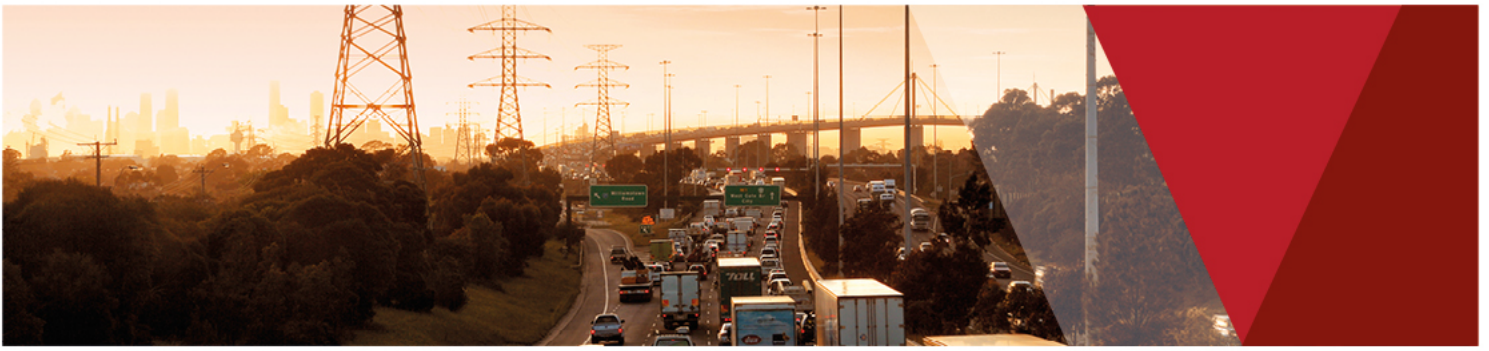


WESTERN DISTRIBUTOR Business Case

November 2015





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Overview

This business case informs a decision by Government on investment in Melbourne's transport network

Major transport decisions can shape cities for future generations so it is vital that governments and communities have the best evidence before making decisions.

The genesis of this business case was the market-led proposal from Transurban to the State Government in March 2015 to build a \$5 billion Western Distributor Project, funded by new tolls and an extension to CityLink tolls. Transurban's preliminary design included a tunnel and widening of West Gate Freeway to address Melbourne's long-standing over-reliance on the West Gate Bridge and to take trucks off residential streets. This design has since been updated in response to technical, safety and community feedback.

Transurban's Proposal is currently at Stage 3 of a five-stage market led proposal process being assessed by the Department of Treasury and Finance (DTF) and a team of independent experts.

Part of that analysis and scrutiny has involved the development of this business case. The State determined that the most appropriate way for Victorians to have confidence that an unsolicited proposal would clearly deliver public benefits for the estimated cost and within timelines, was to test it against a public sector perspective on what it would take to deliver the Project.

This public sector benchmark has been developed by a Project team of experts from across government agencies and the private sector. It considers a range of alternative scope options, delivery and funding approaches to ensure the investment will deliver network-wide benefits.

The business case supports many of the key features of the Transurban Proposal to help Melbourne stay ahead of gridlock, along with more investment in Victoria's critical economic spine, the M1 Corridor.

It finds there is a strong case for investing in:

- An alternative to the West Gate Bridge with a new toll road under Yarraville and a Maribyrnong River Crossing
- A dedicated freeway link to the Port of Melbourne to support a growing freight task while reducing the number of trucks on local roads in the inner west
- A high productivity freight vehicle compliant freeway link to the Port of Melbourne and improved access to Webb Dock to lift national productivity
- Additional lanes and road management technology on the Monash Freeway to unblock Melbourne's M1 Corridor and improve access to important economic and education clusters
- Improved links to the important innovation and education cluster in the inner north
- Upgrades to the West Gate Freeway from the M80 Ring Road to Williamstown Road to cater for growing demand for west-east trips
- A new cycling connection over Williamstown Road to complete the Federation Trail and encourage more active transport

- An extension of truck curfews and proactive planning to support urban renewal in the west.

The business case finds the Project would deliver significant value to Victoria, regardless of who delivers it.

Along with faster, more reliable and safer travel times, the Project would generate a \$11 billion boost to the state gross product, create 5,600 construction jobs, and up to 2,700 ongoing jobs, and deliver an economic cost benefit ratio of 1.3.

The business case explores alternatives to Transurban's Proposal to extend the CityLink tolls, to capture the value of future tolls and potentially offer more flexibility.

If the Project progresses past the business case stage, a transparent planning approval phase is recommended to fully engage communities and stakeholders on all aspects of the Project.

The Government is expected to make a decision [REDACTED] on whether to proceed with the Transurban Proposal, or opt for another delivery method after rigorous scrutiny.

The release of the business case is the starting point for community involvement in a city-shaping project.



Summary

Introduction

This business case informs a decision by Government on investment in Melbourne's transport network

The analysis undertaken in this business case has identified a case for investment in Melbourne's transport network to support the city's growth. This includes the Western Distributor Project, a potential new freeway connection between the West Gate Freeway and CityLink, together with enhanced capacity of the West Gate Freeway from the M80 Ring Road to Williamstown Road, upgraded access from the West Gate Freeway to the Port of Melbourne, and upgraded access to Webb Dock. It also includes the Monash Freeway Upgrade, involving an additional lane in each direction along the Monash Freeway from EastLink to Clyde Road and expanded freeway ramp metering at key points between Warrigal Road and Koo Wee Rup Road.

In March 2015, Transurban submitted a market-led proposal for a Western Distributor project to the Department of Treasury and Finance (DTF). The primary purpose of this business case is to inform a Government decision on whether the Western Distributor has investment merit based on a broader assessment of Melbourne's transport needs and exploring scope, procurement and funding options.

The State has decided that the most appropriate way to inform Government of the merit of investment in the Western Distributor is to consider a range of alternative scope options, delivery and funding approaches. This represents a public sector benchmark and could be progressed irrespective of whether the Transurban Proposal proceeds further. This business case presents the State's developed scope to enable feasibility and deliverability assessments of the Project. The business case does not evaluate Transurban's proposal but will play an important role in informing DTF's assessment on whether to proceed with the Transurban Proposal to Stage 4 in accordance with the Market-led Proposals Interim Guideline. The Government is expected to make its decision [REDACTED]

The role of transport in a growing and changing Melbourne

Melbourne's future population and freight growth, and economic geography will rely on transport connectivity

Melbourne is facing rapid population growth, a changing economic geography and urban structure, and an expanding freight task. As the population, freight and economy of Melbourne continues to grow, transport connectivity and performance is more important than ever.

The scale and speed of Victoria's population growth is unprecedented in Melbourne's history. Melbourne will overtake Sydney as Australia's most populous city with more than 7 million people by 2051 if current growth patterns continue.

The growing pains are already acute in the west, where the population is growing at double the pace of the rest of metropolitan Melbourne. Half of Melbourne's population growth to 2050 will be in the west and north, but only 30 per cent of jobs growth will be in these areas.

An integrated transport network comprising road and public transport will facilitate Melbourne's future growth

As the economy transitions from traditional manufacturing to a service-based economy, the location of jobs and economic activity is also changing.

Inner areas are growing with professional and knowledge intensive services, and specialist manufacturing and related industries are moving to the outer rim of Melbourne in the west, north and south-east, increasing demand for goods movement on freeways and access to the Port of Melbourne.

For the emerging west to develop and realise its full potential, it will need to capitalise on its relative proximity to inner Melbourne. The need for strong connections to Melbourne's south-east economic corridor will become increasingly important to facilitate economic growth and to attract a skilled workforce.

Melbourne's role as a national import and export logistics hub is also underpinning major growth in Victoria's freight task that needs to be accommodated without harming the amenity of the west. Victoria's freight task is projected to grow from 60 billion net tonne kilometres (ntk) a year to 170 billion ntk by 2046. Container growth at the Port of Melbourne is forecast to continue to grow steeply, a task largely handled on road.

Investment in mass public transit and roads will be required to link suburban precincts, inner areas, and jobs with the labour force, along with connecting economic clusters across Melbourne. While sustained high growth in public transport demand is expected, a significant proportion of the additional trip demand will need to be accommodated on the road network, which is already at or close to capacity in key locations.

To enable continued and efficient economic growth, Melbourne will need a highly developed and integrated transport network with efficient road and public transport connections to deliver both people and goods to key economic clusters across Melbourne.

The capacity constraints on the West Gate Bridge and the projected growth in truck movements in and out of the expanding Port of Melbourne is a major problem which will get worse without action.

The predictability of travel times is a growing concern for freight companies and families at both ends of the M1. The start-stop conditions are making travel times unreliable, slow and more dangerous. By 2031, travel times to the central and inner city suburbs are estimated to take more than 20 minutes longer from many locations, particularly in the west and south-east of Melbourne.

The importance of the M1 Corridor in a connected transport network

Reflecting that a Western Distributor Project has been put forward to Government as a market-led proposal, the State has undertaken a broader assessment of Melbourne's transport needs in the M1 Corridor and its adjoining economic precincts.

State Government plans and policies including *Plan Melbourne*, *Victorian Freight and Logistics Plan: Victoria the Freight State*, and *Project 10,000*, support consistent investment in the state's road network and public transport system. With population and freight forecast to grow substantially over the next few decades, further investment and initiatives are required, based on network-wide solutions that integrate with and accommodate economic, land use and other outcomes.

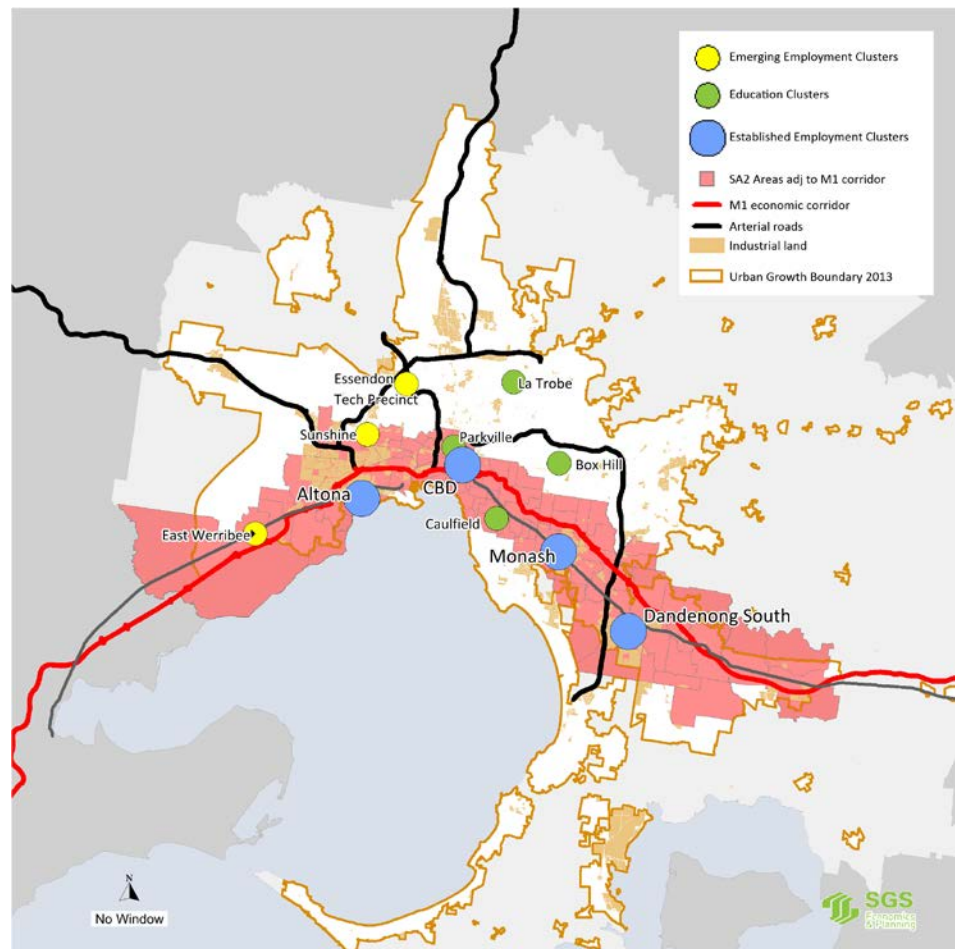
Investment priorities have been identified along the M1 Corridor

The Victorian Government has made commitments and is planning for major investments in Melbourne’s transport network. This includes significant planned investment to serve public transport demand in the west and south-east and road demand in the north-south Tullamarine Freeway (M2) Corridor. However, further investment priorities have been identified to deal with increasing road demand along Victoria’s M1 Corridor.

Victoria’s M1 and adjacent corridor (the M1 Corridor) connects the west and south-east of Melbourne and Melbourne’s central and inner urban areas. It stretches from Geelong through to the Latrobe Valley (see Figure 1) and is underpinned by a radial road and heavy rail links to the CBD and central areas, and a cross-city and cross-state road route for the west, east and south-east.

The corridor accommodates 37 per cent of the metropolitan population and 44 per cent of the skilled workforce. Moreover, more than half the metropolitan workforce (56 per cent) is employed within this area.

Figure 1: Victoria’s M1 and adjacent corridor



Note: Comprises the Statistical Areas (SA2s) encompassing the Princes Freeway, West Gate Freeway and Monash Freeway, i.e. those SA2s lying within a kilometre of the road corridor
 Source: SGS Economics and Planning, 2015

The M1 Corridor accommodates Melbourne's significant economic clusters and assets

The M1 Corridor accommodates key economic assets, including significant employment and education clusters, and major ports and freight terminals including:

- **Employment clusters** – established at Melbourne CBD, Monash, Dandenong South, and Altona, with East Werribee a leading emerging cluster along the corridor
- **Education clusters** – the Parkville, Monash and RMIT education clusters are serviced by the M1 corridor
- **Major ports and freight terminals** – all of Victoria's major arterial freight network either lies along, or extends from this corridor, including the Port of Melbourne and Melbourne Airport (connected by the M2 Freeway)
- **Key road connections** – the corridor comprises the Princes Freeway, West Gate Freeway, CityLink Southern Link and Monash Freeway, with critical connection elements being the West Gate Bridge and the CityLink tunnels
- **Key public transport routes** – rail lines serving the corridor include the Werribee, Williamstown and Sunbury lines in the west and Pakenham, Cranbourne and Glen Waverley lines in the south-east, supported by Melbourne's central tram network.

Corridor transport connectivity (both road and public transport) is critical to the efficient function of key economic assets for Melbourne, including significant employment and education clusters and major and emerging freight terminals.

Why is investment required to relieve capacity on the M1 Corridor?

M1 Corridor transport problems relate to capacity, over-reliance, poor freight connections and land use mismatch

The M1 Corridor is a critical economic corridor for Australia. However, four key problems have been identified in relation to poor transport connectivity on the corridor in Melbourne:

- Transport capacity on the M1 Corridor is inadequate relative to growing demand
- Melbourne is over-reliant on the West Gate Bridge that is currently operating at capacity
- Port and freight connections are inadequate to sustainably cater for growth and cause reduced amenity in the west
- There is a mismatch between transport and land use.

There are two sections of the road corridor identified as operating at capacity by 2031 (Figure 2) and considered to have significant connectivity implications given their linkages to key economic clusters in Melbourne. These are:

- The West Gate Freeway between the M80 Ring Road and the West Gate Bridge
- The Monash Freeway between Warrigal Road, Chadstone and Clyde Road, Berwick.

Figure 2: M1 Corridor volume capacity ratios 2031 – AM Peak (7-9am): Base case



Source: Veitch Lister Consulting, 2015

In addition to the major strain at its bottleneck where 200,000 vehicles cross the West Gate Bridge every day and traffic is still growing, in the south-east the Monash Freeway is reaching capacity. Even a relatively small incident at these choke points can disrupt the wider network with negative economic impacts. Of significant concern is the growing unpredictability of journey times characterised by start-stop conditions conducive to accidents and longer times for the network to recover.

Transport performance will continue to deteriorate along the M1 Corridor as demand increases, particularly in the west and south-east of Melbourne, where, for example, morning peak travel times to the central and inner city are estimated to increase by up to 20 minutes between 2011 and 2031. Travel conditions at other times of the day and week will also deteriorate.

Over reliance on the West Gate Bridge to connect other parts of the city and a lack of network redundancy are major risks to the state economy. This is because the network is highly vulnerable to incidents and disruptions and cannot cope with major and regular disruptions. Significant growth in future demand will further exacerbate these problems.

Increased congestion and travel times may also jeopardise the amount of freight that can be moved in and out of the Port of Melbourne, undermining the efficiency of port operations and future expansion plans, as well as Victoria's productivity.

While there are a number of schemes in place to expand Victoria's High Productivity Freight Vehicle (HPFV) network by strengthening existing bridge infrastructure, there is currently no HPFV compliant link to the Port of Melbourne and the adjoining Dynon freight precinct.

In addition, the arterial road network in Melbourne's west is used by trucks to access the Port and industry in the inner west. These roads, located in largely residential areas, are disconnected, poorly configured and inadequate for such travel. Unless access is improved, the number of trucks on local inner west roads will more than double in 2031 (shown in Figure 3), reducing the liveability of the inner west and increasing pressure on Port activities.

Figure 3: 2031 base case heavy vehicle demand (two-way, 24 hours weekday volumes)



Source: GHD, 2015

If nothing is done, the transport network in the west will not keep pace with changes in economic and urban structure, further entrenching the historic east-west divide instead of narrowing the socio-economic gap. This may discourage potential residents and businesses from locating to the west, slowing the rate of population and employment growth and urban renewal in the inner and middle western suburbs.

Higher costs for residents and business in the south-east will harm the productivity of the region's employment clusters, affect the economy through increasing freight transportation costs and discourage residents and businesses from locating to the south-east, slowing the rate of population and employment growth in these areas.

The preferred response in the western corridor

A persuasive case for investment in major rail and road capacity linking Melbourne's east and west was put forward by Sir Rod Eddington in his 2008 *East West Link Needs Assessment Study* (the Eddington Study). Since then, the case for intervention and investment has become even more urgent and compelling, with population, freight and employment forecasts significantly exceeding the government's projections at that time.

A suite of reform and demand management, productivity and rail and road supply interventions has been considered relative to the problems identified in the corridor. Potential strategic interventions include policy, pricing, public transport and land use responses designed to increase capacity of the M1 to accommodate Melbourne's growth, reduce reliance on the West Gate Bridge, improve performance of the M1 corridor, improve the efficiency of access to the Port of Melbourne and improve the safety and amenity of the inner west.

Strategic options assessment supports a new western road corridor for Melbourne

The strategic assessment undertaken for this business case supported a new western road connection as the preferred option, yet with potential benefits acknowledged from packaging complementary low cost interventions such as establishing a high productivity freight network to the Port of Melbourne, road network pricing by tolling new capacity, and inner west amenity protection. Two corridors identified by the Eddington Study were considered for the new road corridor: a northern route connecting CityLink and the M80 under Footscray, and a southern route connecting CityLink and the West Gate Freeway in the vicinity of Williamstown Road (see Figure 4).

The faster than previously expected growth suggests the need for both corridors in the long term. Substantial investigation and assessment of these corridors has revealed that they are not mutually exclusive. This means that it becomes a matter of determining an optimal sequencing of investment.

Over the long term, solutions are required to respond to demand patterns in both the northern and southern corridors. An 'investment pathways' approach was used in this business case to determine which road corridor option should be the short term priority. This recognises both the urgency of dealing with long-standing issues and the need to maintain a flexible approach to investment given the inherent uncertainty in forecasting long term population and employment projections, advances in technology and societal trends.

Figure 4: Western corridor pathways



The two investment pathways have been assessed by undertaking traffic modelling and rapid economic appraisal. This analysis has indicated that the benefits realised under Pathway 1 will be earlier and greater over time than those under Pathway 2 (see Table 1).

Pathway 1 (assuming the southern corridor as the short term priority) has therefore been identified as preferred and also the greatest potential and flexibility as it:

- offers an early 'network solution' by linking freeways, generating higher benefits (and flows) compared to an almost cost-equivalent stage of the northern corridor (e.g. CityLink to Paramount Rd)
- addresses some of the existing performance issues on the West Gate Freeway (part of the M1 corridor) earlier than the northern corridor by providing relief to the key bottleneck of the West Gate Bridge
- provides more direct and more efficient access to the Port of Melbourne and the Whitehall - Hyde St port/industrial area, enabling trucks to be removed from Francis Street and Somerville Road as envisaged in the original Truck Action Plan and West Gate Distributor
- completes the High Productivity Freight Vehicle network into the Port of Melbourne from the west much earlier than the northern corridor, delivering significant productivity benefits to regional freight exports

- better targets the significant current growth in Melbourne's outer west connected to the West Gate Freeway by the Princes and West Gate Freeways
- offers greater potential to progress reform in network pricing and heavy vehicle charging.

Table 1: Rapid CBA results of potential investment pathways as part of strategic options assessment (\$ June 2015 millions, real, discounted present values)

	Pathway 1	Pathway 2
Rapid Benefit Cost Ratio excluding Wider Economic Benefits (WEBs)	1.7	1.3
Net Present Value excluding WEBs	\$3,700	\$1,300
Rapid Benefit Cost Ratio including WEBs	2.3	1.7
Net Present Value including WEBs	\$6,900	\$3,400

Note: Estimated incremental to the status quo base case, discounted based on a 7% real discount rate over the period 2015/16-2095/96 (50 years after the last construction year in 2045/46), demand modelling accounts for route and mode change only, P50 capital costs, may not total due to rounding..

Source: PwC, 2015

A pathway approach has identified a southern road corridor offers greatest potential and flexibility

The southern corridor is likely to be a medium term solution. It accommodates future construction of the northern corridor and provides the 'real option' to defer significant investment in the northern corridor for 10 to 15 years. Pathway 1 addresses current needs, the inbuilt "optionality" for the northern corridor allows time to resolve some of the uncertainty about future growth and the optimal timing to meet demand. It would also permit enhanced planning for the northern corridor in a more considered timeframe to optimise land use in the west and provide certainty to industry and residents.

The preferred response in the south-east corridor

Strategic options assessment supports upgrading of technology and existing Monash Freeway capacity

In the south-east where the transport system is more mature, the strategic options assessment considered two solutions:

- Upgrade the technology and capacity of the Monash Freeway
- Build a Dandenong Bypass as an alternative route to re-direct some traffic away from the Monash Freeway.

While the Dandenong Bypass would improve network resilience and stimulate industry growth, it would require major arterial intersection upgrades, significant land acquisition and capital investment.

The preferred strategic response in the south-east is to provide new and upgraded technology and provide additional capacity including ramp metering storage on the Monash Freeway. This is expected to achieve greater benefits at a lower cost and enhance existing investment in the Monash Freeway by realising its potential capacity and use.

The project scope comprises investment in the West Gate Freeway, Western Distributor, port access and Monash Freeway

Project scope

An assessment of physical scope options was undertaken considering various design options in relation to the preferred strategic response for both the western and south-east segments of the M1 Corridor. The resulting project scope developed for the purpose of this business case (together defined as 'the Project'), comprises:

- **West Gate Freeway** – Widening of the West Gate Freeway to provide six lanes in both directions between the Princes Freeway / M80 interchange and Williamstown Road. Both directions are proposed to be separated into two three-lane carriageways to separate major conflicting movements. New braided ramp connections are assumed to facilitate movements between the Princes Freeway and M80 to the west and the West Gate Bridge and new Western Distributor to the east. Access at the existing arterial road interchanges is proposed to be maintained and incorporated into the upgraded facility, improvements along the route to cater for high productivity freight vehicles and provision of a broader integrated Managed Motorway System including ramp metering.
- **Western Distributor** – a new Western Distributor connecting the West Gate Freeway to the Port of Melbourne and CityLink via a tunnel under Yarraville, a new Maribyrnong River Crossing and raised viaduct along Footscray Road. The Western Distributor will connect into the West Gate Freeway near Williamstown Road and incorporate direct ramps to Hyde Street, Mackenzie Road (to/from West Swanson Dock) and Appleton Dock Road. The raised viaduct will connect directly with CityLink to the north, Footscray Road and new connections to the inner CBD bypass routes.
- **Cycling and pedestrian facilities** – improvement and upgrade of the shared path facilities along the corridor including grade separated facilities along Footscray Road with Appleton Dock Road and Sims / Mackenzie intersections. Completion of Federation Trail between Williamstown Road and Hyde Street.
- **Port of Melbourne (Webb Dock) Access** – Webb Dock Access which provides an additional eastbound lane on Cook Street and a direct connection from Cook Street to Ramp M to allow direct access to CityLink without mixing with West Gate Freeway traffic. Ramp M will also be modified to improve the safety of the road and incorporate ramp metering.
- **Monash Freeway Upgrade** – consisting of an additional lane in each direction between EastLink and Clyde Road and new and improved ramp metering between Warrigal Road and Koo Wee Rup Road.

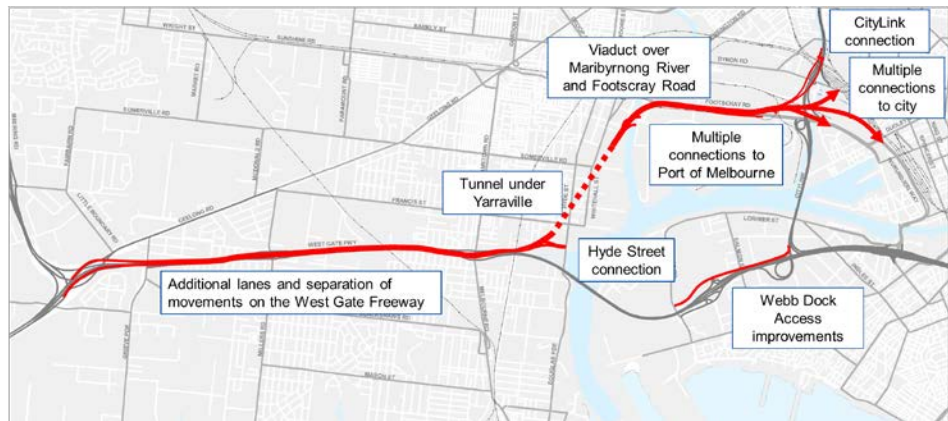
Status of the project scope: not finalised and subject to more exhaustive consultation

This business case was undertaken to inform government of the merit of investment in the Project. The scope of the Project presented in this business case should not be considered to be the finalised scope for the Project. This scope was developed in order to have a reasonable basis on which to develop a range of assessments as part of the typical business case development process. This includes cost estimates, economic assessments and traffic impacts to name but a few.

Should this project proceed past the business case stage, the State will undertake a more exhaustive consultation and engagement process on all aspects of the project scope to ensure that all appropriate and relevant views have been considered before refining any scope through a detailed, inclusive and transparent planning approval phase.

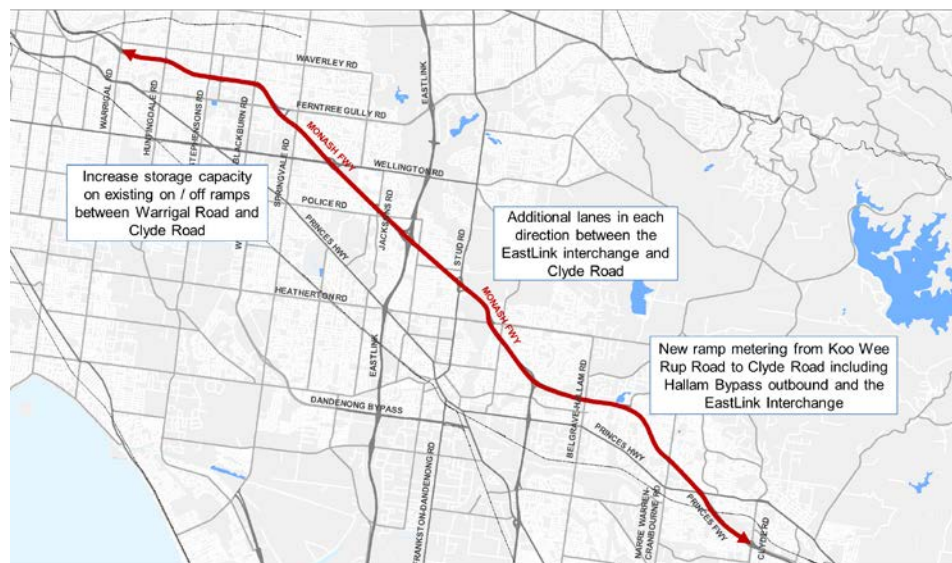
The business case project scope, presented separately for each section along the M1 Corridor is provided in Figure 5 and Figure 6.

Figure 5: Western M1 Corridor Western Distributor, West Gate Freeway, Port of Melbourne and Webb Dock Access business case project scope



Source: GHD, 2015

Figure 6: South-east M1 Corridor Monash Freeway business case project scope



Source: GHD, 2015

Tolling structure

Tolling is proposed to balance transport network use and as a funding source

Tolling can promote more efficient use of the transport network, as well as providing an important source of funding for the Project. Due to its proximity to CityLink, a key focus in developing a preferred tolling structure for the Western Distributor relates to creating a balanced network outcome.

This business case recommends that tolling should continue on CityLink until at least the end of the operational period of the Project to maintain network balance. The tolling assumptions modelled for the purposes of this business case are summarised in Figure 7 and Table 2. Should this project proceed past the business case stage, the tolling strategy will be further considered by Government after the business case is approved.

Figure 7: Tolling of New and Upgraded Assets

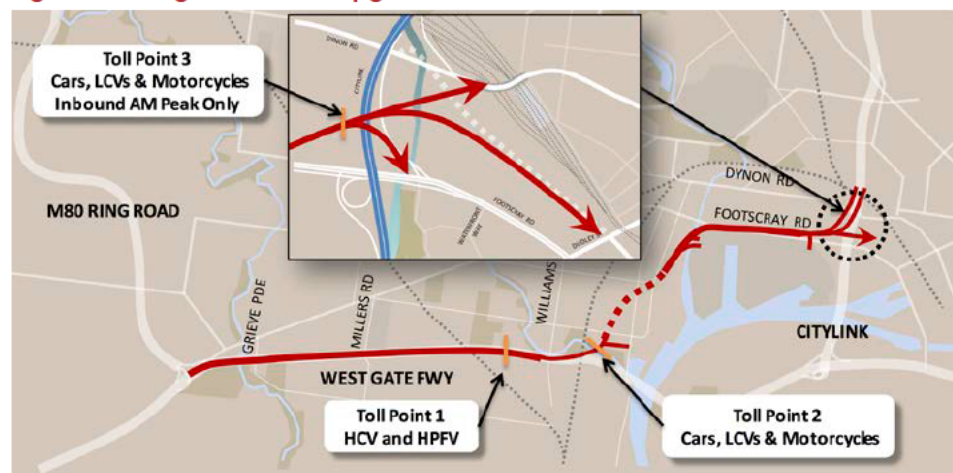


Table 2: Toll Price and Toll Cap (\$ June 2015)

Vehicle type	Toll Point 1	Toll Point 2	Toll Point 3 (AM peak only)	Toll Cap
Cars	-	\$2.77	\$4.43	-
Light Commercial Vehicle (LCV)	-	\$4.43	\$7.09	-
Heavy Commercial Vehicle (HCV) (day – 6am to 8pm)	\$13.30	-	-	\$30.50
Heavy Commercial Vehicle (HCV) (night – 8pm to 6am)	\$8.90	-	-	\$19.00
High Productivity Freight Vehicle (day – 6am to 8pm)	\$20.00	-	-	\$35.00
High Productivity Freight Vehicle (HPFV) (night – 8pm to 6am)	\$13.30	-	-	\$21.35

Benefits include improved transport, network redundancy, freight efficiency, and amenity

Benefits

The Western Distributor and Monash Freeway Upgrade will generate a number of benefits for road users, the Melbourne community and the economy more widely.

Productivity and growth for Melbourne

The Project will play a key role in unlocking productivity in Melbourne by reducing congestion, improving travel times, improving travel time reliability, and lowering the operating costs of running a vehicle.

Travel times in the morning peaks will be up to 12 minutes faster for trips from the west. In the south-east, Monash Freeway Upgrade will improve traffic flow and ease congestion, with travellers saving an average 5 minute peak travel time between Warrigal and Clyde Roads.

An improvement for trips in the west will be the reduction in travel time variability. Commuters, businesses and other travellers will be able to plan the time for their journey with more certainty. This means that some travellers will be able to reduce the travel time buffer allowance (the extra time travellers allow to make sure they will reach their destination on time) by up to 11 minutes.

Average speeds for some journeys will be up to 15 km/h hour faster in the morning and up to 20 km/h faster in the afternoon peak.

Melbourne's CBD will be more amenable and efficient with a reduction of more than 60,000 vehicle kilometres travelling through it each day. With the project, trips destined for the north city area and inner north no longer need to travel on the West Gate Bridge and through the city to reach these destinations as the Western Distributor provides a more direct route.

More competitive port and freight sector

The Project delivers significant improvements to the competitiveness of Australia's busiest container port and Melbourne a national import and export logistics hub.

The construction of high productivity freight vehicle compliant freeway links to the Port of Melbourne will bring significant time and operating cost savings to the freight industry. More than a third of the national containerised trade in Australia will have direct freeway access to the Port precinct by 2031.

The business case finds the superior freight links, with unimpeded access for 110 tonne mass limit trucks to the Port, will deliver \$15 to \$20 per trip efficiency savings for high productivity freight vehicles. Some 28 per cent of trucks that currently use local inner west roads will also have a safer and more efficient option to reach the Port precinct.

Freight using the Western Distributor to access the port precinct from Melbourne's west will enjoy travel time savings, some up to 50 per cent.

Freight sector savings are expected to flow through to consumer prices and bring wide community and economic benefits.

Reduced reliance on the West Gate Bridge

Demand growth is putting more pressure on the iconic West Gate Bridge. Building the Western Distributor will create an alternative river crossing, improve the resilience of the city's transport network, and make Melbourne less vulnerable to shut down when major incidents occur.

While the Bridge will remain a critical element in the city's transport network, building an alternative under Yarraville and a new crossing over the Maribyrnong River will give Melbourne more options to reduce delays and congestion from affecting the entire road system (known as 'redundancy').



The Project will free up capacity on the Bridge by taking up to 22,000 vehicles off it (including 4,000-6,000 trucks a day).

Having an alternative will help bypass the congestion and incidents on the Bridge and reduce the number of incidents and accidents that can cause traffic to block up across the wider network.

In 2014 there were more than 750 vehicle breakdowns on the bridge, including 14 casualty crashes that caused lane closures of up to six hours.

A more liveable Melbourne

Reduced crashes, lower air emissions and improved neighbourhood amenity on residential streets are among the many benefits for communities.

The Project will reduce noise, crashes and pollution, and better connect people to jobs, health, education and other services.

Having greater resilience in the transport network, less reliance on the West Gate Bridge and better connectivity along the M1 Corridor will make Melbourne more liveable. Lower truck volumes on local roads will make the inner west more appealing for urban renewal and residential development. The Project will reduce 50 to 75 per cent of trucks along Francis Street and Somerville Road in Yarraville and up to 28 per cent of trucks more broadly across the inner west roads. This will make Melbourne's west far more attractive for communities.

Cycling will be further encouraged with the completion of the main cycling route, the Federation Trail, which is already used by more than 6,000 cyclists in the west, along with greater connectivity of other shared pathways.

Air pollution will be reduced by 2.3 million tonnes a year, and safety improvements along the M1 are estimated to help avoid 55 serious crashes a year.

The Project will also help address longstanding inequities between the west and east of Melbourne through better connections to education, health and other services and more employment opportunities.

Economic development in Melbourne and the west

Overall, the Project will significantly lift economic activity in Victoria by \$11 billion (present value \$2015, over 50 years of operation) and support employment levels remaining above the long term average.

The business case finds the Project will significantly increase economic activity in Victoria. During the construction phase, 5,600 direct and flow-on jobs will be created and 2,700 jobs a year ongoing.

In the west, the overall employment impact is raised by attracting 2,200 jobs to the west in 2031 and residents will be in range of 7% more job opportunities as a result of the Project.

Businesses in the west will also be boosted, through better access to markets and a workforce that has been difficult to reach.

Some 3,600 households are expected to be attracted to the west, as the region becomes better connected.

Table 3: Key benefits of the Project

Productivity and growth for Melbourne	More competitive port and freight sector	Reduced reliance on the West Gate Bridge	A more liveable Melbourne	Economic development in Melbourne and the west
Up to 12 mins time savings for a peak trip <small>(2031 avg weekday trip)</small>	Direct freeway access to Port of Melb. for 6M TEU per year, or 1/3 of national containerised trade ₍₂₀₃₁₎	Up to 22,000 vehicles per day off the West Gate Bridge <small>(2031 avg weekday)</small>	28% reduction in trucks on local inner west roads <small>(2031 incl curfew extension)</small>	\$11 billion increase in gross state product <small>(\$June 2015 discounted 2016-2072)</small>
Reduce allowance for travel time variability by up to 11 mins for a peak trip <small>(2031 avg weekday trip)</small>	Unimpeded freeway access to Port of Melb. for 110 tonne mass limit trucks	Up to 6,000 trucks a day off the West Gate Bridge <small>(2031 avg weekday trip)</small>	50-75% reduction in trucks on Somerville Rd and Francis St <small>(2031 incl curfew extension)</small>	5,600 direct and flow-on construction jobs <small>(max 2016-2022)</small> and 700 jobs ongoing <small>(average 2023-2072)</small>
Approx 5 min time savings for a peak trip Warrigal to Clyde Road <small>(2031 avg weekday trip)</small>	\$15-20 per trip improvement in efficiency for high productivity trucks from the west or north to POM <small>(2031 avg weekday trip)</small>	50,000-70,000 vehicles per day can avoid congestion and incidents on the West Gate Bridge <small>(2031)</small>	Up to 55 fewer serious network crashes a year causing injury or fatality <small>(2031)</small>	3,600 households attracted to the inner west <small>(2031)</small>
44km of continuous ramp metering from Koo Wee Rup Road to Warrigal Road	Up to 50% travel time saving for trucks accessing Port of Melb. from Melbourne's West <small>(2031 avg weekday trip)</small>	Up to 50 fewer incidents per year on the West Gate Bridge from alternative river crossing <small>(2031)</small>	2.3 million tonnes less air pollution per year <small>(2031)</small>	2,200 jobs attracted to the inner west <small>(2031)</small>
Free up movement within the CBD by removing <small>more than</small> 60,000 vehicle kilometres each day <small>(2031)</small>	\$35M per year in commercial vehicle operating cost savings <small>(2031)</small>	Up to 15 years of extended network life	More than 6000 cyclists per day can enjoy the completed 110km Federation Trail <small>(2031)</small>	7% increase to accessible job opportunities for Melbourne's West <small>(2031)</small>

Note: 2030-31 estimates, economic values over 50 year appraisal period discounted and in 2015 dollars

Source: PwC based on Veitch Lister, GHD and SGS analysis

The Project will deliver economic activity, jobs and net benefits for the community

Economic analysis and the BCR

The Project will generate a number of direct benefits for road users and Melburnians, and economy-wide benefits for Victoria and Australia.

A cost benefit analysis (CBA) has estimated net economic benefits based on directly attributable benefits. Macroeconomic benefits have also been modelled using computable general equilibrium (CGE) modelling.

Key findings of the economic assessment are:

- The Project is expected to boost economy-wide activity in Victoria, through improvements to transport productivity and greater infrastructure expenditure in Melbourne. This includes additional jobs and increased gross state product (GSP).
- Benefits for road users and freight flow from reduced travel times, lower vehicle operating costs, and increased truck load capacities.
- The broader community will benefit from improved transport network resilience and redundancy, improved liveability, accident reductions, agglomeration benefits and improved accessibility to jobs.

