

VicRoads  
**Punt Road Investigation**  
Punt Road Concept Options Report

REP001

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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## Executive Summary

The State Government made an election commitment to establish an independent Advisory Committee to review and report on the future of the Punt Road Public Acquisition Overlay (PAO). On 17 February 2015, the Minister for Planning approved the Terms of Reference for the Punt Road PAO Advisory Committee.

In accordance with Stage 1 of the Terms of Reference, VicRoads was requested to prepare a background report which was prepared and made publicly available in August 2015. As part of Stage 2 of the Terms of Reference, VicRoads was requested to prepare an Options Report to “expand upon the Background Report by including traffic modelling and projections for various future options along Punt Road”. Arup was engaged by VicRoads on 21 July 2015 to prepare this report which provides input into VicRoads response to Stage 2.

The Punt Road-Hoddle Street corridor (also known as the Hoddle Highway) is a key linkage in Melbourne’s transport network for traffic and public transport movement as it is one of the few routes providing a continuous north-south bypass of the central city and access across the Yarra River. The performance of the network along, across and parallel to the Punt Road corridor is critical in connecting people and businesses in inner and eastern Melbourne to social and economic opportunities.

Punt Road between St Kilda Road and Alexandra Avenue currently carries between 31,000 and 38,000 vehicles per day on an average weekday. There are also significant demands for travel across the corridor particularly for trams and pedestrians and also, though to a lesser extent, buses and cyclists.

Punt Road is currently an impediment for access both along and across the corridor for all road users with unreliable and often long journey times; there have also been a high number of crashes along the corridor.

## Network Strategy

A strategy has been developed for the operation of the network drawing upon broader government objectives outlined in Plan Melbourne, the framework provided by SmartRoads and the objectives for this project as defined by VicRoads. The strategy is a multi-modal approach which aims for increased priority and the rebalancing of both road space and operations in order to provide benefits for pedestrians, cyclists, trams, buses and traffic. At a broad level the strategy includes:

- improving walking connections and safety to key activity centres;
- enhancing bicycle connections and safety across the corridor as well as along parallel routes;
- increasing priority for trams travelling across Punt Road as well as providing improved tram stop and waiting facilities;
- improving the performance of the corridor for north-south bus movements along Punt Road and also across Commercial Road;
- providing for the efficient movement of traffic across the network by promoting:
  - utilisation of Punt Road for key north-south traffic movements and for bypassing the central city;
  - utilisation of Williams Road, Princess Street and Power Street for some north-south trips which would also provide network resilience under periods of high congestion or where there are incidents on Punt Road;
  - utilisation of Williams Road and Alexandra Avenue for connections between the east and the north;
  - utilisation of Queens Road for strategic traffic movements from the southeast suburbs to the western segments of the central city; and
  - utilisation of Toorak Road between Punt Road and Queens Road for strategic traffic movements between the north and Southbank/Port Melbourne.

This strategy has been used to guide the development of concepts for the corridor.

## Concepts and Appraisal

A range of concepts for the Punt Road section of the corridor have been developed and appraised focusing on the length between the intersection with St Kilda Road and the Yarra River. The development of concepts for Punt Road has considered those that can be contained within the existing road reservation boundaries as well as those that require utilisation of the land covered by the PAO. The concepts focus on improved efficiency of the existing corridor through changes to the permitted right turn movements or by changing the way that some movements occur in order to simplify the operation of the traffic signals along the corridor.

Transport analysis and a multi-criteria analysis has been undertaken for each of the developed concepts with the key findings outlined as follows:

- Concept 1: The implementation of 24 hour clearways would offer benefits in improved travel times outside of peak periods but would not address congestion during the peak periods and is only a short-term treatment;
- Concept 2 and 3 - 4 Lane Central Right Turn Lane/Median: Moderate infrastructure changes and a rationalisation of existing right turns movements at major intersections would offer significant benefits across all times periods for pedestrians, cyclists, trams, buses and traffic. These improvements could be achieved almost entirely within the existing road reserve and would avoid major environmental and social impacts. These concepts would be viable treatments in the short to medium term but do not provide relief for the broader network or flexibility for the operation of the corridor in the long term;
- Concept 4 - Reversible Lanes: This is not considered an appropriate treatment as it would offer very limited benefits and would result in significant impacts including land acquisition on Punt Road north of Toorak Road within the PAO;
- Concept 5 - 4 Lane/6 Lane Widened Intersections: This concept would address the short, medium and long term travel demands for the corridor as well as providing benefits for the surrounding road network. It provides benefits for users crossing the corridor including pedestrians, cyclists and tram and bus passengers. There would be significant impacts, particularly to existing properties and heritage though this is approximately half of the properties currently subject to the PAO. On this basis, this concept is considered a viable concept for the Punt Road corridor in the medium to long term;
- Concept 6 - 6 Lane Dual Carriageway: This concept provides similar benefits to Concept 5 but with impact to all properties subject to the acquisition overlay including those with a heritage overlay. While there is limited additional benefit in its current form when compared to Concept 5, the full utilisation of the PAO would provide for flexibility over a longer planning horizon (e.g. 30 plus years) for further enhancements to the corridor (e.g. high capacity public transport linkages). This concept is considered to be of marginal viability for the Punt Road corridor and only in the long term; and
- Concept 7 – 4 Lane/6 Lane Bus Lanes: This concept provides similar benefits to Concept 5 and also provides significant benefits and opportunity to encourage mode shift to public transport in the long term. It would address the short, medium and long term travel demands for the corridor and also offers a similar level of flexibility to Concept 6 for further enhancements to the corridor over a longer planning horizon. Similar to Concept 6 there would be significant impacts, primarily due to the extent of land acquisition that would be required including numerous impacts within the heritage overlay. This concept is considered a viable concept for the Punt Road corridor in the medium to long term.

The concepts that have been investigated provide an understanding of the benefits and impacts for the short, medium and long term planning of Punt Road. It is recognised that there is no current government commitment to improvements to Punt Road, however, it is understood that VicRoads would undertake a further detailed assessments of any of the developed concepts forming part of this report prior to identifying a preferred proposal.

# 1 Introduction

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## 1.1 Background

The State Government made an election commitment to establish an independent Advisory Committee to review and report on the future of the Punt Road Public Acquisition Overlay (PAO). On 17 February 2015, the Minister for Planning approved the Terms of Reference for the Punt Road PAO Advisory Committee.

In accordance with Stage 1 of the Terms of Reference, VicRoads was requested to prepare a background report to provide base information to assist with the review, including the following:

- the history of and background to the road widening / the overlay;
- detailed mapping of the overlay;
- the current and projected traffic volumes for all modes of transport, including pedestrian, cyclist, car, heavy and public transport along and near Punt Road;
- the current and projected regional road and transport network operation;
- the current and possible future configurations of Punt Road with and without the overlay;
- the current land use and built form of land subject to the overlay;
- the current public transport along and crossing Punt Road;
- the current planning controls;
- the benefits (advantages) and costs (disadvantages) of retaining the overlay;
- the benefits (advantages) and costs (disadvantages) of removing the overlay, including:
  - possible alternate road and transport network response; and
  - whether any modifications to the overlay are necessary.

The report Review of Punt Road Public Acquisition Overlay Background Report, (VicRoads, August 2015) was prepared and made publicly available in August 2015 and is referred to in this document as the Background Report.

As part of Stage 2 of the Terms of Reference, VicRoads was requested to prepare and Options Report to “expand upon the Background Report by including traffic modelling and projections for various future options along Punt Road”.

VicRoads has engaged Arup to develop a series of improvement concepts for the corridor and assess their relative merit to inform VicRoads response to Stage 2. The scope of this study includes the consideration of concepts that provide for various configurations of at-grade intersections along the corridor as well as concepts that include new lanes for existing public transport routes both along and across the corridor. Concepts that may include grade separation or major new transit corridors (e.g. new light rail systems) were not considered part of the scope of this study.

## 1.2 Report Purpose and Structure

The purpose of this report is to outline the key findings from an appraisal of a range of possible improvement concepts for the Punt Road corridor that respond to forecast travel conditions in order to provide input into the PAO review.

It is recognised that there is no current government commitment to fund improvements to Punt Road, however, it is understood that VicRoads would undertake a further detailed assessments of any of the developed concepts forming part of this report prior to identifying a preferred option.

This report is structured as follows:

- Section 1: Introduction (this Section);
- Section 2: Existing Conditions;
- Section 3: Community and Stakeholder Engagement;
- Section 4: Strategic Context;
- Section 5: Appraisal Framework;
- Section 6: Improvement Concepts;
- Section 7: Concepts Appraisal; and
- Section 8: Way Forward.

This report builds upon and should be read in conjunction with the Background Report.

### 1.3 Investigation Area

Punt Road is a key linkage in Melbourne's transport network connecting people and businesses in inner and eastern Melbourne to social and economic opportunities. It forms part of the Hoddle Street/Punt Road corridor (also known as Hoddle Highway) providing a bypass function of the central city of Melbourne. The function of Punt Road is such that it allows the activity centres on parallel roads such as Chapel Street to have a more local focus.

The nature of the surrounding land use and transport network is such that the Punt Road/Hoddle Street corridor is one of the few significant north-south linkages across the Yarra River. It has a critical role during the typical commuter peak hours as well as non-peak periods and during major events at the Melbourne Sports and Entertainment Precinct. In addition to the traffic movement function, Punt Road also responds to a range of demands for pedestrian, cycling, public transport, freight and local traffic movements as well as car parking and property access.

The role and function of Punt Road is such that there is variety of demands and uses each of which are competing for road space. Improved performance of Punt Road for all users is required to facilitate social participation, provide access to economic opportunities, enhance liveability and support the projected change in land use, travel demands and travel patterns that are forecast for Melbourne.

The area for investigation for this study focuses upon the Punt Road corridor between the Yarra River to the north and the intersection of Punt Road and Peel Street as shown in Figure 1. This includes consideration of the intersections with local streets and major roads (as well as up to 100m along the major roads) that cross the Punt Road corridor. While the investigation area is the focus for this study, the wider network operation have also been considered recognising the importance of the corridor for transport linkages across the city.

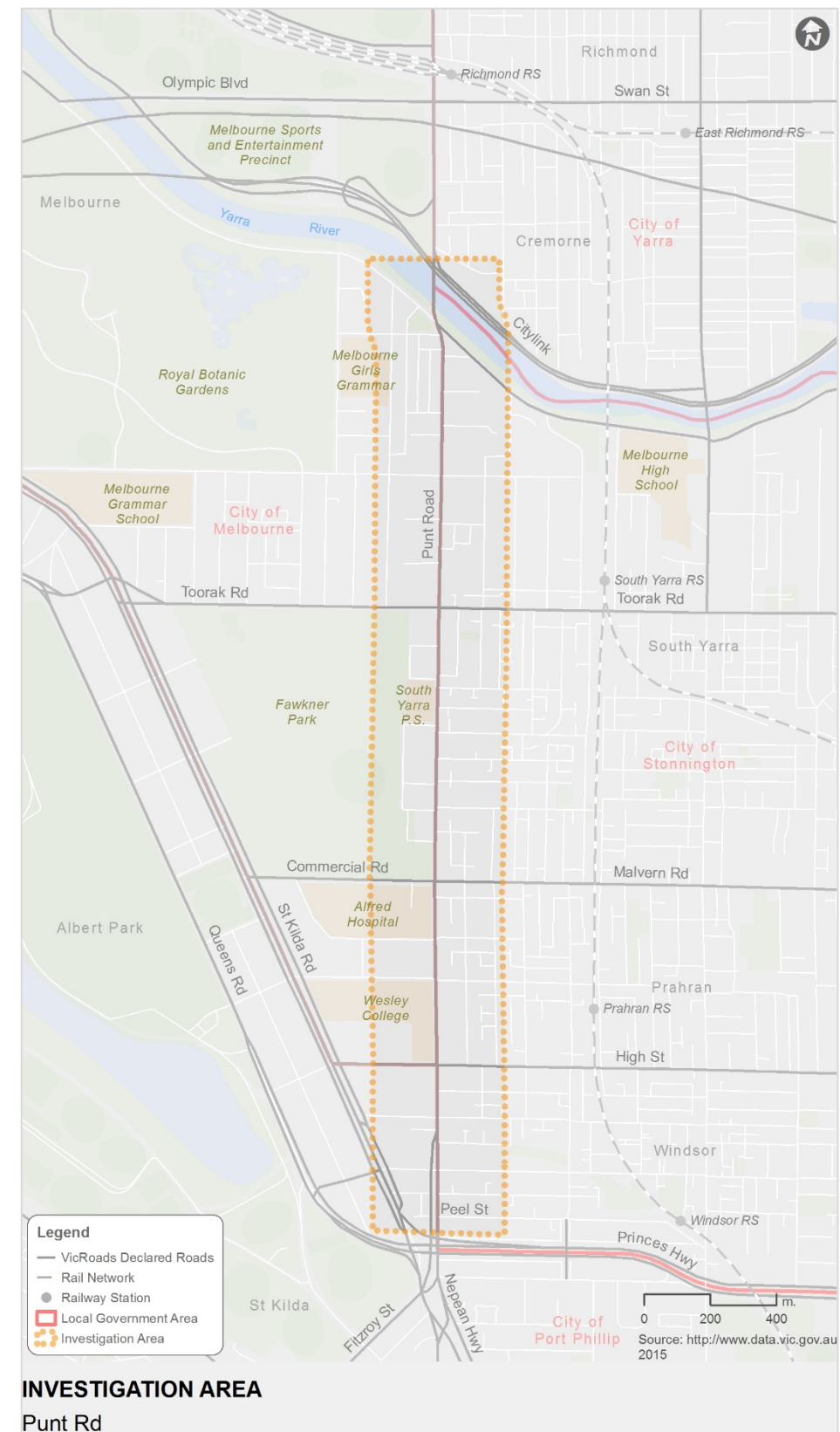


Figure 1: Investigation area

## 2 Existing Conditions

The existing context and travel demands along the corridor has been established as part of the Background Report. For completeness in this report, an overview of the key considerations from a land use, environmental, heritage and transport perspective are outlined below to provide context for the appraisal of the concepts.

### 2.1 Land Use

Consistent with the planning scheme zoning, the properties adjacent to Punt Road (including those subject to the PAO) are predominantly used for residential purposes with some commercial uses (retail and professional services) and a small number of properties used for car parking and tennis courts or that are vacant.

The Punt Road PAO affects approximately 140 properties, with most of these properties comprising residential development. The majority of the buildings on these properties are affected by the PAO. VicRoads owns 22 of the 140 properties within the Punt Road PAO (refer Table 1 of the Background Road). These 22 properties were progressively acquired over time by the State from about 1960 to 1980 when the last property was acquired. These properties were acquired by the Melbourne Metropolitan Board of Works with responsibility for their management transferred to VicRoads by 1989.

### 2.2 Heritage

In 2010, Andrew Long and Associates undertook a desktop heritage assessment along the Punt Road corridor. The assessment involved a preliminary audit of existing heritage registrations and controls within the Punt Road PAO and the road reservation and drew from these to assess the implications for development in the context of the requirements of the Aboriginal Heritage Act 2006 and associated Aboriginal Heritage Regulations 2007 and the Heritage Act 1995. In relation to Aboriginal cultural heritage the assessment concluded:

- there are no Aboriginal and non-Aboriginal heritage sites listed in State and National registers; and
- while the Aboriginal Heritage Regulations 2007 defines land within 200m of a waterway as an area of potential cultural heritage sensitivity, this potential is removed if the land has been subject to significant land disturbance. The study area encompasses land within 200m of the Yarra, however it was determined that the potential for cultural heritage sensitivity had been eliminated as a result of road construction, residential subdivision and utility installation.

Regarding European cultural heritage, the assessment identified:

- there are no listings under the Heritage Act 1995 on the Victorian heritage inventory or register;
- no heritage overlays within the City of Melbourne and City of Port Phillip planning schemes under the Planning and Environment Act 1987;
- five heritage overlays within the City of Stonnington Planning Scheme abutting sections of Punt Road. This affects 40 properties within the Punt Road PAO as follows:
  - Gladstone Street Precinct (HO134) – includes 6 properties on the western end of Gladstone Street that are within the Punt Road PAO;
  - Greville Street (HO126) – includes one property within the Punt Road PAO;
  - Fawcner Street / David Avenue Precinct (HO131) – includes 12 properties within the Punt Road PAO;
  - Toorak Road Precinct (HO150) – includes one property within the Punt Road PAO; and
  - Alexandra Avenue / Domain Road / Punt Road Precinct (HO122) – includes 20 properties along Punt Road.
- the City of Yarra Planning Scheme includes one heritage overlay affecting the corridor as follows:
  - Hoddle Bridge (HO281) – affects the bridge; and
- where an overlay is present alterations of buildings or structures affected by the above heritage overlays requires the approval of the relevant Council.



Figure 2: Planning, heritage and environmental overlays



## 2.3 Environment

A review of the City of Melbourne, City of Port Phillip, City of Stonnington and City of Yarra Planning Schemes has identified the following environmental features of note (as shown in Figure 2):

- an Environmental Significance Overlay (ESO) present in the City of Yarra Planning Scheme associated with the Yarra River to the east of Punt Road. The ESO – Schedule 1 requires a permit to construct a building or carry out works, including a fence, road works and associated street furniture. A number of exemptions apply including the undertaking of repairs and routine maintenance and works undertaken by a public authority to bridge a watercourse, except the elevated approaches to the bridge;
- Land Subject to Inundation Overlay (LSIO) overlays in the City of Stonnington, City of Yarra and City of Melbourne Planning Schemes associated with the Yarra River;
- Within the City of Melbourne Planning Scheme, on the western side of the Punt Road corridor, areas of exceptional trees. These are located on High Street associated with the Victorian School for Deaf Children, Pasley Street West and Mona Place;
- an Environmental Audit Overlay indicating historical contamination, to the east of Punt Road and north of CityLink in the City of Yarra Planning Scheme; and
- Special Building Overlays indicating the potential for overland flooding in the City of Stonnington Planning Scheme in the vicinity of Union Street and Athol Street. These overlays include Punt Road, in particular Athol Street which extends north along Punt Road to Argo Street.

In addition to the above, it is noted that there is no Vegetation Protection Overlay identified in any of the relevant planning schemes. Clause 52.17 of the Victorian Planning Provisions (that is incorporated in all council planning schemes) requires a permit to remove, destroy or lop native vegetation. This includes the construction of a building or works including fencing, road works and street furniture.

There are exceptions to the above requirement where the works involve routine maintenance to buildings and works, or if the vegetation is a tree with a single trunk circumference of less than 0.35 meters at 1 meter above the ground and which less than 6 meters high or has a branch spread of less than 4 meters.

A high level review based on aerial and street level photography suggests that there is minimal vegetation along Punt Road, with the exception of the southern end of Punt Road, where there is native vegetation at the following locations:

- in the centre of Punt Road between St Kilda Junction and Union Street (Eucalyptus trees);
- in the south-west corner between St Kilda Road, St Kilda Junction and Punt Road (Eucalyptus trees); and
- to the west of Punt Road between Henry Street and Raleigh Street (Paperbark trees).

## 2.4 Transport

Punt Road-Hoddle Street is a key linkage for pedestrians, cyclists, trams, buses and traffic. As outlined previously, it is one of the few north-south transport linkages that provide connectivity across the Yarra River. It also has an important role in providing a bypass of central Melbourne. It is one of the key corridors where there is opportunity to significantly improve transport connectivity across Melbourne.

A high level overview of the networks and the travel demands for each of the modes of transport is provided below. This has been based on peak period travel information collected as part of the Background Report, available tram and bus patronage as well as a high level review of reported casualty crashes for the period January 2009 to December 2013.

Pedestrians (Figure 3 and Figure 4)

- highest pedestrian demand across Toorak Road with high demands also at Commercial Road;
- three reported casualty crashes involving pedestrians at the following locations:
  - Alexandra Avenue and Punt Road (variety of directions of vehicle travel);
  - Toorak Road and Punt Road (involving northbound vehicles); and
  - Domain Road and Punt Road (variety of crash types and directions of vehicle travel).

Cyclists (Figure 5 and Figure 6)

- very low demands on Punt Road;
- strategic bicycle linkages on parallel routes including St Kilda Road and Chapel Street;
- some relatively low or moderate demands crossing Punt Road with Malvern Road being the most popular route; and
- few reported casualty crashes involving cyclists along and across the corridor.

Tram (Figure 7)

- highest patronage for the trams along Toorak Road associated with the existing Route 8; and
- congestion and queuing at intersections with Punt Road impact travel time and reliability of tram journeys on Toorak Road, Commercial Road and High Street.

Bus (Figure 8)

- patronage for the 246 bus route gradually increases along the corridor as the bus travels north which highlights the important local function of the cross city service;
- large variability in bus travel times between St Kilda Road and Alexandra Avenue:
  - travel times up to 30 min northbound in the AM;
  - travel times more than 15 min southbound in the PM; and
  - non-peak travel times less than 10 min.
- low demands for existing routes 216, 219 and 200.

Traffic (Figure 9 to Figure 12)

- generally consistent traffic demand along the length of the corridor between St Kilda Road and Alexandra Avenue;
- significant increase in traffic demands north of Alexandra Avenue;
- very slow travel speeds northbound in the AM peak hour, particularly between Commercial Road and Alexandra Avenue which is attributed to the performance of the Alexandra Avenue intersection and the performance of the downstream intersection of Swan Street and Punt Road.
- reported casualty crashes:
  - 118 in total including 32 serious and 86 other injuries; and
  - 35% rear end, 15% involving pedestrians, 14% involving right turn vehicles, 12% loss of control, 8% cross traffic, 6% lane change and 10% other.

