

West Melbourne Structure Plan - Transport & Access

Final Baseline Report



Photos by PBA (clockwise from top right): Bike parking in Spencer St, Curzon St park, Dryburgh St, Spencer St at Rosslyn St

City of Melbourne

11 October 2016

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Executive Summary

This report has been prepared to inform the development of the West Melbourne precinct Structure Plan.

The report identifies the strategic and spatial context of the precinct:

- The transport and built form in the West Melbourne precinct today does not reflect the State and the City of Melbourne strategies that emphasise a compact city with higher densities that makes better use of transport infrastructure to relieve the pressure of increasing congestion. Unlike other precincts that abut the CBD, the precinct has often been omitted from initiatives, plans or overlays that have been directed to this strategic end.
- The precinct has an unusually large area of public realm most of which is allocated to road reserve. This road reserve has been set aside for motor vehicle flow and storage to support light industry and warehousing. Compared to East Melbourne, for example, a relatively small area is defined for footpaths, nature strips, planted kerb extensions and medians.
- This allocation of space provides an opportunity for the precinct to switch to more space efficient travel modes and release space for other purposes such as open space.
- By switching from motor vehicle priority along Spencer Street and establishing a public transport, walking and bicycle riding spine, a dual benefit can be achieved. More trips can be supported and development can be focused around Spencer Street creating a high intensity mixed use street to serve the precinct and taking the pressure off development in other areas of the precinct including those with heritage value.

The report provides a description of the existing transport system in West Melbourne through six lenses: walking, bicycle riding, public transport, other transport services (such as car share), private motor vehicles and heavy vehicles. The modes are evaluated against capacity, priority, accessibility and amenity using criteria from relevant City of Melbourne strategies.

A general statement of the existing condition for each mode is provided along with recommendations for further data collection.

The key findings are:

- Pedestrians are not ‘top priority’ as envisaged by State and Council strategies. The precinct has a high level of pedestrian capacity and medium to high accessibility. These advantages are compromised by high vehicle speeds and low priority for pedestrians, which reduce accessibility and amenity.
- Bicycle riding has been supported on some roads but usage is low. The mode has high potential as many high value destinations are within a few minutes ride.
- Public transport is strong around the perimeter of the precinct. Public transport travelling through the precinct has low priority. The absence of ‘visible’ public transport sends a signal to those considering living, investing or working in West Melbourne that a car will be necessary to support mobility. The absence of visible public transport has a significant impact on development decisions. Visible public transport would be a focus for development.
- Other transport services such as car share, taxis, the NBN and deliveries have not been made a priority. The opportunity is to have these services in place before people move in to help shape their habits.
- People in motor vehicles currently enjoy the highest priority, accessibility and amenity in the precinct. Both the main north south arterials – Spencer and King Streets – support high levels of through movements by motor vehicles. It also acts to suppress the use of other modes. High priority for motor vehicles requires large areas of road and kerb be allocated to the mode. The mode, which is at capacity, is unable to increase its capacity to meet future growth as all available space has already been turned over to it.

- The precinct has many heavy vehicle routes. These long-established routes are likely to be duplicated and may be redundant.

Recommendations

- Apply top priority to pedestrian movements initially around major destinations such as the North Melbourne Railway Station, Festival Hall, Errol Street shops, Flagstaff Gardens, Haileybury School and the Queen Victoria Market.
- Develop bicycle facilities separated from traffic initially along Spencer and Hawke Streets.
- Immediately develop a visible, separated, high priority, public transport spine in the central median of Spencer Street to Dryburgh Street. Existing bus services would use the corridors running contra flow and connecting to central platforms. Bus services that currently terminate in Lonsdale Street can be extended along the spine. The spine would be designed to allow extensions of the tramlines north up Spencer from Latrobe Street.
- Emphasise developer requirements and negotiations as well as retrofitting triggered by development approvals to ensure a high level of Other transport services in the precinct such as car share and delivery services.
- Switch the priority on Spencer Street from motor vehicles to public transport, walking and bicycle riding. Remove car storage from the kerb wherever possible in the precinct to release other opportunities related to mobility and amenity.
- Remove heavy vehicle routes from the precinct wherever suitable alternatives allow.

The report considers major transport infrastructure in the area around the precinct that is committed, planned or being considered. It finds that in the long term the development around the Arden Metro station will be very positive for the precinct. It finds in general that the impacts of the Western Distributor will be strongly negative. However, the proponents of this project suggest that motor vehicle traffic on Spencer Street will be reduced. Such a reduction would facilitate the public transport spine recommendation described above.

The report concludes with an exploration of the challenge of integrating the precinct into the surrounding areas. Connections to the north, east and south, which are structurally sound, can be enhanced by changes to priority and road management settings. It is recommended that Hawke Street be developed as a link to the North Melbourne precinct. Hawke Street could also act as the link to the west as noted below.

The connections to the west are problematic as there is a regional problem of severance caused by the rail lines and likely to be exacerbated by the Western Distributor. The report reviews a number of options and recommends from north to south:

- A 'clip on' or independent pedestrian and bicycle bridge on the south side of Dynon Road bridge
- The re-opening and extension of the North Melbourne station pedestrian bridge to E-Gate and the Moonee Ponds Creek
- A walking and riding bridge that rises from Hawke Street over the rail and road viaducts and touches down in E-Gate at Footscray Road opposite Waterfront Way or Little Docklands Drive.
- The reallocation of the northernmost travel lane of the Dudley Street railway underpass to allow the creation of a pedestrian and bicycle subway next to Festival Hall and E-Gate. That motor vehicle traffic be accommodated by managing the lanes under the central span as reversible, mirroring the flow of vehicles as it changes during the day.

Contents

EXECUTIVE SUMMARY	I
1. INTRODUCTION	1
2. STRATEGIC CONTEXT	3
3. SPATIAL CONTEXT	8
4. EXISTING TRANSPORT MODES & CAPACITY	13
4.1. Pedestrians	14
4.2. Bicycle riders	37
4.3. Public transport	48
4.4. Other Transport services	64
4.5. Motor vehicles	72
4.6. Heavy vehicles	89
5. IMPACTS OF MAJOR TRANSPORT PROJECTS	92
6. INTEGRATION CHALLENGE	94
7. SUMMARY OF MODE ASSESSMENTS	109
APPENDIX A – TRANSPORT INTEGRATION ACT OBJECTIVES & PRINCIPLES	110
APPENDIX B – COLLISION TYPES 2010 - 2015	112

List of Figures

Figure 1 – Growth areas in the City of Melbourne	6
Figure 2 – Map showing West Melbourne in relation to Parking Overlays 1 and 12	7
Figure 3 – Hawke Street north of Adderley Street	10
Figure 4 – Abbotsford Street south of Spencer Street	11
Figure 5 – Street typologies to support pedestrians	15
Figure 6 – Pedestrian Network Volumes	17
Figure 7 – Dynon Road west of Dryburgh Street	17
Figure 8 – Pedestrian priority routes identified in the precinct	18
Figure 9 – Abbotsford Street – more crossovers than kerb	19
Figure 10 – Kerb extension at Albert & Gisborne Streets	20
Figure 11 – William & Walsh Streets North Melbourne	21
Figure 12 – Crossing Dryburgh on Ireland looking east	22
Figure 13 – Roundabouts in West Melbourne and Carlton	23
Figure 14 – Walking Accessibility West Melbourne precinct	24
Figure 15 – Through block link from Miller Street (top) to Hawke Street	25
Figure 16 – Comparing through block links	25
Figure 17 – The 'Peel/Capel Street' through block link	26
Figure 18 – The consequences of a lack of through block links	27
Figure 19 – King and Dudley Streets act as barriers	28
Figure 20 – Midblock Access to Flagstaff Gardens	29
Figure 21 – Links from West Melbourne to for EGate and Docklands	29
Figure 23 – Reconfiguration of Anderson Street at Railway Place	31
Figure 24 – Amenity at the southern end of Railway Place	32
Figure 25 – Narrow and obstructed Footpaths in Railway Place	32
Figure 26 – Pedestrian underpass on the South Side of Dudley Street	33
Figure 27 – Pedestrian underpass on the North side of Dudley Street	34
Figure 28 – Collisions with pedestrians By Year	35
Figure 29 – Location of two main pedestrian Collision types 2010 - 2015	35
Figure 30 – Super Tuesday Counts March 2015 AM Peak	38
Figure 31 – Intersection of Miller and Hawke Streets showing pedestrian links	40
Figure 32 – Access to Errol Street shops by bicycle	40
Figure 33 – Bicycle network in West Melbourne	41
Figure 34 – Comparing rider movements to the designated network	42
Figure 35 – Riding bicycles for transport	43
Figure 36 – Collisions with Bicycle riders By Year	45
Figure 37 – Casualty accidents – Bicycle 2011 – 2016 by Location	46
Figure 38 – High mobility streets in West Melbourne	48
Figure 39 – Centre road shared Platform Queensbridge Street	50
Figure 40 – Proposed E-Gate Tram services	51
Figure 41 – Proposed E-Gate Bus services	52
Figure 42 – Lonsdale-Spencer-Abbotsford street cable tram route	55
Figure 43 – Bus (& Tram) services in the precinct	56
Figure 44 – Available capacity Routes 216, 219 & 220 WITHin the City of Melbourne	57

Figure 45 – Level of service – public transport	59
Figure 46 – North Melbourne Station	60
Figure 47 – Strasbourg Tram Stop Canopy	61
Figure 48 – Bus shelters Spencer Street	62
Figure 49 – Taxi ranks in the West Melbourne precinct	65
Figure 50 – A Premium Taxi Rank	66
Figure 51 – Car next Door West Melbourne	67
Figure 52 – Flexicar (Left) and GoGet (Right) car share locations	68
Figure 53 – Bike share locations in West Melbourne	69
Figure 54 – NBN roll out map	70
Figure 55 – SmartRoads network	73
Figure 56 – Key Access points to the West Melbourne precinct	74
Figure 57 – Intersection of King and Dudley Streets	76
Figure 58 – Dudley Street looking west	77
Figure 59 – Spencer Street between Abbotsford Street (Left) and Hawke Street (right)	77
Figure 60 – Adderley Street between Hawke and Roden Streets	78
Figure 61 – Roden (Left) and Stanley Streets West Melbourne	80
Figure 62 – Batman Street West Melbourne	80
Figure 63 – Miller Street West Melbourne	81
Figure 64 – Residential motor vehicle fleet & off-street car spaces	82
Figure 65 – Parking Overlays in West Melbourne	82
Figure 66 – The growth in the residential supply of off-street car spaces by area	84
Figure 67 – Areas within the planning scheme of the City of Melbourne	84
Figure 69 – Growth of car space inventory in City of Melbourne	85
Figure 71 – Collisions in the precinct by Year	87
Figure 72 – Collisions (Motor Vehicle Only) in the precinct by Year	87
Figure 73 – Location of Right Through motor vehicle Collisions in the precinct	88
Figure 74 – B-Double routes in the West Melbourne precinct	90
Figure 75 – Integration challenges: West Melbourne & neighbouring precincts	94
Figure 76 – The Hawke, Victoria, Curzon, Errol & King intersections	96
Figure 77 – The Hawke, Victoria, Curzon, Errol & King intersections (2)	97
Figure 78 – Looking north from Docklands across E-Gate to West Melbourne	98
Figure 79 – Bay Bridge 'clip on' concept San Francisco USA	99
Figure 80 – Retrofitted cycle pedestrian path, Utrecht Netherlands	100
Figure 81 – Existing Pedestrian Rail Bridge	101
Figure 82 – Tubular Lattice Bridge La Roche-sur-Yon, France	102
Figure 83 – The Regional rail viaduct crosses the suburban network	103
Figure 84 – Kurilpa Bridge Brisbane looking towards the CBD	104
Figure 85 – Kurilpa Bridge overlayed (to scale) on railyards	104
Figure 86 – Flooding in Dudley Street	105
Figure 87 – Westbound Lanes in Dudley Street	106
Figure 88 – Concert goers queueing for tickets at Festival Hall	106
Figure 89 – Eastbound Lanes in Dudley Street	107
Figure 90 – 2.2m clearance on Beaconsfield Avenue, Beaconsfield	107
Figure 91 – Reversible flow on Queensway, Melbourne	108
Figure 92 – The Ubahn at Marienplatz Munich	108

List of Tables

Table 1: West Melbourne allocation of area	8
Table 2: Comparison of West Melbourne with other precincts	9
Table 3: West Melbourne proportion of building line to building line space	9
Table 4: Proportion of 'median' space	10
Table 5: Comparison of GIS Data to measured medians	10
Table 6: Area of Tree Canopy	12
Table 7: Consideration of each mode	13
Table 8: Pedestrian capacity of footpaths	16
Table 9: Summary of Pedestrian Network Findings	36
Table 10: Bicycle rider flow rates	38
Table 11: Interventions to increase the priority of bicycle transport	39
Table 12: Interventions to increase the amenity of bicycle transport	44
Table 13: Summary of Bicycle network findings	47
Table 14: Interventions to increase the amenity of Tram & Bus transport	49
Table 15: Other Interventions to increase the amenity of Tram & Bus transport	50
Table 16: Train loads above benchmark (2014)	53
Table 17: Train loads above benchmark (2015)	53
Table 18: Average Maximum Capacity – AM Peak Loads Route 55	54
Table 19: Average Maximum Capacity – PM Peak Loads Route 55	54
Table 20: Average Maximum Capacity – AM Peak Loads Route 57	54
Table 21: Average Maximum Capacity – PM Peak Loads Route 57	55
Table 22: Bus capacity West Melbourne West Melbourne precinct weekdays	57
Table 23: High Mobility Streets	58
Table 25: Summary of Transport Services Findings	71
Table 26: Motor vehicle capacity of main entries to the precinct	74
Table 27: Peak Flows as a Percentage of AADT	75
Table 28: Allocation of kerbside space in Adderley Street	78
Table 29: Allocation of kerbside space to kerbside parking	79
Table 30: Allocation of 7m Central medians	81
Table 31: Provision of car spaces in dwellings in West Melbourne 2002 - 2015	83
Table 32: Summary of Motor Vehicle Network Findings	89
Table 33: Summary of Heavy Vehicle Network Findings	91
Table 34: Impacts of major transport projects	92
Table 35: Average Motor vehicles and capacity Dudley Street	105
Table 36: Summary of baseline Transport and Access conditions in West Melbourne	109
Table 37: Applying Transport Objectives to West Melbourne	110
Table 38: Alignment of Transport Principles in West Melbourne	111
Table 39: Types of Pedestrian Collisions in West Melbourne 2010 - 2015	112
Table 40: Types of Bicycle Collisions in West Melbourne 2010 - 2015	112
Table 41: Types of Motor Vehicle Collisions in West Melbourne 2010 - 2015	113

1. Introduction

The West Melbourne precinct is adjacent to the CBD and suburban North Melbourne but, during the last one hundred and fifty years, its transport character has reflected the needs of industry and transport uses clustering around the abutting national rail freight depots and lines. As recently as 2010, there were more employees (11,360) in 'West Melbourne' (an area slightly larger than the study area) than residents (3,900). (The area referred to as 'West Melbourne' varies within State and City of Melbourne documents. In some it refers to an area that includes E-Gate to the west for example.)

The small population of West Melbourne has attracted few providers of day-to-day needs or regional services. To meet these needs people in the precinct rely on connectivity to surrounding areas (including neighbouring municipalities).

The residents of the area enjoy housing of a similar heritage character to other areas of the municipality such as East Melbourne and Carlton. Unlike the leafy streets and grassy medians of these other suburbs, the West Melbourne houses sit in a context of wide roads, crossovers for large trucks and asphalted central medians.

The use of the non-residential land in the precinct has begun to change. Some of the industrial and commercial land uses are now obsolete and buildings are lying vacant or being developed. In 2010 there was more vacant space (150,706 m²) than occupied office space (147,487 m²).

The population has grown from 3,923 in 2011 to the current total of 5,240. The City of Melbourne expects the population to triple to 16,696 by 2036. Across the municipality, the motorisation rate is currently 31 vehicles to each 100 people. This suggests that there are 1,600 vehicles based in the suburb today and that the number could rise to over 5,000 by 2036. That number of cars would occupy around 15 ha of land and building floor-space.

These land use changes parallel similar changes nearby in areas such as E-Gate, Arden-Macaulay, Docklands and the CBD.

There are also significant transport changes planned in the area:

- Two new stations on the committed Melbourne Metro project (Arden and Parkville) are within walking distance of West Melbourne
- An extension of tram services into West Melbourne (from the north, south and west) is being considered
- Franklin Street will be extended through the current Queen Victoria Market precinct into the precinct
- The western distributor may include freeway connections to the precinct that influence traffic flows in West Melbourne.

Inside the precinct, motor vehicle traffic – especially through traffic – is dominant. The declared arterial roads (controlled by VicRoads) Dynon Road, Dryburgh, Dudley, King, Spencer, Peel and Victoria Streets generate a high volume of through traffic that affects the transport options and amenity of West Melbourne.

The wide local roads and intersections have been laid out to facilitate motor vehicle access to the historically dominant industrial land use. These priority settings have negative impacts on the overall network operation, causing rat-running, delay on arterial roads and increased risk for all road users. This has been recognised and addressed with road closures in some locations such as:

- Railway Place (outside North Melbourne Station)
- Curzon Street (at Hawke Street)
- Stanley Street (at King Street)

- Victoria Street (at King Street).

Alternatives to motor vehicle traffic exist but have low priority. There are few pedestrian priority measures and amenity can be low. Some road space has been converted to vegetated open space. Most streets in West Melbourne have some trees in them, but very few meet the 40% minimum canopy cover set in the Urban Forest Strategy to reduce the urban heat island effect and support walking trips.

There are significant rail and tram networks but these are located on the boundary of West Melbourne:

- Flagstaff Station on the southern boundary
- North Melbourne Station on the north western boundary
- Tram Route 55 operates along the eastern boundary
- Tram Route 57 operates along the northern boundary

The only regular public transport services that penetrate through the area are Bus Routes 216, 219 & 220 (although Route 401 has one stop at North Melbourne station and Route 403 travels along Dynon Road and Dryburgh Street without stopping).

Structure Plan

In this context of change, the City of Melbourne is developing a structure plan to shape an appropriate future for West Melbourne. This report provides a baseline summary of the current transport and access system to support these considerations.

The baseline assessment begins with an overview of the strategic context relevant to transport in the City of Melbourne and for the West Melbourne precinct.

The assessment considers the allocation of land in the precinct and seeks to understand how the land is being used and, in particular, how the space within the area set aside for transport is allocated between various users. The six main modes of transport and access are considered against the criteria of capacity, priority, accessibility and amenity using criteria from relevant City of Melbourne strategies.

The conclusion contains a chart showing the summarised results of the evaluation.

This report is arranged as follows:

- Chapter 2 outlines the Strategic Context
- Chapter 3 provides the Spatial Context of West Melbourne
- Chapter 4 introduces mode assessment
 - Section 4.1 discusses pedestrians
 - Section 4.2 discusses bicycle riders
 - Section 4.3 discusses the public transport network and users
 - Section 4.4 discusses other transport services
 - Section 4.5 discusses motor vehicles
 - Section 4.6 discusses heavy vehicles
- Chapter 5 considers the impact of major transport projects
- Chapter 6 discusses integration with other areas
- Chapter 7 provides a summary of the mode assessments

2. Strategic context

Transport and land use elements of the West Melbourne structure plan must be informed by the strategic context. This is a requirement of the Transport Integration Act 2010. The key documents informing this strategic context include:

- Transport Integration Act 2010 (in particular the objectives and principles of transport planning in Victoria)
- Plan Melbourne
- Melbourne Planning Scheme

These documents and relevant insights for transport in the West Melbourne Structure Plan are discussed below.

Transport Integration Act 2010

The Transport Integration Act (2010) S. 24(1) requires transport and land use to be considered holistically and ‘have regard’ for the following system objectives:

Social and economic inclusion

Economic prosperity

Environmental sustainability

Integration of transport and land use

Efficiency, coordination and reliability

Safety and health and wellbeing

The following Decision Principles must be adhered to:

Principle of integrated decision making

Principle of triple bottom line assessment

Principle of equity

Principle of the transport system user perspective

Precautionary principle

Principle of stakeholder engagement and community participation

Principle of transparency

These objectives and decision-making principles have significantly affected the project to date and the baseline report. For example:

- The objective of environmental sustainability has resulted in collection of data regarding the extent to which canopy trees shade asphalt (to reduce the heat island effect)
- The principle of a user perspective has informed the collection of data related to public space and how that space is allocated amongst users.

More discussion of how these objectives and principles affect the West Melbourne Structure Plan is provided in Appendix A.

Plan Melbourne

The State Government *Plan Melbourne* document outlines a number of strategic directions relevant to the West Melbourne precinct that can be grouped under Principle 7 Living locally – a ‘20-minute’ city. The 20-minute city describes neighbourhoods with access to local shops, schools, parks, jobs and a range of community services within a 20-minute trip.

The Plan identified locations where these 20-minute neighbourhoods could be developed including the Parkville Employment Cluster near West Melbourne and two urban-renewal precincts in the central city that abut West Melbourne – E-Gate and Arden-Macaulay. The opportunities around railway stations, public transport interchanges and some public transport corridors were identified.

The Plan identified characteristics of the 20-minute city including:

- A compact city with higher densities and a better range and supply of affordable housing options close to the central city at that makes better use of transport infrastructure to relieve the pressure of increasing congestion.
- A healthy city in which ‘housing is within walking, cycling or public transport distance of employment, education, social, cultural, recreational and health facilities, and where people have access to open space and places where they can gather’.

Plan Melbourne also seeks to achieve greener cities through:

- Encouraging more tree planting and the development of more open space, including new parks in urban-renewal precincts and established areas,
- Developing more major roads as tree-lined boulevards.
- Irrigating public spaces using stormwater or recycled water to reduce environmental impacts on downstream rivers and the bays, help to conserve water, cool the city, improve air quality, and provide shade and visual amenity.

Pedestrian friendly neighbourhoods are sought through:

- Ensuring the majority of new dwellings in established areas are within walking distance of the public transport network.
- Creation of quality pedestrian links and short cuts.
- Better footpaths, shade trees and reduced delays at pedestrian crossing points
- New walking and cycling bridge crossings for major roads, freeways, railways and waterways.
- Pedestrian transport would be based on the identification and development of pedestrian networks and pedestrian priority precincts integrated with SmartRoads to provide greater priority to pedestrians where it is needed.
- This would include lower speed limits in mixed-use and residential neighbourhoods in accordance with the new guidelines for 40 km/h pedestrian zones enable children and families in new suburbs to ride bikes locally, and particularly to schools.

Other relevant Plan Melbourne principles include:

- Creating more great public places
- Respecting our heritage
- Including telecommunications pathways in new buildings, particularly multi-dwelling units, shopping centres and office buildings.

Planning scheme

The principles set out in the *Melbourne Planning Scheme* are consistent with principles articulated in *Plan Melbourne* for example:

- **Development:** Encourage development in locations that can maximise the potential use of public transport. Consolidate development with a mix of uses along tram and bus corridors and at and around railway stations in Urban Renewal Areas.
- **Pedestrians:** Develop and maintain a comprehensive, safe, comfortable and convenient pedestrian network throughout the municipality. Ensure that pedestrians are given priority around local centres, along key pedestrian routes, at the rail stations, high volume tram and bus stops, and around major activity generators including sports and entertainment facilities.
- **Bicycle riding:** Develop a comprehensive, safe and convenient cycling network throughout the Municipality. Support the extension of the existing system of dedicated cycle routes (including shared paths) across the entire street network.
- **Public transport:** Maximise the use of public transport through efficient urban structure. Support improvements to public transport waiting areas, to ensure a high level of amenity, accessibility, and safety.

The Local Planning Policy Framework (LPPF) in the *Melbourne Planning Scheme* provides guidance on managing the use of private motor vehicles including:

- Support traffic calming and encourage more efficient and ‘complementary’ use of private motor vehicles, service, delivery and waste freight solutions
- Manage motor vehicle use to minimise adverse impacts on other transport modes, residential areas, parklands, safety and amenity.
- In particular, reduce the negative impact of commuter and heavy vehicle traffic including delivery and waste freight vehicles.
- Manage neighbourhood parking for resident amenity, parklands and safety.

The Planning Scheme also provides guidance for developments including:

- Minimise the traffic and parking impacts from new development including minimise the extent of vehicle crossovers which impede pedestrians
- Ensure that the cumulative traffic and parking impact of developments on an area are considered
- Ensure that new developments have adequate on-site loading facilities.

Other relevant endorsed documents & policies

A number of other strategies and plans influence settings for West Melbourne including:

- City of Melbourne Transport Strategy 2012
- Inner Melbourne Action Plan (IMAP) Strategy Part 2 walking, cycling and public transport
- City of Melbourne Walking Strategy 2014 – 17
- City of Melbourne Bicycle Plan 2016-2020
- City of Melbourne Open Space Strategy 2012
- City of Melbourne Urban Forest Strategy 2012 - 2032

Future Melbourne 2026

Future Melbourne 2026 provides direction for the transport elements of the Structure Plan establishing the following principles:

- Walking will be easy, attractive and safe as the comprehensive, fine-grained and good-quality

pedestrian network will have ‘top priority’.

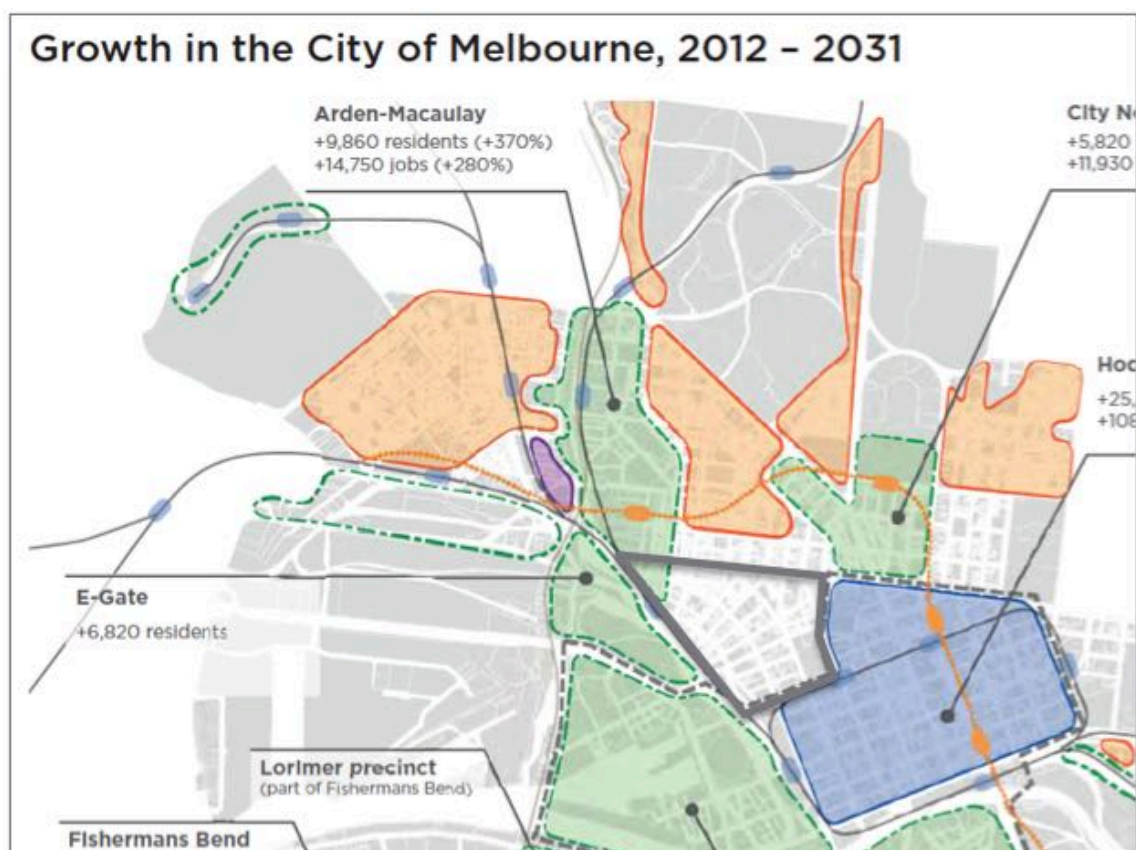
- Cycle only streets that encourage more people to ride are part of a connected and safe bicycle network that is attractive to people of all ages and abilities.
- Frequent, regular, reliable and integrated public transport services will support efficient travel. The services will be attractive, affordable and responsive and coordinated with the bicycle and pedestrian networks.
- Freight transport will be environmentally sustainable and enhance liveability.
- Technology will be used to increase the efficiency of vehicle use, improve traffic flow and reduce congestion. It will also ‘make streets better places for people’.

Overlooked

An important strategic influence on the past development of West Melbourne is its absence from strategic considerations. A summary from the City of Melbourne Walking Plan with the West Melbourne precinct outlined in grey is shown in Figure 1 below.

The anticipated development of “E-Gate” with its anticipated population of 7,000 people is currently paused. It now appears that the next wave of development is going to occur in West Melbourne rather than E-Gate or Arden Macaulay.

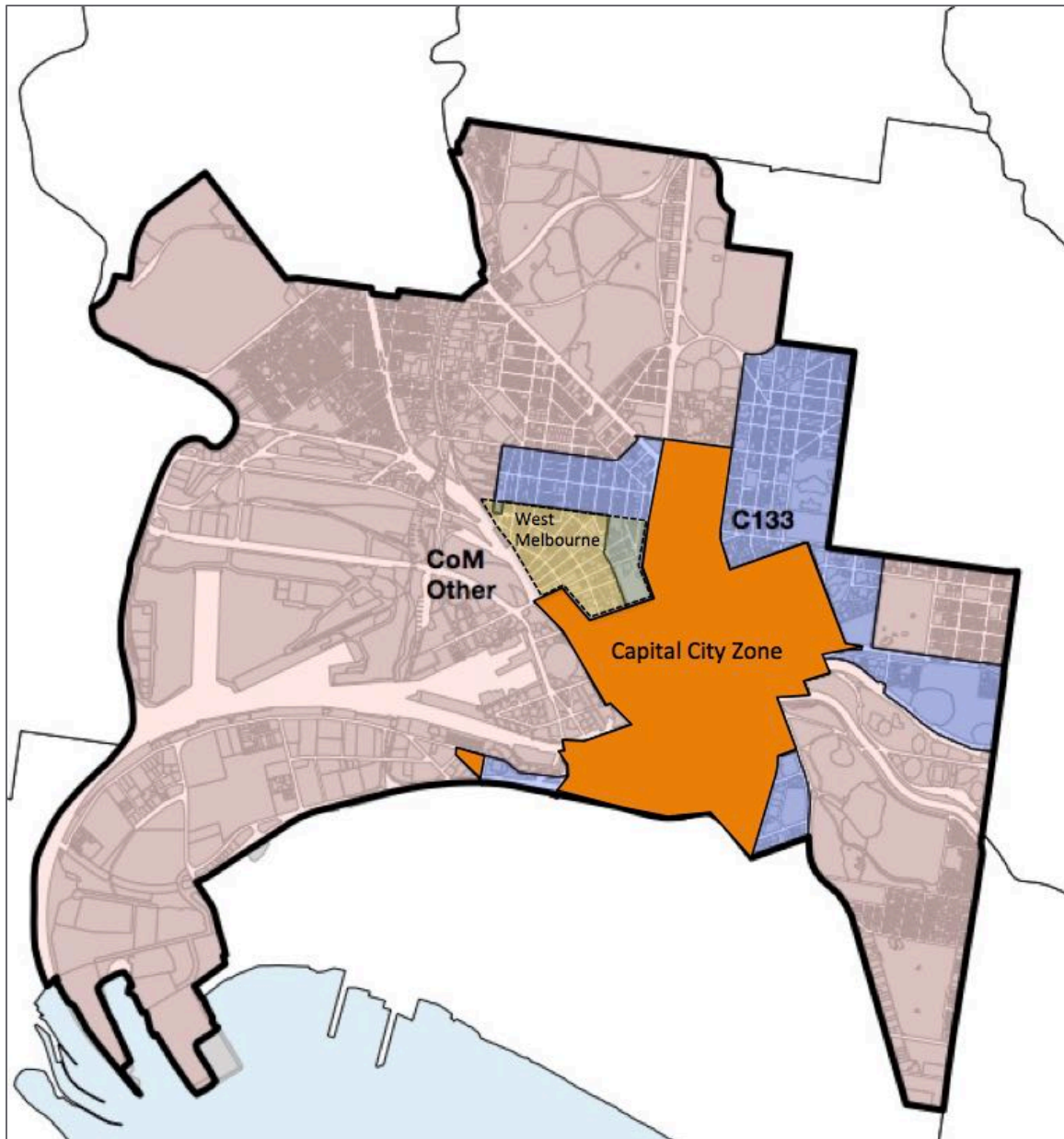
FIGURE 1 – GROWTH AREAS IN THE CITY OF MELBOURNE



Source: City of Melbourne Walking Plan

The Parking Overlay that removed minimum car-space-requirements in new residential developments (AmC133) included areas to the north and south of West Melbourne but excluded most of the West Melbourne precinct. Areas of the City of Melbourne abutting West Melbourne where parking maximums do not apply are shown in Figure 2 below – specifically the Capital City Zone Parking Overlay 1 (shown in orange) and C133 Parking Overlay 12 (blue).

FIGURE 2 – MAP SHOWING WEST MELBOURNE IN RELATION TO PARKING OVERLAYS 1 AND 12



Source: PBA

The rationale for the exclusion of most of West Melbourne was that – despite the presence of North Melbourne Station in the north west and Flagstaff Station in the south east – the area was ‘predominantly industrial’ and had ‘fairly limited accessibility’.

The structure plan for West Melbourne will ‘fill in’ most of this gap, but the absence of the precinct from this level of consideration until now has shaped it profoundly.

For example, most of the City-shaping investments consistent with the principles articulated above that have occurred in the precinct, have occurred on the precinct’s boundaries.

Inside the precinct, traditional practices have continued – high traffic speeds and high rates of car space provision in new dwellings are two examples.

3. Spatial context

Overview

The streets in the east of the precinct align with the north-south, east-west grid of inner Melbourne. Three main north-south streets are linked to the Hoddle Grid.

In the west of the precinct two of these CBD streets – King and Spencer – begin to curve to the west after crossing Dudley Street, giving the street plan south and west of King its distinctive fan shape.

Spencer, King and William Streets are the same width in the precinct as they are in the Hoddle Grid. These generous proportions allow many future possibilities including those already in place in the CBD:

- William and Latrobe Streets carry four separated modes: pedestrians, bicycles, motor vehicles and trams.
- Swanston Street where the absence of motor vehicle traffic allows wider footpaths, public transport priority and wide bicycle routes.
- Spencer Street in the CBD supports two tram tracks, two platforms and a travel lane for motor vehicles.
- Elizabeth Street supports two tramlines alongside a central platform.