The direct benefit cost ratio (BCR) and macroeconomic (or indirect) benefits of the Project are set out below. The BCR has been developed based on current Victorian practice, taking into account Victorian Government guidelines and the Victorian Auditor-General's Office recommendations for traffic modelling. The BCR results have also been developed based on Infrastructure Australia's December 2013 published economic guidelines as these have been recently applied for consideration of other nationally significant infrastructure projects. The Project is estimated to deliver net economic benefits under both approaches.

Table 4: Economic appraisal of the Project (\$ June 2015 millions, real, discounted present values)

Costs and benefits	A. Consistent with Victorian guidelines and practice	B. Consistent with IA guidelines for national comparison
Costs*	\$3,570	\$3,541
Benefits (excluding WEBs)	\$4,642	\$6,615
Benefit Cost Ratio	1.3	1.9
Net Present Value	\$1,072	\$3,074
Benefit Cost Ratio including WEBs	1.6	2.2
Net Present Value including WEBs	\$2,285	\$4,149

*Note: the costs differ from out-turn capital cost estimates as they have been adjusted for inclusion in the economic appraisal to represent real, discounted (present value) costs over the lifecycle

Note: estimated incremental to the base case, discounted based on a 7% real discount rate, based on P50 capital and operating costs; (A) Consistent with Victorian Government economic guidelines therefore analysed over the period 2015/16 – 2071/72, and applying Victorian Auditor-General's Office recommendations for traffic modelling; (B) Consistent with Infrastructure Australia December 2013 published economic guidelines therefore analysed over the period 2015/16 – 2051/52 and not applying VAGO recommendations for traffic modelling;

Source: PwC, 2015

Table 5: Macroeconomic impact assessment (\$ June 2015 millions, real, discounted present values)

Economic impact (direct and indirect)		Construction period 2017/18 – 2021/22	Operating period 2022/23 – 2071/72	Total period 2017/18 – 2071/72
Increase in Gross State Product		\$1,126	\$9,681	\$10,807
Jobs created (FTE)	Maximum	5,600	2,700	5,600
	Average	2,400	700	900

Note: estimated incremental to the base case, analysed over the period 2015/16 to 2071/72, GSP discounted based on a 7% real discount rate and provided in \$ June 2015, jobs estimated on Full Time Equivalent basis.

Source: PwC, 2015

Project cost

The total risk adjusted capital cost of the Project is estimated to be \$5.3 billion (nominal, undiscounted).

Table 6: Total project capital costs during construction period (from Jan 2018 to June 2022, \$ millions, nominal, undiscounted)

Total project capital costs during construction period	Amount
Design and construction costs	
• Western Distributor Works	█
• Monash Freeway Upgrade	█
• Webb Dock Access Improvement Works	█
Risk and contingencies	█ ¹
State procurement, management and land acquisition costs	█
Total project costs	\$5,226

A number of funding sources are proposed

The Project is proposed to be funded through a number of sources, including:

- Tolls on heavy commercial vehicles on the upgraded West Gate Freeway
- Tolls on the Western Distributor
- Tolls from a 15 year extension of tolling on CityLink assets beyond expiry of the current concession with Transurban in 2035
- State budget funding incorporating any Commonwealth Government grant funding.

Toll revenues will also be used to fund operating maintenance, lifecycle and toll collection costs on the West Gate Freeway, Western Distributor and CityLink (after the end of the current concession) and ongoing state management costs.

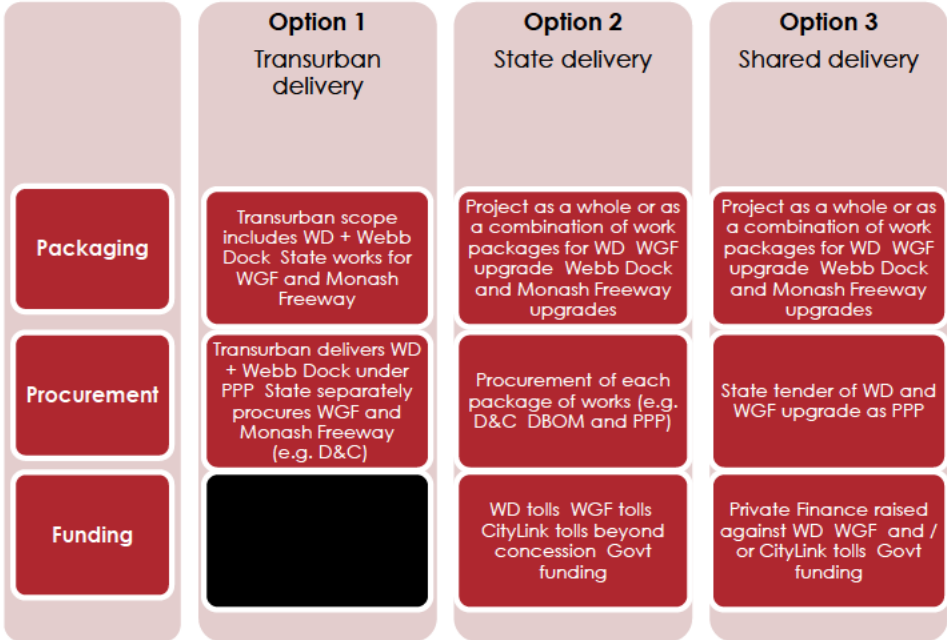
¹ Risk and contingencies are in real terms as the escalation component has been included in the (nominal) design and construction costs.

Deliverability of the Project

This business case assumes state delivery while the Transurban Proposal is under assessment

Three strategic options for procuring and funding the Project have been identified (Figure 8).

Figure 8: Strategic options for project procurement and funding



As the Transurban Proposal is currently being assessed, this business case assumes state delivery as the default pathway.

Project packaging and procurement

Three separate works packages are proposed

A project packaging and procurement options assessment was undertaken, recommending the Project is delivered as three separate works packages, as summarised in Table 7.

Table 7: Works packages and procurement approach

Works Package	Procurement Approach
Western Distributor & West Gate Freeway widening	It is recommended that this works package be procured as an availability Public Private Partnership (PPP) based on the size and complexity of the Project and the opportunities for innovation and efficient risk transfer to the private sector. This procurement option will be further investigated post business case approval (in particular, to investigate whether the PPP could include some element of demand risk transfer to the private sector).
Webb Dock Access Improvement works	It is recommended that the Webb Dock Access Improvement Works be split into two elements: <ul style="list-style-type: none"> • Cook Street Widening –Construct only procurement led by VicRoads, noting that other works are currently being completed in this area. • Ramp M Works – completed as a variation to the CityLink Tulla Widening (CTW) Project noting the direct interface of these works with CityLink and the ability to coordinate timing of works with the CTW Project.

Works Package	Procurement Approach
Monash Freeway Upgrade	<p>It is recommended that the Monash Freeway Upgrade be delivered as a state led Design & Construct (D&C) project. This reflects the limited scope of operating and maintenance activities that have been included in the business case scope of works.</p> <p>An opportunity exists to consider wrapping in a broader scope of operations and maintenance (O&M) and incident response activities along the Monash Freeway. This will be considered further. The procurement approach will be reviewed if there are any material changes to the scope.</p>

Funding

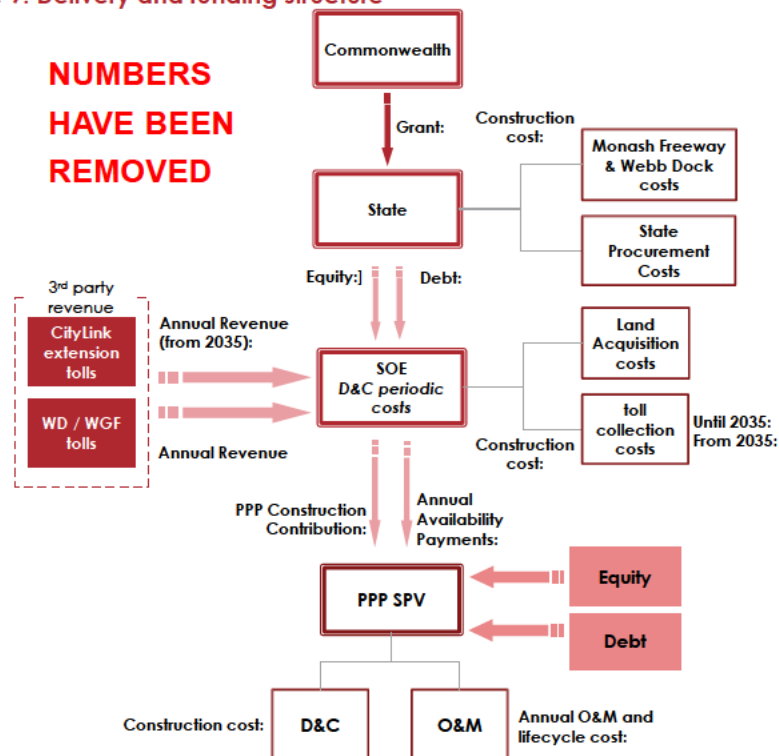
A mix of funding is proposed for the Western Distributor, with state funding for Monash Freeway and Webb Dock access

To achieve value for the State, the business case proposes a mix of funding for the Project:

- Procurement costs to be funded directly by the State
- The availability PPP, land acquisition and toll collection costs be funded via a new State Owned Entity (SOE)
- The SOE to receive funds from the State in the form of debt and equity
- The SOE's debt and equity obligations to be met using the available toll revenues from both the WD/WGF tolls and the extension of tolling on CityLink.

The Monash Freeway Upgrade and Webb Dock Access Improvement works are proposed to be funded directly by the State.

Figure 9: Delivery and funding structure



Notes:

1. Unless otherwise stated the numbers above are nominal
2. SOE D&C period costs include management costs and an allocation for state retained risks

A number of key upcoming tasks are planned including consultation and engagement

Next steps

The business case has been developed in parallel with the State's assessment of Transurban's Proposal and contemplates how the State might implement the Project in the absence of an agreement with Transurban.

In contemplation of this potential delivery pathway, a number of key tasks can be progressed in parallel with the State's assessment on whether to progress Transurban's Proposal to Stage 4 assessment under the Market-led Proposals Interim Guidelines.

These tasks include commencement of the planning approvals process, more exhaustive consultation and engagement process on all aspects of the project scope, further development of the SOE and governance structures, targeted market engagement on the preferred procurement model to 'warm-up' the market should the Government proceed to public tender, further development of the state reference design and additional traffic modelling to refine the optimal tolling structure.

The State has received interest from several private sector parties who would be willing to participate in a tender process to deliver all or some parts of the Project.

The business case outlines a proposed implementation plan and risk management approach assuming a decision is made to proceed under the state-led delivery option.

The timelines assumed in the implementation plan have been structured based on the conduct of a parallel planning approvals and procurement process. An Environmental Effects Statement process is the preferred approvals pathway for the Project.

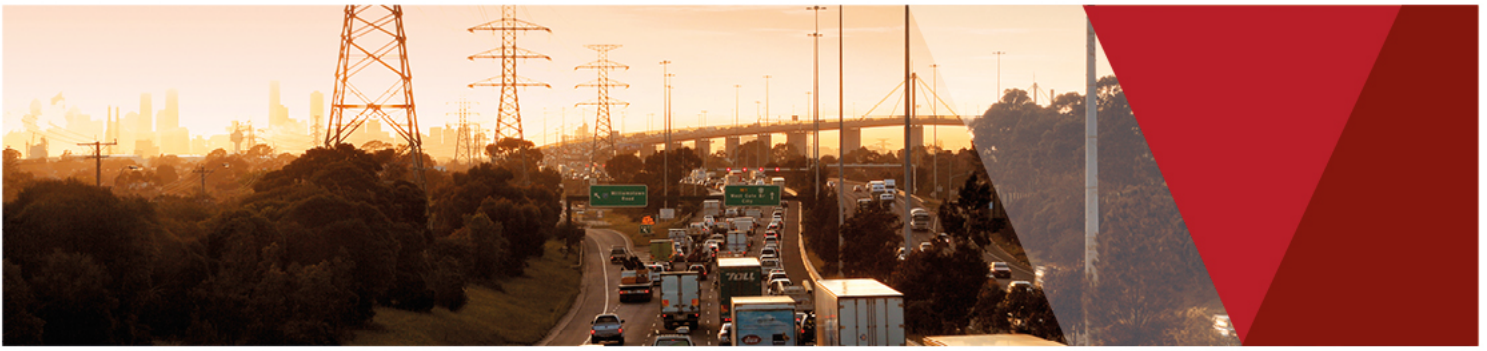


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1. Introduction – a network solution

This chapter introduces the scope and purpose of the business case.

This business case has been undertaken to inform government of the merit of investment in Melbourne's transport network. The following chapter provides greater detail on the context and rationale for developing the business case, including:

- the role of the business case in the context of the Transurban Proposal and the assessment process undertaken in accordance with the Market-led Proposals Interim Guideline
- the history of the Transurban Proposal
- the scope of the proposal originally proposed by Transurban in March 2015.

The following information has been redacted in this chapter:

- A summary of the funding solution proposed by Transurban in Section 1.3.1 has been redacted as the State has an obligation to keep confidential information considered commercially sensitive by Transurban.

1.1. Scope of the business case – a network solution

In March 2015, Transurban submitted a market-led proposal for a Western Distributor project to the Department of Treasury and Finance (DTF). The Western Distributor Project includes a potential new freeway connection between the West Gate Freeway and CityLink, together with enhanced capacity of the West Gate Freeway from the M80 Ring Road to Williamstown Road, upgraded access from the West Gate Freeway to the Port of Melbourne, and upgraded access to Webb Dock.

Reflecting that the Transurban Western Distributor project was put forward to Government as a market-led proposal, the State has undertaken a broader assessment of Melbourne's transport needs in the M1 Corridor and its adjoining economic precincts. Victoria's M1 Corridor stretches from Geelong through to the Latrobe Valley. The M1 Corridor provides transport connectivity (both road and public transport) critical to the functioning of key economic assets for Melbourne, including significant employment and education clusters and major and emerging freight terminals.

As a result of this broader network focus, this business case has also identified the Monash Freeway Upgrade, involving an additional lane in each direction along the Monash Freeway from EastLink to Clyde Road and expanded freeway ramp metering at key points between Warrigal Road and Koo Wee Rup Road.²

1.2. Purpose of the business case

The primary purpose of this business case is to inform a Government decision on whether the Western Distributor has investment merit based on a broader assessment of Melbourne's transport needs in the M1 corridor and exploring scope, procurement and funding options.

² Further reasoning for including both the Western Distributor and Monash Freeway Upgrade Project in this business case is provided in Section 5.4.

This business case informs a decision by Government on investment in Melbourne's transport network

A public sector comparator has been developed to assess the Project

This business case examines the strategic rationale, identifies problems and analyses strategic options for the Western Distributor. The business case involves detailed technical, traffic, financial and economic analyses.

The business case does not evaluate the Transurban Proposal or the merits of that proposal proceeding to the next stage of the market-led proposal process but will play an important role in informing DTF's assessment of the Transurban Proposal. The Government is expected to make a final decision on whether to proceed with the Transurban Proposal or opt for another delivery method [REDACTED].

The business case presents a public sector benchmark assuming the Project is progressed irrespective of whether the Transurban Proposal proceeds further. This business case therefore presents the State's developed scope to enable feasibility and deliverability assessments of the Project.

1.3. Project history and current status

The Transurban Proposal was submitted to DTF on 12 March 2015.

1.3.1. Transurban's March 2015 proposal

The scope of the Transurban Proposal included:

- Construction of a new toll road connection from CityLink to the West Gate Freeway via an elevated section above Footscray Road on the north side of the Port of Melbourne to the west of the Maribyrnong River and a tunnel under Yarraville
- Widening of the West Gate Freeway from Williamstown Road to the Western Ring Road and tolling high capacity vehicles on this section of the freeway
- Improved access to Webb Dock.

[REDACTED]

Attachment B further details the three scope components of the Transurban Proposal (as described in the March 2015 submission). As noted previously, this technical scope and associated tolling strategy will provide a reference point for the State and Transurban's further consideration of the Project, and context to the business case project scope.

1.3.2. Progress under the Market-Led Proposals Interim Guideline

In accordance with the Market-Led Proposals Interim Guideline, the proposal is being assessed under a five stage process. The Transurban Proposal progressed to Stage 3 on 20 April 2015.

Stage 1 Assessment of the Western Distributor Proposal

DTF's assessment found the Transurban Proposal was well advanced, all information requirements identified in the Guideline were met and the Project had the potential to meet the uniqueness criteria. It was recommended that a Stage 2 Assessment be completed by DTF in consultation with VicRoads, the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) and the Department of Premier and Cabinet (DPC).

Stage 2 Assessment of the Transurban Proposal

The Market-Led Proposals Interim Guideline Stage 2 assessments involve two key decision points:

- determining if the Project meets the key criteria required to proceed (Stage 2A), and
- selecting a suitable procurement approach (Stage 2B).

The Stage 2 assessment concluded there was sufficient merit and value in the proposal to justify furthering discussions with Transurban. The assessment recommended an exclusive, well-structured, time-limited negotiation with Transurban.

The assessment recommended that concurrent with the negotiations with Transurban, the State assess alternative competitive approaches (such as Swiss challenge or development manager or traditional open competition) to funding and project procurement.

The Stage 2 assessment concluded that the proposal has strong potential to yield material benefits to the state and national economy and recommended progressing the proposal to Stage 3.

1.3.3. Current status

The Transurban Proposal is currently at Stage 3 of the assessment process outlined in the Market-led Proposals Interim Guideline. The main purpose of Stage 3 is to confirm the investment rationale for the Project, and if it proceeds, whether the State will procure the Project via exclusive negotiation or competitive tender. At the conclusion of Stage 3, the Government will be advised whether:

- Transurban is considered uniquely positioned to offer better value to the State than a competitive procurement approach, and
- whether it is expected that a commercial and funding arrangement (that realises that unique value) could be negotiated exclusively, or
- if an alternative funding and contracting approach would likely create superior value for money.

DTF will also advise the Government as to whether the final scope of Transurban's Proposal satisfies the State's objectives for the Project.

1.3.4. Role of the business case in the Market-Led Proposal assessment

As part of the Stage 3 assessment Transurban is expected to submit a revised proposal to Government.

As outlined in Section 1.2, this business case does not evaluate the Transurban proposal. However, it will play an important role in informing DTF's assessment of the Transurban revised proposal at Stage 3.

Table 8 outlines the respective role of each element of the assessment process and how they relate to the key requirements of the Market-led Proposals Interim Guideline.

Table 8: Role of this business case and revised proposal assessment (Stage 3)

	Business case	Proposal assessment
Role	<ul style="list-style-type: none"> • The role of the business case is to determine whether the Project has investment merit (irrespective of delivery method) 	<ul style="list-style-type: none"> • The role of the proposal assessment is to determine whether Transurban's revised proposal delivers the potential value for money and benefits identified in the Stage 2 assessment and whether the proposed delivery approach meets the State's broader objectives (including value for money)

	Business case	Proposal assessment
Relevant Market-led Proposal Guideline Criteria	<ul style="list-style-type: none"> • Meets a project or service need and is aligned with government policy objectives • Provides social, environmental, economic or financial benefits to the State 	<ul style="list-style-type: none"> • Has unique characteristics that result in outcomes that are not likely to be obtained using standard competitive processes within acceptable timeframes • Provides value for money to the State • Is feasible, affordable and capable of being delivered

1.4. Structure of the business case

In accordance with the DTF's Investment Lifecycle and High Value/High Risk Guidelines, the business case is structured to:

- present the strategic context (chapter 2)
- define the problems that the Project seeks to address (chapter 3)
- examine benefits achieved by addressing the problems (chapter 4)
- identify and assess a range of strategic interventions and reasoning for the recommended intervention (chapter 5)
- present the State's scope developed for the purpose of the business case ('business case project scope') and provide a summary of the options considered and evaluated (chapter 6)
- present the State's preferred tolling structure and the key risks associated with the business case scope and tolling structure (chapter 7 and 8)
- analyse impacts of the Project in terms of transport network impacts (chapter 9), economic benefits (chapter 10), and social and environmental impacts (chapter 11)
- consider how the State would choose to deliver the Project in the absence of the Transurban Proposal, setting out the:
 - financial impact analysis of the Project including forecast toll revenues and the potential funding gap (chapter 12)
 - deliverability of the Project including consideration of various packaging and procurement options for the scope of works (chapter 13)
 - assessment of the Budget impacts of the preferred state-led delivery and funding (chapter 14)
 - risk management principles and the preferred risk allocation for each works package and the key retained state risks, including key procurement and planning risks (chapter 15)
- implementation plan including consideration of next steps following the business case, proposed timelines, the proposed tender, governance and stakeholder engagement strategies (chapter 16).



2. Strategic context

This chapter discusses key trends underpinning the future of Melbourne and implications for the city's transport network. It considers the role of the M1 Corridor underpinning future growth, and outlines the State Government's key plans and policies for investing in transport.

Four main themes are considered:

- Melbourne is facing rapid population growth, a changing economic structure and geography, and expanding freight task
- as the population, freight and economy of Melbourne continue to grow, transport connectivity is more important than ever
- the Government is investing in Melbourne's transport network, however further investment priorities have been identified on the M1 Corridor
- the M1 Corridor is critical to the functioning of key economic assets for Melbourne, including significant employment and education clusters and major and emerging freight terminals.

2.1. Three trends – a growing and changing city

Melbourne is a growing and changing city, facing rapid population growth, a changing economic structure and geography and expanding freight task.

2.1.1. Rapid population growth

The scale and speed of Victoria's population growth is unprecedented in Melbourne's history.

Between December 2004 and December 2014, Victoria's population grew by 19 per cent, from 4.96 million to 5.89 million. Approximately 86 per cent of this growth was in Melbourne (Department of Transport, Planning and Local Infrastructure (DTPLI), 2014).

For the year ended 30 June 2014, Melbourne had the largest population growth of any Australian city (95,700 people), followed by Greater Sydney (84,200) and Greater Perth (48,400) (ABS, 2015). This has been driven by net overseas migration, which accounted for the largest component of population growth (60 per cent) in Victoria, followed by natural increase (37 per cent) and net interstate migration (3 per cent) (ABS, 2015).

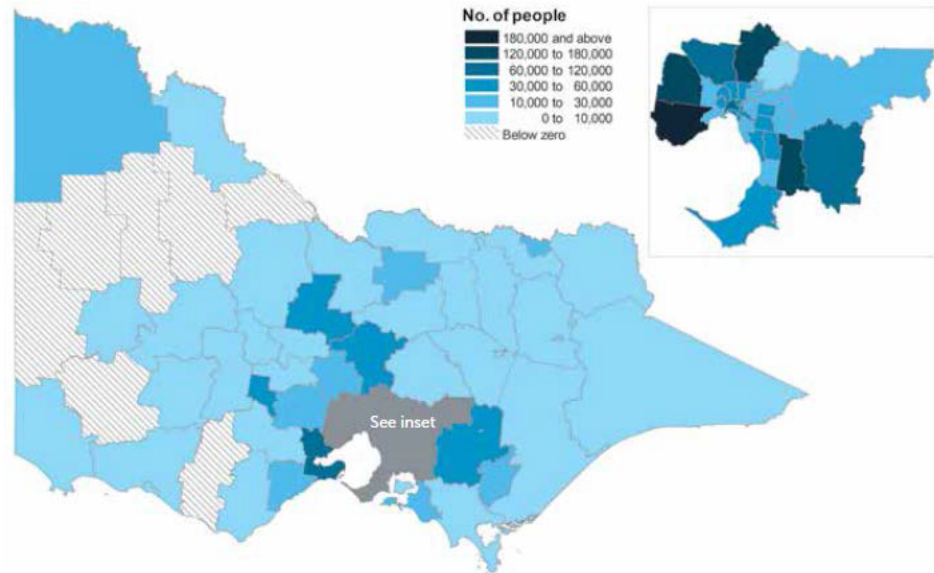
Plan Melbourne (DTPLI, 2014a) forecasts that in 2031 Melbourne's population will have reached between 5.85 and 6.15 million people. This represents a growth rate of between 1.7 per cent and 2.0 per cent. By 2051, Melbourne could achieve a population of 7.7 million, overtaking Sydney to become Australia's most populous city.

The growth in population is not uniform across the State. Growth has occurred in greenfield areas in the outskirts of the city and through urban densification around the CBD and inner areas, along the rail and tram network. The south-east growth corridor is nearing development capacity and growth continues to shift to Melbourne's west, north and central core. Surrounding regional cities such as Geelong, Ballarat and Bendigo have also experienced unprecedented growth, leveraging off Melbourne as a national and global gateway.

Melbourne is experiencing unprecedented population growth

The areas where high levels of population growth are expected are highlighted in Figure 10.

Figure 10: Melbourne's projected population change by Local Government Area, 2011 to 2031



Source: DTPLI, *Victoria in Future 2014: Population and Household Projections to 2051*.

Western Melbourne will experience the most dramatic increase in population

The most dramatic population growth is expected to take place in the western region³, with growth also expected in Melbourne's south-east⁴. Table 9 illustrates the population growth that has occurred between 1996 and 2014 and compares the average annual growth rate between Melbourne's west and the rest of Melbourne. The population growth in the west has been very rapid, at twice the rate experienced in the rest of Melbourne. The eastern and south-eastern sub-regions together are expected to grow by 550,000 to 700,000 between 2011 and 2031.

Table 9: Melbourne's historical population growth by region (000's) 1996-2014

	1996	2001	2006	2011	2014	AAGR
Western	558.3	631.5	650.3	673.3	815.4	2.1%
Rest of Melbourne	2,913.4	3,111.5	3,167.5	3,228.7	3,447.2	0.9%
Melbourne	3,471.6	3,743.0	3,817.8	3,902.1	4,262.6	1.1%

Note: Western areas include the Maribyrnong, Moonee Valley, Hobsons Bay, Brimbank, Wyndham and Melton LGAs; AAGR represents average annual growth rate

Source: SGS Economics and Planning, 2015

³ Western areas include the Maribyrnong, Moonee Valley, Hobsons Bay, Brimbank, Wyndham and Melton LGAs.

⁴ South-eastern areas include Casey, Cardinia, Greater Dandenong, Monash and Stonnington LGAs.

2.1.2. Changing structure and geography

At the same time as Victoria's population has grown, the structure and geography of the State's economy has undergone significant change, affecting the locations of job and economic activity in Melbourne.

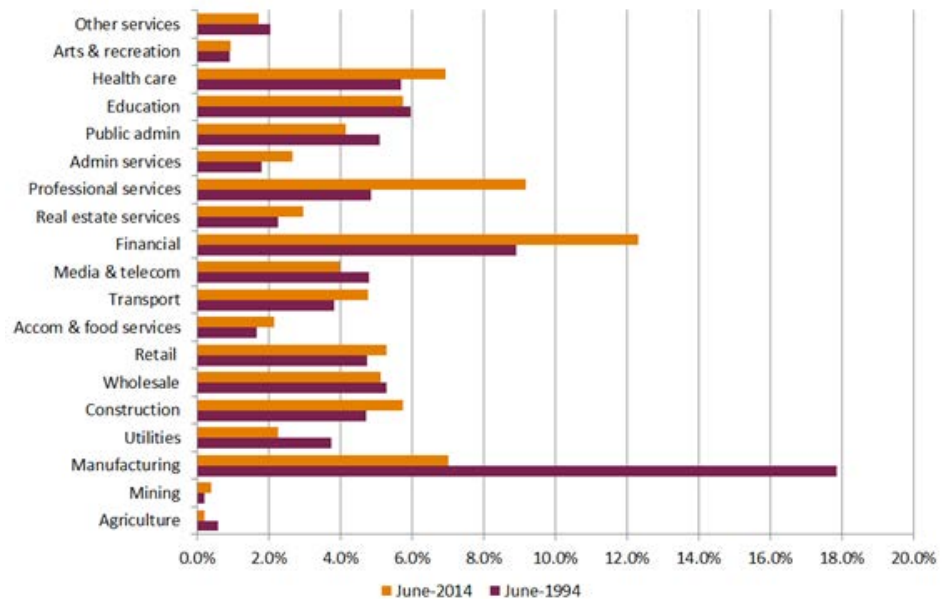
The structure of the economy has shifted from a broad-based manufacturing and agricultural economy to a more diverse and specialised knowledge-intensive economy. This represents a broad transition from 'making things', to commerce associated with design, brokerage and finance, as well as household related services.

While manufacturing remains a key sector in Victoria contributing 7 per cent to the economy, the impact of globalised value chains has resulted in structural adjustment and the contraction as well as specialisation of the manufacturing sector.

Melbourne's economic growth is increasingly being experienced in the financial and insurance services, professional, scientific and technical sectors (see Figure 11). Strong population growth has also underpinned expansion of the healthcare, housing construction, education and retail sectors.

The State's economy is shifting from manufacturing and agriculture to a knowledge-intensive economy

Figure 11: Melbourne's changing economic structure (1994 and 2014)



Note: As measured by industry gross value added share of total industry value added (excluding ownership of dwellings)

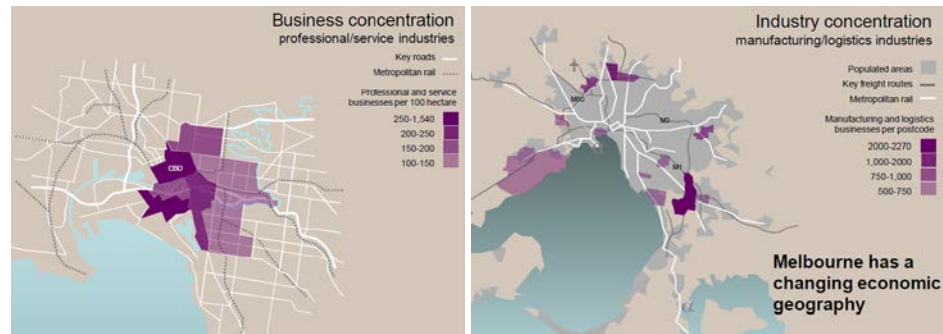
Source: SGS Economics and Planning, 2015

Structural economic changes affect the location of jobs in Melbourne:

Jobs growth is occurring across the city in central and outer areas

- ongoing growth in professional and knowledge-intensive services is occurring in the inner areas of Melbourne
- in line with structural adjustment in the manufacturing sector, manufacturing and related industries have relocated from the central and inner parts of Melbourne to the outer west, outer north and outer south-east
- for industries that follow population, such as retail and construction, growth is continuing across the city in a more dispersed fashion with a detectable shift to the west and the outer suburbs of Melbourne.

Figure 12: Melbourne's changing economic geography (2011)



Source: DPC, Priority Infrastructure Submission to Infrastructure Australia, 2013

2.1.3. Expanding freight task

Melbourne is a critical national import and export logistics hub serving an area stretching as far as South Australia in the west, New South Wales in the north, and across Bass Strait to Tasmania in the south.

Melbourne's competitive advantage for freight and logistics is due to:

- its strategic proximity to about 70 per cent of Australia's population
- extensive areas of flat land around Melbourne which is well suited to transport and warehousing operations
- a well-trained and accessible labour market
- a large, efficient and accessible capital city port (DTPLI, 2013).

Melbourne has also benefited from a legacy of well-planned transport corridor reservations and land use allocations, allowing the development of high quality road and rail networks. These historical advantages are under pressure from the rapid increase in population and the accompanying increases in the freight task.

The Port of Melbourne (the Port) is Australia's busiest port for containerised and general cargo. This serves a catchment of Victoria, Tasmania, parts of South Australia and New South Wales. It is located near inner Melbourne and covers an area at the mouth of the Yarra River.

The Port's container trade grew by more than 150 per cent between 2003-04 and 2013-14 and is estimated to grow from 2.5 million twenty-foot equivalent units (TEUs) in 2013-14, to 11.2 million TEUs in 2045-46 (Port of Melbourne Corporation (PoMC), 2014a; PoMC, 2014b; DTPLI, 2013). The air freight task, like general and containerised freight, is expected to grow strongly in the coming years, although representing less than 1 per cent of import/export trade by volume (DTPLI, 2013).

Based on demand forecasting conducted for the Victorian Freight and Logistics Plan 2013, the total size of Victoria's freight task is projected to grow from 60 billion net tonne kilometres (ntk) per annum to 170 billion ntk by 2046 (DTPLI, 2013).

Victoria's freight task is projected to almost triple by 2046, with the Port freight task experiencing a four-fold increase

The number of tonnes of freight accommodated by road is forecast to double by 2030 from today's levels. Approaching 2050, even allowing for an increase in average vehicle size, the number of truck trips on Melbourne's roads will increase from 290,000 trips a day to almost 650,000 (DTPLI, 2013).

Transport connectivity is essential to Melbourne's economic growth, freight competitiveness and people's access to economic opportunities

Melbourne's future population and freight growth, and economic geography will rely on transport connectivity

2.2. The role of transport in a connected city

Melbourne's economic and population growth means there will be a very substantial increase in demand for travel – by public transport and private vehicles. It also means substantial growth in the volume of freight being moved around Melbourne and to and from the city's ports and airports, predominantly on road.

Access to reliable, timely and safe travel is essential to support economic growth, freight competitiveness, and community access to economic opportunities.

2.2.1. Sustaining Melbourne's economic growth and prosperity

Melbourne's transport system plays a central role in the everyday functioning of the city and national economy.

Rapid population growth is expected in the west and south-east, yet employment growth is projected to be concentrated in inner areas and suburban economic clusters. This will increase cross-city travel between the west and south-east, and the west and north, along with radial travel to and from central/inner Melbourne.

The changing nature of Melbourne's economy to be more dependent upon knowledge-intensive and professional services is also generating different patterns of travel.

Many high income, highly sought after jobs will continue to be located in the inner urban region. This will place further pressure on peak period transport connections to central and inner areas.

A developed and integrated transport network plays a critical role facilitating continued economic growth by delivering both people and goods to key economic clusters around Melbourne.

2.2.2. Efficient freight access

Connectivity is important to manage the strong predicted growth in Melbourne's freight task.

Efficient, accessible and high capacity freight transport underpins the ability of Melbourne's freight and logistics industries to compete nationally and internationally and offer lowest cost goods to local consumers.

Most Port container imports (87 per cent) are destined for a location within Melbourne's greater metropolitan area (PoMC, 2014a) with most of the freight being carried by road transport (DTPLI, 2013).

Where in the past much of the city's freight moved in and out of inner Melbourne, it now needs to bypass it while retaining access to the Port of Melbourne and Melbourne Airport in order to service the growing manufacturing and warehousing precincts in outer Melbourne.

The success of manufacturing and related businesses that have located in the outer west, north and south-east further depends on efficient access across the supply chain – from international and domestic gateways to local roads and manufacturing/distribution points.

There are broader implications related to freight connectivity. The ability of the transport network to cater for growth in truck movements will have a significant impact on congestion, local amenity and road safety.

2.2.3. Access to economic opportunities

The pattern of growth expected in Melbourne increases the need to address imbalances and bottlenecks between the east and the west of Melbourne. In addition, broadening opportunities for suburban and regional Victoria to share in future economic growth and improve access to services without unreasonable travel times remains critical.

Melbourne's west is forecast to be one of Victoria's highest population growth areas over the next decade. Half of Melbourne's population growth to 2050 will be in the west and north, but only 30 per cent of jobs growth will be in these areas.

The south-east remains an important location for business and employment, home to around 130,000 businesses spanning a diverse array of industries.

Greater cross city travel by road and public transport will be critical to addressing this mismatch and supporting economic participation. The ability of the west to connect with inner urban areas and the employment clusters located in Melbourne's north and south-east is vital to accommodate the growth of the west and ultimately expand the productivity capacity of Melbourne and Victoria.

For the emerging west to develop and realise its full potential, it will need to capitalise on its relative proximity to inner Melbourne. The need for strong connections to Melbourne's south-east economic corridor will become increasingly important to facilitate economic growth and to attract a skilled workforce.

2.2.4. Role of road and public transport in Melbourne

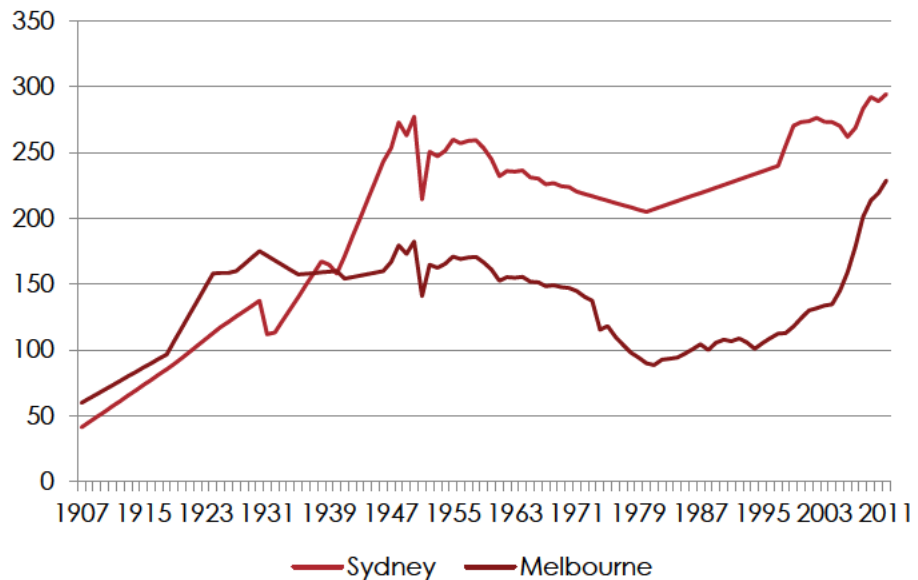
Networked cities are the cities of the future. In the years ahead, Melbourne will need a flexible, fully connected transport network to reduce road and rail congestion and to support the economic journeys that are critical to a thriving modern economy.

As the city's population increases toward 7 million people, an integrated lattice of transport modes will be required.

Passenger trains will funnel people into major economic nodes (largely the CBD), and tram and bus networks will distribute commuters throughout these central nodes, providing short trips for people and businesses.

Melbourne's passenger rail network has experienced unprecedented 70 per cent growth in patronage in the last decade, with 40 per cent of that growth occurring in the last five years. This has largely been accommodated through efficiency improvements on existing infrastructure such as the City Loop (Public Transport Victoria, 2012), as well as major infrastructure investment including the Regional Rail Link.

Figure 13: Rail passenger journeys, Melbourne and Sydney (millions)



Note: The time series is not complete so data has been interpolated and estimated in certain period

Source: SGS Economics and Planning, 2015, analysis of Historical ABS Year Books and Grattan Institute 2012 'Can we afford to get our cities back on the rails'.

Notwithstanding the importance of public transport, complementary investment in roads will continue to be required to connect suburban precincts including inner areas, and to link new emerging economic areas into the historically dispersed employment and labour force centres of the east and south-east. The majority of Melbourne's traffic is carried on freeways and major arterial roads. These roads link activity centres across Melbourne.

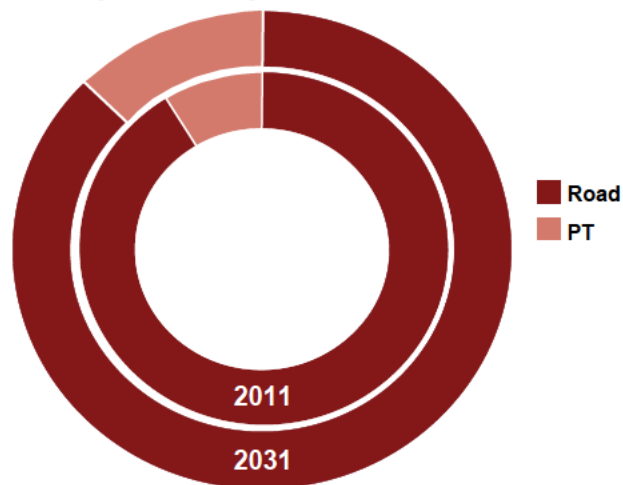
Demand for cross city freight routes will grow even faster than population as the economy shifts toward importation and specialisation requiring increased distribution networks. If Melbourne and Victoria are to retain existing export competitive advantage, efficient access to the Port of Melbourne and Melbourne Airport, dominated by road to enable flexibility for freight origins and destinations, will need to be improved.