In addition to the above which focuses on weekday peak hours of travel, Punt Road has a significant function outside commuter peak hours which includes a major role in providing access to the events precinct north of the investigation area.

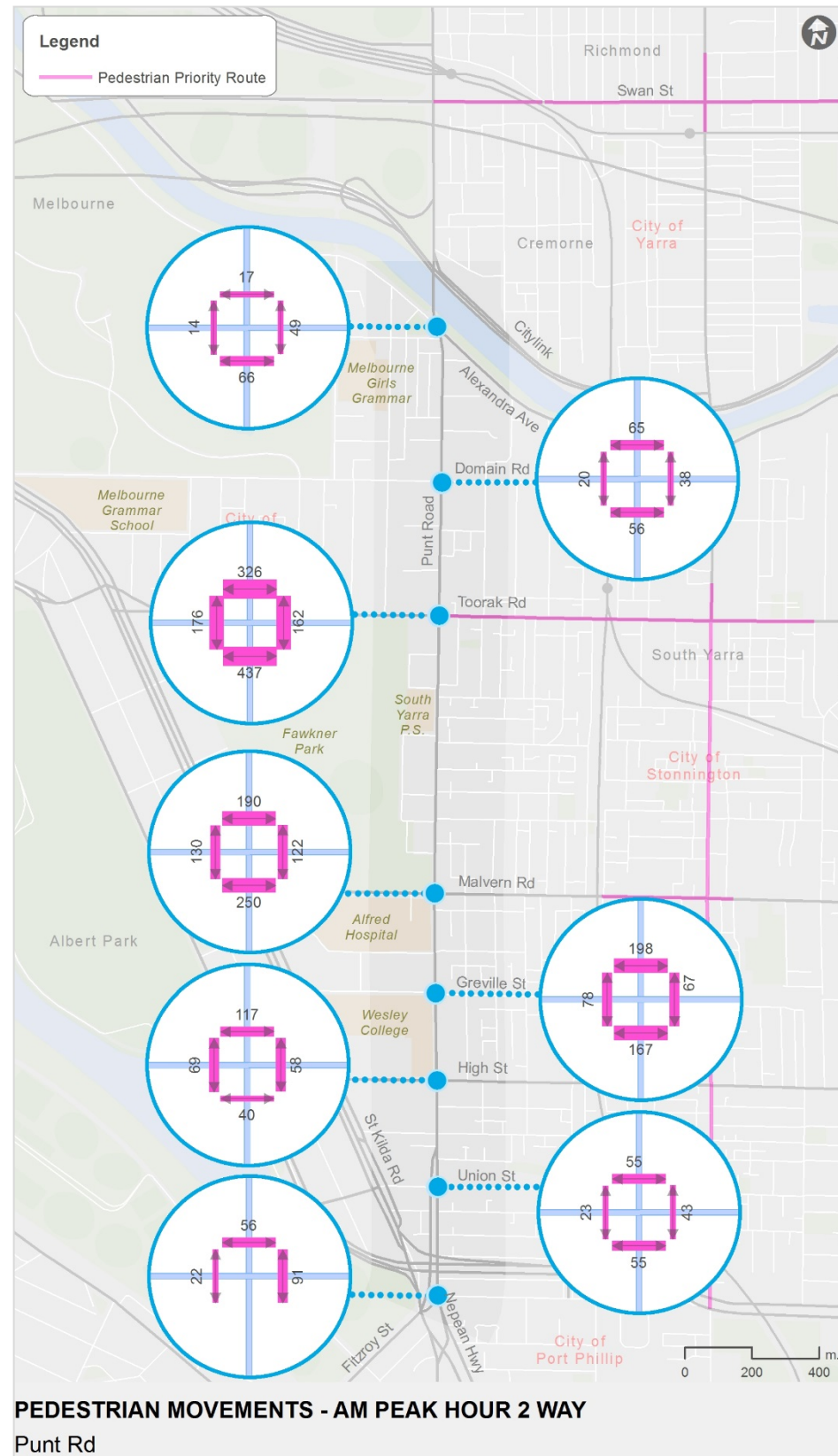


Figure 3: Pedestrian movements during a typical weekday AM peak hour (2015)

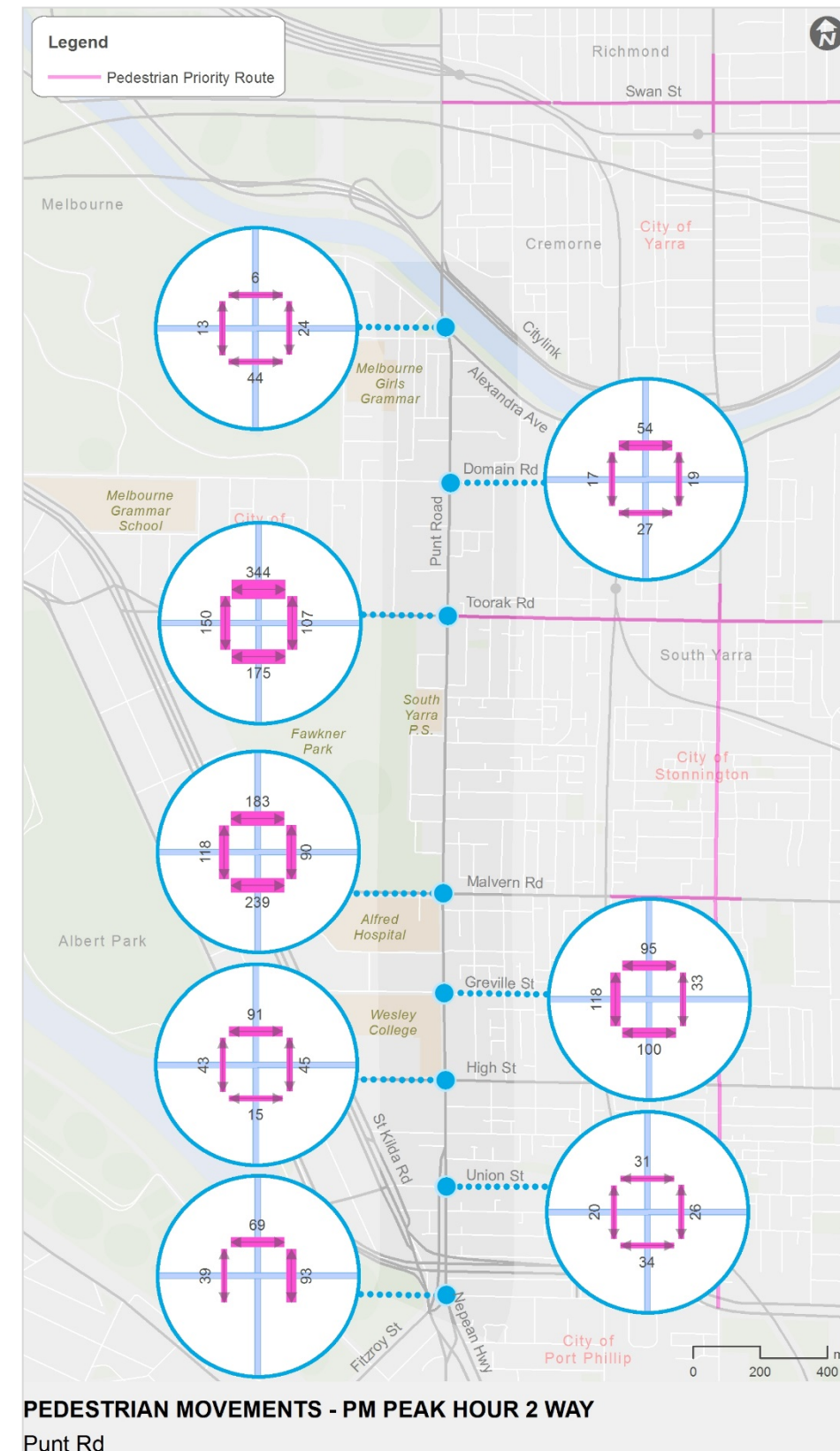


Figure 4: Pedestrian movements during a typical weekday PM peak hour (2015)

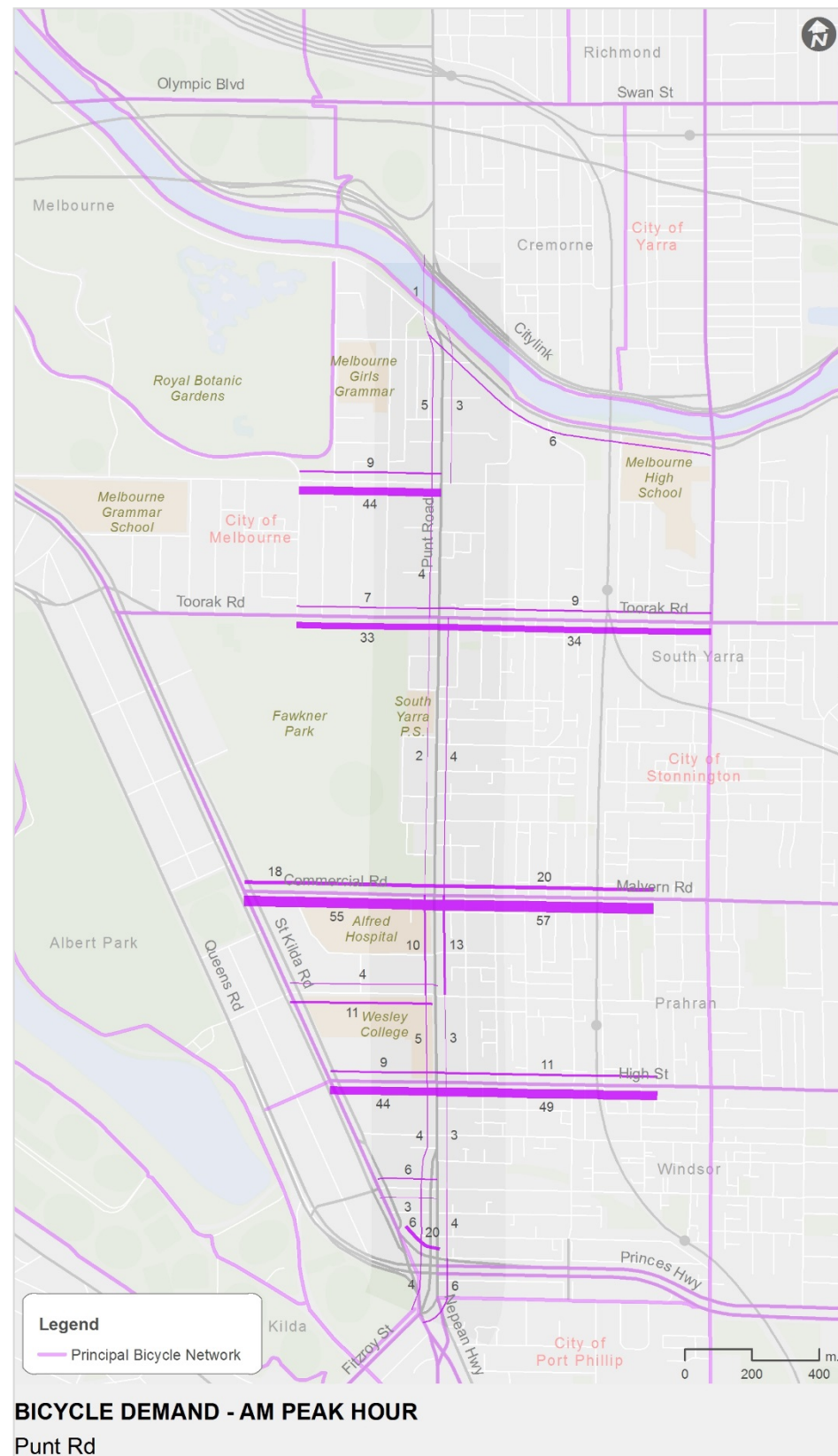


Figure 5: Cyclist network and movements during a typical weekday AM peak hour (2015)

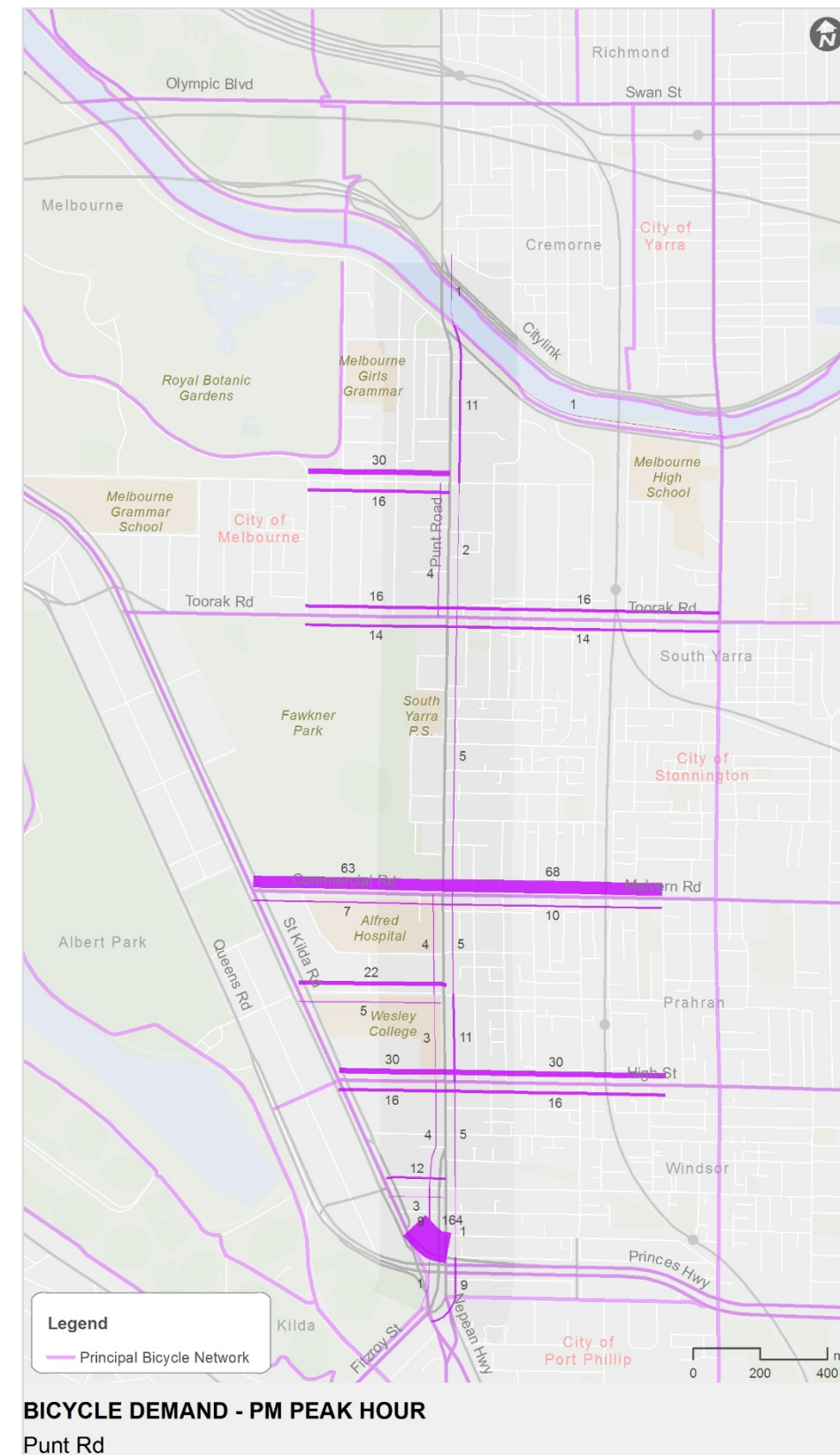


Figure 6: Cyclist network and movements during a typical weekday PM peak hour (2015)

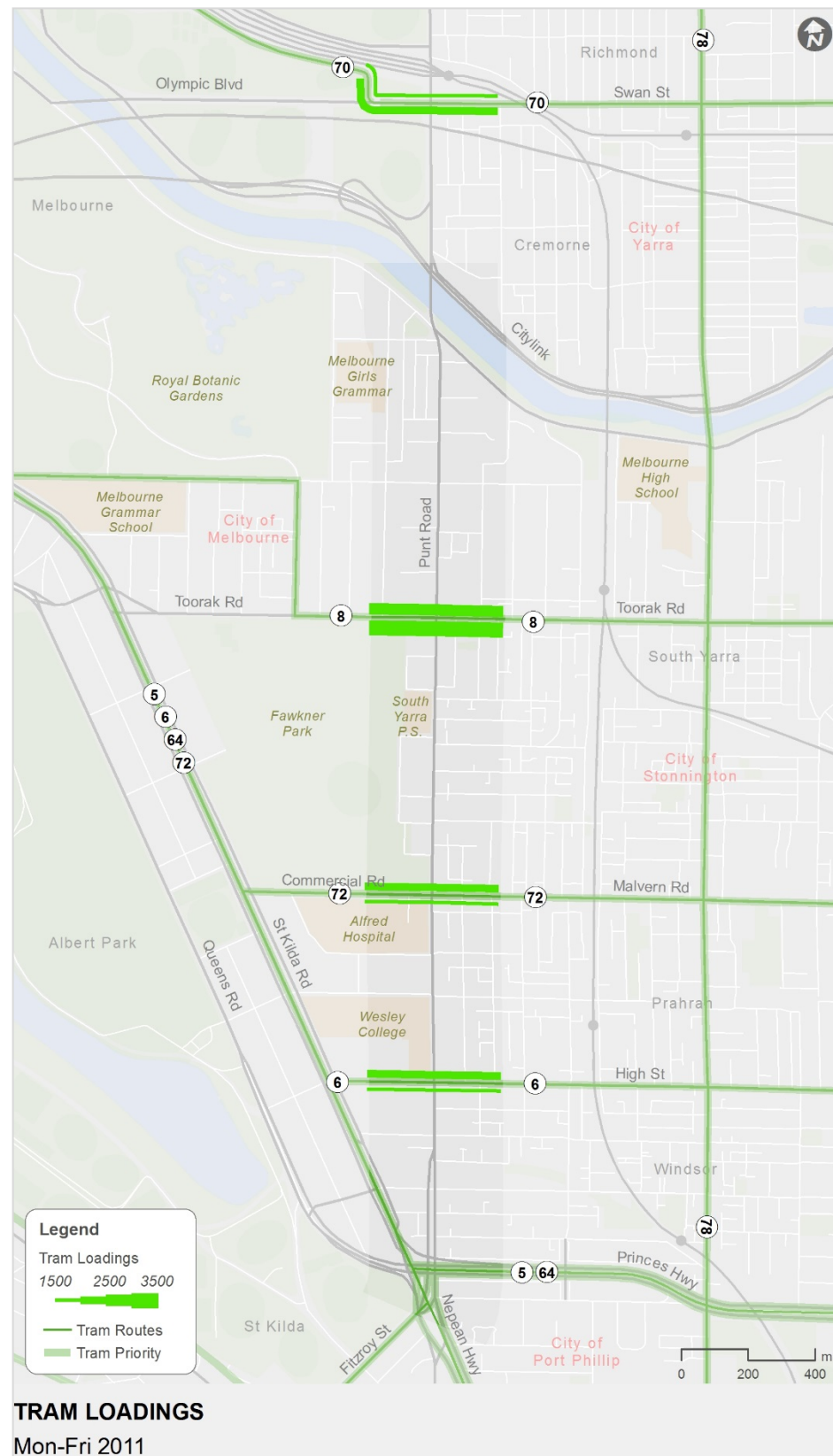


Figure 7: Tram network and estimated tram loadings during a typical weekday (2011)

