic on Princes Street is relatively low, a zebra crossing is recommended here. Survey results highlight that Beach Street is the favourable route at this intersection, therefore it is recommended the operation of the two pedestrian crossings on these approaches are synchronised.

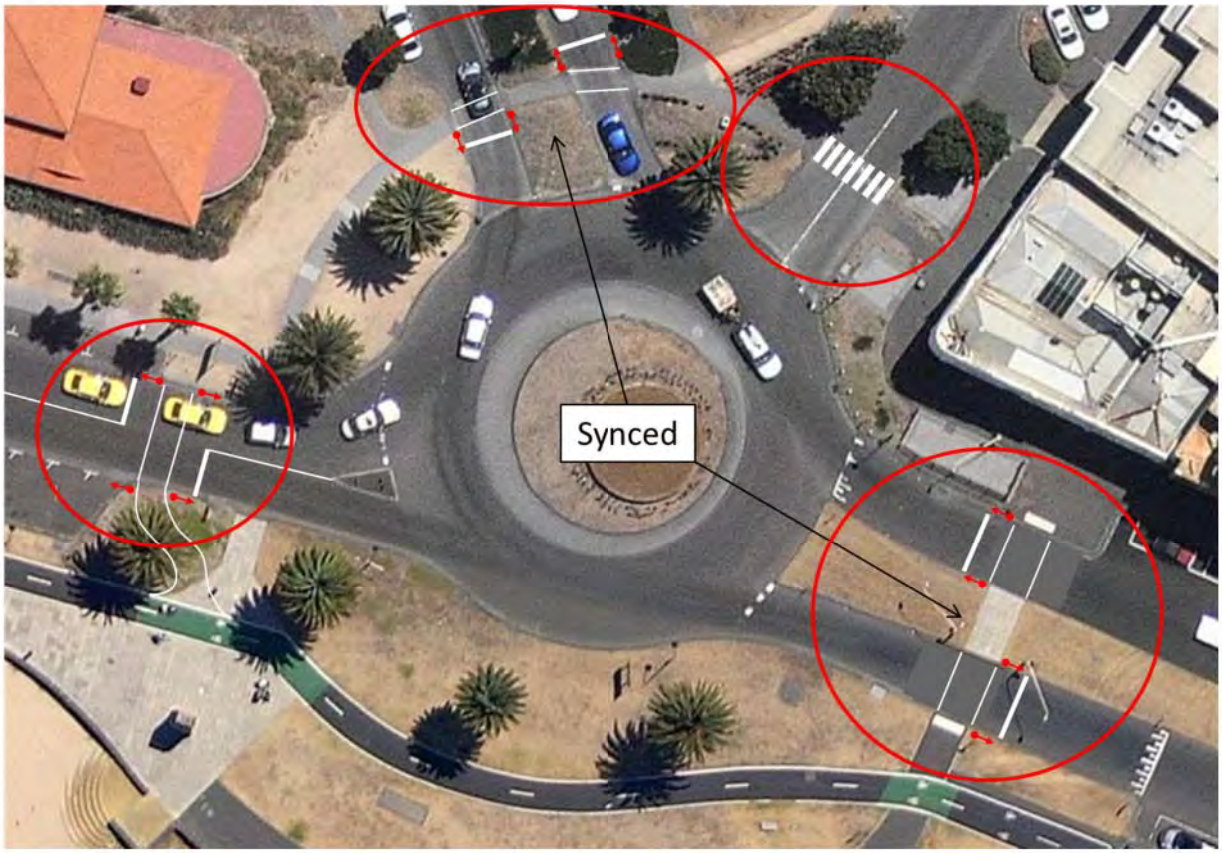


Figure 9-2 Beach St / Waterfront Place / Princes St - Proposed Layout

9 Cycling and Pedestrian Analysis

Shown in Figure 9-8 is the current layout of Beach Street. It is recommended that on road cycle paths be included on Beach Street as shown in Figure 9-4.