The local roads have the same dimensions as the main arterials. In other areas of the municipality, these areas in local roads have been allocated to central medians of grass and trees, kerb outstand bicycle parking (Pelham Street), as well as sports fields (Neill Street Carlton) and open space (Eastwood Street, Kensington and Errol Street North Melbourne).

Analysis of the spatial context

The area of West Melbourne can be divided into developable or private land and the public realm, which includes all the public space between buildings – the open spaces such as public parks or squares as well as the streets and laneways. (This calculation includes the streets on the boundary of the study area and is measured from the property line on the far side of the street.

TABLE 1: WEST MELBOURNE ALLOCATION OF AREA

	LAND	PRIVATE LAND	PUBLIC REALM
Area in hectares	91	~31	~60
Percentage of area	100%	To be compared	To be compared

Source: PBA

A large area of the public realm in West Melbourne has been allocated to ‘roads and footpaths’ – approximately 50 hectares and around 55% of the total land area. This is higher than the proportion in the Hoddle Grid.

The area of open space in the precinct has not been reported in other City of Melbourne documents and was not assessed for this report. However, considering Flagstaff Gardens is 7.2 there is probably in the order of 8-10 ha of open space in the precinct, around 10% of the area.

The proportional allocation of land in neighbouring precincts is worth considering when understanding the context that affects West Melbourne. These are shown in Table 2 below.

TABLE 2: COMPARISON OF WEST MELBOURNE WITH OTHER PRECINCTS

STRUCTURE PLAN OR OTHER AREA	PUBLIC REALM	ROADS & FOOTPATHS	OPEN SPACE
West Melbourne	64%	55%	10% (estimated)
City North	43%	39%	4%
Hoddle Grid (CBD)	Not known	33%	Not known
Arden Macaulay	35%	20%	15%

Source: City of Melbourne City North Structure Plan (p. 72)

The allocation of kerb-to-kerb space

Table 3 shows a breakdown of the area of ‘roads and footpaths’. There is 82km of road and 63km of kerb in the precinct. The ‘road’ includes the carriageway (which in the precinct varies from a marked travel lane 2.7m wide (King Street) and an unmarked space 8.0m wide. Footpaths occupy 10% of the precinct, roads 45%.

TABLE 3: WEST MELBOURNE PROPORTION OF BUILDING LINE TO BUILDING LINE SPACE

STRUCTURE PLAN OR OTHER AREA	LENGTH KMS	Area HECTARES	PROPORTION OF AREA OF PRECINCT
Road		41	45%
Carriageway (Sub set of road)	82	26	28%
Footpath	63	9.5	10%

Source: PBA

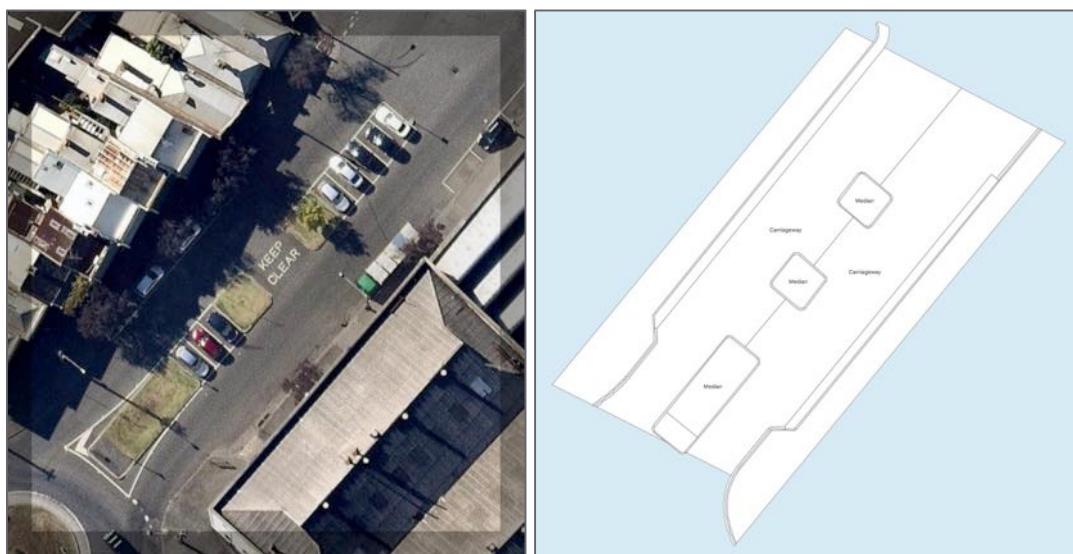
The ‘road’ is used for a number of purposes aside from the ‘carriageway’. These uses include:

- To the left of the carriageway:
 - Kerbside parking and storage of motor vehicles
 - Marked bicycle lanes
 - Kerb outstands for pedestrians or plantings for example Adderley Street at Dudley Street and Roden Street at Spencer Street
- To the right of the carriageway (centre of road). This ranges in width from no median to 7 metres:
 - Additional areas of carriageway marked ‘Keep Clear’ (up to 12m wide)
 - Parking and storage of motor vehicles
 - Pedestrian refuges (usually at the intersection)
 - Areas planted with trees and/or grass.

The last two categories (pedestrian refuges and planting) are recorded in the City of Melbourne database simply as ‘median’ – and therefore it is difficult to determine the exact amount of space dedicated to these uses.

Figure 3 shows the block of Hawke Street north east of Adderley Street (left) and its GIS ‘shape’ (right). The central median contains some planted area, some car spaces and a Keep Clear section. The categorisation of the GIS data allocates the car spaces and the Keep Clear to ‘Carriageway’ and the balance to ‘median’.

FIGURE 3 – HAWKE STREET NORTH OF ADDERLEY STREET



Source: PBA

Table 4 shows that the 'median' allocation is 3% across the precinct.

TABLE 4: PROPORTION OF 'MEDIAN' SPACE

CATEGORY	AVERAGE AREA OF ROADWAY
Roadway	65%
Footway	22%
Median	3%
Kerb & Channel	6%

Source: PBA

The length of kerb (63km) allows an estimate of the capacity of the kerbside vehicle storage space in the precinct. If 13km (20%) is allowed for crossovers and setbacks from intersections, and 5m is allowed for each vehicle, the remaining length of kerb will accommodate 1,000 vehicles (or other uses).

To understand the proportion of the roadway that is not needed for travel, twelve central medians were measured in the precinct. Six 'wide' central medians in Dryburgh, Abbotsford, Hawke, Roden, Stanley and Rosslyn Streets, which are 3.5m-7m wide and six 'narrow' central medians in sections of Spencer and Adderley, which are 1-3m wide. Table 5 shows the proportion of the road that is taken up by the central medians and highlights the proportion of space used for vehicle movement.

TABLE 5: COMPARISON OF GIS DATA TO MEASURED MEDIANS

CATEGORY	MEDIAN PROPORTION OF ROADWAY	REMAINING ROADWAY
Wide medians	19%	46%
Narrow medians	6%	59%
Precinct average	3%	65%

Source: PBA

In a street with wide medians, the remaining roadway (46%) can contain more functions than the motor vehicle carriageway. Even with a 7m median it is possible to have a single chevron bicycle lane and kerbside parking as well as a travel lane as shown in Figure 4 below.

FIGURE 4 – ABBOTSFORD STREET SOUTH OF SPENCER STREET



Source: Nearthmap

The potential alternative uses of roadway space (particularly medians) has been discussed in some of the city's endorsed strategies including:

- The Urban Forest Strategy:

'Despite the industrial uses of West Melbourne the wide streets and central medians have provided opportunities to plant trees – as a result the canopy cover is greater than the area of open space. It is however still less than the City of Melbourne's target of 40%. Traffic control measures have increased the grassy areas within the roadway...In precincts such as North and West Melbourne with only a 20% canopy cover, streets are an obvious priority for tree planting.'

- The Open Space Strategy:

'New Local open space [in West Melbourne] potentially utilising one of the larger road reserves but away from major roads to provide refuge from busy traffic'

Because the GIS does not distinguish between Keep Clear spaces and car spaces in the central median it is not possible to know how many car spaces have been provided in the centre median. The supply has been estimated across the precinct to be at a similar scale – around 1,000 vehicles – to the kerbside supply.

It is recommended that the median parking be surveyed and documented in detail. The supply of on-street parking is likely to be a contested element of the structure plan and therefore one that the City should ensure it is adequately informed about.

The area of tree canopy was estimated by comparing the GIS canopy layer to the roadway. This analysis identified that a quarter of the footpath is under canopy but only a small proportion of the roadway asphalt (including kerbside car spaces, bike lanes, centre median car spaces and carriageway) is under canopy as shown in Table 6 below.

TABLE 6: AREA OF TREE CANOPY

	canopy Area HECTARES	TOTAL AREA HECTARES	PROPOTION UNDER CANOPY
Footpath	2.3	9.5	24%
Roadway	3.8	30	12.5%

Source: PBA

It is recommended that the existing road closures in the precinct be evaluated. It is likely that these areas are 'one dimensional' that is they provide a traffic calming or channelling function but do not also operate effectively as open space, to support shade or capture storm water.

Summary of the spatial context

Compared to other areas of the City of Melbourne, an unusually large area of the public realm in the West Melbourne precinct is allocated to road reserve. Most of the road reserve is allocated to motor vehicles including most of the central medians, which are used for turning, parking and storing vehicles. The space allocated to motor vehicles is not used efficiently. Carriageways on local roads are up to three times wider than necessary.

The result is that there is a relatively small area set aside for footpaths, nature strips, planted kerb extensions and medians.

The opportunity is to significantly reduce the area for motor vehicle travel, turning, parking and storage and repurpose it to support in appropriate proportions:

- Enhanced space, access, amenity and priority for walking, bicycle riding, public transport and transport services
- Neighbourhood amenity, open space, shade canopy and stormwater capture.

4. Existing Transport Modes & Capacity

This section assesses six modes: walking, bicycle riding, public transport, other transport services (which includes car and bike share as well as the internet), private motor vehicles and freight.

Each mode has been assessed against four criteria: capacity, priority, accessibility and amenity. Positive and negative settings for these criteria have been derived, as much as possible, from the *Transport Strategy 2012*. Reference has also been made to other strategic documents such as the Melbourne Planning Scheme, Future Melbourne 2026, Walking Plan, Motorcycle Strategy and Draft Bicycle Plan. The type of consideration given to each existing mode is shown in Table 7 below.

TABLE 7: CONSIDERATION OF EACH MODE

CRITERIA	QUESTIONS
Capacity	What is the current capacity of the mode? How many people are using it currently? What is the utilisation of the current network?
Priority	What are the positive priority settings for this mode? What are the negative priority settings?
Accessibility	How accessible is this mode to those starting a trip? How accessible is the area to someone using this mode? What are the positive and negative settings?
Amenity	What is the amenity of this mode for users? What are the positive and negative settings?

Source: PBA analysis

In general, more positive settings for a mode are likely to be associated with higher use of the mode. However, since the modes interact, positive settings for one mode can compromise, be neutral or positive for others. For example:

- Providing a bicycle facility to a train station can increase the capacity of both modes.
- The overall capacity of the corridor can be increased by increasing the capacity of on-road public transport. However this is likely to affect the capacity of the private motor vehicle network.
- The high amenity experienced inside a car is associated with low amenity to those outside.
- A bus shelter on the footpath provides passenger amenity but can impede pedestrians.
- A bike share node in a kerbside space could reduce the pedestrian and car access (to a small extent).

With an understanding of the current settings, options can be developed later in the structure planning process to support the forecast growth and development in the precinct.

4.1. PEDESTRIANS

The City has unambiguously put pedestrians at the top of the transport hierarchy. The Transport Strategy 2012 states that:

‘walking has top priority over other modes of urban mobility’

‘There is a direct link between the city’s economic prosperity and the safety and convenience of the pedestrian experience.’

This ‘top priority’ has been reinforced in Future Melbourne 2026

High-level pedestrian targets have been set for 2030:



- 6% of trips to the municipality (up from 2.6% VISTA 2009)
- 80% of all trips within the municipality (65.6% VISTA 2009).

This strategic direction has been further developed in the City of Melbourne *Walking Plan*. Actions undertaken so far that are consistent with the Strategy include:

- Development of high-mobility pedestrian and public transport streets
- Establishing new pedestrian right of ways including new laneways through developments
- Widening footpaths (15% increase in area between 2007 – 2012) and reducing the share of roads, especially in areas of high pedestrian use, such as approaching train stations
- Establishing safe staging points for pedestrians to cross busy roads including painted medians
- Reducing motor vehicle priority by removing slip lanes
- Reducing risk and increasing amenity by reducing motor vehicle speed limits to 10 km/h, 30 km/h and 40 km/h on local streets and on arterial roads
- Increasing amenity of pedestrian routes and spaces with bluestone paving, trees and street furniture and the introduction of active uses including retail and hospitality

The Walking Plan has defined five street typologies show in Figure 5 below.

FIGURE 5 – STREET TYPOLOGIES TO SUPPORT PEDESTRIANS

INCREASING PEDESTRIAN FUNCTION		
	CHARACTERISTICS	STREET MANAGEMENT
Street as Place (local street)		
 <p>Hardware Lane</p>	<ul style="list-style-type: none"> • Pedestrians move freely across the street. • People linger on the street, at cafes, on public seating or to play. • Amenity increased by providing spaces for people to be in. • Low traffic function. 	<ul style="list-style-type: none"> • Can be used as a place permanently or during specific times (such as lunchtimes or in evenings). • Can operate as a shared zone to provide traffic access. • Provide for deliveries, property servicing, cycling and access to off-street car parking.
Walking Street (local street)		
 <p>Little Collins Street</p>	<ul style="list-style-type: none"> • Pedestrians move freely across the street. • Key transport link for pedestrians. • Amenity and safety increased by reducing crowding. • Low through-traffic function. 	<ul style="list-style-type: none"> • Can be used as a walking street permanently or during specific times (such as lunchtimes or in evenings). • Can operate as a shared zone to provide traffic access. • Provide for deliveries, property servicing, cycling and access to off-street car parking.
High Mobility Walking Street (public transport corridor)		
 <p>Swanston Street</p>	<ul style="list-style-type: none"> • Streets shared by trams, buses, bikes and pedestrians. • High-frequency public transport corridor. • Low traffic function. • Significant interchange between public transport and walking network. 	<ul style="list-style-type: none"> • Provide for deliveries, property servicing, cycling and access to off-street car parking.
High Mobility Street (public transport corridor)		
 <p>Victoria Parade</p>	<ul style="list-style-type: none"> • Streets shared by trams, buses, private vehicles (including bikes) and pedestrians. • High frequency public transport corridor. • Traffic function. 	<ul style="list-style-type: none"> • Trams, buses and pedestrians have priority under SmartRoads. • Provide for deliveries, property servicing, cycling and access to off-street car parking.
Other streets used by pedestrians		
 <p>Lygon Street</p>	<ul style="list-style-type: none"> • Streets shared by private vehicles (including bikes) and pedestrians. • Traffic function. • Examples include shopping strips, local residential streets or arterial roads. 	<ul style="list-style-type: none"> • Varies depending on use. • Provide for deliveries, property servicing, cycling and access to off-street car parking.

Walking Plan 2014-17

Source: City of Melbourne Walking Plan 2014 - 2017

Capacity

Footpaths in the precinct are generally 3.5m wide. Some are wider than 6m – such as Dudley Street between Spencer and Kings Streets. However, from a pedestrian capacity perspective, the effective width of a footpath is less than the total width.

The capacity of footpaths in the City of Melbourne can be derived. The City of Melbourne does not set standards for a transition or frontage ‘zone’ at the building line. It does however set a preferred distance from the building line of 2m for pedestrian traffic. The absolute minimum width of this *pedestrian zone* is 1.5m. The actual width of the *pedestrian zone* can vary – widths of 3m, 4.5m and 10m have been observed in some situations.

The City also considers a *kerb clearance zone* (sometimes called furniture or service zone) which can contain light poles, signs, existing street furniture, fire hydrants, trees, public seats, café chairs and tables, parking meters and other features. For this *kerb clearance zone* the City applies a kerbside setback from (0.8 – 1.5m) that varies with context.

The capacity of each footpath in the precinct can be calculated on this basis. For example, the footpath along Spencer Street has a *pedestrian zone* that is 2m wide. This is the usable width of the footpath.

The City of Melbourne Walking Plan identifies a desirable pedestrian flow rate of 15 – 17 people per metre of clear footway width per minute. This ratio is used to assess pedestrian comfort but it can be used to understand capacity per hour – a comfortable flow will be around 1,000 people per hour per metre of width.

This assessment can be compared to other published flow rates. Table 8 shows three parameters from Australia.

TABLE 8: PEDESTRIAN CAPACITY OF FOOTPATHS

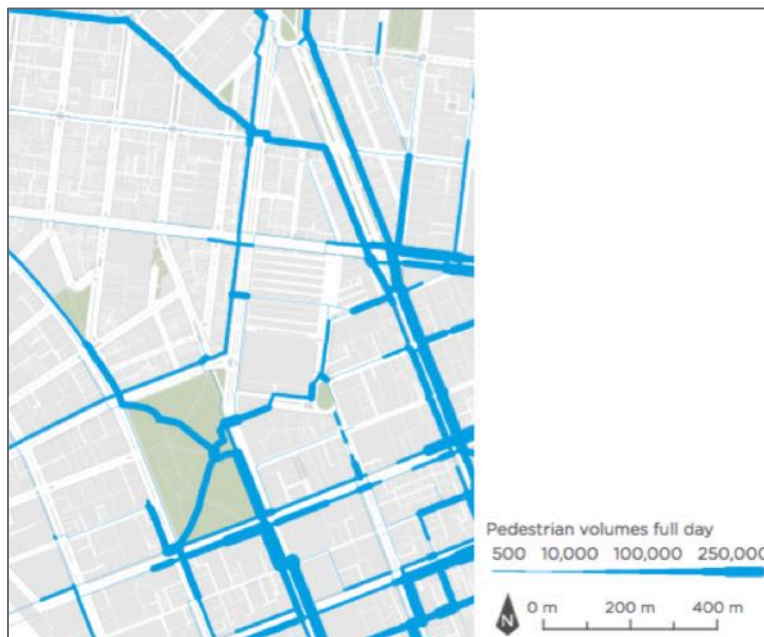
FOOTPATH WIDTH	WA GUIDELINES	MELBOURNE – 16 PEOPLE / MINUTE / METER OF WIDTH	QLD SHARED PATH GUIDELINES
2m effective width		2,000	
2.5m	At least 2.4m in commercial or shopping environments	2,500	Up to 50 pedestrians/hour
3m	3m – 4m in busy CBD pedestrian area	3,000	50 – 100 pedestrians/hour
4m		4,000	100 – 200 pedestrians/hour

Sources: *Technical Note 133 Guidance on the widths of shared paths and separated bicycle paths* Department of Transport and Main Roads, Qld (2014), *Planning and designing for pedestrians: guidelines* Government of WA (2011)

The City of Melbourne pedestrian flow rate calculation shows that the two 2m-wide footpaths on both sides of Spencer Street could deliver 4,000 people an hour into the City in one direction. By contrast, the 15m wide carriageway of Spencer Street (both directions) has an estimated vehicle capacity of 2,800 vehicles for a peak hour.

Actual pedestrian numbers for the whole precinct are unknown. The *Walking Plan* shows pedestrian volumes for some streets in West Melbourne. King Street on the west side of the Flagstaff Gardens in particular has strong pedestrian flows carrying perhaps 100,000 people, more than twice as many people as the road which has a capacity of less than 40,000 vehicles per day. An excerpt from the Walking Plan is provided in Figure 6 below.

FIGURE 6 – PEDESTRIAN NETWORK VOLUMES



Source: City of Melbourne Walking Plan 2014 - 2017

It should be noted that the data above is not an exhaustive collection on all pedestrian paths. Data is only shown for the links between two points at which data was collected. No data or a thin blue line does not indicate that there are no pedestrians on that path.

Some segments of road have no footpaths or narrow paths with obstacles that would not be accessible for all. For example:

- The north side of King Street between Roden and Curzon Streets
- Either side of Dynon Road west of Dryburgh Street
- The west side of Adderley between Dudley and LaTrobe Streets

Dynon Road in particular, offers no path across the Dynon Road bridge on the north side of the road. Nor does it offer an easy (or disability accessible) way to access the path on the southern side of the bridge as shown in Figure 7 below.

FIGURE 7 – DYNON ROAD WEST OF DRYBURGH STREET



Source: Google Streetview

Obstacles that reduce capacity

In general, permanent fixtures such as bus shelters or temporary obstacles such as motorcycles do not compromise the pedestrian clearance zones on the footpaths in West Melbourne. This is partly because there are relatively few potential obstacles in the precinct and relatively wide footpaths. Some bus shelters on Spencer Street have, however, been placed in the centre of the footpath compromising the capacity and amenity of the street. (See Figure 48 below).

Priority

In general, in the precinct the pedestrian network has a low priority.

The few examples of high priority for pedestrians include:

- A section of roadway (Railway Place) has been turned into a pedestrian space.
- A zebra crossing at the North Melbourne Station. (The only other zebra crossing in the precinct is on a slip lane from Dryburgh to Spencer – installed to mitigate a risk as pedestrians already have the right of way at that location)
- There is one signalised mid-block pedestrian crossing into the precinct on Peel between Dudley and Victoria Streets. William Street is linked into the precinct by a signalised crossing west of the Dudley Street roundabout. There are no mid block signalised pedestrian crossings in the precinct itself.

In part, this reflects the low traffic volumes on side streets (resulting in minimal conflict between cars and pedestrians crossing the road). However, on busier streets it reflects the significant priority given to the through-movement of vehicles.

High priority pedestrian blocks have been identified by VicRoads in the SmartRoads Network Operating Plan.

High priority pedestrian links (red) are shown in Figure 8 below.

FIGURE 8 – PEDESTRIAN PRIORITY ROUTES IDENTIFIED IN THE PRECINCT



Source: VicRoads SmartRoads Road Use Hierarchy – Reported in Walking Plan 2014-2017

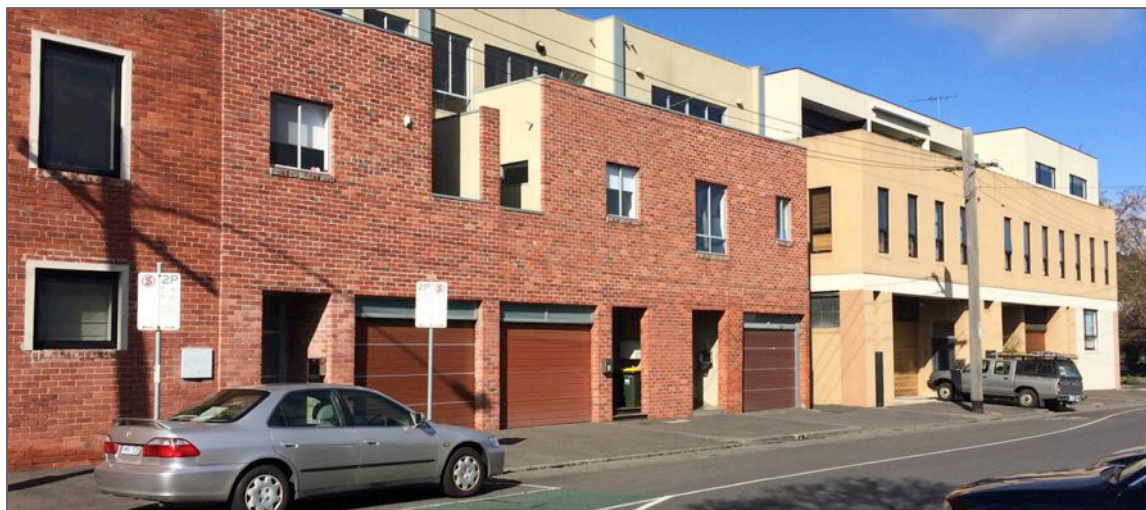
Sections of Dudley and King Streets are inside the precinct. Victoria, Peel, William and La Trobe Streets form the eastern boundary of the precinct.

Positive priority settings

The pedestrian network is supported by separation and delineation including:

- On some local roads, the ends of the central medians have been designed to form a pedestrian refuge to support crossing at the intersection. There are streets where this has not been done, such as Jeffcott Street at Adderley Street.
- Painted chevrons between the tram tracks on Victoria Street support mid-block crossings
- In a number of locations parts of roadway or intersections have been closed to traffic (or roadway has been narrowed) and replaced with footpaths and landscaped areas
- Some streets have very few driveways crossing the footpath. Examples include Eades Place, some residential sections of Spencer Street such as between Hawke and Abbotsford Street and the eastern end of Miller Street. (This is not typical for the precinct. Most streets have many crossovers. On the eastern side of Abbotsford Street between Ireland and Adderley Streets shown in Figure 9 below, 40% of the space in front of the buildings is crossovers (26m/60m).

FIGURE 9 – ABBOTSFORD STREET – MORE CROSSOVERS THAN KERB



Source: PBA

A much broader range of positive settings could be used in West Melbourne (and are used in other parts of the City of Melbourne). The lack of these priorities for pedestrians illustrates how vehicle movement has been prioritised in the precinct for many decades.

Negative priority settings

Pedestrians in the precinct encounter negative priority settings especially when crossing roads. Vehicle driveways across footpaths (crossovers) are also negative for pedestrians. (Crossovers are discussed below in the section on off-street car spaces.)

Traffic signals do not favour pedestrians:

- Pedestrian signals in the precinct are not set to automatically trigger on every complimentary traffic phase
- Turn arrows for motor vehicle traffic (such as at Curzon/King Streets) reduce crossing opportunities and time for pedestrian crossings
- The traffic signal at Curzon King is without a pedestrian crossing on one leg of the intersection

In general, street crossings in the precinct have been treated in the same manner whether across arterials such as King Street, local roads such as Hawke or shorter road sections such as Eades Place. Even some car parking areas have been prioritised over the movement of people on the footpath – motor vehicles have priority when exiting car-parking areas in Errol Street and Victoria Street at the Hawke Street Reserve and Howard Street.

Kerbs at the intersections have not been extended towards central median islands to reduce pedestrian crossing distances. This has been done elsewhere in the municipality such as at Albert and Gisborne Streets East Melbourne as shown in Figure 10 below – the original kerb position is a yellow dash line.

FIGURE 10 – KERB EXTENSION AT ALBERT & GISBORNE STREETS



Source: *Nearmap with PBA graphic additions*

It can be difficult to cross roads in the middle of the block. Examples include Spencer and King – although this crossing movement has often been observed on site visits. Crossing these two roads at secondary streets such as Roden and Stanley is also difficult. There can also be difficulty (and risk) crossing minor streets through areas of car parking in the central median. These type of informal crossings are extremely difficult for some people to use and do not offer any level of compliance with the Disability Discrimination Act (DDA).

There are also some central medians with no pedestrian access at desire lines, for example at William and Walsh Streets in North Melbourne. Nor have speed humps been aligned with pedestrian desire lines for example at Miller and Curzon Streets, Capel and William or Walsh and William Streets.

Walsh Street intersects with the William Street as shown in Figure 11 below.

FIGURE 11 – WILLIAM & WALSH STREETS NORTH MELBOURNE

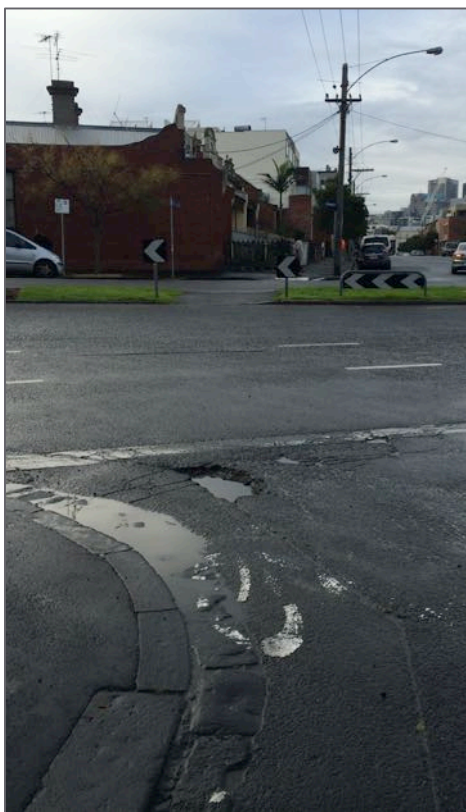


Sources: Nearthmap with PBA graphic additions, Google Streetview

The desire lines (shown by yellow arrows) are unsupported by pedestrian refuges in the central median. The speed hump shown between the two arrows could have been placed on either of the desire lines and been given the added function of a raised zebra crossing.

At Ireland and Dryburgh Streets the pedestrian crossing has been provided in the central median but the approach is inadequate as shown in Figure 12 below. It appears that, at some stage, the footpath has been reduced to support left turning motor vehicles out of this minor street.

FIGURE 12 – CROSSING DRYBURGH ON IRELAND LOOKING EAST



Source: PBA

The speed limits in the precinct are high – a negative setting for pedestrians (and bicycle riders):

- There are roads with 60kph limits – Spencer, King and Dudley Streets
- Most roads have a 50kph limit
- There are no roads or areas with 40kph, 30kph or 20kph speed limits, as would be found in other areas of the municipality.
 - King Street has a 40kph limit in the CBD but north of Latrobe Street and past the Haileybury School the street has a 60kph limit.
 - There is no low speed zone around the North Melbourne Station or Festival Hall

There are two high-speed roundabouts in the precinct – on Adderley Street at Hawke Street and a multi lane roundabout on Peel and William Streets at Dudley Street.

Figure 13 shows the roundabout on Adderley and Hawke Streets in West Melbourne (left) and the roundabout at Faraday and Cardigan in Carlton (right). The intersections are the same dimensions but the pedestrian (and bicycle) priority is higher in the Carlton example.

FIGURE 13 – ROUNDABOUTS IN WEST MELBOURNE AND CARLTON



Source: *Nearmap*

In West Melbourne, the road around the roundabout is 2m wider, there are no zebra crossings and the kerbs have not been extended towards the centre of the intersection.

High settings for motor vehicle priority and low settings for pedestrians can also be observed along Spencer Street where turning movements for local motor vehicle trips have been given a high priority. In places the central median has been cut back from the kerb line of intersecting streets removing the central pedestrian refuge. There are many midblock openings in the central median of Spencer. These measures increase risk for pedestrians crossing side streets and Spencer itself. This is in contrast to King Street where measures to support through traffic have included the closure of intersecting roads and uninterrupted central medians. The risk of vehicles turning across the path of pedestrians moving along King is lower than on Spencer.

Accessibility

Pedestrian accessibility in the precinct ranges from low to high as shown in Figure 14 below.

FIGURE 14 – WALKING ACCESSIBILITY WEST MELBOURNE PRECINCT



Source: *Walking Plan 2014-2017*

Negative settings

Through block links

The precinct has some successful through block links. One is shown in Figure 15 below.

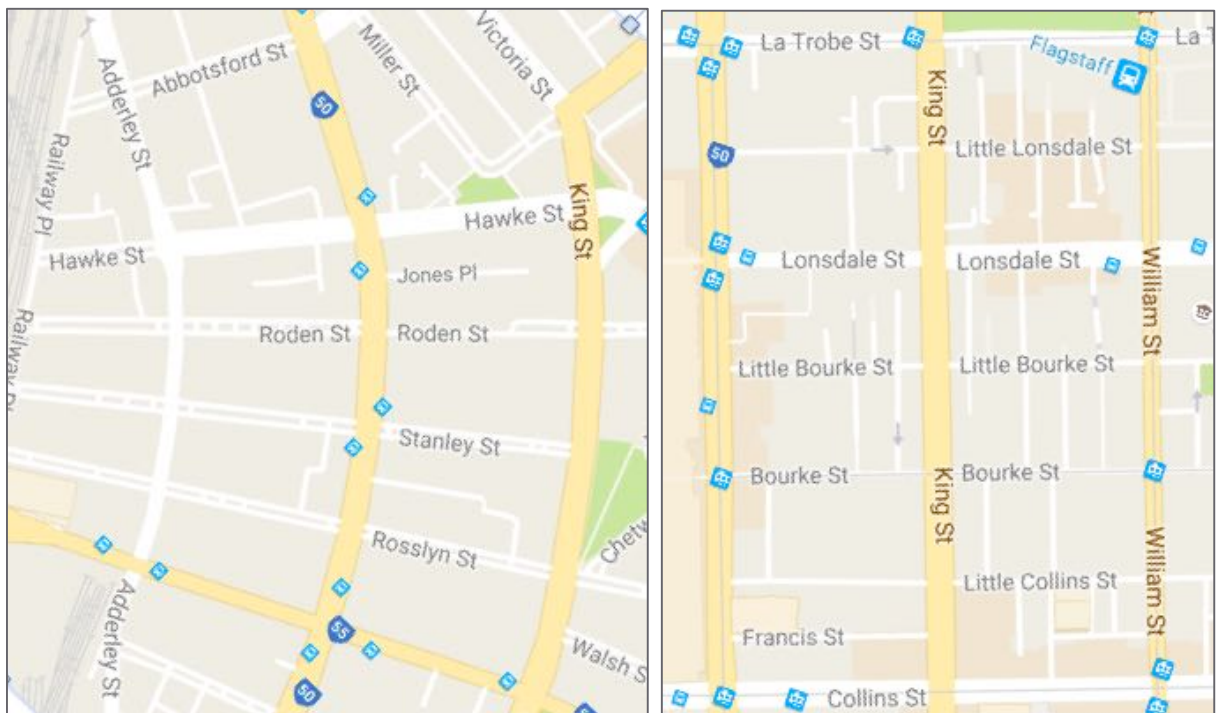
FIGURE 15 – THROUGH BLOCK LINK FROM MILLER STREET (TOP) TO HAWKE STREET



Source: PBA

However, as Figure 16 below shows, the north south alternatives in the precinct are mostly limited to King, Spencer and Adderley Streets. In the CBD, on the other hand, there are many north south alternatives between King and William Streets.