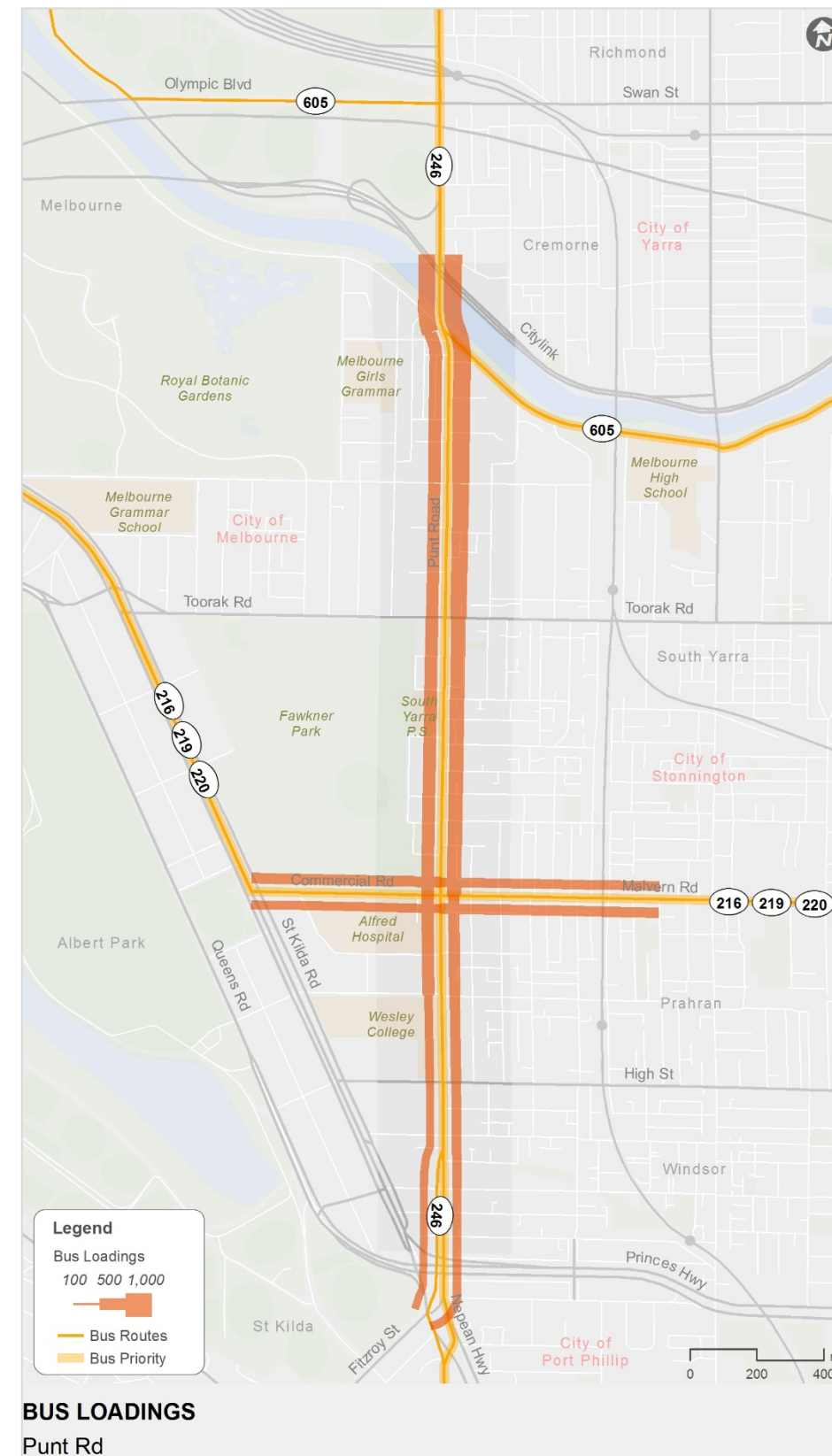


Figure 8: Bus network and estimated loadings during a typical weekday (2014)

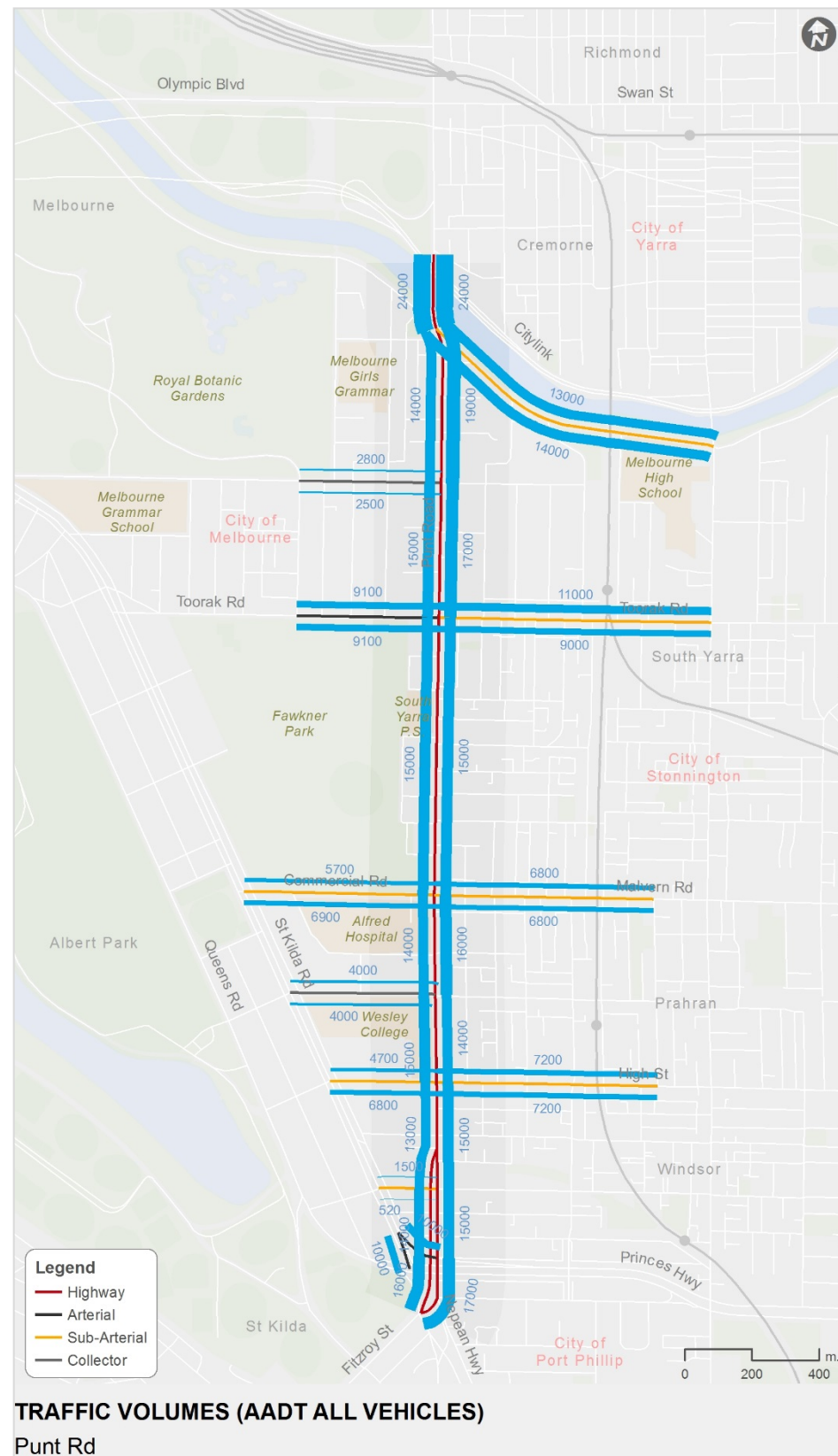


Figure 9: Average annual daily traffic (2013)

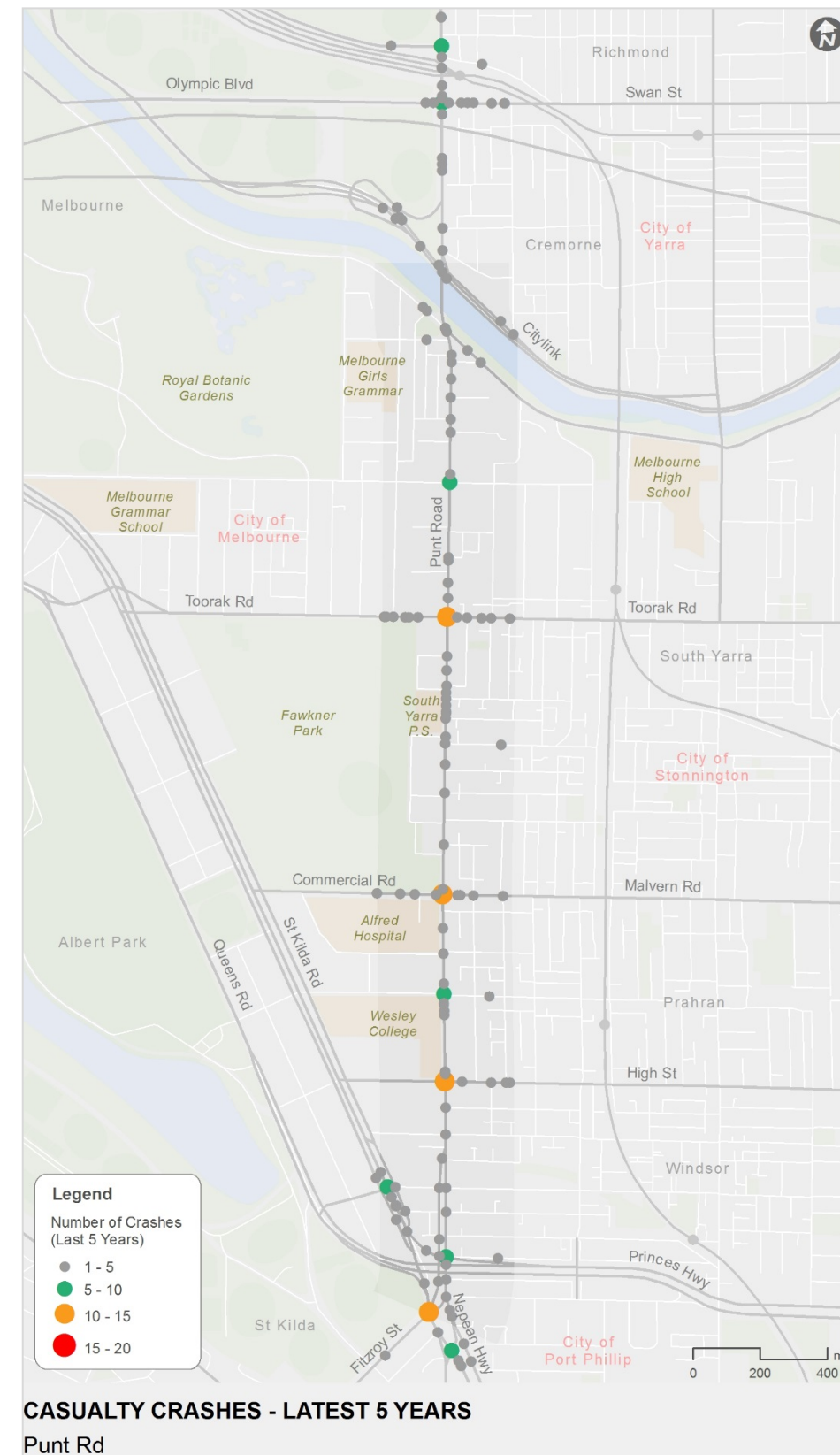


Figure 10: Reported casualty crashes (Jan 2009 to December 2013)



Figure 11: Travel speeds - AM peak hour (2015)



Figure 12: Travel speeds - PM peak hour (2015)

### 3 Community and Stakeholder Engagement

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To inform the development of concepts and the appraisal, VicRoads provided the outcomes from the community consultation activities undertaken. This included a series of community drop-in sessions as well as online engagement during September 2015. The key themes that were identified from the community consultation are outlined as follows:

- congestion is a major issue throughout the Punt Road corridor;
- extended clearways are generally supported to ease congestion, enhance safety and improve traffic flow along the corridor;
- the public acquisition overlay on Punt Road is a contentious issue;
- prioritising public transport in the corridor is widely supported to encourage alternatives to car travel; and
- cyclists do not feel safe riding in the corridor.

There were also a number of more specific issues relating to particular sections of the corridor including a desire to improve access to the Monash Freeway for northbound traffic on Punt Road as well as pedestrian safety near schools and key activity centres adjacent to the corridor.

## 4 Strategic Context

This section discusses the strategic and metropolitan planning strategies that impact the Punt Road-Hoddle Street corridor. It also sets out the SmartRoads framework as well as the objectives for the study.

### 4.1 Relationship to Government Policy

As outlined in the Background Report, the Plan Melbourne - Metropolitan Planning Strategy is an important government policy in considering the future operation of the Punt Road-Hoddle Street corridor.

Plan Melbourne was released in 2014 and outlines the strategy for managing Melbourne's growth and change to the year 2050. The current Government has committed to refreshing Plan Melbourne. It has flagged a transparent and consultative review process to produce a renewed Plan Melbourne that provides the long-term vision for Victoria's growing population. This will include identifying further housing opportunities and alternatives, increasing jobs and improving liveability, dealing with a changing climate, integrating public transport and supporting infrastructure investment.

The seven key outcomes and associated objectives that were developed to underpin Plan Melbourne are as follows:

- “Delivering jobs and investment: create a city structure that drives productivity, supports innovation and creates more jobs”;
- “Housing choice and affordability: provide a diversity of housing in defined locations that cater for different households and are close to jobs and services”;
- “A more connected Melbourne: provide an integrated transport system connecting people to jobs and services, and goods to market”;
- “Liveable communities and neighbourhoods: create healthy and active neighbourhoods and maintain Melbourne's identity as one of the world's most liveable cities”;
- “Environment and water: protect our natural assets and better plan our water, energy and waste management systems to create a sustainable city”;
- “A State of Cities: maximise the growth potential of Victoria by developing a State of Cities which delivers choice, opportunity and global competitiveness”; and
- “Implementation: delivering better governance: achieve clear results through better governance, planning, regulation and funding mechanisms”.

“A more connected Melbourne” is a particularly relevant outcome for the Punt Road-Hoddle Street corridor. Within this outcome there are a number of directions and within each of these directions are specific initiatives. Improvement to Punt Road would be compatible with the following:

- Direction 3.2 – Improve access to job-rich areas across Melbourne and strengthen transport networks in existing suburbs:
  - Initiative 3.2.4 - Develop the road system in the suburbs to improve connections across Melbourne.
- Direction 3.5 – Improve the efficiency of freight networks while protecting urban amenity; and
- Direction 3.1 – Transform the transport system to support a more productive central city;
  - Initiative 3.1.3 - Improve tram travel times, capacity and reliability and extend the tram network into key urban renewal precincts; and
  - Initiative 3.1.4 – Support growing areas of the central city by strengthening bus services to and around central Melbourne.

Improvement to Punt Road would improve access to employment areas in the Cities of Yarra, Melbourne, Stonnington and Port Phillip that surround the Melbourne Central Business District. It would also improve access for freight (particularly light commercial vehicles) with Plan Melbourne identifying the Punt Road-Hoddle Street corridor from the Eastern Freeway to St Kilda Junction. Similarly, improvements to Punt Road would provide opportunities for reducing the travel time and increasing the reliability of tram and bus journeys both along and across the Punt Road- Hoddle Street corridor.



## 4.2 SmartRoads

SmartRoads is an approach developed by VicRoads that manages competing interests for limited road space by giving priority use of the road to different transport modes at particular times of the day.

SmartRoads recognises the increasing importance of walking, cycling and public transport as transport modes. It uses a set of guiding principles to establish the priority use of roads by transport mode, time of day, and place of activity. This approach also ensures that decisions about the operation of the road network support integrated land use and transport planning.

Under SmartRoads, all road users continue to have access to all roads, but over time, changes are being made to how roads are operated to:

- facilitate good pedestrian access into and within activity centres in periods of high demand;
- prioritise trams and buses on key public transport routes that link activity centres during morning and afternoon peak periods;
- encourage cars to use alternative routes around activity centres to reduce the level of ‘through’ traffic
- encourage bicycle travel through further developing the bicycle network; and
- prioritise trucks on important transport routes that link freight hubs and at times that reduce conflict with other transport modes.

These priority movements are assigned to arterial roads across the network forming SmartRoads Network Operating Plan. The Network Operating Plan and its relationship to the investigation area is shown in Figure 13.

## 4.3 Punt Road Project Objectives

The objectives for improving Punt Road have been developed by VicRoads in consultation with various government stakeholders and incorporating feedback from the community. The identified objectives are outlined as follows:

- increase person throughput:
  - along Punt Road for north-south cross town travel i.e. bypassing Central Melbourne; and
  - east-west across Punt Road on key public transport corridors.
- improve travel times and reliability for bus services operating along Punt Road;
- allow better prediction and comparison of journey times for vehicles that may need to travel along Punt Road, including bus travel times;
- improve local amenity and sustainable transport on adjacent corridors;
- reduce the risk of casualty crashes; and
- provide value for money.

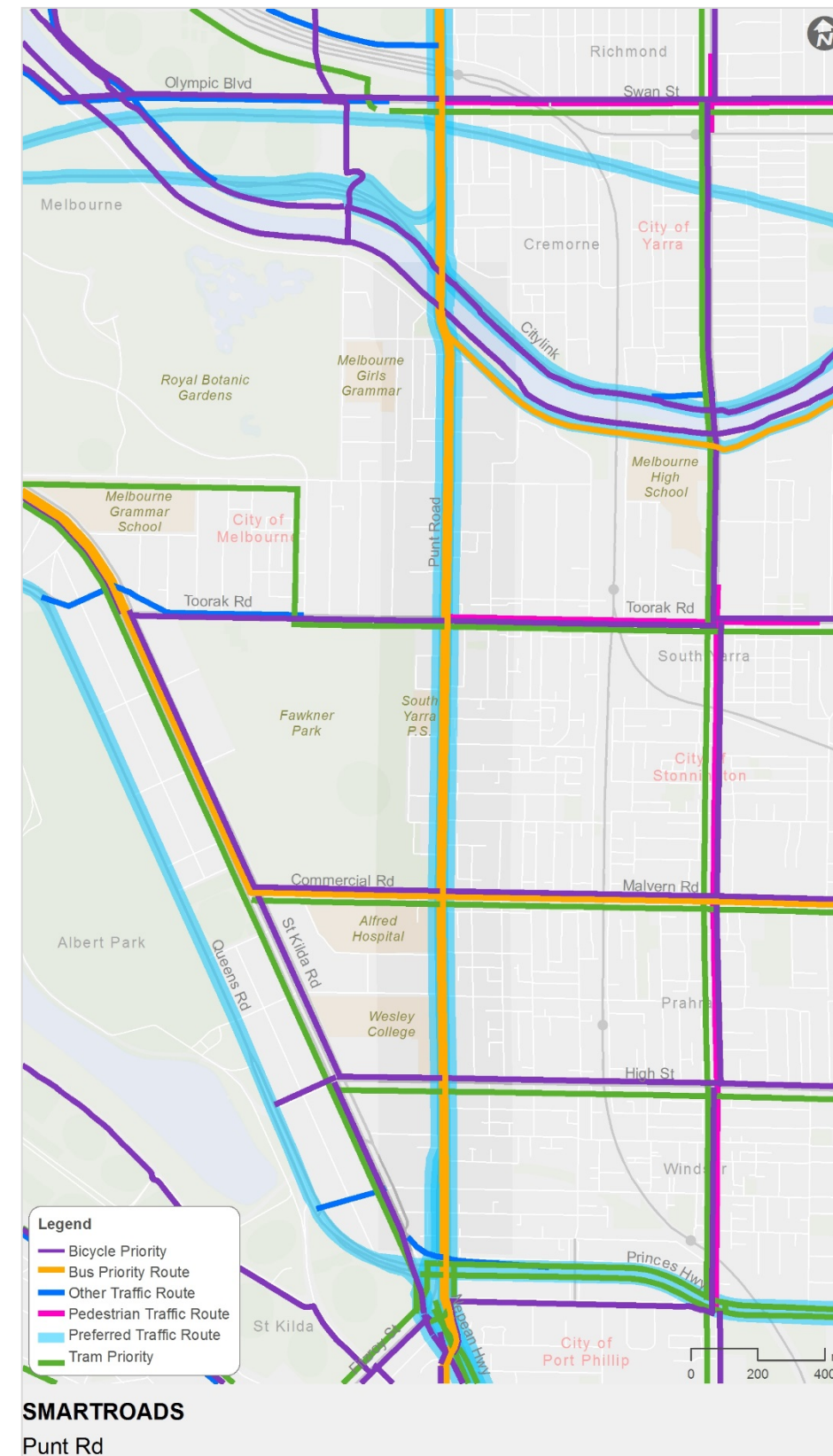


Figure 13: SmartRoads network

## 4.4 Network Strategy

The Punt Road- Hoddle Street corridor caters for a number of competing demands for traffic and bus movement along and across the corridor, tram movements across the corridor, cycling and pedestrian demands as well as parking and access to the adjacent land use. For the purpose of this study, a network strategy has been created and agreed with VicRoads to provide a framework for the development of improvement concepts for Punt Road. This network strategy combines the VicRoads SmartRoads network operating plan with the project objectives and also has consideration to the journeys that people are undertaking along and across the corridor.