Strong growth is set to continue for both road and rail, and while sustained high growth in public transport demand is expected, the majority of trips will continue to be undertaken by road.

Figure 14 presents the change in transport mode shares for Melbourne's west, suggesting that trips originating in the west will significantly increase across all modes. Demand for public transport (dominated by rail) is estimated to grow more than 140 per cent and road demand by 60 per cent between 2010-11 and 2030-31 (see Attachment H – Network Impact Assessment).

However as Figure 14 illustrates the majority of trips will continue to be via road – even with the completion of Melbourne Metro and the Regional Rail Link demonstrating the key role road travel will play in facilitating growth.

Figure 14: Proportion of public transport trips compared to traffic trips in Melbourne's west (2031 vs 2011): Base case



Note: Includes LGAs of Melton, Wyndham, Hobsons Bay, Maribyrnong, Moonee Valley and Brimbank; based on 2031 traffic modelling that includes Regional Rail Link and Melbourne Metro

Source: GHD, 2015

2.3. Investing in transport

State Government plans and policies support consistent investment in the state's road network and public transport system. This underpins the vision for Melbourne as a global city of opportunity and choice with efficient freight, productivity growth and connected Victorian businesses.

An integrated transport network comprising road and public transport will facilitate Melbourne's future growth

Melbourne would not be the successful liveable city it is today without past investments in connectivity. With population and freight forecast to grow substantially over the next few decades, further investment and initiatives are required, based on network-wide solutions that integrate with and accommodate economic, land use and other outcomes.

The Victorian Government has made commitments to major investments in Melbourne's transport network. However, further investment priorities have been identified to deal with increasing road demand along Victoria's M1 Corridor.

2.3.1. Government policy

The key State Government policies and strategies that underpin the land use and transport network outcomes for Melbourne include:

- *Plan Melbourne* (currently being refreshed)
- Victorian Freight and Logistics Plan: Victoria the Freight State
- Project 10,000.

Plan Melbourne

Plan Melbourne articulates the Victorian Government's vision for Metropolitan Melbourne in the future and recognises that:

Melbourne's productive employment centres will be located around an enhanced transport network. This will link an expanded central city, national employment clusters and state-significant industrial precincts (DTPLI, 2014).

Supporting this form of development is designed to enhance investment opportunities along key transport corridors, driving productivity increases as well as residential and employment growth.

Plan Melbourne establishes the Victorian Government's vision for Melbourne as a "global city of opportunity and choice" with seven overarching objectives for Melbourne's development (Table 10), each of which is to some extent impacted by transport connectivity.

Table 10: Objectives of Plan Melbourne

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

Source: *Plan Melbourne, 2014*

Plan Melbourne is currently being reviewed and refreshed. *Plan Melbourne 2016* will be published in the first half of 2016, following a review of updated data, submissions and advice from the Ministerial Advisory Committee.

To promote community, stakeholder and expert discussion of options to refresh *Plan Melbourne*, a discussion paper (Victorian Government, 2015) was released in October 2015. The discussion paper confirmed that there is bipartisan support for much of *Plan Melbourne*.

The refresh does not propose a comprehensive revision. *Plan Melbourne* will maintain its key priorities but also strengthen the focus on housing affordability, climate change and energy efficiency. The refresh will revisit the plan in light of new information, and incorporate some ideas that planning experts and citizens have raised. It also updates *Plan Melbourne* to reflect current government transport commitments and priorities, including:

- Melbourne Metro Rail Project
- Cranbourne Pakenham Rail Upgrade
- Mernda Rail Extension
- Removal of 50 metropolitan level crossings

- CityLink Tulla Widening
- The Western Distributor or the West Gate Distributor, subject to the outcome of assessments of the options underway.

Victoria the Freight State

The *Victorian Freight and Logistics Plan* (DTPLI, 2013) outlines the Victorian Government's long term strategy to improve freight efficiency, grow productivity and better connect Victorian businesses. It recognises rapid population growth and the resulting increase in the freight task as the key challenges facing Melbourne. The plan specifically highlights the need for continued investment in key transport network infrastructure and maintenance programs particularly around key freight gateways to help ensure the continued success of Melbourne's significant freight and logistics industry.

Project 10,000

Project 10,000 (Victorian Labor, 2014) is the Victorian Government's transport plan, it specifically seeks to address identified transport issues across Melbourne. *Project 10,000* identifies congestion, unreliability and poor safety along Melbourne's transport network as key issues to be addressed through targeted infrastructure investment and supports:

Consistent investment in the state's road network and public transport system (Victorian Labor, 2014).

Project 10,000 highlights the M1 Corridor as a vital component of Melbourne's freight network and recognises the need to facilitate more efficient access to the Port of Melbourne.

All three state plans are aligned in a network approach to Melbourne's transport challenges recognising the importance of developing an integrated long-term, multi-modal transport plan.

2.3.2. Network approach to investment

Melbourne would not be the successful liveable city it is today without past investments in connectivity from the completion of the City Loop in the 1980s through to CityLink and more recently, EastLink, the Western Ring Road, Melbourne's Managed Motorway Programme and the Regional Rail Link.

With Melbourne's population and freight forecast to grow substantially over the next few decades, further transport investment and initiatives are required, based on network-wide solutions that integrate with and accommodate:

- land use
- economic development goals
- technology and the smart use of infrastructure
- public and active transport
- effective incentives and pricing signals.

A critical element in applying a network approach to future planning is an understanding that Melbourne is not homogenous. Land uses, population projections and transport networks vary, often substantially across the city. The extent of the challenges and the mix of interventions will therefore vary across the city. Key opportunities and challenges by geographic area include:

- Half of Melbourne's population growth to 2050 will be in the west and north, but only 30 percent of jobs growth will be in these areas. Greater cross city travel by road and rail will be critical to addressing this mismatch and supporting economic participation

- Transport reliant industries (manufacturing, freight and logistics, warehousing) are relocating to the outer west and north, increasing demand for goods movement on freeways and access to the Port of Melbourne
- Container growth at the Port of Melbourne is forecast to continue to rise steeply, a task largely handled on road
- The fastest growth in regional Victoria is to the west of Melbourne, with Geelong, Bendigo and Ballarat requiring greater access to Melbourne by road and rail.

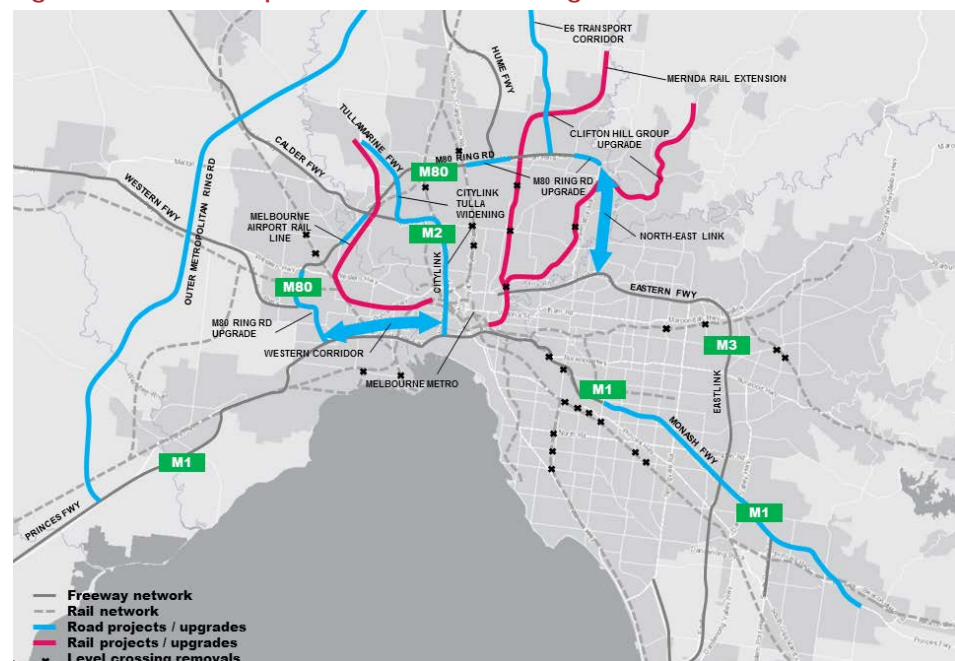
The Victorian Government has made commitments and is planning for major investments in Melbourne’s transport network with a focus on improving the capacity and performance of the rail and road networks. The *Plan Melbourne Discussion Paper* (Victorian Government, 2015) outlines some of these commitments. However, further investment priorities have been identified to deal with increasing road demand along Victoria’s M1 Corridor.

Future scenario for Melbourne’s transport network

Figure 15 highlights a potential future network scenario, capturing Melbourne’s significant road and rail corridors as well as committed, planned and potential future major investments in the transport network. The absence of any major road project in the M1 Corridor represents a critical gap in Melbourne’s transport network.

Investment priorities have been identified along the M1 Corridor

Figure 15: Future transport network scenario: long term



On a geographic basis, investment in Melbourne’s transport network can be characterised as:

Short-medium term – planned and committed initiatives

- **North** – improved road capacity and connections to Melbourne Airport and central Melbourne as a result of CityLink Tulla Widening Project, improved and better managed road capacity from upgrades to the M80 Ring Road, and rail expansion to cater for population growth in the north through the Mernda Rail extensions.
- **East** – increased rail services, capacity and reliability to be realised from the Cranbourne-Pakenham Line Upgrade and associated new rolling stock, and

- improved road operation as a result of removing level crossings on this line and, from streamlining movements and intersections on Hoddle Street.
- **West** – new track capacity enabling extra metropolitan and regional rail services as part of the Regional Rail Link opened in June 2015, Melbourne Metro a new rail connection between the inner west and south-east via the CBD, improved local road and northern port access from the West Gate Distributor Northern Section (Stage 1).
 - **Central** – expanded inner core rail network capacity as part of Melbourne Metro.
 - **City/statewide** – new rolling stock to accommodate rail patronage growth, improved local road safety and reduced congestion from the Level Crossing Removal Project, improving the quality and efficiency of the tram network including upgrading specific tram lines to light rail service levels, expanding the bus network with better facilities and access along with greater on road priority at critical parts of the network, more efficient freight movements through expansion of the High Productivity Freight Vehicle network to the Hume Freeway, Monash Freeway, Western Highway, Goulburn Valley Highway, Princes Freeway, and the M80 last section between Deer Park Bypass and the West Gate Freeway. Active Transport Victoria will also lead development of cycling and walking networks across the city (Plan Melbourne Refresh Discussion Paper).

Medium-long term

- **Network Development Plan – Metropolitan Rail** – in 2012 Public Transport Victoria released a network development plan for Melbourne's rail system in 40 years. The plan proposes:
 - *Stage 1 – Overcoming constraints* – including Regional Rail Link, Hurstbridge line upgrade, Eltham stabling, new trains, carriages and stations, and timetable changes.
 - *Stage 2 – Commencing the introduction of a metro-style system: within 10 years* – including Melbourne Metro, duplication to Melton, Dandenong Rail Corridor (Pakenham-Cranbourne) upgrades, and high capacity signalling.
 - *Stage 3 – Extending the network: within 15 years* – with new lines to Melbourne Airport and Rowville, diversion of South Morang services, electrification to Melton, and continuation of Dandenong Rail Corridor upgrades.
 - *Stage 4 – Preparing for further growth: within 20 years* – including reconfiguring the City Loop to provide separate suburban lines, quadruplication between Burnley and Camberwell, duplication Altona Junction to Seaholme, electrification projects to Geelong and Wallan, extension to Mernda, duplication from Mooroolbark to Lilydale, extension from Werribee to Wyndham Vale, and extension of the South Morang – Southern Cross Line.
 - *Long-term* – complete the rollout of high capacity signalling (Public Transport Victoria, 2012).
- **Long term road transport initiatives** – a number of long term major road initiatives have been identified by the State Government. These include:
 - *Outer Metropolitan Ring/E6 Transport Corridor* – a 100 kilometre long high-speed transport link in Melbourne's north and west. It will create new transport links through the Werribee, Melton, Tullamarine, Craigieburn/Mickleham and Epping/Thomastown areas. Planning for the transport corridor provides options for an ultimate freeway standard road, capable of up to four lanes in each direction and four railway tracks in the median for interstate freight and high-speed passenger

trains between Werribee and Kalkallo and ultimately a six-lane freeway standard road elsewhere (VicRoads e, 2015)

- *North East Link* – to connect the Metropolitan Ring Road at Greensborough to the Eastern Freeway (Plan Melbourne 2014 and Plan Melbourne Refresh Discussion Paper).

2.4. Importance of the M1 Corridor

Reflecting that the Western Distributor has been put forward to Government as a market-led proposal, the State considers that it is relevant to undertake a broader assessment of Melbourne's transport needs, referencing past and planned investment projects and priorities to identify Melbourne's transport needs.

Considering the planned and longer term initiatives above, a gap has been identified to deal with increasing demands on Victoria's M1 Corridor.

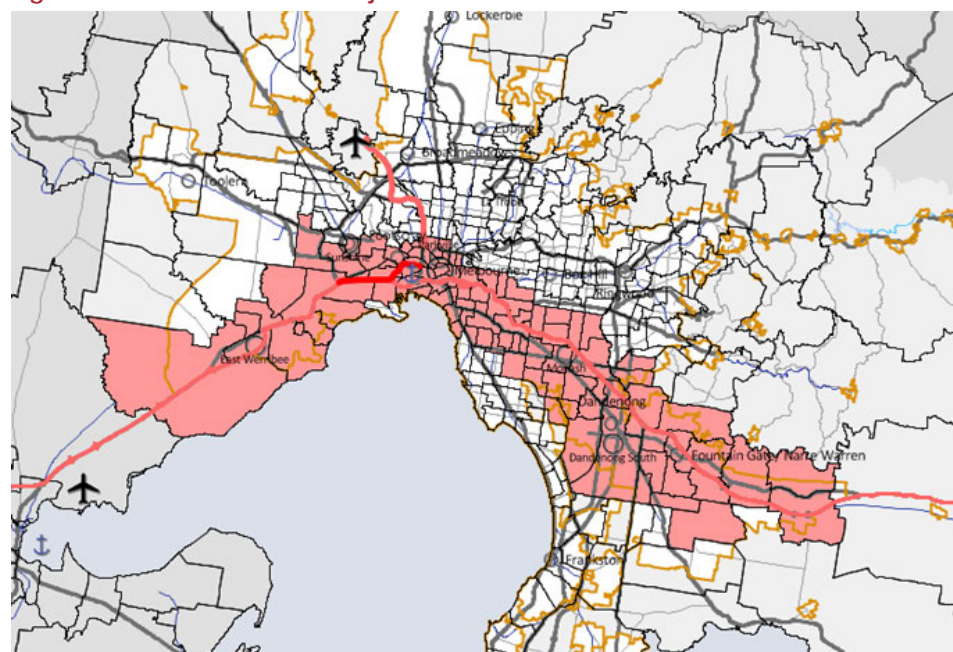
This is a critical economic corridor for Victoria and Australia. The majority of population, job and economic growth in Melbourne will occur along the west to south-east spine of Melbourne along the M1 Corridor.

The M1 Corridor accommodates Melbourne's significant economic clusters and assets

2.4.1. Definition of the M1 Corridor

Victoria's M1 Corridor stretches from Geelong through to the Latrobe Valley, and accommodates key economic assets, including significant employment and education clusters; major ports and emerging freight terminals; arterial roads and freeways; and key public transport routes (see Figure 16). For the purpose of this business case the M1 Corridor comprises the Statistical Areas (SA2s) encompassing the Princes Freeway, West Gate Freeway and Monash Freeway, i.e. those SA2s lying within one kilometre of the road corridor.

Figure 16: Victoria's M1 and adjacent corridor



Source: SGS Economics and Planning, 2015

2.4.2. Strategic significance of the M1 Corridor: linking Melbourne's key economic clusters

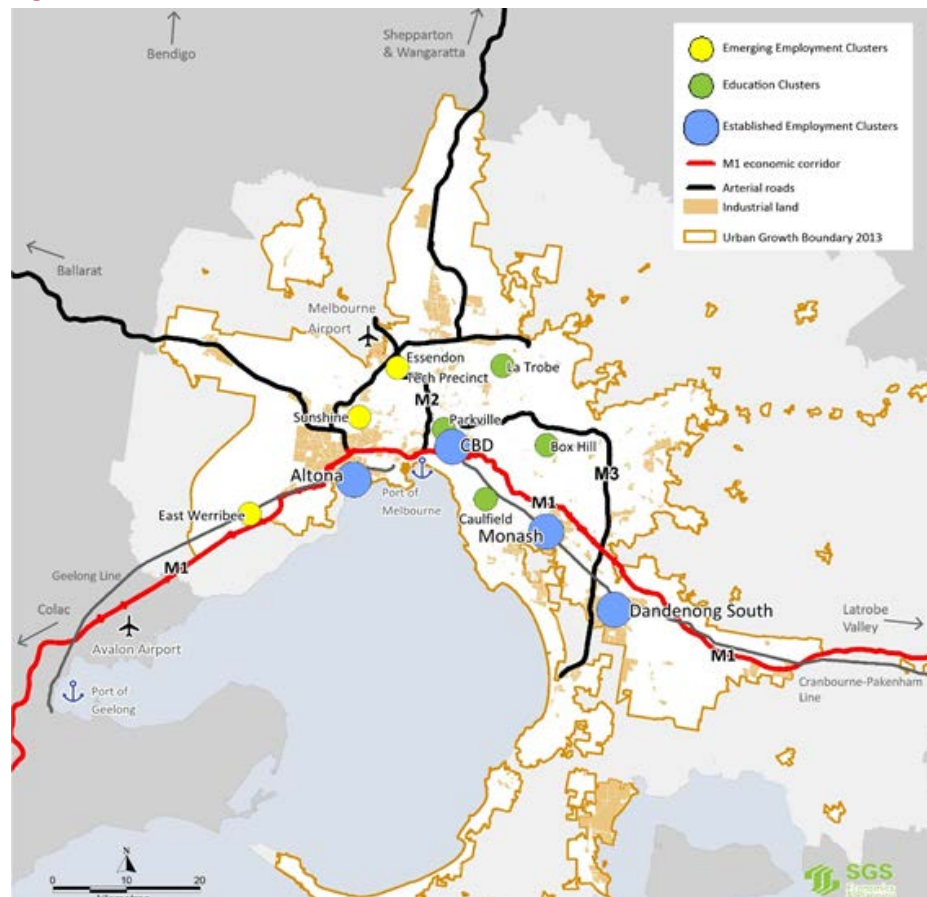
Before focusing on the strategic significance of the M1 Corridor for Melbourne, it is relevant to reflect on the nature of travel in a multimodal urban transport corridor. Travel is rarely end-to-end: instead, public transport trips focus on accessing key nodes in particular CBDs, and the traffic volumes along roads are accumulated from many shorter trips along the way.

The role of the M1 Corridor extending from Melbourne's west to south-east is not solely to satisfy a demand for travel from one side of the city to the other – in other words, travel that extends right across the city. Such journeys will always be a minor component of general travel along the corridor. The M1 Corridor plays many roles: it provides access to inner Melbourne, it facilitates cross town as well as cross regional movements and is used by residents of the surrounding areas to make short trips between suburbs.

In considering the M1 Corridor, it is critical to identify where clusters of economic and social activity are located to determine the importance of accessibility and linkages between these clusters.

As presented in Figure 17, Victoria's M1 Corridor accommodates key economic assets, including significant employment and education clusters, major ports and freight terminals.

Figure 17: Victoria's M1 Corridor



Source: SGS Economics and Planning, 2015

Employment clusters

The established employment clusters along the corridor employ more than 600,000 workers, or nearly 28 per cent of the metropolitan workforce (Melbourne CBD: 470,000; Monash: 58,500; Dandenong South: 55,000; and Altona: 20,000). There is no other single significant concentration of workers in Melbourne that matches the scale of these established clusters. The Sunshine employment cluster supports some 14,000 workers, whereas Melbourne Airport supports nearly 15,000, the success of both of which relies significantly on the performance of, and access to, the M1 Corridor. A leading emerging employment cluster along this corridor at East Werribee is expected to support up to 80,000 of Victoria's workers.

Education clusters

The Parkville, Monash (Clayton and Caulfield) and RMIT education clusters, all of which fall within or connect to the M1 Corridor, comprise nearly three quarters of the total student load at metropolitan Melbourne's world-leading universities.⁵

Major ports and freight terminals

The majority of Victoria's major arterial freight network, which connects Melbourne and the regional Victorian economy, either lies along, or extends through to this corridor. The Port of Melbourne handles the bulk of Victoria's freight (excluding road) at 35 million tonnes, with Melbourne Airport (connected to the M1 Corridor by the M2 Freeway) providing a further 350,000 tonnes of air freight handling annually.

Key road connections

The M1 freeway corridor comprises the Princes Freeway, West Gate Freeway, CityLink Southern Link and Monash Freeway, which provide direct cross city road connections and access to high value economic clusters along the corridor, to greater Melbourne and Victoria's regional cities. In addition, the M1 Corridor provides key connections to major arterial roads and freeways including the M80 Ring Road in the west, Kings Way, St Kilda and Burke Roads in the inner east and Warrigal Road in the east. Critical elements within these corridors are the West Gate Bridge, the Bolte Bridge and the CityLink tunnels.

Key public transport routes

The rail lines serving the M1 Corridor include the Werribee, Williamstown and Sunbury lines in the west and the Pakenham, Cranbourne and Glen Waverley lines in the south-east. These rail corridors largely provide access to Melbourne's CBD from the south-east and west and are supported by Melbourne's central tram network. In addition to the rail lines, the M1 is also served by an extensive bus network.

⁵ Nearly 200,000 split as follows: University of Melbourne – Parkville (~54,000); Monash – Clayton and Caulfield (~45,000); RMIT – City (~45,000); Deakin – Burwood (~26,000); and La Trobe – Bundoora (~26,000).

2.4.3. Strategic significance of the M1 Corridor: concentration of population, jobs and economic activity

The M1 Corridor (refer highlighted region in Figure 17) is characterised by a concentration of Melbourne's residential population, workforce, job locations and economic activity demonstrating its significance to the State.

The M1 Corridor represents:

- a key production and consumption corridor for Australia and Victoria
- a major location for high value employment in Melbourne
- a key contributor to economic output and productivity for the State.

Key production and consumption corridor

The M1 and adjacent corridor accommodates 37 per cent of the metropolitan population and 44 per cent of the skilled workforce. Moreover, more than half the metropolitan workforce (56 per cent) is employed within this area.

The M1 Corridor is anticipated to remain a highly desirable place to live and work by 2046 even without the Western Distributor and Monash Freeway Upgrade Project. Growth in population is expected to outpace that of the rest of the metropolitan economy. Employment growth is on par (see Table 11).

Table 11: Population and employment comparison: M1 Corridor and rest of Melbourne

	M1 and adjacent corridor	Rest of Melbourne	M1 share of Melbourne
Population			
2011	1,515,300	2,593,000	37%
2046	2,713,300	4,499,000	38%
AAGR 2011-46%	2.3%	2.1%	-
Employment			
2011	1,202,100	959,400	56%
2046	2,164,200	1,716,900	56%
AAGR 2011-46%	2.3%	2.3%	-

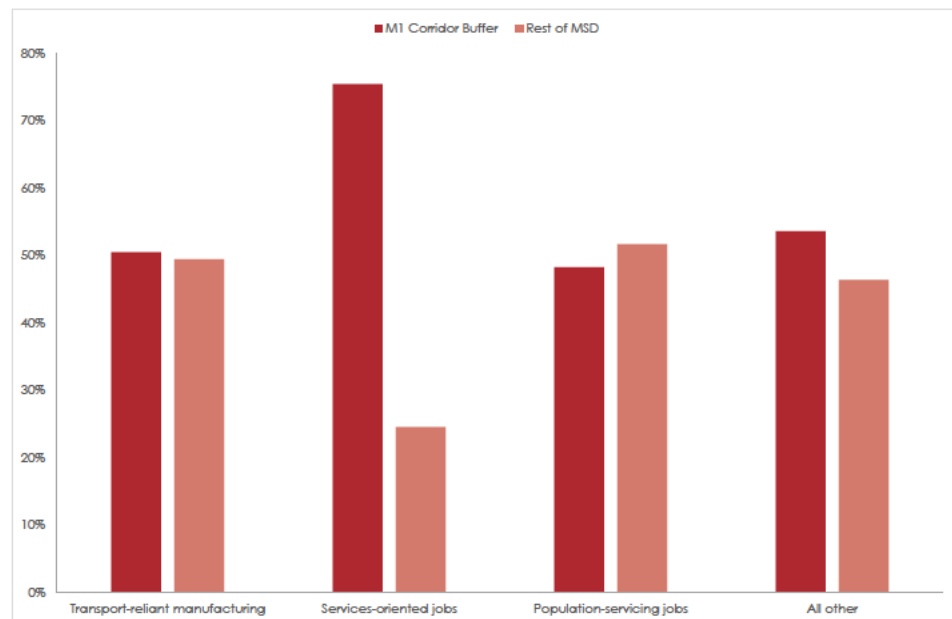
Note: Rest of Melbourne is defined as Melbourne Statistical Division, AAGR represents average annual growth rate

Source: SGS Economics and Planning, 2015

Location for high value employment

The economic significance of the M1 Corridor is further underscored by its share of high value jobs. Relative to the rest of the metropolitan economy, the M1 and adjacent corridor is home to nearly three times the number of service-oriented jobs and higher transport-reliant manufacturing workers (see Figure 18).

Figure 18: Share of metropolitan employment accommodated: M1 Corridor and rest of Melbourne, 2014



Note: Transport-reliant manufacturing includes one digit ANZSIC industries of Manufacturing; Wholesale Trade; and Transport, Postal and Warehousing. Services-oriented industries include Telecommunications; Finance; Professional Services; and Rental and Hiring industries. Population-servicing industries include Retail; Accommodation and Food; Education; and Health Care. Other remaining industries include Agriculture; Mining; Utilities; Construction; Administration; and the Creative sector.

Source: SGS Economics and Planning, 2015

Future job growth in these higher value industries in Melbourne is also expected to occur predominantly along the corridor (see Table 12).

Table 12: Anticipated jobs growth: M1 Corridor and rest of Melbourne, 2014-46

	M1 Corridor	Rest of Melbourne
Transport-reliant manufacturing	82,000	59,000
Services-oriented jobs	318,200	110,000
Population-servicing jobs	396,700	439,900
All other	118,800	96,800
Total	915,700	705,700

Source: SGS Economics and Planning

Notes: Transport-reliant manufacturing includes the one digit ANZSIC industries of Manufacturing; Wholesale Trade; and Transport, Postal and Warehousing. Services-oriented industries include Telecommunications; finance; Professional Services; and Rental and Hiring industries. Population-servicing industries include Retail; Accommodation and Food; Education; and Health Care. Other remaining industries include Agriculture; Mining; Utilities; Construction; Administration; and the Creative sector.

Contributor to economic output for the State

The M1 Corridor contributes nearly two-thirds of the metropolitan economy's total value-added – nearly \$135 billion in gross value added per annum (in 2011)⁶ or 63.8 per cent of the total for Melbourne (refer Table 13).

Table 13: Gross value added: M1 Corridor and rest of Melbourne, 2011

Region	Gross value added (\$ million)
M1 Corridor	\$134,900
Rest of Melbourne	\$76,500
Melbourne Total	\$211,400

Source: SGS Economics & Planning, 2015

2.4.4. Role of road and public transport in the M1 Corridor

The freeway corridors provide people and freight with direct cross city road connections, and access to economic opportunities in and around central/inner Melbourne, as well as greater Melbourne and Victoria's regional cities.

The M1 freeway corridor is the only *continuous* strategic road connecting the western suburbs and Melbourne's central and eastern suburbs. All alternative routes (Footscray Road, Dynon Road and Ballarat Road) entail travel through residential areas. The M80 has an east to west segment, however it generally provides orbital connections.

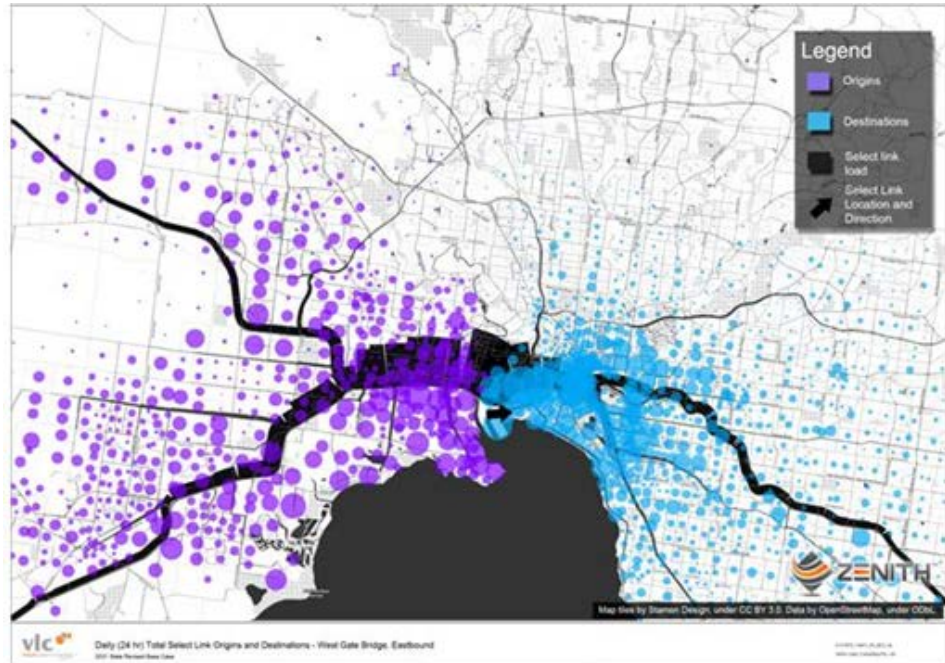
The rail lines largely provide access to Melbourne's CBD from the south-east and west. Public transport is relatively attractive for radial journeys to and from the CBD, however is not considered a viable alternative for many M1 freeway users whose destination is often not the CBD, or for those travellers who require a car for other purposes.

As Figure 19 shows, rail passengers crossing the Maribyrnong River are predominantly travelling to the CBD and areas immediately surrounding it.

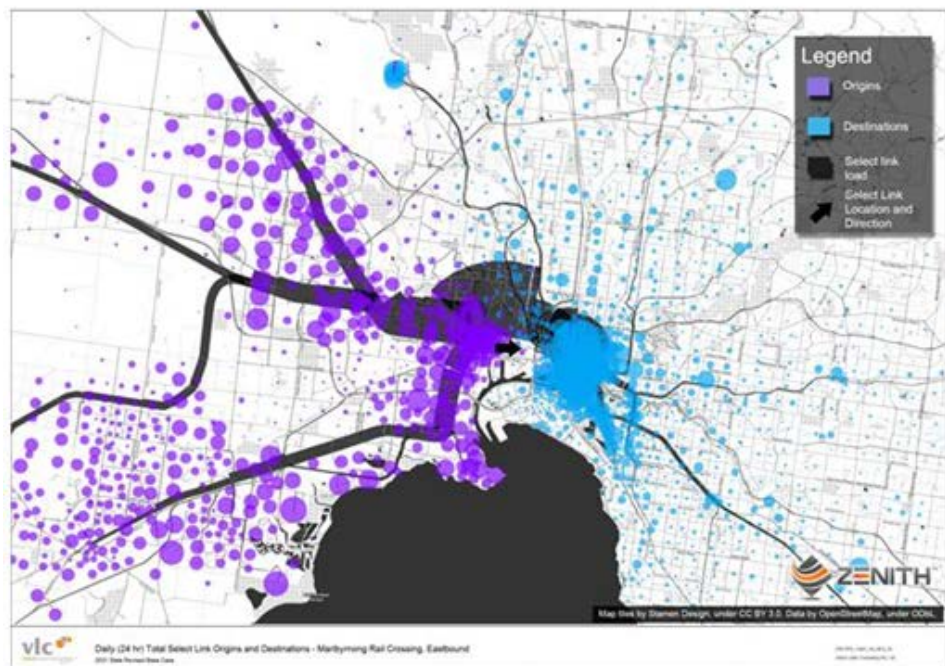
Conversely, road trips made across the West Gate Bridge are more widely dispersed across Melbourne with destinations across the east and south-eastern suburbs and to central areas, with far lower concentration on CBD origins and destinations than rail.

⁶ This figure represents the aggregate of all output generation in the statistical areas (SA2s) that comprise the corridor as highlighted in Figure 16.

Figure 19: Origins and destinations of West Gate Bridge Traffic AM peak



A. Road trips across the Maribyrnong River (West Gate Bridge)



B. Rail trips across the Maribyrnong River (Sunbury, Werribee and Williamstown lines)

Source: Veitch Lister Consulting, 2015

The majority of Melbourne's traffic is carried on freeways and major arterial roads. These roads link activity centres across Melbourne. Currently the Monash-West Gate-Princes Freeway services more than 1 million person movements each day (VicRoads, 2015f). In the west, demand is forecast to increase significantly across all modes, with demand for public transport growing more than 140 per cent and road demand growing by 60 per cent between 2011 and 2031 (see Attachment H).



3. Problems

This chapter identifies and assesses key problems relating to poor transport connectivity on Victoria's M1 Corridor.

As Melbourne faces rapid population growth, changing economic geography and expanding freight task, transport connectivity is increasingly critical to underpin the Victorian Government's vision for Melbourne as a 'global city of opportunity and choice'. While the Government is investing in Melbourne's transport network, further investment priorities have been identified to deal with increasing road demand on the M1 Corridor and the West Gate Bridge, despite the M1 Corridor being critical to the functioning of key economic assets for Melbourne.

The four key problems include:

- Transport capacity on the M1 Corridor is inadequate relative to growing demand
- Melbourne is over-reliant on the West Gate Bridge that is currently operating at capacity
- Port and freight connections are inadequate to sustainably cater for growth and cause reduced amenity in the west
- There is a mismatch between transport and land use.

3.1. Problems and impacts

Four key problems have been identified in relation to transport connectivity on the M1 Corridor. The problems and their impacts are summarised in Table 14.

Table 14: Problems and impacts

Problems	Impacts
Transport capacity on the M1 Corridor is inadequate relative to growing demand	Increasing congestion, reduced reliability and higher travel costs for road users Safety implications for users through higher accidents and incidents
Melbourne is over-reliant on the West Gate Bridge currently operating at capacity	High network vulnerability to constraints and disruptions on the West Gate Bridge Lack of network redundancy to cater for future demand growth without undesirable performance
Port and freight connections are inadequate to sustainably cater for growth and cause reduced amenity in the west	Diminishing freight competitiveness of Melbourne Negative impacts on amenity for local communities in the inner west

M1 Corridor transport problems relate to capacity, over-reliance, poor freight connections and land use mismatch

Problems	Impacts
There is a mismatch between transport and land use	Constrained jobs accessibility for the west's growing population Challenges attracting workers to Melbourne may occur in the future

3.2. Transport capacity on the M1 Corridor is inadequate relative to growing demand

Problem

The M1 Corridor is the only *continuous* strategic road connecting the western, eastern and inner suburbs of Melbourne.

Growing residential areas, particularly the outer western suburbs, together with employment growth and development of Melbourne's economic clusters, is generating strong demand for road and rail travel along the M1 Corridor to a range of locations in inner areas and destinations across Melbourne.

Historically, the Government has invested progressively along the M1 Corridor, particularly on the sections east of the West Gate Bridge and along the Monash Freeway, including CityLink Southern Link to expand capacity and implement managed motorway initiatives. These past investments to improve the existing road network have improved speed, reliability and throughput. However, capacity is not sufficient to cater for the future significant growth in travel demand forecast in the corridor over the coming decade and beyond; reflecting the high proportion of Melbourne's economic clusters, jobs and residential growth concentrated along the M1 Corridor.

Previous investment on the M1 Corridor

Over the past decade, the Victorian Government has invested progressively along the M1 Corridor. Recent investments have included:

1. The Monash-CityLink-West Gate (M1) Upgrade completed in 2011, which added lane capacity and other physical capacity improvements along the M1 corridor from the West Gate Bridge through to South Gippsland Freeway, lane use management system (from the West Gate Bridge on the West Gate Freeway through to High Street on the Monash Freeway) and ramp metering along the broader M1 Corridor (from Duncans Road, Werribee to Clyde Road, Berwick) to improve speed, reliability and throughput.
2. West Gate Bridge Strengthening completed in 2011, which enabled use of the existing shoulder and reconfiguration of lane width.
3. The West Gate Freeway Managed Motorway Project completed in 2014, which installed lane use management to assist incident recovery between the M80 Ring Road and Williamstown Road.
4. The Monash Freeway Managed Motorway completed in 2015, which extended lane use management to assist incident recovery from High Street to Warrigal Road.

Impacts

Key impacts from increasingly poor transport connectivity and capacity on the M1 Corridor relative to growing demand include increasing congestion, reduced reliability and higher travel costs for road users, along with safety implications for users through higher accidents and incidents.

When a road is operating at or close to capacity the likelihood of flow breakdown even from a minor incident is increased dramatically, this can create shockwaves upstream with low travel speeds affecting thousands of motorists.

If not addressed, the liveability and competitiveness of Melbourne with other cities may be compromised in the future.

Increasing congestion, reduced reliability and higher travel costs

There are two sections of the M1 Corridor where projected demand is well above capacity in 2031 and considered to have significant connectivity implications⁷ given their linkages to key economic clusters in Melbourne:

- The West Gate Freeway between the M80 Ring Road and the West Gate Bridge
- The Monash Freeway between Warrigal Road, Chadstone and Clyde Road, Berwick.

Figure 20: M1 Corridor volume capacity ratios 2031 – AM peak (7-9am): Base case⁸



Source: Veitch Lister Consulting, 2015

West Gate Freeway (M80 Ring Road – West Gate Bridge)

The West Gate Freeway links the western suburbs to central, northern and south-east Melbourne and beyond. It is also a link between Melbourne and the west and linking industrial and residential areas west of the Yarra River with the city and port areas. The West Gate Bridge is a part of the freeway.

⁷ While high volume capacity ratios have been identified on the Princes Freeway west of the M80 Ring Road, the sections identified link key economic clusters along the corridor and therefore have been identified as priority problem areas in this business case.