Figure 9-3 Beach Street - Current Layout

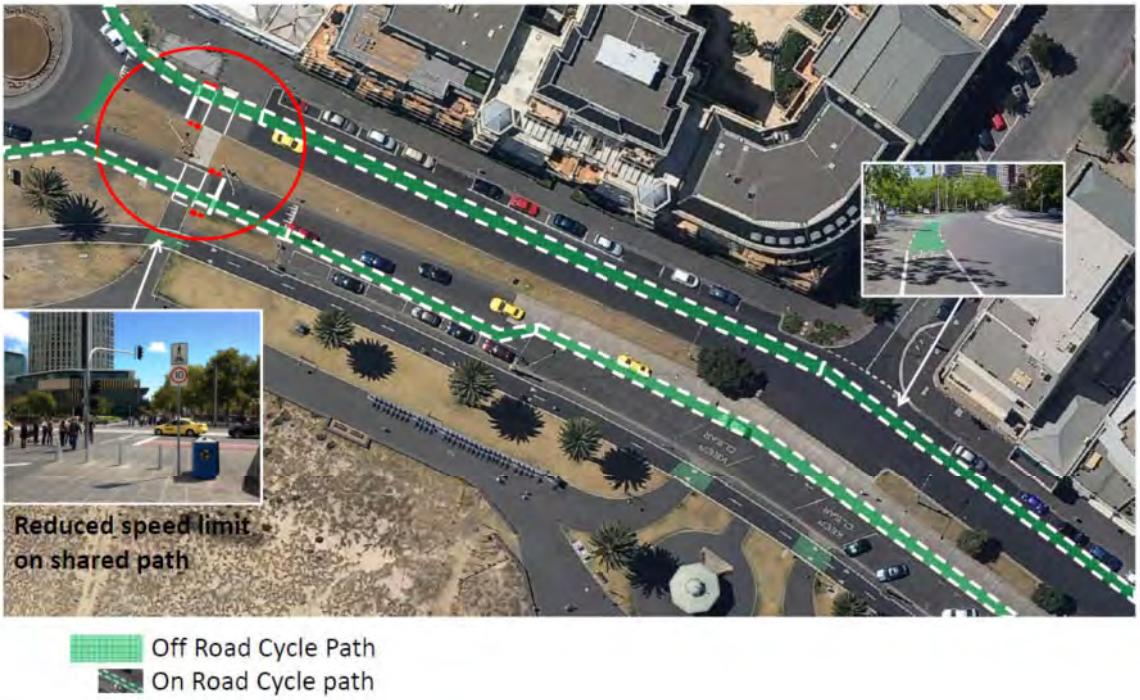


Figure 9-4 Beach St Proposed bicycle lanes

Crash Stats recorded three crashes that occurred here over a five year period at this roundabout intersection.

One crash involved a bicycle colliding with a vehicle at the exit from the roundabout onto Waterfront Place. It is not clear from the crash data how this incident occurred, however it is assumed the cyclist collided with the vehicle whilst negotiating a crossing at the entry/exit with the roundabout.

The implementation of the signal controlled pedestrian crossing along Waterfront Place shown in Figure 9-2 should remove this risk in future.

Another incident occurred when a motorcycle side swiped with a vehicle on the circulatory of the roundabout. The implementation of an on-road cycle lane thus reducing the circulatory to one lane shown in Figure 9-4 should remove the risk of two vehicles side by side conflicting.

A third crash was recoded at this intersection, however it is not clear from the crash data how the event occurred therefore this was not investigated further.

More information can be found in Chapter 8 which reports on the crash analysis within the study area.

9.6 Recommended Improvements at Waterfront Place

The current layout of Waterfront place is shown in Figure 9-5. The current layout includes pedestrian footpaths on the north and south sides of the road and an off road bike path on the south side.

Figure 9-5 Waterfront Place - Current Layout

9 Cycling and Pedestrian Analysis

Shown in Figure 9-6 are suggested alterations to this area. Dedicated pedestrian and cycle areas are recommended for the northern side of this road. In order to improve cyclist safety, a curb can be installed separating cyclists and motorists. This curb would provide a suitable area for street lighting. With these alterations, the frontages of the development could be used as cafes/restaurants to further improve the amenity of the area.