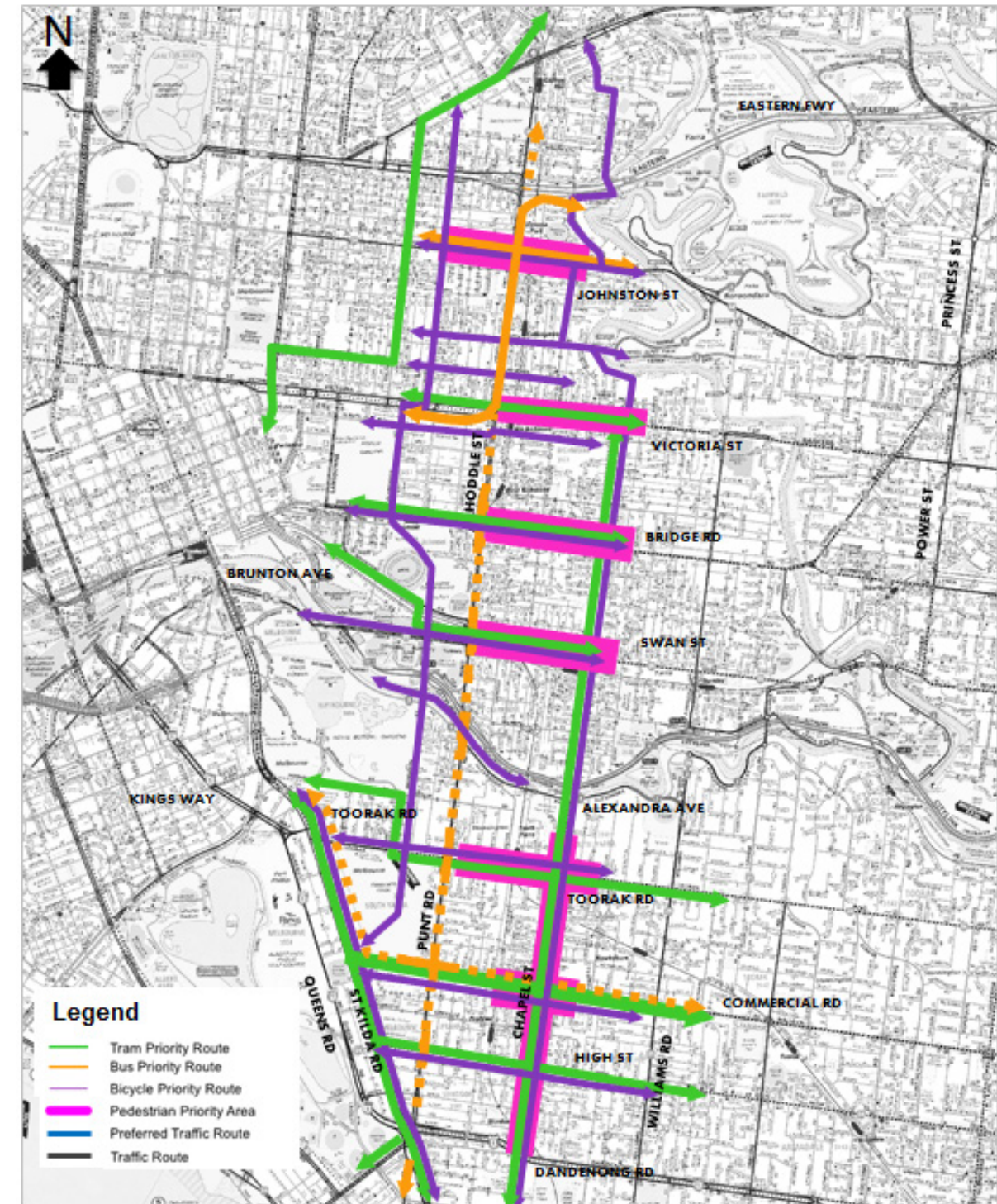
The strategy has been developed as a multi-modal system and is shown in Figure 14 and Figure 15 (separated for clarity). The key elements of the strategy are outlined as follows:

- improving walking connections and safety to key activity centres through discouraging right turns into pedestrian priority areas, making changes to traffic signal timings, reducing delays at intersections and providing new and improved pedestrian connections and amenities such as widened footpaths, wayfinding signage, lighting, shade and enhanced street furniture;
- enhancing bicycle connections and safety across the corridor as well as along parallel routes by reducing traffic demands on strategic bicycle links such as St Kilda Road and Chapel Street, providing new and improved cycling facilities (such as bicycle lanes, bicycle paths and head start storage boxes) and making local streets safe and amenable places for cycling. An example of the progression of this strategy is the current study that is underway to identify the best way to improve cycling along St Kilda Road;
- increasing priority for trams travelling across Punt Road through a reduction in the number of turning movements occurring at major intersections which cause delays for trams and reallocating road space for tram priority as well as providing improved tram stop and waiting facilities;
- improving the performance of the corridor for north-south bus movements along Punt Road (and also across Commercial Road) by addressing key congestion points at intersections, providing more beneficial traffic signal timings and improving stop and waiting facilities;
- providing for the efficient movement of traffic across the network by promoting:
  - utilisation of Punt Road for key north-south traffic movements and for bypassing the central city through improvements to the efficiency of the corridor including intersection improvements, changes to traffic signal priority, traffic lane and turning lane arrangements as well as changes to on-street parking;
  - utilisation of Williams Road, Princess Street and Power Street for some north-south trips which would also provide network resilience under periods of high congestion or when there are incidents on Punt Road. This would be undertaken through additional signage advising motorists of traffic conditions at key decision points, changes to traffic signal timing and turning lane arrangements along Williams Road and changes to on-street parking arrangements (particularly during peak periods);
  - utilisation of Williams Road and Alexandra Avenue for connections between the east and the north with changes to promote traffic around the key activity centres along Toorak Road, Commercial Road and High Street;
  - utilisation of Queens Road for strategic traffic movements from the southeast suburbs to the western segments of the central city; and
  - utilisation of Toorak Road between Punt Road and Queens Road for strategic traffic movements between the north and Southbank/Port Melbourne in order to relieve the significant congestion issues at the Punt Road / Swan Street / Olympic Boulevard intersection.



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Figure 14: Network Strategy (Traffic)



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Note: Bus priority routes shown dashed indicates that the focus is on localised bus priority measures near intersections. The bus priority route shown in a solid line indicates a further level of priority such as dedicated lanes (shown along the northern sections of Hoddle Street).

Figure 15: Network Strategy (Pedestrians, Cyclists, Tram and Bus)

## 5 Appraisal Framework

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In order to understand the relative merits of the concepts, an appraisal framework has been developed. This framework outlines the transport modelling tools that have been utilised in appraising the concepts and the structure of the multi-criteria analysis. This framework provides for a comparative appraisal of the range of concepts that have been developed. Following the completion of this study, it is understood that VicRoads will undertake a further detailed assessment which includes identifying socio-economic impacts and costs prior to determining specific proposals for Punt Road.

### 5.1 Transport Modelling Overview

A variety of transport models have been used to inform the development of concept layouts for each of the concept and to assess their performance. The assessment of the concepts draws upon three layers of transport modelling with the key layers and their application are described as follows:

- the Victorian Integrated Transport model (VITM) is developed and maintained by the Department of Economic Development, Jobs, Transport and Resources. It covers the major cities in Victoria and has been used to estimate the travel demands to the year 2031. This is based on the forecast changes in population and employment, land use and the transport network (e.g. capturing the implications of key projects such as Melbourne Metro or significant changes to the existing Punt Road corridor represented by the concept);
- the VicRoads Mesoscopic Model (VMM) has been used to assess the performance of the Punt Road-Hoddle Street corridor. The VMM covers metropolitan Melbourne and includes a broad level representation of traffic signal operations and intersection geometry. Given that the model is currently under development a local area covering 250m either side of the corridor between the Eastern Freeway and the intersection with St Kilda Road (both inclusive) has been refined and used to inform this study. The VMM allows for the assessment of the existing and proposed operation of intersections with consideration of the impacts that queuing has on the adjacent intersections; and
- intersection modelling software aaSIDRA has been used to understand the operation of each of the individual intersections and to understand more detailed operational issues such as the delay for motorists and pedestrians.

In each case, the models have been developed to reasonably represent the existing observed travel patterns based on existing travel demand data, traffic signal operations information and travel time surveys of the corridor. Travel demand forecasting has then been undertaken to establish a Base Case scenario with the concepts then assessed relative to the performance of the Base Case. Key assumptions in relation to the assessment of the concepts are described below:

- 2031 forecast year for the assessment of concepts;
- travel demands to the year 2031 have been derived based on the Reference Case project assumptions within the Victorian Integrated Transport Model (determined by the Department of Economic Development, Jobs, Transport and Resources); and
- the Base Case for Punt Road in the year 2031 is a Do Minimum scenario with Punt Road assumed to operate as per the existing conditions with minor changes to the operation of the signalised intersections in response to changing travel patterns.

## 5.2 Multi Criteria Analysis Structure

The structure of the multi-criteria analysis has been developed with regard to the guidance provided by the National Guidelines for Transport System Management (2015). The appraisal criteria is summarised in Table 1 and includes a description of the impacts to be considered. For the purpose of this appraisal, impacts to business and industry have been considered to be derivatives of the identified criteria. It is understood that VicRoads would further consider these impacts prior to developing specific proposals for Punt Road. The scale of impacts has been rated based on the descriptions shown in Table 2.

Table 1: Appraisal criteria

Strategic Category	Impact Type	Description
Financial	Capital and operating cost	Qualitative assessment of upfront investment and any non-recurrent expenditure as well maintenance and operating costs.
Economic	Journey times	Effect on time involved in transport across all transport modes.
	Reliability	Effect on movement and service reliability.
	Vehicle operating costs	Effect on vehicle/bus/train/etc. operating costs: fuel, tyre wear, lubricants, repairs and maintenance.
Social	Road safety	Effect on the number of conflict points and safety risk exposure.
	Public transport access	Effect on way-finding to public transport stops, walk distance to key locations and DDA compliance.
	Pedestrian access and amenity	Effect on pedestrian connectivity, increase equity and the quality of environment for pedestrians to encourage pedestrian activity along and across the corridor.
	Cycling access	Effect on the connectivity and level of segregation of cyclists from other modes.
	Dislocation and land acquisition	Effect on existing properties and the effect on people and their connection with their local community.
Environmental	Climate change	Effect on greenhouse gas emissions and the impact on society.
	Visual amenity	Effect on visual amenity, precinct gateways and local neighbourhoods and the effect on landscaping/boulevard treatments of the corridor.
	Noise	Effect on traffic noise impacts in the vicinity of the corridor.
	Biodiversity	Effect on key flora and fauna values and the opportunities for improved environmental resilience.
	Cultural heritage	Effect on aboriginal and post-settlement heritage as well as key heritage interfaces.

Table 2: Impact rating scale

Rating Level	Description
Major –ve	Major negative impacts with serious, long-term and possibly irreversible effects leading to serious damage, degradation or deterioration of the physical, economic or social environment. Requires a major re-scope of concept, design, location, justification, or requires major commitment to extensive management strategies to mitigate the effect.
Moderate –ve	Moderate negative impact. Impacts may be short-, medium- or long-term and impacts will most likely respond to management actions.
Slight –ve	Slight negative impact, probably short-term, able to be managed or mitigated, and will not cause substantial detrimental effects. May be confined to a small area.
Neutral	Neutral – no discernible or predicted positive or negative impact.
Slight +ve	Slight positive impact, possibly only lasting over the short-term. May be confined to a limited area.
Moderate +ve	Moderate positive impact, possibly of short-, medium- or long-term duration. Positive outcome may be in terms of new opportunities and outcomes of enhancement or improvement.
Major +ve	Major positive impacts resulting in substantial and long-term improvements or enhancements of the existing environment.

## 6 Improvement Concepts

The development of concepts for Punt Road considered those that can be contained within the existing road reservation boundaries as well as those that required utilisation of the land covered by the existing PAO (see Figure 2 for PAO extents). The concepts focus on improved efficiency of the existing corridor through changes to the permitted right turn movements or by changing the way that some movements occur in order to simplify the operation of the traffic signals along the corridor. The identified concepts are summarised as follows:

- Concept 1 - 24 Hour Clearways;
- Concept 2 - 4 Lane: Central Right Turn Lane;
- Concept 3 - 4 Lane: Narrow Central Median;
- Concept 4 - 5 Lane: Reversible Lane;
- Concept 5 - 4 Lane/6 Lane: Widened Intersections;
- Concept 6 - 6 Lane: Dual Carriageway; and
- Concept 7 - 4 Lane/6 Lane: Bus Lanes.

An overview of the key features is provided below with the appraisal outlined in Section 7.

These concepts explore different ideas for possible changes to the operation on Punt Road. Each of the concepts has different levels of performance from a transport perspective and different impacts both positive and negative. Should funding become available, it is understood that VicRoads may explore a number of the ideas presented below, combinations of those identified or new treatments.

Each of the concepts are considered to be preliminary only and include a number of components that are common to each of the concepts as well as assumptions for improvements to the network including:

- 24 hour clearways implemented for all concepts with the extent of reprovision of parking varying between the concepts.
- while outside the scope of this study, improvements to the intersection of St Kilda Road and Punt Road have been assumed to be undertaken if required which may include new turn lanes to be accommodated within the existing corridor;
- the existing delays experienced along Hoddle Street (north of the investigation area) have been assumed to be improved in response to the forecast travel demands through signal timing adjustments in order to facilitate the delivery of the capacity improvements that are identified by each of the concepts;
- tram lanes and new accessible tram stop have been proposed on Toorak Road, Commercial Road and High Street with the specific location, time of day of application, type and extent of the facility is to be further developed;
- the changes that each of the concepts presents for property and local road access has not been considered in detail and would require further development including consultation with the community, Council and other stakeholders. This may require slight modification to the concepts to increase access to Punt Road or may require mechanisms to reduce the potential for increases in traffic on the local road network as a result of restrictions to the right turn movements;
- general improvements to the walking and cycling facilities with possible treatments including new footpaths, improved signage, cycling head-start storage boxes etc; and
- peak period right turn bans are included in each of the concepts with these applying to both the morning and evening peak hour unless indicated otherwise.

The improvement concepts provided in the following sections include a diagrammatic representation of the key improvements and changes to traffic movements. For comparison purposes, a diagrammatic representation of the Base Case network for the Punt Road corridor (network as per the existing conditions) is provided in Figure 16. Drawings of the preliminary concept layouts and cross sections are provided in Appendix A.

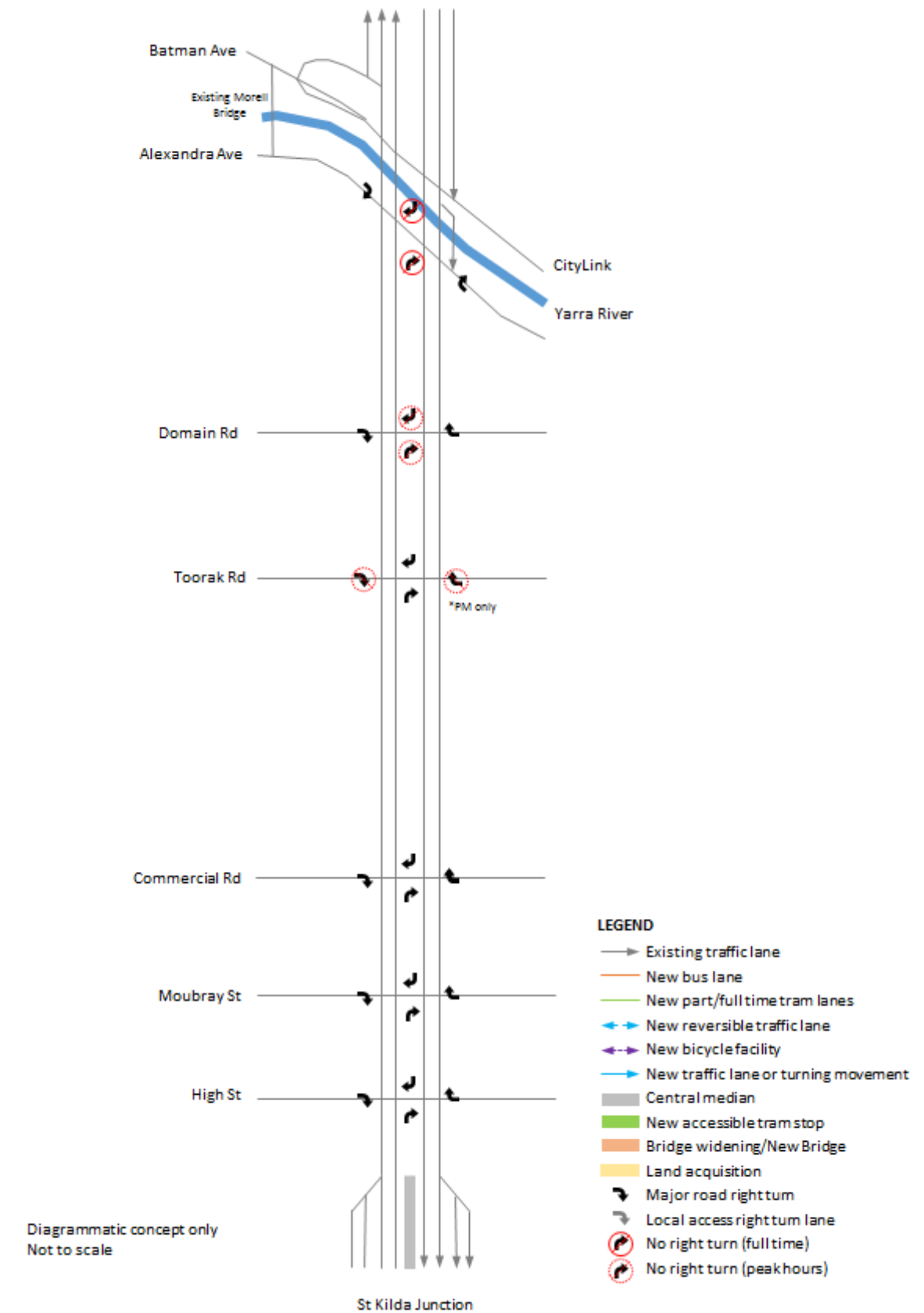


Figure 16: Punt Road corridor - Base Case network.

## 6.1 Concept 1 - 24 Hour Clearways

Clearways currently apply along Punt Road in both the morning (6:30am to 9:30am) and evening (3:30pm to 6:30pm) on weekdays. Concept 1 involves the implementation of clearways 24 hours a day, 7 days a week to improve the efficiency of Punt Road between Union Street and the Yarra River outside of peak periods. Other than the implementation of clearways, there are no other changes to the existing operation of the network as part of this concept. The key features of this concept are outlined below:

Transport network:

- prohibition of parking that is currently permitted along Punt Road outside of the peak commuter periods (i.e. in the middle of the day and late evening Monday to Friday and on weekends);
- prohibition of parking on east-west roads for approximately 100m either side of the intersection with Punt Road;
- conversion of a number of existing VicRoads owned properties along Punt Road to car parking to off-set the loss of on-street car parking; and
- other than the construction of new off-street car parking and potential changes to the associated property accesses, no other significant construction works within the Punt Road corridor.

Land, environment and heritage:

- no major works and therefore no significant land, biodiversity or heritage impacts; and
- minimal changes to acoustic amenity.

It is understood that the impacts to parking as a result of this concept have been assessed separately by VicRoads.

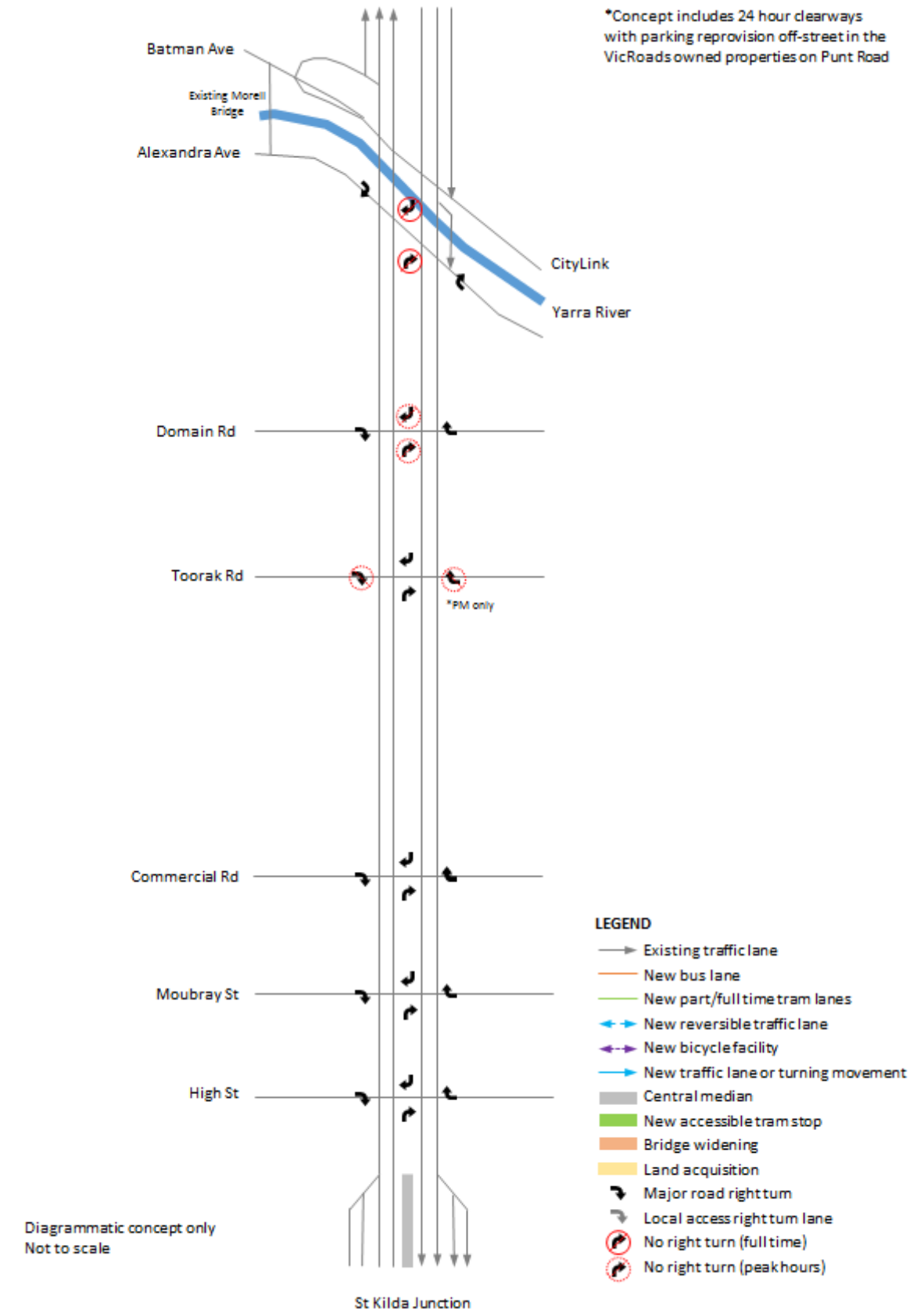


Figure 17: Concept 1 – 24 Hour Clearway

## 6.2 Concept 2 - 4 Lane: Central Right Turn Lane

Concept 2 involves changes within the existing road reserve to provide a fifth central lane with this lane designated to provide right turn lanes at some major and minor roads.