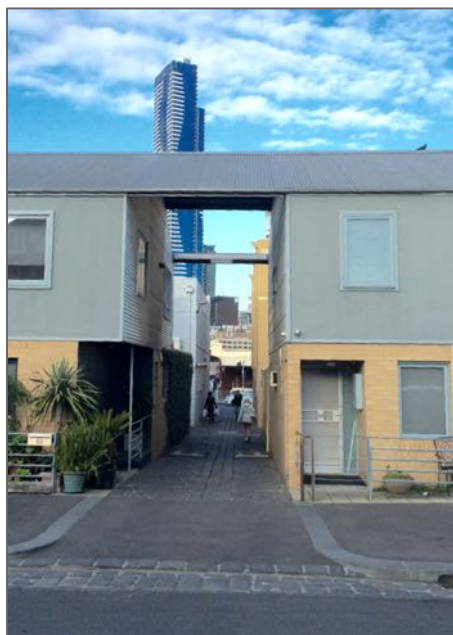
FIGURE 16 – COMPARING THROUGH BLOCK LINKS



Source: Google Maps

The consequences of a lack of through block links can be illustrated by imagining a pedestrian at the corner of Roden and King Streets whose destination is the pedestrian crossing to the Queen Victoria Market at Peel Street. At this point there is an important through block link in the 250m Capel/Peel Street, Victoria/Dudley Street block. Figure 17 below shows the link looking east towards the Queen Victoria Market.

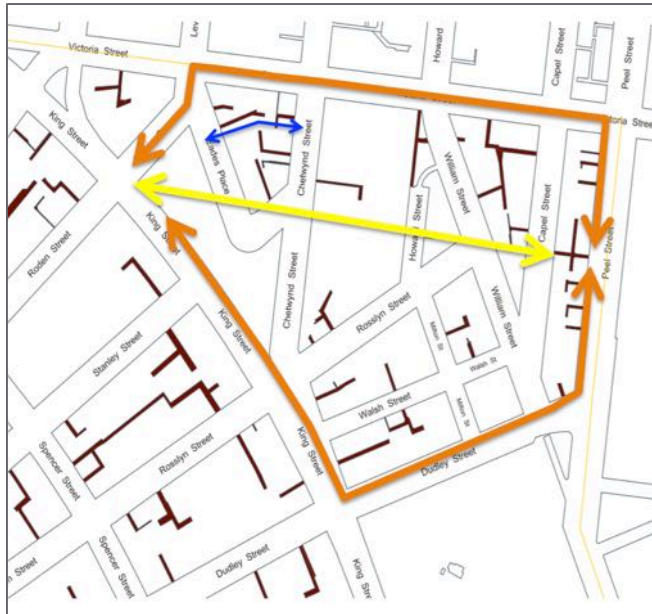
FIGURE 17 – THE 'PEEL/CAPEL STREET' THROUGH BLOCK LINK



Source: PBA

Figure 18 below shows their desire line with a yellow arrow. The Chetwynd Street block is 250 long – one and a half times the distance preferred by the City. The pedestrian cannot use the Wing Sing/Prout Lane link (blue arrow); although a car can be driven from end to end along these lanes, as 7m of private property sits between the two lanes. There is a well positioned through block link between Capel and Peel Streets but it is not supported by other links. The pedestrian must follow either of the orange arrows, turning a 500m journey into a 700 or 800m trip an increase of at least 40%.

FIGURE 18 – THE CONSEQUENCES OF A LACK OF THROUGH BLOCK LINKS



Source: City of Melbourne PBA

An isometric catchment assessment of the precinct based on key destinations (such as the North Melbourne Railway Station, Festival Hall, Errol Street shops, Flagstaff Gardens, Haileybury School and the Queen Victoria Market) would identify where through block links would make a significant contribution to the pedestrian network.

Mid-block links

King and Dudley Streets are barriers within the precinct as there are no mid-block pedestrian crossings across roads with high traffic volumes and high speed limits (60kph). The distance between crossings on Dudley on the north side is 200m while on King Street the distance is 350m. Figure 19 below shows the northern and western barrier as well as the Haileybury School (yellow box) and Flagstaff Station (orange box).

FIGURE 19 – KING AND DUDLEY STREETS ACT AS BARRIERS



The lack of mid-block links is exacerbated by other barriers. Pedestrians on the north side approaching from Milton Street have to get over the 1m wide splitter island on Dudley, step up onto the kerb and climb a set of steps to the park.

Pedestrians approaching the Gardens on the west side from Batman and Jeffcott – including people travelling to and from Haileybury School – have to cross four travel lanes with no formal pedestrian space on the median, two lanes of kerbside parking and then climb a set of stairs. Figure 20 below shows the north side of the Gardens (left) looking south from Milton Street and the western side (right) looking east from Batman Street.

FIGURE 20 – MIDBLOCK ACCESS TO FLAGSTAFF GARDENS



Source: PBA

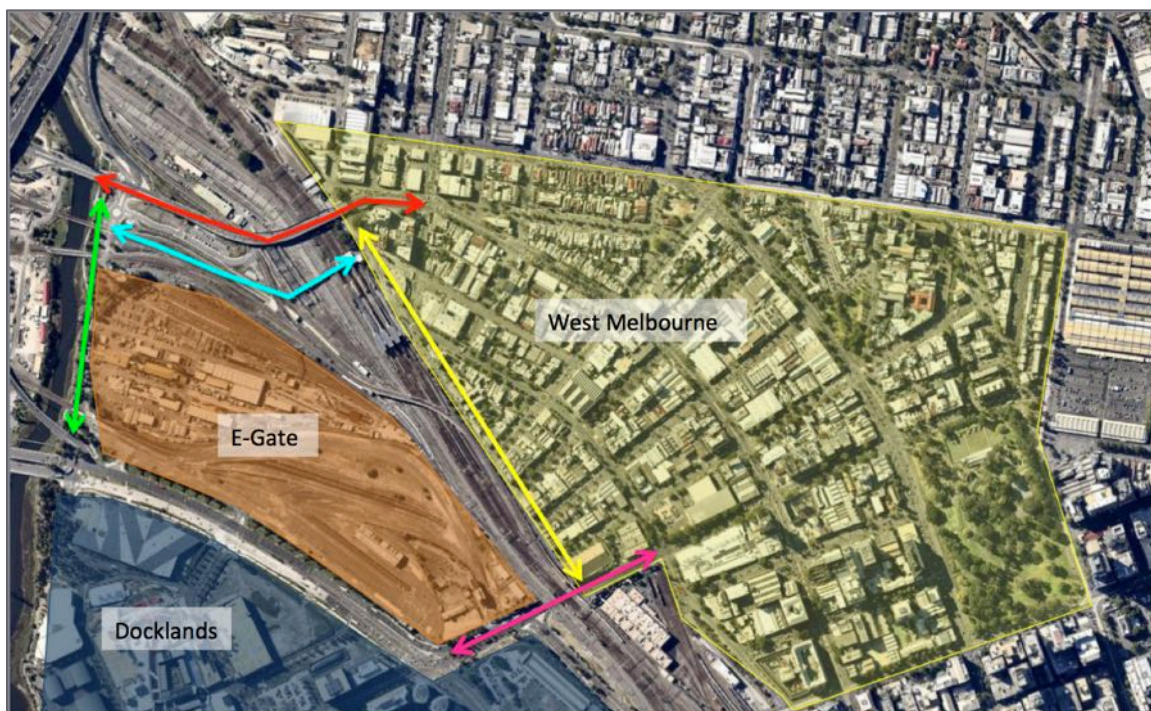
Links to the west

The most significant accessibility problem is the link to the west from West Melbourne to what will be E-Gate. There are currently two open links that provide connections (albeit poorly):

- via Dynon Road Bridge footpath (southern side of the road only)
- via Railway Place and Dudley Street

The three precincts that need to be better connected (to accommodate future residential growth and meet the objectives of planning in Victoria) are shown in Figure 21 below – West Melbourne (yellow), E-Gate (orange) and Docklands (blue).

FIGURE 21 – LINKS FROM WEST MELBOURNE TO FOR EGATE AND DOCKLANDS



Source: PBA

Pedestrian connections shown in the figure are:

- The blue arrow shows the footbridge that until 2013 provided an alternative to the Dynon Road Bridge path. This footbridge was partially removed and access closed as part of the Regional Rail Link project.
- The green arrow shows the existing creek-side path
- The Dynon Road Bridge path is shown with a red arrow
- Railway Place is shown with a yellow arrow
- Dudley Street is shown with a pink arrow

The most inaccessible part of the precinct for pedestrians is the Dynon Road Bridge footpath. There is no path on the north side of the Dynon Road bridge requiring people in the north-west corner of the precinct to travel south on Laurens/Ireland Street and pass under Dynon Road.

Figure 22 shows the narrow path on the south side of the bridge (right) and the access from Anderson Street (south) (left). The guard fence has been installed in the middle of the footpath. This path also has low amenity as it is close to noisy, high-speed heavy vehicle and general traffic. As well as being unpleasant, there is a degree of risk for the pedestrian in this environment.

FIGURE 22 – PEDESTRIAN SCESS TO DYNON ROAD BRIDGE FOOTPATH



Source: PBA

These links are discussed below in Integration Challenge.

DDA

Some of the footpath infrastructure has been upgraded to DDA standards. The bus stop at North Melbourne Railway Station has been linked to the station entrance with tactile paving for example. The footpaths along Spencer Street have been also been upgraded in this way.

It is unlikely however that a complete retrofit of tactile paving to existing conditions would facilitate DDA access more than a general upgrading of the low priority settings on the pedestrian network – by raising footpaths at intersections for example.

Amenity

Pedestrian amenity is high on local streets with extended kerbs (that support trees and grass) separating the pedestrians from motor vehicle traffic. There are a number of examples of this in the precinct:

- Extended planted kerbs – Adderley and Roden Streets

- Road closures that provide open space – Eades Park, Miller Street at Hawke Street, Howard Street, Victoria, Hawke, Errol and King Streets
- A high proportion of planting in the central median – Miller Street for example

A number of interventions have improved the design and management of the public realm. shows the reconfiguration of Anderson Street in the west of the precinct. This park will be expanded again in the near future.

FIGURE 23 – RECONFIGURATION OF ANDERSON STREET AT RAILWAY PLACE



Source: PBA

This amenity is reduced when:

- The extended kerb is covered with asphalt – Adderley between Stanley and Rosslyn for example
- The kerb is not extended or there is a low level of planting at the kerb or central median – Abbotsford between Ireland and Adderley for example
- The central median planting is replaced by roadway and parking – such as in Stanley Street
- The footpath is intersected with crossovers

Pedestrian amenity is lower on arterial roads and streets with higher volumes of traffic such as Spencer, King and Dudley Streets where:

- Traffic volumes are higher
- Traffic speeds are higher
- Heavy vehicles use the route further increasing noise and pollution
- The roadway has been divided into two travel lanes in each direction – Hawke Street between Spencer and Victoria for example
- Informal crossing opportunities are significantly reduced

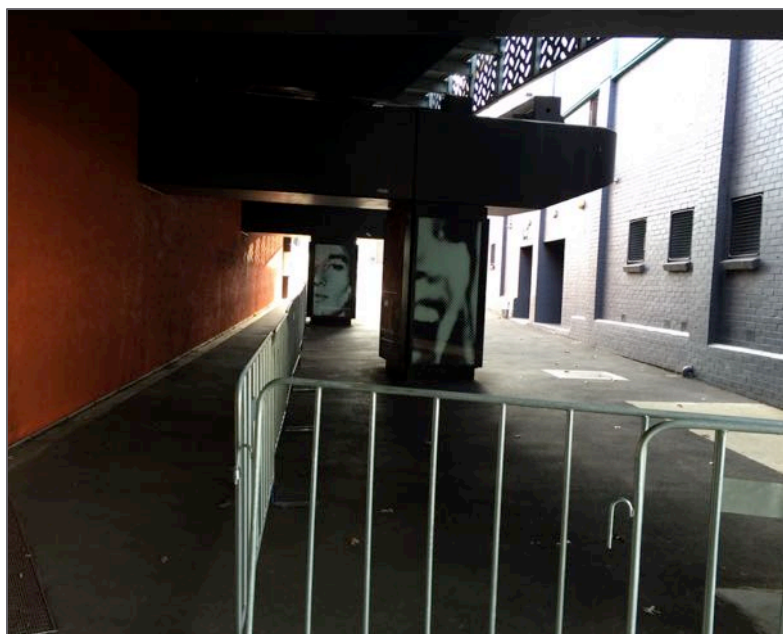
Railway Place

Railway Place connects to six local roads providing the shortest walking route to Docklands (and E-Gate).

Unlike most footpaths in the precinct, the footpaths in Railway Place are narrow, discontinuous and obstructed with poles and signs. Kerb outstands for trees have been provided and planted.

The poor quality of the street and the inadequate night-time lighting make this key route unattractive. Feedback from local stakeholders suggests that Railway Place plays an important role in supporting events at Festival Hall. Many patrons arrive from North Melbourne Station, La Trobe Street trams and Spencer Street Station. Generally, the venue keeps the Dudley Street doors closed. Figure 24 shows how the Regional Rail viaduct at the southern end of Railway Place has further compromised the amenity of the place (also known as Wren Lane).

FIGURE 24 – AMENITY AT THE SOUTHERN END OF RAILWAY PLACE



Source: PBA

Figure 25 shows the narrow and obstructed footpaths on Railway Place. Looking south from North Melbourne Railway Station (left) and north from Festival Hall (right).

FIGURE 25 – NARROW AND OBSTRUCTED FOOTPATHS IN RAILWAY PLACE



Source: PBA

The layout of Railway Place is not suitable for its current role for local residents and visitors to Festival Hall. It is not DDA compliant and lacks amenity that should be provided particularly given the proximity of the railway tracks. To comply with the *Transport Integration Act* a comprehensive redesign and reallocation of the space in the road reserve will be required as part of the structure planning process.

Dudley Street

There is a shared use pathway along both sides of Dudley Street. The path on the south side leads to a pedestrian crossing over 8-lanes of traffic (61 metres from kerb to kerb). The pedestrian has to call up three sets of signals. The path on the north side avoids the Wurundjeri Way intersection and is preferred by pedestrians. Indicative plans for the Western Distributor indicate that the southern intersection will be replicated on the north side allowing drivers on the Western Distributor to enter Dudley eastbound.

The elevated pathway on each side removes the traffic-related risks of Dynon Road but the railway underpass increases the noise and reduces the natural lighting and ventilation. The fence and wall as well as the absence of active frontages on either side of Dudley between Footscray Road and Adderley Street increase the perception of safety and security risks.

The north side path provides the link between businesses on the south side of Dudley Street, such as the Red Cross, and the parking structures in Docklands. Figure 26 shows the pedestrian path on the southern side of Dudley Street looking towards Docklands from West Melbourne.

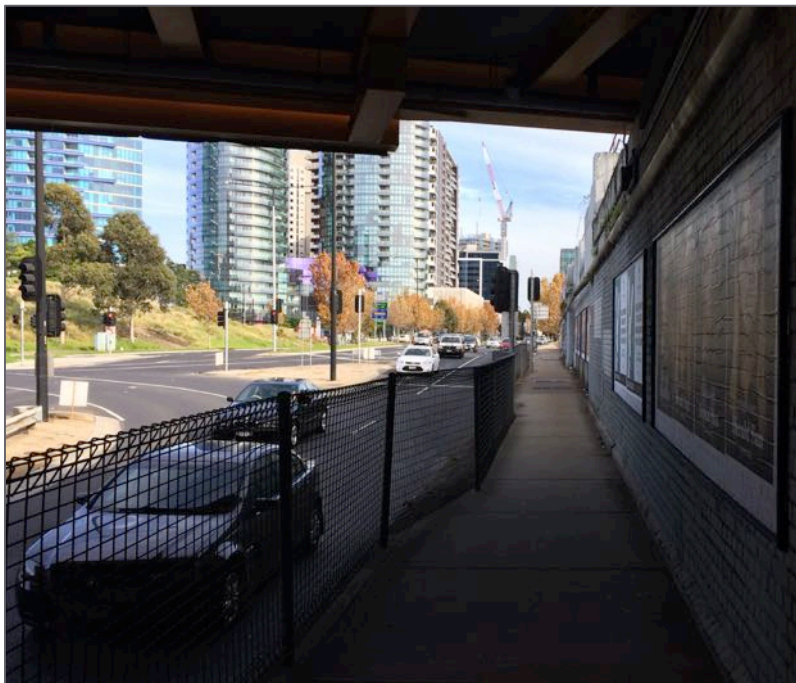
FIGURE 26 – PEDESTRIAN UNDERPASS ON THE SOUTH SIDE OF DUDLEY STREET



Source: PBA

The north side path narrows significantly on the west side of the railway as shown in Figure 27 below.

FIGURE 27 – PEDESTRIAN UNDERPASS ON THE NORTH SIDE OF DUDLEY STREET



Source: PBA

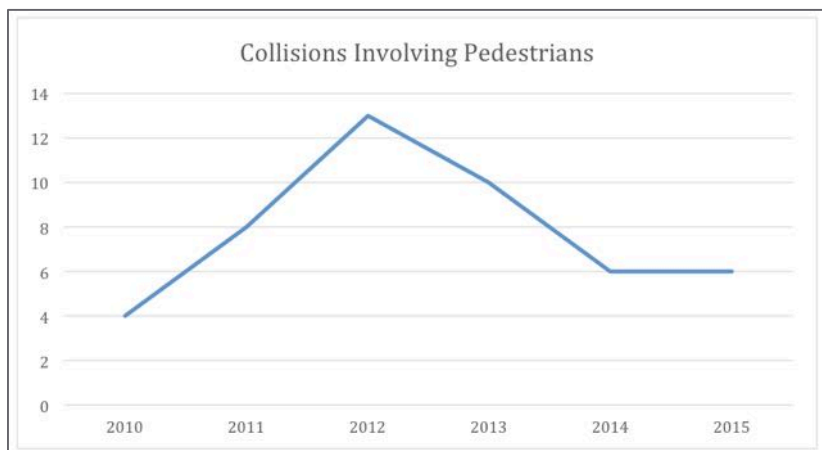
To comply with the Transport Integration Act both the Western Distributor project and the Structure Plan will need to positively address and provide for movement of pedestrians between West Melbourne and Docklands. The pedestrian movement networks between these two neighbourhoods is inadequate at the moment.

These two examples of very poor pedestrian amenity make the remainder of the precinct feel as if it has adequate amenity, when actually the pedestrian amenity across the precinct is low relative to other similar neighbourhoods in the City of Melbourne. The structure planning process should leverage experiences from other neighbourhoods such as East Melbourne and Carlton in order to generate the pedestrian amenity that will support future growth in population.

Crash History

Since 2010, there have been 47 motor vehicle collisions with pedestrians in the precinct. The recent trend is positive as shown in Figure 28 below.

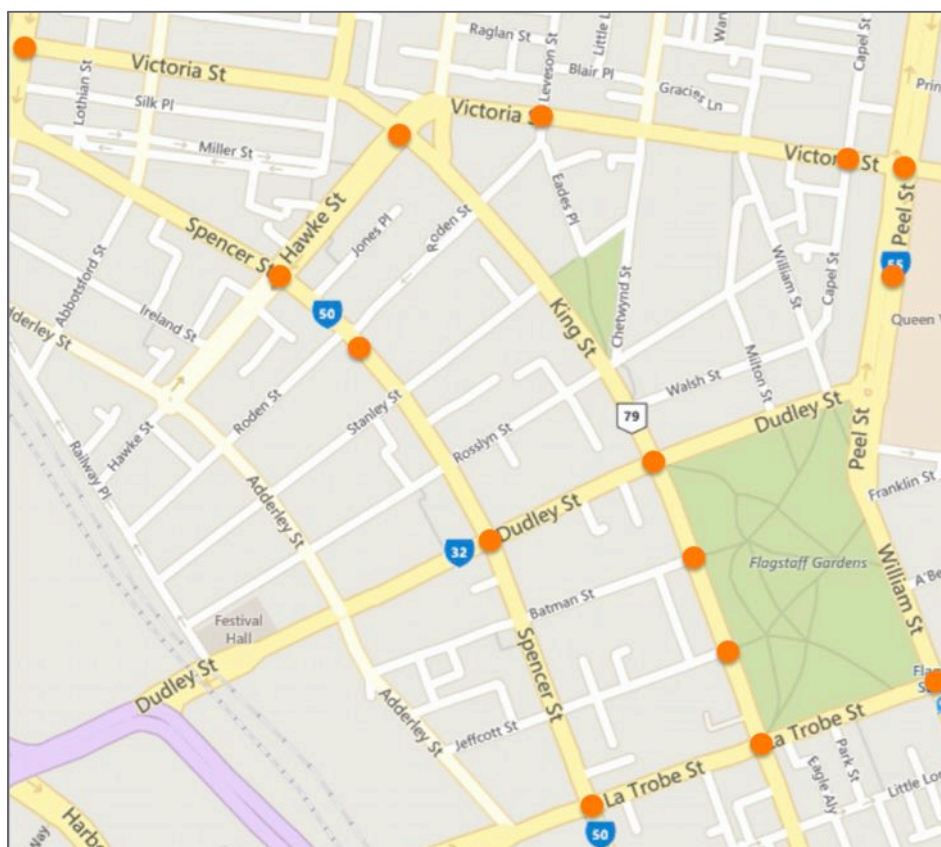
FIGURE 28 – COLLISIONS WITH PEDESTRIANS BY YEAR



Source: Crashstats VicRoads

Two-thirds (30) of the collisions have occurred when pedestrians have been hit from the right or left by drivers, suggesting that the major risk to pedestrians is from motor vehicle turning movements. Figure 29 shows that these collisions have occurred on the main through roads in and around the precinct. (A list of pedestrian collision types is included in the Appendix B)

FIGURE 29 – LOCATION OF TWO MAIN PEDESTRIAN COLLISION TYPES 2010 - 2015



Source: CrashStats

Pedestrian Summary

The precinct has a high level of pedestrian capacity and medium to high accessibility. Accessibility and amenity are compromised by high vehicle speeds and low priority for pedestrians.

Access to the west is very poor. The two links (Dynon Road and Dudley Street) fail all four criteria (capacity, priority, accessibility and amenity). There is also an 800m gap between these two low-quality links. As a result, the precinct is cut off from E-Gate and Docklands while people in these areas are cut off from North Melbourne and the Queen Victoria Market.

To cope with the forecast growth and current level of development, pedestrian traffic will need to take the place of motor vehicle traffic in the position of 'top' priority referred to in State and City of Melbourne strategies. This top priority would be reflected in many ways including: vehicle speeds, traffic signal settings and physical works such as raised zebra crossings to support desire lines. Access can be improved to all these destinations by selected through block links and mid-block links.

Initially the top priority can be developed around major destinations such as the North Melbourne Railway Station, Festival Hall, Errol Street shops, Flagstaff Gardens, Haileybury School and the Queen Victoria Market.

The severance to the west of the precinct is a regional problem for the municipality with implications for the economic success and liveability of Docklands, E-Gate, West Melbourne and North Melbourne. A significant effort will need to be made to improve and establish links in the west.

Key criteria related to the pedestrian network in West Melbourne are summarised in Table 9 below.

TABLE 9: SUMMARY OF PEDESTRIAN NETWORK FINDINGS

CRITERIA	FINDINGS
Capacity	The network has high capacity that is not fully used
Priority	Pedestrians have a low priority
Accessibility	<p>High in some areas</p> <p>There are few through block links and some mid-block links are difficult</p> <p>In general, there are barriers to east-west movement across Victoria St, King St, Spencer St, and the railway</p> <p>Access to the west is either missing (between Dudley Street and Dynon Road) or of very low capacity, accessibility and amenity on those two links</p>
Amenity	<p>Average amenity in the residential streets and low where roundabouts exist</p> <p>Low amenity on wider, busier and faster roads (particularly King, Spencer and Dudley Streets)</p> <p>Very low amenity on some key links such as Dudley Street, Railway Place and Dynon Road</p>

Source: PBA analysis

4.2. BICYCLE RIDERS

The City of Melbourne *Bicycle Plan 2016–2020* (Bike Plan) defines the role of the bicycle as ‘increasingly important’. This importance can perhaps be best understood in association with other modes. The bicycle provides an alternative that some users liken to:

- Efficient walking
- Additional seats on public transport taking ‘pressure off the public transport system’
- A space efficient, silent and non-polluting private vehicle

The bicycle has a range of around 4km for low-key riding, and around 7-10km for higher intensity travel usually associated with sporting wear and the need to shower and change. An electric-bike (e-bike) doubles the range of the higher-intensity traveller but reduces the intensity to low-key, combining both advantages.

A low-key rider in the northwest corner of the precinct can easily reach Festival Hall or the Queen Victoria Market in 7 minutes (1.3km). Both are located at the edge of the precinct at a distance slightly beyond the edge of the 800m walking catchment. This rider could also reach Flinders Street station in a quarter of an hour while a high intensity or e-bike rider can reach St Kilda Junction from West Melbourne in 30 minutes.

It is likely therefore that the current (and future) use of the bicycle in West Melbourne will be for low-key trips to and from the rest of the municipality. These trips will be competitive with walking (time), public transport (time and capacity) and driving (time and parking). People will not take up these options unless they have a low risk place to ride. The Bike Plan goals describe ‘a connected network for people of all ages and abilities to ride bikes’, ‘connected to schools, shops and community facilities by local neighbourhood routes’.

2030 Targets identified in the plan include:

- 25% of vehicles entering the central city in the morning peak will be bicycles. (Currently bicycles are 35% of vehicles on Royal Parade – 891 bicycles an hour.)
- 7% of total trips to, within and from the City of Melbourne will be made by bike (10% mode share)
- A 10% reduction in fatalities and serious injuries

The Bike Plan emphasises the importance of planning for bicycle and other sustainable transport routes in the West Melbourne structure plan and, in the longer term, using development funds for ‘local level improvements to streets, including quality bicycle lanes’.

Actions anticipated in the Bike Plan that are relevant to the West Melbourne precinct include:

- Improvements to two of the three strategic corridors identified in the Bike Plan. These are on the border of the precinct (the east west bicycle corridor along La Trobe Street and southern boundary of the precinct as well as the corridor along Peel and William Streets on the eastern boundary). Planned improvements include for example, full-time bike lanes on Peel Street at the Queen Victoria Market.
- Stakeholder contributions to the Plan included identification of the need to upgrade:
 - The Dynon Road bridge width or alternative routes
 - The Arden Street Rail Bridge (an upstream link in the Adderley Street route through West Melbourne)

Capacity

Investigations by Seriani and others (2014)¹ identified the flow rate of bicycle riders in London through traffic signals by time and lane width as shown in Table 10 below.

TABLE 10: BICYCLE RIDER FLOW RATES

WIDTH OF BICYCLE FACILITY	NUMBER OF RIDERS PER HOUR
1.0m	2,000
1.5m	3,400
2.0m	4,700

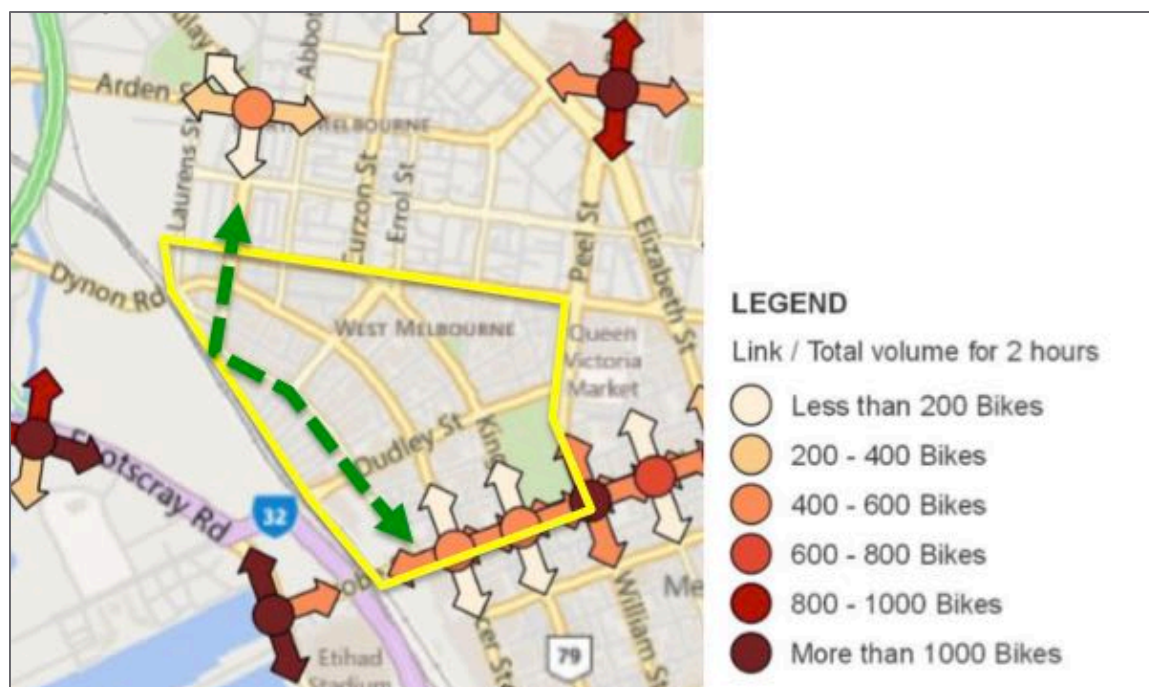
Source: Seriani (2014)

This suggests that the flow on Royal Parade (1m wide lane at the intersections) is at 50% capacity.

The rates in the table are consistent with published results from Copenhagen where an average of ten-hour, two-way counts over a bridge is 1,400 – 1,600 per metre per hour. The 24-hour two-way count for the Hawthorne Bridge in Portland USA on a day in summer is typically 5 – 6,000 but 13,000 has been recorded.

The Super Tuesday counts conducted for the City of Melbourne in the precinct shows low levels of use in the morning peak. An excerpt from the Super Tuesday count report is shown in Figure 30 below with the precinct boundary (yellow) and the main bicycle route through the precinct on Adderley Street (green dashed arrow).

FIGURE 30 – SUPER TUESDAY COUNTS MARCH 2015 AM PEAK



Source: Bicycle Network

¹ Experimental study for estimating capacity of cycle lanes Seriania, Fernandez, Hermosilla European Transport Conference 2014

It is problematic that the main bicycle route through West Melbourne is not a specific site on the Super Tuesday count. This data should therefore be considered a minimum count that may lack some data from Adderley Street.

If the 1.5m lane bike lane from Arden Street is carrying less than 200 riders in two hours (based on the riders exiting from Arden), the route is carrying less than 6% of its hourly capacity. On the other hand, the riders on Spencer and King Streets are riding on roads with no bicycle facilities and could be understood as being ‘above capacity’.

Future bicycle rider counts in West Melbourne (such as Super Tuesday) should be encouraged to include a count of riders on Adderley Street.

Priority

Priority for bicycle riders can be provided in time and directness. Typical time measures include early starts at traffic signals. Typical directness priority allows bicycle users to pass through road closures or take short cuts unavailable to some other road users. Swanston Street provides examples of both. Riders entering Swanston Street from Princes Bridge benefit from an early start signal at Flinders Street. Riders have been included in the priority modes that are permitted to enter the street.

The measures identified in the Bike Plan that increase the priority of bicycle riders are shown in Table 11 below.

TABLE 11: INTERVENTIONS TO INCREASE THE PRIORITY OF BICYCLE TRANSPORT

TYPICAL INTERVENTIONS SHOWN IN BIKE PLAN	EXAMPLE IN PRECINCT
Prioritising the level of service at intersections	-
Early start signals	-
Bike boxes at intersections	Victoria Street
ADDITIONAL CRITERIA FROM VICROADS LEVEL OF SERVICE	EXAMPLE IN PRECINCT
Controlled intersection	Various
Reduced delay	-

Source: City of Melbourne Bike Plan

Positive settings

There are no early start signals in the precinct, however there are examples of ‘directness’ priority:

- Railway Place, which supports riders entering the precinct from Laurens Street, has been closed to motor vehicles at North Melbourne Station. An additional closure, to allow a park expansion project, will still permit bicycle access.
- Adderley Street at Dudley Street is open to riders in both directions but closed to northbound motor vehicles.

Negative settings

Several opportunities to provide priority to bicycle riders have been missed across the precinct.

Riders are not permitted to use the connections between Miller, Curzon and Hawke Streets highlighted in yellow in Figure 31 below.

FIGURE 31 – INTERSECTION OF MILLER AND HAWKE STREETS SHOWING PEDESTRIAN LINKS



Source: Google Maps with PBA graphic additions

The connections to the Errol Street shops from the precinct are weak. Figure 32 shows that Hawke Street (yellow dashed arrow) has been prioritised for motor vehicles. The 10m roadway has been divided into three travel lanes northbound with no bicycle lane. There is no direct link from Victoria Street east into the Errol Street shopping precinct (solid yellow arrow).

FIGURE 32 – ACCESS TO ERROL STREET SHOPS BY BICYCLE



Source: Nearthmap with PBA graphic additions

The central median at Dryburgh and Ireland (discussed above in pedestrian priority) is closed for east west motor vehicle traffic. The crossings in this median have been aligned for pedestrians and are not well suited to bicycle riders.

Access

The City of Melbourne Bicycle Plan network map identifies the key access routes in the precinct. These routes are also the VicRoads SmartRoads Priority routes for bicycle trips. Figure 33 shows the network in green (standard on-road routes) and red (quality on-road routes) inside the precinct (blue line).

FIGURE 33 – BICYCLE NETWORK IN WEST MELBOURNE



Source: City of Melbourne Bicycle Plan

Access is positive on the red routes. Two of the three key corridors in the City of Melbourne Bike Plan are on the boundary of the precinct – La Trobe on the south and Peel/William Streets on the east. These increase access to other areas of the municipality for those in the precinct. Two other red routes – Victoria in the north and Adderley to the south support bicycle riding around the perimeter of the precinct.

Inside the precinct, bicycle access is not well supported. There has been strategic support for a bicycle route on Spencer Street. The street is designated as a bicycle route in the SmartRoads Network Operating Plan and the street is designated as a ‘high mobility street’ by the City of Melbourne in the Transport Strategy 2012. (See below). However, strategic decisions have not lead to the installation of bicycle facilities on the street. The recent 2016 – 2020 Melbourne Bicycle Plan does not give Spencer Street the status of a bicycle route.