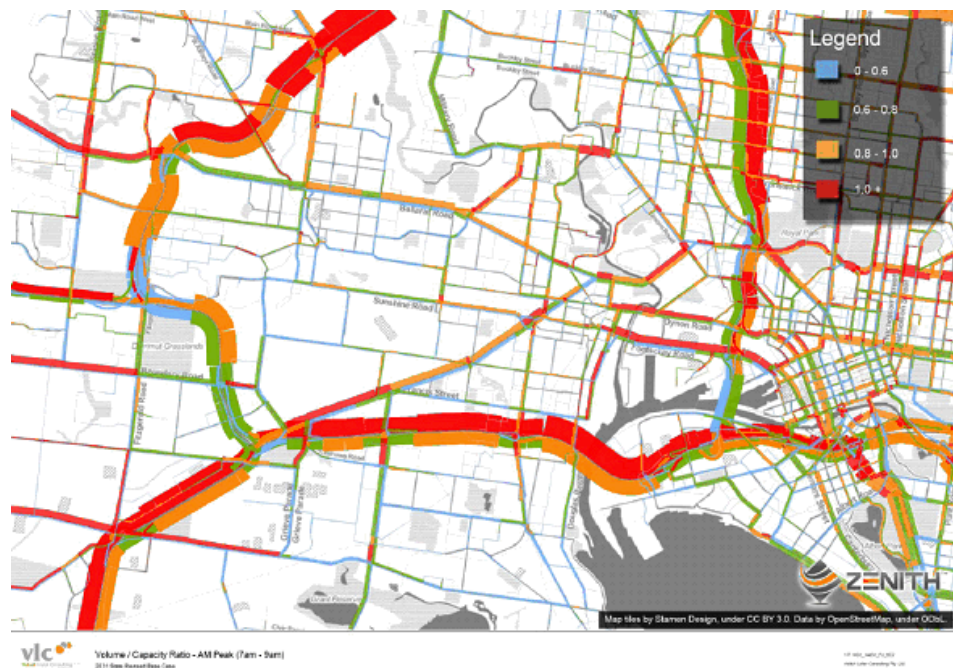
⁸ Congestion is typically measured through volume-capacity (V/C) ratios which represent the ratio of average peak traffic volumes compared to the theoretical maximum volume. They are used as an indicator of demand and congestion, typically any link displaying a V/C ratio above 0.9 is considered congested.

In 2031 average weekday demand on the West Gate Bridge is forecast to increase to between 240,000 to 250,000 vehicles a day (Veitch Lister Consulting, 2015, see Attachment H), which would result in this road operating under heavily congested traffic conditions for the majority of the day.

Even at current demand levels, congestion is being experienced on the West Gate Bridge. Traffic volumes have increased from approximately 161,000 vehicles per day in 2007 to 202,000 in October 2013. The previous investments on the M1 and the West Gate Bridge in particular have seen average peak (AM) hour travel speeds improve, increasing from 52.1 to 58.6 kilometres per hour between 2007 and 2013, despite the significant increase in throughput (VicRoads, 2015 d). However, it is important to note travel speeds during the peak period are still considered sub-optimal for a freeway link. Alternative routes such as Footscray Road, Dynon Road and Ballarat Road have also experienced strong volume growth and are nearing capacity.

As Figure 21 shows, significant congestion is expected by 2031 with forecast traffic demand exceeding theoretical capacity. This is also expected on the alternative river crossings at Footscray Road, Dynon Road and Ballarat Road, with all these crossings exceeding capacity in 2031 without capacity enhancements.

Figure 21: West Gate Freeway volume capacity ratio 2031 – AM peak (7–9am): Base case



Source: Veitch Lister Consulting, 2015

Monash Freeway (Warrigal Road – Clyde Road)

The Monash Freeway, between Warrigal Road and Clyde Road, is a 30 km section of the M1 Corridor located in Melbourne's south-east. The Monash Freeway between Warrigal Road and Clyde Road carries over 200,000 vehicles per day along its busiest sections and approximately 30,000 vehicles during the morning peak period (7am to 9am).

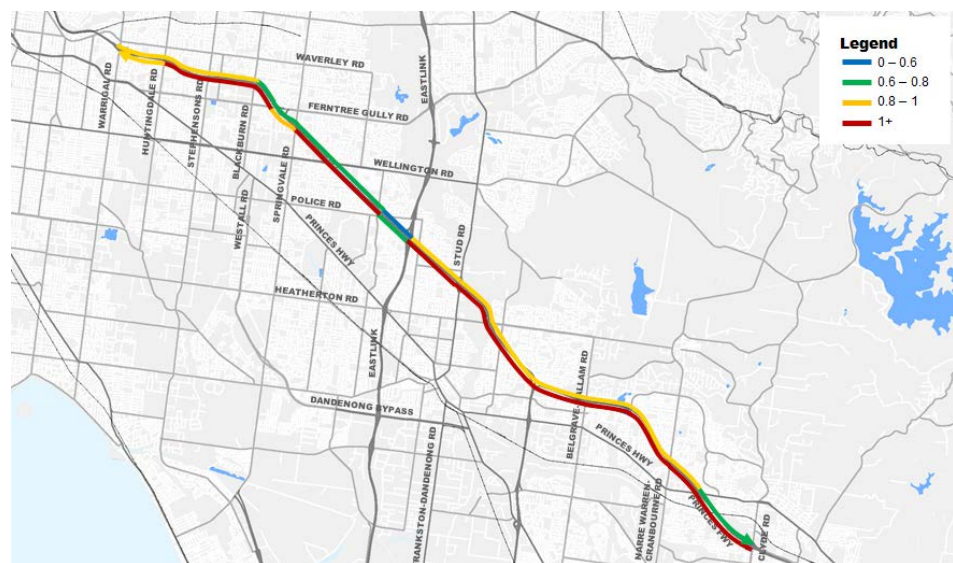
This section of the M1 Corridor plays a number of critical roles in the south-east region by supporting the movement of people to employment and services from both within and outside the region, and supporting the transport of goods from businesses to markets.

More broadly, it plays an important role in linking the south-east with Melbourne Airport, Port of Melbourne and the northern and western suburbs through its connection with other major freeways such as CityLink, the West Gate Freeway and EastLink. It is also a critical link in connecting Melbourne with important regional centres in Eastern Victoria, including the Latrobe Valley and Warragul.

Traffic volumes are highest between the South Gippsland Freeway and Warrigal Road, carrying between 160,000 and 210,000 vehicles per day, with lower volumes east of the South Gippsland Freeway interchange (approximately 100,000 vehicles per day) (VicRoads, 2014 a, Traffic volume data).

In 2031, daily traffic volumes are expected to increase across the entire length of the Monash Freeway by approximately 10 to 30 per cent (Veitch Lister Consulting, 2015, see Attachment H).

Figure 22: Monash Freeway volume capacity ratios 2031 – AM peak (7–9am): Base case



Source: Veitch Lister Consulting, 2015

Users of the Monash Freeway are currently experiencing congestion, with demand approaching or exceeding theoretical capacity on a number of sections (Figure 22).

There are also a number of other choke points along the Monash Freeway where insufficient entry and exit ramps from and onto arterial roads are quickly becoming saturated and spilling back onto either the M1 Corridor or the arterial network. When the latter occurs, the approach has been to clear the entry ramps onto the highway by allowing vehicles to enter in an uncontrolled fashion. While this partly resolves the issue of congestion on the arterial network, it does so at the cost of the efficient operation of the freeway.

Along the Monash Freeway, key bottlenecks where drivers are experiencing start-stop conditions include:

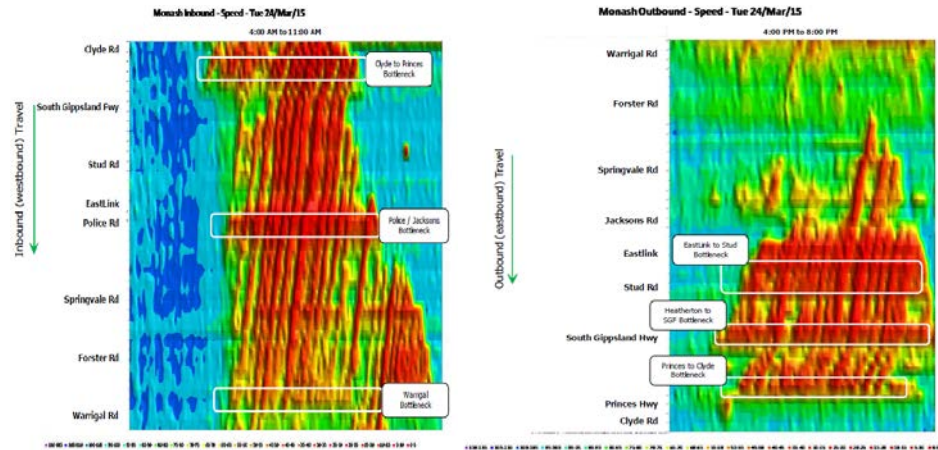
- AM west-bound: Clyde/Princes and Police/Jacksons Roads
- PM east-bound: EastLink and Stud Road, Heatherton to South Gippsland Freeway, and Princes to Clyde Road on the Hallam Bypass.

Figure 23 shows the typical speed contours for the inbound and outbound direction between Warrigal Road and Clyde Road. The figure demonstrates the locations where congestion causes flow breakdown and the subsequent reductions in speed and as a result, reduced throughput.

Figure 23: Monash Freeway speed contours between Warrigal and Clyde Roads, 2015: Base case

West-bound AM Peak (4-11am)

East-bound PM Peak (4-8pm)



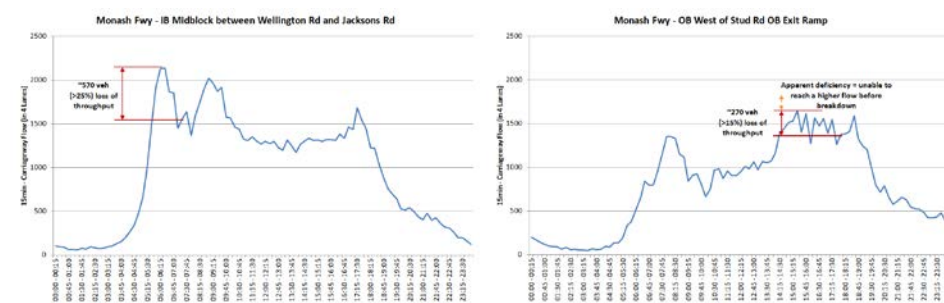
Note: The speed contour plots in this figure show the speed of traffic along the Monash Corridor. The direction of flow is down the page (key locations are notated) and the time scale is from left to right. The parallel diagonal lines propagating up from the large red bottlenecks are shockwaves indicating that drivers are experiencing stop-start conditions. Source: VicRoads, 2015, Data collected in 2015

The bottlenecks highlighted above result in significant reductions in traffic flow throughput. Figure 24 shows the throughput reduction at two key locations due to bottlenecks during the morning and evening periods. The flow throughput is unable to reach high flows before flow breakdown due to the heavy uncontrolled flows from EastLink and Police/Jacksons and resulting weaving that occurs.

Figure 24: Monash Freeway throughput cap and breakdown flow reduction due to bottlenecks, 2015: Base case

Police/Jacksons (AM Peak)

Monash Freeway and EastLink (PM peak)



Source: VicRoads, 2015, Statistical data collected in 2015

Currently, the Thompson Road duplication upgrade is the only funded road project aimed at assisting and managing the problems faced by increasing demand in the outer south-eastern suburbs which will further increase the ability for traffic demand to access the Monash Freeway corridor. Even at current demand levels, existing congestion on the Monash Freeway indicates significant issues with the operation of transport routes through the south-east corridor.

Safety implications from accidents and incidents

West Gate Freeway (M80 Ring Road – West Gate Bridge)

The West Gate Freeway and West Gate Bridge are vulnerable to crashes and incidents, with around 2,150 incidents per year, or around six per day. On the West Gate Bridge in 2014 there were more than 750 vehicle breakdowns/incidents, 70 collisions causing damage and 14 casualty crashes. The remaining 1,300 incidents occurred on the remainder of the West Gate Freeway between M80 and Todd Road (VicRoads, 2015 b).

VicRoads has advised that on average it takes approximately 10 minutes to respond to an incident on the M1 and another 16 minutes to clear the carriageway on average. However, lane closures can vary from short momentary closures to complete freeway closures of up to six hours in the event of a fatal or major collision. It is estimated that a single lane closure on the West Gate Freeway accounts for around 90 per cent of incidents while closures of two or more lanes occur 10 per cent of the time.

When incidents occur, the flow-on impact can be broad across the network, with the resulting congestion lasting much longer than the time taken to clear the original incident.

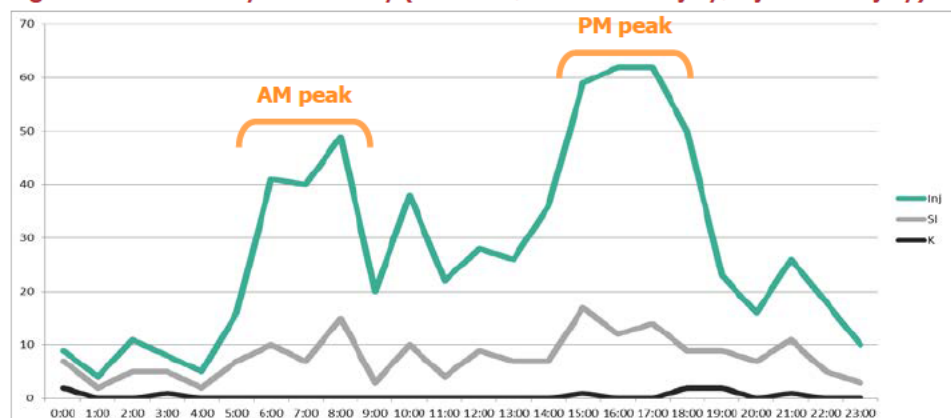
Monash Freeway (Warrigal Road – Clyde Road)

The dual role of the Monash Freeway as both a key transport corridor for trips to the west, inner areas and CBD as well as trips within the south-east region, results in significant vehicle weaving and merging issues arising. It is also causing increased queuing along significant lengths of the Freeway.

Congested traffic and stop-start conditions reduce the time available for drivers to react to changes in traffic conditions and increase the risk of accidents on the Monash Freeway. The difference in speeds with which vehicles merge onto the Monash relative to vehicles already on the freeway and the higher speed with which traffic approaches congested sections of the M1 Corridor between Warrigal and Clyde Roads increase the risk of serious crashes.

There is a high average frequency of incidents on the Monash Freeway at around five a day (VicRoads Incident Response Service, 2013) with a notable concentration of incidents and injuries during peak periods (see Figure 25).

Figure 25: Crashes by time of day (k – killed, SI – serious injury, Inj – other injury)



Source: VicRoads, (2015), *Strategic Options Report: Monash Freeway – Warrigal Road to Clyde Road*

There is also a pattern of increasing incidents on the Monash Freeway over time that coincides with increasing demand levels. For Monash to Princes Freeway East (excluding CityLink), there were 1,648 incident response call-outs in 2013,

increasing to 1,954 in 2014. For 2015, there were already 947 call outs between January and June (VicRoads, 2015 c).

3.3. Melbourne is over-reliant on the West Gate Bridge currently operating at capacity

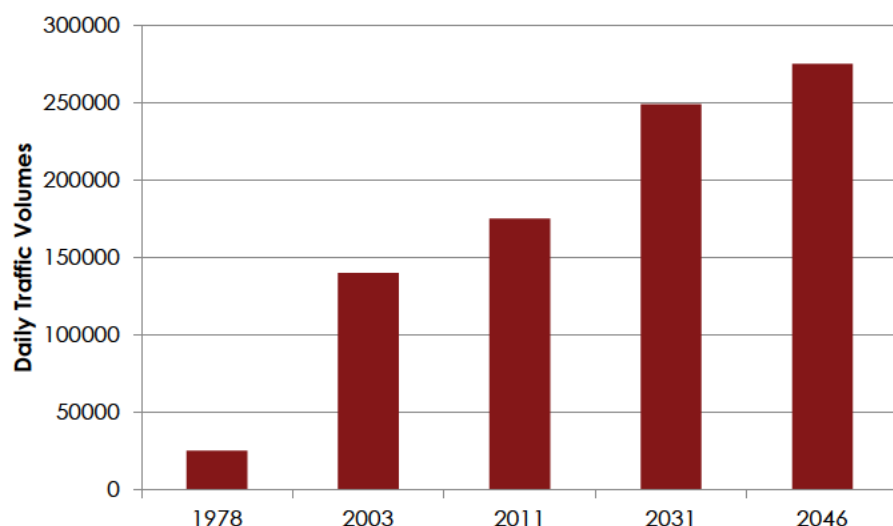
Problem

Melbourne's west to east routes must cross the Yarra or Maribyrnong Rivers to connect to other parts of the city.

Melbourne is heavily reliant on the West Gate Bridge. It is a major collector distributor road for key economic activity centres in the west and south-east of Melbourne. The West Gate Bridge carries approximately 59-63 per cent of all trips that cross the Yarra from the west (Veitch Lister Consulting, 2015 see Attachment H). All alternative road routes (Footscray Road, Dynon Road and Ballarat Road) entail travel through residential, industrial and commercial areas.

Figure 26 presents historic and predicted estimated daily traffic volumes on the West Gate Bridge.

Figure 26: West Gate Bridge traffic volumes



Source: 1978, 2003, 2011 VicRoads, 2031, 2046 Veitch Lister Consulting, 2015

Impacts

The heavy reliance on the M1 Corridor as the primary road connection from the west into Melbourne makes the state economy highly vulnerable to incidents and disruptions on the West Gate Bridge; it also reduces the overall redundancy on the transport network to cater for future demand growth.

High network vulnerability to constraints and disruptions on the West Gate Bridge

Even a minor traffic incident on or near the West Gate Bridge, can have a severe, costly and disruptive effect. A single incident can bring traffic to a halt across several kilometres of the M1 Corridor and generate congestion across the entire road transport network.

Given Melbourne's role as a national freight and logistics hub, and increased traffic volumes on the M1, the effects of major incidents that severely restrict access to the West Gate Bridge or make it unavailable for an extended period would be calamitous for the economy.

Lack of network redundancy to cater for future demand growth without undesirable performance

Traffic modelling suggests that by 2031 under a business as usual scenario, total daily traffic demand for the West Gate Bridge will exceed 260,000 movements per day (Veitch Lister Consulting, 2015, see Attachment H).

The West Gate Bridge is already operating at capacity during peak times. In the absence of an alternative for the Bridge or bypass to enable users not needing to access the south-east or inner areas of Melbourne to avoid the Bridge, there will be serious impacts to the transport network and broader economy.

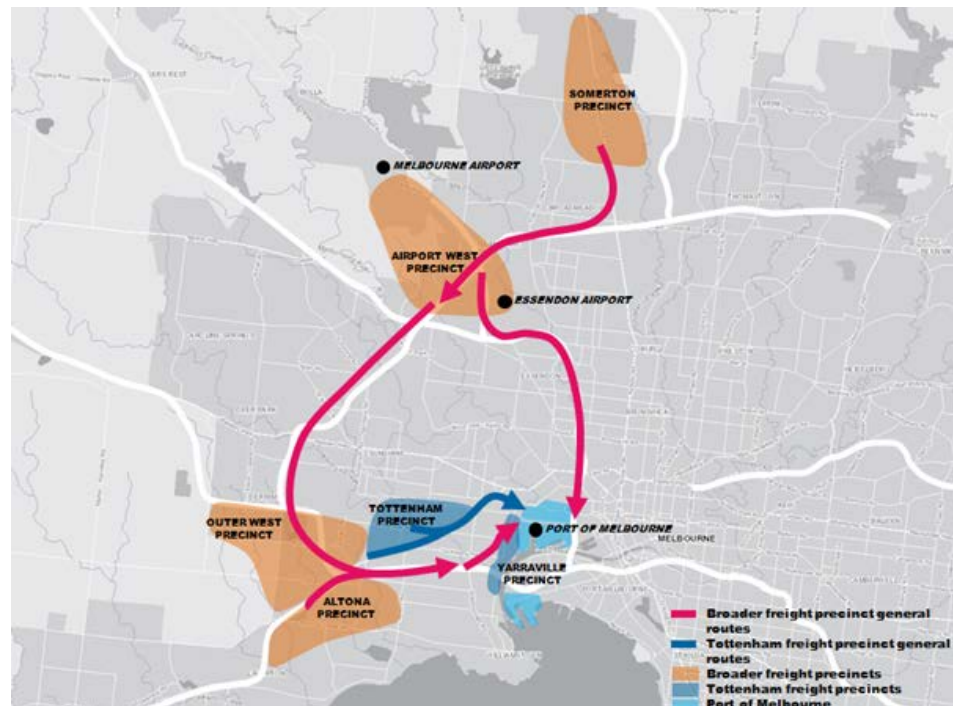
3.4. Port and freight connections are inadequate for growth and cause reduced amenity in the west

Problem

The M1 Corridor is Melbourne's most important land freight route, with between 24,000-28,000 heavy vehicles per day travelling over the West Gate Bridge (VicRoads, 2014 a, Traffic volume data). The volume of light commercial vehicles and heavy commercial vehicles using the M1 is high relative to other arterial roads and freeways.

The corridor plays a key role accommodating efficient freight movements to and from the Port of Melbourne, across Melbourne to various industrial and freight precincts, to and from regional Victoria, and interstate. Figure 27 presents Melbourne's key industrial and freight precincts in the west and north, highlighting the critical role the M1 Corridor plays in the movement of freight. Increasing volumes of freight are vying for road space with other road users.

Figure 27: Industrial/freight precincts relevant to the M1 Corridor (west and north)



Source: GHD, 2015 b

The road network in Melbourne's west is also used by trucks to access the Port of Melbourne. This includes Francis Street, Somerville Road and Williamstown Road.

These roads, located in largely residential areas, are poorly configured and inadequate for travel between the west and the Swanson and Appleton Docks, and intermodal terminals at South Dynon and North Dynon. As these roads are not freeway standard, they have many junctions, pedestrian crossings and driveways, making these roads undesirable freight roads for the community. Truck curfews are in place on Francis Street and Somerville Road between 8pm and 6am from Monday to Saturday, and 1pm Saturday to 6am Monday. These curfews however do have exemptions for trucks in the Tottenham and Brooklyn Precincts.

While there are a number of schemes in place to expand Victoria's High Productivity Freight Vehicle (HPFV) network by strengthening existing bridge infrastructure, there is currently no HPFV link to the Port of Melbourne and the adjoining Dynon freight precinct. Figure 28 shows the locations the Victorian Government has identified for expansion of the HPFV network by strengthening existing bridge infrastructure.⁹ However, the upgrades planned do not include the final connection to the Port.

Figure 28: Bridge strengthening programs for High Productivity Freight Vehicles




Source: VicRoads 2015

Impacts

Congested freeway access, inadequate and sensitive local and arterial road access, and low mass limit connections to the Port of Melbourne and other

⁹ Bridge strengthening is planned on the Hume Freeway, Monash Freeway, Western Highway, and Goulburn Valley Highway (announced as part of the Infrastructure Growth Package in the 2014-15 Budget), an additional seventeen bridges on arterial roads have been identified for strengthening in the near future ('Stronger Bridges, a Stronger Economy' business case DEDJTR 2015), current route assessments and funding submissions suggest that bridges on the Princes Freeway and the M80 last section between Deer Park Bypass and West Gate Freeway will be strengthened in the near future, and the Princes Freeway from M80 to Geelong is currently the subject of a business case with M80 bridges expected to be strengthened as part of the scope examined and is therefore considered likely to proceed in the short term.



freight connections along the M1 Corridor need to be addressed to preserve Melbourne's competitiveness. In addition, congestion is negatively influencing amenity of communities in the inner west, which would constrain Melbourne sustainably reaching its economic potential.

Higher supply chain costs diminishing the freight competitiveness of Melbourne

With the freight task forecast to triple by 2050 (DTPLI, 2013), realising the benefits of the planned expansion of the Port of Melbourne will depend on freight access that is reliable, timely and promotes HPFV access.

Unless it is addressed, increasing congestion in the west and along the M1 Corridor will limit the amount of freight that can be moved in and out of the Port of Melbourne. Trade between key activity centres in the west and east and Melbourne's position as a freight and logistics hub would also be threatened by increasing congestion and delays on the corridor.

Increasing congestion and delay impacts on freight and logistics can lead to increased inventories, particularly when goods are perishable, difficult to warehouse or subject to rapid changes in value. This in turn increases the costs of freight through increasing the number of vehicles and drivers, or through the extension of operating hours to accommodate longer travel times and less reliable pick-up and delivery times. The market reach of businesses would be compromised, potentially resulting in smaller plants with higher unit costs and less access to specialised inputs. Ultimately, the competitiveness of Victorian exports would be harmed. A constrained Port of Melbourne would lead to freight operators seeking more efficient and cost-effective options at alternative gateways, such as Port Botany or the Port of Brisbane. Constraints on the Port of Melbourne would have ramifications across Australia.

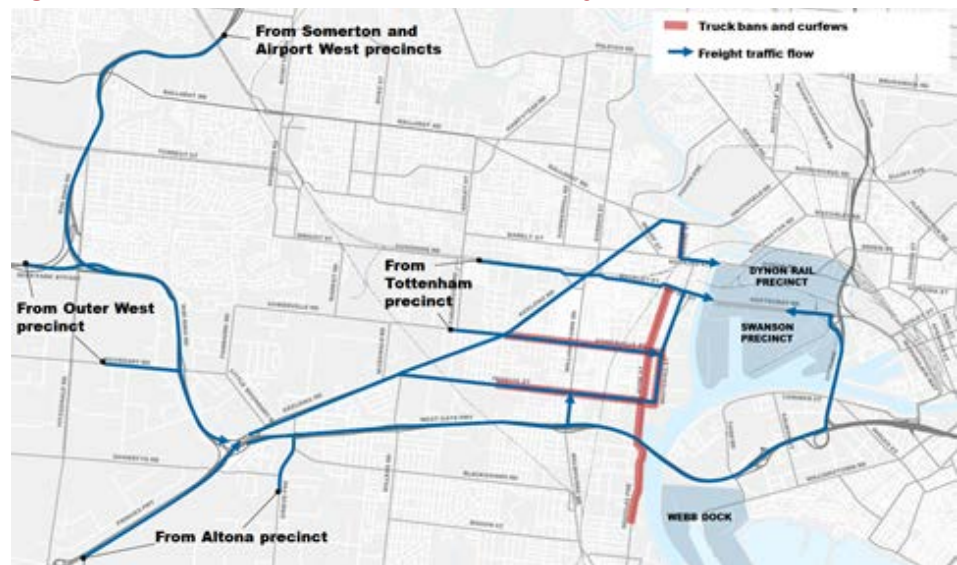
Worsening amenity for local communities

The absence of an efficient freeway connection between the west and the Port of Melbourne and growth in port-related freight is leading to increasing volumes of trucks passing through residential streets in the inner west.

Heavy vehicle numbers in the Footscray and Yarraville areas are estimated to rise by 40 per cent by 2021 on major roads. On lower level roads, truck volumes are forecast to increase by 80 per cent as trucks increasingly seek to avoid delays (VicRoads, 2010).

Ideally, traffic between the Appleton and Swanson Docks and the west would use the freeway network (CityLink and the West Gate Bridge) via Footscray Road, more suitable for high volumes of truck traffic, particularly for those with an origin or destination in Tottenham. However, many commercial vehicles travel on the residential streets of Francis Street, Whitehall Street, Hyde Street, Somerville Road and Williamstown Road between the West Gate Freeway and the Port (as shown in Figure 29).

Figure 29: General truck flows to/from Swanson/Dynon Precinct



Source: GHD, 2015 b

VicRoads and Maribyrnong City Council commissioned GHD (2015) to study vehicle volumes, types and trends within the inner west area. GHD used overview cameras, number plate cameras and automatic traffic counters (ATCs). The results showed up to 10-30 per cent of all vehicles through the area were trucks, and most commonly container trucks.

The use of local roads in the inner west by commercial vehicles has been a long-standing issue for local residents, concerned about their safety and loss of amenity from noise and air pollution, negatively impacting land values and severely restricting potential uses.

An alternative route to the Port of Melbourne would alleviate congestion and have the potential to reduce noise and air pollution in residential areas in the inner west. Without an alternative route these impacts threaten the urban regeneration of designated sites in Footscray, Brooklyn and Tottenham.

3.5. There is a mismatch between transport and land use

Problem

At the same time as Victoria's population has grown, the structure of the State's economy and associated employment base has undergone significant change, affecting the location of jobs and economic activity in Melbourne.

Manufacturing activity was historically located in the inner suburbs, but over time has shifted to the outer metropolitan area, with the development of major manufacturing and logistics precincts in the west, north and south-east. These areas contain a third of all manufacturing and transport-related firms in Melbourne.

The shift of transport reliant manufacturing activity from inner Melbourne to outer metropolitan areas, particularly in the west, north and south-east, has implications for the city's transport network.

Where in the past much of the city's freight moved in and out of inner Melbourne, it now needs to bypass inner Melbourne (while retaining access to the Port of Melbourne) in order to service the growing manufacturing and warehousing precincts in outer Melbourne.

Over the next three decades, Melbourne is expected to accommodate around 3 million additional people, and grow its employment base by approximately 1.7 million jobs (see Table 11). However, there is a mismatch between manufacturing production and consumption centres that will continue to exacerbate the job deficit.

Impacts

The mismatch between transport and land use will result in constrained jobs accessibility for the west's growing population. In turn, it also presents a challenge to attracting workers in the future.

Constrained jobs accessibility for the west's growing population

Population growth in the western part of the M1 and adjacent corridor is expected to be significantly higher at 1.8 per cent a year relative to 1.4 per cent for the eastern section. By contrast, employment growth in the west will be less than that anticipated in the east (1.4 per cent compared with 1.5 per cent). Nearly 285,000 additional people are expected to live in the west by 2046, supported by an additional 93,000 jobs.

The self-sufficiency ratio (i.e. the ratio of employment to people) in the western part is estimated by SGS (2015) to fall in the west from 44 per cent today to 39 per cent by 2046. By contrast, it is estimated to rise in the eastern section of the M1 Corridor (refer Table 15). This will further exacerbate the self-containment of workers (or ability for resident workers to find jobs locally) in the region.

Table 15: Anticipated population and employment growth in the M1 Corridor

	West	East	Centre
Change in Population 2011-46	283,000	649,000	267,000
AAGR population	1.8%	1.4%	
Change in Employment 2011-46	93,000	391,000	480,000
AAGR employment	1.4%	1.5%	
Self-sufficiency ratio at 2011*	44%	53%	448%
Self-sufficiency ratio at 2046*	39%	56%	258%
Self-containment**	82%	93%	-

Notes: *defined as the ratio of employment to population. **defined as the ratio of employment to resident workers of the region. The corridor has been explained in western, central and eastern sections, with the western and eastern sections comprising the SA2s that lie to the west and east of the Melbourne CBD respectively, and the City of Melbourne being the central region.

Source: SGS Economics and Planning, 2015

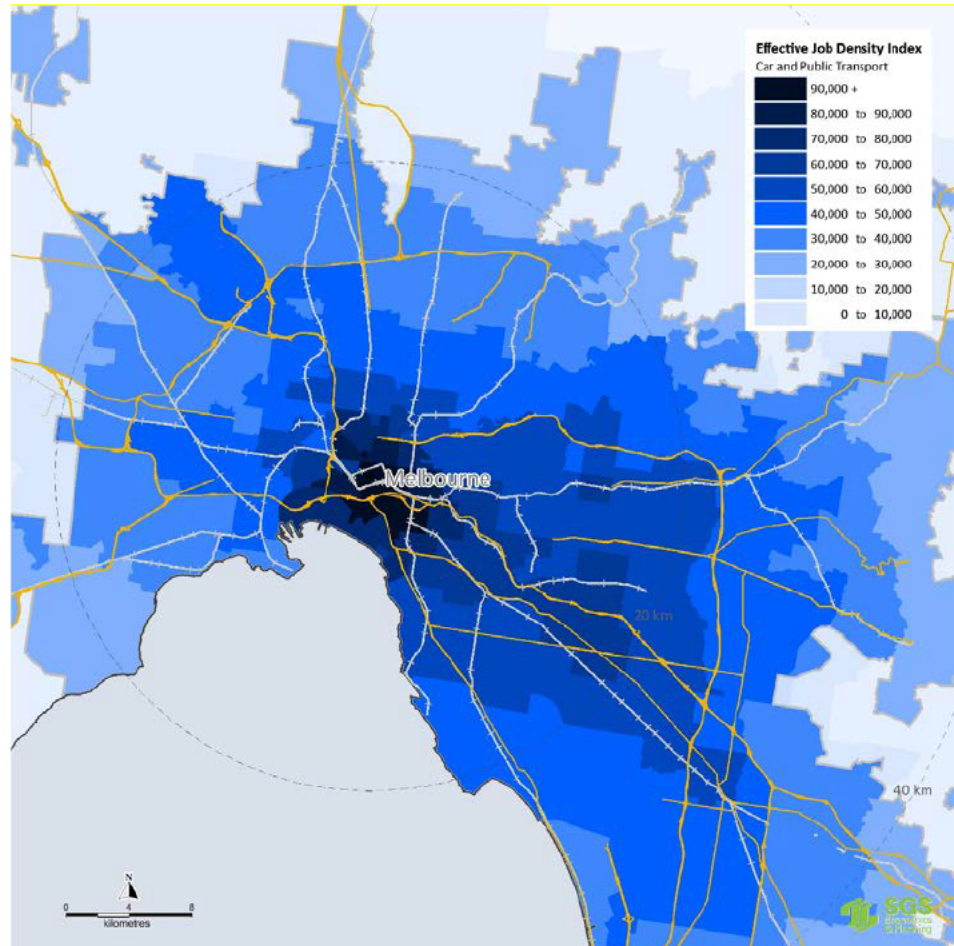
It is important that efficient transport connections are provided for west to south-east and other linkages with Melbourne, such as those along the M1 Corridor, to avoid exacerbating the separation between Melbourne's production and consumption centres.

Challenges attracting workers to Melbourne may occur in the future

The outcomes in the west are already compromised, with 18 per cent of all resident workers travelling outside of the region for work, compared with 7 per cent for the east. Access to jobs for residents of the west is also lower compared with those in the east (refer Figure 30).

As a result, significant travel flows will be required in both directions; skilled workers in the west will need to access jobs and services in the east, while production companies will need to access households and warehouses in the west for distribution.

Figure 30: Effective job density*

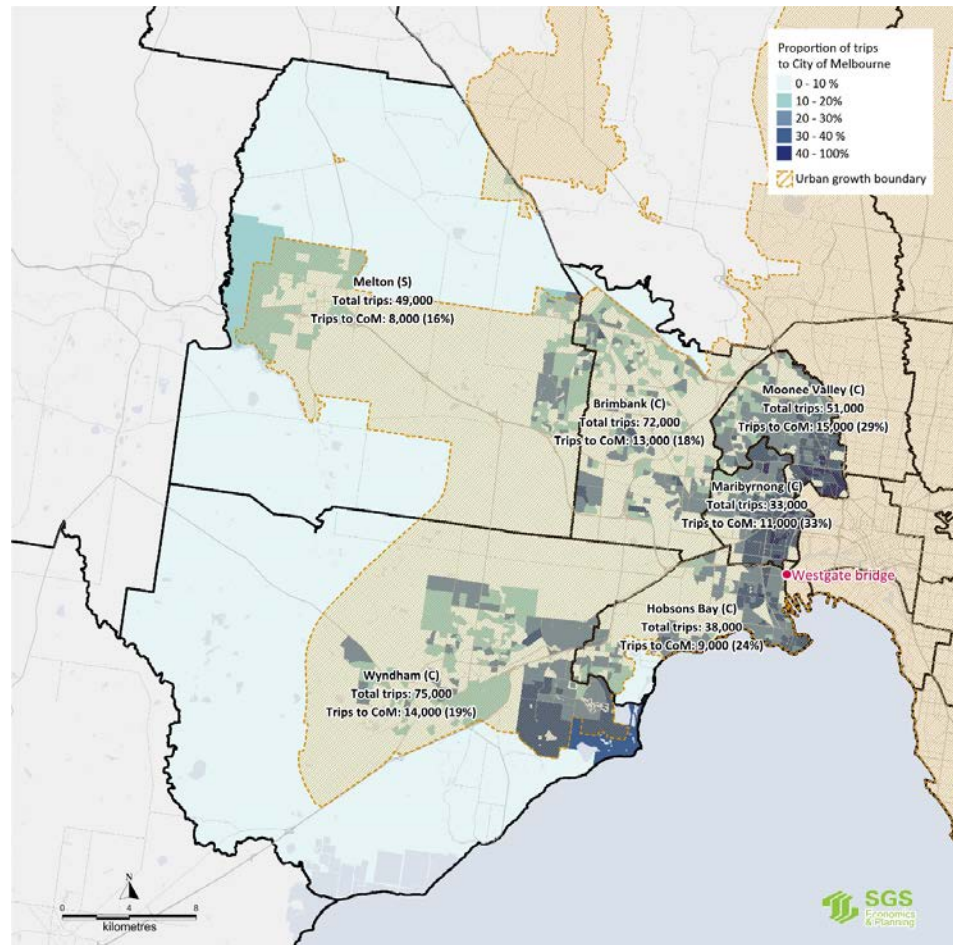


Source: SGS Economics and Planning, 2015

Notes: *a measure of number of jobs accessible from a given location, which is dependent on scale of economic activity in that region, and transport connections available in that region.

The gap between population growth and jobs location is having a significant impact on Melbourne's liveability. Figure 31 illustrates the work destinations of the residents in the local government areas (LGAs) that make up the western region of Melbourne. Nearly 70,000 daily trips – or 22 per cent of all work-related trips originating in the west – are City of Melbourne bound (including public transport and private vehicle trips).

Figure 31: Work related travel from the western region to the City of Melbourne



Source: SGS Economics and Planning, 2015

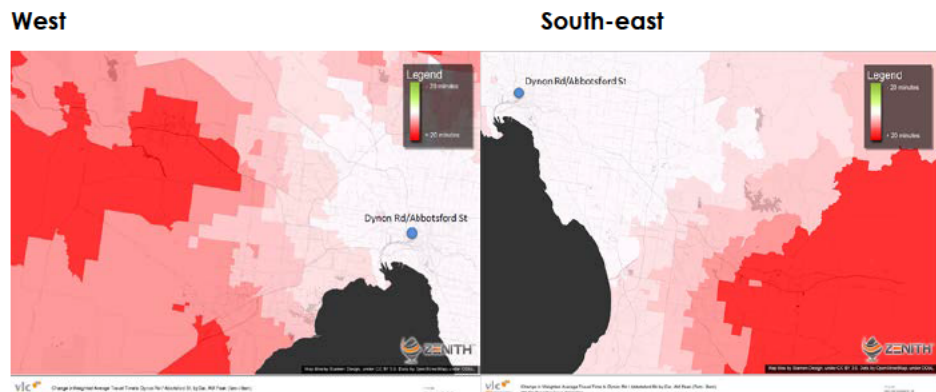
Relative to the east, beyond 10km from the city the west has limited access to essential services, such as hospitals and education facilities, all the way out to Werribee. The largest and most significant educational institutions, such as Monash University, Latrobe University, RMIT and the University of Melbourne are all located in central Melbourne or in the east.

The west's relative proximity to inner Melbourne should be a major advantage, but the inadequate transport connections means that the west fails to capitalise on its geography. Unless the network is improved, the consequences are likely to be reduced access to employment opportunities for the west's growing population, constraining Melbourne's ability to reach its economic potential.

3.6. Implications of doing nothing

Congestion will worsen, average travel speeds will decrease, delays will be more common and travel time reliability will deteriorate without improvements to the capacity of the road network along the M1 Corridor, particularly in the west and south-east of Melbourne, where morning peak travel times to the central and inner city will increase by more than 20 minutes between 2011 and 2031 from many locations (see red areas in Figure 32).