Consistent with the network strategy described in Section 4.4, this concept involves a number of changes to the operation of key movements in order to simplify traffic signal operations and improve efficiency for all modes of transport. The key features of this concept are described as follows:

### Transport Network:

- an additional central lane on Punt Road through the narrowing of lanes within the existing kerbs (mostly, with some localised narrowing of the nature strip) to provide four 3.0m wide through lanes and a minimum 2.5m wide central right turn lane where possible;
- simplified traffic signal operations with changes to the permitted right turns in order to improve the efficiency of movement along and across the corridor with the key changes noted as follows:
  - Alexandra Avenue: Eastbound right turns undertaken utilising the displaced right turn concept (also known as a continuous flow intersection) with traffic crossing to the right side of the carriageway at a new intersection in advance of the intersection with Punt Road. Westbound right turns are undertaken utilising Dobson Street;
  - Commercial Road and Toorak Road: Northbound and westbound right turns are undertaken utilising the median u-turn concept to the west of the Punt Road intersection (i.e. motorists approach the intersection, turn left/travel through then undertake a u-turn at a nearby intersection and travel back to the intersection to complete their movement); and
  - High Street: Peak hour right turn bans for northbound, southbound and eastbound movements;
- separated central right turn lane to maintain access to and from the local road network and key property accesses;
- changes to parking to provide 24 hour clearways and provision of new off-street parking as per Concept 1 and 100m clearways on major east-west roads that intersect Punt Road;
- new accessible tram stops on Toorak Road, Commercial Road and High Street in the vicinity of the intersections with Punt Road which will improve accessibility and the quality of the stops for tram passengers;
- new part time tram lanes along Toorak Road, Commercial Road and High Street in the vicinity of the intersections with Punt Road to improve tram travel times and service reliability for passengers with trams also benefiting from the restriction to existing right turn movements. There is also the potential to consider full time tram lanes in some sections; and
- signalised intersections to operate on a signal cycle time that is reduced from approximately 130 seconds to 100 seconds. A reduced cycle length will reduce the delay for all road users and particularly pedestrians as the pedestrians will wait for less time to be able to cross the road.

### Land, environment and heritage:

- potential land acquisition of a small section of Fawkner Park abutting Toorak Road as well as some areas adjacent to the Yarra River with the extent of impact possibly able to be reduced subject for further investigation;
- negligible changes to visual amenity;
- negligible changes to acoustic amenity;
- no significant impact to heritage features; and
- no significant impact to biodiversity values.

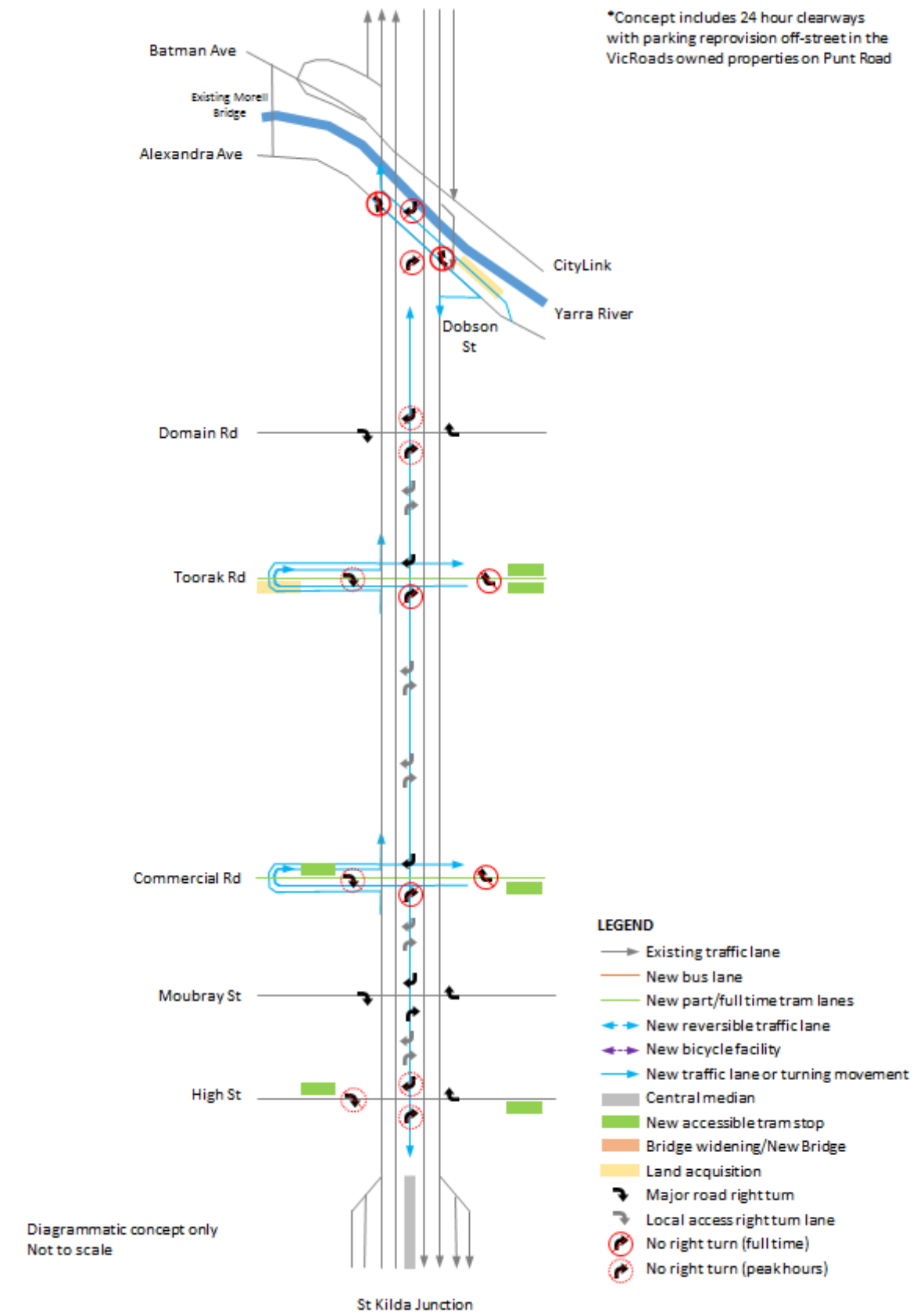


Figure 18: Concept 2 – 4 Lane: Central Right Turn Lane



### 6.3 Concept 3 - 4 Lane: Central Median

Concept 3 involves changes within the existing road reserve to provide a central median. This concept includes the same intersection changes as Concept 2 and modifies the operation of key right turn movements in order to simply traffic signal operations and better align with the network strategy outlined in Section 4.4.

The key features of this concept are described as follows:

Transport network:

- simplified traffic signal operations with changes to the permitted right turns in order to improve the efficiency of movement along and across the corridor with the key changes noted as follows:
  - Alexandra Avenue: Eastbound right turns undertaken at a new one-way bridge built adjacent to the Morrell Bridge and connecting to the existing CityLink off-ramp for Punt Road. This bridge would also provide access to Batman Avenue to reduce pressure on the Swan Street / Punt Road intersection for trips travelled toward the city centre. The changes to CityLink would also include a new outbound off-ramp connecting Batman Avenue to Punt Road via a new signalised intersection at Kelso Street which would provide improved access to Punt Road from the city centre and reduce the pressure on the Swan Street / Punt Road intersection. Westbound right turns are undertaken utilising Dobson Street; and
  - The operation of all remaining major intersections as per Concept 2.
- central median provided to limit property access and minor road intersections to left-in and left-out only (i.e. no right turns to or from the adjacent property or minor roads);
- no change to the existing Hoddle Bridge;
- changes to parking to provide 24 hour clearways and provision of new off-street parking as per Concept 1 and 100m clearways on major east-west roads that intersect Punt Road;
- new accessible tram stops on Toorak Road, Commercial Road and High Street as per Concept 2;
- new part time tram lanes along Toorak Road, Commercial Road and High Street as per Concept 2 with the potential to consider full time tram lanes in some sections;
- signalised intersections to operate on a reduced cycle length of 100 seconds as per Concept 2.

Land, environment and heritage:

- potential land acquisition of a small section of Fawkner Park abutting Toorak Road as well as some localised parkland areas adjacent to the Yarra River and CityLink with the extent of impact possibly able to be reduced subject for further investigation;
- potential visual impact with the introduction of a new bridge across the Yarra River;
- negligible changes to acoustic amenity;
- no significant impact to heritage features; and
- no significant impact to biodiversity values.

It is noted that the access arrangements to local roads are indicative only and would require further study and consultation with the community as well as City of Yarra and Melbourne as part of any proposal.

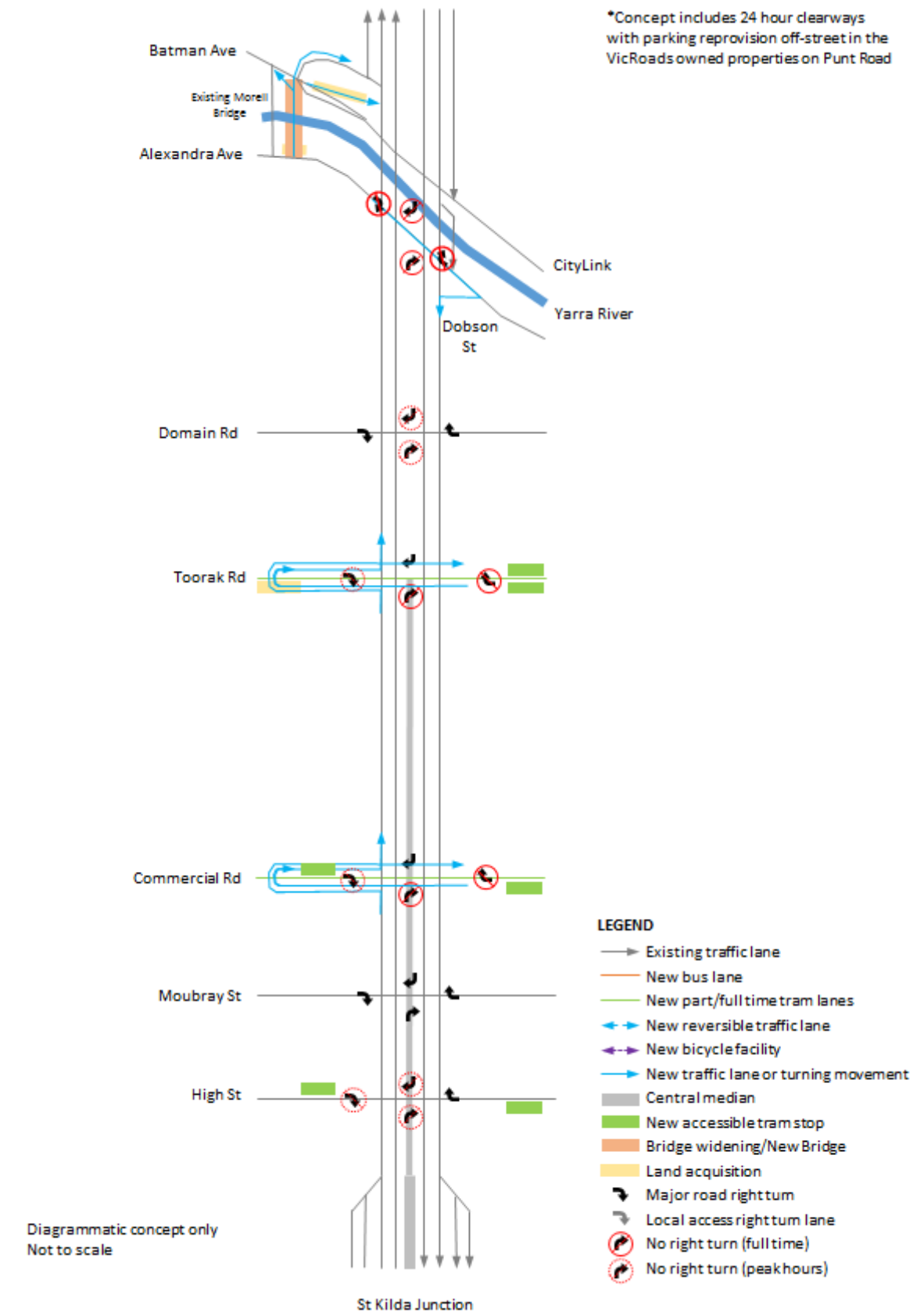


Figure 19: Concept 3 – 4 Lane: Narrow Central Median

## 6.4 Concept 4 - 5 Lane: Reversible Lanes

Concept 4 involves changes within the existing road reserve (in most areas) to provide a fifth reversible central lane. As part of this concept, this lane would utilise overhead signs to operate as a reversible lane to serve the typical peak direction of travel along the corridor (e.g. northbound in the morning peak and southbound in the evening peak hour). This concept is similar to the treatments along Queens Road in Melbourne and along Johnston Street in Collingwood. The key features of this concept are described as follows:

Transport network:

- implementation of overhead gantries and electronic signs to control the different directions of traffic and operate the central lane as a reversible lane;
- widening of Punt Road through the narrowing of the nature strip and footpath to provide five separate 3.0m wide lanes;
- simplified traffic signal operations with changes to the permitted right turns in order to improve the efficiency of movement along and across the corridor with the key changes noted as follows:
  - Alexandra Avenue: Eastbound and westbound right turns are diverted to Dobson Street in order to simplify the operation of the Punt Road / Alexandra Avenue intersection. Dobson Street is converted to one-way westbound;
  - the operation of all remaining major intersections as per Concept 2 but with all right turns from Punt Road prohibited (i.e. also including Toorak Road, Commercial Road, Moubay Street);
- widening of the Hoddle Bridge to allow for three lanes to be maintained southbound in both the AM and PM peak periods;
- changes to parking and provision of new off-street parking as per Concept 1 and 100m clearways on major east-west roads that intersect Punt Road;
- new accessible tram stops on Toorak Road, Commercial Road and High Street as per Concept 2;
- new part time tram lanes along Toorak Road, Commercial Road and High Street as per Concept 2 with the potential to consider full time tram lanes in some sections; and
- signalised intersections to operate on a reduced cycle length of 100 seconds as per Concept 2.

Land, environment and heritage:

- impact to existing properties on the east side of Punt Road between Alexandra Avenue and Toorak Road which would affect approximately 35 properties that are subject to the PAO. It is noted that while narrower lanes and footpaths may be possible, this is not appropriate over an extended length for safety reasons;
- potential land acquisition of a small section of Fawkner Park abutting Toorak Road with the extent of impact possibly able to be reduced subject to further investigation;
- potential for visual impacts associated with widening of Hoddle Bridge;
- new traffic noise impacts associated with the acquisition of properties. This will particularly impact the residents where the rear property boundary will abut the road reservation requiring mitigation to provide reasonable acoustic amenity;
- permit required for works within the Yarra River Environs Environmental Significance Overlay;
- no significant impact to biodiversity values;
- potential for heritage impacts associated with widening of Hoddle Bridge; and
- potential for heritage impacts and council approval required for alterations to acquired properties within the Heritage Overlay.

It is expected that there would be a number of operational challenges with this concept relating to the utilisation of the right turn lane for property access and access to the local roads. This is expected to limit the effectiveness of the reversible lane during peak periods as vehicles slow and stop in the right lane. This concept would also require the removal of right turns during peak periods at critical locations such as at Toorak Road as well as limiting access to The Alfred Hospital on Commercial Road. Given the above, as well as the impacts to property and the bridge widening that is required, this concept has not been investigated further.

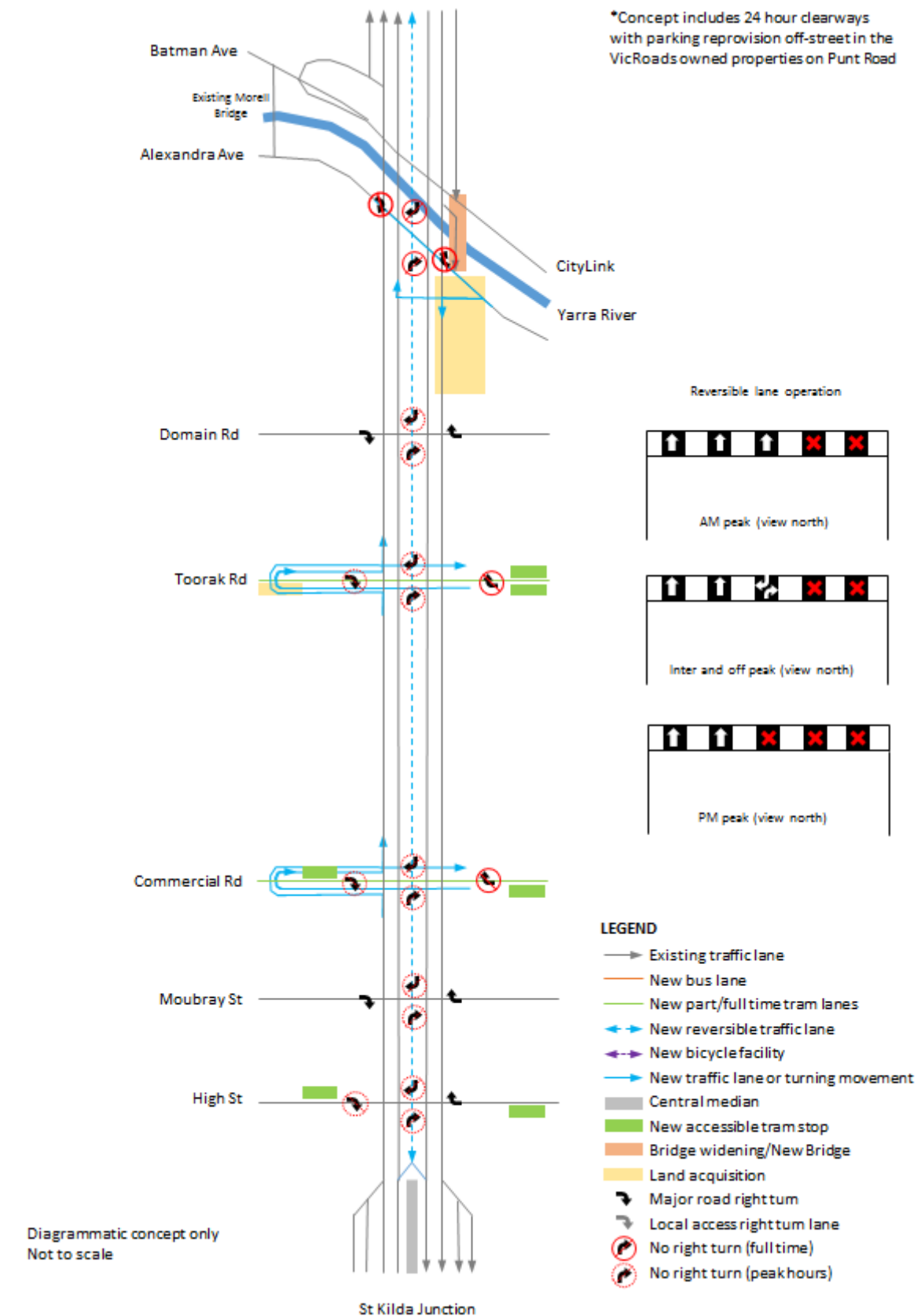


Figure 20: Concept 4 – 5 Lane: Reversible Lanes

## 6.5 Concept 5 - 4 Lane/6 Lane: Widened Intersections

Concept 5 provides an additional lane in each direction through the acquisition of properties on the east side of Punt Road in the vicinity of the major intersections with the cross section narrowing back to broadly match the existing kerb line between intersections.

Similar to previous concepts, the operation of key right turn movements are modified in order to simply traffic signal operations and better align with the network strategy outlined in Section 4.4. The key features of this concept are described as follows:

Transport network:

- significant widening of the road to provide an additional lane of capacity in each direction in the vicinity of the major intersections;
- simplified traffic signal operations with changes to the permitted right turns in order to improve the efficiency of movement along and across the corridor with the key changes consistent with Concept 2 (with the additional through lane in each direction in the vicinity of the intersections as well as a new double right turn lane on the north approach at Toorak Road);
- construction of a widened or new Hoddle Bridge adjacent to the existing bridge to provide three through lanes in each direction;
- separated central right turn lane to maintain access to and from the local road network and key property accesses;
- 24 hour clearways along Punt Road and on major east-west roads for approximately 100m either side of the Punt Road intersections with car parking displaced into the surrounding area;
- new accessible tram stops on Toorak Road, Commercial Road and High Street as per Concept 2;
- new part time tram lanes along Toorak Road, Commercial Road and High Street as per Concept 2 with the potential to consider full time tram lanes in some locations; and
- signalised intersections to operate on a signal cycle time that is reduced from approximately 130 seconds to 110 seconds. A reduced cycle length will reduce the delay for all road users and particularly pedestrians as the pedestrians will wait for less time to be able to cross the road.