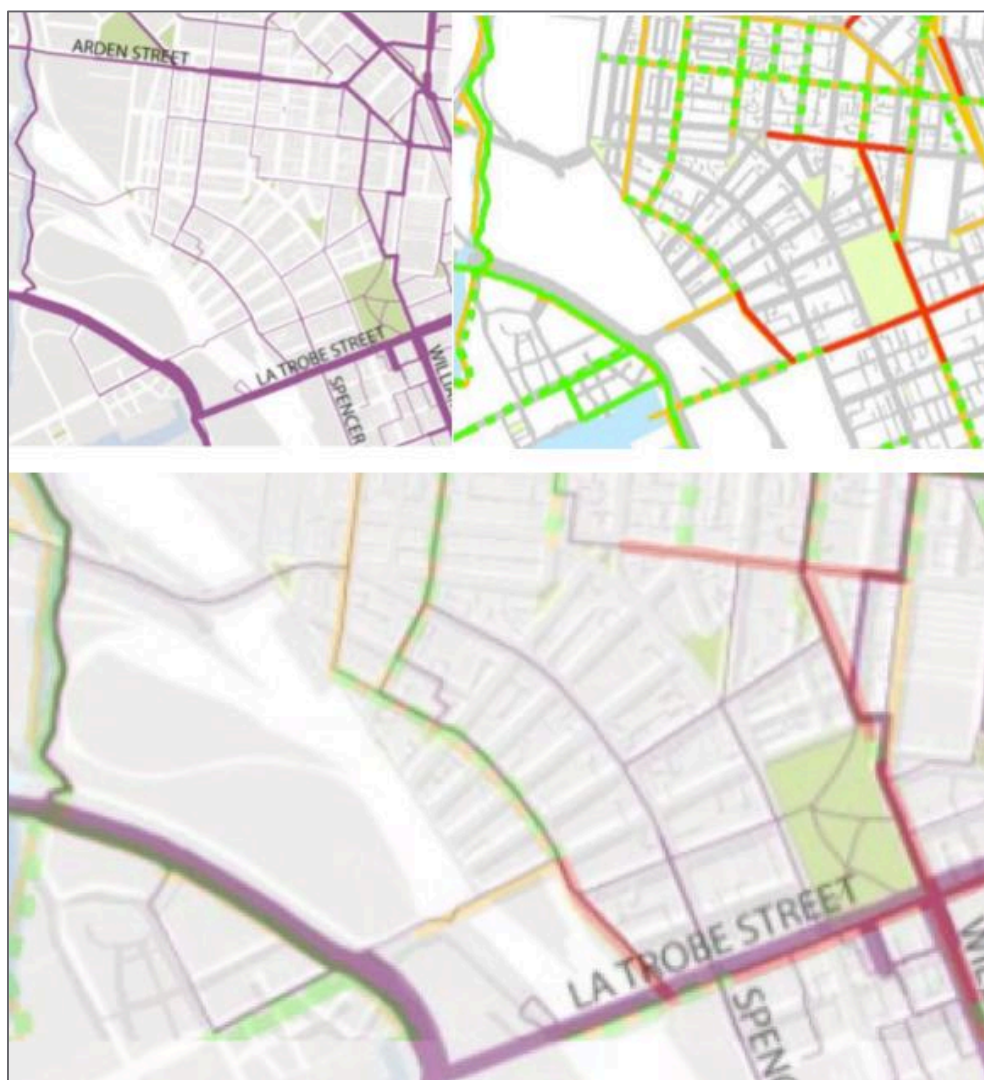
Two of the north-south bicycle routes in North Melbourne continue through the precinct – Abbotsford Street in the west and William Street in the east. Between these two streets in North

Melbourne are three other north-south routes: Curzon, Errol and Leveson Streets. None of these routes have been extended into the West Melbourne precinct.

The absence of these north-south routes and the lack of facilities in Spencer Street means that the central area of the precinct is without facilities.

Despite this lack of support, people are riding in the central area of the precinct. Figure 34 shows the routes reported by riders using RiderLog (top left) and the designated bicycle network (top right) – both images from the Bike Plan. The bottom image shows the two images superimposed.

FIGURE 34 – COMPARING RIDER MOVEMENTS TO THE DESIGNATED NETWORK



Source: City of Melbourne Bicycle Plan

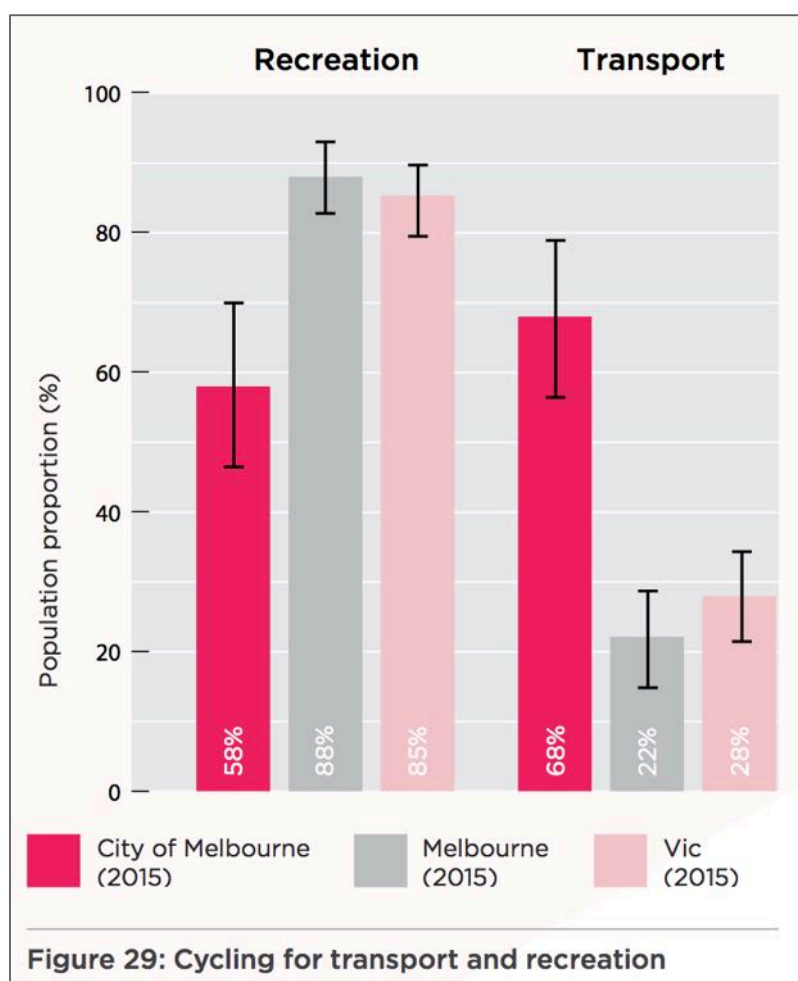
The (green) network does not support all the reported (purple) routes such as Spencer, Rosslyn, King, Jeffcott and Chetwynd Streets. As noted above, the Super Tuesday counts show rider movements on Spencer and King Streets.

In addition, a flow of riders in the peak hour has been observed on Laurens, Ireland, Railway Place, Adderley Streets. One rider using bike share at the Station to avoid going round the Loop said he was heading to Docklands and rode down Railway Place to Dudley Street.

Amenity

This assessment considers the amenity (including perceived and statistical risk) for people riding a bicycle for transport on roads – the main use in the municipality and likely to be the main use in the precinct. The 2016 – 2020 City of Melbourne Bicycle Plan notes that ‘of the people who cycled in the City of Melbourne in the last month, 58 per cent cycled for recreation and 68 per cent used a bicycle for transport. The proportion of people who ride for recreation is lower than the Melbourne average, and the proportion riding for transport is much higher than the Melbourne average.’ See Figure 35 below.

FIGURE 35 – RIDING BICYCLES FOR TRANSPORT



Source: City of Melbourne Bicycle Plan

The single route inside the perimeter is a separated lane 2.0m wide that enters the precinct in the north on Abbotsford Street, becomes a painted lane with double chevrons at Miller Street and a painted lane on Adderley Street, returning to a double chevron lane east of Dudley Street. Although this treatment is inconsistent, the quality is high for sections.

Positive settings

Table 12 shows the measures identified in the Bike Plan that increase the priority of bicycle riders and examples of where these have been applied in the precinct.

TABLE 12: INTERVENTIONS TO INCREASE THE AMENITY OF BICYCLE TRANSPORT

Typical City of Melbourne intervention (LIST FROM BIKE PLAN)	EXAMPLE IN PRECINCT
Physically-separated bicycle lane	Abbotsford Street Adderley Street at Dudley Street
Double chevron line marking	Victoria Street
Single chevron line marking	
Green pavement	Victoria Street Abbotsford Street
Profiled-edge line	-
Painted lanes	William Street (north of Dudley) Adderley Street
Peak period bike lane	-
Contra-flow lane	-
Low-speed environments	-
Controlled right turns	-
Removal of slip lanes	Anderson Street south of Dynon Road
Reduction of vehicle speeds at roundabouts and facilities for bikes where possible	-
Connections, to and through, intersections	William Street to William Street across Dudley Street
Crossing points at intersecting streets, laneways and drive-ways	-
High quality road surfaces	Various
Adequate lighting for safety	-
Way-finding and consistency	-
Adequate sight-lines and distances	Various
ADDITIONAL CRITERIA FROM VICROADS LEVEL OF SERVICE	EXAMPLE IN PRECINCT
Reduced volume of traffic	Road closure at Railway Place

Source: PBA, City of Melbourne Bicycle Plan

The available interventions can be applied at other locations in the precinct. For example:

- The Adderley Street roundabout could be treated:
 - As the Errol, Courtney, Harcourt roundabout has been in North Melbourne and turned into open space
 - As the Faraday/Cardigan roundabout in Carlton with zebra crossings on the approach leg (discussed above).
- Slip lanes could be removed, for example the one at Dynon Road and Dryburgh Street.
- A peak period or other type of bike lane could be applied in Spencer Street.

Negative settings

The most significant negative setting for bicycle riders is the speed and volume of motor vehicle traffic in the precinct. Even on the bicycle route through the precinct (Adderley Street) there is a high-speed single lane roundabout that adds avoidable risk. The high volume and speeds of motor vehicles in the precinct make it difficult for bicycle riders (and pedestrians) to cross uncontrolled intersections. Figure 34 above shows that riders are using Chetwynd/Rosslyn and Batman Streets to cross Spencer and Kings Streets. Only one of these intersections is controlled (King and Rosslyn/Chetwynd Streets).

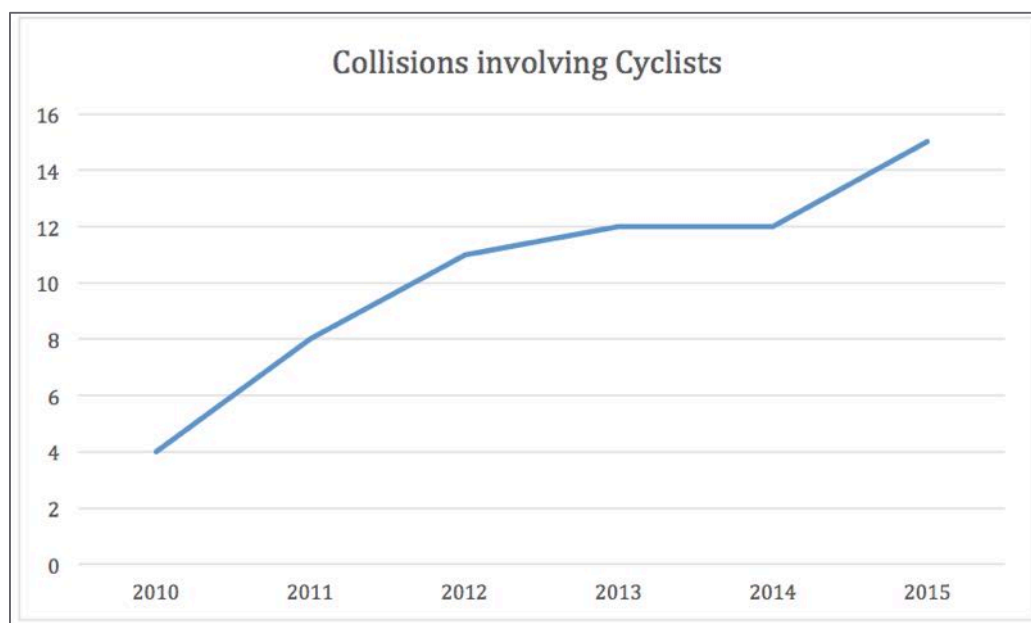
There is no suitable off-road access on the Dynon Road Bridge for bicycle riders.

The consequences of these settings can be seen in the casualty accidents bicycle riders have experienced in the precinct.

Crash History

Since 2010 there have been 62 motor vehicle collisions with bicycle riders and the trend is increasing as shown in Figure 36 below.

FIGURE 36 – COLLISIONS WITH BICYCLE RIDERS BY YEAR

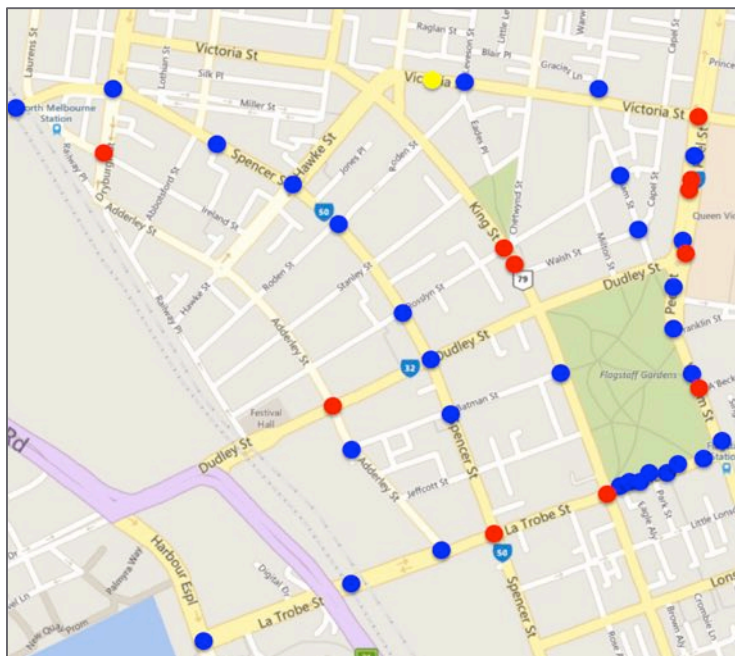


Source: PBA

Half of the total (31 collisions) have been bicycle riders hit by oncoming vehicles turning across the riders' path (right-through) or left turning drivers. This suggests that the major risk to bicycle riders is turning movements. Another 8 collisions were rider collisions with car doors. A list of all the types of collisions with bicycles is in Appendix B.

Figure 37 shows the location of the casualty accidents (all types) inside the precinct involving bicycle riders (2011 – 2016). The collisions are defined as Serious (red), Other (blue) and Non-injury (yellow).

FIGURE 37 – CASUALTY ACCIDENTS – BICYCLE 2011 – 2016 BY LOCATION



Source: CrashStats

Most of the collisions are on the perimeter roads and on the designated network (on perimeter roads such as La Trobe and William/Peel Streets).

Inside the precinct, most of the collisions have been on Spencer Street – a road that is not part of the defined network. Nonetheless, riders clearly use it or cross it in their journeys within the precinct.

There have been four serious injuries inside the precinct – three associated with high speed, high volume roads – King and Dudley Streets.

Bicycle Summary

The bicycle mode has not been prioritised in the precinct. Through movements have been supported by lanes and separated facilities on some routes. Usage is generally low in comparison to other areas.

The potential however is high. The generous travel lanes noted above allow space to be allocated to bicycle routes separated from traffic. Such routes would provide an attractive choice for people in the precinct wishing to access destinations around the precinct including the CBD. Federation Square is 3km from the North Melbourne Railway Station – a 15-minute trip at a moderate to slow pace. Once at the perimeter of the precinct, the trip would be fully on routes separated from traffic. Local destinations such as the library and shops in Errol Street are three times ‘closer’ on a bicycle than on foot.

It is difficult to make a case to leave the bicycle out of a future transport system in the precinct as it complements all the alternative modes by, for example, linking to public transport and providing a faster alternative to walking.

The mode provides an extended ‘walking’ catchment and can ‘fill gaps’ in the public transport service. As private transport, it complements car services such as taxis and car share. Even car owners with vehicles in multi-level car storage areas of new apartments would find the bicycle provided competitive door-to-door travel times. The measures to support cycling often complement other public transport and pedestrian priority measures such as traffic signal timings.

The barrier to use is separation from traffic. When this is provided along routes of suitable gradients with strong destinations, then usage can be high. City of Melbourne cordon counts are showing increasing use of bicycles during the morning peak.

An initial local separated network could be developed along Spencer and Hawke to link to existing Latrobe and Victoria Street facilities on the perimeter of the precinct.

Links that are developed to the west need to support bicycle use as destinations like the Docklands Library for example at 2km from North Melbourne Railway Station, are outside the pedestrian catchment but well inside the ‘low key’ riding catchment.

Higher levels of bicycle parking in apartments will need to be delivered to support use of this mode by residents of the precinct. Key criteria related to the bicycle network are summarised in Table 13 below.

TABLE 13: SUMMARY OF BICYCLE NETWORK FINDINGS

CRITERIA	FINDINGS
Capacity	Low capacity as only a few roads have marked lanes Use is low although riders are using areas not defined for bicycle riding
Priority	Low levels of priority across the precinct
Accessibility	Current network design supports perimeter and edges of the precinct but not the centre This fails to support local trip origins and destinations Access to Dynon Rd Bridge & Dudley St west of Adderley St is very poor
Amenity	Typically, very low Motor vehicle speeds are higher than other areas of the municipality

Source: PBA analysis

4.3. PUBLIC TRANSPORT

The City of Melbourne's public transport strategy has been set out in the Transport Strategy 2012.²

Targets in the Strategy for the combined share of public transport, cycling or walking are:

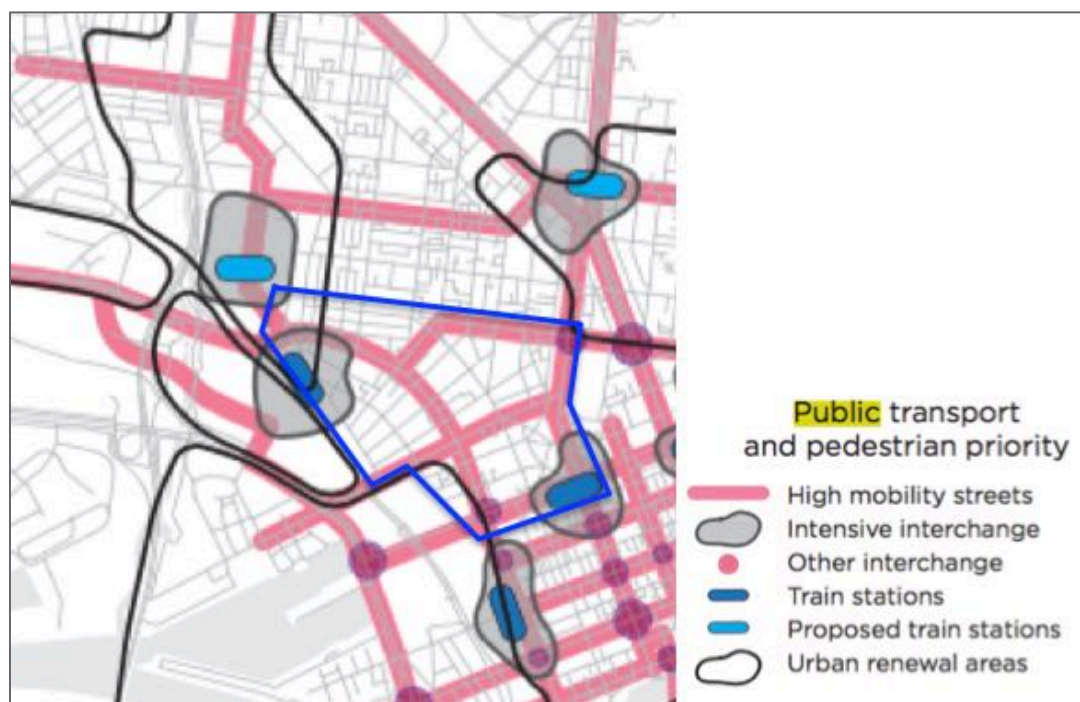
- By 2020 commuter trips to the CBD: 90% up from 72% in 2006
- By 2030 all trips to the City of Melbourne: 80% up from 51% (2009)
- All trips within the municipality: 95% up from 84% (2009)

To achieve these targets, the strategy imagines new tram and bus routes running on 'high mobility streets' that are characterised by:

- High frequency tram and priority bus services
- Level access platforms
- Seamless movement from footpath to public transport stops supported by infrastructure and signalling
- Excellent pedestrian access to and around stops
- Separated cycle lanes, early signal starts
- Low speed motor vehicle traffic

Figure 38 shows a map from the Transport Strategy for the West Melbourne precinct (blue line), which indicates that Spencer, Dynon, Dudley, Hawke, Peel, Dryburgh and Victoria Streets are anticipated to be high mobility streets.

FIGURE 38 – HIGH MOBILITY STREETS IN WEST MELBOURNE



Source: City of Melbourne Transport Plan 2012

² The strategy defines public transport as train, tram, bus, taxi, car share and bike share and air travel. This report considers train, tram and bus services in West Melbourne in this section and taxi, car & bike share and other transport services in the next section.

Table 14 shows the public transport priority interventions identified in the Strategy.

TABLE 14: INTERVENTIONS TO INCREASE THE AMENITY OF TRAM & BUS TRANSPORT

CATEGORY	Criteria (TRANSPORT STRATEGY 2012)	PRECINCT EXAMPLE	MUNICIPAL EXAMPLE
Network	New tram and bus routes	-	Spring & Spring/Victoria (bus) Spring/Collins (tram)
Priority (Reliability & travel time)	High mobility streets	Spencer, Dynon, Dudley, Hawke, Peel, Victoria, Dryburgh	Swanston Street
	Buses run in centre of road (like trams) See Figure opposite	-	Bus using elevated tram track Queensbridge
	Priority at intersections (Time and space priority)	-	Bus lantern Spring/Victoria
	Delay crossing King Street	-	
	Delays caused by congestion (Road space priority)	-	Bus lane Spring, Lonsdale
	Delays caused by motor vehicles using dedicated lanes, left turns	Tram separators Victoria Street Separated central median Peel Street	Bus using elevated tram track Queensbridge
	Extend short bus stops	Long bays at North Melbourne Station	Remove car parking in Victoria Parade
Accessibility	Safe, easy and disability compliant access at stations and stops	-	Various
	High standard (convenient, logical and safe) walking conditions to and from public transport	-	Macarthur/Spring
	Park and ride for bicycle trips	On-street parking rails near North Melbourne Station (40m)	On-street parking rails at entrance to Parliament Station (10m) (Lonsdale)
Amenity	Integrated design and management of the public realm between stops, stations and interchanges	-	Parliament Station at Lonsdale Spring Swanston Street at Melbourne Central

Source: Transport Strategy 2012 with PBA analysis

Table 15 shows the interventions identified in the Strategy that are beyond the direct control or influence of the City.

TABLE 15: OTHER INTERVENTIONS TO INCREASE THE AMENITY OF TRAM & BUS TRANSPORT

CATEGORY	CRITERIA	POSSIBLE INTERVENTION
Capacity	Overcrowding	Larger vehicles, more routes, higher frequencies
	Frequency	Higher frequencies
Priority	Automated Enforcement techniques	Enforcement by camera
Amenity	Noise, air quality, carbon emissions	Electric propulsion for buses

Source: City of Melbourne Transport Plan PBA

Figure 39 shows a centre of the road public transport platform used by buses and trams.

FIGURE 39 – CENTRE ROAD SHARED PLATFORM QUEENSBRIDGE STREET



Source: PBA

The strategic context has changed in the time since the *Transport Strategy 2012* was endorsed. In particular, urban renewal priorities have changed. This does not affect the general direction of the *Transport Strategy 2012* but there are impacts on the area around West Melbourne.

In particular, the E-Gate precinct, which had been a high priority, has been postponed while areas such as Fishermans Bend are developed. The West Melbourne structure plan – and much of West Melbourne – is likely to be developed and completed before any further consideration of developing E-Gate.

Figure 40 shows the tram network envisaged in the *Transport Strategy 2012*. Three new tracks are envisaged in the West Melbourne precinct:

- A new (brown) route is imagined extending along Spencer Street (yellow arrow). This route links north along on Hawke Street to the existing tram service in North Melbourne (Route 57).
- The new Spencer Street line is continued along Dynon Road to the west.
- Another line connects the Dynon Road route south along the Moonee Ponds Creek and then east through E-Gate to connect to the existing Dudley Street tram in Docklands.

FIGURE 40 – PROPOSED E-GATE TRAM SERVICES



Source: City of Melbourne Transport Plan with PBA graphic additions

A connection to the east (not shown) 'on Victoria Parade, between Swanston Street and Carlton Gardens' proposed in the Strategy will have some indirect impact on the precinct as the Victoria Street tram runs along the northern boundary of the precinct.

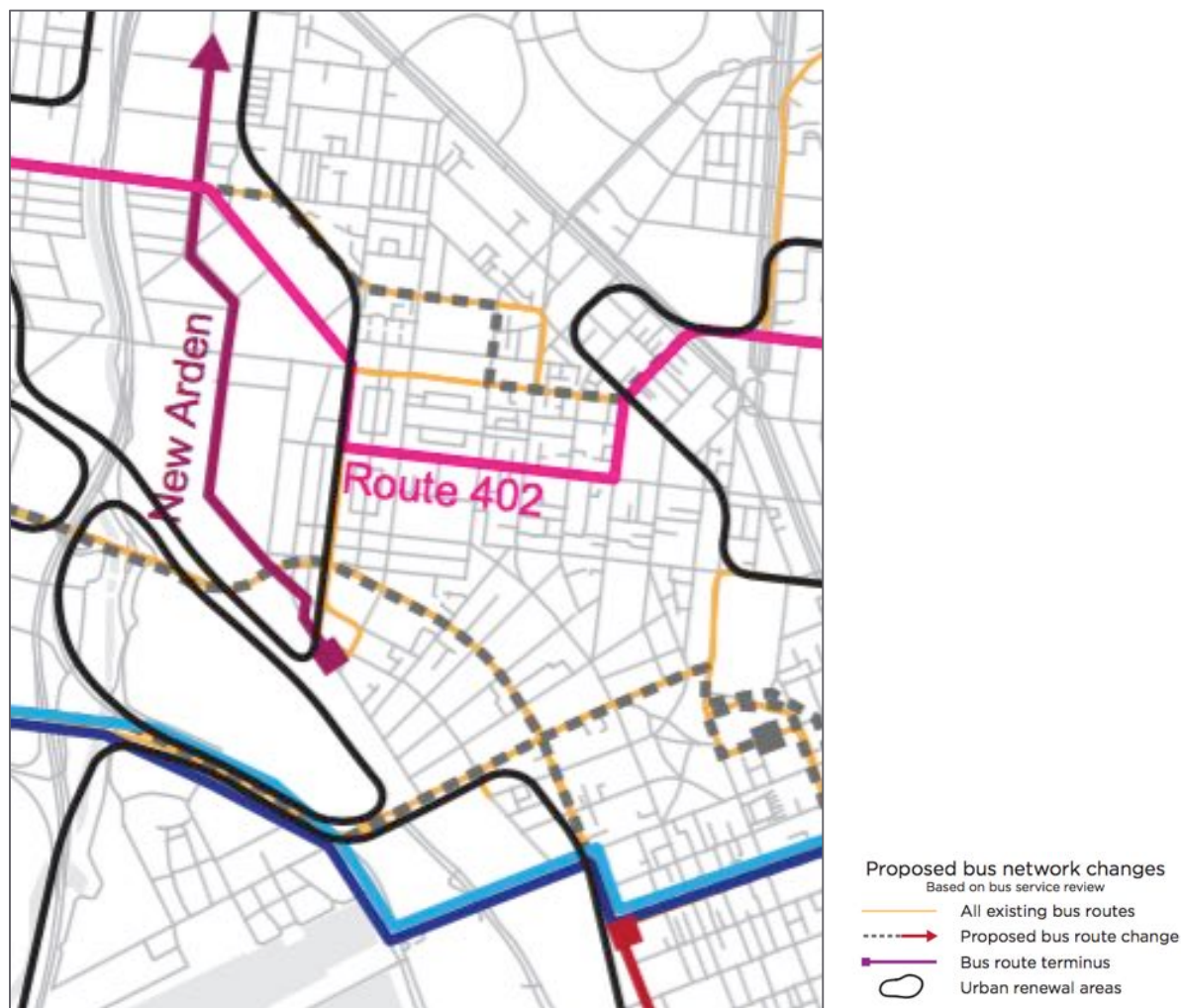
These concepts have not been developed further – probably because of the lower priority of development in E-Gate.

The Metro Station at Arden (blue circle) is likely to influence the choice of a connection between the Spencer Street tram and Route 57. A connection along Abbotsford Street may be preferred. (Until the 1930s the cable tram route ran along Abbotsford Street and then south along Spencer Street. See Figure 42)

The proposed extension of the tram network into West Melbourne via Spencer Street is consistent with the Strategy and can be considered as part of the structure plan.

Figure 41 shows the equivalent figure for the bus network. In this figure the current bus routes (grey dashes) along Spencer and Dudley have been shifted to Footscray Road and Collins Street (blue lines) to serve E-Gate.

FIGURE 41 – PROPOSED E-GATE BUS SERVICES



Source: City of Melbourne Transport Plan 2012

These concepts have not been developed further – again probably because of the lower priority of E-Gate.

The proposed removal of the bus routes from West Melbourne is no longer relevant. When the Transport Strategy 2012 was developed, E-Gate was the most significant urban renewal project being planned for Melbourne. Since then the urban renewal focus has moved to Fisherman's Bend. In addition, closure of light industry and development of residential buildings in West Melbourne has accelerated. Therefore re-aligning the bus routes in West Melbourne to service the railway yards (E-Gate) is no longer an appropriate vision for public transport in the area. Such a change would have a negative impact on the current and future access to public transport in the precinct and would be inconsistent with the Strategy.

Capacity – Public transport

Train services

The precinct has access to high capacity public transport through North Melbourne Railway Station. However, services approaching the CBD are showing signs of increased overloading at North Melbourne Station as shown in Table 16 and Table 17 below.

TABLE 16: TRAIN LOADS ABOVE BENCHMARK (2014)

LINE	AM PEAK	% OF SERVICES	PM PEAK	% OF SERVICES
Craigieburn	7	35%	3	12%
Sunbury	2	10%	4	16.7%
Werribee	8	38.1%	7	33.3%
Upfield	1	12.5%	0	-
Williamstown	0	-	0	-

Source: *Metropolitan Train Load Standard Surveys 2014 PTV*

Overloading is becoming more frequent as shown below.

TABLE 17: TRAIN LOADS ABOVE BENCHMARK (2015)

LINE	AM PEAK	% OF SERVICES	PM PEAK	% OF SERVICES
Craigieburn	8	40%	5	20%
Sunbury	7	35%	6	25%
Werribee	8	40%	9	43%
Upfield	2	25%	1	1.1%
Williamstown	0	-	0	-

Source: *Metropolitan Train Load Standard Surveys 2015 PTV*

The network wide average for the am peak is 18.7% and 10% for the pm peak suggesting that the overloading is a greater problem on the North Melbourne lines.

The overfull trains may be diverting passengers from rail to other trips. Passengers outbound from West Melbourne to the CBD are likely to choose to ride a bicycle or walk when train services are regularly overloaded. Counter peak services are not likely to be stressed maintaining an advantage over car travel to destinations well served by public transport.

Tram services

Tram services are currently only available around the perimeter of the precinct.

The routes around the precinct have been affected by overloading in recent years. Overloading is being addressed at a network level by provision of larger trams (on some routes) and more frequent services. Routes with small trams – like those that currently serve the precinct – are more likely to be above capacity:

- 64% of services with small trams are above maximum capacity
- 72% of the overloading (>90%) was observed on routes with smaller vehicles

Route 55 (Peel – William Streets)

This route was provided with extra capacity in 2015, loads fell below the load breaches of 2014.

Table 18 shows the percentage of average maximum capacity for the two years in the morning and Table 19 the evening peak as measured at Peel and Victoria Streets.

TABLE 18: AVERAGE MAXIMUM CAPACITY – AM PEAK LOADS ROUTE 55

			2014	2015	CHANGE
Peel/Victoria (55)	Southbound	7:01-8:00	88.6%	65.4%	Decrease
		7:31-8:30	108.9%	72.2%	Decrease
		8:01-9:00	116.2%	90.7%	Decrease
		8:31-9:30	107.3%	88.3%	Decrease
		9:01-10:00	83.0%	62.4%	Decrease
		Total average	101.0%	75.3%	Decrease

Source: *Metropolitan Tram Load Standards Survey Report May 2015 PTV*

TABLE 19: AVERAGE MAXIMUM CAPACITY – PM PEAK LOADS ROUTE 55

			2014	2015	CHANGE
Peel/Victoria (55)	Northbound	16:01-17:00	51.7%	46.7%	Decrease
		16:31-17:30	73.0%	70.8%	Decrease
		17:01-18:00	89.9%	75.7%	Decrease
		17:31-18:30	89.2%	68.4%	Decrease
		18:01-19:00	80.7%	61.8%	Decrease
		Total average	77.2%	64.3%	Decrease

Source: *Metropolitan Tram Load Standards Survey Report May 2015 PTV*

Route 57 – (Errol Street shops – Victoria Street)

The route carried 11% more passengers between 0800 – 0900 in 2015, lifting the load to 97%. The average load increased by 3% in the AM and 16% in the PM peak. PTV rate this loading as a ‘potential issue’.

Table 20 shows the percentage of average maximum capacity in the morning and Table 21 the evening peak as measured at Errol St and Victoria Streets.

TABLE 20: AVERAGE MAXIMUM CAPACITY – AM PEAK LOADS ROUTE 57

			2014	2015	
Errol/Victoria (57)	Southbound	7:01-8:00	67.0%	66.1%	Decrease
		7:31-8:30	85.3%	86.8%	Increase
		8:01-9:00	87.9%	97.2%	Increase
		8:31-9:30	78.8%	84.2%	Increase
		9:01-10:00	63.3%	61.1%	Decrease
		Total average	76.5%	79.1%	

Source: *Metropolitan Tram Load Standards Survey Report May 2015 PTV*

TABLE 21: AVERAGE MAXIMUM CAPACITY – PM PEAK LOADS ROUTE 57

			2014	2015	
Errol/Victoria (57)	Northbound	16:01-17:00	54.8%	66.5%	Increase
		16:31-17:30	59.7%	72.1%	Increase
		17:01-18:00	65.8%	75.7%	Increase
		17:31-18:30	68.1%	78.3%	Increase
		18:01-19:00	75.5%	84.1%	Increase
		Total average	64.8%	75.3%	Increase

Source: *Metropolitan Tram Load Standards Survey Report May 2015 PTV*

Passenger overloading is not necessarily a sign that the route has reached its capacity. In principle, the manager of a tram route approaching the CBD will seek to ensure that the trams are full when they arrive in the centre. The loadings of these routes reflect this approach.

When tram routes approaching a CBD become overfull, then additional services or trams with greater capacity (or a combination of both) can be provided. Again, the response to overloading on these routes reflects this approach.