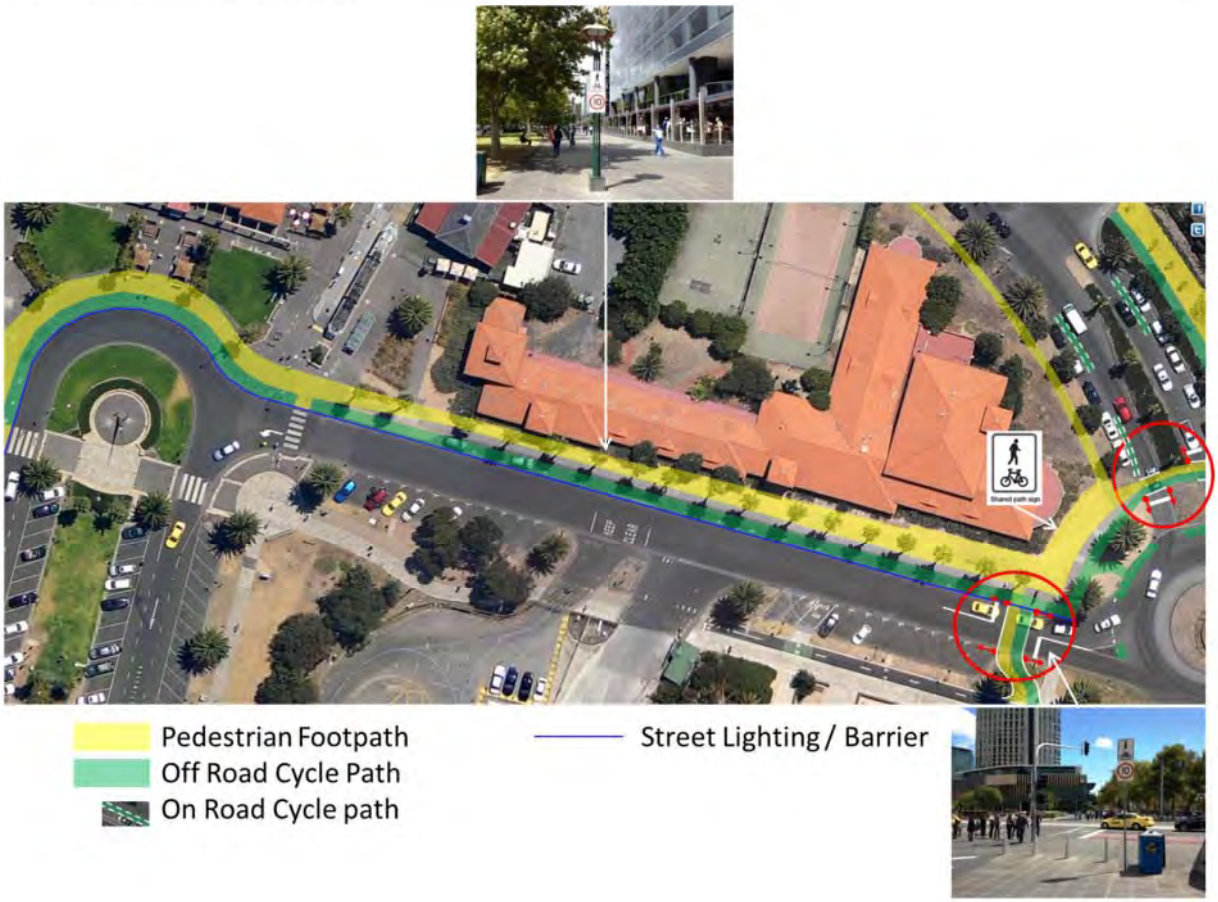


Figure 9-6 Waterfront Place - Proposed Layout

Note however, that this suggested arrangement conflicts with the current TMP arrangement being trialled for large cruise ships. See Figure 2-5 in the Background Information. This conflict would need to be addressed before these improvements could be made.

10

Conclusion

There are a number of key transport and access issues highlighted by the CoPP in the vicinity of Waterfront Place and Station Pier, including:

- traffic congestion and parking overflow – particularly when the Spirit of Tasmania and cruise ships are docked at Station Pier;
- pedestrian and cyclist safety and amenity; and
- the additional demand on traffic and parking in the area that would come with a possible redevelopment of 1-7 Waterfront Place.

URS was engaged by the CoPP to investigate these issues both now and into the future for Waterfront Place and its surrounds for the Transport and Access Study for the Waterfront Place Precinct, Port Melbourne.

Below is a brief summary of the outcomes of the study.

Traffic counts were undertaken on busy days including one weekday (Monday 19th November) and one weekend day (Sunday 25th November), on Monday there was both a cruise ship and the Spirit of Tasmania at Station Pier. This is when the highest traffic volumes were observed.

The additional traffic generated by the potential development at 1-7 Waterfront Place is shown to have only a small impact to the road network, as the traffic generated by the development represents only a small proportion of the traffic already using the local roads.

The development's proximity to excellent public transport, walking and bicycle paths means that the residents already have many alternatives to using a private vehicle. If this were complemented by a travel plan for the development that encouraged sustainable travel through measures such as restricted parking allocation, introducing a car share scheme and providing bicycle storage facilities then impact to the local area road network will be kept to a minimum. As a general rule, most travel plans tend to reduce car trips to/from individual sites by around 10-20%.