Land, environment and heritage:

- impact to approximately 65 properties that are subject to the PAO;
- potential land acquisition of a small section of Fawkner Park abutting Toorak Road as well as some localised parkland adjacent to the Yarra River with the extent of impact possibly able to be reduced subject to further investigation;
- potential visual impacts associated with widening of road corridor and widening of Hoddle Bridge;
- new traffic noise impacts associated with the acquisition of properties. This will particularly impact the residents where the rear property boundary will abut the road reservation requiring mitigation to provide reasonable acoustic amenity;
- permit required for works within the Yarra River Environs Environmental Significance Overlay;
- no significant impact to biodiversity values;
- potential for heritage impacts and council approval required for alterations to acquired properties within the Heritage Overlay;
- potential for heritage impacts associated with widening of Hoddle Bridge; and
- potential for overland flooding around Commercial Road in area designated with Special Building Overlay, which incorporates the proposed widened road.

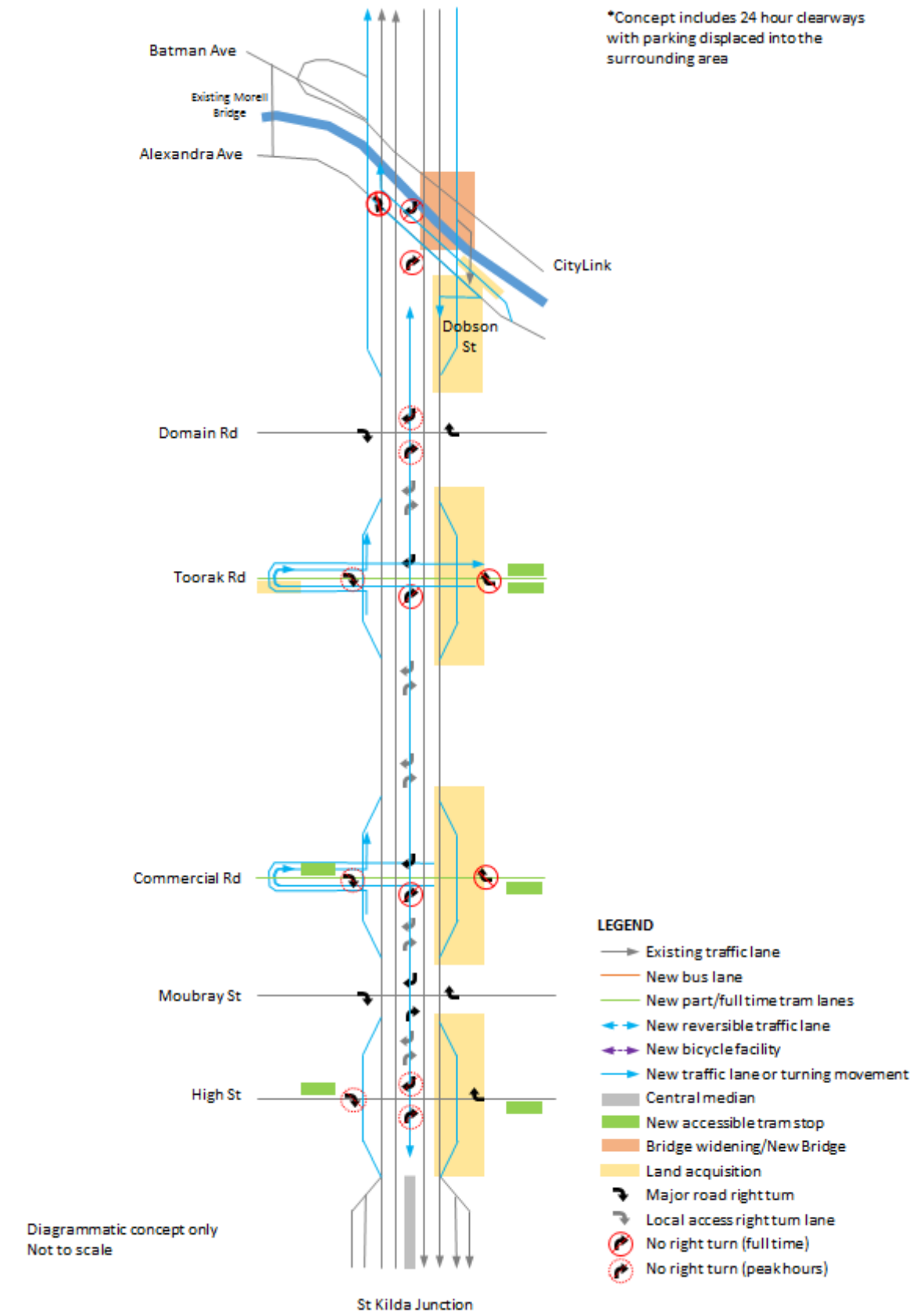


Figure 21: Concept 5 – 4 Lane/6 Lane: Hybrid with widened intersections

## 6.6 Concept 6 - 6 Lane: Dual Carriageway

Concept 6 involves the acquisition of properties on the east side for the majority of the length of Punt Road in order to provide a six lane dual carriageway.

Similar to previous concepts, the operation of key right turn movements are modified in order to simply traffic signal operations and better align with the network strategy outlined in Section 4.4. The key features of this concept are described as follows:

Transport network:

- significant widening of the road to provide an additional lane of capacity in each direction along the length of the corridor;
- simplified traffic signal operations with changes to the permitted right turns in order to improve the efficiency of movement along and across the corridor with the key changes noted as follows:
  - Alexandra Avenue: Eastbound and westbound right turns are diverted to Dobson Street in order to simplify the operation of the Punt Road / Alexandra Avenue intersection. Dobson Street is converted to one-way westbound; and
  - the operation of all remaining major intersections is as per Concept 2 with the exception of Toorak Road where a double right turn lane is provided on the north approach.
- construction of a widened or new Hoddle Bridge adjacent to the existing bridge to provide three through lanes in each direction;
- new off-road bicycle facilities along the east side of Punt Road with the potential for alternative treatments such as on-road cycling lanes or dedicated off-road cycling and pedestrian paths;
- 24 hour clearways along Punt Road and on major east-west roads for approximately 100m either side of the Punt Road intersections with car parking displaced into the surrounding area;
- new accessible tram stops on Toorak Road, Commercial Road and High Street as per Concept 2;
- new part time tram lanes along Toorak Road, Commercial Road and High Street as per Concept 2 with the potential to consider full time tram lanes in some sections;
- signalised intersections to operate on a reduced cycle length of 110 seconds as per Concept 5; and
- the utilisation of the land within the PAO providing additional flexibility and opportunities for the long term planning of the corridor (e.g. providing additional space for new high capacity public transport systems that may be identified over horizon of 30 years or more).

Land, environment and heritage:

- impact to approximately 130 properties that are subject to the PAO;
- potential land acquisition of a small section of Fawkner Park abutting Toorak Road with the extent of impact possibly able to be reduced subject to further investigation;
- increase in traffic noise associated with the acquisition of properties. This will impact the residents where the rear property boundary will now abut the road reservation requiring mitigation to provide reasonable acoustic amenity;
- potential visual impact associated with widening of the road corridor and Hoddle Bridge;
- no significant impact to biodiversity values;
- permit required for works within the Yarra River Environs Environmental Significance Overlay;
- potential for heritage impacts and council approval required for alterations to acquired properties within the Heritage Overlay;
- potential for heritage impacts associated with widening of Hoddle Bridge; and
- potential for overland flooding around Commercial Road in area designated with Special Building Overlay, which incorporates the proposed widened road area at Albion Street and Athol Street.

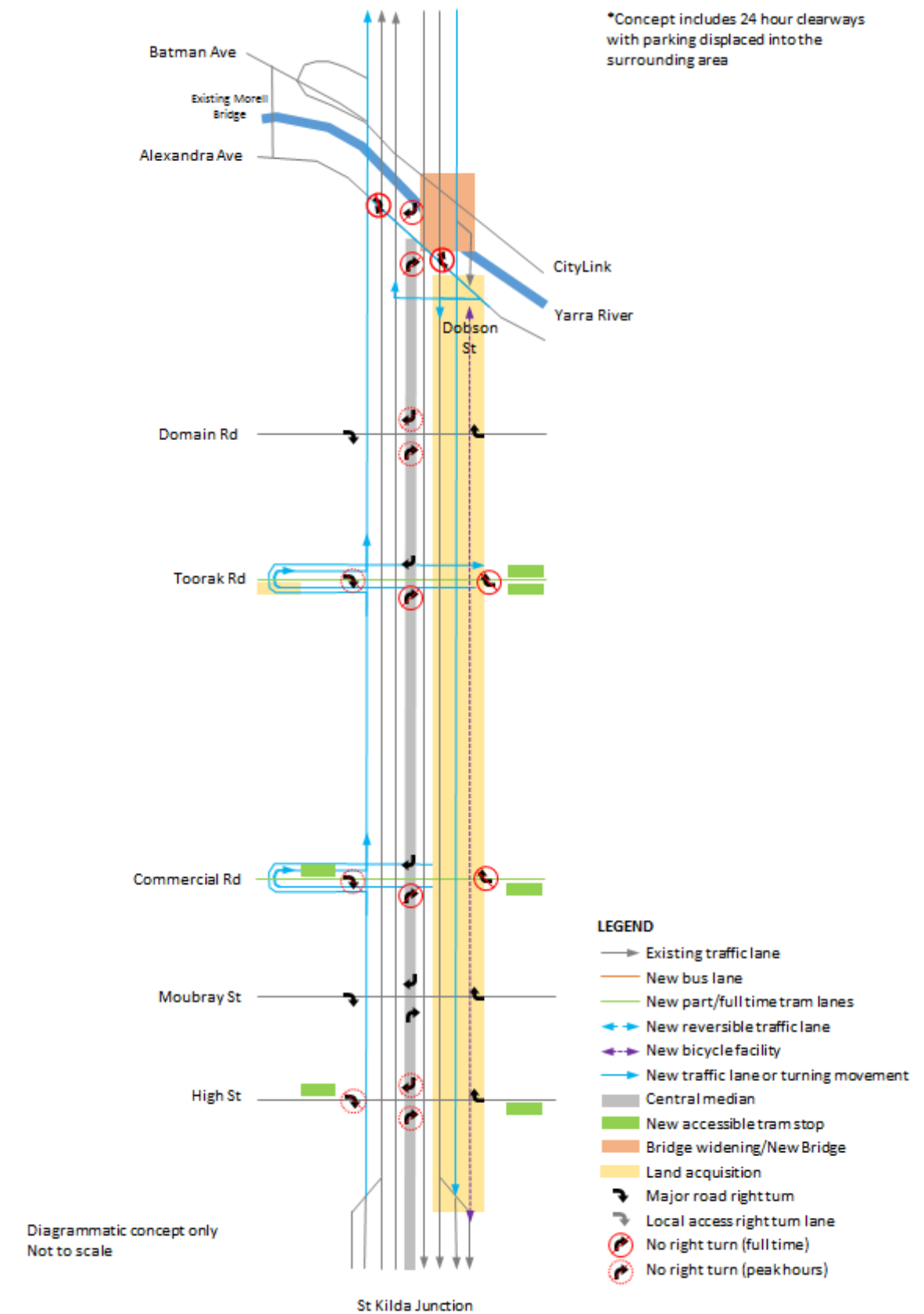


Figure 22: Concept 6 – 6 Lane: Dual carriageway

## 6.7 Concept 7 - 4 Lane/6 Lane: Bus Lanes

Concept 7 involves acquisition of properties on the east side for the majority of the length of Punt Road in order to provide a six lane dual carriageway comprising two traffic lanes and a bus lane in each direction. This concept also incorporates widening on the approaches to the intersections to provide further capacity enhancements.

Similar to previous concepts, the operation of key right turn movements are modified in order to simplify traffic signal operations and better align with the network strategy outlined in Section 4.4. The key features of this concept are described as follows:

Transport network:

- significant widening of the road to provide a bus lane in each direction along the length of the corridor (also to be shared with left turning vehicles);
- changes to parking and provision of new off-street parking as per Concept 1;
- simplified traffic signal operations with changes to the permitted right turns in order to improve the efficiency of movement along and across the corridor with the key changes noted as follows:
  - Alexandra Avenue: Eastbound right turns undertaken at a new one-way bridge built adjacent to the Morrell Bridge and connecting to the existing CityLink off-ramp for Punt Road; and
  - the operation of all remaining major intersections as per Concept 2 (with the additional through lane in each direction) with the exception of Toorak Road where traffic and trams on the west approach mix to provide adequate junction capacity;
- construction of a widened or new Hoddle Bridge adjacent to the existing bridge to provide three through lanes in each direction;
- 24 hour clearways along Punt Road and on major east-west roads for approximately 100m either side of the Punt Road intersections with car parking displaced into the surrounding area;
- new accessible tram stops on Toorak Road, Commercial Road and High Street as per Concept 2;
- new part time tram lanes along Toorak Road (though to a lesser extent than other concepts), Commercial Road and High Street as per Concept 2 with the potential to consider full time tram lanes in some sections;
- signalised intersections to operate on a reduced cycle length of 110 seconds as per Concept 5; and
- the utilisation of land within the PAO providing additional flexibility and opportunities for the long term planning of the corridor (e.g. providing additional space for new high capacity public transport systems that may be identified over horizon of 30 years or more).

Land, environment and heritage:

- acquisition of approximately 130 properties that are subject to the PAO;
- potential land acquisition of a small section of Fawkner Park abutting Toorak Road as well as some localised parkland adjacent to the Yarra River and CityLink with the extent of impact possibly able to be reduced subject to further investigation;
- potential visual impact associated with widening of road corridor, widening of Hoddle Bridge and the introduction of a new bridge across the Yarra River;
- permit required for works within the Yarra River Environs Environmental Significance Overlay;
- increase in traffic noise associated with the acquisition of properties. This will impact the residents where the rear property boundary will now abut the road reservation requiring mitigation to provide reasonable acoustic amenity;
- potential for heritage impacts and council approval required for alterations to acquired properties within the Heritage Overlay;
- potential for heritage impacts associated with widening of Hoddle Bridge;
- no significant impact to biodiversity values; and
- potential for overland flooding around Commercial Road in area designated with Special Building Overlay, which incorporates the proposed widened road area at Albion Street and Athol Street.

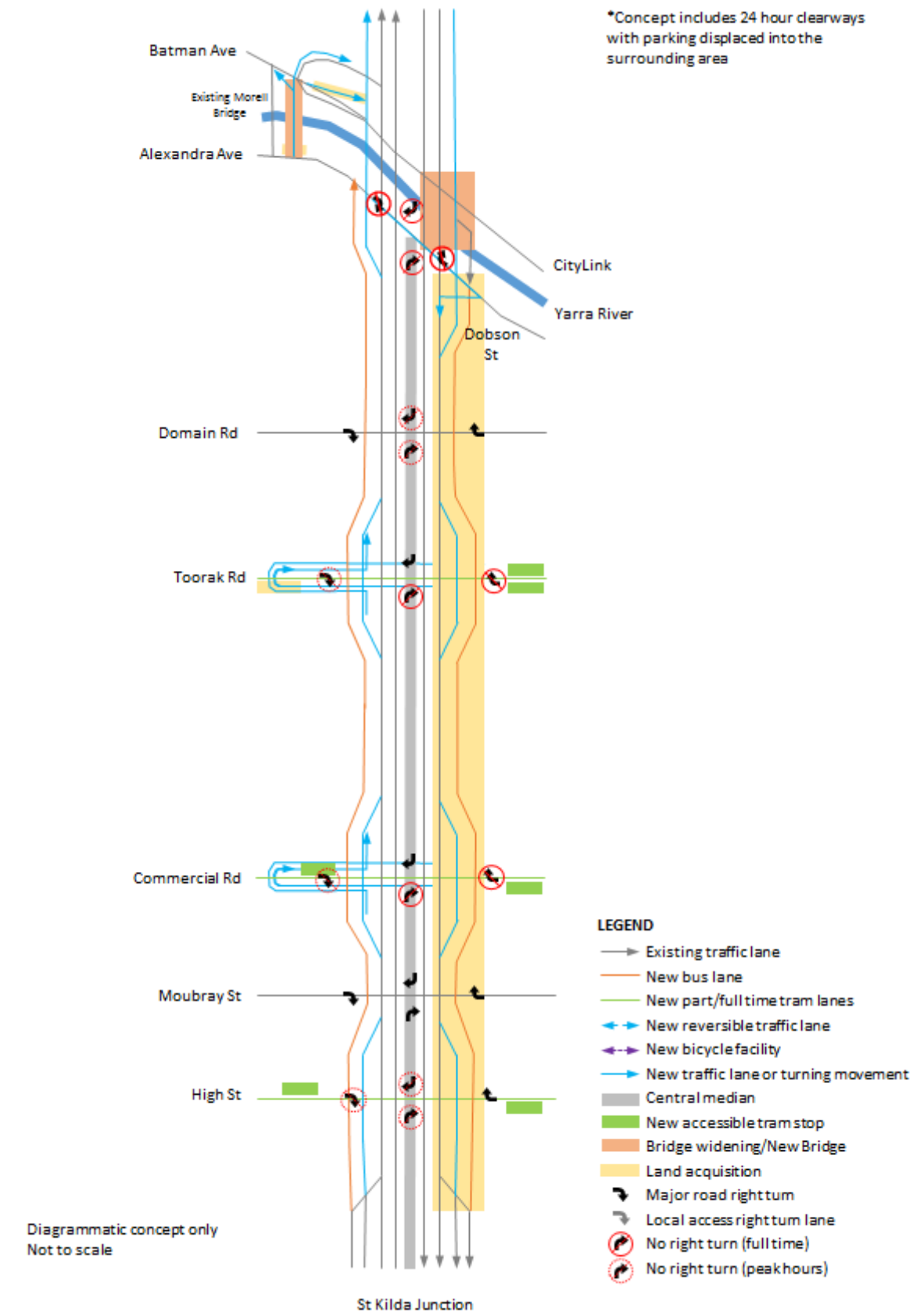


Figure 23: Concept 7 – 6 Lane: Bus lanes

## 7 Concepts Appraisal

The improvements for pedestrians, cyclists, buses and trams has been summarised as part of the concepts overview provided in Section 6. Some of the concepts include significant enhancement to the traffic operation of the Punt Road corridor and the roads crossing the corridor. These enhancement would change the forecast travel patterns for the wider network, the performance of the Punt Road corridor as a whole and also the operation of the individual intersections along the corridor. An overview of the impacts under these categories is provided in Section 7.1 to 7.3. The impacts that are in addition to the performance of the transport network are outlined in Section 7.4 with a summary provided in Section 7.5.

### 7.1 Wider Transport Network Performance

The changes in travel demand on the wider transport network for each of the concepts has been estimated using the Victorian Integrated Transport Model (VITM). An overview of the changes in daily traffic volumes of each of the concepts relative to a Base Case is provided in Table 3. The key findings are noted as follows:

- Punt Road volumes increase significantly under the six lane concepts when compared to the Base Case as additional demand is attracted to the corridor (particularly during the inter peak period);
- volumes on parallel north-south roads such as Chapel Street reduce providing improved travel times along these corridors with greater benefits associated with the 6 lane scenarios; and
- volumes on east-west road vary with a minimal change in traffic overall.

Outputs from the VITM (Figure 24 to Figure 26) show the change in travel speeds during the morning, midday and evening peak hour for concepts that provide for six through traffic lanes at the intersections (i.e. Concept 5, 6 and 7). This shows that in addition to Punt Road, traffic as well as public transport that is mixed with traffic, that is using Chapel Street, Williams Road and St Kilda Road (morning and midday only) will also benefit from improved travel times on Punt Road. Depending on the peak period, there would also be some dis-benefits on Nepean Highway, Commercial Road and Dandenong Road given the demand attracted to the corridor.

The concepts that provide four lanes with 24 hour clearways (e.g. Concepts 1, 2 and 3) will also provide benefits for traffic and public transport during the middle of the day both along Punt Road and also on the surrounding road network as shown in Figure 27. As to be expected the corridors that benefit are similar to the six lane concepts though with a lower magnitude. Given that there is no change to the number of through lanes during the morning and evening peak hours for Concepts 1, 2 and 3 the results for these periods are not presented.

The concepts that provide for six lanes along Punt Road provide considerable flexibility in terms of the operation of the network. For example, the capacity that is added to Punt Road under the six lane concepts could be utilised to provide a balance of improved north-south travel as well as promoting east-west travel across the corridor for key public transport movements. Alternatively, there would be opportunities to provide added public transport or bicycle priority on parallel routes such as Chapel Street and St Kilda Road as a result of the reduction in traffic demands on these routes.