If this approach is followed in the future, then the tram capacity on the routes on the boundaries of the precinct will be able to increase. In practice, the increase in capacity will be limited by a number of factors. In particular the when other priorities on the tram network, in public transport and in transport overall cause resources to be directed elsewhere.

Tram capacity in the precinct would increase significantly if the Spencer Street tram were extended into the precinct. As noted above, for forty years the precinct was served by trams along Spencer Street. The cable tram route ran from the corner of Abbotsford and Queensberry Streets North Melbourne via Spencer Street, Lonsdale Street and Elizabeth Street to a terminus at Flinders Street Station in the CBD as shown by the brown route in Figure 42 below.

FIGURE 42 – LONSDALE-SPENCER-ABBOTSFORD STREET CABLE TRAM ROUTE



Source: www.anzacs.trammuseum.org.au

In the 1930s, the cable-tram was replaced with a bus route – a forerunner to the Route 216/219 that operates on Spencer and Lonsdale Streets today.

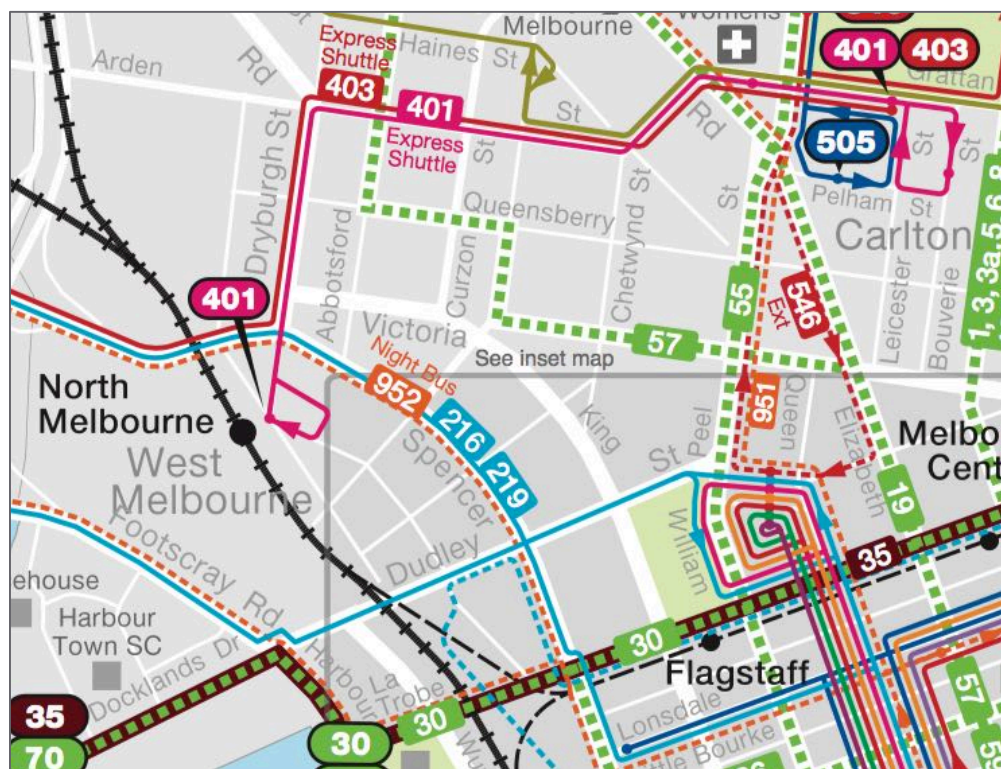
Bus services

Although twelve bus routes have stops in the precinct only three can be considered to be serving a significant part of the precinct as regular routes. The three significant services in the precinct are:

- Route 216 and Route 219 on Spencer Street
- Route 220 on Dudley Street.

The other services typically only have one or two stops in the precinct. These include Routes: 232, 234, 235, 236, 237, 401, 546, as well as the 951 and 952 Night Bus. The PTV service map for the precinct is shown in Figure 43 below.

FIGURE 43 – BUS (& TRAM) SERVICES IN THE PRECINCT



Source: PTV

Some of these bus services are not directly relevant to the precinct:

- Some run on Queen Street, serve the Queen Victoria Market and have one or two stops on the perimeter of the precinct: 232, 234, 235, 236, 237, 546 and 951.
- The Spencer Street Night Bus 952 carried 41 people in 2015 – fewer than one passenger a week. Most passengers from the precinct boarded the bus at the North Melbourne Station.
- North Melbourne station is the terminus for the 401 and 403 shuttle service to Melbourne University. This service carried 254,521 people in 2015 – 654 boardings per day on average. This service has no other stops in the precinct.

The three ‘precinct services’ operate on alignments that have not changed for fifty years. These routes are on priority bus routes in the VicRoads SmartRoads Network Operation Plan.

Table 22 shows the capacity of these bus services. The two corridors have SmartBus levels of service. Route 220 has 15-minute headways and the Spencer Street services (Routes 216 & 219)

have a combined headway of 15-minutes (the timetable staggers services evenly). The Saturday services are at 15-minute intervals while the Sunday service is at 30-minute intervals.

The capacity of existing bus services is highlighted in Table 22 below.

TABLE 22: BUS CAPACITY WEST MELBOURNE WEST MELBOURNE PRECINCT WEEKDAYS

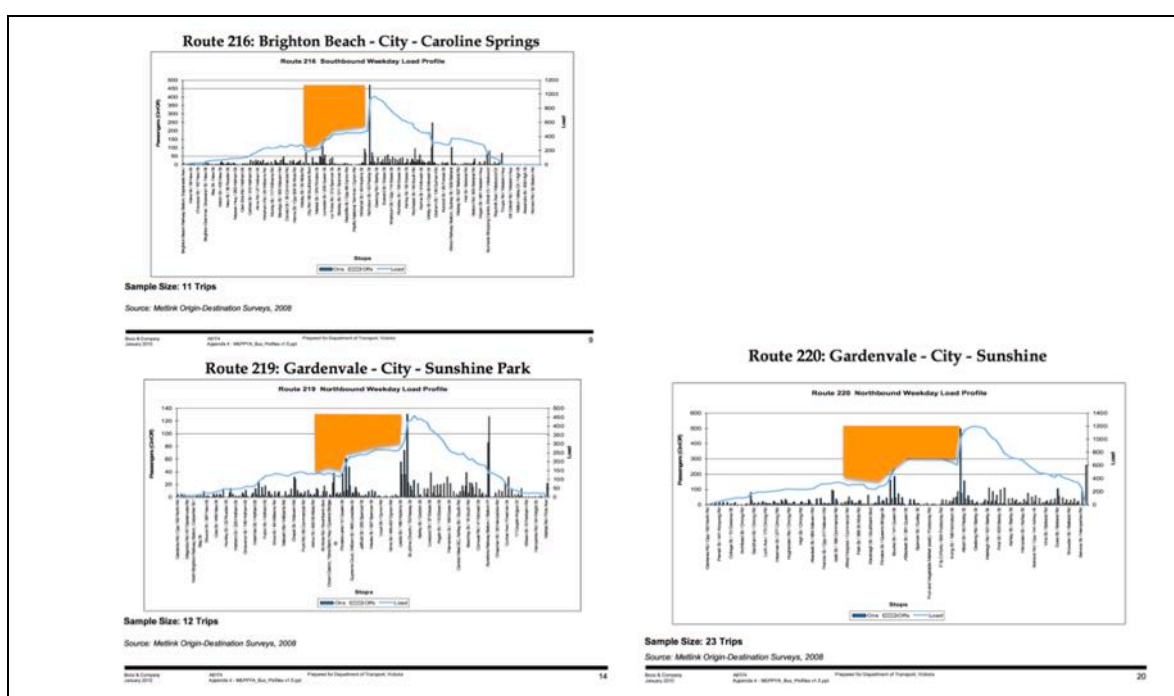
ROUTE	ROAD CORRIDOR	SERVICES / DAY	CAPACITY / DAY	AVERAGE BOARDINGS / DAY	BOARDINGS P.A.
216	Spencer Street	35/35	4,200	42	16,288
219	Spencer Street	43/41	5,040	34	13,161
Passenger experience of combined service	Spencer Street	76/78	9,240	76	29,449
220	Dudley Street	76	8,820	75	29,135

Source: PBA

Vehicles with a range of capacities are used along the route. The passenger capacity of the buses on the route is estimated at 60 passengers.

There is a significant amount of spare capacity in the bus service. Load profiles from the Metropolitan Bus Review 2010 show the services have a peak load of 1,000 – 1,200 passengers. This peak load is at Footscray Station. On their way through the precinct the buses have a load of 300 – 400 passengers. This suggests that the buses could double or triple their load through the precinct. Load profiles from the Metropolitan Bus Review 2010 are shown in Figure 44 below and highlight the available capacity on existing services (orange area) as they pass through the precinct.

FIGURE 44 – AVAILABLE CAPACITY ROUTES 216, 219 & 220 WITHIN THE CITY OF MELBOURNE



Source: *Metropolitan Bus Review 2010*

As was noted above, providing larger vehicles or increasing frequency can increase the capacity of the service.

On-road Public Transport Priority

Tram priority measures

Priority measures in the Strategy have not been applied extensively in the precinct.

There are no high mobility streets in the precinct. Table 23 shows some of the high mobility streets indicated in the Transport Strategy against the high mobility street criteria. Dynon, Dudley and Hawke Streets have not been included in the table as, like Spencer Street, they fail all criteria. The streets that meet some of the criteria, Peel, Victoria and La Trobe Streets, are all on the perimeter of the precinct.

TABLE 23: HIGH MOBILITY STREETS

CRITERIA	PEEL	VICTORIA	LATROBE	SPENCER
High frequency tram and priority bus services in centre of road	Yes	Yes	Yes	No
Level access platforms	Some	No	No	No
Seamless movement from footpath to public transport stops supported by infrastructure and signalling	Yes	Yes	Yes	No
Excellent pedestrian access to and around stops	No	Yes	No	No
Separated cycle lanes	No	No (High level of delineation)	Yes	No
Early signal starts	No	No	No	No
Low speed motor vehicle traffic	50kph	50kph	40kph	60kph

Source: *PBA*

Bus priority measures

The bus priority measures in the Strategy have generally not been applied in the precinct:

- None of the bus routes run in the middle of the road.
- None have signal priority or a bus lane.
- All tram and bus services are delayed at King Street.
- Bus stops on Dudley and Spencer are at the approach rather than the departure side of the intersection. The stops on Spencer are short (13 – 20m) whereas the stop at North Melbourne Station is 44m long. Stops on Victoria Parade are 33m long and 30 – 40m on Lonsdale Street.
- Although un-signalised roads intersecting with King Street have been closed or reconfigured (for example Errol and Curzon as well as Stanley and Chetwynd at Eades Park), none of the crossings on Spencer have been treated to improve flow and priority for the bus service.
- The central median is open on Spencer Street at all intersections and some laneways.

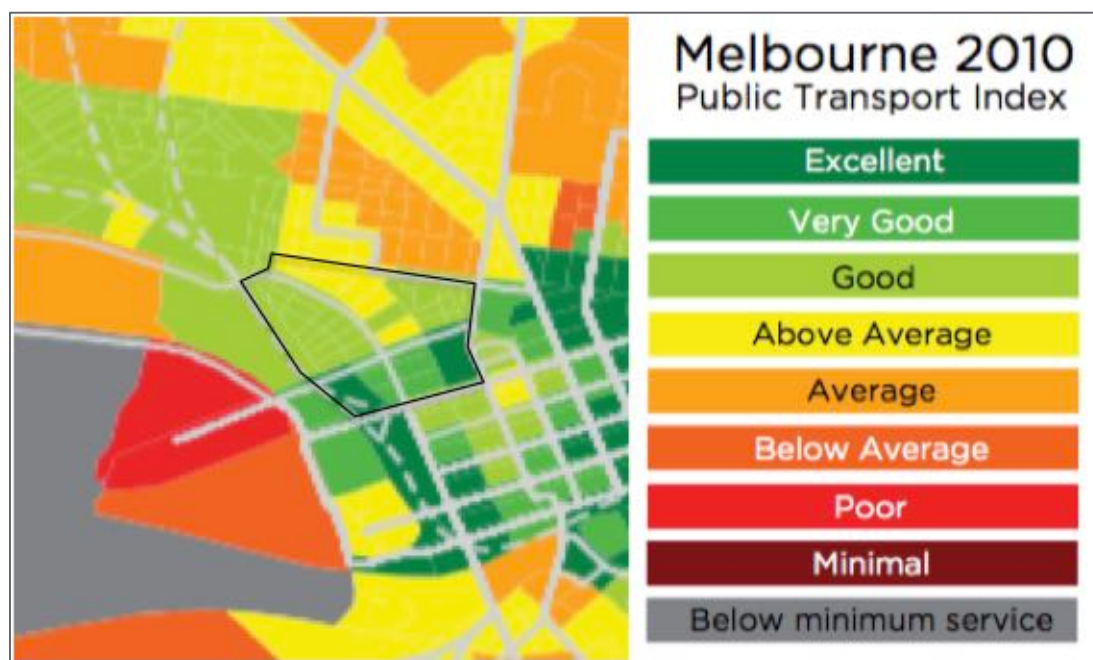
There are two important bus routes that pass through the precinct: Skybus and the 401 between North Melbourne Station and Melbourne University. Both services have a terminus on the (or just beyond) the perimeter of the precinct and so are convenient to people in the precinct even though they do not make any stops on their way through. Bus priority measures would be appropriate for these services. In particular, the Skybus would benefit from a centre of the road corridor along Spencer Street. The buses use this route from time to time to avoid congestion and when the Dudley Street underpass is flooded.

Public Transport Accessibility

Distance to public transport

The *Transport Strategy 2012* rated the public transport service in the precinct as ranging between Excellent and Above Average. This assessment does not appear to reflect the benefit of the North Melbourne Railway Station in the northwest corner of the precinct. Depending on the catchment measures used, it is likely that the entire precinct has Very Good access. Figure 45 shows the assessment from the Strategy with the precinct shown inside the black border.

FIGURE 45 – LEVEL OF SERVICE – PUBLIC TRANSPORT



Source: *Transport Strategy 2012*

Quality of 'last 100m' to public transport

The measures of accessibility in the Strategy identify a number of criteria related to the quality of the 'last 100m'. The Strategy says a high level of accessibility would mean that there was 'high standard (convenient, logical and safe) walking conditions to and from public transport' that lead to 'safe, easy and disability compliant access at stations and stops'. This feature of accessibility includes passengers who come by bicycle.

A high-quality example in the City of Melbourne might be the context and links between Melbourne Central, the State Library and the tram route on Swanston Street.

The area in West Melbourne that has had the most intensive access treatment is at the North Melbourne Station. Measured against the Strategy, the result is adequate rather than high standard. An aerial view of North Melbourne Station is shown in Figure 46 below.

FIGURE 46 – NORTH MELBOURNE STATION



Source: PBA

-  Private bicycle parking
-  Share Bicycle dock
-  No zebra crossing
-  No support for pedestrians
-  Public open space

An area of public open space has been established using extended kerbs and a closed roadway (orange area). A zebra crossing has been provided (at grade rather than raised). No zebra was provided at Railway Place (yellow box). Approaching (or departing) passengers could have been supported across the intersections shown in green. The blue line shows the well-located bicycle share dock. The end of trip bicycle parking is 40m from the entrance at the blue circle rather than right at the entrance near the bike share dock.

The approach taken at North Melbourne Station was one that had minimal impact on the design and access qualities beyond the limits of the site boundary. In other jurisdictions, such a public

transport improvement would have included significant works on the public land and road reserves leading up to the front door of the station. For example, the urban design feature incorporated into a new tram line in Strasbourg is shown in Figure 47 below.

FIGURE 47 – STRASBOURG TRAM STOP CANOPY



Source: Wikipedia

The canopy provides a centre to the L’Homme de Fer square, integrates the tram platforms with the urban fabric, identifies the location of the platforms and provides amenity for passengers.

Amenity – Public transport

There is generally a low level of amenity on the bus routes in the precinct. Some stops do not have shelters while one duplicates the shelter provided by buildings. Figure 48 shows two stops on Spencer Street at Stanley Street.

FIGURE 48 – BUS SHELTERS SPENCER STREET



Source: Google Maps, PBA

The south side has no shelter but does have a small veranda awning on the adjacent shop. The north side stop has a bus shelter placed in the middle of the footpath under a wide veranda.

Public transport Summary

The precinct has strong public transport around the perimeter of the precinct. There is spare capacity on the bus routes through the precinct and the ability to grow the capacity of trains and trams.

Public transport travelling through the precinct – buses on Dudley and Spencer Streets – has a low priority. The accessibility and amenity of public transport is low, partly because pedestrian and bicycle priority and amenity is low. The train stations and some tram stops have high levels of DDA access.

One of the attractions of the precinct for businesses and residents will be the public transport services available in the precinct for the journey to work and for access to CBD based businesses. It is likely that the walkability and bikeability of the area will be judged through the lens of public transport services and expectations of the need for and feasibility of using motor vehicles for many trips will be set on this basis.

Businesses and residents will expect and be attracted to a low car use future in the areas around the North Melbourne Railway Station precinct and the southern blocks near the Flagstaff Gardens. (Haileybury School is an example). The centre of the precinct, however, does not provide the same signals or the same confidence in alternative transport choices. It is likely to generate different expectations.

The opportunity is to provide an immediate and relatively low cost public transport spine along Spencer Street to the Dryburgh Street, Dynon Road intersection. This spine can be defined in the central median and raised from the roadway separating it from traffic establishing priority. The spine could be reinforced by the closure of intersecting local roads on one or both sides of the spine.

The current bus routes can be run along the spine (possibly running contra flow and servicing shared central platforms). Over time additional bus routes can be added (such as the SmartBus routes to Doncaster) and rails provided to extend tram services up the road.

Separated bicycle routes and pedestrian priority as noted above could support the public transport spine.

This intervention would signal that the whole precinct is supportive of low car use.

Key criteria related to the public transport network in West Melbourne are summarised in Table 24 below.

TABLE 24: SUMMARY OF PUBLIC TRANSPORT NETWORK FINDINGS

CRITERIA	FINDINGS
Capacity	The network has some spare capacity and the capability to grow as long as funding is available. The current use of the network is high for trains and trams. It is low for buses.
Priority	Some public transport passengers benefit from some positive priority settings. Some do not.
Accessibility	Accessibility is high when measured by time and distance to nodes. It is poor when measured by the quality and convenience of 'the last 100m'
Amenity	The amenity of the public realm around public transport nodes is low. Overcrowding reduces amenity.

Source: PBA analysis

4.4. OTHER TRANSPORT SERVICES

In 2011, there were nearly 17,000 zero car households in the City of Melbourne – ten thousand more than in 2001. As well as using walking, bicycle riding and public transport, this group relies heavily on a number of transport services that includes short-term rentals, deliveries and the Internet.

These services are often overlooked as they can appear to car owners as trivial additions to the mainstream ‘alternatives’ to car use. However, for someone who does not own a car these services allow a higher level of mobility than can be gained from the mainstream ‘alternatives’ alone. Poor levels of service in these areas can be the decisive factor in the choice people make about car ownership – either to give it up or to take it up.

There is no accepted name for this category, which will be called ‘other transport services’ in this report. This chapter considers the following services:

- Hire of car and driver (taxi services)
- Hire of car – self-drive, short-term car rental (car share)
- Hire of bicycle – Bike share
- Deliveries that replace or avoid a transport trip such as prepared food, groceries and other retail purchases
- Data services that support, replace or avoid a transport trip such as real time public transport information, on-line services such as films and communication or transactions such as Skype or bill payment.

Taxi

Strategy

The City of Melbourne strategy for these services is outlined in the *Transport Strategy 2012*. The City of Melbourne strategy is to manage taxi-parking zones including the Safe City Zones in the CBD and to support moves to a more efficient fleet. The assumption in the strategy appears to be that taxis serve businesses and visitors to the City rather than residents. Transport network companies, such as Uber, were not anticipated by the Strategy.

Capacity

The capacity of the taxi and Uber fleet available in North Melbourne is not known. As noted below taxis are not always available including at times of high demand. ‘Uber’ type taxi services tend to be more reliable (in that the location of the car being booked is visible to the customer) but at peak times incur a premium fee. While this approach works well to temper demand and stimulate supply at peak times, it also has equity impacts for people with less disposable income.

Priority

Of the 340 taxi spaces across 74 ranks in the municipality, there are three taxi ranks in the West Melbourne precinct – all rated as low use:

- There are no ‘Safe City Taxi Ranks’
- The Roden Street rank is not a typical ‘passenger rank’
- The Queen Victoria Market ranks are north (east side) and south (west side) of the Peel/William/Dudley Streets roundabout.

Figure 49 shows the ranks as reported in the *Melbourne Taxi Masterplan 2012* (above) and the ranks at the Queen Victoria Market (below). The Masterplan rates the service standard of these ranks as 'low'.

FIGURE 49 – TAXI RANKS IN THE WEST MELBOURNE PRECINCT



Source: *Melbourne Taxi Masterplan 2012, NearMap*

Neither the level of subscription or use by passengers or the capacity of transport network companies is known.

Accessibility

The report of the Taxi Industry Inquiry 2012 noted that:

- Two in three Victorians (66 %) have used a taxi at least once in the past 12 months
- Around 30% of all metropolitan taxi trips are booked

This suggests that many in the precinct will be using taxis and that most people will look for a taxi on the street.

On this basis, the low provision of taxi ranks in the precinct is a negative setting even if the proportion of 'booked' trips has increased with Uber's entry into the market. There is, for example, no taxi rank at the North Melbourne station or in the vicinity of Festival Hall. Feedback from local stakeholders identifies Rosslyn Street to the north of Festival Hall as the informal taxi zone for the venue. Taxi access at this venue is not supported by any infrastructure or controls.

The standard taxi service itself is responsible for low access and amenity. The Taxi Industry Inquiry found considerable dissatisfaction with the timeliness of booked services, reliability and availability of taxi services, especially during peak periods such as late at night in the Melbourne CBD (particularly Friday and Saturday nights) and during major events in Melbourne.

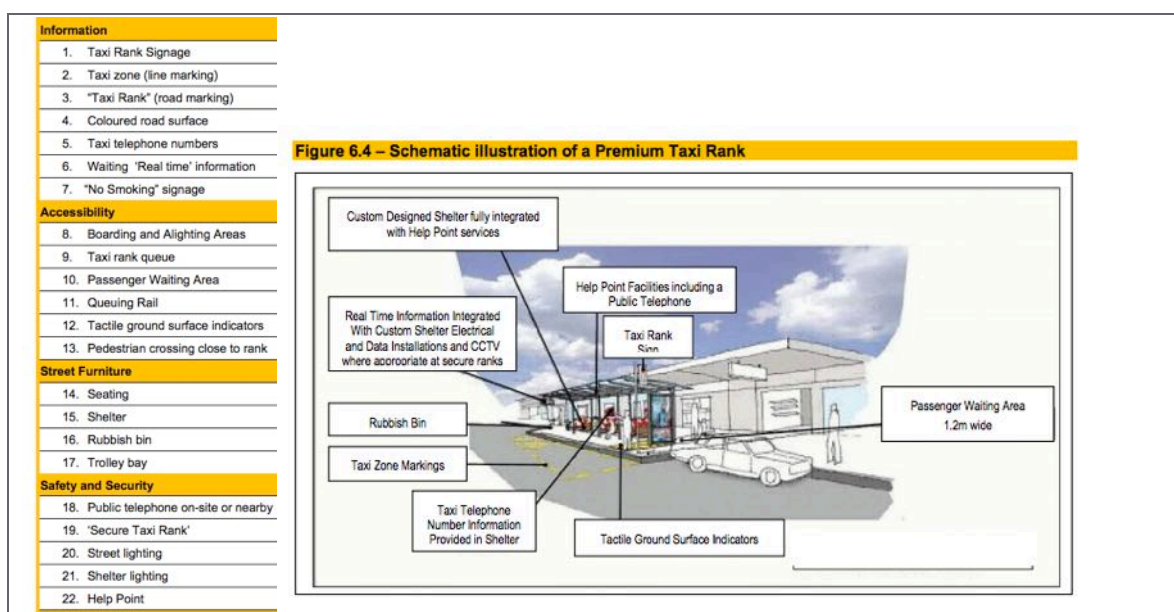
Amenity

The amenity of traditional taxi services in the precinct is low. The report of the Taxi Industry Inquiry 2012 found widespread agreement that the service quality of taxi services and drivers needed to improve. This negative setting reflects the service rather than the precinct.

The *Melbourne Taxi Masterplan 2012* contains guidance on the amenity of taxi ranks. The Masterplan articulates principles such as departure side ranks at intersections and signage facing passengers on the footpath. (Generally signage at ranks is regulatory and is positioned facing the carriageway.)

Figure 50 shows a premium taxi rank with a list of features that provide high amenity. There are no premium taxi ranks in the precinct. Sites such as North Melbourne Station and Festival Hall would be appropriate locations.

FIGURE 50 – A PREMIUM TAXI RANK



Source: PBA

Car share

Strategy

The City's expectation is that car share programs will provide an alternative to car ownership for people living and working in the municipality. The City will support this by allocating on- and off-street parking to car sharing where possible. The City has a goal of 300 on-street car parking spaces by 2016.

The Strategy envisaged allocating car spaces 'in a similar way to the allocation of taxi parking spaces'. Subsequently a decision was taken to charge a fee for the space (something that is not done for taxis, buses or loading zones). The Strategy said that 'on-street space for car-sharing is

often preferred’. However, since then City policy has linked the provision of taxed on-street spaces to the number of car share vehicles available in off-street storage.

Some issues raised in the Strategy have been resolved including the concern in the Strategy about the maturity of the service providers and the minimum profitable fleet size. These services are no longer ‘evolving’. In the City of Sydney 20% of the resident population are members and more than 800 cars are deployed. Progress has been slower in the City of Melbourne.

Capacity

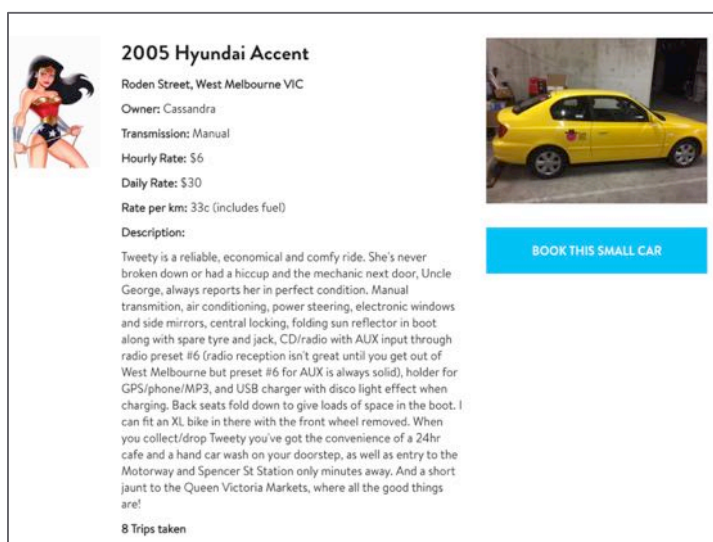
The main service providers, Flexicar and GoGet, have collectively provided 23 cars in the precinct. Unfortunately, car share service providers are reluctant to provide localised membership and vehicle utilisation data. Therefore the number of users and the utilisation rate of the car share network West Melbourne network can only be estimated.

In a well-managed network, cars are not provided unless people are using them. In general, around 20 people can use each car. On this basis, the 23 cars are supporting 400 ‘users’ who are probably a subset of a larger group of enrolled members – perhaps one thousand.

One service provider reported that an established customer was interested in an expanded network in the area. The customer – a Sydney engineering firm that uses four cars in the Sydney network – has a branch office in West Melbourne and would like the same service to be available to their staff at the branch office.

There is a Car Next Door vehicle available. Figure 51 shows the vehicle has been used 8 times. The offer through the scheme suggests that the owner does not use the car frequently. The usage by others suggests that there are people in the precinct who value car services.

FIGURE 51 – CAR NEXT DOOR WEST MELBOURNE



2005 Hyundai Accent

Roden Street, West Melbourne VIC

Owner: Cassandra

Transmission: Manual

Hourly Rate: \$6

Daily Rate: \$30

Rate per km: 33c (includes fuel)

Description:

Twety is a reliable, economical and comfy ride. She's never broken down or had a hiccup and the mechanic next door, Uncle George, always reports her in perfect condition. Manual transmission, air conditioning, power steering, electronic windows and side mirrors, central locking, folding sun reflector in boot along with spare tyre and jack, CD/radio with AUX input through radio preset #6 (radio reception isn't great until you get out of West Melbourne but preset #6 for AUX is always solid), holder for GPS/phone/MP3, and USB charger with disco light effect when charging. Back seats fold down to give loads of space in the boot. I can fit an XL bike in there with the front wheel removed. When you collect/drop Twety you've got the convenience of a 24hr cafe and a hand car wash on your doorstep, as well as entry to the Motorway and Spencer St Station only minutes away. And a short jaunt to the Queen Victoria Markets, where all the good things are!

8 Trips taken

BOOK THIS SMALL CAR

Source: Car Next Door

Priority

The provision of on-street spaces for car share services is a positive setting. The tax on those spaces is a negative setting.

Accessibility

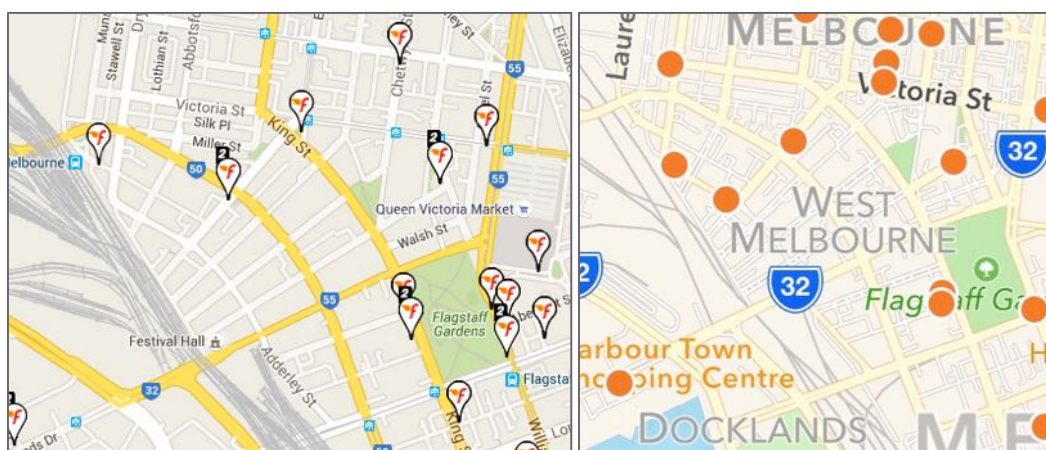
Figure 52 shows the locations of Flexicar (left) and GoGet (right) in the precinct. Some locations have more than one car and some are in buildings. Most however are one car in an on-street

location. Many residents will be more than 250m from a vehicle and further from another vehicle in the network. This will reduce the competitiveness and reliability of the service. (Users have to pick the ‘next car’ if ‘their car’ is in use.) A high level of accessibility is key to the adoption of car share and a reduction in car ownership as envisaged by the Strategy.

Amenity

It is assumed that the amenity of the car share fleet judged on factors such as cleanliness, age and quality of vehicles is high.

FIGURE 52 – FLEXICAR (LEFT) AND GOGET (RIGHT) CAR SHARE LOCATIONS



Source: Flexicar and GoGet

Bike share

Strategy

The Strategy imagines the bike share service ‘well integrated with and complementary to the rest of the public transport system’: reflected in:

- Strategic location of bike share nodes including at public transport nodes such as stations
- Located on the road
- Integrated information and payment systems.
- Supported by a network of safe cycling routes and low speed streets

Capacity

There is a 21-bike node at North Melbourne Station and an 11-bike node in William Street south of Dudley Street. The membership and usage in the precinct has not been assessed.

Priority

The bike share node locations show signs of positive and negative settings:

- Bike share is in an excellent location at the North Melbourne station. This reflects a high priority and is consistent with the Strategy. During the investigation for this report, a train passenger leaving the train at North Melbourne said he was using the service to reach Docklands without going around the Loop.
- The bike share nodes are supported by bicycle infrastructure. The Adderley Street bicycle route and the quiet local streets support the North Melbourne station node. The William Street node is located at a gap in the on-road bicycle lanes but on the Flagstaff Gardens-

William Street off and on-road, north-south route. It is not however at a natural drop-off and pick-up point.

- Negative settings include:
 - The North Melbourne bike share node is not supported by other bike share nodes in the precinct.
 - There is no bike share node at Flagstaff Station, which abuts the precinct. Heavy rail stations are often popular bike share locations. In London for example, the rail stations are a focus of the bike share network.
 - There is no bike share node where the Victoria Street tram route turns at Abbotsford or Errol Streets. A node in the North Melbourne shops would enable tram passengers to link to the North Melbourne Station and passengers from that station to reach the shopping centre for example.
 - The bike share nodes in the precinct are on the footpath rather than on the road.

Accessibility

Figure 53 shows the locations of the two bike share nodes in the precinct. The accessibility of the bike share network is low in the precinct.

FIGURE 53 – BIKE SHARE LOCATIONS IN WEST MELBOURNE



Source: RACV Bikeshare

Amenity

The amenity of the bike share service is strongly influenced by the quality of the bicycle network in the precinct, which, in general, is low.

One of the weaknesses of all 'other transport services' that applies to bike share is that they each require a separate customer account and access card.

Deliveries

No City of Melbourne strategy supports the use of home deliveries to avoid trips or car ownership. The Strategy does imagine improvement to the efficiency of loading and deliveries including:

- Off-street loading facilities (possibly required by the planning scheme) to minimise the impact of freight and delivery activity on the surrounding street network
- A consolidated approach to deliveries for buildings or precincts.

It is not known whether there are any off-street loading spaces or addresses that have developed consolidated delivery in the precinct. The availability and suitability of delivery facilities in the precinct is not known. The number of people who use delivery services is unknown although it has been observed during site visits for this report.

Data services

Strategy

Expansion and connection of the NBN is not referred to in the *Transport Strategy 2012*. Plan Melbourne refers to telecommunications pathways in buildings. The Strategy endorses seamless and integrated transport payment interfaces such as bike share, bicycle parking at train stations, SkyBus, car sharing, car parking and other non-transport services. This relies on excellent mobile data but is constrained by inter organisation agreements.