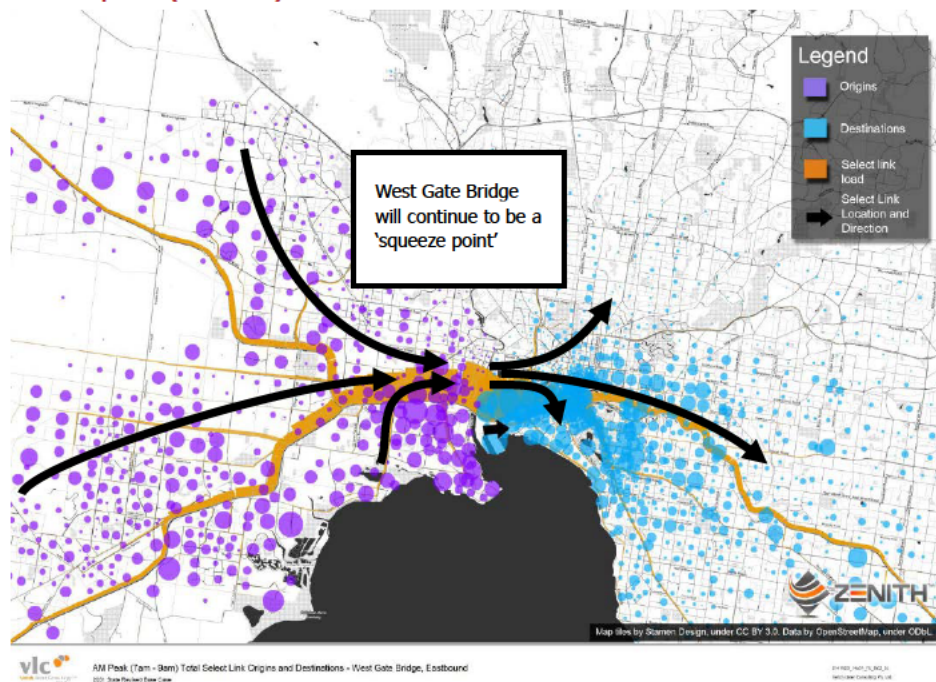
Figure 32: Change in AM peak travel times between 2031 base and 2011: Base case



Source: Veitch Lister Consulting, 2015

Most of Melbourne's major arterial roads will have demand well above theoretical capacity by 2030-31 without network augmentation particularly the West Gate Bridge (see Figure 33).

Figure 33: Origins and destinations of vehicles using the West Gate Bridge during the AM peak (inbound) – 2031 base case



Source: Veitch Lister Consulting, 2015

Unless a second river crossing is provided, the state economy will remain highly vulnerable to short-term and long-term strategic risks. A major incident that severely restricts access to the West Gate Bridge or renders it unavailable for an extended period could have calamitous effects for the state economy.

Increased congestion and travel times may also jeopardise the amount of freight that can be moved in and out of the Port, undermining the efficiency of port operations and future expansion plans as well as Victoria's productivity.

As shown in Figure 34, the volume of trucks on Francis Street could almost double to 10,000 trucks per day in 2031, evenly spread across the day this represents seven trucks per minute. Unless access to the Port of Melbourne is improved, the

numbers of trucks on local inner west roads (shown in Figure 34) will increase, reducing the liveability of the inner-west and increasing pressure on port activities that could affect its ability to grow.

Figure 34: 2031 base case heavy vehicle demand (two-way, 24 hour weekday volumes)



Source: GHD, 2015 a

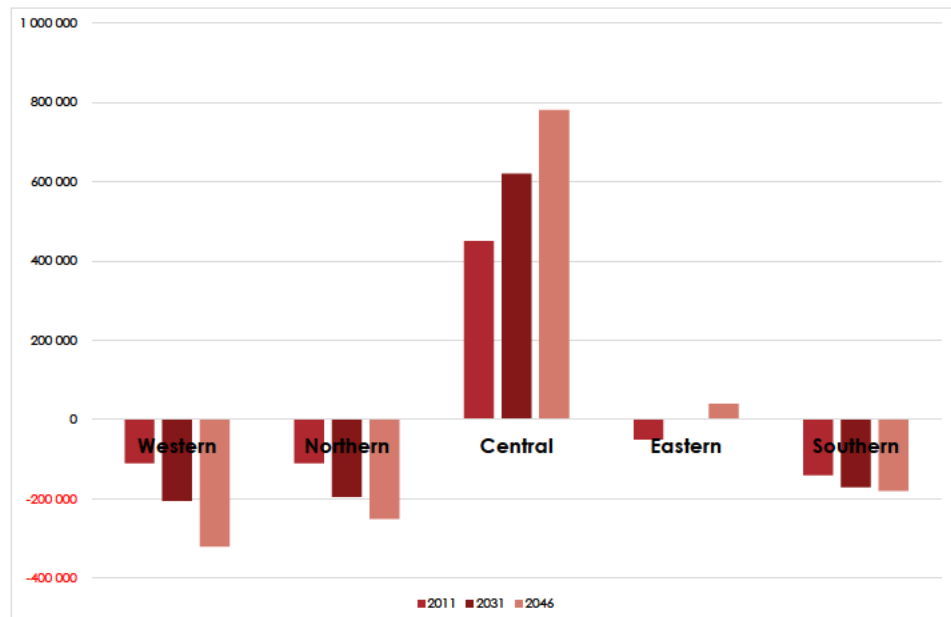
If nothing is done, the transport network in the west will not keep pace with changes in economic and urban structure, further entrenching the historic east-west divide instead of narrowing the socio-economic gap.

This may discourage potential residents and businesses from locating to the west, slowing the rate of economic and employment growth and urban renewal (see Figure 35).

In the south-eastern corridor, increasing congestion will result in longer trip times and unreliable journeys making the freeway network less efficient and safe.

Higher costs for residents and business in the south-east will harm the productivity of the employment clusters in the south-east, cost the economy through increasing freight transportation costs and discourage residents and businesses from locating to the south-east.

Figure 35: Change in resident worker and local job mismatch: Base case



Source SGS Economics and Planning, 2015

3.7. Timing imperative

The problems described in the previous two sections are pressing in nature. The West Gate Bridge is already at capacity during peak periods. Congestion is worsening, costing the Victorian economy billions of dollars each year (Infrastructure Australia, 2015) and creating flow-on problems in the network.

Victoria is growing at an unparalleled pace, yet there is a mismatch between where people live and where the jobs in the knowledge-based economy are growing.

The risk of poor transport capacity on the M1 Corridor relative to growing demand threatens to hinder economic growth, social equity and sustainability at a time of national and global economic uncertainty.

While these challenges cannot be resolved quickly or easily, it is important that decisions to invest in critical infrastructure be taken as soon as possible. Large infrastructure investments involve long lead times and require meticulous planning and preparation. New tunnels, motorways and lane expansions take a significant amount of time to design, plan, approve and construct.

Addressing the problems identified in this chapter will help secure Victoria's future competitiveness, productivity and prosperity.



4. Benefits

This chapter identifies potential benefits to be delivered, as well as a framework for assessing, categorising and measuring these benefits

Addressing the transport capacity, performance and access problems identified along the M1 Corridor will generate a range of benefits, including productivity, freight competitiveness, network redundancy, liveability and economic development.

This chapter outlines each of the key benefits, identifies objectives based on achieving those benefits, and presents Key Performance Indicators (KPIs) to measure benefit achievement. It considers the alignment of the project objectives with key state and national strategic policies and plans, and identifies interdependent policies and projects that may impact or be impacted by the realisation of the benefits described above.

4.1. Benefits delivered across Melbourne

By addressing the transport capacity, performance and access problems identified along the M1 Corridor, a range of benefits are expected:

Benefits include improved transport, network redundancy, freight efficiency, and amenity

- **Productivity and growth for Melbourne** – by providing transport capacity to meet future population and economic growth needs along the M1 corridor, improving transport connectivity between economic clusters, and enhancing transport performance to offer travellers lower travel times, shorter trips, and less time in congested travel conditions.
- **A more competitive port and freight sector** – by improving freight productivity and lowering supply chain costs, as well as improving freight access to the Port of Melbourne and broader Melbourne.
- **Reduced reliance on the West Gate Bridge** – by increasing network capacity and providing an alternative link to the Bridge and the central city improves network redundancy and resilience.
- **A more liveable Melbourne** – by reducing trucks on roads in the west improves amenity through reduced noise and emissions, as well as reducing the potential for crashes involving large vehicles.
- **Economic development in the west** – from improving accessibility so residents are closer to jobs and services, and business activation is encouraged in a more connected west.

4.1.1. Productivity and growth for Melbourne

Melbourne's growth will be supported by increasing transport capacity to meet future population and economic growth needs along the M1 Corridor. Improving transport performance to enable shorter trips and faster will cater for future demand and growth avoiding growth in congestion and deterioration of travel times and reliability.

Facilitating improved transport performance characterised by faster, less congested and more reliable travel across the city, whether for work, education, recreation or business, will make individuals and businesses more productive, and families more prosperous.



Improving transport network efficiency and reducing congestion will also create sizeable benefit for business. Travel costs will fall for trade services, maintenance, repair, sales, health and community service businesses that rely on being able to move efficiently.

The value of these benefits is expected to be large. At a micro-level, travel costs represent around 16 per cent of household expenditure, even excluding travel time cost (ABS, 2011). At a macro-level, the costs of road congestion have been estimated as \$2.8 billion as at 2011 in the Melbourne-Geelong region and are forecast to rise to \$9 billion by 2031 (Infrastructure Australia, 2015).

4.1.2. More competitive port and freight sector

A more competitive freight sector will be enabled by improving freight access to the Port of Melbourne and improving the efficiency of the M1 Corridor. Enhanced freight access to the Port will lower supply chain costs for freight and logistics companies. These savings flow through to lower consumer prices and enable productivity benefits across the wider economy, allowing the economy to produce goods that may otherwise have been uncompetitive.

Improving access to the Port of Melbourne will help export-focused industries improve their international competitiveness, particularly those based to the west and south-west of Melbourne. It will also encourage businesses to use the Port of Melbourne over interstate alternatives, supporting its expansion plans and helping Victoria maintain its status as a freight and logistics hub.

Freight and logistics contribute a significant amount to Victoria's Gross State Product (GSP) (between \$19 billion and \$23 billion in 2011), with as much as 15 per cent of the Victorian economy tied up with the sector when indirect and related activity is considered. Even a modest increase in the efficiency of freight movements, particularly freight movements in and out of the Port of Melbourne, could translate into significant economic benefits for the Victorian and national economies.

4.1.3. Reduced reliance on the West Gate Bridge

Increasing network capacity and where possible enabling users to bypass the West Gate Bridge and the central city will improve network redundancy and reduce reliance on the West Gate Bridge.

This will help to mitigate the risk of severe economic repercussions for Victoria from a major incident that could severely restrict access to the West Gate Bridge for an extended period.

On a more regular basis, incidents on the Bridge can have a significant impact. For example, a truck fire on 10 April 2015 led to lane closures for several hours and caused congestion to spread across the west and along the M1 Corridor into the south-east.

For road users, the costs of unexpected delays range from being late, losing valuable work time, missing meetings, incurring extra childcare fees, missing family and social time. For the freight and logistics sectors, unexpected delays result in lost efficiency from just-in-time delivery and manufacturing processes.

4.1.4. A more liveable Melbourne

More efficient links to the Port of Melbourne will reduce the reliance on local and arterial roads as key freight routes. This will boost amenity in the inner west by reducing the number of heavy vehicles moving through residential areas.

Benefits for residents and businesses will include improved air quality, reduced noise pollution and safer and less congested arterial roads, encouraging more residents to walk and cycle. Freeing up arterial connections from trucks will also

better connect people within their own neighbourhood and surrounding communities.

Together with other transport and land use initiatives, improved connectivity will support urban renewal projects in the west such as the Arden/Macaulay Project, making the western suburbs more attractive places to live and invest, capitalising on the region's proximity to the highly productive central city core. The cumulative effect of these benefits will be improved quality of life and increased land values for those living in the west, fostering a more cohesive community.

More broadly along the M1 Corridor, there are safety benefits from improving performance of the transport network. Increasing numbers of incidents are a key concern for this corridor.

4.1.5. Support for long-term growth and economic development

Improved performance along the M1 Corridor and crossing the Maribyrnong and Yarra Rivers will support growth in the west and further reduce Melbourne's historical east-west divide.

Overloaded transport connections are holding back the west from attracting more local jobs and making it harder for people to travel to the inner, south-east and northern suburbs for work and business. Improved transport connections will reduce congestion and travel times and improve travel time reliability to reach employment. Residents will benefit from improved access to economic clusters such as education institutions, essential services such as major hospitals, and social infrastructure such as sporting grounds, parks and arts precincts.

The benefits could be expected to increase over time, as businesses and employment opportunities are increasingly attracted into the inner west. Better road links between the west and the south-east and north will also increase investment in the west by making it a more viable option for business start-ups, expansions or relocations. When deciding where to locate, businesses examine how well connected a potential location is to the city, interstate and international gateways (such as ports and airports) and other parts of the State that are sources of workers, suppliers and customers.

Improving traffic flow and creating a more complete and reliable road network in the west will support economic development across the greater western region, including Geelong, and bring economic benefits to the state and nation.

Better access to jobs from the west will expand the potential for employment diversity and boost income levels, making the west more prosperous and attractive for continued population growth from interstate and overseas.

A more balanced pattern of growth and development within the city offers the best prospects for improving Melbourne's productivity and competitiveness. In the long term, productivity is a key driver of growth in jobs and gross state product.

4.1.6. Project Objectives

Reflecting on the problems and benefits identified, four Project Objectives have been identified to assess alternate options:

1. Improve transport performance in the M1 Corridor:
 - to meet increased travel demand due to future population and economic growth trends
 - to enhance connectivity between economic clusters
 - to enhance safety along the M1 Corridor
 - to enhance access to jobs and services.

2. Reduce reliance on the West Gate Bridge:
 - to improve network resilience and redundancy
 - to mitigate strategic risks to the state and national economies
 - to improve travel reliability.
3. Improve freight access to the Port of Melbourne and greater Melbourne:
 - to improve reliability of access to the Port of Melbourne and on the freight network
 - to meet travel demand arising from the future freight task
 - to enhance state and national competitiveness through freight productivity improvements.
4. Improve community amenity on local streets in the inner west:
 - to reduce freight on local streets
 - to improve safety on local streets.

4.2. Benefit management

Based on the Project Objectives identified, KPIs and performance measures have been developed to assess the extent to which some of these Project Objectives are being achieved.

More specific targets will be developed as the project scope is refined and as part of planning approval processes.

It is important to note that some of the identified KPIs will require definition of a base case scenario (assuming the Project does not proceed) as benefits are measured incrementally.

Table 16: KPIs to evaluate benefit realisation in the M1 Corridor

Benefit/Objective	KPIs	Measure
1. Productivity and growth for Melbourne	KPI 1.1: Travel times	Time saving between Grieve Parade and Footscray Road Time saving between Warrigal Road and Clyde Road
	KPI 1.2: Travel time reliability	Reduction in reliability time allowance between Grieve Parade and Footscray Road Reduction in reliability time allowance between Warrigal Road and Clyde Road
2. More competitive port and freight sector	KPI 2.1: Freight travel times	Time saving between Grieve Parade to the Port of Melbourne
	KPI 2.2: Mass limit for Port of Melbourne access	Truck mass limit allowance for access to Swanson Dock and Webb Dock
3. Reduced reliance on the West Gate Bridge	KPI 3.1 Vehicles on the West Gate Bridge	Vehicles using alternative Maribyrnong river crossings

Benefit/Objective	KPIs	Measure
4. A more liveable Melbourne	KPI 4.1: Reduced trucks on local roads in the inner west	Reduced HCVs on Somerville Rd and Francis St
5. Economic Development in Melbourne and the west	KPI 5.1: Access to jobs	Percentage increase in jobs within 45 minutes for western SLAs
	KPI 5.2: Project-related employment	Direct construction jobs

4.3. Importance of the benefits to government

The Project Objectives and identified benefits closely align with the policy agenda of the Victorian and Commonwealth governments, including seven key strategies, plans and legislation:

- *Australian Infrastructure Audit* (Infrastructure Australia, 2015) examines the drivers of demand for infrastructure over the next 15 years to aid long term planning and future investment priorities. The Audit found that without investment in transport infrastructure, Australia's productivity and quality of life could be negatively impacted. Moreover, the Audit specifically identified the M1 as part of a heavily congested transport corridor likely to face capacity constraints in the absence of investment in additional capacity.
- *Infrastructure Australia's Reform and Investment Framework* the Framework provides a set of overarching policy goals, problems and challenges facing Australia. All four Project Objectives are aligned with the Strategic Priorities identified in the Framework. Increasing capacity and improving access to the Port of Melbourne addresses the Strategic Priorities of expanding Australia's productive capacity, increasing productivity and building on Australia's competitive advantage. Project Objective 4 is aligned with the Framework Strategic Priorities relating to developing cities and regions and improving social equity and quality of life.
- *National Land Freight Strategy* (Infrastructure Australia, 2011) is the outcome of a partnership between the Commonwealth, State, Territory and local governments and industry to create a streamlined, integrated and multimodal transport and logistics system, which is capable of efficiently moving freight throughout Australia. The Project Objectives closely align with the overarching objectives of the Strategy. The Strategy identifies the M1 as a key road links in the proposed national land freight network, thereby closely aligning with Project Objectives 1 and 2. Furthermore, the Strategy highlights the strategic significance of the Port of Melbourne and the importance of efficient freight connections, as also highlighted in Project Objective 3. Project Objective 4 is closely connected to the second overarching objective of the Strategy, relating to minimisation of the impacts of freight movements.
- *Plan Melbourne* (DTPLI, 2014) is the Victorian Government's Metropolitan Planning Strategy. It outlines the Government's vision for Melbourne's growth to the year 2050. Project Objectives 1 and 2 are closely aligned with *Plan Melbourne's* goal of alleviating Melbourne's reliance on the M1 Corridor for cross-city connections, and providing greater resilience in the transport network. Project Objectives 3 and 4 are in line with *Plan Melbourne's* goal to improve network efficiency of freight networks while protecting urban amenity. As discussed in section 2.3.1, *Plan Melbourne 2014* is currently being reviewed and refreshed. However, *Plan Melbourne 2016* will maintain the key priorities of *Plan Melbourne 2014*, including increasing network efficiency and resilience, and safeguarding urban amenity.

- *Project 10,000* (Victorian Labor, 2013) is the Victorian Government's transport plan. It seeks to address transport issues across Melbourne, specifically the inadequate transport capacity in the western section of the M1 Corridor and the over reliance on the West Gate Bridge (in line with Project Objective 1 and 2). The plan also seeks to improve access to the Port of Melbourne (in line with Project Objective 3).
- *The Victorian Freight and Logistics Plan* (DTPLI, 2013) outlines the Victorian Government's long-term strategy to improve freight efficiency, grow productivity and better connect Victorian businesses with their markets. Investing in additional transport capacity along the M1 Corridor (Project Objective 1) and improving freight and supply chain efficiency (Project Objective 3) will contribute towards meeting the overarching objectives of the Plan.
- *Transport Integration Act 2010* (Parliament of Victoria, 2010) creates a framework for the provision of an integrated and sustainable transport system in Victoria and creates a vision for an 'integrated and sustainable transport system that contributes to an inclusive, prosperous and environmentally responsible state'. To realise this vision, the Act sets a number of transport system objectives, which are closely aligned with all of the Project Objectives.

Figure 36 summarises how the Project Objectives align with each of the seven documents. The high degree of alignment demonstrates the strategic nature of the M1 Corridor and its importance to Melbourne's freight and logistics industries as well as the key role it serves it connecting key economics clusters around Melbourne.

Figure 36: Alignment between the M1 Corridor the Project Objectives and state and federal policy and planning documents

M1 Corridor Project Objectives	Strategic planning and policy documents						
	Infrastructure Australia, Australian Infrastructure Audit (2015)	Infrastructure Australia, Reform and Investment Framework (2014)	National Land Freight Strategy (2011)	Plan Melbourne (2014)	Project 10,000 (2013)	The Victorian Freight and Logistics Plan (2013)	Transport Integration Act (2010)
1. Improve transport performance in the M1 Corridor	●	●	●	●	●	●	●
2. Reduce Reliance on the West Gate Bridge	●	●	●	●	●	◐	●
3. Improve freight access to the Port of Melbourne and greater Melbourne	●	●	●	●	●	●	●
4. Improve community amenity on local streets in the inner west	○	●	●	●	○	○	●

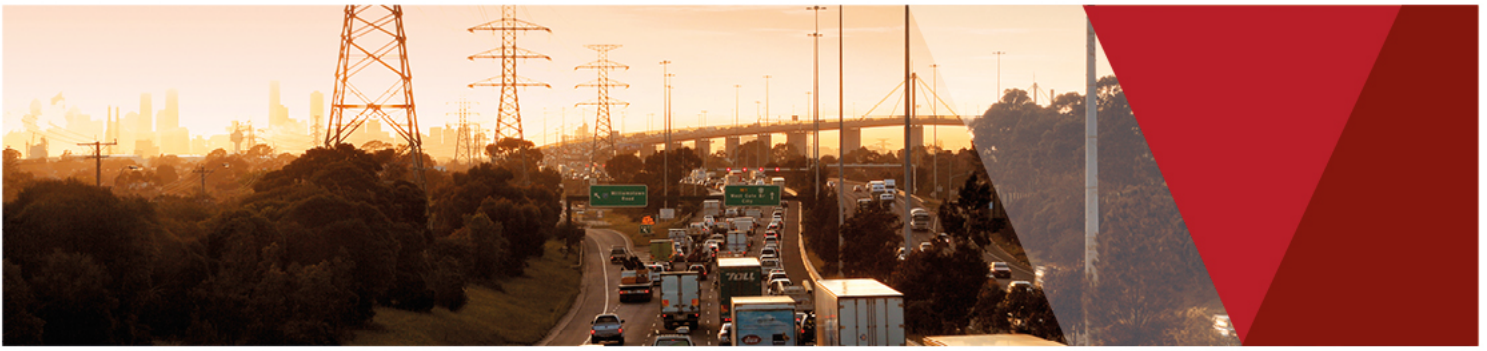
4.4. Interdependencies

A range of investments and actions will be needed to develop Melbourne's transport network to meet the demand from projected population growth. There are several projects that may benefit from a significant investment in the M1 Corridor. Six of these projects with funding already committed and underway are summarised along with the potential impacts in Table 17.

Table 17: Potential impact of addressing transport capacity, performance and access problems identified along the M1 Corridor

Project	Description	Benefits/disbenefits
CityLink Tulla Widening Project	The CityLink Tulla Widening Project involves adding new lanes and other measures to improve traffic flow across 24 kilometres of freeway between the CityLink tunnels and Melbourne Airport. The project will provide significant travel time savings between Melbourne Airport and Power Street during peak periods. A freeway management system will also be introduced including ramp signalling and variable speed limit signs	A second connection from the M1 Corridor to the CityLink Western Section via the Port of Melbourne would improve the connectivity of Melbourne's freeway network and potentially lead to greater economic benefits. No significant detrimental impacts are foreseen
Melbourne Metro/Arden Urban Renewal	As part of the Melbourne Metro Rail project, new underground stations are planned for Arden and Parkville. These stations will drive urban renewal in Arden Macaulay transforming the 150 hectare precinct from its existing industrial character to a vibrant new city edge community with a core of retail and commercial uses supporting high density residential areas	If the preferred option involves a second river crossing and a connection to Dynon Road, it would potentially improve Arden's connectivity to other precincts within the central city and across the metropolis. This would strengthen its urban renewal potential, subject to traffic impacts being effectively managed.
Dynon Rail Terminals	Dynon Rail terminals currently handle over 500,000 TEUs of interstate containers annually. The longer term plan for the North Dynon area is to become an urban renewal area	Better road links from the west to the Footscray Road and Dynon Road area north of the Port of Melbourne would have positive benefits for the Dynon Terminals. Future land use changes and urban renewal plans need to be considered
Port of Melbourne Expansion	The Port of Melbourne is Australia's busiest container port. Container throughput is forecast to grow from around 2.53 million TEUs in 2013-14, to around 5 million TEUs by 2024 and 11 million TEUs by 2046. To cater for the forecast trade demand growth, the Port of Melbourne will be expanded	Certainty and efficiency of access to the Port of Melbourne is critical. Addressing the problems with Port of Melbourne access is vital to the success of the Port of Melbourne expansion plan

Project	Description	Benefits/disbenefits
E-Gate	E-Gate is a 20 hectare site owned by VicTrack. It has been identified as an opportunity for urban renewal. Major Projects Victoria has developed a vision for a high density residential community with supporting retail and some commercial uses. Government is yet to approve E-Gate as a priority project	The impact on E-Gate of a new road link from the west to the Footscray and Dynon Roads would depend on the specific design. A road connection between Dynon Road, Footscray Road and Wurundjeri Way could benefit E-Gate by improving accessibility, if it included a connection to E-Gate
Thompson Road Duplication	This project includes the duplication of Thompsons Road between EastLink in Carrum Downs and Berwick-Cranbourne Road in Clyde North.	Currently Thompsons Road is the only funded road project aimed at assisting and managing the problems of the eastern part of the Monash Freeway corridor. Any additional investment in key problem points along the Monash Freeway are likely to complement one another
Level Crossing Removal Program	The grade separation of rail lines and road network is aimed at removing bottlenecks and improving safety. These bottlenecks currently block and congest the road network, many of which are located close to major road corridors and restrict access to key employment clusters in south-eastern Melbourne	This project will likely enhance the benefits of any augmentation to the M1 Corridor, particularly the Monash Freeway which provides direct access to key employment clusters in the south-east



5. Strategic response

This chapter identifies and assesses potential strategic options for the problems identified along the M1 Corridor. It provides a summary of potential strategic interventions and identifies a preferred strategic response for the west and south-east sections of the Corridor.

Addressing the transport capacity, performance and access problems identified along the M1 Corridor and realising the potential benefits require a carefully considered strategic response. This chapter identifies a range of strategic interventions and presents analysis of the preferred strategic response by:

- Firstly identifying a range of potential strategic interventions then assessing the potential interventions on a standalone basis against their ability to address the identified problems within the M1 Corridor (Section 5.1)
- Then considering the western section of the M1 Corridor (Section 5.2), identifying the preferred integrated strategic response in terms of:
 - Potential packaging of strategic interventions
 - Assessment of road corridor options
- Finally considers the potential strategic response on the south-eastern section of the M1 Corridor (Section 5.3).

5.1. Assessment of strategic interventions

5.1.1. Definition of strategic interventions

A range of strategic interventions has been considered to address the problems identified for the M1 Corridor. These fall into three broad intervention types and include:

- Reform and demand management
 - *Network pricing and transport funding reform* – this intervention proposes the introduction of network or corridor pricing schemes in which charges reflect the marginal cost of congestion, road wear and tear and externalities incurred.
 - *Heavy vehicle charges and investment reform* – implementation of heavy vehicle charges on the corridor to reflect the marginal cost of congestion, road wear and tear and externalities incurred.
 - *Arterial road management* – implementation of road network measures to establish appropriate priority for modes in accordance with the designated role of that road. This will include truck curfews, streetscape improvements and measures to support the role of those roads. This will protect the amenity of the inner western suburbs and support the urban renewal of key precincts such as central Footscray by reducing trucks on roads in residential areas.
 - *Investment and land use change* – this intervention could involve facilitating land use changes and investment in the west to create accessible employment and business centres and a more balanced economic geography for Melbourne.

- Improve productivity
 - *Improve network utilisation* – this intervention aims to create a more efficient and dynamic road network by improving traffic flow and efficiency on existing roads using Intelligent Transport Systems (technologies and network management systems).
 - *High productivity freight vehicle network* – this intervention could facilitate greater use of high-productivity freight vehicles on dedicated parts of the network to reduce the growth in trip requirements.
 - *Enhance efficiency of bus services* - this intervention could comprise introduction of a freeway bus lane and an increase in bus services to boost passenger throughput into central Melbourne.
 - *Port-rail shuttles* – development of port-rail shuttle services to improve the efficiency of containerised freight transport throughout Melbourne by connecting the Port of Melbourne to major outer suburban freight hubs using the rail network. It would likely require augmentation of the existing rail network to support significant train volumes.
- Increase supply
 - *New rail link connecting west and east Melbourne* – new rail lines across central Melbourne connecting the east and west to address the growth in demand and increasingly poor performance of the existing system.
 - *New western road connection* – new freeway connection in the west incorporating an additional crossing of the Maribyrnong River to reduce reliance on the West Gate Bridge and improve performance of an already constrained M1 Corridor.
 - *Increase existing freeway capacity* – improve the ability of the road network to meet the growth in demand by the creation of additional freeway capacity in the west and south-east by widening the M1.

5.1.2. Assessment of strategic interventions on standalone basis

A qualitative assessment has been undertaken for each of the strategic interventions, drawing on the significant work undertaken in the Eddington Study and subsequent transport planning investigations on Melbourne’s key transport corridors undertaken by the Victorian Government. It has considered emerging trends in Melbourne’s transport infrastructure performance, Melbourne’s continued higher than expected growth in recent years (refer Section 5.1.1) and projects that are committed or have been delivered in recent years.

The individual performance of each of the interventions has been assessed across four criteria, including:

- **Benefits** – estimated likely proportion of benefits outlined in Chapter to be realised as a consequence of successful implementation of the intervention
- **Deliverability** – relative cost and risk of implementing the intervention.
- **Timing of benefits** – time to implement the intervention and realise the benefits.

A comparative summary of the outcomes of the assessment of each strategic intervention is charted in Figure 37 below.

Reflecting on the scale and timing of benefits as well as deliverability, a new western road connection is preferred to achieve the stated benefits along the western section of the M1 Corridor.

A new rail link was also identified as high value and resulting in high achievement of benefits in the western M1 Corridor. However, the rail link was initially identified

in the Eddington Study and has now been partly delivered (Regional Rail Link) with the remainder now planned by Government (Melbourne Metro), hence has not been identified for further consideration. Furthermore, as a result of the varying demand segments served by road not all able to be served by rail, the rail link (ie Melbourne Metro and the Regional Rail Link), while expected to deliver significant benefits, will not be able to address key identified problems in the M1 Corridor.

Freeway capacity interventions were identified as more appropriate for the south-east M1 Corridor on the Monash Freeway.

Interventions identified as difficult to deliver and yielding low benefits have not been identified for further consideration. These include enhancing efficiency of bus services (challenging to implement on a standalone basis without concurrent widening of the corridor, limited in the range of demand segments served and not considered appropriate as rail lines exist on the corridor) and network or corridor pricing (identified as not able to feasibly be delivered on a standalone basis in the short term).

However as a key finding of the assessment was that many of the interventions have merit if packaged with other interventions, these are considered again in Section 5.2.2 in relation to the merit of implementing together with other interventions.

Figure 37: Individual assessment of strategic interventions

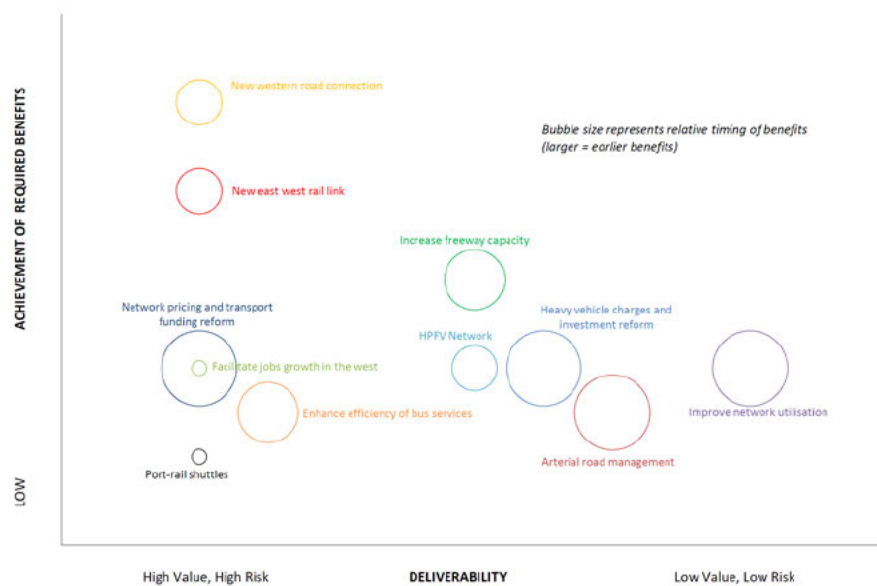


Table 18 outlines the assessment of each of the potential interventions.

Table 18: Individual assessment of strategic interventions

Strategic intervention	Individual assessment	Outcome
Network pricing and transport funding reform	Network or corridor pricing alone could deliver significant benefits. However, delivering such a reform alone without upgrading or delivering enhanced network capacity is a likely barrier to its early delivery, as travellers may not be offered alternative travel options. This may result in a long lead time to achieve benefits, and potentially also suppress travel and economic	✘ Standalone not likely to sufficiently address problems

Strategic intervention	Individual assessment	Outcome
	activity. Partial network pricing concurrently with other investment in the network could deliver benefits while providing travellers with options.	
Heavy vehicle charges and investment reform	As per network pricing, heavy vehicle charging could deliver benefits. However, without concurrently providing freight capacity as part of a broader network reform this could be challenging to deliver benefits. The potential benefits would also be limited by only directly affecting heavy vehicles not addressing private vehicle traffic. Differential pricing of heavy vehicles is already implemented on toll roads and this reform is being further progressed. It may be more straightforward to deliver than network pricing, however industry consultation and alignment would be critical.	* Standalone not likely to sufficiently address problems
Arterial road management	The level of efficiency that can be achieved through arterial road management, such as that identified in the Eddington Study as part of the Truck Action Plan, can be significant at a local level. However, such an initiative is considered unlikely to achieve wider network benefits significant enough to make an impact on a standalone basis. The physical works are relatively minor and straightforward to deliver, though significant consultation with stakeholders and the community would be required to optimise benefits. There may also be difficulty in enforcing some potential management measures such as truck curfews and accommodating 'placarded' loads.	* Standalone not likely to sufficiently address problems
Facilitate jobs growth in the west	Planning and zoning changes could be considered to encourage jobs growth in the west of Melbourne. A more balanced mix of business and residential development will contribute to liveability benefits in the west and generate employment and economic growth. Planning and zoning changes could be considered to encourage jobs growth in the west of Melbourne. However, this intervention could require significant and sustained public and private sector investment to achieve the level of industry and employment decentralisation necessary to have any meaningful impact on demand.	*

Strategic intervention	Individual assessment	Outcome
Improve network utilisation	Intelligent Transport Systems are a proven intervention to improve network use that has delivered improved motorway performance. The level of productivity gains are however unlikely to be sufficient to realise benefits on its own. The solution is straightforward and quick to deliver at relatively low risk and is considered an essential part of a new or upgraded road connection.	* Standalone not likely to sufficiently address problems
High productivity freight vehicle network	This intervention could bring significant freight productivity benefits on its own, is likely to be supported by industry and is already being delivered across the broader network, though not into the Port of Melbourne. On its own it does not address the broader problems identified in the corridor.	* Standalone not likely to sufficiently address problems
Enhance efficiency of bus services	Given the significant congestion on the M1 Corridor, installing dedicated bus lanes will not generate benefits on a standalone basis without concurrent widening of the corridor. This is likely to be very costly, and may not be technically feasible on the West Gate Bridge. Moreover, the ability of high quality bus services to impact congestion on the M1 is limited by the diversity of trip purposes across the day and week on the M1. Furthermore, as there are major rail lines along the M1, including significant investment planned as part of Melbourne Metro, implementing Bus Rapid Transit style services on freeways is likely to be more appropriate on corridors where rail lines do not exist.	* Standalone not likely to sufficiently address problems
Port-rail shuttles	While this intervention is likely to reduce truck traffic to the Port of Melbourne, it is expected to require major investment on key rail corridors to accommodate the number of freight trains required to have that significant impact. It is also unlikely to significantly address other problems identified along the M1 Corridor.	* Standalone not likely to sufficiently address problems
New east west rail link	This is a major intervention that would transform Melbourne's rail system. It would deliver significant uplift on all metropolitan rail corridors, relieve congestion across the road network and reshape the city's economic and social development. It does not however fully align with the specific problems addressed by this investment and does not deliver the benefits required to the same extent as a new freeway.	* Being delivered separately as a critical complement to this investment

Strategic intervention	Individual assessment	Outcome
	It is however, a critical complement to the core road investment as it plays the major role in delivering people into central Melbourne. This intervention is proceeding separately as Melbourne Metro.	
New western road connection	This intervention is closely aligned with the Project Objectives and problems identified. It is therefore considered to deliver the highest benefits of any of the interventions in terms of providing for growth, redundancy and supporting performance of the M1 Corridor. It could, however, require significant investment and management of risks relative to some of the other interventions considered.	✓ Potential to address problems on the West Gate Bridge and Freeway
Increase existing freeway capacity	Increasing capacity of existing infrastructure on a standalone basis is considered useful for sections of the corridor not constrained by bridge capacity on the south-east of the corridor on the Monash Freeway. However, on the western section of the M1 Corridor this intervention is not expected to achieve the benefits as it would be challenging to deal with resilience and redundancy problems. Widening of the M1 on the West Gate Freeway would be difficult in at least one key section – West Gate Bridge – though freeway widening could be considered alongside solutions able to provide alternative capacity to supplement the West Gate Bridge.	✓ Potential to address problems on the Monash Freeway

5.2. Western corridor options assessment

5.2.1. Approach to options assessment

The assessment of each strategic intervention on a standalone basis in Section 5.1 identified a new western road connection as preferred to achieve the stated benefits along the western section of the M1 Corridor. Supply, productivity and reform/demand management strategic interventions were also identified with potential merit if packaged with other interventions.

The options hierarchy developed for further western corridor options is shown in Figure 38. In addition to considering strategic interventions, the hierarchy has been developed to identify possible corridor options for the new freeway.

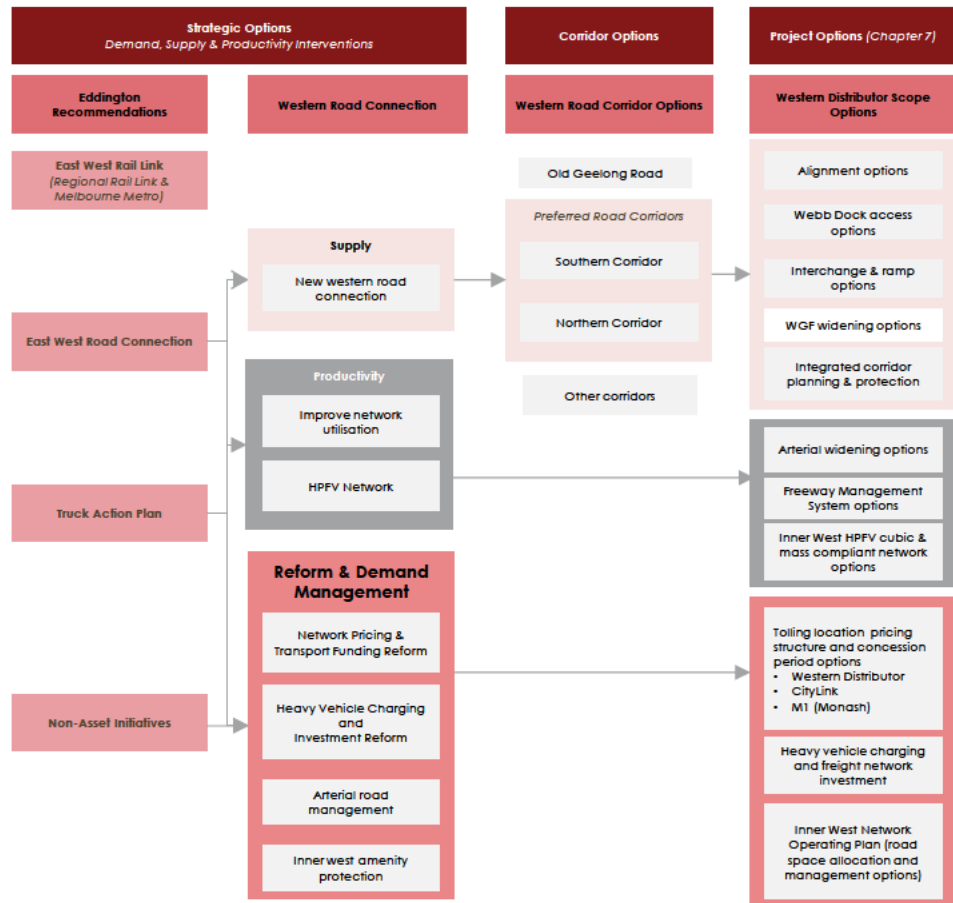
A separate options hierarchy has been developed for the western and south-eastern corridors reflecting that the interventions may be similar but of a varying scale. Of note the western section is faced with the challenge of dealing with resilience and redundancy problems on the West Gate Bridge where widening of the existing corridor is difficult.