SIDRA modelling indicates that the intersections performed well under all future land use scenarios, except for the intersection of Beach Street and Bay Street, which is at capacity from the beginning. This is due to traffic turning right from Beach Street into Bay Street in the morning peak (i.e. city bound traffic) reaching capacity and traffic turning left from Bay Street into Beach Street in the afternoon peak (i.e. traffic leaving the city). To alleviate this congestion, it was recommended to give more green time to the right turn phase in the AM peak at the sacrifice of some of the green time from Beach St traffic from the west.

There was a higher demand for parking in the study area on the weekend the surveys were undertaken, but at no point did any of the parking zones reach their capacity. There is sufficient parking available in the study area to cater for the PoMC's trial TMP arrangement for small cruise ship arrivals, however additional parking will need to be provided if PoMC's trial TMP arrangement for large cruise ship arrivals were to go ahead;

Overall, the number of accidents recorded in the study area over the last 5 years is low. However, over half of the accidents recorded involved bicycles and pedestrians. There is clearly a conflict between pedestrians, cyclists and vehicles along Waterfront Place and Beach Street. The following table is a summary of some possible future initiatives and mitigation measures to address these issues and encourage growth in pedestrian and cycling numbers in the area.

10 Conclusion

Future Initiatives and Mitigation Measures	
1.	Activate surrounding public spaces and provide welcoming, comfortable and safe areas for pedestrian activity
2.	Enhance the existing and proposed pedestrian environment and public spaces and enhance links between differing land uses to enable and encourage walking
3.	Reduce conflict between pedestrians and cyclists in shared spaces
4.	Minimise pedestrian conflicts with other modes of transport abutting residential interfaces
5.	Improve cross connectivity by providing safe links
6.	Improve the pedestrian connection between Bay Street and Beach Street, enabling safer more convenient linkages
7.	Implement additional crossing facilities on pedestrian desire lines along the length of Beach Street, thus to enable safe permeability to the urban centres
8.	Broaden pedestrian footpaths where possible to make walking an attractive option
9.	Limit the use of cycles on pedestrian footpaths, where there is an appropriate dedicated cycle way
10.	Implementation of night lighting on walk and pedestrian routes, to enable safe use at night
11.	Calming of cycle traffic along the Bay Trail through implementation of speed restrictions (pictured below)
12.	Reduce traffic around Waterfront Place by enabling and encouraging the use of sustainable modes of travel, such as walking and cycling. Reduced traffic levels will in turn encourage more sustainable travel as the area will appear safer and more appealing
13.	Implementation of on-road cycle routes along the length of Beach Street (in both directions) to provide dedicated routes for cyclists who prefer to use on-road facilities, this may in turn reduce the speed on the Bay Trail, lessening the likelihood of conflicts
14.	Clear signage for new and experienced cyclists to understand and adhere to, which may assist in lessening pedestrian and cycle conflicts
15.	Educational start and end facilities to assist beginners and reduce the potential of conflicts
16.	Provide pedestrians (and cyclists) with additional waypoint signage (pictured below) highlighting destinations and travel times would provide local awareness of route times compared with car travel, thus promoting model shift
17.	Provide bicycle facilities at Waterfront Place in addition to the existing Bike Share, these should include good visibility and lighting, CCTV coverage and aesthetically pleasing features (pictured below)
18.	Signal controlled crossings that cater for both pedestrian and cyclists. This type of crossing would provide a safety benefit at heavy trafficked routes such as tram crossing on Beach Street and Waterfront Place (pictured below).
19.	On-crossing detectors can also help reduce the delay to drivers by reducing the pedestrian green time should the user already have reached the opposite kerb or should the crossing not be in use.
20.	Rumbles strips (below) could be provided along the continuous line between the cycle lane and main carriageway along Beach Street to alert errant drivers.

Specific improvements recommended for the Waterfront Place/Beach Street/Princes Street roundabout included signalised crossings for the Beach Street approaches and Waterfront Place, as the traffic on Princes Street is relatively low, a zebra crossing is recommended here. Survey results highlight that Beach Street is the favourable route at this intersection, therefore it is recommended the operation of the two pedestrian crossings on these approaches are synchronised.

At Waterfront Place it is recommended to include a dedicated pedestrian and cycle area on the northern side of this road. In order to improve cyclist safety, a curb can be installed separating cyclists and motorists. This curb would provide a suitable area for street lighting. With these alterations, the frontages of the development could be used as cafes/restaurants to further improve the amenity of the area. However this may not be feasible if the PoMC trial TMPs are made permanent in the future.

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