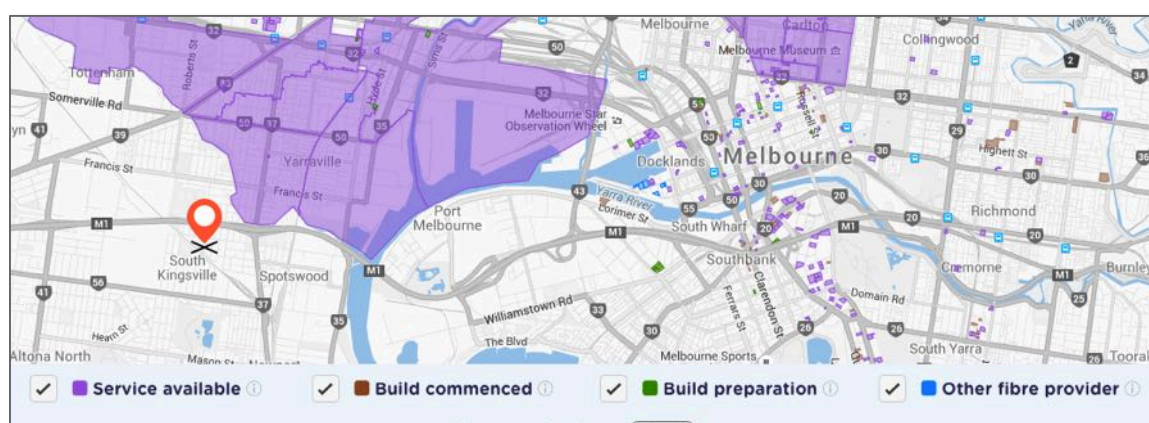
The City would like to benefit from data derived from use of the Internet related to transport and provided on an open platform. The Strategy notes the importance of on-street signage and information based on the Internet including real time arrival information for public transport.

Capacity

4G mobile data is available in the precinct.

The NBN is not available in the precinct nor is the precinct on the 'build plan' of the NBN or other fibre providers. Fibre to the building has been provided by a third party supplier to the property at 270 King Street a block south of the precinct. Figure 54 shows the planned roll out of the fibre network by the NBNCo and others.

FIGURE 54 – NBN ROLL OUT MAP



Source: NBN Co

The availability of data has not always triggered the subsidiary steps of integration and deployment.

There is no integration of payment services as envisaged by the *Transport Strategy 2012*.

Real-time information for public transport services in Melbourne is available via smartphone on a number of apps such as Next There and Transit. For those without access to smartphone

technology, the provision of real time information at public transport stops can be enabled through improved Internet service provision.

The opportunities to deploy information through mobile data have not all been taken:

- There are no tramTRACKER mini units installed at stops in the precinct. (These provide real-time tram arrival predictions, voice options for visually impaired customers, alerts for planned or unplanned disruptions and advice on which trams are low-floor for easy access.)
- There are no real-time service announcements at tram stops in the precinct.
- None of the bus stops in the precinct are supported by real time information.

Accessibility

Deliveries and Internet based services are available across the precinct. The speed, reliability and capacity of these networks have not been assessed.

Transport services Summary

Transport services are not well developed in the precinct. Other areas of the municipality have significantly higher levels of services. Nor have the new developments been supported by increased services.

The lack of local services raises the importance of deliveries. For example, supermarkets and prepared food can be provided in the area through deliveries.

The lack of attention to Transport Services reflects on the proponents who have not established partnerships with the NBN or third party fibre and Internet service providers, nor have developers set aside land for bike share, car share or taxi ranks. It also reflects on the City's ability to identify this need and negotiate with proponents to ensure suitable provision. Fortunately, the City can retrofit many of these services around new buildings. So far, this has not been done systematically.

The opportunity is to have these services in place before people move in and are an available option when people are orienting themselves and establishing their travel habits. Development applications can be assessed for the quality of Internet and delivery support. Development approvals can be used to trigger a roll out of Transport Services in the immediate area.

Key criteria related to the transport services network in West Melbourne are summarised in Table 25 below.

TABLE 25: SUMMARY OF TRANSPORT SERVICES FINDINGS

CRITERIA	FINDINGS
Capacity	High: Taxi & Deliveries Medium: Internet Low: Bike Share & Car Share
Priority	Medium: Deliveries & Internet Low: Bike Share, Car Share & Taxi
Accessibility	Medium: Deliveries & Internet Low: Bike Share, Car Share & Taxi
Amenity	High: Car Share Medium: Bike Share Low: Taxi

Source: PBA analysis

4.5. MOTOR VEHICLES

The Transport Strategy notes that the municipality is now well into a major shift away from car driving to greater use of a combination of train, tram, bus, walking and cycling. The share of weekday trips into the municipality made by car has declined from 65% (1990) to 45% (2007) even though the number of jobs and residents increased in that period.

High level goals in the Strategy include supporting future growth with a comprehensive public transport service that integrates rail, tram, bus, taxi, car and local bike share complemented by good passenger car, service and delivery vehicle access.

The Strategy emphasises that the limits of the road network when optimised for car transport have been reached, and on many of the key roads in the municipality exceeded. The future role of the motor vehicle will therefore be as ‘complementary’ or ‘niche’ transport for future West Melbourne residents. Even as a niche mode (as it is for residents of the CBD) the road network will still provide excellent accessibility for private vehicles when needed for longer distance trips.

The Strategy says that future growth can be supported by the greater capacity of other modes. ‘Trams can move more than 10,000 people per hour in a single arterial traffic lane that could otherwise move only 800 cars. During peak hour on key routes into the city, trams already move more people than motor vehicles. For example, they move 56 per cent of the people travelling on Nicholson Street, Carlton, and 54 per cent of the people on Bridge Road, Richmond.’

The strategic direction on transport ‘flow’ is towards:

- Efficient allocation of road space so that it is ‘optimised for the more space-efficient, higher amenity and lower risk modes, including dedicated lanes for trams, bus priority lanes, bicycles lanes, wider pedestrian footpaths, safer and more comfortable level access tram stops’.
- Reallocation of signal time – ‘significantly better priority for space efficient vehicles at traffic lights especially trams, buses and pedestrians’.
- Lower speed limits
- A reduction of ‘through traffic’
 - Priority given to internal traffic movements and cross route movements by public transport passengers and pedestrians
 - Replacing by-pass and through-pass roads with comfortable, safe and attractive streetscapes. (An example of a successful management regime is Victoria Street in the West Melbourne precinct, which now has high amenity and local mobility.)
 - Implementation of Local Area Traffic Management (LATM) to discourage ‘filtering’ away from arterials and protecting residential, commercial, retail, educational and entertainment uses from through traffic
- Reduction in statistical and perceived risk for other road users
- A change in the vehicle fleet to more compact vehicles (including two wheelers) that emit less air pollution, noise and carbon emissions

These principles are also applied to the space used by vehicles paused at a destination or garaged between uses. The Strategy signals the end of ‘excessive provision of space’ to store and park motor vehicles off and on-street:

- It notes the oversupply in off-street parking in residential buildings, in commercial car parks and office buildings and signals changes to the planning scheme.
- The Strategy notes that the ‘transport efficiency and effectiveness of some of the road space currently allocated to car parking needs to be increased by re-allocating it to meet the emerging profile of city mobility needs, including new level-access tram stops, bus priority

lanes, safe city taxi ranks, car share parking, bike share parking, dedicated bicycle lanes, and footpath widening.’ ‘This re-allocation of parking spaces will result in a reduction in the number of on-street car parking spaces.’

- On-street vehicle storage by residents in established dwellings will be supported by a kerbside permit scheme that matches the number of available parking spaces in the street with the number of dwellings, restricting access to the kerb to other users and preventing over-subscription.

Figure 55 shows the SmartRoads network in the precinct (blue boundary). There are many ‘traffic routes’ in the precinct including: Dudley, Spencer, King, Curzon, Dryburgh Streets and Dynon Road. This network was designed before the Western Distributor and Franklin Street road projects were developed. The impact of these two projects is discussed below.

FIGURE 55 – SMARTROADS NETWORK



Source: VicRoads

Capacity

The capacity of car-based transport in the precinct has been assessed by identifying key ‘entry/exit points’ to the precinct. The key access points are those with traffic signals at:

- Arterial roads that enter the precinct (Dynon, Dryburgh/Victoria, King/La Trobe, Spencer/La Trobe and Dudley Streets)
- Secondary arterials that enter the precinct Curzon/Victoria
- The north east corner of the precinct (Victoria/Peel) and the northern direct link to Flemington Road – via Abbotsford/Victoria

Figure 56 shows the precinct entries marked with yellow pins.

FIGURE 56 – KEY ACCESS POINTS TO THE WEST MELBOURNE PRECINCT



Source: PBA Google Maps

Table 26 shows the annual average daily traffic at each of these entrance/exits. The total capacity is 20,200 vehicles more than the current flow. Taken together the precinct has 10% capacity left on the road system when optimised for private motor vehicles.

TABLE 26: MOTOR VEHICLE CAPACITY OF MAIN ENTRIES TO THE PRECINCT

ROAD	SEGMENT	DIRECTION	VEHICLES	CAPACITY	%
Dynon Road	West of Dryburgh St	East	16,000	17,000	94%
		West	16,000	18,000	89%
Dryburgh Street	Queensberry St – Victoria St	South	8,200	9,100	90%
		North	7,200	8,000	90%
Abbotsford	Queensberry St – Victoria St	North and South	1,900	2,100	90%
Curzon Street	Queensberry St – King St	South	5,500	6,100	90%
		North	6,900	7,700	90%
Victoria Street	Elizabeth St – Peel St	East	9,300	10,000	93%
		West	10,000	12,000	83%
Dudley Street	Peel St – King St	East and West	10,000	11,000	91%
King Street	Latrobe St – Lonsdale St	South	16,000	18,000	89%
		North	20,000	22,000	91%
Spencer Street	Latrobe St – Lonsdale St	North and South	13,000	14,000	93%
Dudley Street	Wurundjeri Way – Adderley St	East	17,000	19,000	89%
		West	8,700	9,700	90%
Total (average)			190,600	210,800	90%

Source: VicRoads

Notes: Vehicles and capacity is based on annual average daily traffic

This is heavy flow compared to the number of residents and jobs in the precinct. If the 15,000 people who live or work in the precinct all drove in and out of the precinct every day (which they do not actually do), then they would account for 7% of the motor vehicle traffic through these entry points. Most of the vehicle movement is therefore through traffic.

Peak flows are not known for all roads. In the available data, they range from 4% - 12%. This is consistent with the general rule of thumb that peak flows are 10% of the annual average daily traffic. Table 27 shows the peak flow data for the precinct.

TABLE 27: PEAK FLOWS AS A PERCENTAGE OF AADT

ROAD	PEAK	AADT VEHICLES	% OF AADT
Dynon Road			
Outbound AM	690 AM West	16,000E	4%
Inbound PM	890 PM East	16,000W	6%
Dynon Road			
Inbound AM	1,700 AM East	16,000E	11%
Outbound PM	1,900 PM West	16,000W	12%
Dryburgh Street			
Outbound AM Peak	440 AM	7,200N	6%
Inbound PM Peak	620 PM	8,200S	9%
Curzon Street			
Inbound AM Peak	540 AM	5,500 S	10%
Outbound PM Peak	330 PM	6,900 N	6%
Victoria Street			
Outbound AM Peak	640 AM	9,300E	7%
Inbound PM Peak	870 PM	10,000W	9%
Victoria Street			
Outbound AM Peak	630 AM	9,300E	6%
Inbound PM Peak	760 PM	10,000W	8%

Source: VicRoads

Notes: AADT: annual average daily traffic

Kerbside capacity

There is no spare capacity at the kerbside in the precinct. All the space is in use, either as:

- Roadway
- Back of kerb footpath extension (planted or surfaced)
- Vehicle parking
- Vehicle crossovers
- The other uses anticipated by the Strategy such as level-access tram stops, bus priority lanes, safe city taxi ranks, car share parking, bike share parking and dedicated bicycle lanes

Parking and storage of motor vehicles is discussed below in Priority.

Priority

Priority flow

Considerable work has been undertaken over many decades to provide high motor vehicle priority in West Melbourne. This has been achieved on arterial roads through:

- Space
 - Widened intersections. CBD-bound on King Street at Dudley Street there are five lanes – one more than inbound over Charles Grimes Bridge, one more than inbound across the Yarra from the south on King Street, two more than inbound on the Exhibition Street tollway. Another inbound five-lane intersection is on Hoddle at Victoria Parade.
 - Narrowing travel lanes to 2.7m (King Street)
 - Closing cross streets such as on King Street and Curzon Streets
 - Closing intersecting streets such as Eades Street and Chetwynd Street on King Street inbound.

FIGURE 57 – INTERSECTION OF KING AND DUDLEY STREETS



Source: *NearMap*

- Time
 - Higher speed limits. 60kmh limits are posted on Dudley, King and Spencer Streets
 - Longer signal times
 - Turn arrows for example at Curzon and King Streets

FIGURE 58 – DUDLEY STREET LOOKING WEST



Source: *Google Maps*

On Spencer Street, the central median has not been established at any intersecting street. Many lane ways and driveways also have access to a gap in the central median. This is true of the minor streets that have many property crossovers, Keep Clear signs and few median barriers. Drivers using these turning opportunities disrupt the flow along the street and create risk for pedestrians and bicycle riders. Figure 62 below shows the three turning opportunities in the 190m long block of Spencer Street between Abbotsford and Hawke Streets.

FIGURE 59 – SPENCER STREET BETWEEN ABBOTSFORD STREET (LEFT) AND HAWKE STREET (RIGHT)



Source: *NearMap*

Travel lanes on minor roads are over 6m wide. Vehicles occupy most of the kerbside and central median space.

On the other hand, in some streets and areas, the settings are different.

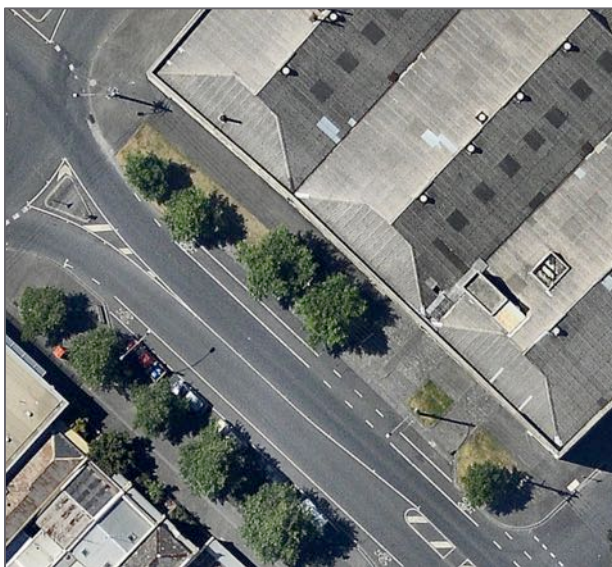
- Space
 - Roads have been closed and turned into open space

- Bicycle lanes have been provided
- Tram routes have been protected from motor vehicle traffic

Priority space

An illustrative assessment was made of a section of Adderley Street (between Hawke and Roden Streets) to understand the allocation of kerbside space. This segment of road has a high proportion of kerb extensions as shown in Figure 60 below.

FIGURE 60 – ADDERLEY STREET BETWEEN HAWKE AND RODEN STREETS



Source: PBA, Nearmap

Table 28 shows that most of the space is allocated to vehicle crossovers or kerbside car spaces. In this location, the four bays (equivalent) are set aside for 15-minute parking.

TABLE 28: ALLOCATION OF KERBSIDE SPACE IN ADDERLEY STREET

CATEGORY	METRES	%
Roadway	62	100%
Kerb allocated to parked or stored vehicles	20	32%
Private use (Crossover)	17	27%
Kerb extension planting	15	24%
Kerb extension asphalt	10	16%
Allocated to other transport (bus stops, bike parking etc.)	0	0

Source: PBA

Vehicles at the kerb

Within the space set aside for vehicles, the management regime is unclear. The number of bays available at the kerb is not known – not all kerbside parking areas are marked into bays and parking sensors are only deployed at meters. To understand the allocation of space and the management principles that are operating in the precinct it would be necessary to collect the data highlighted in Table 29 below.

TABLE 29: ALLOCATION OF KERBSIDE SPACE TO KERBSIDE PARKING

	TOTAL	METERED	UNMETERED	%
Kerbside Bays				
Uncontrolled				
Daytime storage for visitors (>4 hours)				
Parking for visitors (<4 hours)				
2 Hour limit				
1 Hour limit				
Less than 1 Hour				
24-hour storage for residents (Permit zones)				

Source: PBA

This data will be presented in an attachment to this report.

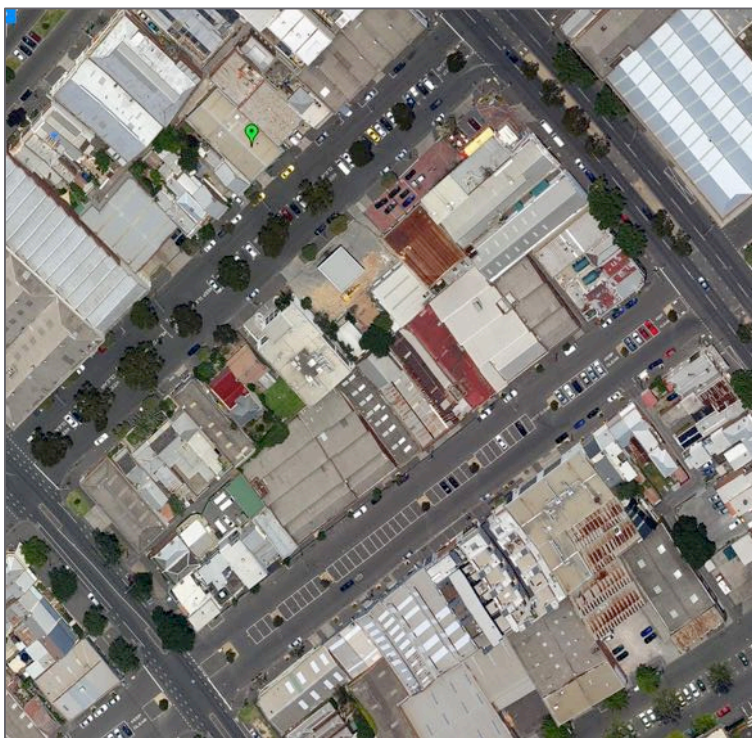
These on-street spaces according to resident feedback and informal observation form a pool of free on-street parking for CBD workers and patrons of events at Festival Hall and Etihad Stadium. This use provides an advantage to the individuals but no benefit to the precinct.

Central medians

All the space in the central median is similarly occupied. A desktop audit of three central medians indicates the range of allocations across the precinct.

Figure 61 shows Roden Street (with trees) set out with 10% planting, 63% vehicle storage, and 27% Keep Clear. It also shows Stanley Street with very sparse planting of trees and four keep clear areas.

FIGURE 61 – RODEN (LEFT) AND STANLEY STREETS WEST MELBOURNE

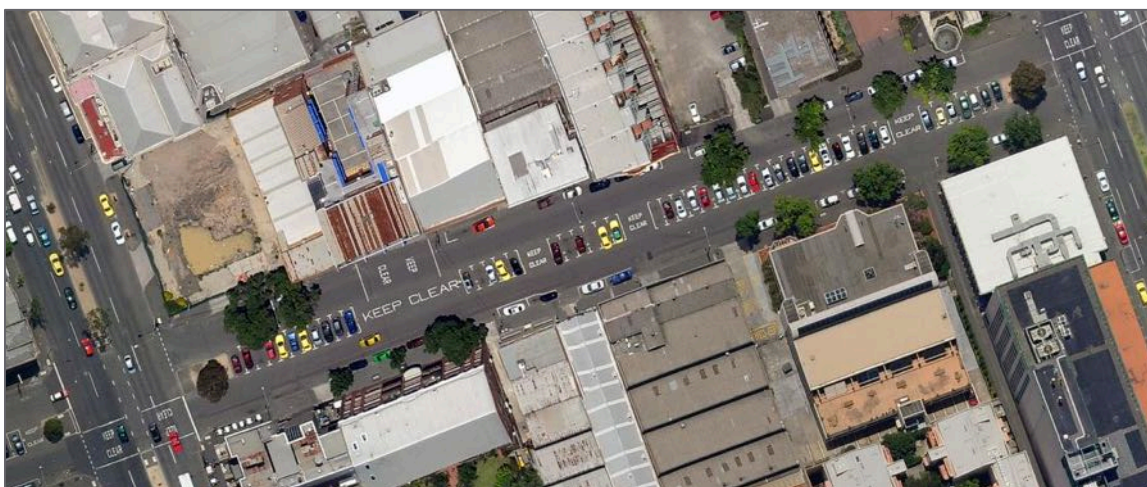


Source: PBA Nearmap

The *Keep Clear* areas are of particular interest because they were required to enable large trucks to access various sites. Now that the industrial uses are closing and being replaced by residential uses, the *Keep Clear* zones should all be reviewed. This will need to happen in order to comply with the *Transport Integration Act 2010*.

Batman Street is set out with 8% planting, 72% vehicle storage and 20% *Keep Clear* as shown in Figure 62 below.

FIGURE 62 – BATMAN STREET WEST MELBOURNE



Source: PBA Nearmap

Figure 63 shows Miller Street set out with 65% planting, 25% vehicle storage and 10% *Keep Clear*.

FIGURE 63 – MILLER STREET WEST MELBOURNE



Source: PBA Nearmap

Table 30 shows the varying allocations.

TABLE 30: ALLOCATION OF 7M CENTRAL MEDIANS

	RODEN	BATMAN	MILLER
Planting	10%	8%	65%
Vehicle storage or parking	63%	72%	25%
Keep Clear	27%	20%	10%

Source: PBA

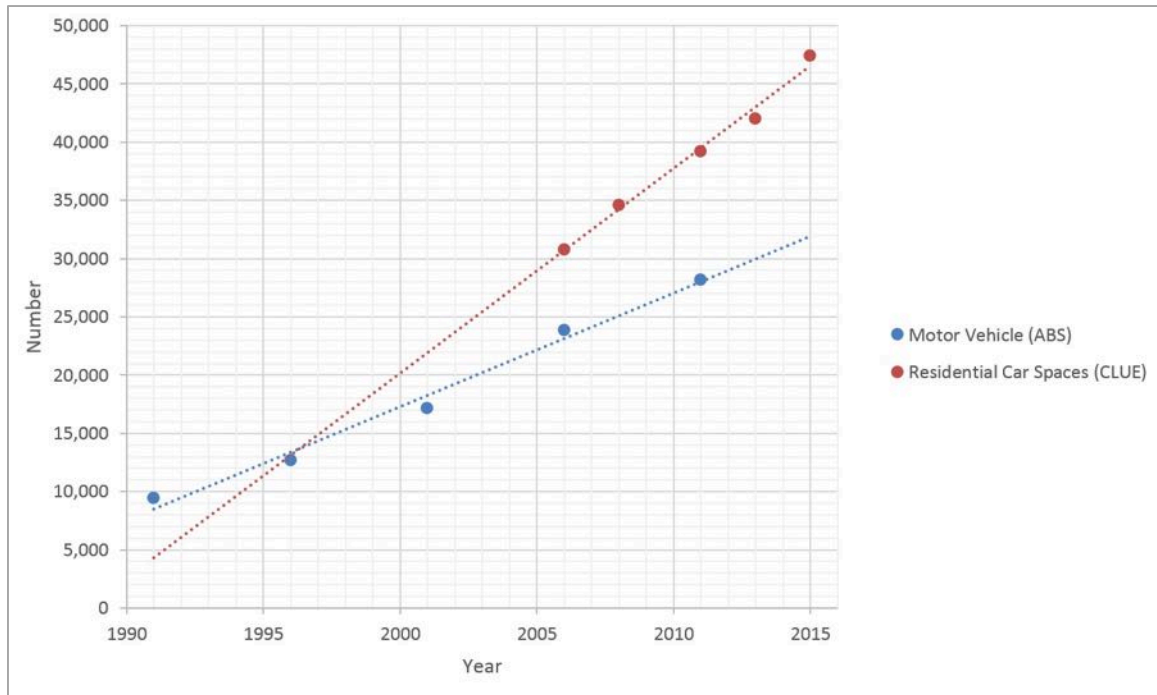
The allocation of space in the central median is a useful indicator of pedestrian access (through informal crossings) and amenity of an area (grass and trees). Areas with a high proportion of the central median allocated to vehicle storage, parking and keep clear areas will have low pedestrian access and amenity.

Off street car spaces

The number of off-street spaces is growing strongly across the municipality in private provision such as for offices and for residential uses. Since 2006, the supply of residential spaces in buildings has grown by 54% or 16,616 spaces. This rate of growth is faster than the growth in the residential vehicle fleet. Today the supply of residential car spaces is larger than the number of cars based in the municipality.

The growth of the residential vehicle fleet since 1991 and the growth in the number of off street spaces since 2006 is shown with a trend line in Figure 64 below.

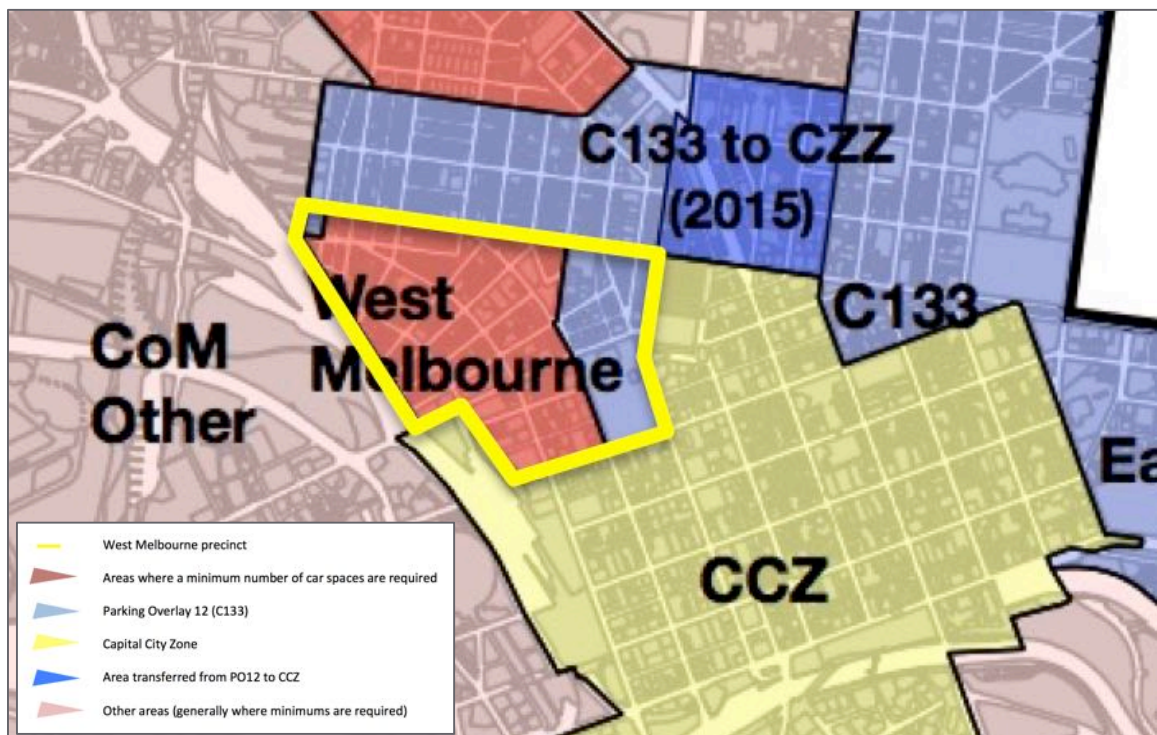
FIGURE 64 – RESIDENTIAL MOTOR VEHICLE FLEET & OFF-STREET CAR SPACES



Source: CLUE and ABS data

Two Parking Overlays apply in West Melbourne. Figure 65 below shows the two areas.

FIGURE 65 – PARKING OVERLAYS IN WEST MELBOURNE



Source: Melbourne Planning Scheme

In the east of the precinct – where Parking Overlay 12 (or Planning Scheme Amendment C133) applies – the planning scheme allows developments with zero car parking and sets a maximum on the number of spaces that can be provided. The maximum can be exceeded if a permit is obtained.

In the west of the precinct a minimum number of car spaces are required per dwelling. This requirement is one car space per dwelling. The granting of a waiver can reduce this minimum. In practice, waivers are often granted. As a result, the average provision ratio in the west of the precinct is lower than the minimums required by the planning scheme.

An investigation into the impact of these two approaches by PBA for the City of Melbourne found that the level of provision was broadly the same.

The actual provision in the west of the precinct is 0.8. The ratio varies from site to site:

- A development on Dudley Street has 442 dwellings and 584 car spaces – a dwelling to car space ratio of 1.3
- A development near the North Melbourne Station has 60 dwellings and 35 car spaces – a dwelling to car space ratio of 0.58

Table 31 shows a breakdown of residential car space provision for the western area of West Melbourne. If the minimum ratio of 1:1 had been required across the precinct, 250 more spaces would have been provided.

TABLE 31: PROVISION OF CAR SPACES IN DWELLINGS IN WEST MELBOURNE 2002 - 2015

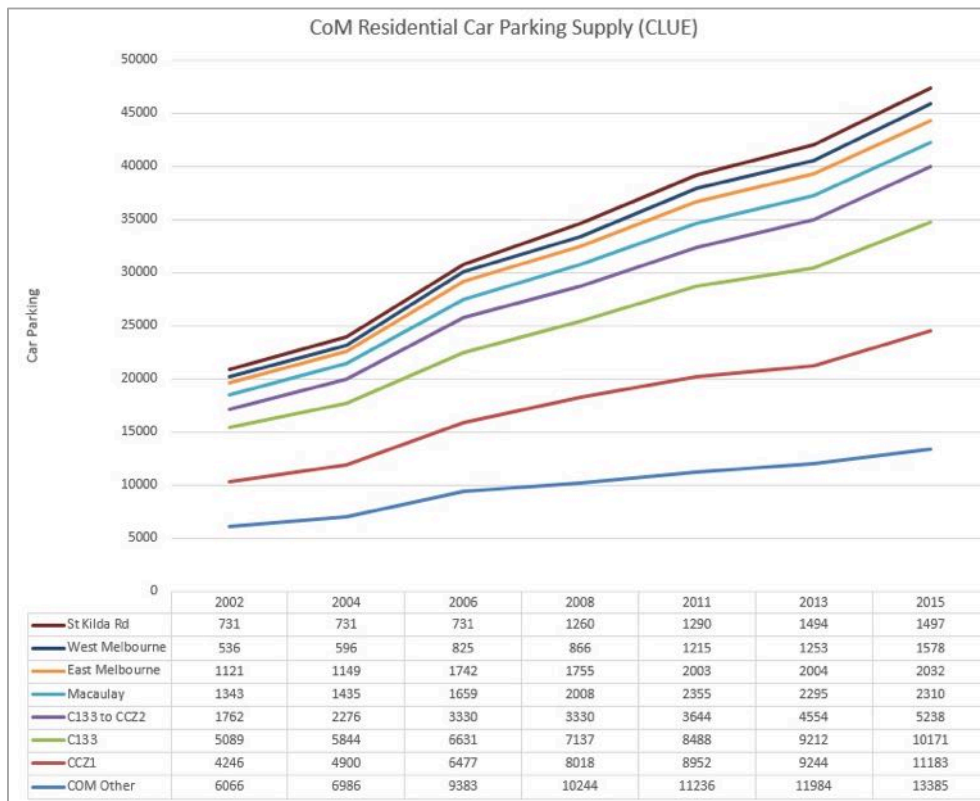
NEW DWELLINGS	RESIDENTIAL CAR SPACES PROVIDED	ACTUAL PROVISION RATIO	STRICT MINIMUM REQUIREMENTS	REQUIRED RATIO	REDUCTION IN REQUIRED PROVISION
1,961	1,578	0.80	1,841	0.94	-13%

Source: CLUE data

Even though the actual provision ratio is 13% lower than the planning scheme requires, the level of over provision is still substantial. Each dwelling in the precinct is being provided (on average) with 0.8 car spaces. However, the car ownership rate in the City of Melbourne is 0.31 per person. This means that (on average) nearly three car spaces are being provided for every car that is owned.

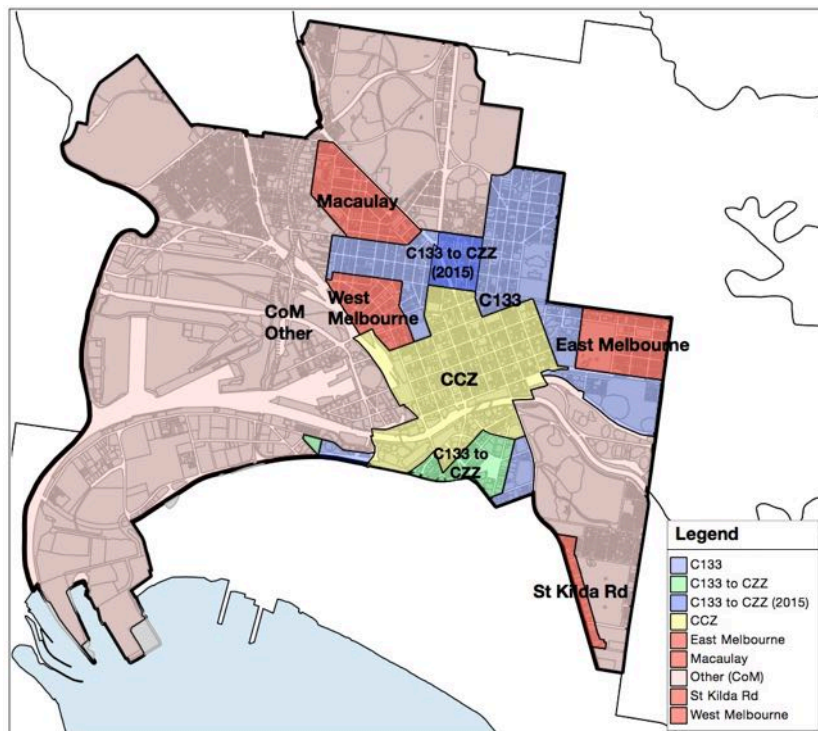
Figure 66 shows the growth by year. In the last year, the number of car spaces in West Melbourne grew by 325. The on-street supply is rapidly being duplicated inside buildings. (There are, for comparison, 132 car spaces in the central median of Rosslyn Street between King Street and the railway line (600m).)

FIGURE 66 – THE GROWTH IN THE RESIDENTIAL SUPPLY OF OFF-STREET CAR SPACES BY AREA



Source: CLUE data

FIGURE 67 – AREAS WITHIN THE PLANNING SCHEME OF THE CITY OF MELBOURNE



Source: PBA research of Melbourne Planning Scheme changes

The high level of provision of car spaces has two impacts on the precinct. Houses with car spaces cost more than those without. Developments with car spaces on site require a crossover. Even when only one vehicle is stored off-street, the footpath and kerbside space will be interrupted with a crossover.