The case for a flexible and integrated strategic response on this western corridor encompassing supply, productivity and reform/demand management

interventions is even stronger than it was at the time of the *Eddington East West Link Needs Assessment Study* (Victorian Government, 2008).

Melbourne's Urban Growth Boundary has been expanded in the west, while growth in population, the freight task and CBD employment have all exceeded the Government's projections at the time of the Eddington Study. For example, Eddington forecast Melbourne's population to be 4.5 million in 2031, whereas the current forecast is a population of approximately 5.8 million. Significant revisions have been made to forecast growth rates in Melbourne's west.

Figure 38: Overall options hierarchy: western corridor



5.2.2. Assessment of strategic intervention packaging

Table 19 presents the integrated assessment of interventions not considered to have merit on a standalone basis yet with the potential to provide benefits as part of an integrated strategic response on this corridor.

While a new western corridor was identified, there is merit in considering this intervention packaged with other low cost initiatives to concurrently improve the network, particularly given growth in population, the freight task and CBD employment have all exceeded previous projections for the purposes of network planning.

Table 19: Integrated assessment of strategic interventions with new western road corridor

Strategic intervention	Integrated assessment	Outcome
Network pricing and transport funding reform	Partial network pricing concurrently with other investment in the network could deliver benefits while providing travellers with options for journey decisions.	<p>✘</p> <p>Standalone not likely to sufficiently address problems</p> <p>✓</p> <p>Merit packaging with other responses</p>
Heavy vehicle charges and investment reform	Heavy vehicle charging could deliver benefits concurrently providing freight capacity.	<p>✘</p> <p>Standalone not likely to sufficiently address problems</p> <p>✓</p> <p>Merit packaging with other responses</p>
Local road management	Potential to achieve wider network benefits through management measures as part of broader interventions.	<p>✘</p> <p>Standalone not likely to sufficiently address problems</p> <p>✓</p> <p>Merit packaging with other responses</p>
Improve network utilisation	Considered an important part of a new or upgraded road connection.	<p>✘</p> <p>Standalone not likely to sufficiently address problems</p> <p>✓</p> <p>Merit packaging with other responses</p>
HPFV Network	On its own, it does not address the broader problems however has potential for cost savings and benefits packaged with a new freeway connection.	<p>✘</p> <p>Standalone not likely to sufficiently address problems</p> <p>✓</p> <p>Merit packaging with other responses</p>
New western road connection	There is merit considering this intervention packaged with others, for example: Arterial road management – considered beneficial to manage the impacts of a major new freeway.	<p>✓</p> <p>Potential to address problems on the West Gate Bridge and Freeway</p> <p>✓</p> <p>Merit packaging with other responses</p>

Strategic intervention	Integrated assessment	Outcome
	HPFV network – a new freeway is expected to be able to accommodate HPFVs so strengthening the adjacent freeway connections to ensure HPFV access to the Port of Melbourne could be a worthy initiative to include as part of any new or upgraded freeway connection in the west.	
Increase freeway capacity	Widening of West Gate Bridge would be challenging however widening the West Gate Freeway could be considered alongside solutions able to provide alternative capacity to supplement the West Gate Bridge.	<p>✓</p> <p>Potential to address problems on the Monash Freeway</p> <p>✗</p> <p>Standalone not likely to sufficiently address problems on the West Gate Freeway</p> <p>✓</p> <p>Merit packaging with other responses</p>

Public transport interventions were considered on a standalone basis to address problems identified in the M1 Corridor (Section 5.1), however were not identified for further packaging or consideration for the western transport corridor strategic response. Some further reasoning and related business case analysis is outlined below.

Public transport considerations for western M1 corridor problems

Public transport interventions have not been found to address the western corridor problems identified in this business case, for the following reasons:

1. Roads serve a range of different demand segments in the corridor not all able to be served by public transport

Roads serve a range of varying demand segments not all able to be served by public transport, therefore public transport interventions, even packaged with the new road corridor are not able to address key identified problems in the M1 Corridor.

Passenger trains funnel people into major economic nodes (largely the CBD), and tram and bus networks distribute commuters throughout these central nodes, providing short trips for people and businesses. In contrast, the road network accommodates a range of social and economic trip purposes. These trips occur between a range of origins and destinations and at different times of the day and week.

In Melbourne's west strong growth is set to continue for both road and rail demand, and while sustained high growth in public transport demand is

expected, a significant proportion of the additional trip demand will need to be accommodated by road.

2. Significant rail investment is planned/underway in the west

Recent and planned public transport capacity increases in Melbourne's west include:

- Melbourne Metro (Eddington Recommendation 1), planned to commence construction in 2018 to provide rail capacity for Melbourne's west allowing improved access to central Melbourne and the CBD
- Regional Rail Link (Eddington Recommendation 2 regarding Tarneit Rail Link) is now completed and operating.

These transport investments will provide capacity for a large component of travel to and from central Melbourne and are critical to the continued substantial jobs growth in the inner city. Analysis undertaken for this business case has demonstrated that even with these much needed investments in public transport, the transport challenges identified in the west cannot be addressed solely through public transport investment. The transport of goods and people across Melbourne, to the Port of Melbourne and to other key freight and employment hubs will remain a major challenge for Melbourne as the bulk of this task is reliant on the road network.

3. Analysis undertaken does not suggest public transport capacity impacts on the Western Distributor

Traffic modelling undertaken for this business case has included scenario testing whether public transport capacity constraints (in the form of public transport crowding) impact road volumes. Constraining public transport capacity was found to affect Western Distributor volumes by less than 1 per cent. A key consideration is that the completion of Melbourne Metro is expected to provide significant capacity in the public transport network.

While public transport interventions have not been identified for the problems outlined in this business case, investment in a western road corridor has the potential to offer capacity to support broader network problems. For example, the road capacity created may enable existing bus services to be enhanced/expanded prior to Melbourne Metro construction being completed.

5.2.3. Assessment of corridor options

There is more than one possible corridor option for a new western freeway river crossing from Melbourne's west that Eddington proposed. Various studies of these corridor options (and *Truck Action Plan*) have been undertaken since the Eddington Study. This work now needs to be consolidated and considered within the context of the latest demographic and freight forecasts, as well as the container port landscape, to determine a preferred road corridor.

Previous studies of corridor options

Eddington identified two corridors for the new freeway river crossing from Melbourne's west: a northern route connecting CityLink and the M80 under Footscray, and a southern route connecting CityLink and the West Gate Freeway in the vicinity of Williamstown Road (Figure 39).

Subsequent Victorian Government work has examined these routes as part of a broader integrated solution:

- Old Geelong Road
- variations of the northern corridor
- the West Gate Distributor (part of Eddington's *Truck Action Plan*)
- combinations of the above.

These investigations have shown that the northern and southern corridors were preferred long term corridors, and Old Geelong Road and West Gate Distributor could be part of a staged or complementary upgrade of the northern and/or southern corridor.

Figure 39: Eddington – Western Road Corridor Options



Source: Eddington (2008) and GHD 2015

A summary of the development history for the western road corridor and *Truck Action Plan* options is provided in Table 20.

Table 20: Development history of the western road corridor

EDDINGTON		VICTORIAN TRANSPORT PLAN	PLAN MELBOURNE	PLAN MELBOURNE REFRESH (Network Development Strategy)
Truck Action Plan Stage 1 <i>WGF – Hyde St Ramps and Hyde / Whitehall Upgrade</i>		Truck Action Plan Section 1: Northern		West Gate Distributor Stage 1
		Truck Action Plan Section 2: Central		
		Truck Action Plan Section 3: Southern		Southern Corridor
East West Road Connection (Western Section)	Southern Corridor			
	Northern Corridor			
Truck Action Plan Stage 2 <i>Paramount / Ashley / Dempster Upgrade</i>		WestLink	East West Link (Western Section)	Northern Corridor

Source: VicRoads, 2010; Eddington, 2008

The major road corridor options previously identified can generally be depicted as ‘northern’ or ‘southern’ options but the reality for the west is more complex than a binary choice. While the intent and broad scope of these corridors have not significantly changed, elements of each have been progressed or prioritised. For example, the Ashley-Dempster-Paramount Road¹⁰ upgrade has previously been considered in assessments of the feasibility of a new freeway in the northern corridor, while the West Gate Distributor (WGD)¹¹ is part of the southern corridor. While elements can be progressed separately from each other, their interdependence requires mutual consideration.

¹⁰ As proposed in the Eddington Study, the Ashley-Dempster-Paramount Road Upgrade involved a new and upgraded north-south freight route along Paramount Road, Dempster Street and Ashley Street in West Footscray. This route would link the Geelong Road, Sunshine Road and the Western Highway (Ballarat Road).

¹¹ The West Gate Distributor was identified in: Victorian Labour (2013), *Project 10,000*, released November 2013. The scope included three main components: West Gate Freeway (WGF) widening between Williamstown Road and M80; WGF on-and-off ramps to Hyde Street, an elevated road along Hyde Street, Yarraville; Upgrade and duplication of Whitehall Street between Francis Street and Somerville Road; and Strengthening of Shepherd Bridge and upgrade into Footscray Road.

Northern corridor

Road planning work in recent years (notably East West Link Western Section and WestLink) has focused mainly on the northern corridor and a first stage of the *Truck Action Plan/West Gate Distributor*. While valuable information has been collected on needs, impacts and community views, the northern corridor has not progressed due to high cost challenges and a stage delivery approach delaying the achievement of a network solution.

Southern corridor

The work undertaken as part of the Eddington Study, and further developed through the assessment of the Transurban Proposal, has demonstrated the feasibility of effectively managing the impacts of adding demand to the West Gate Freeway Corridor. The business case project scope takes advantage of advances in managed motorway technologies, and design approaches to separating weaving movements.

Bifurcation: north and south-west freeway connection

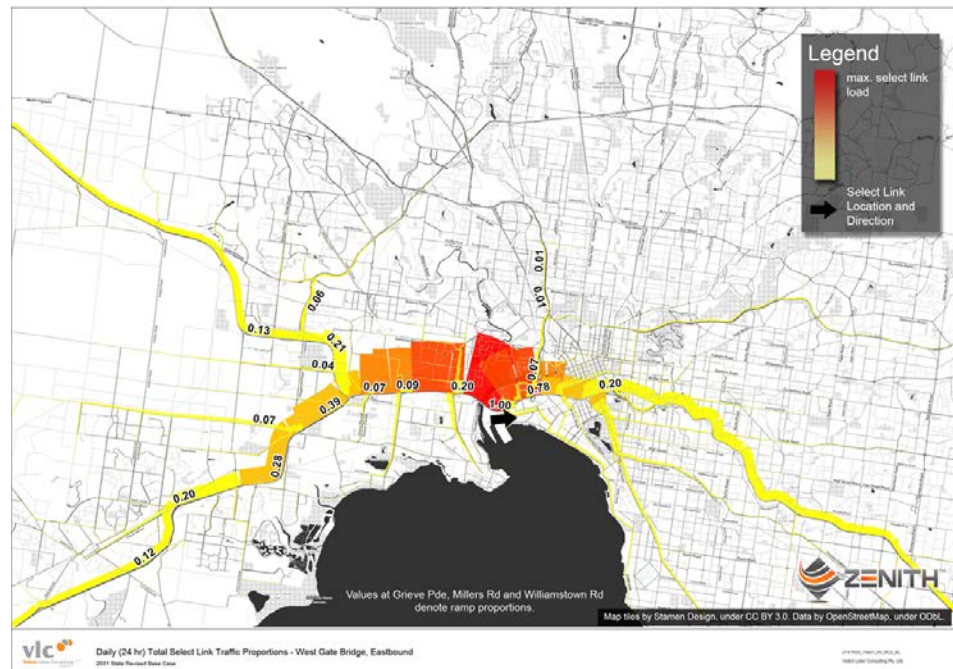
The northern corridor was generally considered preferable to the southern corridor in planning work since Eddington as the southern corridor was thought to place too much pressure on the West Gate Freeway, based on demand and land use modelling at the time.

However, subsequent work on the northern corridor has identified the importance of developing a bifurcated connection (the division of the freeway into two branches) to the M80 in the north and the Princes Freeway via Old Geelong Road in the south-west. Sequential construction of the southern and northern corridors (investment pathway 1 as outlined below) would also ultimately provide a bifurcated connection to the West Gate in the south-west and the M80 in the north-west.

A bifurcated connection has been identified as important given the higher proportion of demand generated on the West Gate Freeway from the south-west relative to the north-west, suggesting reliance on the Bridge requires links to address both north-west and south-west originating demand.

Demand originating from the south-west along the M1 Princes Freeway is estimated to generate twice as much demand from the north-west (39 per cent of east bound Bridge crossings compared to 25 per cent) in 2031 (see Figure 40).

Figure 40: Total select link traffic proportions, west gate bridge eastbound (2031 base case)



Source: Veitch Lister Consulting 2015

The north-west demand catchment along the M80 is orientated towards Melton and Tarneit (and the future Western Interstate Freight Terminal and associated freight precinct at Truganina). In contrast, the south-west along the Princes Freeway is orientated towards Wyndham and Geelong. Traffic demand projections to 2031 indicate rapid growth in movements from the M1. Movements from the south-west are best serviced by the southern branch of the bifurcated solution. Beyond 2031 it is expected that demand from the M80 will be more evident as land use change and supporting infrastructure is developed, particularly the Outer Metropolitan Ring Corridor and Western Interstate Freight Terminal.

Previous Victorian Government assessment has identified the bifurcated design on the northern corridor as preferable due to:

- the physical and technical design constraints associated with the Boundary Road interchange at the M80
- the increased pressure on the M80 that a 'single' interchange connection created, and
- it providing a shorter and better route for the dominant flow from the Princes Freeway.

Assessment of corridor options

Method for assessing corridor options

Reflecting that the growth forecast in Eddington significantly understated the travel demand requirements for Melbourne, there is now a case to consider both the northern and southern corridors. The need to develop a bifurcated connection as part of the northern corridor would potentially be reduced in the case that both the southern and northern corridors are implemented (through sequential investment. As a result neither corridor can be considered mutually exclusive.

As the corridor options are not mutually exclusive, the typical approach of comparing corridor options is not useful. An 'investment pathways' approach has therefore been used to determine which road corridor option should be the short term priority. This approach recognises the time critical and interdependent nature of investments in the transport network. It also enables a long time investment horizon to respond to emerging industry needs.

The investment pathway approach evaluates each investment pathway relative to the base case and against three criteria:

- **Benefits** – as measured through rapid economic analysis
- **Optionality** – relates to the flexibility of future infrastructure and investment decisions, in effect giving the state a 'real option'
- **Early benefits** – the ability of a given pathway to generate early benefits to those areas that have the greatest immediate need.

Defining the investment pathways

The northern corridor provides a comprehensive alternative to the western M1 Corridor. It enables the land use of the corridor to be transformed and has the potential to re-balance Melbourne's growth. It could also accommodate a rail corridor to be an effective freight link to the future Western Interstate Freight Terminal at Truganina.

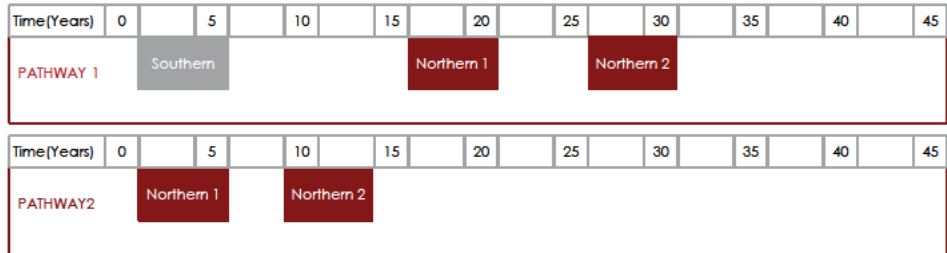
The southern corridor targets traffic performance issues on the West Gate Freeway and provides a bypass of the West Gate Bridge, addresses truck issues in the inner west, takes advantage of other network investment in HPFVs, and aids the continued growth in Melbourne's western region providing access to employment clusters in inner and south-east Melbourne.

Given the strategic challenges Melbourne is facing including the scale of population and freight growth, and the network problems identified along the M1 Corridor, further deferring investment in the road network in the west is not an option. However, Stage 1 of the northern corridor is unlikely to bring the network benefits typically generated from new freeway-to-freeway links. This dilemma gives rise to consideration of sequential investment pathways in two corridors:

- Southern Corridor** West Gate Freeway to City Link via the Port, West Gate Freeway Widening
- Northern Corridor** Stage 1 – City Link to Paramount Road (Northern 1), followed by Stage 2 – Paramount Road to M80 (Northern 2)

Figure 41 illustrates the proposed pathways and the assumed indicative timing of each major investment stage. These pathways are designed to inform the current investment decision in the context of possible future investments rather than determining those future investments.

Figure 41: Investment pathways: potential construction timing



Source: Advisian, 2015

A comparison of the characteristics of the two pathways is presented in Table 21 below:

Table 21: Comparison of pathway 1 and 2 characteristics

Pathway 1:

- prioritises the southern corridor
- enables deferral of the northern corridor for 15 years and then constructed in stages
- both corridors assumed as being required given substantial population, employment and freight growth projections, and transport modelling
- bifurcated connection from stage 2 of the northern corridor (Northern 2) may not be required under Pathway 1 because this pathway would provide new freeway links from the Footscray Road viaduct to the Princes Freeway M1 (via the southern corridor) and to the M80 (via the northern corridor)
- the need for bifurcation in this pathway could be re-assessed after the southern corridor is built and more considered land use planning can be incorporated
- Truck Action Plan stage 1 is incorporated into the southern corridor as West Gate Distributor Phase 2 (southern section)
- enables greater flexibility than Pathway 2 to accommodate uncertainty in assumptions underpinning long-term demand forecasting
- is able to take advantage of HPFV access to the M80 with bridges strengthened to the Port as part of other West Gate Freeway improvements
- estimated present value of real costs is approximately \$5.3 billion.

Pathway 2:

- prioritises stage 1 of the northern corridor (Northern 1)
- stage 2 (Northern 2) assumed to be built ten years later
- Northern 2 is likely to require a bifurcated connection, involving the division of the new freeway link into two branches to the:
 - M80 in the north
 - the Princes Freeway via Old Geelong Road in the south-west
- possible that the southern corridor (or more likely the West Gate Distributor Phase 2) may be required in this pathway, but conservatively it is assumed for the purposes of analysis that it is not required
- Truck Action Plan stage 2 is incorporated into the northern corridor
- is able to facilitate renewal of the Brooklyn-Tottenham industrial area earlier than Pathway 1
- estimated present value of real costs is approximately \$5.0 billion.

Note: estimated real costs are based on a 7% real discount rate over the period 2015/16-2095/96 (50 years after the last construction year in 2045/46), P50 capital costs.

Source: PwC

A pathway approach shows that delivering a southern road corridor offers greatest potential benefit and flexibility

Comparative assessment of investment pathways

Transport modelling and a rapid cost benefit analysis have been undertaken to compare the investment pathways. This analysis indicates that the benefits realised under Pathway 1 will be greater than those under Pathway 2, therefore indicating the first block of Pathway 1 (the southern road corridor) proceed initially.¹²

Table 21: Rapid CBA results of the investment pathways (\$ June 2015 millions, real discounted presented values)

	Pathway 1	Pathway 2
Present Value of Costs*	\$5,300	\$5,000
Present Value of Benefits excluding WEBs	\$8,900	\$6,300
Rapid BCR excluding WEBs	1.7	1.3
NPV excluding WEBs	\$3,700	\$1,300
Rapid BCR including WEBs	2.3	1.7
NPV including WEBs	\$6,900	\$3,400

*Note: Estimated incremental to the status quo base case, \$ June 2015 millions (rounded to nearest hundred million), discounted based on a 7% real discount rate over the period 2015/16-2095/96 (50 years after the last construction year in 2045/46), demand modelling accounts for route and mode change only, P50 capital costs, may not total due to rounding. *Costs differ from out-turn capital cost estimates as they have been adjusted for inclusion in the economic appraisal to represent real, discounted (present value) costs over the lifecycle.*

The economic appraisal results are driven in particular by:

- **Earlier network benefits** – by prioritising the southern corridor, Pathway 1 provides an early ‘network solution’ that links freeways and generates higher benefits (and flows) compared to an almost cost-equivalent stage of the northern corridor (e.g. CityLink to Paramount Road). Stage 1 of the northern corridor (Northern 1) does not connect the freeway system, and so will not attract the same initial demands as the southern corridor or benefits to the network. Pathway 1 also addresses some of the existing performance issues on the West Gate Freeway (part of the M1 Corridor) earlier than the northern corridor. The southern corridor provides direct and improved access to the Whitehall – Hyde St corridor which contains port and industry uses, in accordance with the original *Truck Action Plan*. This more directly targets trucks currently using Francis Street and Somerville Road for access to this area.
- **More direct benefits to the M1 Corridor** – the southern pathway provides more direct benefits to the M1 Corridor by providing relief to the key bottleneck of the West Gate Bridge. It completes the HPFV network into the Port of Melbourne from the west much earlier than the northern corridor, leveraging the current and planned investments in bridge strengthening

¹² Rapid CBA was undertaken based on Veitch Lister Consulting demand modelling (excluding Monash Freeway improvements). The benefits include travel time cost savings, reliability benefits, network redundancy benefits, vehicle operating cost savings, environmental and other externality cost savings. Wider economic benefits quantified include agglomeration and imperfect competition.



across the freeway network. This delivers significant productivity benefits to regional freight exports.

- **Ability to serve south-west and north-west growth areas without additional bifurcation cost** – the southern corridor targets the significant growth in Melbourne’s south-west. These areas are principally served by the Princes and West Gate Freeways. This growth is somewhat higher in absolute terms than the north-west areas in the short to medium term, hence the importance of the service upgrades achievable on the Werribee/Geelong rail corridor as part of Regional Rail Link and eventually via completion of Melbourne Metro. Completion of Regional Rail Link, Melbourne Metro, the widening and upgrade of the M80, together with planned progressive upgrades of the Melton rail corridor will support the growth in the medium term of the north-west areas.
- **Greater flexibility for future network solutions by supporting a northern connection if and when required** – at the same time, the initial investment of Pathway 1 is only likely to be a medium term solution. While not certain, the northern corridor is likely to be needed to accommodate future growth and provide a long term, effective transport network to support Melbourne’s west and stimulate redevelopment of the Tottenham-Brooklyn area. Flexibility is important in planning and making provision for the northern corridor, considering the potential variability in future demand forecasts.

Pathway 1 accommodates future construction of the northern corridor but provides the ‘real option’ to defer investment for 10 to 15 years (or alternatively accelerate investment if required). While Pathway 1 addresses current needs, it builds in “optionality” for the Northern Corridor allowing time to resolve some of the uncertainty about future growth and consider the optimal timing when the future investment will be required to meet demand. It would also permit enhanced planning for the northern corridor in a more considered timeframe to optimise land use in the west (i.e. urban renewal, employment precincts and a potential rail freight corridor) and still provide certainty to industry and residents. It also potentially frees up funds for other allocations.

- **Greater potential to support broader network pricing reform** – Pathway 1 is considered to have greater potential to progress reform earlier than Pathway 2. The southern corridor has the additional benefits that:
 - a new freeway-to-freeway link in the southern corridor can potentially be brought under a new tolling regime. This could only be realistically contemplated under Pathway 2 when the full northern corridor is complete
 - the pricing structure of the proposed tolling regime can be better aligned with heavy vehicle charging reform principles and attribution to investments
 - it can create greater funding potential through higher toll revenues, hence aligning better with pricing principles.

Sensitivity testing of investment pathway timing and scope

Sensitivity testing has been undertaken to understand the impact on rapid economic appraisal results from changes in pathway timing and scope. As with the analysis of pathways 1 and 2 above, this sensitivity testing has been designed to inform the current investment decision rather than determining future investments. Four aspects have been considered:

Timing sensitivities

- **Timing of each stage of investment within the pathways** – the timing of each ‘block’ or stage of investment within the pathways determines the present value of the cost as well as the timing of benefits. Potential variations in the timing of the pathways are:
 - Earlier delivery of the northern corridor (entire northern corridor or only Northern 2) to achieve a network solution sooner
 - Later delivery of the northern corridor (entire northern corridor or only Northern 2) to defer expenditure and reduce the present value of cost.

Scope sensitivities

- **Inclusion of the West Gate Distributor in Pathway 2** – the West Gate Distributor was identified in the Labor Government’s Project 10,000 to improve truck access from the west to the Port of Melbourne, cater for increased volume and size capacity of road freight accessing the Port of Melbourne, and improve social and environmental amenity in the inner west. Stage 1 of the West Gate Distributor is currently underway.¹³ Sensitivity testing has been undertaken to explore the impact of including the remaining stages of the West Gate Distributor as part of Pathway 2. This is because Pathway 1 includes this scope as part of the Western Distributor.
- **Deferring Northern Stage 2 and upgrading arterial roads** – there is potential that Northern Stage 2 could be deferred with improved interim connections to the M1 and the M80 on arterial roads. This would require upgrades to key north-south connections to facilitate access to Geelong Road for increased traffic volumes. Previous studies (Eddington’s Truck Action Plan, WestLink Planning Study (2008/09) and subsequent state investigations) have identified the following upgrades to facilitate this:
 - Market Road extension (from Somerville Road to Geelong Road)
 - Boundary Road extension (from Little Boundary Road to Market Road)
 - Ashley Street and Paramount Road extension (to Geelong Road) and widening (two lanes, Geelong Road to South Road).
- **No bifurcated connection from Northern 2** – previous work on the northern corridor has identified the importance of developing a bifurcated connection (the division of the freeway into two branches) to the M80 in the north-west and the Princes Freeway via Old Geelong Road in the south-west. Pathway 1, which ultimately includes both the southern and northern corridors, offers a bifurcated connection (with the southern corridor connecting to the West Gate Freeway in the south-west and the northern corridor connecting to the M80 in the north-west). Pathway 2 is also assumed

¹³ West Gate Distributor Stage 1 (Northern Section) comprises of widening of Moreland Street, widening and strengthening of Shepherd Bridge, new signalled intersections along Moreland Street and a new dedicated shared user path bridge over the Maribyrnong. Preferred tenderers have been shortlisted through an expression and construction is expected to begin later this year or early next year and will take approximately eighteen months to complete.

to include a bifurcated connection. This has been identified as important given the higher proportion of demand generated on the West Gate Freeway from the south-west relative to the north-west. To examine this, a sensitivity test has been undertaken to understand whether cost savings from avoiding a north-west link to the M80 improve relative results for Pathway 2.

The results (Table 22) show that the relativity of the two overarching pathways is insensitive to changes in assumed timing or scope of investments, with Pathway 1 remaining more favourable. Sensitivity testing finds that:

- The relativity of pathway 1 and 2 is insensitive to variations to investment block timings
- Adding the West Gate Distributor to Pathway 2 does not increase the net benefits of Pathway 2 at forecast levels of demand
- Deferring Northern 2 and upgrading existing arterial roads does not affect the comparison of Pathways 1 and 2 with analysis suggesting Northern 2 provides a better connection to demand segments
- Testing Northern 2 without a bifurcated connection suggests that while costs are reduced, savings do not offset foregone benefits associated with a connection to the north-west.

Table 22: Rapid CBA results of investment pathway sensitivities (\$ June 2015 millions, real discounted presented values)

Pathway	Description	BCR
Pathway 1 (core)	<ul style="list-style-type: none"> • Southern Corridor constructed 2016/17–2020/21 • Northern 1 constructed 2031/32–2035/36 • Northern 2 constructed 2041/42–2045/46. 	1.7
Pathway 2 (core)	<ul style="list-style-type: none"> • Northern 1 constructed 2016/17–2020/21 • Northern 2 constructed 2026/27–2030/31 	1.3
Timing sensitivities		
Pathway 1 <i>Early delivery of northern corridor</i>	<ul style="list-style-type: none"> • Southern Corridor constructed 2016/17–2020/21 • Northern 1 brought forward 5 years to 2026/27–2030/31 • Northern 2 brought forward 5 years to 2036/37–2040/41 	1.6
Pathway 1 <i>Delayed delivery of northern corridor</i>	<ul style="list-style-type: none"> • Southern Corridor constructed 2016/17–2020/21 • Northern 1 delayed 5 years to 2036/37–2040/41 • Northern 2 delayed 5 years to 2046/47–2050/51 	1.8
Pathway 2 <i>Early delivery of northern corridor</i>	<ul style="list-style-type: none"> • Northern 1 constructed 2016/17–2020/21 • Northern 2 brought forward 5 years to 2021/22–2025/26 	1.1
Pathway 2 <i>Delayed delivery of northern corridor</i>	<ul style="list-style-type: none"> • Northern 1 constructed 2016/17–2020/21 • Northern 2 delayed 5 years to 2030/31–2035/36 	1.4

Pathway	Description	BCR
Scope sensitivities		
Pathway 2 <i>Including West Gate Distributor</i>	<ul style="list-style-type: none"> Northern 1 constructed 2016/17–2020/21 Northern 2 constructed 2026/27–2030/31 West Gate Distributor constructed concurrently with Northern 1 (2016/17–2020/21) 	1.1
Pathway 2 <i>Market/Boundary/Ashley/Paramount</i>	<ul style="list-style-type: none"> Northern 1 constructed 2016/17–2020/21 Market Road, Boundary Road, Ashley Street, Paramount Road Upgrades (2016/17–2020/21) 	1.1
Pathway 2 <i>No bifurcation</i>	<ul style="list-style-type: none"> Northern 1 constructed 2016/17–2020/21 Northern 2 constructed 2026/27–2030/31 and connects to the Princes Freeway West only (no direct connection to the M80 in the north-west) 	1.1

*Note: Estimated incremental to the status quo base case, \$ June 2015 millions (rounded to nearest hundred million), discounted based on a 7% real discount rate over the period 2015/16–2095/96 (50 years after the last construction year in 2045/46), demand modelling accounts for route and mode change only, P50 capital costs, may not total due to rounding. *Costs differ from out-turn capital cost estimates as they have been adjusted for inclusion in the economic appraisal to represent real, discounted (present value) costs over the lifecycle*

Investment pathway recommendations

It is recommended that:

- the southern corridor is the preferred corridor for short-term investment
- planning and protection of the northern corridor be progressed in parallel with investment in the southern corridor to provide future flexibility and optionality in road investments in the corridor and inform land use planning.

5.3. South-east corridor transport options

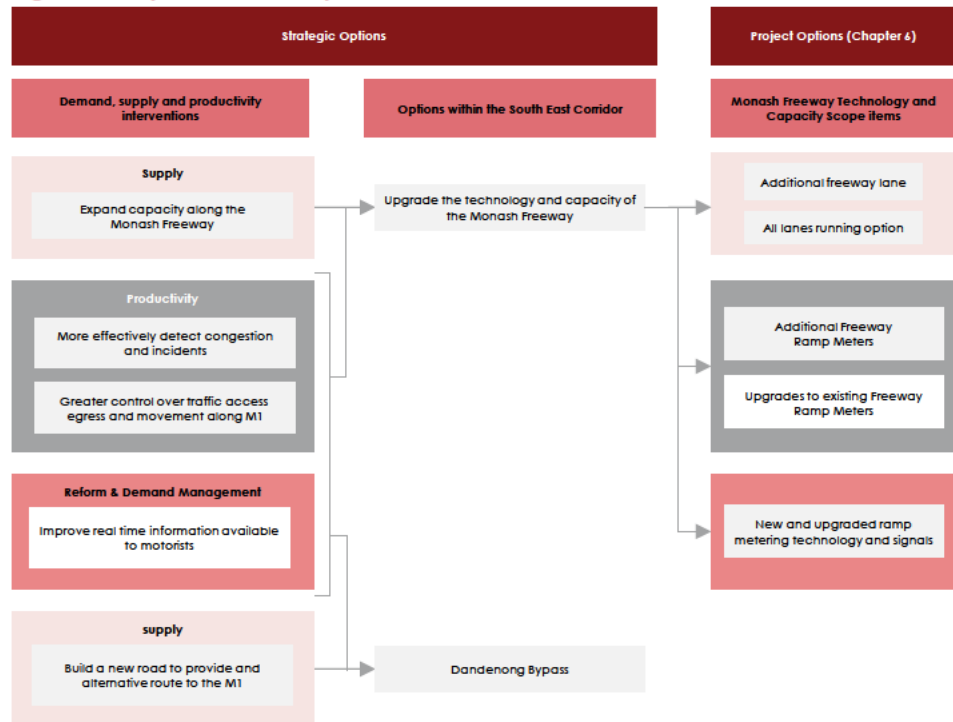
In the south-east where the transport system is more mature, the strategic options assessment considers packages of supply, productivity and reform/demand management interventions.

5.3.1. Approach to options assessment

Two strategic options have been identified to achieve benefits and address specific problems identified in the south-east M1 Corridor.

The overall options hierarchy used is shown in Figure 42.

Figure 42: Options hierarchy: south-eastern corridor



The two strategic options considered to address the identified problems on the Monash Freeway in the south-east are:

- Upgrade the technology and capacity of the Monash Freeway:
 - **Supply:** expand capacity with an additional lane
 - **Productivity:** provide greater control of traffic movements by upgrading ramp metering
 - **Demand management:** upgrade ramp metering and data stations to enable more effective management of congestion and incidents.
- **Dandenong Bypass** – build an alternative route to re-direct some traffic away from the Monash Freeway. The Dandenong Bypass route could include:
 - **Supply:** to re-direct traffic from the Monash Freeway, extend the Dandenong Southern Bypass to the South Gippsland Freeway and the new south to east connection at the South Gippsland Freeway/Monash Freeway Interchange
 - **Productivity and demand management:** include upgrades to the Monash Freeway east of South Gippsland Freeway, including an additional lane and ramp metering improvements. This would enable traffic from further east to access the alternative Dandenong Bypass.

Ongoing rail and public transport facility improvements along the south-eastern corridor already planned by the State will provide some future benefits for commuters during peak hour, although the route is already congested in peak periods and there is limited additional capacity.

The proposed Cranbourne-Pakenham Line Upgrade, improved network signalling and the level crossing removal programme will all contribute to improvements in the south-eastern corridor. However it is important to note the rail network in Melbourne currently provides limited linkages to key employment clusters in the region, as a result rail investment will only provide a partial solution and will not fully address the increasing congestion and delays on the Monash Freeway. Realistic immediate strategic options are needed on the road network.

Strategic options assessment supports upgrading of technology and existing Monash Freeway capacity

5.3.2. Assessment of strategic interventions

The key difference between the two strategic options is the type of supply intervention. The Monash Freeway Upgrade focuses on upgrading existing road infrastructure, whereas the Dandenong Bypass provides a completely new route.

It is important to consider how each option will contribute to achieving the desired benefits identified for the south-east transport corridor and at what cost. A high level assessment of the options based on these criteria is shown in Table 23.

Although only travel time savings have been provided from the initial strategic modelling, other economic benefits often bear some correlation to these travel time savings and therefore the modelling is useful in making a preliminary assessment. The benefit assessment at this strategic stage can only make educated guesses at the likely results from this modelling. Accordingly, additional care has been taken in interpreting the available preliminary results. These are only intended to compare options at a strategic level.

Table 23: Comparison of strategic options

Strategic options	Contribution to improving accessibility in the south-east corridor	Contribution to improving resilience of the south-east transport corridor	Preliminary estimates (\$ million, nominal)	
			Travel time savings (hours/year)	Cost estimates
Upgrade the Monash Freeway	Upgrades a key preferred traffic route and truck route but does not open up new connections	Continues concentration of investment on M1 Corridor, does not improve resilience	3,062,250	\$300m – \$400m
Dandenong Bypass	Opens up new connections but only partly upgrades a key preferred traffic and truck route	Opening up an alternative route improves resilience but likely capacity shortfall means poor reliability of M1 corridor not fully resolved	2,137,750	\$600m – \$800m

With 12 separate capacity upgrades along the Monash Freeway over the past 40 years, Victoria has placed significant investment in the Monash corridor in response to increasing demand, these investments have achieved an early return. Any further investment in the corridor will continue to build on these improvements, achieving additional efficiency. Project options developed for Monash Freeway upgrades are designed to address this concern. Further investment on the M1 freeway corridor will boost its performance and improve accessibility. This is supported by the estimates of travel time savings in the order of three million hours per year.

As a counterpoint, continued investment in one corridor at the expense of alternative strategic routes should be carefully examined with additional lanes adding diminishing returns and increased network sensitivity, with an incident on the Monash having significant network impacts. Upgrading the Monash Freeway does not improve network flexibility.

The Dandenong Bypass option would improve network flexibility and stimulate industry growth along the south Dandenong to Moorabbin corridor. However, early modelling for this option shows that there would be constrained uptake on

the Monash Freeway between EastLink and the South Gippsland Freeway. The modelling also shows difficulties in accommodating large traffic volumes within the local arterial network east of Dandenong, further reducing potential benefits.

To fully realise the potential of the Dandenong Bypass option, major arterial intersection capacity upgrades including flaring of approaches/departures would be required and the capital investment and land acquisition could be significant. Early cost estimates were in the order of \$600 million, but are now expected to be around \$800 million.

Given the high cost, the Dandenong Bypass option is not preferred. Ongoing development is recommended as a future strategic option to complete the ultimate outer east corridor network.

In summary, the preferred strategic response in the south-east is to upgrade the technology and capacity of the Monash Freeway. This is expected to achieve greater benefits at a lower cost and enhance existing investment in the Monash Freeway by fully realising its potential capacity and use.

5.4. Inclusion of both west and south-east responses in this business case

The State has undertaken a broader assessment of Melbourne's transport needs than the initial Transurban March 2015 proposal, including the M1 Corridor and its adjoining economic precincts. As outlined in Chapter 2, the M1 Corridor is a critical economic corridor for Australia. However, Chapter 3 identifies that transport performance and capacity is a key problem on the corridor, particularly on the following two sections:

- The West Gate Freeway between the M80 Ring Road and the West Gate Bridge
- The Monash Freeway between Warrigal Road and Clyde Road.

While acknowledging that a range of investments and actions will be needed to ensure Melbourne's transport network is able to serve city-wide future population and freight growth, for the following reasons the State has included both the west and south-east corridor responses in this business case:

- The identified west and south-east sections on the M1 Corridor provide the links to the most significant economic clusters along the corridor. Simultaneous investment improves access to economic clusters.
- Together the West Gate Freeway and Monash Freeway play an important role in linking the west and south-east with the Melbourne Airport, Port of Melbourne and the northern, south-eastern and western suburbs through the connection with other major freeways.
- Simultaneous investment provides the opportunity to support planning outcomes for Melbourne not restricted to one location – in particular:
 - fostering growth in the west with a significant increase in road transport capacity and alternate river crossing, while
 - concurrently enabling west-east connectivity and supporting the populous south-east by improving transport.
- While future network augmentation is likely to be desirable in the future, these two corridor sections are proposed initially as a precursor to unlock opportunity for further complementary investment. For example, expanding capacity over the West Gate Bridge and widening the West Gate Freeway unlocks the opportunity to further invest in capacity on the Princes Freeway to further open connections in the outer west.