Table 3: Broader network daily traffic volumes and change from Base Case (2031)

Road	Existing Observed	Base Case	Concept 1, 2 and 3	Concept 5, 6	Concept 7
	2013	2031	Punt Road 4 through lanes	Punt Road 6 through traffic lanes	Punt Road 6 through traffic lanes and bus lanes
<b>NORTH-SOUTH ROADS</b>					
St Kilda Rd	44,000	47,000	+1%	-3%	-2%
Punt Road - south of Toorak Rd	32,000	34,000	+30%	+65%	+64%
Punt Road - south of Swan St	56,000	61,000	+4%	+13%	+14%
Chapel St*	17,000	19,000	-5%	-9%	-8%
Williams Rd	23,000	25,000	-6%	-10%	-10%
Orrong Rd	13,000	15,000	-4%	-6%	-6%
<b>EAST-WEST ROADS</b>					
High St	16,000	20,000	+2%	+3%	+2%
Commercial Rd	18,000	21,000	+3%	+5%	+4%
Toorak Road	22,000	23,000	-3%	-2%	-3%
Alexandra Ave – east of Punt	30,000	40,000	-5%	-3%	-3%
Alexandra Ave – west of Punt**	20,000	36,000	+5%	+6%	+7%

\*Approximated volumes based on Traffic Profile Viewer

\*\*Approximated volumes from SCATS traffic data and Turning Movement Surveys

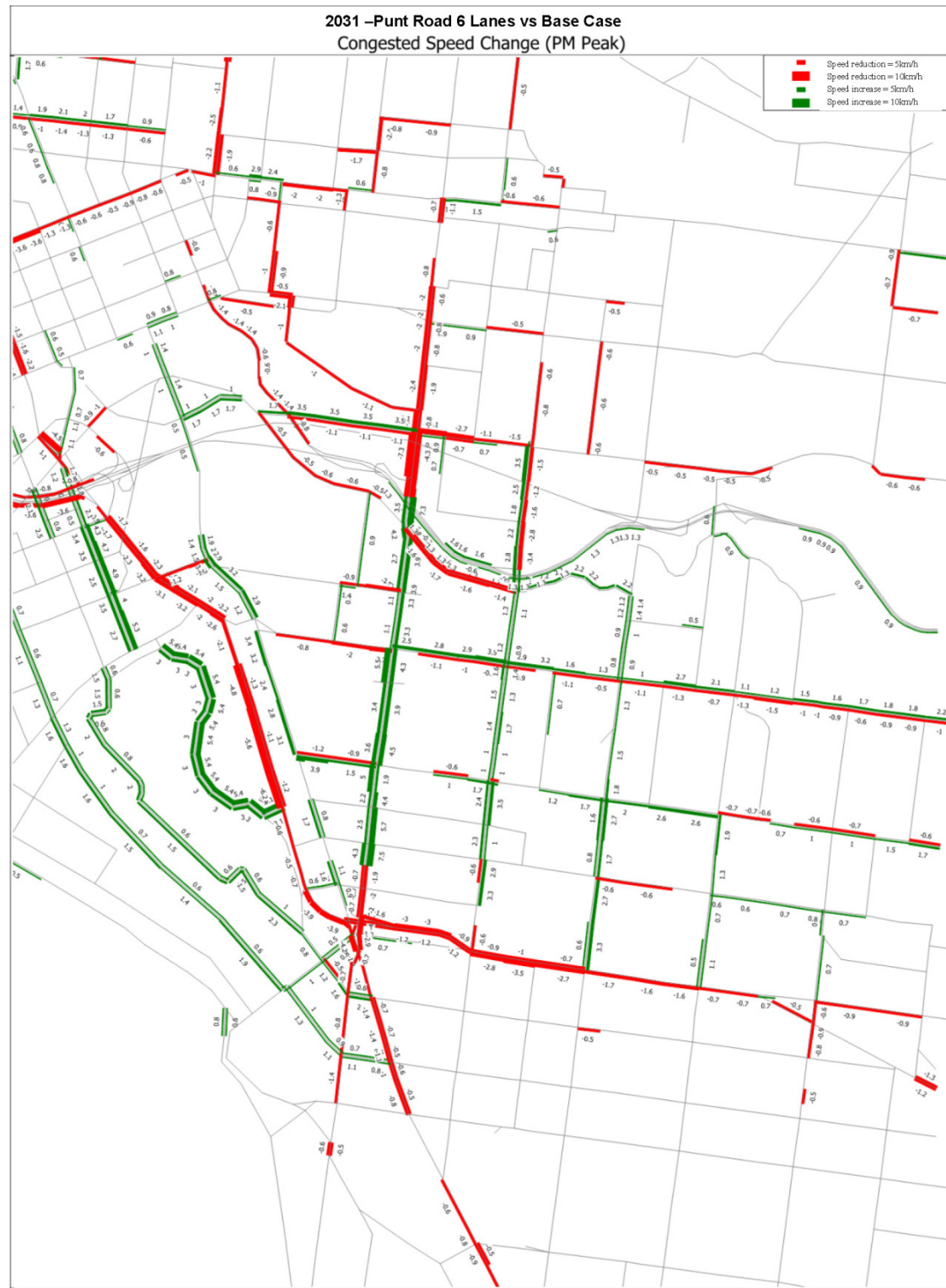


Figure 24: Change in 2031 congested travel speed - morning peak hour (6 lane vs Base Case)

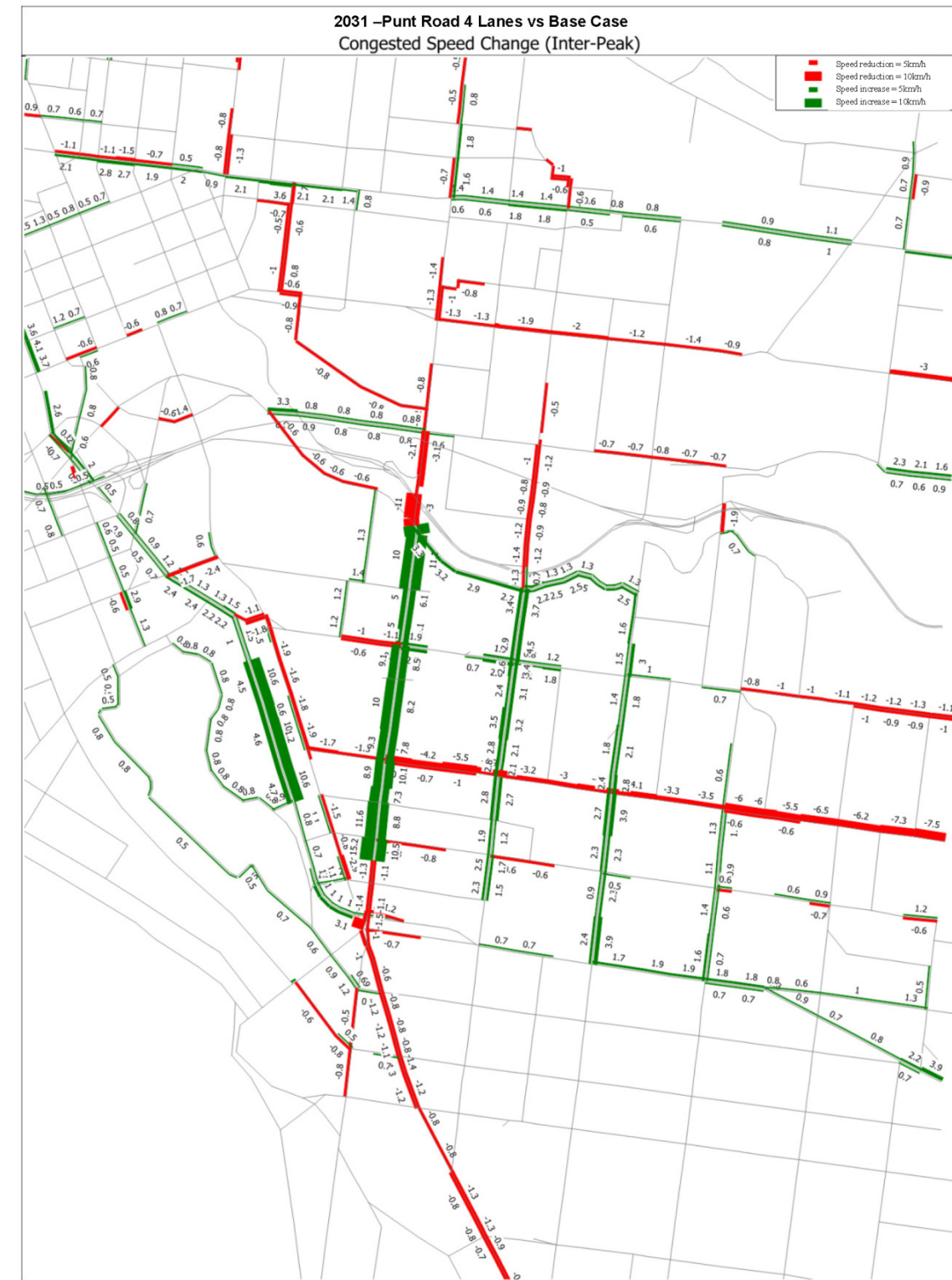


Figure 25: Change in 2031 congested travel speed - midday peak hour (6 lane vs Base Case)

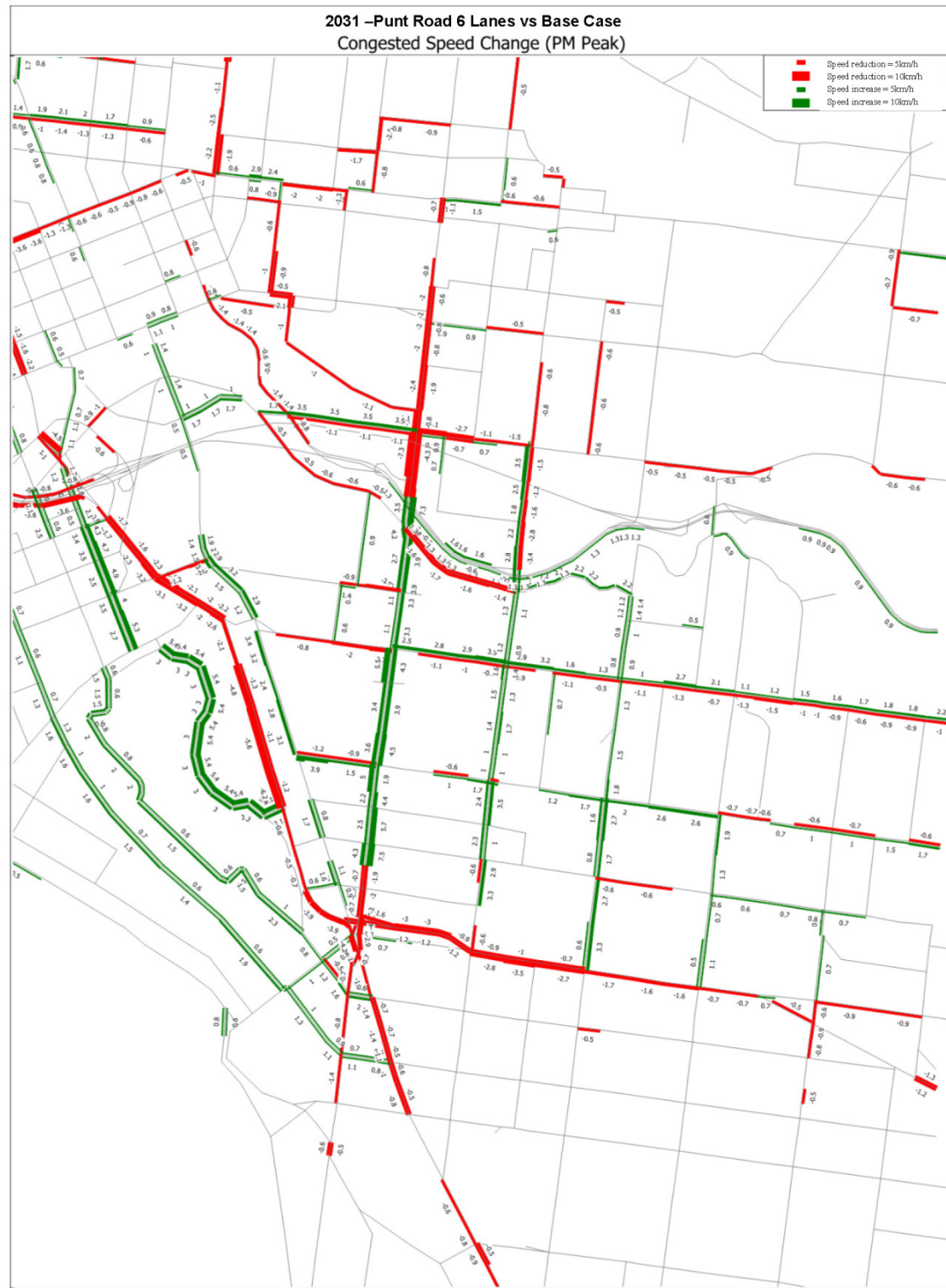


Figure 26: Change in 2031 congested travel speed - evening peak hour (6 lane vs Base Case)

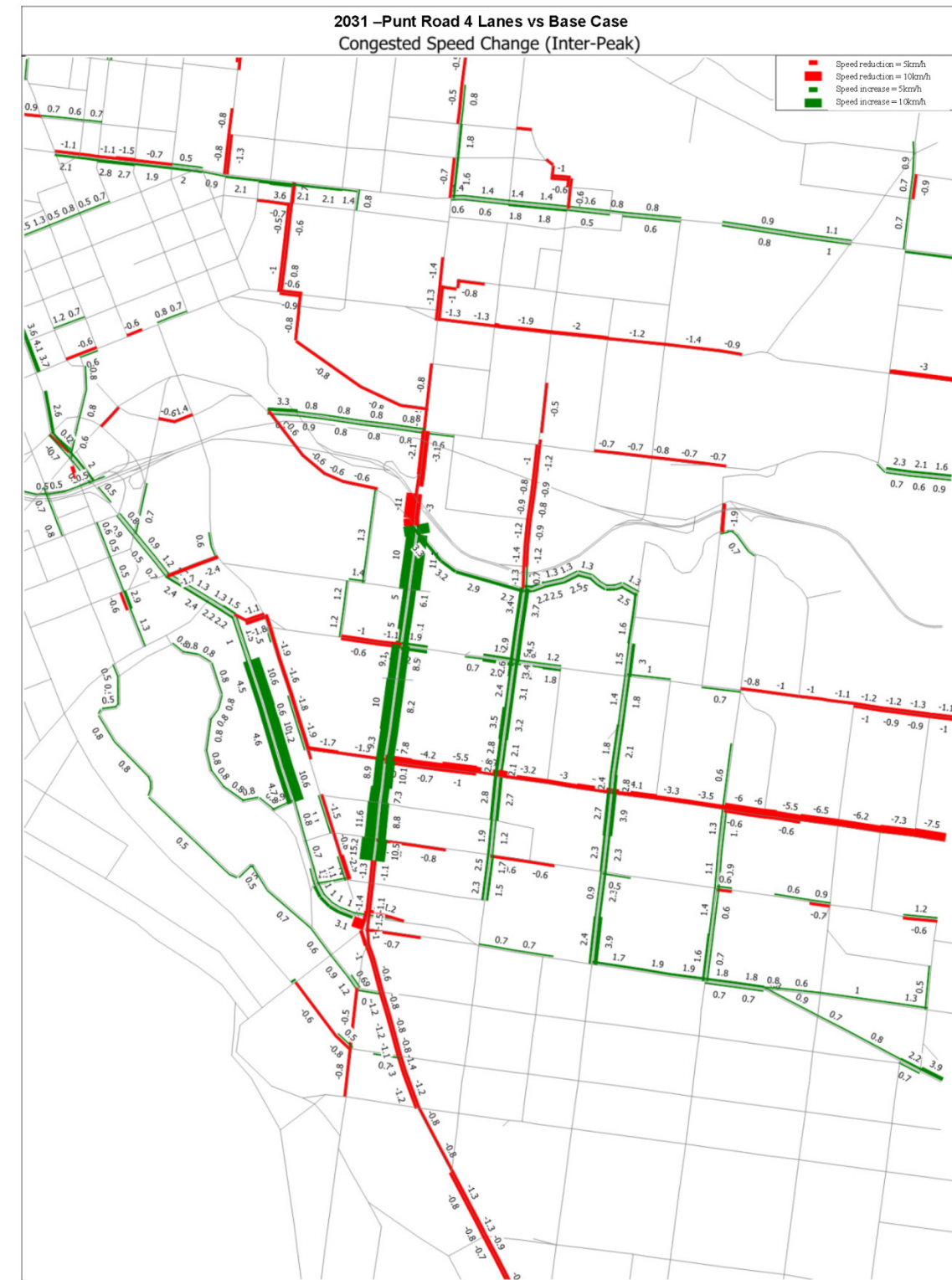


Figure 27: Change in 2031 congested travel speed - midday peak hour (4 lane vs Base Case)



## 7.2 Punt Road Corridor Performance

The concepts have been appraised in further detail to understand the likely changes in traffic performance specifically along the length of the Punt Road-Hoddle Street corridor having greater regard to traffic signal operations and queuing impacting on adjacent intersections.

Each of the concepts has been tested based on the traffic demand derived from the VITM that is associated with the number of through lanes at major intersections. This means that the concepts 1 to 3 have been tested assuming a 4 lane traffic demand and Concepts 5 to 7 have been tested based on six lane traffic demands. The testing of the performance of the corridor has been undertaken using the VMM with the forecast travel demands from the VITM refined to better represent the existing conditions prior to being input into the VMM.

The indicators that have been used to appraise and interpret the concepts include travel time and mean speed as well as the growth in demand on the corridor and are defined as follows:

- **Punt Road Traffic Growth from Existing:** this provides an indication of the growth in two way traffic demand along Punt Road when compared to the 2015 conditions for the identified peak one hour period. It has been measured using the VMM on Punt Road between Toorak Road and Commercial Road;
- **Travel Time (northbound and southbound):** this represents the average time that it takes for vehicles to travel between the intersection of Punt Road with St Kilda Road and the Yarra River during the identified peak hour. It has been measured using the VMM; and
- **Mean Speed:** this represents the average speed travelled by all vehicles within the transport model extent (i.e. along the Punt Road-Hoddle Street corridor between the Eastern Freeway and St Kilda Road and approximately 250m either side) during the identified peak hour. This provides an indication of the performance of the network including the east-west roads and has been measured using the VMM.

The congested nature of the transport network in 2031 is such that some of the forecast traffic demand is not able to travel through the network during the peak one hour period. In reality, this represents some motorists changing their time of travel or potentially their travel patterns as congestion on the network increases. Generally, the level of suppressed demand is in the order of 5% to 10% across the existing conditions, Base Case and project improvement cases and is mainly occurring due to limited capacity further north along Hoddle Street.

Table 4, Table 5 and Table 6 show a comparison of the concepts with the key considerations including:

- all concepts offer higher mean speeds across the network when compared to the Base Case which indicates that Punt Road and the east-west roads are also benefiting from the enhancements;
- the introduction of 24 hour clearways attracts additional traffic to the corridor providing relief to alternative routes whilst providing similar network speeds to the Base Case during the midday peak period. The additional capacity is also expected to improve reliability as the impact of right turning vehicles (i.e. to property or local roads) will be reduced;
- the four lane concepts provide significant travel time improvements along Punt Road (particularly northbound in the critical morning peak hour) with Concept 2 providing higher average speeds;
- the six lane concepts (Concepts 5, 6 and 7) accommodate a significantly higher travel demand providing relief to alternative routes (see Section 7.1) with a marginally reduced level of performance along Punt Road when compared to the four lane concepts; and
- Concept 5 (intersection widening only) provides for similar performance when compared to Concept 6 which provides for widening along the length of the corridor.

The nature of traffic demand is such that it will respond to the available capacity that is provided. This means that making changes to the network will encourage changes to travel patterns, time of day etc. A balance is required in relation to the capacity that is delivered relative to the strategy for the operation of the network. In this context, the six lane concepts provide flexibility to reallocate road space for public transport or other users (e.g. reduce the number of traffic lanes on the east-west roads to provide further dedicated tram lanes). This approach would likely result in some of the traffic demand being pushed back to the parallel routes identified in Table 3 but could provide improved outcomes for travel across Punt Road.

Table 4: 2031 corridor performance (morning peak hour)

Performance	Modelled 2015	Base Case 2031	Concept 1 24 Hour Clearways	Concept 2 4 Lane Right Turn Lane	Concept 3 4 Lane Narrow Median	Concept 4 5 Lane Reversible	Concept 5 4/6 Lane Widened Intersect.	Concept 6 6 Lane Dual	Concept 7 4/6 Lane Bus Lanes
Punt Road traffic growth from existing	-	15%	15%	15%	15%	-	70%	70%	70%
Travel time northbound (mins)	10.4	11.3	-	7.3	8.0	-	9.0	9.3	8.8
Travel time southbound (mins)	6.2	7.2	-	6.0	6.4	-	6.9	7.1	6.8
Mean speed (km/h)	21	20	-	30	24	-	23	24	23

Table 5: 2031 corridor performance (midday peak hour)

Performance	Modelled 2015	Base Case 2031	Concept 1 24 Hour Clearways	Concept 2 4 Lane Right Turn Lane	Concept 3 4 Lane Narrow Median	Concept 4 5 Lane Reversible	Concept 5 4/6 Lane Widened Intersect.	Concept 6 6 Lane Dual	Concept 7 4/6 Lane Bus Lanes
Punt Road traffic growth from existing	-	2%	70%	70%	70%	-	140%	140%	140%
Travel time northbound (mins)	7.2	8.6	7.9	7.9	8.0	-	8.3	8.4	7.8
Travel time southbound (mins)	6.4	6.5	6.8	6.2	6.5	-	6.6	6.4	6.2
Mean speed (km/h)	32	29	30	40	42	-	39	39	39

Table 6: 2031 corridor performance (evening peak hour)

Performance	Modelled 2015	Base Case 2031	Concept 1 24 Hour Clearways	Concept 2 4 Lane Right Turn Lane	Concept 3 4 Lane Narrow Median	Concept 4 5 Lane Reversible	Concept 5 4/6 Lane Widened Intersect.	Concept 6 6 Lane Dual	Concept 7 4/6 Lane Bus Lanes
Punt Road traffic growth from existing	-	10%	10%	10%	10%	-	65%	65%	65%
Travel time northbound (mins)	6.8	10.4	-	7.2	7.2	-	8.1	8.3	8.3
Travel time southbound (mins)	6.2	6.5	-	6.0	6.1	-	7.2	6.8	6.8
Mean speed (km/h)	23	20	-	28	24	-	23	25	22

### 7.3 Intersection Performance

The enhancement to the intersections will provide improved performance on Punt Road and on the crossing roads during the critical AM and PM peak hours. For the purpose of comparing concepts, an assessment has been undertaken of the key intersections along the corridor to determine the change in level of service. Level of service is measured from A (best) to F (worst) and categorises the delay that road users experience. This has been measured as the average delay for all traffic through an intersections which means that some particular turning movements will perform worse than that shown in these results. The categories for level of service are outlined in Table 7 with level of service D considered to represent the threshold for reasonable levels of performance.