Figure 68 shows Adderley Street east of the North Melbourne Railway Station between Dryburgh and Hawke Streets. There are 10 vehicle access crossovers to properties in the 250m segment shown. On the north side, crossovers take up 12% of the length of the kerb (29m). Many of the crossovers in the precinct support only one vehicle. The crossovers interrupt the pedestrian use of the footpath and reduce the space available for planting trees.

FIGURE 68 – CROSSOVERS ADDERLEY STREET

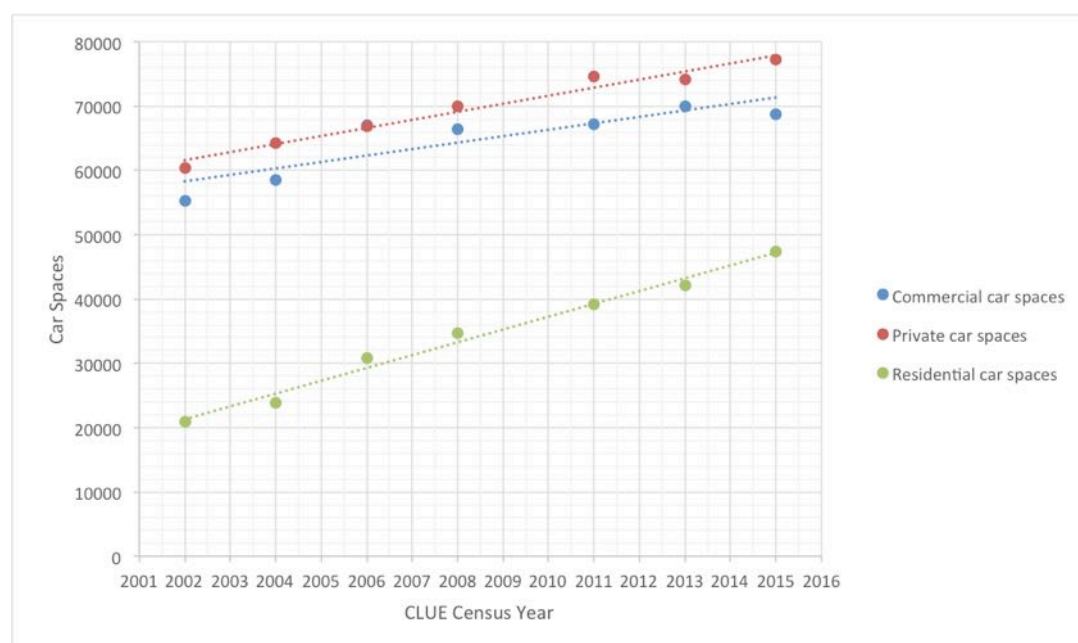


Source: PBA Nearthmap

Commercial off street spaces

The precinct is in the Category 2 area of the State Congestion Levy levied on off-street car spaces. The 2016 fee is \$960 a year per space. The levy was introduced in 2005. Based on Figure 69 below, the levy has not had a significant impact on supply across the municipality. (There has been a reduction of commercial car spaces in the CBD but this is due to other factors including the value that can be gained by repurposing a car parking structure.)

FIGURE 69 – GROWTH OF CAR SPACE INVENTORY IN CITY OF MELBOURNE



Source: CLUE data

The nearest car parking structure is the CarePark in Docklands, which has space for 2,225 cars across six floors. The top two floors of this facility are locked suggesting that the supply is currently greater than the demand. This site is 600m from Festival Hall, which has a capacity of 2,700. Using this structure in the off peak costs \$5 an hour to a maximum of \$15.

Accessibility

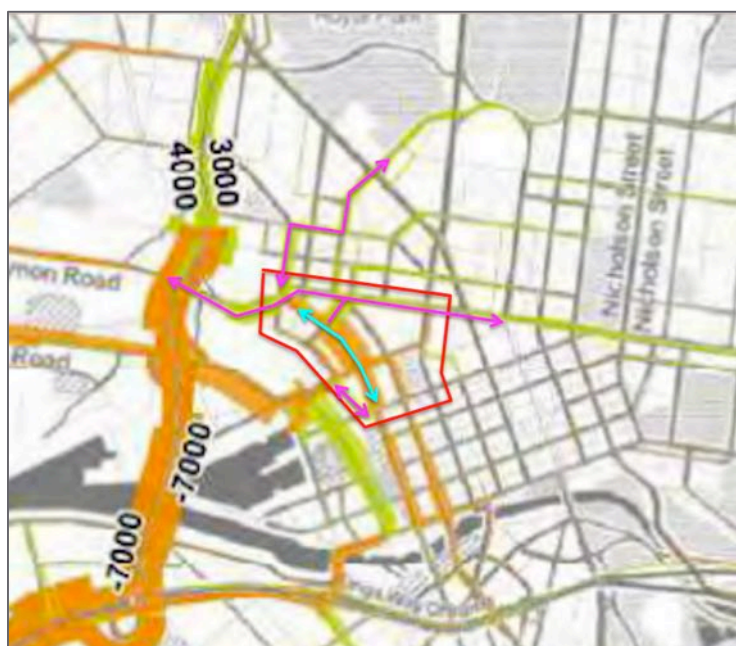
Accessibility by motor vehicle is high reflecting the high priority given to motor vehicle transport. There is no place in the precinct that cannot be reached easily and conveniently by motor vehicle.

It is unclear what impact the construction of the Franklin Street connection and the Western Distributor will have on the accessibility of the precinct by motor vehicle. As Dynon Road and Dudley Street are between 89% - 94% of capacity it is unlikely that accessibility will increase.

In 2015 the Melbourne CBD North Edge Traffic Study was conducted to inform street realignments proposed in the Queen Victoria Market Precinct Renewal Master Plan. This study found that a direct connection between the Dudley and William Street intersection would neither increase or decrease the level of motor vehicle traffic concluding the link 'is unlikely to create any undesirable congestion impacts but will contribute to a more even distribution of traffic flows along the three northern east-west routes in central Melbourne [Franklin, La Trobe and Victoria Streets].'

Proponents of the Western Distributor project find that traffic levels will be reduced on some streets. Figure 70 shows a heat map provided by the project. The precinct is shown in red. The heat map shows traffic reductions in orange and increases in green. The proponents suggest that traffic will decrease on Spencer Street (blue arrow) but increase on Victoria, Hawke, Dryburgh and Adderley Streets (pink arrows).

FIGURE 70 – TRAFFIC FLOW ESTIMATES FROM WESTERN DISTRIBUTOR PROJECT



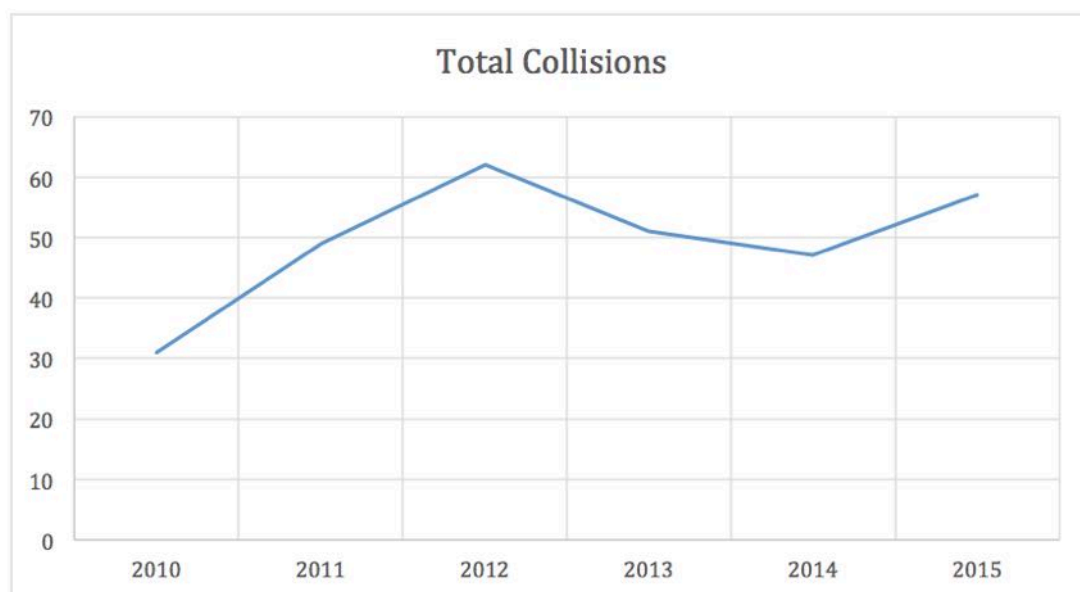
Source: Western Distributor Project

Amenity

Amenity for motor vehicle transport in the precinct is generally high. The only negative is collisions between motor vehicles and other road users.

Since 2010 there have been 297 collisions on the roads of the precinct. Most of these (79%) have been between motor vehicles (236). Figure 71 shows the total collisions in the precinct over the same period.

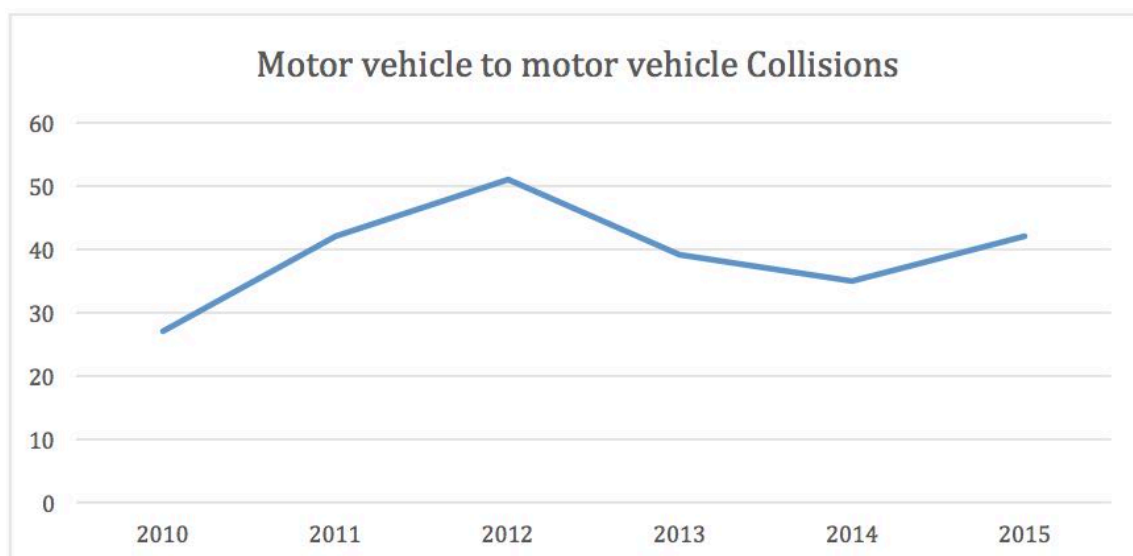
FIGURE 71 – COLLISIONS IN THE PRECINCT BY YEAR



Source: CrashStats VicRoads

The collisions involving only motor vehicles is a relatively large proportion of the total as shown in Figure 72 below.

FIGURE 72 – COLLISIONS (MOTOR VEHICLE ONLY) IN THE PRECINCT BY YEAR

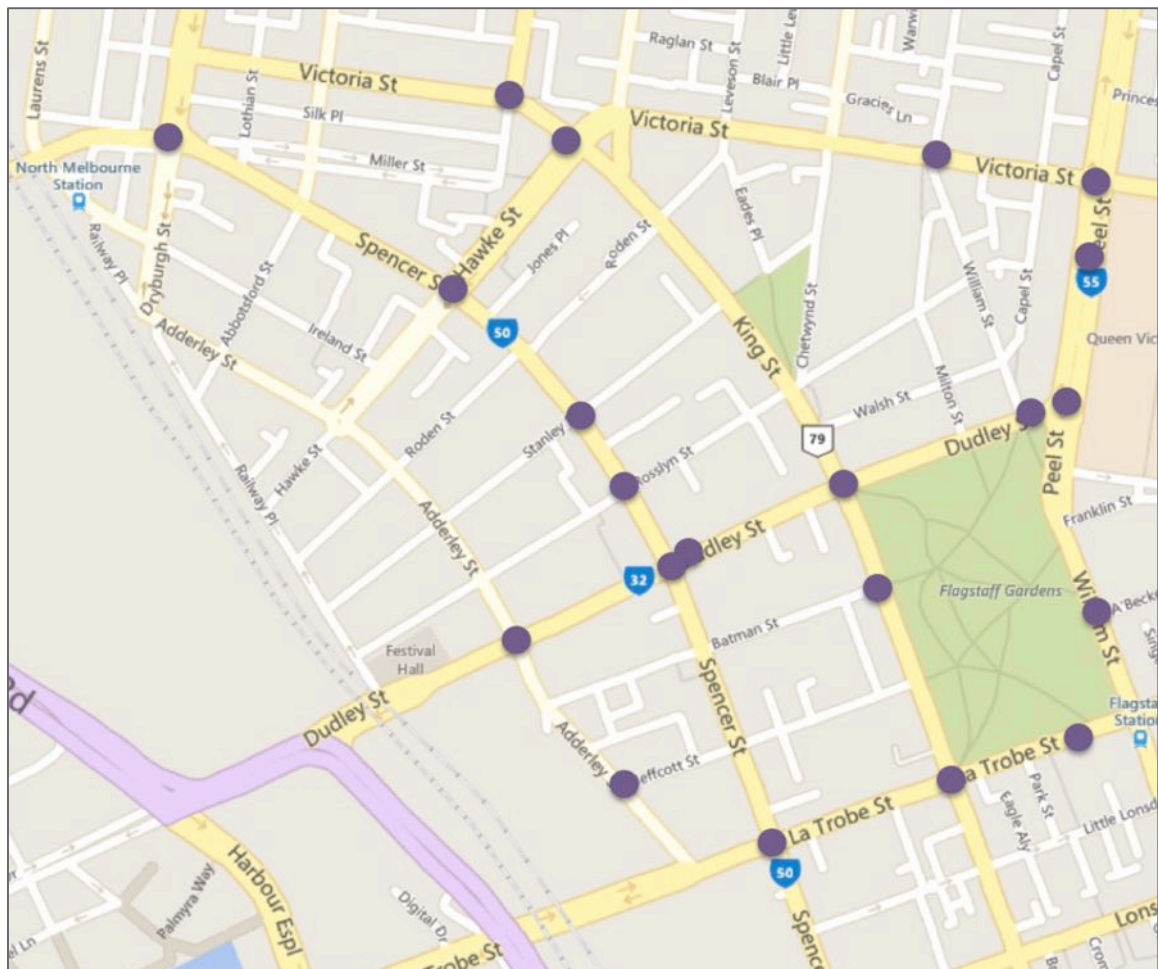


Source: CrashStats VicRoads

Most of the motor vehicle to motor vehicle collisions involve turning movements (84) rear-ending other vehicles (33) and hitting other vehicles or objects at the kerb.

Figure 73 maps the 68 ‘right through’ collisions – the most common crash type in the precinct. This combines the collisions between motor vehicles and the collisions between motor vehicles and bicycle riders mentioned in the bicycle section. All of these collisions have occurred on the 60kph roads – Dudley, Spencer, Dynon and King Streets –and the roads bordering the precinct such as La Trobe, William/Peel and Victoria Streets.

FIGURE 73 – LOCATION OF RIGHT THROUGH MOTOR VEHICLE COLLISIONS IN THE PRECINCT



Source: CrashStats

A list of the all the crash types for motor vehicles is provided in Appendix B.

Private motor vehicle Summary

Current users of the motor vehicle system enjoy high priority, accessibility and amenity.

Road management in the precinct has optimised the main roads through the precinct for through motor vehicle traffic: lanes have been narrowed, intersections have been widened and speed limits on some roads are higher than the default speed limit in built up areas. In addition, a large area of the roadways in the precinct is set aside for parked and stored motor vehicles.

This system is now at maximum capacity and fully occupied. The throughput of the lanes has been maximised and, in the peaks, cannot carry any more people. The supply of car spaces has also been maximised and no more cars can be accommodated.

Because it lacks the ability to expand, the current system will not be able to provide mobility for the forecast increase in the number of people travelling from, to, inside and through the precinct.

More ‘people capacity’ can be provided for this additional load by replacing motor vehicle travel lanes with lanes that carry more people per hour than private cars. These ‘lanes’ could be wider footpaths, dedicated public transport right of ways or separated bicycle facilities. Such a rebalancing of the system would reduce the impact that the current approach has on the amenity of those outside cars who are affected by pollution and collisions.

Currently Spencer Street and King Street both support the through traffic task. It would be appropriate to change the task of one of these streets – Spencer is the most suitable candidate – to these other forms of travel. This would mirror the allocation of tasks in an east west direction at the southern end of the precinct where Dudley Street is prioritised for motor vehicles while Latrobe Street carries public transport, bicycles and pedestrians in separate and segregated lanes.

As the emphasis in the precinct shifts from ‘people passing through’ to people living and working in the area it is likely that the use of public space for private use (parking and storing cars) will be replaced by shared uses such as open space or at least charged at the market rate.

Key findings related to the private motor vehicle network are summarised in Table 32 below.

TABLE 32: SUMMARY OF MOTOR VEHICLE NETWORK FINDINGS

CRITERIA	FINDINGS
Capacity	High flow capacity but little spare capacity (10%) to absorb growth Mainly used by through traffic Cannot significantly expand the space set aside for on-street car spaces Supply of car spaces inside buildings is growing rapidly but use is restricted to the resident
Priority	High priority is given to motor vehicles across the precinct Traffic signals almost always favour motor vehicles
Accessibility	High accessibility exists across the precinct There are very few movements that are not permitted
Amenity	There is high amenity for motor vehicle travel. Reductions in amenity have been to increase capacity.

Source: PBA analysis

4.6. HEAVY VEHICLES

The *Transport Strategy 2012* distinguishes between ‘last kilometre freight’ and freight in heavy vehicles. The former has been considered under Other Transport Services. This section considers the latter in the precinct.

The City of Melbourne Transport Strategy notes ‘the decline of manufacturing and the rationalisation of freight logistics in the municipality provides significant urban renewal opportunities. This strategy identifies the need to develop more efficient solutions to reduce the overall cost of this freight task and reduce its impact on the roads and general urban amenity.’

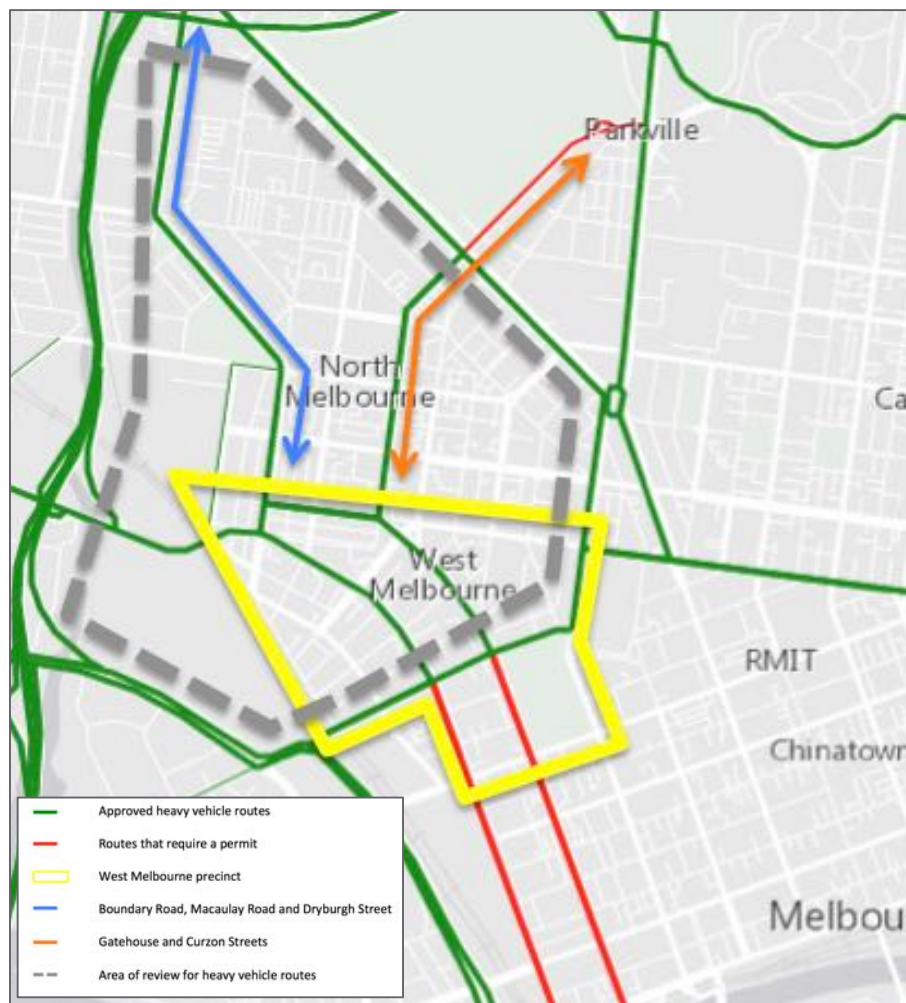
In particular, the Strategy points to prioritising freight on the freeway network.

Capacity

The precinct has many heavy vehicle routes – probably more than are necessary for the heavy vehicle network or the current needs of the precinct.

The B-Double routes in the West Melbourne precinct are shown in Figure 74 below.

FIGURE 74 – B-DOUBLE ROUTES IN THE WEST MELBOURNE PRECINCT



Source: VicRoads

The approved routes (green) and those requiring an approval permit (red) for Class 2 & 3 B-doubles and 5-axle (Dog) trailers. Two-axle cranes, 40-tonne cranes or concrete pumps, and other Special Purpose Vehicles require a permit for the length of King Street west of the Flagstaff Gardens.

The same network is used for Higher Mass Limits, 3-4 axle truck and 3-4 axle trailers, controlled-access buses, although these do not require a permit for Spencer and King Streets. 4 and 5 axle cranes need a permit for the Dynon Road Bridge. Low loaders need a permit to enter the precinct on Dynon, King, Hawke and Victoria Streets. High Productivity Freight Vehicles (heavier B-doubles) are not permitted in the precinct.

Priority & Accessibility for Heavy Vehicles

It is likely that heavy vehicles have an unnecessarily high priority and accessibility in the precinct, given the ongoing change from predominantly industrial to residential land uses.

The many heavy vehicle routes in the West Melbourne precinct reflects the industrial past of the area and provide a higher priority than is required today:

- The Boundary Road, Macaulay Road, Dryburgh Street route (blue arrow) was a heavy vehicle route before the City Link Freeway was built.
- The Curzon and Gatehouse Streets route (orange arrow) is likely to be unusable for these vehicles, as chicanes have been built in Gatehouse Street.
- It is unlikely that two parallel heavy vehicle routes 200m apart on Spencer and King Streets are both needed.
- It may be possible to remove all the heavy vehicle routes inside the dotted grey line without compromising the efficiency and amenity of the heavy vehicle networks.

Heavy Vehicle Summary

The precinct contains multiple heavy vehicle routes, some of which are likely to be obsolete or redundant, as they do not reflect the development of new roads such as City Link and Wurundjeri Way or the reconfiguration of others such as Gatehouse Street.

Some heavy vehicle uses remain in the area for the time being. To the north of the precinct, heavy vehicle access is still required to Arden siding from Arden and Laurens Streets for example. The Arden Metro Station site in that area will be a focus for heavy vehicles during the construction of the tunnels, station and mixed-use precinct. Developments within the precinct will require temporary heavy vehicle access to particular sites.

The Structure Plan provides an opportunity to review heavy vehicle routes through the precinct, remove redundant routes and identify those that are necessary in the short, medium and longer term.

Key criteria related to the heavy vehicle network in West Melbourne are summarised in Table 33 below.

TABLE 33: SUMMARY OF HEAVY VEHICLE NETWORK FINDINGS

CRITERIA	FINDINGS
Capacity	High capacity
Priority	High priority
Accessibility	High accessibility
Amenity	Not assessed

Source: PBA analysis

5. Impacts of major transport projects

Significant transport infrastructure changes are committed, planned or conceived in and around the precinct. Table 34 below summarises their likely impact on the precinct. (Service changes to buses and road management changes such as separation are not considered major.)

TABLE 34: IMPACTS OF MAJOR TRANSPORT PROJECTS

PROJECT	IMPACT	TIMESCALE	SUMMARY
Arden Parkville Metro Stations	Faster access by train between West Melbourne and the Domain and St Kilda Road	10 years	Small benefit
Arden Development site	The scale of this development means it is likely to have a significant impact on land values and uses in the precinct. As a result the precinct will be able to support or be close to more services and opportunities.	More than 10 years	Significant impact. Likely to be positive
Extending the Spencer Street tram into the precinct	This would be unambiguously positive for the precinct	No time scale	Very positive
Linking Victoria Parade and Victoria Street tram lines	Faster and more convenient tram access between West Melbourne and medical and university precinct Victoria Street Richmond and Victoria Gardens may have some attraction	No time scale	Small benefit
A tram line along Dynon Road with connections to the precinct	Tram, bicycle and pedestrian links will help bind the Dynon Road freight yards urban renewal area to the precinct and that area to Footscray	No time scale	Some benefit
Franklin Street to Dudley Street road link	A report prepared for Council states that this link will redistribute existing levels of motor vehicle traffic rather than stimulate an increase. Dudley Street is at capacity so this outcome is possible. Unforeseen and unintended consequences will occur The replacement of the Dudley, Peel and William Streets roundabout with traffic signals will improve access for all non-motor vehicle modes in all directions	Within 5 years	Small positive impact Possible negative impacts
Western Distributor traffic projections	The proponent's traffic assessment shows reduced motor vehicle traffic on Spencer Street. This prediction opens up significant opportunities in the precinct The assessment anticipates more traffic on Victoria Street. This is negative for the precinct as it will impact on access to neighbouring areas such as North Melbourne	Within 5 years	Positive on Spencer Street Negative on Victoria Street

PROJECT	IMPACT	TIMESCALE	SUMMARY
Western Distributor link to Dynon Road	<p>The precinct will benefit significantly if all private motor vehicle traffic on the Dynon Road bridge becomes tolled and high quality pedestrian and bicycle facilities are installed</p> <p>The precinct will be negatively affected if more motor vehicle traffic uses the Dynon Road bridge</p> <p>This connection and traffic volumes flowing into Victoria Street will also increase the barrier between the precinct and Arden. This will reduce any positive impacts that could result from development of the Metro Station and Activity Centre at Arden</p>	Within 5 years	Unknown
Western Distributor link to Dudley Street	The added capacity west of Dudley Street will reinforce its current character which is negative for the precinct	Within 5 years	Negative
Western Distributor link to Wurundjeri Way	<p>The at-grade intersection at Dudley Street will increase the severance for pedestrians and bicycle riders between the precinct, E-Gate and Docklands</p> <p>The viaduct for the road will make links between Dudley Street and Dynon Road and between the precinct, E-Gate and Docklands less effective and more expensive</p>	Within 5 years	Strongly negative

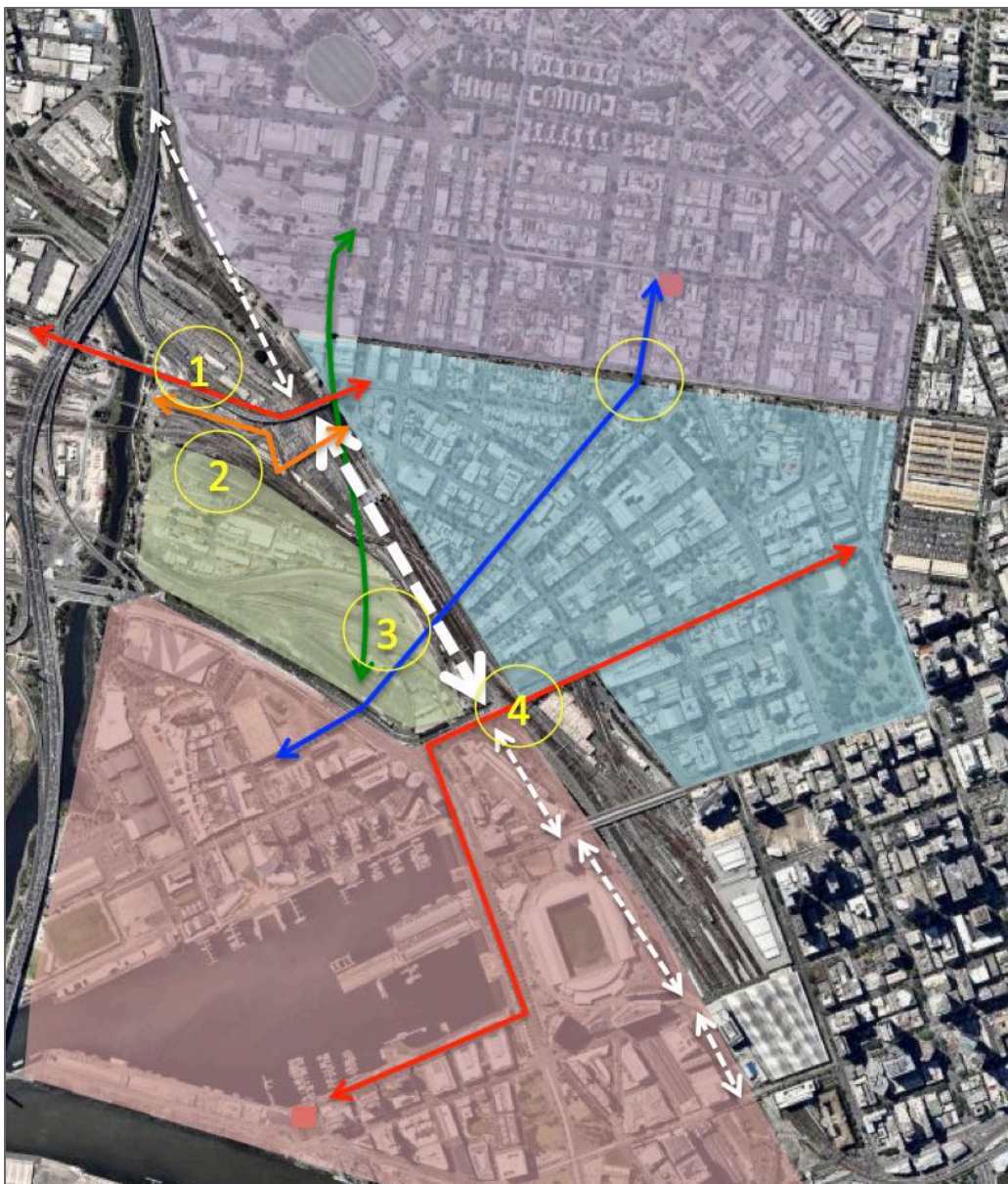
Source: PBA analysis

6. Integration challenge

The precinct sits between North Melbourne to the north, E-Gate to the west and Docklands to the south. Figure 75 shows the West Melbourne precinct (blue) between E-Gate (green), North Melbourne (purple) and Docklands (red).

The North Melbourne and Docklands libraries are shown to represent regional municipal services and facilities. The top red arrow shows Dynon Road to the west. The orange arrow shows the pedestrian bridge across the rail lines and yards. The green arrow shows a link between the Arden Metro station and Docklands. The blue arrow shows a link between the North Melbourne library and Docklands. The bottom red arrow shows a link between the Docklands Library and the Queen Victoria Market along Dudley Street.

FIGURE 75 – INTEGRATION CHALLENGES: WEST MELBOURNE & NEIGHBOURING PRECINCTS



Source: PBA

The West Melbourne precinct is not well integrated with its neighbours. As a result, the people and businesses in the precinct cannot benefit from assets, services and opportunities in neighbouring precincts. Similarly, the neighbouring precincts are isolated from West Melbourne's advantages.

This section considers these integration challenges and proposes interventions that will help make an integrated whole out of the various parts. It is expected that these ideas will be developed further through consultation with the community and more detailed analysis.

The integration challenges to the north, east and west are of the same character and are the most straightforward to resolve. The many links to the north, east and south are discussed using the example of the Hawke, Victoria, Curzon, Errol and King intersection (yellow circle).

The integration challenge to the west is substantial. There are wide gaps between east-west crossing points. The white arrows on the map above show the distance between the crossing points. In addition, the quality of the existing crossing points is low. The two east-west roads (Dynon Road and Dudley Street) do not support people on foot or riding a bicycle.

The challenge to the west is therefore to reduce the distance between the crossing points and to improve the current links.

This section considers the four integration challenges to the west marked on the map above:

- (1) A link across the Dynon Road Bridge for pedestrians and bicycle riders
- (2) A link between the west of West Melbourne to E-Gate and the Moonee Ponds Creek
- (3) A link between central West Melbourne to E-Gate and Docklands
- (4) A link along Dudley Street for pedestrians and bicycle riders

Connections to the north, east and south

The precinct is structurally well integrated to the north, east and south as the roads in the precinct line up with those in North Melbourne, the City fringe and the CBD. Some of these excellent structural connections have been compromised by road management and mode priority setting, which can be adjusted relatively easily. Examples of this have been noted above:

- High vehicle speeds and lack of support for pedestrians are a significant barrier to people accessing Flagstaff Gardens from the precinct between intersections.
- Pedestrian desire lines are not supported for mid-block crossings
- Well sited through block links might reduce pedestrian travel times and amenity

Hawke Street

It is useful to consider the Hawke, Victoria, Curzon, Errol and King intersection as an example of these settings and the impact they have inside the precinct and on connections to neighbouring areas to the north, east and south. This intersection is the key link between the precinct and the services in Errol Street. Even when the precinct has gained its own similar services it is still likely that the Hawke Street alignment will retain its significance as a walking and cycling link to regional services such as the North Melbourne library, North Melbourne schools and the Parkville precinct. At the southern end, Hawke Street might anchor connections to the west discussed below. Figure 76 below shows the intersections.

FIGURE 76 – THE HAWKE, VICTORIA, CURZON, ERROL & KING INTERSECTIONS



Source: PBA

The high motor vehicle priority setting can be observed. There are, for example, four three-lane approaches to intersections – two on local roads. It is unlikely that volume of motor vehicle traffic exiting ‘south’ Curzon onto Victoria at (1) warrants two lanes. It is likely that the southern section of Curzon could be closed completely without compromising motor vehicle movement and the open space extended.

There is no pedestrian crossing leg south from (2). This requires the pedestrian to cross two legs of the intersection to reach ‘south’ Curzon. The waiting time is extended as ‘green arrows’ for vehicles moving between King and Curzon curtail the pedestrian phases across these legs.

As noted above, there is no entrance to the Victoria Street carpark at (2) for bicycle traffic from the west. In that triangle, (3) the parking has been put near the buildings and the open space near the road. The reverse would have no impact on the former and derive greater value from the latter.