6. Project scope: Physical solution

This section sets out the preferred physical scope of the Project for the purpose of the business case. It provides a summary of the options considered and evaluated and the business case project scope.

Various project scope options (based on the preferred investment pathway identified in Section 5) are examined for the western and south-east corridors.

This business case was undertaken to inform government of the merit of investment in the Project. The scope of the Project presented in this business case should not be considered to be the finalised scope for the Project. This business case scope was developed in order to have a reasonable basis on which to develop a range of assessments as part of the typical business case development process. This includes cost estimates, economic assessments and traffic impacts to name but a few.

Should this project proceed past the business case stage, the State will undertake a more exhaustive consultation and engagement process on all aspects of the project scope to ensure that all appropriate and relevant views have been considered before refining any scope through a detailed, inclusive and transparent planning approval phase.

6.1. Overview

The physical solution options assessment was split in two distinct sections of the M1 Corridor with various design options for:

- the western corridor, and
- the south-east corridor.

Having identified the southern alignment as the preferred short term investment option to address the problems in the western corridor, the analysis considers a number of options along the southern alignment and the optimal network outcome.

For the south-east corridor, the preferred strategic response is to upgrade the technology and capacity of the Monash Freeway. A number of options have been considered to achieve this.

The scope options reflect the State's ongoing assessment of the Transurban Proposal and its wider policy objectives for the road network. It includes amendments and augmentations to the technical scope of works and the tolling strategy proposed by Transurban. Specifically, the state concept has been informed by the State's own modelling and analysis, briefings between Transurban and the State, attendance at stakeholder meetings with Transurban and additional stakeholder consultation.

The following opportunities were identified to enhance the scope of the Project:

- Widening of the West Gate Freeway to 6 lanes in each direction to include separation of movements to the West Gate Bridge and Western Distributor could lead to improved operational performance by reducing the turbulence created by high volumes of weaving and merging movements

The business case scope comprises investment in the West Gate Freeway, Western Distributor, port access and Monash Freeway

- Relocating the tunnel portal (currently proposed within the West Gate Freeway road reserve) to assist in reducing the levels of disruption to vehicles using the West Gate Freeway, during construction
- Additional benefits for relocating the tunnel portal (including reducing truck movements using inner west arterial roads (such as Somerville Road and Francis Street)) may be realised through the addition of an identified route for trucks carrying dangerous goods (placarded loads) and over-height trucks which need to bypass the tunnel, and trucks travelling to/from the Yarraville Precinct
- Improving access to each of the docks within the Port of Melbourne
- Improving access to the inner urban arterial road network consistent with state and local urban planning policy goals
- Undertaking more detailed design in respect of potential improvements to Federation Trail
- Undertaking more detailed design in respect of potential improvements to Freeway Management System (FMS).

In addition to the above issues, the business case scope development process has taken a broader transport network perspective and considered additional options beyond the physical scope identified in the Transurban Proposal.

6.2. Project scope options

The project scope options are listed below:

Table 24: Project scope options

Project section	Scope options	Section
Western Distributor	<ul style="list-style-type: none"> • West Gate Freeway <ul style="list-style-type: none"> – West Gate Freeway Widening – number of lanes, lane configuration and separation of carriageways – Existing access to West Gate Freeway – Millers Road, Williamstown Road, Grieve Parade – Pedestrian and bicycle connectivity – Strengthening of existing structures – Noise Walls – Pavement Works • Western Distributor <ul style="list-style-type: none"> – Alignment of road through Yarraville – New freight access between West Gate Freeway and Hyde Street – Tunnel Portal – southern end – Tunnel Portal – northern end – Maribyrnong River crossing – Number of lanes – Shared user facilities • Port of Melbourne Access <ul style="list-style-type: none"> – Improved Port of Melbourne Access 	Section 6.4

Project section	Scope options	Section
	<ul style="list-style-type: none"> – Webb Dock Access Improvements • Western Distributor – Eastern Interchange <ul style="list-style-type: none"> – CityLink Connection – Inner urban access and CBD Bypass • Freeway Management System (FMS) <ul style="list-style-type: none"> – Ramp metering, new and upgraded – Lane Use Management System (LUMS) and supporting ITS hardware and systems 	
Monash Freeway Upgrade	<ul style="list-style-type: none"> • Additional traffic lane in each direction between EastLink and Clyde Road • New and modified ramp metering signals in both directions between Warrigal Road and Koo Wee Rup Road, including new ramp signals on the EastLink to Monash Freeway ramps 	Section 6.5

An assessment of each component is provided in the subsequent sections. It draws on the assessment of all technical options for various scope components, analysed in the Technical Options Report (West Gate Freeway and Western Distributor Works), provided in Attachment D.

6.3. Assessment framework

The business case project scope was assessed against the Project Objectives as well as value for money and deliverability considerations to form the project scope assessment framework (Assessment Framework), summarised below:

Table 25: Assessment Framework

Assessment Framework
<ul style="list-style-type: none"> • Improve transport performance in the M1 Corridor: <ul style="list-style-type: none"> – to meet increased travel demand due to future population and economic growth trends – to enhance connectivity between economic clusters – to enhance safety along the M1 corridor – to enhance access to jobs and services • Reduce reliance on the West Gate Bridge: <ul style="list-style-type: none"> – to improve network resilience and redundancy – to mitigate strategic risks to the state and national economies – to provide travel reliability • Improve freight access to the Port of Melbourne and greater Melbourne: <ul style="list-style-type: none"> – to improve reliability of access to the Port of Melbourne and on the freight network – to meet travel demand arising from the future freight task – to enhance state and national competitiveness through freight productivity improvements

Assessment Framework

- Improve amenity and safety for communities in the inner west:
 - to reduce freight on local streets
 - to improve safety on local streets
- Maintaining sufficient long term flexibility to manage the road network as required
- Achieving value for money outcomes for the State and road users, while leveraging alternative funding sources that help limit the impact on the state balance sheet

6.4. Western Distributor

It is important to consider how the Western Distributor will be integrated with existing infrastructure, public areas, and the surrounding environment when identifying a preferred state concept design.

A high-level options assessment has been undertaken to select possible concept designs and their relative impacts (positive or negative). Value for money is an overarching theme in assessing the broad scope options against the relevant Project Objectives, along with consideration of:

- Long-term transport and land-use planning
- Property
- Social and environmental impacts
- Project scope (Design & Construction)
- Project scope (Operation & Maintenance)
- Impacts during construction.

The following tables present a high-level summary of the findings of the options evaluation and other key features considered with a more detailed assessment available in the Technical Options Summary Report (Attachment D) and Monash Project Options Report (Attachment D2).

West Gate Freeway

A summary of the options assessment for West Gate Freeway works is provided below.

Table 26: West Gate Freeway Options Assessment

Scope Options	Options Considered	Summary of Assessment
West Gate Freeway Widening – number of lanes, separation of carriageways, lane configuration and posted speed (between M80 and Williamstown Road)	Preferred option: Widening of both inbound and outbound directions (between the M80 and Williamstown Road) to provide a total of 6 lanes in each direction (addition of two lanes each way). This is provided with carriageways (collector-distributors) separated by solid safety barriers (F-type profile), each with 3 lanes; an emergency stopping lane within the central carriageways; and breakdown bays in the collector distributors.	The collector-distributor design option was selected due to its superior performance from a network operation perspective. It supports continued population and employment growth in the west. In the absence of the separation of carriageways, significant weaving volumes would conflict in a 6-lane single carriageway. The resulting turbulence and flow breakdown would result in severely restricted capacity (potentially no more than the current four lanes) and

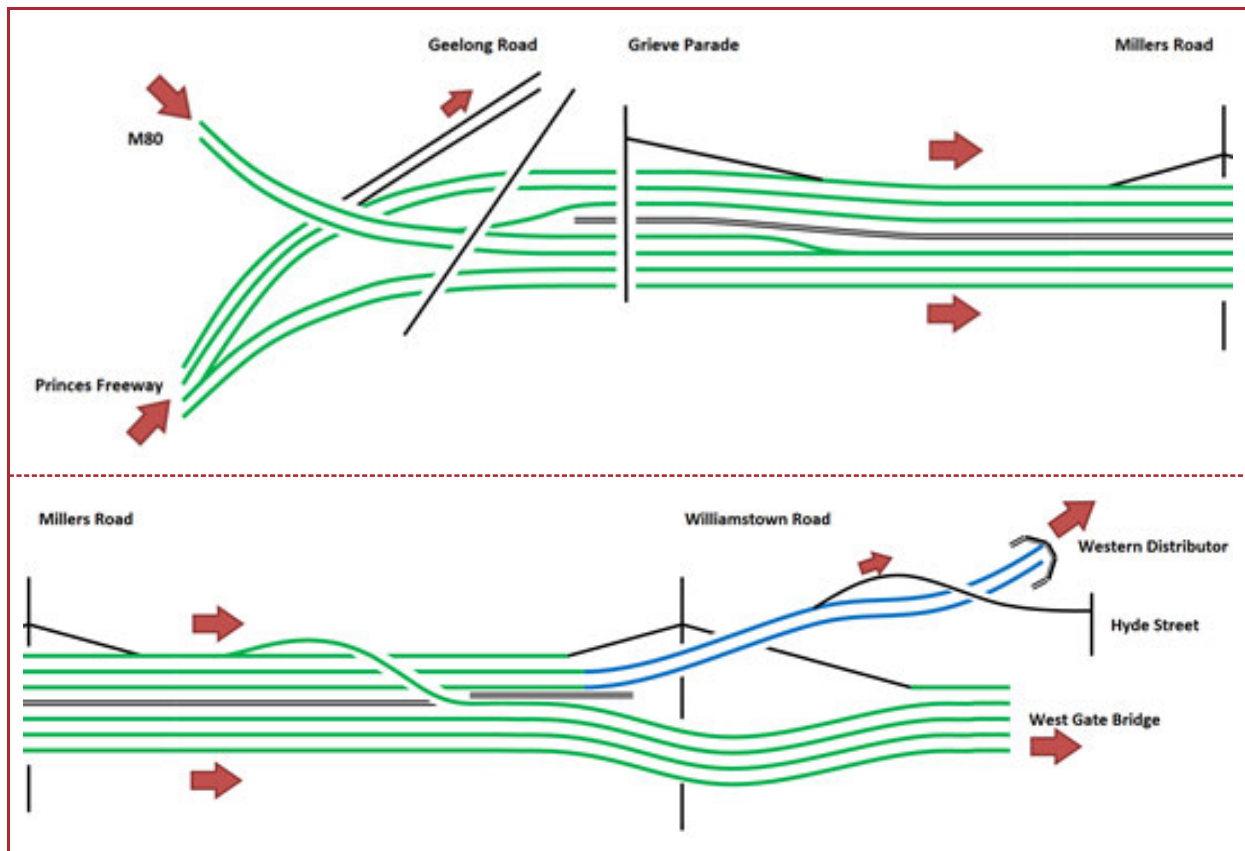
Scope Options	Options Considered	Summary of Assessment
	<ul style="list-style-type: none"> Inbound, the central carriageway is dedicated to traffic bound for the West Gate Bridge and the outer collector distributor for access to the Western Distributor and Hyde Street, and access to Grieve Parade, Millers Road and Williamstown Road. Outbound, the central carriageway will cater for Princess Freeway and Grieve Parade traffic while the outer collector distributor will service M80, Williamstown Road and Millers Road. Access to Grieve Parade will be restricted from Williamstown Road and Millers Road but available from Western Distributor, Hyde Street and the West Gate Bridge. <p>This option provides for safe operation at posted speeds of:</p> <ul style="list-style-type: none"> 100km/h from the M80 interchange to the west of Williamstown Road 80km/h for the remainder of the West Gate Freeway, in line with existing restrictions <p>The option incorporates braided connections at:</p> <ul style="list-style-type: none"> Inbound – near the standard gauge freight railway overpass (west of Williamstown Road) connecting the outer carriageway to West Gate Bridge carriageway Outbound – Grieve Parade exiting traffic from the central carriageway will pass over the M80 carriageway. <p>Other options considered:</p> <ul style="list-style-type: none"> Widening of West Gate Freeway without separation of movements – two additional lanes in both directions Variations of the braided connections and allocation of traffic streams to each carriageway. 	<p>significant safety and disruption impacts from incidents and crashes.</p> <p>The inclusion of separated main and collector-distributor carriageways by solid safety barriers (F-type profile) provides additional network redundancy. A disruption caused by a substantial incident on the West Gate Freeway between Williamstown Road and the M80 interchange will be predominately contained to the carriageway it occurred in, reducing the overall disruption to the network and allowing the unaffected carriageway to keep flowing.</p> <p>Further, connectivity is maintained to and from Millers Road, Grieve Parade and Williamstown Road (discussed further below) through braiding of ramps within the West Gate Freeway section of works.</p> <p>Emergency stopping lanes in the central carriageways and emergency stopping bays in the collector-distributors and LUMS provide greater levels of resilience to incidents and breakdowns facilitating efficient incident response and clearance.</p> <p>Solid safety barrier (F-type profile) separation with appropriate offsets from traffic lanes allows the posted speed of 100km/h to be maintained.</p> <p>A schematic of the separated carriageways is presented in Figure 43 below. The typical cross section for the West Gate Freeway is provided in Figure 44.</p>

Scope Options	Options Considered	Summary of Assessment
Existing access to West Gate Freeway – Millers Road, Williamstown Road, Grieve Parade	<p>Preferred option:</p> <p>Fully retain existing access to/from Grieve Parade, Millers Road and Williamstown Road, including:</p> <ul style="list-style-type: none"> Inbound: A new eastbound ramp connecting the Princes Freeway to the collector-distributor via the existing Geelong Road inbound exit ramp. All arterial road entry and exit movements to the freeway will occur on the collector-distributor. A braided ramp will link the collector-distributor to the West Gate Bridge prior to Williamstown Road servicing traffic from Grieve and Millers. Outbound: the collector-distributor provides access to Williamstown Road and Millers Road. The connection from the West Gate Freeway to Grieve Parade will be from the central carriageway via a flyover of the collector distributor. 	<p>Braiding of the movements along the West Gate Freeway has been incorporated to retain connectivity from existing arterial roads while providing the separation of major movements into separate carriageways, necessary to ensure efficient operation of the West Gate Freeway corridor.</p> <p>The preferred option generally provides access opportunities to the Western Distributor tunnel from the broader network, except directly from Williamstown Road.</p> <p>The splitting of the major traffic streams to access both carriageways (in both directions) reduces the amount of weaving occurring on the West Gate Freeway between the M80 interchange and Millers Road, improving safety and operation of the West Gate Freeway.</p>
Strengthening of existing structures	<p>Preferred option:</p> <p>This scope element involves strengthening of the existing bridges along the West Gate Freeway (between the M80 and Williamstown Road) to 75% SM1600 to accommodate up to 110 tonne High Productivity Freight Vehicles (HPFV) at higher mass limits.</p> <p>Other option considered:</p> <ul style="list-style-type: none"> Provide 100% SM1600 capacity which requires complete replacement of bridges (8 No.) 	<p>Strengthening the bridge structures to 75% SM1600 is compatible with the adjacent network including the Western Distributor, noting that the M80 is progressively being upgraded to this standard and this section of the West Gate Freeway will remain as a 'missing link' for HPFV connectivity. This will work to increase the efficiency of the transport task, resulting in reduced trips to transport the same mass.</p>
Additional scope items included in the preferred design		
Noise Walls	Upgrade noise walls along the West Gate Freeway (between the M80 and Williamstown Road) with concrete and Perspex noise walls	The existing timber walls are impacted by the modified alignment along the West Gate Freeway. As a result of the project, greater levels of noise attenuation are required compared with the existing timber facility. Concrete and Perspex panels are included to improve amenity and urban design

Scope Options	Options Considered	Summary of Assessment
		<p>outcomes along the corridor.</p> <p>Residents and businesses will be consulted as part of the design development process post business case.</p>
Retention of pedestrian and bicycle connectivity	<p>Retain existing pedestrian connectivity between the north and south sides of the freeway corridor through replacement of existing pedestrian bridges to cater for upgraded West Gate Freeway, including anti-throw screens.</p> <p>Retain and enhance the existing Federation Trail shared user path with the completion of the missing link to Hyde Street.</p>	<p>Incorporated into preferred design.</p> <p>There are currently two pedestrian bridges that provide pedestrian only access over the West Gate Freeway at Wembley Avenue and Rosala Avenue. The widening works along the West Gate Freeway will require these bridges to be replaced with new structures that will span across the new upgraded freeway.</p> <p>The existing Federation Trail shared user path will be maintained and improved, with the existing bridge over the standard gauge freight rail line retained.</p>
Pavement Works	Required works for existing pavement areas including shape correction, patching, waterproofing and strengthening.	<p>The existing pavement along the West Gate Freeway has been assessed as structurally inadequate and at the end of its life.</p> <p>Significant rehabilitation is required to treat rideability and strength deficiencies.</p>

Figure 43: Proposed separation of movements on the West Gate Freeway

Inbound Lane Arrangements



Outbound Lane Arrangements

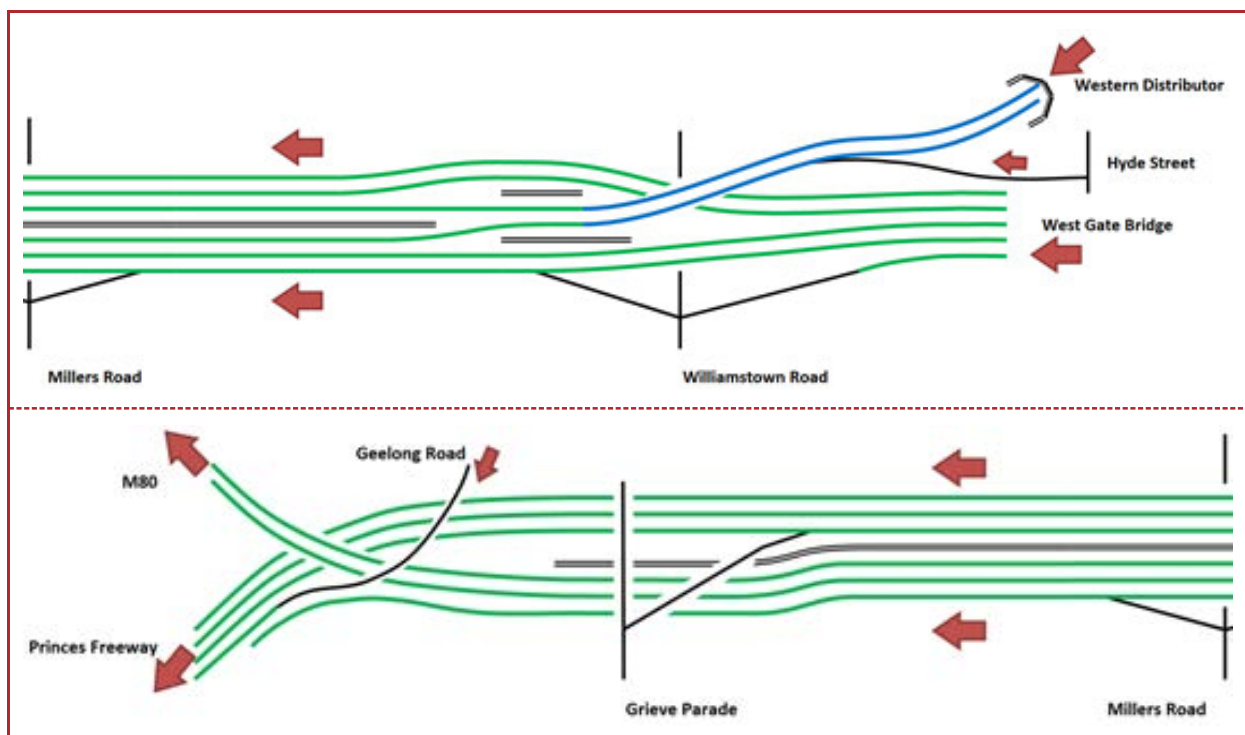
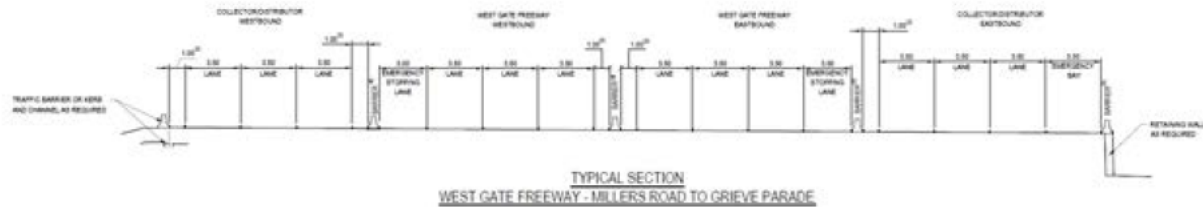


Figure 44: Typical cross section of the West Gate Freeway between Grieve Parade and Millers Road



Western Distributor

A summary of the options assessment for Western Distributor is provided in the table below.

Table 27: Western Distributor Options Assessment

Scope Options	Options considered	Summary of Assessment
Alignment of road through Yarraville	<p>Preferred option: Tunnel – with elevated connections between the West Gate Freeway and Tunnel Portal, including rebuilding of the Williamstown Road interchange bridges.</p> <p>Other options assessed</p> <ul style="list-style-type: none"> At-grade Viaduct 	<p>A tunnelled option is superior to an at-grade or elevated road above Yarraville. It will provide better visual amenity and surface air and noise outcomes for the local community and better land use outcomes.</p> <p>Tunnels generally have a significantly higher cost – around six times the cost of an elevated solution and up to 20 times the cost of at-grade. The tunnel portals have been located considering costs and impacts on land and amenity on the local community.</p> <p>For the tunnelled option, it is assumed that two bored tunnels of 15.5m diameter would be constructed. This provides for two 3.5m wide lanes with 0.5m right shoulder and a 4.5m left shoulder. The wide shoulder allows for the provision of a full width (third) traffic lane with a 1.0m shoulder for use in emergencies and for an ultimate third full time traffic lane in the future. A truck lane could also be provided in the wide shoulder space to assist the access of trucks to and from the Port of Melbourne via Mackenzie Road.</p> <p>The connections between the West Gate Freeway and the southern tunnel portals will be partly elevated with a 2 lane cross section, incorporating the Hyde Street connecting ramps. This requires bridges, realignment and rebuilding at the Williamstown Road interchange.</p>
Route for over-height (unable to use tunnel) and placarded vehicles	<p>Preferred option: New ramp connections between Hyde St and the elevated West Gate Freeway to Western Distributor connection</p> <p>Other options considered:</p> <ul style="list-style-type: none"> No connection to Hyde 	<p>The proposed ramps to Hyde Street are an important connection for placarded trucks (such as fuel tankers and other hazardous vehicles) and over-height vehicles unable to use the tunnel, removing them from existing residential arterial roads. The ramps are an alternative for trucks to bypass Francis Street and Somerville Road which may enable more extensive truck curfews to be applied on these</p>

Scope Options	Options considered	Summary of Assessment
	Street	<p>roads.</p> <p>This connection also provides for redundancy (especially for port-traffic) when the tunnel or the West Gate Bridge is closed for maintenance or incidents.</p>
Tunnel Portal – southern end	<p>Preferred option:</p> <p>Tunnel portal located north of West Gate Freeway and near Hyde Street (short tunnel)</p> <p>Other options considered:</p> <ul style="list-style-type: none"> • Tunnel portal entrance direct from West Gate Freeway road reserve within the Williamstown Road interchange (long tunnel) 	<p>A shorter tunnel option constructed off the West Gate Freeway is the preferred option.</p> <p>It takes the major construction of the tunnel portals out of the live, restricted and highly-sensitive traffic environment of the West Gate Freeway. Building tunnel portals within the West Gate Freeway would generate a substantial disruption to the approximately 200,000 vehicles that use the West Gate Freeway every day with additional impacts on Williamstown road traffic.</p> <p>A tunnel portal north of the West Gate Freeway near Hyde Street allows for a new direct connection from the West Gate Freeway to Hyde Street that can be used as a tunnel bypass for placarded and over-height vehicles, instead of these vehicles using residential roads.</p> <p>This option creates the opportunity to integrate improvements to the open space and urban amenity of the Stony Creek Reserve and surrounds, through shared path connections (including the Federation Trail completion), linking major cycling routes in the west.</p> <p>The community including nearby residents and businesses will be consulted as part of the design development process to achieve an optimal outcome.</p> <p>The tunnel portal location north of the West Gate Freeway near Hyde Street reduces the length of the tunnel by approximately 1km.</p>
Tunnel Portal – northern end	<p>Preferred option:</p> <p>Tunnel located west of Maribyrnong River</p>	<p>It is anticipated that construction of the bored tunnels will be launched from the northern tunnel portal using one tunnel boring machine. This will require a large temporary construction footprint to be acquired, or the temporary relocation of land use east of Whitehall Street. On that basis, there is no discernible difference between options available for the northern tunnel portal location.</p>

Scope Options	Options considered	Summary of Assessment
		A tunnel portal east of the Maribyrnong River was not considered due to the expected substantially higher cost, difficult ground conditions, significant environmental impacts, and major disruption to port and freight rail operations.
Maribyrnong River crossing	<p>Preferred option: Clear span over river</p> <p>Other options considered:</p> <ul style="list-style-type: none"> • Pier(s) within river 	<p>A clear span bridge over the Maribyrnong River is the preferred option for a better urban design outcome and to minimise environmental impacts on the Maribyrnong River. Public safety barriers are proposed to be installed on the proposed bridge.</p> <p>It is acknowledged that a clear span bridge (most likely cable-stay construction) may be more expensive than bridge piers in the Maribyrnong River, although further structural and design investigations are required to prove feasibility of this clear span option. These investigations will also include consultation with the community and stakeholder in relation to the visual appearance of the river crossing.</p>
Shared user facilities:	<p>Preferred option: Grade separated bicycle facility at Appleton Dock Road, Footscray Road and Mackenzie Road intersections</p> <p>Other options considered:</p> <ul style="list-style-type: none"> • At-grade crossing(s) • Grade separation for full length, not just locations listed • Relocate to other side of Footscray Road 	<p>Ensuring pedestrian and cyclist connectivity in the west and Port of Melbourne is an important consideration. An option that grade separates pedestrians and cyclists from vehicles entering and exiting the Port of Melbourne would deliver the best safety and amenity for pedestrians and cyclists.</p> <p>Relocation and at-grade options would expose cyclists to more conflict with freight vehicles. Full length grade separation is cost-prohibitive for no additional benefit. With the future downgrade of DockLink Road, grade separation will no longer be required here.</p>

Port of Melbourne Access

A key objective is to improve safety and freight efficiency, and minimise the impact of heavy vehicles on local roads in the inner west and on the West Gate Bridge. The various scope options considered as part of the Port of Melbourne access were split between improved Swanson Dock access and improved Webb Dock access. A summary of the assessment is provided in the table below and the business case project scope is presented in Figure 45.

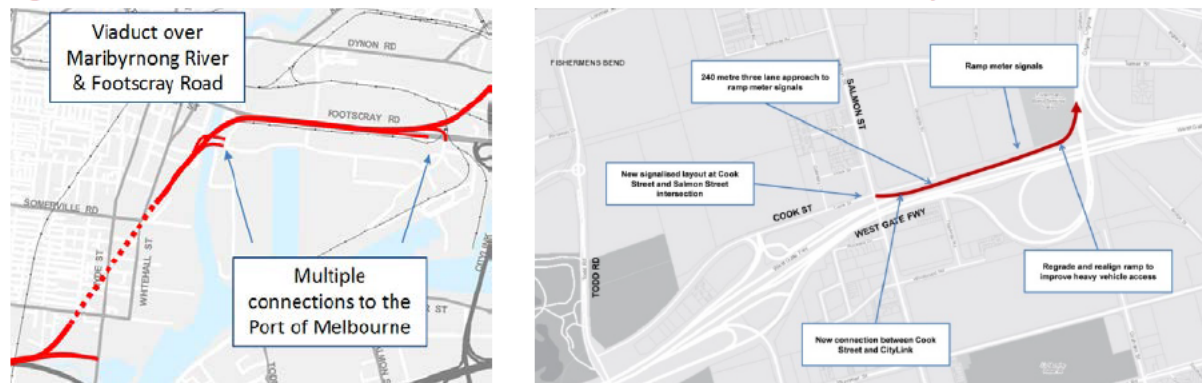
Table 28: Port of Melbourne Access

Scope Options	Options Considered	Summary of Assessment
Improved Port of Melbourne Access	<p>Preferred Option:</p> <ul style="list-style-type: none"> • bridges across the Maribyrnong River • viaducts above Footscray Road 	High quality road connections to the Port precinct are important elements to maintain the competitiveness of Port of Melbourne. Optimal connections will provide direct access and minimise the need for circuitous travel. They should be reliable and minimise

Scope Options	Options Considered	Summary of Assessment
	<ul style="list-style-type: none"> direct access to the Port of Melbourne at Mackenzie Road (to/from West Swanson Dock) and Appleton Dock Road (to/from West Swanson Dock, Victoria Dock, Appleton Dock). <p>Access to West Swanson Dock/Mackenzie Road will be via ramps from the Western Distributor immediately north of the northern tunnel portal with new bridges provided over the Maribyrnong River. To maintain adequate clearance over the river, the Mackenzie Road gradeline will be raised with signalised intersections provided at the ramp terminals.</p> <p>Access to Appleton Dock Road will be via an elevated ramp connection from the Western Distributor viaduct connecting to the north side of the existing Footscray Road/Appleton Dock Road intersection. Port of Melbourne traffic returning to the west will access the Western Distributor viaduct via a ramp connection from Footscray Road west of Appleton Dock Road.</p> <p>Other options considered:</p> <ul style="list-style-type: none"> Single access point from Footscray Road via; Dock Link Road 	<p>the likelihood of delays caused by congestion or incidents on the arterial network. These connections should provide a level of redundancy so that if internal issues within the Port of Melbourne affect one gate, ease of access to the other gates can be provided. The connections should be efficient and minimise overall travel time or unnecessary changes in grade; and, as much as possible, provide equitable access to both East and West Swanson Dock. For these reasons, a configuration which provides multiple port access is preferred.</p> <p>The preferred option provides direct, efficient, reliable and safe connections for heavy trucks to each of the docks.</p> <p>The preferred option provides reasonably equitable and non-circuitous access to the eastern and western portions of the Port of Melbourne with direct ramp connections to and from key access intersections. Specifically, West Swanson Dock will be connected via new ramps to Mackenzie Road. East Swanson Dock will be accessed via new connections to Appleton Dock Road. These connection options minimise the use of Footscray Road by freight trucks thereby reducing the potential for unnecessary congestion at key intersections (e.g. with Dock Link Road).</p> <p>The alignment minimises the changes in vertical grade for trucks accessing the Port of Melbourne, compared to the other options considered.</p> <p>The alignment is expected to have minimal impact on port land in the West Swanson Dock area. Alternative alignments have been considered to avoid this impact; however, they have a significant impact on residential and commercial properties and may result in a significantly more costly span over the Maribyrnong River.</p> <p>The preferred option retains access to the Dynon rail precinct, including freight forwarders.</p> <p>The alternative of providing a single point of access at the Dock Link Road intersection introduced a number of grade issues (steep ramps impacting truck performance), negotiation challenges (U-turning required by large vehicles) and operational impacts (inefficient intersection operations).</p>

Scope Options	Options Considered	Summary of Assessment
Webb Dock Access Improvements	<p>Preferred option:</p> <ul style="list-style-type: none"> • Widening of Cook Street west to two lanes eastbound from Todd Road to the West Gate Freeway Ramps Terminal Intersection (in addition to the Port funded widening to two lanes westbound) • Direct Western Link Connection – A separated carriageway on the north side of West Gate Freeway providing direct access from Cook Street to the CityLink Western Link ramp without interacting with West Gate Freeway mainline traffic via signalisation of the Cook Street/Salmon Street intersection. Includes widening, realignment and regrading of the ramp to improve heavy vehicle performance and safety (based on the history of truck rollovers) • Ramp metering of west to north movement (West Gate Freeway-to-CityLink) with adequate storage. <p>Other options considered:</p> <ul style="list-style-type: none"> • CityLink Connection <ul style="list-style-type: none"> – Collector distributor with alignment along south side of the existing freeway service centre – Collector distributor connection via a new flyover over the eastbound carriageway of the West Gate Freeway 	<p>The preferred option was selected as the most direct and efficient access from Webb Dock to Western Link for heavy vehicles. By separating West Gate Freeway bound traffic from Western Link traffic, ramp controls can be applied more efficiently.</p> <p>The tight curve radius and grade of the Ramp currently makes it difficult for trucks to negotiate safely. To improve safety, the ramp will be regraded and realigned along with the installation of ramp metering with adequate storage provisions.</p> <p>All options include one additional eastbound lane on Cook Street to assist egress from Webb Dock.</p> <p>The flyover option for the CityLink connection was not considered appropriate because of the complexity it added to exiting the service centre.</p> <p>The alignment option on the south side of the freeway service centre was eliminated due to its operational impacts, environmental and compensation risks with leasing arrangements to the freeway service centre. This alignment was also less amenable for large numbers of large vehicles and introduced potential operational issues with the Cook Street entry ramp meter.</p>

Figure 45: Port of Melbourne Access and Webb Dock Access business case scope



Western Distributor – Eastern Interchange

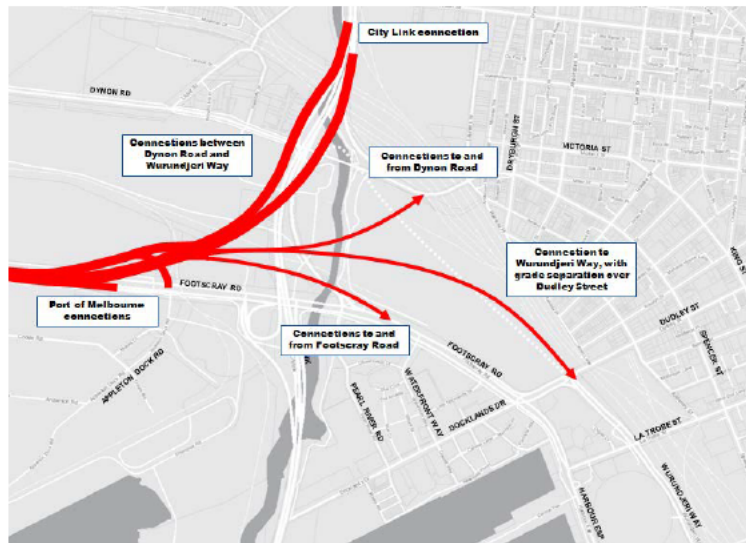
A summary of the assessment for the various scope options for the eastern interchange are presented in the table below.

Table 29: Eastern Interchange

Scope Options	Options Considered	Summary of Assessment
CityLink connection	<p>Preferred Option: Inbound and Outbound: Connections between Western Distributor and CityLink via the existing Dynon Road ramps. Lane arrangements as part of the CTW project will need to be modified to ensure efficient operation with the new connection. Installation of upstream ramp meters at Ramp M and the West Gate Freeway to CityLink Ramp is important to safely connect with the Western Distributor and maintain operational efficiency.</p> <p>Other options considered:</p> <ul style="list-style-type: none"> • New connection between Dynon Road and Footscray Road • Connections for both directions combined with Footscray Road ramps 	<p>The preferred option to connect to CityLink at the existing Dynon Road ramps seeks to minimise the number of freeway entry/exit points for safety and efficient traffic flows. The option of combining the new ramps with the Footscray Road ramps required significant modification and extension of the northbound entry ramp. This resulted in insufficient separation between the revised connection and the Dynon Road entry, likely to cause turbulent operations and flow breakdown.</p> <p>Combining the Dynon Road ramps is compatible with the traffic demands for Racecourse Road downstream.</p> <p>There is insufficient space between the existing Dynon Road and Footscray Road ramps to provide a separate Western Distributor connection.</p>
Inner urban access and CBD Bypass	<p>Preferred Option: Access via ramps onto Footscray Road. Additional connections to Dynon Road and Wurundjeri Way via a new CBD bypass road extending between Wurundjeri Way and Dynon Road and connecting with the Western Distributor, grade separated over Dudley Street.</p>	<p>Significant growth in population and high value employment is expected in areas such as North and West Melbourne, Arden-Macaulay precinct and E-Gate in the longer-term.</p> <p>While a substantial part of the expected increase in travel demand will be catered for from the western metropolitan area by the recently completed Regional Rail Link project and the Melbourne Metro Project and active transport modes such as walking and cycling,</p>

Scope Options	Options Considered	Summary of Assessment
	<p>Modifications to interface intersections to provide for new and modified traffic movements have been included.</p> <p>Other options:</p> <ul style="list-style-type: none"> • Footscray Road connection only • Footscray Road and Dynon Road connections (no Wurundjeri Way connection) 	<p>there is still a heavy demand for private travel by car.</p> <p>Traffic analysis indicates that access to inner areas solely from Footscray Road would lead to unacceptable levels of congestion, impacting on Footscray Road, Dudley Street and Docklands, as well as the Western Distributor and CityLink operation.</p> <p>Accordingly, a connection option that disperses traffic accessing central Melbourne and surrounds would be beneficial.</p> <p>One option considered was to provide connections to both Footscray Road and Dynon Road. The analysis indicates that while this option would assist in reducing traffic demands along Footscray Road, it increases traffic demand along Dynon Road to a level that is likely to create significant and unacceptable congestion along Dynon Road and surrounding streets.</p> <p>Strategic traffic modelling has shown that a large proportion of traffic from Dynon Road is destined for locations south of the Yarra River and this traffic travels through the CBD to access these locations. This through traffic places pressure on CBD roads and signalised intersections. In addition to Western Distributor connections to Footscray Road and Dynon Road, an extension of Wurundjeri Way which essentially extends the city bypass function of this important road could assist in relieving the pressure on Dynon Road. This approach would disperse and redistribute this traffic providing a better balance of trip distribution and diverting trips away from the CBD.</p> <p>On that basis, the preferred option is assumed to include a direct connection via ramps onto Footscray Road, as well as additional connections to Dynon Road and Wurundjeri Way via a new CBD bypass road extending between Wurundjeri Way and Dynon Road and connecting with the Western Distributor, grade separated over Dudley Street.</p> <p>While the preferred option has been adopted for the business case, the final network and connections outcome will be determined following extensive consultation with stakeholders (including the City of Melbourne) and the community.</p>

Figure 46: Eastern interchange business case scope



Freeway Management System

An integrated freeway management system (FMS) is critical to meet the stated Project Objectives and to ensure additional capacity is fully used and reliability of travel is maintained. The table below summarises the inclusion of traffic management systems into the project scope.