Table 7: Level of service definitions

Level of Service	Delay (d)*
A	≤14.5 sec
B	14.5 sec < d ≤ 28.5 sec
C	28.5 sec < d ≤ 42.5 sec
D	42.5 sec < d ≤ 56.5 sec
E	56.5 sec < d ≤ 70.5 sec
F	70.5 sec < d

\*Control delay per vehicle in seconds (including geometric delay)

An overview of the operation of the individual intersections is provided in Table 8 and Table 9 for the AM and PM peak hour, respectively. These results are based on the assessment of isolated intersections (i.e. the analysis assumes that there is no constraint on the upstream or downstream capacity). The key results are noted as follows:

- without improvements to the network, existing intersections will become considerably more congested in 2031, particularly the Alexandra Avenue, Toorak Road and Commercial Road intersections;
- during the morning peak hour the intersection with High Street marginally improves between the existing conditions and the 2031 Base Case as traffic at the intersection redistributes and the performance of the intersection changes from LOS F to LOS E;
- there is some variation in the results for Concepts 5, 6 and 7 which is associated with the differing layouts at each of the intersections for example:
  - Concept 7: Single right turn on the north approach and an additional westbound through lane at Toorak Road, reduced cross section to provide four lanes at some intersections (e.g. Moubray Street), additional crossing distance for pedestrians (e.g. Domain Road).
  - Concept 5: Limited length of short lanes to minimise the impact to adjacent property (e.g. Toorak Road and High Street).
- other than Concept 1 which does not include changes to the existing operation during the peak hour, all concepts offer significant improvement in travel conditions for motorists with a level of service of D or better during both the morning and evening peak hours;
- Concepts 2 and 3 are able to cater for the forecast growth during the peak hours of between 10% and 15% when compared to the existing conditions and both offer similar levels of traffic performance with this additional demand; and

- Concepts 5, 6 and 7 are able to cater for the forecast growth during the peak hours of up to 70% when compared to the existing conditions whilst still offering significant improvements in traffic performance.

As outlined previously, the concepts will also offer improvements for trams, buses, pedestrians and cyclists that are crossing the corridor as the traffic signal cycle length has been reduced under each of the concepts which will reduce the delays for these users. Buses travelling along the corridor will also benefit from the improved corridor operation and more significantly so with the introduction of dedicated bus lanes under Concept 7.

Table 8: Punt Road-Hoddle Street intersection level of service at 2031 (morning peak hour)

Intersection	Existing 2015	Base Case 2031	Concept 1 24 Hour Clearways	Concept 2 4 Lane Right Turn Lane	Concept 3 4 Lane Narrow Median	Concept 4 5 Lane Reversible	Concept 5 4/6 Lane Widened Intersect.	Concept 6 6 Lane Dual	Concept 7 4/6 Lane Bus Lanes
Punt Road traffic growth from existing	-	15%	15%	15%	15%	-	70%	70%	70%
Alexandra Ave	D	F	F	B	B	-	B	B	B
Domain Rd	B	B	B	B	B	-	B	B	B
Toorak Rd	F	F	F	D	D	-	D	D	C
Commercial Rd	C	C	C	B	B	-	B	B	B
Moubray St/ Greville St	B	B	B	B	B	-	B	B	C
High Street	F	E*	E*	C	C	-	D	C	D

\*Note: Improved performance associated with a forecast redistribution of traffic.

Table 9: Punt Road-Hoddle Street intersection level of service at 2031 (evening peak hour)

Intersection	Existing 2015	Base Case 2031	Concept 1 24 Hour Clearways	Concept 2 4 Lane Right Turn Lane	Concept 3 4 Lane Narrow Median	Concept 4 5 Lane Reversible	Concept 5 4/6 Lane Widened Intersect.	Concept 6 6 Lane Dual	Concept 7 4/6 Lane Bus Lanes
Punt Road traffic growth from existing	-	10%	10%	10%	10%	-	65%	65%	65%
Alexandra Ave	E	F	F	B	B	-	C	B	C
Domain Rd	B	B	B	B	B	-	B	B	C
Toorak Rd	D	D	D	C	C	-	D	C	C
Commercial Rd	C	E	E	C	C	-	D	D	D
Moubray St/ Greville St	B	B	B	B	B	-	B	B	C
High Street	D	E	E	B	B	-	C	B	B

## 7.4 Multi-criteria Analysis

A multi criteria analysis has been undertaken to assess the concepts relative to the Base Case utilising the appraisal framework and ratings established as part of Section 5 and is shown in Table 10. This combines the transport network performance impacts outlined in Section 7.1 to 7.3 with broader economic, social and environmental impacts for each of the concepts that was described as part of the concept overview in Section 6.

Table 10: Multi-criteria Analysis

Description								
Large -ve								
Moderate -ve								
Slight -ve								
Neutral								
Slight +ve								
Moderate +ve								
Large +ve								
Strategic Category	Impact Type	Concept 1 24 Hour Clearways	Concept 2 4 Lane: Central Right Turn Lane	Concept 3 4 Lane: Narrow Central Median	Concept 4 5 Lane: Reversible Lanes	Concept 5 4 Lane/6 Lane: Widened Intersections	Concept 6 6 Lane: Dual Carriageway	Concept 7 4 Lane/6 Lane: Bus Lanes
Financial	Cost	Low	Moderate	Moderate-High	Moderate-High	Moderate-High	High	High
Economic	Journey times Effect on time involved in transport across all transport modes.	Speeds along Punt Road and its intersecting east-west roads: AM = No change IP = minimal improvement PM = No change Slight improvement in network wide travel speed during the midday peak periods. Tram lanes improve journeys.	Speeds along Punt Road and its intersecting east-west roads: AM = 10km/h improvement IP = 10km/h improvement PM = 9km/h improvement Slight improvement in network wide travel speed during the midday peak periods. Tram lanes improve journeys.	Speeds along Punt Road and its intersecting east-west roads: AM = 4km/h improvement IP = 12km/h improvement PM = 5km/h improvement Slight improvement in network wide travel speed during the midday peak periods. Tram lanes improve journeys.	Not assessed given operational feasibility issues.	Speeds along Punt Road and its intersecting east-west roads: AM = 4km/h improvement IP = 10km/h improvement PM = 4km/h improvement Moderate improvement in network wide travel speeds at all times of the day. Tram lanes improve journeys.	Speeds along Punt Road and its intersecting east-west roads: AM = 4km/h improvement IP = 10km/h improvement PM = 5km/h improvement Moderate improvement in network wide travel speeds at all times of the day. Tram lanes improve journeys.	Speeds along Punt Road and its intersecting east-west roads: AM = 4km/h improvement IP = 9km/h improvement PM = 3km/h improvement Moderate improvement in network wide travel speeds at all times of the day. Tram and bus lanes improve journeys.
	Reliability Effect on movement and service reliability.	Moderate reduction in congestion improves travel time reliability during the midday peak. Tram lanes increase reliability	Moderate reduction in congestion improves travel time reliability during the midday peak. Tram lanes increase reliability	Moderate reduction in congestion improves travel time reliability during the midday peak. Tram lanes increase reliability	Not assessed given operational feasibility issues.	Moderate reduction in congestion improves travel time reliability during the midday peak. Tram lanes increase reliability	Moderate reduction in congestion improves travel time reliability during the midday peak. Tram lanes increase reliability.	Moderate reduction in congestion improves travel time reliability during the midday peak. Tram and bus lanes increase reliability.
	Vehicle operating costs Effect on vehicle/bus/train/etc. operating costs: fuel, tyre wear, lubricants, repairs and maintenance.	Moderate improvement in Punt Road travel speeds at all times of the day. Slight improvement in network wide travel speed during the midday peak periods.	Moderate improvement in Punt Road travel speeds at all times of the day. Slight improvement in network wide travel speed during the midday peak periods.	Moderate improvement in Punt Road travel speeds at all times of the day. Slight improvement in network wide travel speed during the midday peak periods.	Not assessed given operational feasibility issues.	Moderate improvement in Punt Road travel speeds at all times of the day. Moderate improvement in network wide travel speeds at all times of the day. Slight increase in the length of trips as motorists change their route to take advantage of the improved travel times.	Moderate improvement in Punt Road travel speeds at all times of the day. Moderate improvement in network wide travel speeds at all times of the day. Slight increase in the length of trips as motorists change their route to take advantage of the improved travel times.	Moderate improvement in Punt Road travel speeds at all times of the day. Moderate improvement in network wide travel speeds at all times of the day. Slight increase in the length of trips as motorists change their route to take advantage of the improved travel times.
Social	Road safety Effect on the number of conflict points and safety risk.	Removal of parking reduces merge movements and visual obstruction for other users.	As per Concept 1 as well as slight safety benefits with separated lanes for right turning vehicles.	As per Concept 1 as well as moderate safety benefits with central median.	As per Concept 1 though a potential increase in rear end collisions with slowing turning vehicles in the right lane.	As per Concept 1 as well as slight safety benefits with separated lanes for right turning vehicles.	As per Concept 1 as well as moderate safety benefits with central median.	As per Concept 1 as well as moderate safety benefits with central median.
	Public transport access Effect on way-finding to stops, walk distance to key locations and DDA compliance.	No change to existing conditions.	New accessible tram stops. No significant changes to existing bus stops.	New accessible tram stops. No significant changes to existing bus stops.	New accessible tram stops. No significant changes to existing bus stops.	New accessible tram stops. No significant changes to existing bus stops.	New accessible tram stops. No significant changes to existing bus stops.	New accessible tram stops. No significant changes to existing bus stops.

Strategic Category	Impact Type	Concept 1 24 Hour Clearways	Concept 2 4 Lane: Central Right Turn Lane	Concept 3 4 Lane: Narrow Central Median	Concept 4 5 Lane: Reversible Lanes	Concept 5 4 Lane/6 Lane: Widened Intersections	Concept 6 6 Lane: Dual Carriageway	Concept 7 4 Lane/6 Lane: Bus Lanes
	<b>Pedestrian access and amenity</b> Effect on pedestrian connectivity, increase equity and the quality of environment for pedestrians to encourage pedestrian activity along and across the corridor.	No change to existing conditions.	Moderate reduction in wait times due to lower cycle time (i.e. from 130 to 100 sec). Minimal increase in informal crossing opportunities with localised traffic islands No change to crossing distances or amenity.	Moderate reduction in wait times due to lower cycle time (i.e. from 130 to 100 sec). Moderate increase in informal crossing opportunities with midblock median. No change to crossing distance or amenity.	Moderate reduction in wait times due to lower cycle time (i.e. from 130 to 100 sec). No change to crossing distances, opportunities or amenity.	Slight reduction in wait times due to lower cycle time (i.e. from 130 to 110 sec). Slight increase in informal crossing opportunities with localised traffic islands Moderate increase to crossing distances. Moderate increase in landscaping opportunities.	Slight reduction in wait times due to lower cycle time (i.e. reduced from 130 to 110 sec). Moderate increase in informal crossing opportunities with midblock median. Moderate increase to crossing distances. Slight increase in landscaping opportunities.	Slight reduction in wait times due to lower cycle time (i.e. reduced from 130 to 110 sec). Slight increase in informal crossing opportunities with localised traffic islands Major increase to crossing distances. Slight increase in landscaping opportunities.
	<b>Cycling access</b> Effect on the connectivity and level of segregation of cyclists from other modes.	No change to existing conditions	Slight improvements to cycling access with the introduction of localised treatments on east-west roads and head start storage boxes.	Slight improvements to cycling access with the introduction of localised treatments on east-west roads and head start storage boxes	Slight improvements to cycling access with the introduction of localised treatments on east-west roads and head start storage boxes	Slight improvements to cycling access with the introduction of localised treatments on east-west roads and head start storage boxes	New dedicated cycling facilities along Punt Road. Slight improvements to east-west roads and head start storage boxes.	Opportunity for cyclists to utilise the dedicated bus lanes. Slight improvements to east-west roads and head start storage boxes
	<b>Dislocation and land acquisition</b> Effect on existing properties and the effect on people and their connection with their local community.	No impact to existing property or residents.	Localised acquisition of a small section of Fawcner Park and near the banks of the Yarra River.	Localised acquisition of a small section of Fawcner Park as well as adjacent to the Yarra River and CityLink.	Impact to approximately 35 properties subject to the PAO north of Toorak Rd. Localised acquisition of a small section of Fawcner Park.	Impact to approximately 65 properties subject to the PAO. Localised acquisition of a small section of Fawcner Park and near the banks of the Yarra River	Impact to approximately 130 properties subject to the PAO. Localised acquisition of a small section of Fawcner Park.	Impact to approximately 130 properties subject to the PAO. Localised acquisition of a small section of Fawcner Park as well as adjacent to the Yarra River and CityLink.
Environmental	<b>Climate change</b> Effect on greenhouse gas emissions and the impact on society.	Moderate improvement in Punt Road travel speeds at all times of the day. Slight improvement in network wide travel speed during the midday peak periods. Increase in tram priority encouraging mode shift. Potential improvements to travel speed.	Moderate improvement in Punt Road travel speeds at all times of the day. Slight improvement in network wide travel speed during the midday peak periods. Increase in tram priority encouraging mode shift. Some potential for increased car use with improved travel conditions.	Moderate improvement in Punt Road travel speeds at all times of the day. Slight improvement in network wide travel speed during the midday peak periods. Increase in tram priority encouraging mode shift.	Not assessed given operational issues. Some potential for increased car use with improved travel conditions.	Moderate improvement in Punt Road travel speeds at all times of the day. Moderate improvement in network wide travel speeds at all times of the day. Slight increase in the length of trips as motorists change their route to take advantage of the improved travel times. Increase in tram priority encouraging mode shift. Some potential for increased car use with improved travel conditions.	Moderate improvement in Punt Road travel speeds at all times of the day. Moderate improvement in network wide travel speeds at all times of the day. Slight increase in the length of trips as motorists change their route to take advantage of the improved travel times. Increase in tram priority encouraging mode shift. Some potential for increased car use with improved travel conditions.	Moderate improvement in Punt Road travel speeds at all times of the day. Moderate improvement in network wide travel speeds at all times of the day. Slight increase in the length of trips as motorists change their route to take advantage of the improved travel times. Increase in tram and bus priority encouraging mode shift. Some potential for increased car use with improved travel conditions.
	<b>Visual amenity</b> Effect on visual amenity, precinct gateways and local neighbourhoods and the effect on landscaping/boulevard treatments of the corridor.	Negligible change to existing conditions.	Negligible change to the existing conditions.	Potential visual impact with the introduction of a new bridge across the Yarra River.	Potential visual impact associated with widening of Hoddle Bridge.	Potential visual impact associated with widening of Hoddle Bridge and widening subsections of Punt Road.	Potential visual impact associated with widening of Hoddle Bridge and widening Punt Road to the east.	Potential visual impact associated with widening of Hoddle Bridge, new bridge across the Yarra and widening Punt Road to the east.
	<b>Noise</b> Effect on traffic noise impacts in the vicinity of the corridor.	Negligible change to existing acoustic amenity.	Negligible change to existing acoustic amenity.	Negligible change to existing acoustic amenity.	Increase in noise levels as a result of property acquisition north of Toorak Road to be mitigated to provide reasonable acoustic amenity.	Increase in noise levels as a result of property acquisition of subsections of Punt Road to be mitigated to provide reasonable acoustic amenity.	Increase in noise levels as a result of property acquisition on the east side of Punt Road to be mitigated to provide reasonable acoustic amenity.	Increase in noise levels as a result of property acquisition on the east side of Punt Road to be mitigated to provide reasonable acoustic amenity.
	<b>Biodiversity</b> Effect on key flora and fauna values and the opportunities for improved resilience.	No change to existing conditions	No significant impact to biodiversity values.	No significant impact to biodiversity values.	No significant impact to biodiversity values.	No significant impact to biodiversity values.	No significant impact to biodiversity values.	No significant impact to biodiversity values.
	<b>Cultural heritage</b> Effect on aboriginal and post-settlement heritage as well as key heritage interfaces.	No change to existing conditions.	Negligible change to the existing conditions.	Negligible change to the existing conditions.	Properties on the east side of Punt Road north of Toorak Road (within Heritage Overlay) to be acquired and widening of Hoddle Bridge.	Properties on the east side of Punt Road (within Heritage Overlay) to be acquired and widening of Hoddle Bridge.	Properties on the east side of Punt Road (within Heritage Overlay) to be acquired and widening of Hoddle Bridge.	Properties on the east side of Punt Road (within Heritage Overlay) to be acquired and widening of Hoddle Bridge.

## 7.5 Assessment Summary

Based on the appraisal that has been undertaken of the Punt Road concepts, the key findings are provided as follows:

- Concept 1 - 24 Hour Clearways: this concept provides moderate benefits for existing Punt Road users outside of the commuter peak hours (including event periods) and has minimal social or environmental impacts. However, this concept does not address the congestion issues during the AM and PM peak periods or offer significant benefits for other modes of transport. This is a viable improvement concept in the short-term only;
- Concept 2 - 4 Lane: Central Right Turn Lane: this concept provides benefits for Punt Road traffic at all times of the day. It addresses the short to medium term congestion issues along the corridor and provides benefits for users crossing the corridor including pedestrians, cyclists and tram and bus passengers. While there are some social and economic impacts, these impacts are generally slight or localised given that the concept is mostly contained within the existing road reserve. This is a viable short-medium term improvement concept, however, it does not provide flexibility to address long term demands for travel across the network;
- Concept 3 - 4 Lane: Narrow Central Median: this concept provides similar benefits and impacts to Concept 2. The primary difference is that there would be additional cost associated with the new bridge across the Yarra and further assessment is required in relation to the changes to local road and property access;
- Concept 4 - 5 Lane: Reversible Lane: as outlined in Section 6.4, this concept would not offer significant benefits for road users and would require restriction to strategic movements on the corridor. It would also require the acquisition of a number of properties resulting in the associated social and heritage impacts. On this basis, this concept is not considered viable for the Punt Road corridor in the short, medium or long term;
- Concept 5 - 4 Lane/6 Lane: Widened Intersections: this concept would address the short, medium and long term travel demands for the corridor as well as providing benefits for the surrounding road network. It also provides benefits for users crossing the corridor including pedestrians, cyclists and tram and bus passengers. There would be significant impacts, particularly to existing properties and heritage though this is approximately half of the properties currently subject to the PAO. In summary, this concept is considered a viable concept for the Punt Road corridor in the medium to long term;
- Concept 6 - 6 Lane: Dual Carriageway: this concept provides similar benefits to Concept 5 but with impact to all properties subject to the acquisition overlay including those with a heritage overlay. While there is limited additional benefit in its current form when compared to Concept 5, the full utilisation of the PAO would provide for flexibility over a longer planning horizon (e.g. 30 plus years) for further enhancements to the corridor (e.g. high capacity public transport linkages). In its current form, this concept is considered to be of marginal viability for the Punt Road corridor and only in the long term; and
- Concept 7 - 6 Lane: Bus Lanes: this concept provides similar benefits to Concept 5 and also provides significant benefits and opportunity to encourage mode shift to public transport in the long term. It would address the short, medium and long term travel demands for the corridor as well as providing benefits for the surrounding road network. It also offers a similar level of flexibility to Concept 6 for further enhancements to the corridor over a longer planning horizon. Similar to Concept 6 there would be significant impacts, primarily due to the extent of land acquisition that would be required including numerous impacts within the heritage overlay. This concept is considered a viable concept for the Punt Road corridor in the medium to long term.

## 8 Way Forward

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This report has established the existing conditions, policy context and network strategy for Punt Road. It has also outlined the concepts that have been tested using transport analysis as well as a multi-criteria analysis.

The outcomes of this appraisal indicate that there are concepts that improve the operation of Punt Road that can almost entirely be contained within the existing road reserve. These concepts would provide significant benefits for traffic and would facilitate the introduction of additional facilities and improved outcomes for pedestrians, cyclists, trams and buses. These treatments would provide for significant improvements to the operation of Punt Road in the short to medium term though only limited benefits to the surrounding road network.

The concepts that utilise the land within the PAO to provide six lanes provide added traffic benefits, opportunities for significant north-south public transport improvements and provide some congestion relief on the surrounding road network. This in turn could allow for improvements to key parallel public transport and cycling routes such as St Kilda Road and Chapel Street or may allow flexibility in managing east-west travel demands with the allocation of additional priority to east-west routes. These concepts, however, also result in significant impacts which is primarily driven by the extent of land acquisition that is required. Given that there are improvements concepts with lower impacts that can meet the short-medium term need, the concepts that provide for six lanes are considered to be viable medium to long term treatments for the Punt Road corridor.

This report is provided as an input into VicRoads response to Stage 2 of the requirements of the Terms of Reference of the Punt Road PAO review. Subject to the findings of the review, it is recommended that further detailed investigations be undertaken of the identified concepts prior to developing a specific proposal for Punt Road. These investigations should include additional stakeholder and community consultation, further detailed traffic and civil engineering design, detailed environmental and heritage assessments to confirm any identified impacts and the development of a complementary urban design strategy for the corridor.