As noted above, there is no pedestrian crossing or priority at (4) on the east side of the triangle.

Two lanes in each direction have been provided in Hawke Street ‘north’ (5) and south (7) even though Victoria and Errol Streets only have one lane and Hawke is a local road.

There is a significant opportunity to reallocate space around Errol Street ‘south’ (6).

The ‘small solution’ would be to move the car parking next to the road or remove it altogether. Hawke Street could be reduced to two lanes and these lanes could be located on the north side of the current median.

Hawke Street could be provided with separated bicycle lanes, pedestrian priority signals and other measures to support access between West and North Melbourne.

This would provide an attractive walking and cycling link to and through a useful and attractive park at the southern end of Errol Street abutting the buildings.

A larger vision, shown in Figure 77 below would be to close Hawke Street between Miller and Errol ((7) and (5)), providing open space to complement the North Melbourne centre and a pedestrian and bicycle link to West Melbourne. (This would also service to guide traffic from the Western Distributor onto the collector road (Curzon Street) rather than down the local road (Victoria Street.)

FIGURE 77 – THE HAWKE, VICTORIA, CURZON, ERROL & KING INTERSECTIONS (2)



Source: PBA

The link between North Melbourne Station and the Metro Station west of Laurens can be based on similar opportunities in ‘west’ Miller, Laurens and Ireland Streets.

Connections to the west

Dynon Road bridge and Dudley Street provide the precinct with two high volume, high-speed motor vehicle connections to the west (Footscray and E-Gate) and the south-west (Docklands and E-Gate) These roads also carry bus services without priority in general traffic. As noted above, the links cannot be considered acceptable pedestrian and bicycle links as they are:

- Formally ‘inaccessible’ due to steps and steep ramps or
- Of below standard width

They fail all the criteria used in this assessment: capacity, priority, accessibility and amenity.

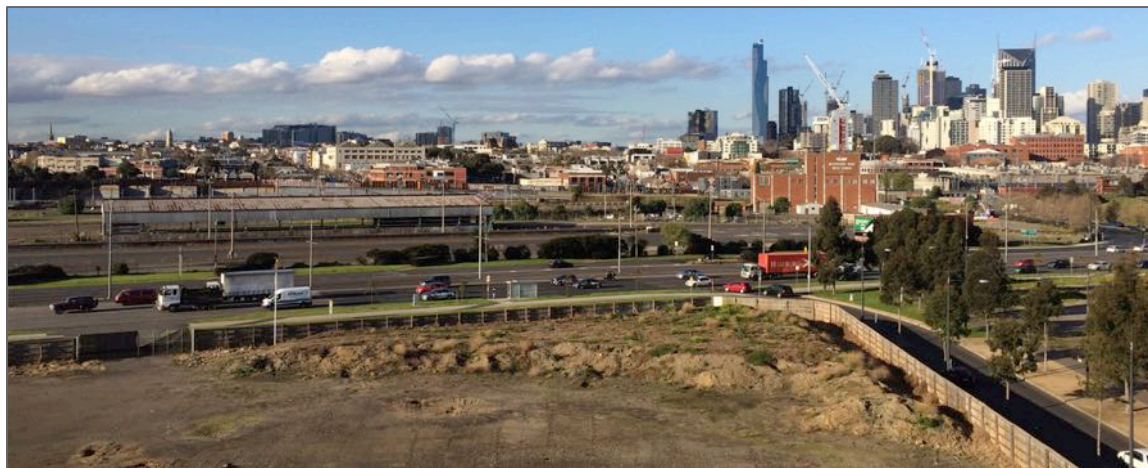
Furthermore, the distance between Dynon Road bridge and Dudley Street is around 800m – more than three City blocks in the Hoddle Grid. The link in the precinct between these two western exits of the precinct, Railway Place, is also of a low standard.

This is a regional problem. The severance stretches from Arden Street in the north to Collins Street in the south. The railway line and Wurundjeri Way act to separate the western side of North Melbourne, West Melbourne and the CBD from E-Gate and Docklands. North of the precinct, the next crossing of the rail line for pedestrians and bicycle riders is 1km away by road. The next crossing to the south is 500m. Further south the next pedestrian link is 500m away and the next bicycle link 200m further.

The regional problem warrants a regional response. Effective solutions will be expensive and, if they are to be requested, negotiated or part funded by the City as part of major infrastructure projects such as the Melbourne Metro or Western Distributor, then a regional case will need to be made.

A regional solution or solutions should be pursued for another reason. It is true that the people in West Melbourne are cut off from the Moonee Ponds Creek and services and opportunities in Docklands and E-Gate – symbolised by the Docklands library. However, it is equally true that people in those areas are (or will be) cut off from opportunities in West and North Melbourne – symbolised by the North Melbourne library and the Queen Victoria Market. The value in reducing the severance may lie in the development value of E-Gate for example, rather than in the precinct. Figure 78 shows the development sites in Docklands and, on the far side of Footscray Road, E-Gate looking north to the precinct. The Uniting Church in Curzon Street and the North Melbourne Town Hall (both on the far side of the precinct) can be seen on the left.

FIGURE 78 – LOOKING NORTH FROM DOCKLANDS ACROSS E-GATE TO WEST MELBOURNE



Source: PBA

An important transport challenge is to identify and develop active transport links that will integrate the 'western' precincts allowing them to share regional services such as the Queen Victoria Market and the libraries. If these precincts can be linked, then public and private services (such as supermarkets) will be facilitated, as the catchment will be the region rather than the precinct. If the links are not established, then the risk is that none of the areas will attract services and facilities and in the west the City will have three separated neighbourhoods rather than three integrated areas with a value greater than the sum of the parts.

Recognising these wider perspectives, this section considers the precinct-only and assuming that the benefit of the links will flow to the people of West Melbourne.

1 Linking West Melbourne to Dynon Road – retrofitting Dynon Road Bridge

The Footscray Market is 3.5km from North Melbourne Railway Station. The walking and cycling journey to this destination will not be competitive with trains from Footscray to North Melbourne and Arden Metro stations. However, the potential urban renewal area to the north of Dynon Road on the current North Dynon Freight Terminal would be within a few minutes' walk or ride.

It is likely to be possible to provide a pedestrian and bicycle connection that is separated from the noise of traffic on the south side of the Dynon Road bridge. below shows a 'clip on' concept being developed in San Francisco. shows a more modest example in the Netherlands.

FIGURE 79 – BAY BRIDGE 'CLIP ON' CONCEPT SAN FRANCISCO USA



Source: San Francisco Examiner

FIGURE 80 – RETROFITTED CYCLE PEDESTRIAN PATH, UTRECHT NETHERLANDS



Source: hacknecyclist.blogspot.com.au

Alternatively, an independent structure could be built abutting the existing bridge. (If the crossing requires an independent bridge, there may be more suitable crossing points north of the precinct boundary.)

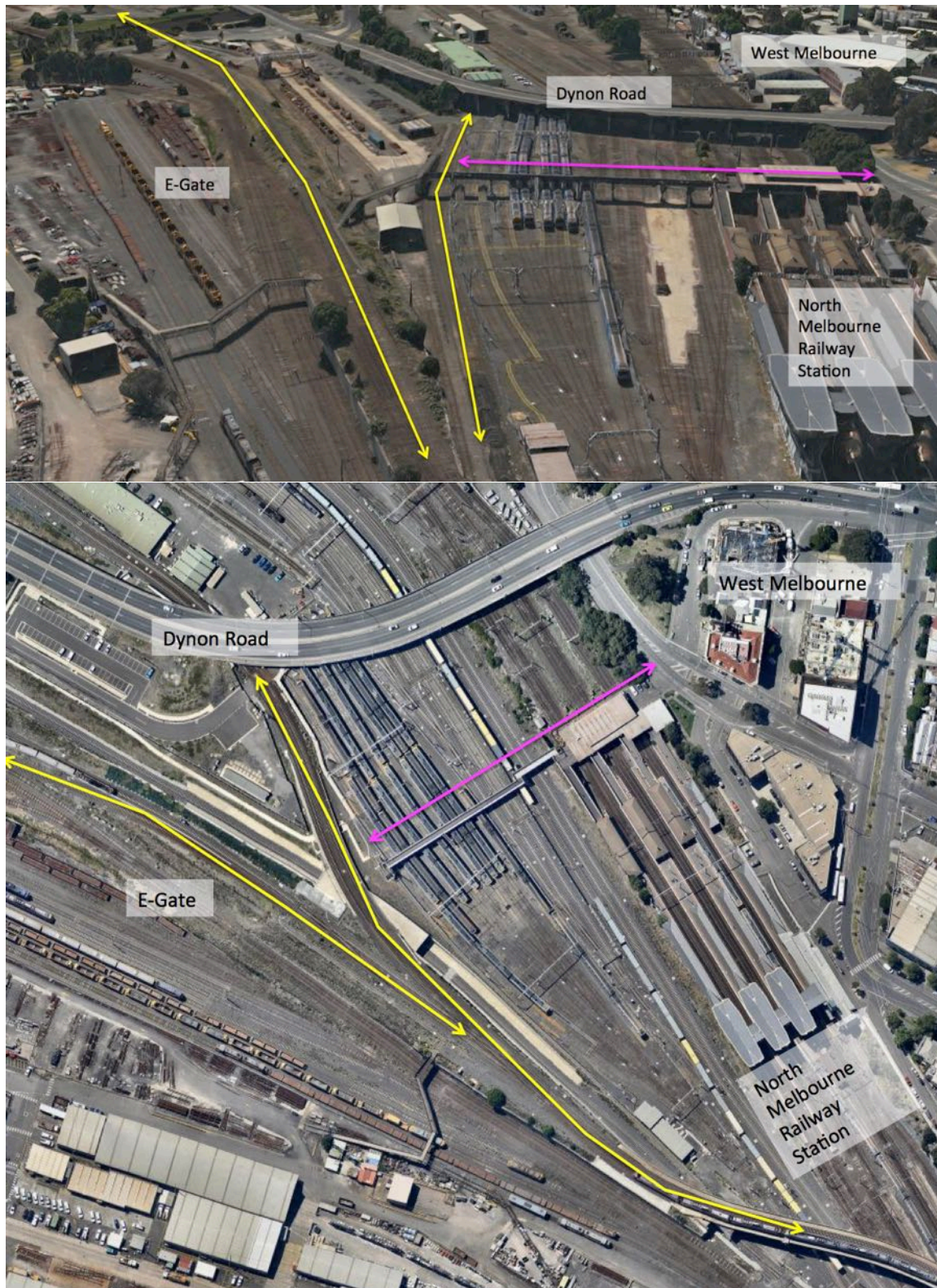
2 Linking the west of West Melbourne to E-Gate and the Moonee Ponds Creek

At the western end of the precinct, links across the railways are more easily developed as the rail lines are low and the land is high. Links such as the green arrow shown above are therefore more straightforward.

It is possible to walk over the rail lines at the western end of North Melbourne station although this access is denied to the public (shown as an orange arrow above). When this link was available, it mitigated the poor quality of the northern link along Dynon Road by providing a ramped connection to the Moonee Ponds Creek and Dynon Road. The deck of the bridge remains and stands clear of all railway operations, but the ramp that ran down to the northwest from the western end of the deck has been removed and public access denied. The western end of the existing bridge deck is perhaps 100m from the boundary of E-Gate.

Figure 81 below shows the pedestrian bridge looking west (above) and from above (below). The bridge crosses fourteen rail lines. It does not cross the five regional rail lines to the south.

FIGURE 81 – EXISTING PEDESTRIAN RAIL BRIDGE



Source: Apple Maps (above) (before Regional Rail works) NearMap (2016)

This structure could provide the basis for a crossing opportunity at the northern end of the precinct. (From an E-Gate perspective, this structure would be the most direct connection to North Melbourne station and the Arden Metro Station to the north.)

Figure 82 shows a distinctive bridge over TGV tracks in France.

FIGURE 82 – TUBULAR LATTICE BRIDGE LA ROCHE-SUR-YON, FRANCE



Source: inhabitat.com

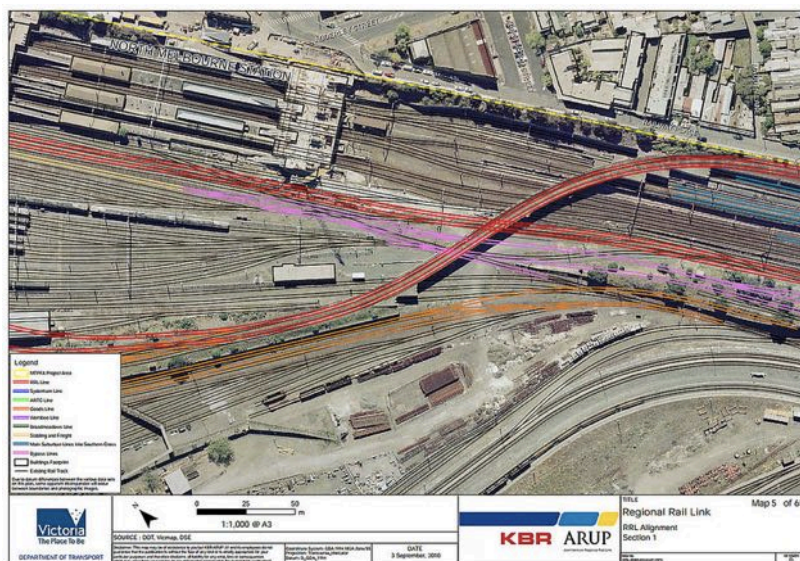
3 Linking central West Melbourne to E-Gate and Docklands

The links to the west and south of the West Melbourne precinct are particularly challenging: As the rail lines approach Southern Cross station, the rail bed and 'V/Line' viaduct rise while the land falls. Referring to Figure 75 above, between the blue arrow and the bottom red arrow, the land is at the same height as the track, requiring a 7m climb out of the West Melbourne precinct to clear the rail line.

Figure 83 below shows the path of the viaduct (above) and illustrates the height of the railway viaduct (below).

The problem potentially becomes more difficult if the Western Distributor connects City Link to Wurundjeri Way. This road viaduct is likely to increase the distance that has to be crossed and create other problems of related to height.

FIGURE 83 – THE REGIONAL RAIL VIADUCT CROSSES THE SUBURBAN NETWORK



Source: *Victorian Government (Daniel Bowen)*



Source: *Waking up in Geelong*

A similar problem was solved in Brisbane with the award winning \$63m Kurilpa pedestrian and bicycle bridge. The deck at the east end is at the height of the CBD – analogous to the West Melbourne escarpment – and above the riverside freeway and path. The spiral ramp on the Southbank raises the deck to 11m above the Brisbane River on the south before it rises again to the height of the CBD escarpment.

Figure 84 shows the Kurilpa Bridge from the western and southern bank.

FIGURE 84 – KURILPA BRIDGE BRISBANE LOOKING TOWARDS THE CBD

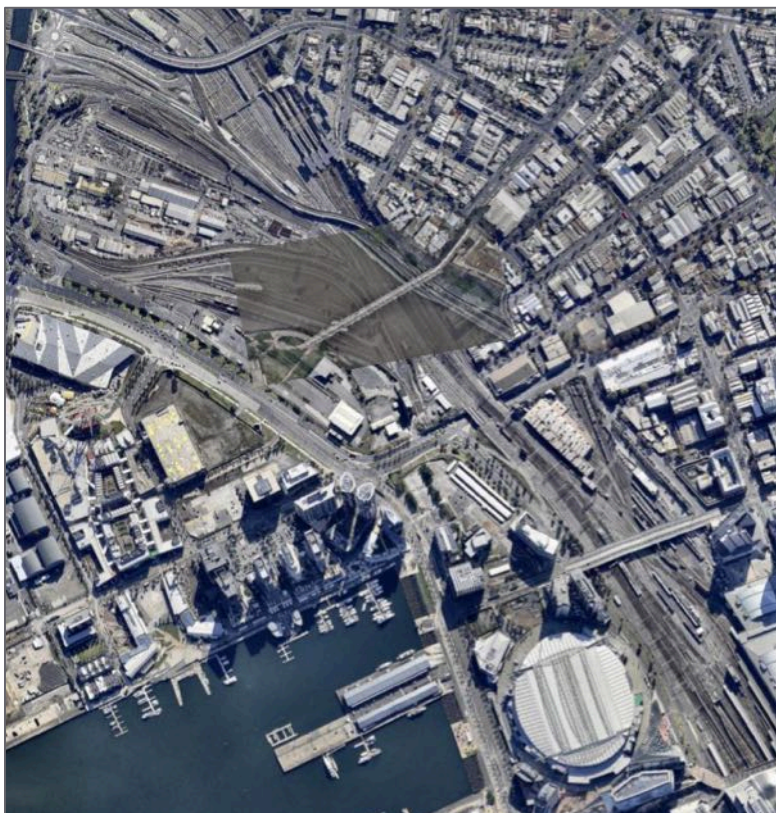


Source: *Australian Design Review*

The western end of the bridge aligns with Waterfront Way in Docklands.

Figure 85 shows the Kurilpa Bridge to scale linking the West Melbourne precinct to E-Gate and Docklands. The western end of the bridge aligns with Waterfront Way in Docklands.

FIGURE 85 – KURILPA BRIDGE OVERLAYED (TO SCALE) ON RAILYARDS



Source: *Nearmap with PBA graphic additions*

4 Retrofitting Dudley Street to support pedestrians and bicycle riders

Dudley Street has the distinction of being the most important connection and the most challenging problem.

The pedestrian and bicycle route along Dudley Street goes under the rail line solving the problem of height of the railway but creating new problems of capacity and amenity (discussed above) as the ‘tunnel’ is shared with six travel lanes. The situation is about to become more complex as the Western Distributor concept includes an at grade intersection on the north side of Dudley Street – mirroring the Dudley Street Wurundjeri Way intersection on the south side. The depth of the ‘tunnel’ also leads to flooding seen in Figure 86 below.

FIGURE 86 – FLOODING IN DUDLEY STREET



Source: triplem.com.au

There are only three possible solutions for pedestrians and bicycle riders: over, under or through. It would be physically possible to go over the rail line, dig beneath the roadway or widen the tunnel but these options would have a high cost and provide a low level of priority and amenity.

This assessment considers what could be done with the existing area under the rail bridge.

It is assumed that the pedestrian and bicycle connection will be developed under the southern or northern span rather than under the centre span. A ‘centre of road’ solution would be feasible. The area under the centre span could, like the central median of St Georges Road, be developed into a reserve for walking, riding and public transport. However, this would entail complex access arrangements at Adderley Street and Footscray Road as well as at the Wurundjeri Way/Western Distributor intersection.

A solution is possible on the south side. Between Wurundjeri Way and Adderley Street the motor vehicle flow is mainly inbound from the west to the east.

TABLE 35: AVERAGE MOTOR VEHICLES AND CAPACITY DUDLEY STREET

ROAD	SEGMENT	DIRECTION	VEHICLES	CAPACITY	%
Dudley Street	Wurundjeri Way – Adderley St	East	17,000	19,000	89%
		West	8,700	9,700	90%

There are however four westbound travel lanes and only two eastbound. It could therefore be possible to reallocate the 3.5m wide southernmost lane and add it to the existing space on the south side in order to develop a solution. Figure 87 below shows area under the southern span.

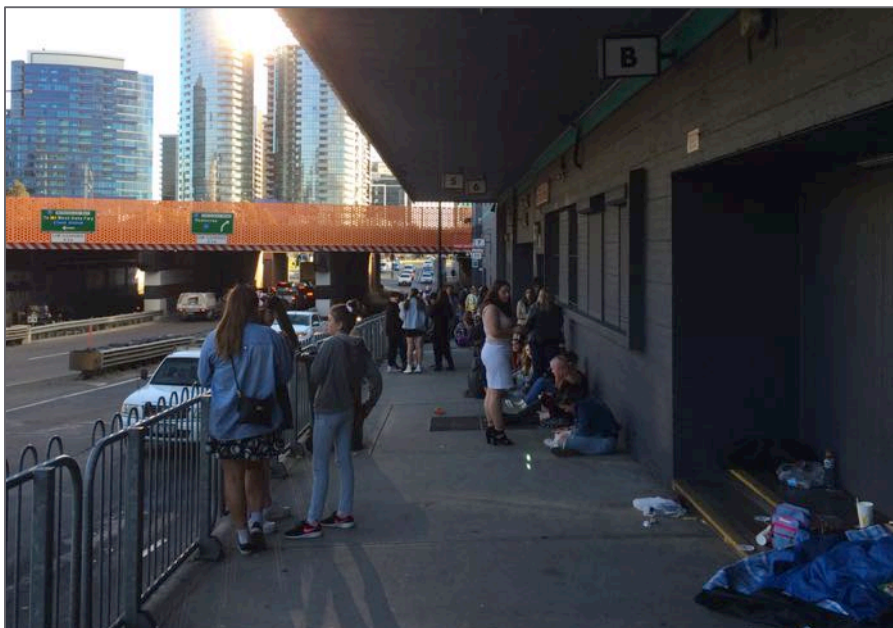
FIGURE 87 – WESTBOUND LANES IN DUDLEY STREET



Source: PBA

The weakness of this solution is that it is on the ‘wrong side’ for Festival Hall and E-Gate. The Bombardier depot on the south side has less relevance and is unlikely to change use. West of Wurundjeri Way it would be better for the link to be on the northern E-Gate side than near the smaller Digital Drive precinct to the south. Surprisingly the south side of Festival Hall on the north side of Dudley Street is an active frontage as shown in Figure 88 below.

FIGURE 88 – CONCERT GOERS QUEUEING FOR TICKETS AT FESTIVAL HALL



Source: PBA

It may be possible to further lower the north side travel lanes to allow a pedestrian and bicycle space above a low level tunnel perhaps as low as 3.2m. See Figure 89 and Figure 90 below.

FIGURE 89 – EASTBOUND LANES IN DUDLEY STREET



Source: PBA

Such an idea is not recommended, but is provided to highlight the potential compromises that can be made in order to better balance how the transport network meets the community's needs. An example of extreme compromise can be found in Beaconsfield, where Beaconsfield Avenue passes under a very low railway bridge. The compromise balances the need for access against a range of issues including flooding, crash risk and cost. Interestingly there are no dedicated pedestrian facilities in this location as shown in Figure 90 below.

FIGURE 90 – 2.2M CLEARANCE ON BEACONSFIELD AVENUE, BEACONSFIELD



Source: Google Streetview

The solution with perhaps the greatest merit is to use ‘lane reversibility’ to support a reduction in the available road space for motor vehicle traffic. On Queensway, signals on gantries indicate which way the centre lane is flowing, switching the role of the centre lane to reflect the tidal flow of motor vehicles. The lanes under the centre span in Dudley Street could be managed the same way. This would allow a lane on the north (and possibly the south) to be reallocated to people on foot and on bicycles.

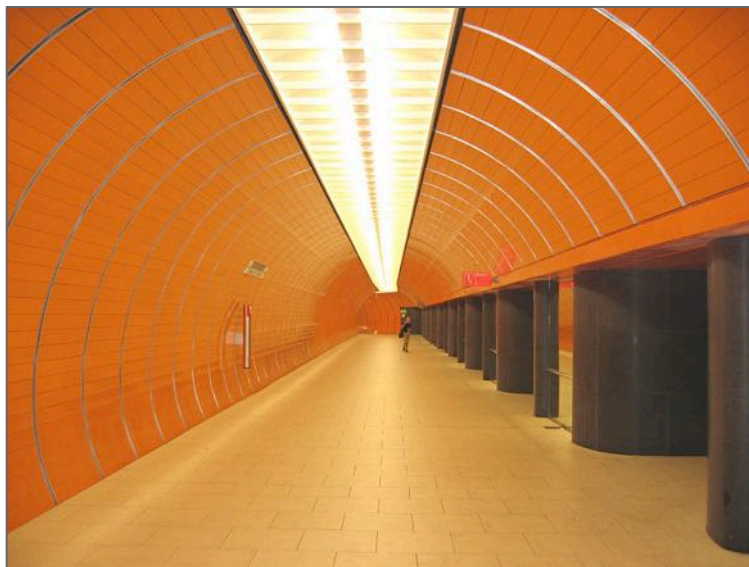
FIGURE 91 – REVERSIBLE FLOW ON QUEENSWAY, MELBOURNE



Source: Google Streetview

The bicycle pedestrian link on one or both sides could be developed as a ‘subway’ or tunnel providing shelter, protection from noise and security surveillance. Figure 92 below shows the pedestrian tunnel to the U Bahn at Marienplatz in Munich.

FIGURE 92 – THE UBAHN AT MARIENPLATZ MUNICH



Source: Wikipedia Photo Commons

7. Summary of Mode assessments

The assessments in this report are summarised in Table 36 below.

TABLE 36: SUMMARY OF BASELINE TRANSPORT AND ACCESS CONDITIONS IN WEST MELBOURNE

CRITERIA	PEDESTRIAN	BICYCLE	PUBLIC TRANSPORT	TRANSPORT SERVICES	PRIVATE MOTOR VEHICLE	HEAVY VEHICLES
Capacity	High	Low	Medium	Low - Medium	High	High
Current utilisation	Low	Low	Low inside precinct High on perimeter	Probably low	HIGH	Unknown
Opportunity to increase capacity	High	High	High	High	Low	Low
Priority	Low	Low	Low inside precinct High on perimeter	Low	High	High
Accessibility	Medium (with some exceptions)	Low (with some exceptions)	High	Low	High	High
Amenity	Very low – Medium	Low	Low inside precinct High on perimeter	Low	High	Unknown

Source: PBA

The table above provides a ‘dashboard’ view of the transport settings in the precinct:

The priority, accessibility and amenity for private motor vehicles have been set to ‘high’ (bold type). As the settings in these dimensions for motor vehicles are high, the settings must be low for the alternatives; priority and the other values cannot be shared evenly across all modes.

In response to these favourable settings, the level of motor vehicle use has risen until the available capacity has been absorbed and utilisation is ‘high’ (Capital letters). High utilisation means that this mode has reached the limit of its capacity. To support more people, more space would have to be allocated to road and vehicle storage space. Additional space is not available. The opportunity to increase capacity through the motor vehicle mode is therefore ‘low’ (red type).

The increasing number of people in the precinct requires the transport system to gain greater overall capacity. This can only be achieved by switching the settings to lower the priority, accessibility and amenity of the motor vehicle and raise the priority, accessibility and amenity of the other modes.

Changing the settings in this way can have two beneficial impacts. It can increase the capacity of the transport system and – because the alternative modes are significantly more space efficient – it can release space from the transport system for other purposes.

Appendix A – Transport Integration Act Objectives & Principles

The following tables summarise an assessment of the current transport system against the objectives and decision principles of the Transport Integration Act 2010. The objectives of transport planning in Victoria are discussed in Table 37 below.

TABLE 37: APPLYING TRANSPORT OBJECTIVES TO WEST MELBOURNE

OBJECTIVES	CURRENT NEGATIVES	POTENTIAL POSITIVES
<i>Social and economic inclusion</i>	Participation in the current motor vehicle-based transport system is expensive	West Melbourne is within walking distance of CBD education, employment and services
<i>Economic prosperity</i>	Transport system designed for enterprises and jobs that have moved to other areas Walking trips are not supported well or given enough priority More car spaces are being required in new developments than necessary or desirable	The space and skeleton required to create a highly efficient transport system already exists. Shared mobility systems are going to be more and more attractive as density increases
<i>Environmental sustainability</i>	High negative impact on the precinct of high level of motor vehicle use	Active transport can be a majority mode in West Melbourne given the proximity the suburb has to the CBD and a wide array of services
<i>Integration of transport and land use</i>	Motor vehicles have access to many buildings across the footpath Major area of open space – Flagstaff Gardens has few access points from the precinct. Most of the ones that exist have steps.	Development of West Melbourne can significantly reduce the need for private motor vehicle travel There is potential to facilitate better access to and greater mobility within local communities There is potential to improve the amenity of the local community and minimise the negative impacts of transport system (rail and road) that divide West Melbourne
<i>Efficiency, coordination and reliability</i>	Large area of space allocated to motor vehicle travel, storage and parking Most travel lanes on local roads are wider than they need to be Links to the west for people walking and on bicycles are circuitous and low amenity Public transport services not supported with high quality stops and vehicle priority Heavy vehicle routes are duplicated and no longer necessary Road network is near capacity – reducing reliability of travel times	SmartBus level of frequency for bus routes in the precinct – however they are not branded. SmartBus branding on its own was found by Monash University research to increase patronage by 6% High frequency bus link to Melbourne University from North Melbourne Station Well-located bike share node at North Melbourne Railway Station High frequency train, tram and bus services in and around the precinct
<i>Safety and health and wellbeing</i>	Risk is rising for motor vehicle collisions with bicycle riders and other motorists Low proportion of active trips by walking and bicycle riding (& public transport)	Fewer motor vehicle collisions with pedestrians in 2014 and 2015 than previously Active transport can be a majority mode in West Melbourne given the proximity the suburb has to the CBD and a wide array of services

Source: PBA Analysis

Key insights regarding the transport decision making principles with regard to West Melbourne are provided in Table 38 below.

TABLE 38: ALIGNMENT OF TRANSPORT PRINCIPLES IN WEST MELBOURNE

DECISION PRINCIPLES	APPLICATION TO WEST MELBOURNE
<i>Principle of integrated decision making</i>	<p>Precinct is in a prime location (proximity to CBD)</p> <p>It is treated as corridor for long distance vehicle movements</p> <p>Motor vehicle trips receive a high level of support across the precinct.</p> <p>There is little sign of priority being allocated to other modes</p>
<i>Principle of triple bottom line assessment</i>	<p>This is being applied through the structure planning process</p>
<i>Principle of equity</i>	<p>An initial focus on the allocation of space for users of the transport system has highlighted several equity issues</p>
<i>Principle of the transport system user perspective</i>	<p>Low perception of non-motor vehicle needs: pedestrian desire lines, distance to bicycle parking, location of bus shelters</p> <p>High level of consideration of motor vehicle users especially through traffic</p>
<i>Precautionary principle</i>	<p>The precautionary principle has not been applied to previous planning of the area. For example: both main north south corridors – Spencer and King Streets – have been designed for the same task</p> <p>There is a strong focus on motor vehicle transport with little concern for the width of roads and impact that width has on the local and global environment</p>
<i>Principle of stakeholder engagement and community participation</i>	<p>It appears that the businesses that have been in the area (mostly now relocated) have had a strong influence on the design of the current transport system</p> <p>It is difficult to consult the future resident population, as they have not yet moved to the precinct</p>
<i>Principle of transparency</i>	<p>Publicly available data is being used during the process</p>

Source: PBA Analysis

Appendix B – Collision types 2010 - 2015

The following tables show the collision types for pedestrians, bicycle riders and drivers.

TABLE 39: TYPES OF PEDESTRIAN COLLISIONS IN WEST MELBOURNE 2010 - 2015

COLLISION DESCRIPTION	BICYCLE COLLISIONS	MAIN COLLISION TYPES
Pedestrian near side. Pedestrian hit by vehicle from the right.	16	76% of all pedestrian collisions
Far side. Pedestrian hit by vehicle from the left	14	
Any manoeuvre involving pedestrian not included in DCAs 100-108.	4	26% of all pedestrian collisions
Pedestrian struck walking to/from or boarding/alighting vehicle.	4	
Pedestrian emerges from in front of parked or stationary vehicle	3	
Pedestrian playing/lying/working/standing on carriageway.	2	
Vehicle strikes pedestrian on footpath/median/traffic island.	2	
Pedestrian on footpath struck by vehicle entering/leaving driveway.	1	
Pedestrian walking against traffic.	1	

Source: CrashStats

TABLE 40: TYPES OF BICYCLE COLLISIONS IN WEST MELBOURNE 2010 - 2015

COLLISION DESCRIPTION	BICYCLE COLLISIONS	MAIN COLLISION TYPES
Right through	18	64% of all bicycle collisions
Left turn sideswipe	13	
Vehicle strikes door of parked/stationary vehicle	8	36% of all bicycle collisions
Left near (intersections only)	5	
Out of control on carriageway (on straight)	3	
Cross traffic (intersections only)	2	
Off carriageway to left	2	
Rear end (vehicles in same lane)	2	
Vehicle strikes another vehicle while emerging from driveway	2	
Entering parking	1	
Far side. Pedestrian hit by vehicle from the left	1	
Lane change left (not overtaking)	1	
Lane side swipe (vehicles in parallel lanes)	1	
Right far (intersections only)	1	
U turn	1	
Vehicle off footpath strikes vehicle on carriageway	1	

Source: CrashStats

TABLE 41: TYPES OF MOTOR VEHICLE COLLISIONS IN WEST MELBOURNE 2010 - 2015

COLLISION DESCRIPTION	MOTOR VEHICLE COLLISIONS	MAIN COLLISION TYPES
Right through	60	
Rear end (vehicles in same lane)	33	59% of all motor vehicle collisions
Cross traffic (intersections only)	19	
Pedestrian near side. Pedestrian hit by vehicle from the right.	15	
Far side. Pedestrian hit by vehicle from the left	12	
Out of control on carriageway (on straight)	9	
Right off carriageway into object/parked vehicle	9	
Right turn sideswipe	8	
U turn	5	
Any manoeuvre involving pedestrian not included in DCAs 100-108.	4	
Lane side swipe (vehicles in parallel lanes)	4	
Pedestrian struck walking to/from or boarding/alighting vehicle.	4	
Head on (not overtaking)	3	
Lane change right (not overtaking)	3	
Left near (intersections only)	3	
Off carriageway to left	3	
Permanent obstruction on carriageway	3	
Right far (intersections only)	3	
Right near (intersections only)	3	41% of all motor vehicle collisions
Entering parking	2	
Lane change left (not overtaking)	2	
Leaving parking	2	
Left rear	2	
Pedestrian emerges from in front of parked or stationary vehicle	2	
Pedestrian playing/lying/working/standing on carriageway.	2	
Right rear.	2	
Vehicle strikes pedestrian on footpath/median/traffic island.	2	
Vehicle collides with vehicle parked on left of road	2	
Left off carriageway into object/parked vehicle	1	
Left through	1	
Left turn sideswipe	1	
Off carriageway on left bend	1	
Off carriageway to right	1	
Other accidents not classifiable elsewhere	1	
Other accidents-off straight not included in DCAs 170-175	1	

COLLISION DESCRIPTION	MOTOR VEHICLE COLLISIONS	MAIN COLLISION TYPES
Other manoeuvring not included in DCAs 140-148	1	
Out of control on carriageway (on bend)	1	
Pedestrian on footpath struck by vehicle entering/leaving driveway.	1	
Pedestrian walking against traffic.	1	
Pulling out (overtaking)	1	
Right/left. One vehicle turning right the other left.	1	
U turn into fixed object/parked vehicle	1	
Vehicle strikes door of parked/stationary vehicle	1	

Source: *CrashStats*