Table 30: Freeway Management System

Scope Options	Options Considered	Summary of Assessment
Ramp Metering – New and Upgraded Sites	<p>Preferred Option:</p> <ul style="list-style-type: none"> Reinstatement of ramp metering on modified arterial road entry ramps along the West Gate Freeway Increased storage provision and associated works on existing metered ramps along the Princes Freeway West New Ramp meters on the West Gate Freeway/WesternLink connections (East-to-North and North-to-West) Ramp metering on new arterial road connections to the Western Distributor. <p>Other options considered:</p> <ul style="list-style-type: none"> New ramp metering sites in the outbound direction along Princes Freeway West New ramp metering sites and upgrades to existing sites along the M80 and Deer Park Bypass 	<p>The arterial road entry ramps to the West Gate Freeway will be modified as part of the project due to the widening and separation of carriageways. Proposed modifications to metering storage will accommodate future traffic demand. Upstream corridors to the West Gate Freeway will experience traffic demand increases requiring additional storage to efficiently manage inflows, and limit impacts on arterial and feeder roads.</p> <p>The connection of the Western Distributor to CityLink and the West Gate Freeway may add operational bottlenecks into the freeway system and may require the West Gate Freeway/WesternLink connections to be controlled to ensure safe and reliable operation of both.</p>
Lane Use Management System and Supporting ITS	<p>Preferred Option:</p> <p>The FMS scope includes reinstatement of the Lane Use Management System (LUMS) accommodating the changed carriageway and lane configuration</p>	<p>High traffic on the West Gate Freeway means even small incidents can have significant impacts with queues and delays upstream, especially during peak periods.</p>

Scope Options	Options Considered	Summary of Assessment
	<p>along the West Gate Freeway. LUMS will also be provided on eastbound sections of the Princes Freeway West and M80 which feed the West Gate Freeway:</p> <ul style="list-style-type: none"> • On Princes Freeway West, LUMS gantries will be provided from the railway overpass in Laverton through to the M80/West Gate Freeway interchange • On the M80, for the inbound direction LUMS gantries will be provided from Pipe Road through to the West Gate Freeway. <p>The scope also includes improvements to the West Gate Freeway approach with:</p> <ul style="list-style-type: none"> • Variable message signs • New and upgraded detection on the mainline and ramps • CCTV Cameras • Weigh in Motion stations • Height detection stations • Boom gates and automated emergency barrier gates • Power and Communications hardware • Backend system modifications for integration of new assets <p>Other options considered:</p> <ul style="list-style-type: none"> • Minimum number of LUMS gantries on Princes Freeway West to provide the transition to the managed environment on the West Gate Freeway • Extension of LUMS to cover the Princes Freeway West between Werribee (Princes Highway) and the West Gate Freeway 	<p>Better management of freeway traffic can improve traffic flow, improve safety, and reduce the impacts of planned and unplanned incidents.</p> <p>The LUMS system enables any remaining capacity of the freeway to continue to be used as efficiently as possible during an incident. Additional supporting ITS infrastructure assists in preventing disruptive incidents and also rapidly identifying incidents, further reducing the potential incident impacts.</p> <p>LUMS help emergency services to access incidents in sections where there are no emergency lanes.</p> <p>The need to treat upstream sections of the M80 and Princes Freeway West corridors recognises the critical need to inform and manage traffic approaching the West Gate Freeway and Western Distributor. It alerts drivers to alternative routes in the case of an incident or event.</p>

6.5. Monash Freeway Upgrade

The works provide an additional lane in each direction along the Monash Freeway from EastLink to Clyde Road and expanded freeway ramp metering at key points between Warrigal Road and Koo Wee Rup Road.

The summary of the options assessment is presented in the table below.

Figure 47: Monash Freeway scope area – Warrigal Road to Koo Wee Rup Road



Table 31: Monash Freeway Works

Scope option	Description	Summary of Assessment
Monash Freeway Upgrade	<p>Preferred Option:</p> <p>One additional lane in both directions from EastLink to Clyde Road, widening into the median, a central median barrier and structural widening, strengthening and associated upgrades as required. Ultimately it will provide:</p> <ul style="list-style-type: none"> Five traffic lanes each way between EastLink and South Gippsland Freeway Three traffic lanes each way between South Gippsland Freeway and Clyde Road <p>Other options considered:</p> <ul style="list-style-type: none"> No additional physical capacity 	<p>Analysis of an additional lane in each direction from EastLink to Clyde Road provides significant network benefits to meet existing high demand and future growth in the south-east.</p> <p>The existing cross section of the Monash Freeway, particularly along the Hallam Bypass section, operates at capacity for extended periods of the day, causing regular flow breakdown, congestion and delays. Widening of the Hallam section alone to three lanes will not resolve these issues, as the interface with the Monash Freeway to the west would become the next major bottleneck. Extension of the widening to the west by providing five lanes in both directions between the South Gippsland Freeway and EastLink extends the additional capacity through to a number of key strategic connecting</p>

Scope option	Description	Summary of Assessment
	<p>(new traffic lanes)</p> <ul style="list-style-type: none"> Hard shoulder running – using the existing emergency lanes part time (during peak periods) 	<p>routes.</p> <p>Additional capacity alone will not resolve some existing operational bottlenecks. An additional freeway management system would complement the additional lanes.</p> <p>Providing no additional capacity would create new major bottlenecks during peak periods, cause significant congestion and poor and unreliable travel times.</p> <p>Hard shoulder running has been extensively investigated, particularly along the Monash Freeway from South Gippsland Freeway to Clyde Road. Analysis found the pavement is not wide enough to support an additional lane and maintain current levels of safety or operational speeds, even with the support of current and any future proposed managed motorway technology.</p> <p>Forecasts showed it would need to operate at a reduced speed for up to 16 hours a day. Overseas studies of part time lanes, particularly in the UK and West Europe, found a decline in their use, reverting to full time lanes. Reasons cited included extended operational periods, unrealised benefits and higher than expected operational and maintenance costs.</p> <p>Based on these factors, the hard shoulder running option is not considered feasible.</p>
Managed Motorway System	<p>Preferred Option:</p> <p>Provision of new ramp meters:</p> <ul style="list-style-type: none"> Westbound from Koo Wee Rup Road to Clyde Road (4 No. ramps) Eastbound from Narre-Warren North Road to Princes Highway East (2 No. ramps) 	<p>The new westbound ramp metering, east of Clyde Road, will ease the existing overloaded ramp meter and mainline bottlenecks west of Clyde Road and further along the M1 corridor. These new meters will support full use of the additional inbound lane.</p> <p>The new outbound ramp meters will assist the operation of the Princes Highway East to Clyde Road section which currently experiences flow breakdown.</p>

Scope option	Description	Summary of Assessment
	<ul style="list-style-type: none"> At the EastLink/Monash Freeway interchange on the freeway-to-freeway ramps connecting to the Monash in both directions (2 No. ramps) 	<p>The new ramp meters at the EastLink/Monash interchange will greatly improve operations both to the east and west of the interchange in peak periods. The high flows entering from EastLink and flow breakdowns from uncontrolled flows is quite extensive and evident in locations seemingly remote from the interchange.</p>
	<p>Upgrades of existing ramp meters (including storage) in both directions along the Monash Freeway between Warrigal Road and Clyde Road</p>	<p>Ramp storage upgrades, that allow more vehicles to fit on the ramps before getting on or off the freeway, will help address existing deficiencies and add flexibility to meet future growth. Adequate ramp storage limits the impacts on connecting arterial roads when traffic banks up, and provides fair access to the Monash Freeway across the day.</p>
	<p>Upgrades and extension of the freeway mainline and ramp detection to facilitate new and upgraded ramp metering and widening works</p>	<p>Controlling all entries to the Monash Freeway and providing appropriate storage will significantly delay and frequently prevent flow breakdown.</p>
	<p>Signalisation of the Ferntree Gully Road outbound exit ramp</p>	<p>It minimises the impacts of congestion and delays, resulting in better throughput and reliable travel across the day. In the event that flow breakdown does occur, full control will enable significantly faster recovery of the system to return operations to a reliable state, optimising the benefits to the community, business and freight.</p>
	<p>Improved incident response along the Monash Corridor.</p>	<p>A full Level 3 Managed Motorway System, in addition to full ramp metering control, is highly desirable to further improve the response to incidents. It can be introduced in stages.</p>
	<p>Other options considered:</p> <ul style="list-style-type: none"> Provision of LUMS 	<p>To reduce the impact of incidents, increased on-road incident response services will be allocated to the corridor.</p>

6.6. Business case project scope

A summary of the business case project scope is provided in the tables and figures below for both the Western Distributor and the Monash Freeway Upgrade Project.

This business case project scope is a concept level scope developed for the purposes of the business case and allowing government to make an investment decision. This concept design will be subject to more detailed development and amendment post business case, which will include extensive opportunity for stakeholder and community consultation and input, including opportunities as part of the statutory approvals pathway that is adopted for the Project (discussed further in Section 1.6).

Table 32: Western Distributor business case project scope

Project Component	Description
West Gate Freeway - Widening	<ul style="list-style-type: none"> • Widening, associated pavement rehabilitation and carriageway separation of the West Gate Freeway in both directions to provide overall capacity of 6 lanes each direction (additional 2 lanes each way) between Williamstown Road and M80 configured as 3 lanes on each of the separated carriageways. • Separated carriageways with braided connections with the following features: <ul style="list-style-type: none"> – Eastbound – The outer carriageway destined for the Western Distributor and inner carriageway destined for the West Gate Bridge with grade separated connections at each end as well a flyover connection from the outer to inner carriageway near the standard gauge freight railway overpass (west of Williamstown Road). Arterial road connections provided along the outer carriageway. – Westbound – The outer carriageway destined for M80 and the central carriageway destined for Princes Freeway West with grade separated connections to both carriageways from the Western Distributor and the West Gate Bridge. Williamstown and Millers Road access via the outer carriageway and Grieve Parade access from the central carriageway via a braided flyover of the M80 carriageway. • Strengthening of bridges along the West Gate Freeway to 75% SM1600 to accommodate High Productivity Freight Vehicles (HPFV) at higher mass limits • Separation of carriageways via solid safety barrier, provision of emergency lanes in the central carriageways and stopping bays along the outer carriageways • Posted speed of 100km/h from M80 to west of Williamstown Road • Replacement of two existing pedestrian bridges spanning over the West Gate Freeway in the vicinity of Wembley Avenue and Rosala Avenue • Upgrade noise walls along the West Gate Freeway with concrete and Perspex noise walls

Project Component	Description
Western Distributor – Yarraville alignment (including tunnel)	<ul style="list-style-type: none"> • Connections between the West Gate Freeway and the tunnel portals and rebuilding of the Williamstown Road interchange bridges • New west-facing ramps for vehicles to access Hyde Street from the elevated connection • Two 15.5m diameter bored, 1.6km tunnels ultimately catering for three traffic lanes in both directions, operating only as two lanes with shoulders initially, using a single tunnel boring machine • Southern portal on the north side of the West Gate Freeway near Hyde Street • Northern portal east of Whitehall Street, north of Somerville Road, west of the Maribyrnong River
Western Distributor – Elevated road and port access	<ul style="list-style-type: none"> • Single span bridge across the Maribyrnong River • Direct access to the Port of Melbourne at Mackenzie Road (to/from West Swanson Dock) • Viaducts in both directions above Footscray Road • Eastbound viaduct connection to Appleton Dock Road at the existing intersection with Footscray Road (to access East Swanson Dock, Victoria Dock, Appleton Dock) with a return westbound viaduct connection from Footscray Road • Grade separated shared user facility at Appleton Dock Road, Footscray Road and Mackenzie Road intersections
Webb Dock Access	<ul style="list-style-type: none"> • Single lane widening of Cook Street (Eastbound) from Todd Road to the West Gate Freeway ramp terminal intersection. • Dedicated new connection and an upgrade to the West Gate Freeway-to-CityLink northbound ramp (Ramp M) including widening for ramp metering, realignment and regrading along the ramp and signalisation of the Cook Street/Salmon Street intersection.
Western Distributor – Eastern interchange	<ul style="list-style-type: none"> • Inbound and Outbound: Connections to CityLink via modified Dynon Road ramps • Access via ramps onto Footscray Road with additional connections to Dynon Road and Wurundjeri Way. Final resolution of scope will include consultation with Melbourne City Council, other stakeholder and the community.
Freeway Management System	<ul style="list-style-type: none"> • Ramp metering upgrades (increased storage provisions) and new installations including the West Gate Freeway, Western Distributor and Princes Freeway West, including metering of the West Gate Freeway/CityLink connections (East-to-North and North-to-West) • Installation of LUMS and supporting ITS along the West Gate Freeway and Western Distributor, including adjacent sections of the Princes Freeway West and M80.

Figure 48: Western Distributor business case project scope

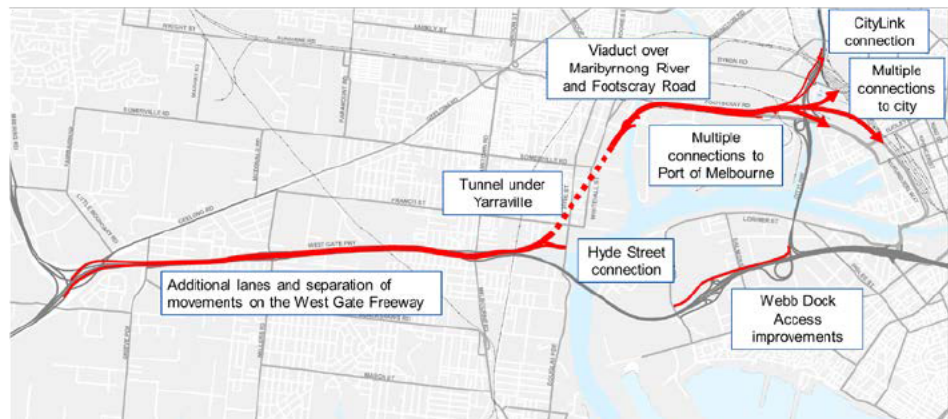
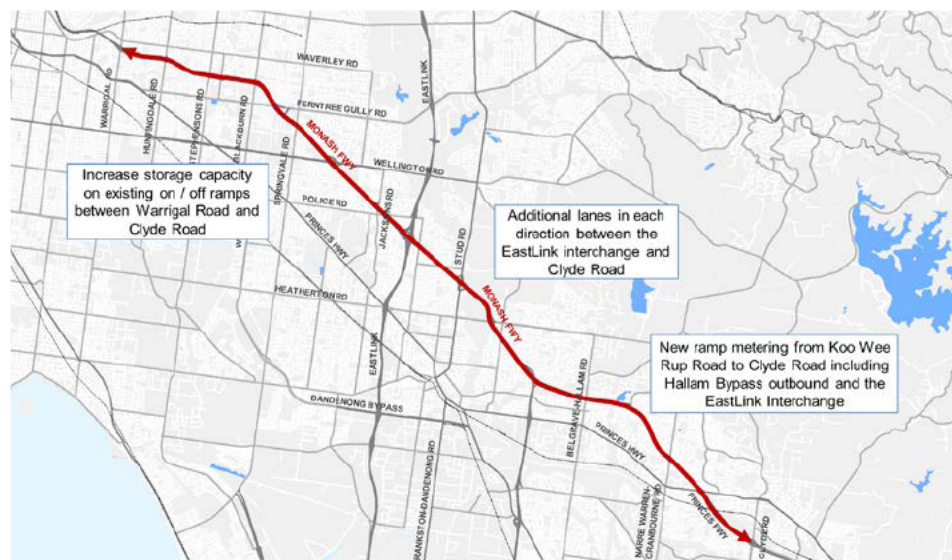


Table 33: Monash Freeway business case project scope

Project Component	Description
Monash Freeway Upgrade	<ul style="list-style-type: none"> Additional traffic lanes – one in each direction – on the Monash Freeway between the EastLink interchange and Clyde Road in the south-east New ramp metering installations on the Monash Freeway from Koo Wee Rup Road to Clyde Road inbound, along Hallam Bypass outbound and on the EastLink connections to the Monash Freeway, including new and upgraded mainline and ramp detection Increase the storage capacity on existing entry ramps along the Monash Freeway between Warrigal Road and Clyde Road Increased on-road incident response services.

Figure 49: Monash Freeway business case project scope





7. Project scope: Tolling structure

This section sets out the approach taken to developing a tolling strategy for the Project and the various toll pricing alternatives considered. It also presents the forecast toll revenues and cost estimate for the toll collection system.

The approach to forecasting toll revenues is outlined, including the assumptions used for the purposes of this business case. The tolling strategy and potential pricing are described, along with toll revenue forecasts.

This section also considers toll collection costs and the impact of tolling the Project, legislative considerations and sensitivities that exist.

The analysis identifies an approach to toll pricing that is reasonable based on the business case project scope and on the current pricing regimes on Melbourne's existing toll roads. Further refinements to the tolling structure are likely in the tendering stage of the Project.

The State's tolling principles provide the overarching framework for assessing various tolling options. The tolling principles appropriately balance the trade-off between collecting toll revenues with delivering superior road network management outcomes, to:

- Improve transport outcomes by optimising asset utilisation and managing traffic flows across the transport network
- Ensure that toll levels reflect the benefit obtained by the user and avoid distortionary impacts on the network, while protecting the long-term interests of the state, including the state's ability to fund future network augmentation.

The following information has been redacted in this chapter:

- Toll revenue forecasting assumptions assumed for the purposes of the business case including annualisation factors and ramp-up assumptions
- Assumptions in relation to the network toll cap assumed for purposes of the business case

This information has been redacted as it is considered to represent commercially sensitive information that, if published, might prejudice the State's ability to deliver a value for money outcome for the Project.

7.1. Overview

Major transport infrastructure projects such as this are typically focused on achieving significant benefits for the transport system in terms of managing the transport network, providing transport choices and influencing travel behaviour. With respect to road infrastructure, another tool to assist is a user pays system through a toll road scenario. The inclusion of tolls on users of the Project will help to manage transport demand and behaviours to maximise efficiency and improve benefits for all users of the surrounding transport network.

Irrespective of the procurement model adopted, the tolling arrangements should be flexible to allow future governments, if they wish, to consider the potential for distance based and/or dynamic time of day pricing on either a link-by-link or network-wide basis to maximise efficient use of the road network.

For the purposes of this business case, the tolling analysis undertaken indicates what a reasonable tolling structure might deliver in terms of economic and financial impacts. The Government does not need to decide a preferred toll pricing regime now. Under a state-led procurement arrangement, for example, if a PPP is tendered to the broader market, then a toll pricing regime will be required to be developed in conjunction with the procurement process. The precise timing of such development will depend on whether demand risk in respect of toll revenue is proposed to be transferred to the private sector or retained by the State. Further refinement post business case will look to optimise the toll price structure to ensure that the forecast economic benefits are not eroded. Should Government progress the Transurban Proposal, Government will need to determine the toll pricing regime as part of those negotiations.

Alternative toll pricing scenarios were also developed to inform the Government about the potential benefits and revenue that might be derived, and to understand the impacts on the adjacent transport networks.

The tolling structure options assessment was split into two distinct sections:

- Tolling of new and upgraded assets
- Transport network management and tolling.

This section outlines the proposed tolling structure and tolling options for the broader transport network. This analysis is supported by a summary of the approach to traffic modelling and forecasting toll revenues. The toll collection system and risk adjusted cost for all tolling elements is also provided.

All toll prices expressed in this submission are set at June 2015 prices unless stated otherwise.

7.2. Tolling options considered

The table below summarises the various tolling and network management options considered.

Table 34: Tolling options considered

Project part	Scope options	Section
Tolling of new / upgraded assets	<ul style="list-style-type: none"> • Western Distributor <ul style="list-style-type: none"> – Establishing the underlying toll price – Inner urban access – Time of day tolling • West Gate Freeway Widening <ul style="list-style-type: none"> – Heavy vehicle tolling – Sectional tolling 	Refer to Section 7.4
Transport Network Management and Tolling	<ul style="list-style-type: none"> • Heavy vehicle tolling options <ul style="list-style-type: none"> – Alternate vehicle class for High Productivity Freight Vehicles – Toll charging options for Port shuttle movements – Unified Toll cap • Broader transport network tolling options <ul style="list-style-type: none"> – State continues to charge tolls on CityLink (upon expiry of existing concession) 	Refer to Section 7.5

Technical papers summarising the detailed assessment are attached in Tolling Options Summary Paper– Attachment F and CICA Tolling Operations Cost Model Report – Attachment G.

7.3. Assessment framework

The State's tolling principles provide the overarching framework for assessing various tolling options.

7.3.1. Approach to determining traffic volumes, benefits and toll revenues

The process of estimating the potential traffic, benefits and toll revenues from the project all draw from the use of a traffic model to forecast average weekday traffic volumes and travel time savings given a defined toll structure. The specific process for estimating toll revenues includes the following steps:

- Using a traffic model to forecast average weekday traffic volumes across Melbourne's transport network at future points in time, using a defined toll price structure
- Using annualisation factors to convert daily volumes (average annual weekday volumes) into annual volumes
- Calculating forecast annual toll revenue based on volume projections for a defined toll price
- Estimating the traffic growth profile over the Project life (through interpolation between the above data point years and extrapolation beyond the final data point year) for that toll price in order to forecast whole of life revenues.

Traffic modelling

Transport models are complex mathematical models that take a range of inputs – such as population growth, employment forecasts and the effect of toll prices on driver behaviour. They generate predicted patronage levels and mode and route choices into the future after putting in the key inputs of location/connections, relative cost, volume carrying characteristics and desirability. This gives a forecast of the travel demand for private vehicle, public transport and light and heavy commercial vehicle.

Veitch Lister Consulting (VLC), a major Australian transport modelling company, was engaged to develop a transport model to forecast the network impacts, traffic volumes and revenue potential. VLC's 'Zenith' four-step model is well regarded in the area of toll road forecasting both in Victoria and other Australian states, and was used in the planning and delivery of Melbourne's existing toll roads (CityLink and EastLink) and other Government projects.

Table 35: Toll revenue forecasting process

Step	Description
Assumptions	<p>The traffic model used relies on a number of significant forecasting assumptions, including:</p> <ul style="list-style-type: none">• Future population and employment forecasts from Victoria in Future (2014)• Transport network development plans based on the DEDJTR and PTV reference case for the 2021 and 2031 network, but excluding large scale, unfunded network augmentations• Transport cost growth forecasts for both public and private transport modes, as developed by DEDJTR.

Step	Description
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The impact of tolling	<p>The use of tolled infrastructure is generally determined by evaluating the time savings and cost benefits obtained by travellers when they use the project road, compared to the previous best alternative (in the case where the project road does not exist) in conjunction with the monetary value of the toll.</p> <p>The transport model needs to identify and analyse the potential network wide benefits and impacts created by the Project, while also considering the appropriate toll price structure for revenue purposes.</p> <p>On most inner urban toll facilities, there are opportunities to increase toll prices to reflect greater travel time savings , particularly in the peak periods. However, a high toll price is often not adopted as it would typically not offer the greatest network wide benefits, which would result in a lower economic benefit.</p>
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Annualisation factors	<p>The traffic model produces forecast traffic volumes for a typical week day, exclusive of public and school holidays. To convert these daily projected volumes into yearly volumes, annualisation factors are applied based on historic trends for roads of a similar nature and use, such as CityLink, EastLink and the West Gate Freeway. They are:</p>
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Vehicle Class	2021	2031
Car		
LCV		
HCV		
All Vehicles		

Additional annualisation factors may be required when considering alternate tolling structures, such as weekday only tolls, and reduced volumes on public holidays. The assumed factor for a weekday only toll is:

- [redacted] for cars and LCVs

Ramp-up period	<p>When a new road opens it takes a period of time, known as 'ramp up', for traffic volumes to build to a steady state of growth. It takes time for potential users to become familiar with the new travel options and the relative value the new road offers.</p> <p>Existing roads which will have a toll applied to them, such as the West Gate Freeway for HCVs, will have a different ramp up profile as drivers already use the road and know its value.</p> <p>Ramp up is often very difficult to predict as it varies depending on the savings the road may provide, who is likely to use the road and how well the benefits are perceived. To develop an assumed ramp up profile for the Project, the actual experiences of recent toll road facilities in Victoria and</p>
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Step	Description
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Australia have been reviewed with the trends applied to the Project.

Table 36 provides the ramp up profile to be adopted for the Western Distributor Tunnel and Viaduct. This reflects the 'greenfield' nature of this new facility.

Table 36: Project ramp up period – Western Distributor Tunnel and Viaduct

Month after opening	% of steady state volume	Month after opening	% of steady state volume

Table 37 provides the ramp up profile to be adopted for the HCVs on the West Gate Freeway. This profile has been based on the observed profile from the Tullamarine section of CityLink and represents those conditions of an existing freeway being upgraded. In that case the tolls were applied to all vehicles, whereas in this case it is proposed that they are only applied to HCVs. It is likely that HCVs would have an even shorter ramp up profile to that depicted below, due to their higher focus on operational costs of travel.

Table 37: Project ramp up period – West Gate Freeway for HCVs


Month after opening	% of steady state volume	Month after opening	% of steady state volume

7.4. Tolling of new / upgraded assets

This section provides information on establishing the overall toll price structure and options for the new assets of the Western Distributor and upgraded West Gate Freeway. Further information can be found in Tolling Options Summary Paper (Attachment F).

The Project connects with and, for some length, runs parallel to an existing toll road with mature traffic levels and demonstrated levels of toll acceptance. These existing toll prices, together with an understanding of network management, provide a sound basis for recommending a proposed toll price structure.

Table 38: Western Distributor Tolling Options

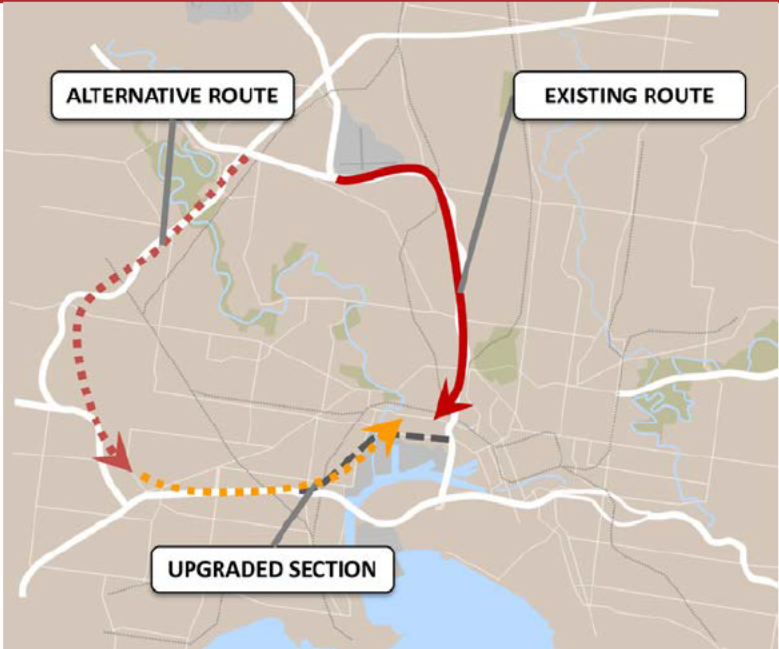
Tolling option	Description & Assessment
Underlying Toll Price for Western Distributor	<p>The proposed tolling structure considers the toll rates on adjacent roads for consistency in toll prices across the network, as well as minimising unbalanced distribution of traffic volumes. As the Project creates new routes for vehicles to access various parts of the network these new routes should be considered with respect to the existing alternatives to avoid potential unbalanced network outcomes.</p> <p>The Project provides a real alternative to the Bolte Bridge for traffic travelling to/from the West Gate Freeway bypassing congestion on the West Gate Bridge particularly in the peak periods. If the toll price on the Western Distributor and the Bolte Bridge are not harmonised, it could result in unbalanced flows on the network and under/over used assets.</p> 
Preferred Solution:	<p>Current analysis suggests setting a toll for the Western Distributor that is similar to the tolls for Cars and LCVs on the Bolte Bridge. For the purposes of the business case, the toll price for use of the Western Distributor tunnel has been assumed at the same price as the Bolte Bridge for Cars and LCVs. That is, \$2.77 for cars and \$4.43 for LCVs (June 2015 dollars).</p>

Tolling option	Description & Assessment
Inner urban access	<p>The business case provides for three dedicated ramp connections from the western suburbs of Melbourne to key arterial roads at the edge of the city.</p> <p>Given the need to manage vehicle demand for access to inner urban areas and the desire to balance traffic flows across the network, a higher toll price for access to the inner city has been considered.</p> <p>Melbourne currently has a toll for vehicles accessing the CBD via the Exhibition Street Extension. The toll that is charged to access the CBD from the Monash Freeway is the same as the toll charged to travel through the tunnels to access the West Gate Freeway (from CityLink), highlighting the 'premium' that citybound drivers pay to use a high quality connection.</p> <p>In applying any tolling structure to these access ramps, consideration needs to be given to balancing the economic benefits of the Project against the demand management considerations. This is best considered across the various times of the day and/or directions of travel. The following scenarios have been considered:</p> <ul style="list-style-type: none"> • increased toll applied throughout the day • increased toll applied during the weekday PM peak outbound, and • increased toll applied during the weekday AM peak inbound. <p>If the increased toll was applied throughout the day it could have limited use (other than during the peak, as other roads are less congested). This could make the Project less attractive as a tolled option during the off peak and inter-peak, reducing its use and its economic value for the state. Initial traffic modelling supports this view, showing that travel time savings benefits would be significantly reduced.</p> <p>If the increased toll is applied during the PM peak outbound when demand is high, it would have the potential to divert trapped vehicles originating in the CBD to other more congested CBD roads thereby limiting any significant benefits of the improved access to inner city arterial roads. However, providing the high quality access to inner urban roads without the additional toll price in the PM peak would help flush vehicles out of the city fringe during the afternoon, reducing the congestion on inner urban roads during the PM peak.</p> <p>Preferred Solution:</p> <p>With the toll only applied during the inbound AM weekday peak period, the toll would have the potential to influence travel mode choices and limit demand for car access to the CBD. Further, given the level of congestion on the surrounding network at this time, it would have limited impact on economic benefits and would create the opportunity to manage inbound traffic flow during the morning peak.</p> <p>Due to the considerations outlined above, it has been assumed</p>

Tolling option	Description & Assessment
	<p>that at this stage the most suitable tolling structure is to apply a higher toll price for inner urban access inbound during the weekday AM peak only.</p> <p>A similar trip from the East of Melbourne to the CBD using the CityLink city access at the Exhibition Street Extension is charged at around \$7.20 (June 2015 prices).</p> <p>For consistency and equity of toll prices across the network, a similar price has been assumed for the project inner urban access ramps. That is, a \$4.43 car toll for the ramps, plus the Western Distributor tunnel set at \$2.77, bringing the total trip price to \$7.20. However, as noted above, to optimise benefits to the community, this toll would only be applied inbound during the weekday AM peak period.</p> <p>It is worth noting that this price is higher than that of an equivalent journey on public transport. A daily full fare ticket is \$7.52 (using Myki Money). This fare provides for two-way travel. The equivalent price for that trip using the Western Distributor is \$9.97 (\$7.20 inbound and \$2.77 outbound), both with 2015 prices. This demonstrates that the toll price assumed for the Project is expected to provide a disincentive for trips to change modes from public transport to road.</p>
Time-of-day tolling	<p>Time-of-day tolling is where the toll price varies depending on demand at different times of day. This approach has been adopted in many cities around the world. There are a number of reasons to consider this pricing policy, including to:</p> <ul style="list-style-type: none"> • reduce peak period congestion by encouraging more people to travel in the off-peak and inter-peak periods • provide a consistent value for money proposition for drivers using the toll road by reducing the toll when the surrounding network is less congested and the travel time savings would not be as high • charge a premium price in peak periods when demand is high, particularly for access to a CBD location where viable alternatives exist, including public transport • encourage greater use of the tolled facility throughout the day, thereby optimising the value of the asset in the network and promoting easier travel in non-peak periods to improve overall travel benefits across the network. <p>Time-of-day tolling would be beneficial to the Project as it provides a balance between usage and revenue.</p> <p>A key consideration for the toll structure on this Project is to provide overall balance on the network. The toll prices assumed in the business case are similar to those on CityLink to minimise distortionary impacts. As CityLink does not have time of day tolling for Cars and LCVs (there are discounts for HCVs at night) there are challenges to introducing this concept on this Project without creating the risk of undesirable imbalances on the network.</p> <p>While not further progressed at this stage, the Project should not</p>

Tolling option	Description & Assessment
	<p>compromise the ability to modify the tolling structure both on the project and potentially through negotiations with CityLink to implement a more sophisticated time of day tolling structure across the inner urban freeway network.</p> <p>Time-of-day tolling would support government policy objectives to encourage greater use of the road network by freight at night when there is spare capacity and when the impacts of truck performance and breakdowns are less significant.</p> <p>Further, given that the project provides direct linkages to the Port of Melbourne, consideration needs to be given to the 24/7 operation of the Port of Melbourne. It has been acknowledged that for the port capacity to continue to grow, more and more truck trips will need to occur at night. A form of night time discount will assist in incentivising this behaviour for the freight industry.</p> <p>Preferred solution:</p> <p>Without similar changes to the CityLink tolling structure an all-encompassing time of day tolling structure is not proposed for the Project.</p> <p>As noted above, CityLink provides discounts for HCVs at night. This discount, agreed as part of the CTW deal, is a 33% discount applied between 8pm and 6am and is applied to the sectional tolls and the toll cap. The same night time discount has been assumed for this Project.</p> <p>As outlined above, time-of-day tolling for access to inner urban areas has also been considered as there is not a direct tolled alternative providing the same quality of access. In this case, the higher price during the peak period can be applied without creating the risk of network imbalance.</p> <p>It is possible that a reduced discount (to 25%) could be negotiated with Transurban at a later stage to increase the toll value at night while not creating an imbalance. This could be explored further in the future, and is not considered necessary at this stage.</p>
Tolling of HCVs on upgraded West Gate Freeway	<p>Heavy commercial vehicles can access the Port of Melbourne via CityLink or the West Gate Freeway for part of their journey. The Project will provide a high capacity, high speed alternative route to access the Port of Melbourne from the west and north west of the City. As part of this Project, the West Gate Freeway will be widened from the M80 Ring Road to the ramps to/from the Western Distributor tunnel in the vicinity of Williamstown Road. It is proposed that HCVs and HPFVs using the upgraded section of the West Gate Freeway will be tolled.</p>

Tolling option	Description & Assessment
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In developing the toll rate for HCVs along the West Gate Freeway, consideration has been given to the toll rate on the adjacent Western Link (CityLink) and maintaining a balance between the two routes. The assessment includes the change in HCV toll multipliers along Western Link that has been agreed as part of the CTW project.

The toll rate for vehicles travelling to Footscray Road from the Tullamarine Freeway along an upgraded Western Link will be \$13.26 (June 2015 prices) with the CTW agreed HCV multiplier of three.

Preferred solution:

To maintain balanced flow on the network, a similar toll rate to the Western Link section of CityLink has been assumed for HCVs travelling to Footscray Road via an upgraded West Gate Freeway and/or Western Distributor tunnel. This is assumed as \$13.30 (June 2015 prices)

<p>West Gate Freeway sectional tolls</p>	<p>While it has been noted that there is the need to provide a balanced toll for the network with respect to the HCV tolling on the West Gate Freeway and therefore the price would be set equivalent to the similar journey that could use CityLink, there is opportunity for further refinement in how this toll price is applied on the various sections of the upgraded West Gate Freeway.</p> <p>Sectional tolling could be applied to the two sections from Grieve Parade to Millers Road and Millers Road to Williamstown Road. Setting the actual toll prices can be done through a number of different price determination methods, however, the simplest would be to assign them based on distance. These sections represent an approximate 40/60 percentage split of the total distance between Grieve Parade and Williamstown Road.</p>
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Tolling option	Description & Assessment
	<p>Therefore, the HCV toll price could be allocated as:</p> <ul style="list-style-type: none"> Grieve Parade to Millers Road - \$5.30 Millers Road to Williamstown Road - \$8.00 <p>The total trip from Grieve Parade to Williamstown Road would still equate to \$13.30 (June 2015 dollars).</p> <p>There is the possibility that some heavy vehicles would avoid the West Gate Freeway to bypass the sectional tolling, such as heavy vehicles that might have entered at Millers Road to travel west. These vehicles might stay on the arterial road network to travel further west beyond the toll point to access the freeway. Conversely, heavy vehicles which were travelling east might enter the West Gate Freeway at Millers Road, rather than Williamstown Road to avoid the \$13.30 toll, as the toll for this section would be lower.</p> <p>Preferred solution:</p> <p>Overall, this option could provide some minimal value in terms of user benefits and revenue. Further refinement could be undertaken to look at the possibility of increasing these prices for each section while maintaining the same overall price cap. This would only serve to increase revenue but would have the potential to divert short trip truck traffic away from the Freeway and back onto local roads in the west. For that reason, this concept has not been progressed further, although there may be merit in investigating it in later stages of project development.</p>

7.5. Transport network management and tolling

This section considers alternative tolling options above the base structure to deliver broader transport network benefits. Further detail can be found in the Tolling Options Summary Paper (Attachment F).

Table 39: Freight Tolling Options

Tolling option	Description/Assessment
New vehicle class for HPFVs	<p>On toll roads around the world, it is common to charge higher prices for commercial vehicles than cars.</p> <p>The general industry practice adopted in Victoria and Australia is to charge:</p> <ul style="list-style-type: none"> Light Commercial Vehicles (LCVs) 1.6 times the unit car price Heavy Commercial Vehicles (HCVs) 3 times the unit car price. <p>HPFVs such as super B-doubles or B-triples can help to reduce the number of trucks on Melbourne's road network by transporting more freight than traditional trucks. However, HPFVs place an additional burden on road infrastructure, with the higher loads carried by HPFVs causing extra wear and tear on the road surface and many existing structures require</p>

Tolling option	Description/Assessment
	<p>strengthening to be able to take the high mass trucks. As a result, the higher capital expense and higher ongoing maintenance requirements will cause road operators to incur additional costs.</p> <p>HPFVs have a higher commercial value due to their ability to carry additional loads and so would place an even higher value on travel time savings.</p> <p>Creating a fifth vehicle class to separately toll HPFVs would potentially allow the higher costs incurred from HPFVs to be recovered without passing on the cost to other road users. It is noted that in structuring heavy vehicle tolls that a differential toll should not be set so high as to discourage the use of larger more efficient trucks, such as HPFVs, and the toll should be understood by the industry. Implementation of differential tolls should be straight forward and not present a barrier to the take up of larger trucks.</p> <p>VicRoads define a HPFV as a vehicle:</p> <ul style="list-style-type: none"> • of 26m or greater in length; or • one that can carry 68.5 tonnes or greater. <p>Typically, a HPFV can carry twice as much as the standard HCVs. This would appear to justify a 100% increase in the multiplier from HCV to HPFV, however this does not consider the broader cost of operation of these vehicles. Nor does this increase reflect the lower impact per TEU of these vehicles on the network. While carrying twice the load, HPFVs do not inflict twice the wear and tear on the road network, nor do they consume twice the capacity of the other HCVs. This increase would also not look to incentivise the use of the HPFVs over standard HCVs.</p> <p>Preferred solution:</p> <p>A higher toll rate is appropriate for the HPFV class.</p> <p>To determine the multiplier to be applied to this additional class, consideration should be given to the logistics costs of running HPFVs, the operational efficiencies of running with full or empty loads, and the need to incentivise the industry to move towards using more efficient vehicles.</p> <p>For the purpose of the business case, a multiplier of 4.5 for the HPFV class is assumed – a 50% increase of the HCV rate. Over time, as the carrying capacity of HPFVs increase (as supported by Government policy), flexibility will be required in the tolling scheme to accommodate increasingly higher tolls to reflect increasing increments of vehicle mass, reaching 110 tonnes. This would equate to around \$20.00 for the HPFVs on the upgraded West Gate Freeway.</p>

Toll charging options for Port shuttle (HCV) movements

A key objective is to take truck traffic off local streets in the inner west. A key element of this traffic is those trucks that undertake multiple trips each day between the Port of Melbourne and the container yards in the west of Melbourne. These trucks, referred to as Port shuttles, are likely to currently

Tolling option	Description/Assessment
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be using the arterial roads within the west to access the specified container yards.

Shuttle trucks commonly make six trips a day, which if tolled, could cost up to \$80 a day – a cost that would inevitably flow through to consumers, or discourage trucks from using the new link.

Truck surveys undertaken over a 24 hour period, showed that over 3,600 heavy vehicle trips were made between the Port and destinations in the west of Melbourne accessed via Francis Street and Somerville Road (routes that are likely to redistribute to the Project). The 3,600 trips were made by 1,715 different vehicles, indicating a reasonably high number of vehicles undertaking shuttle movements.

Preferred solution:

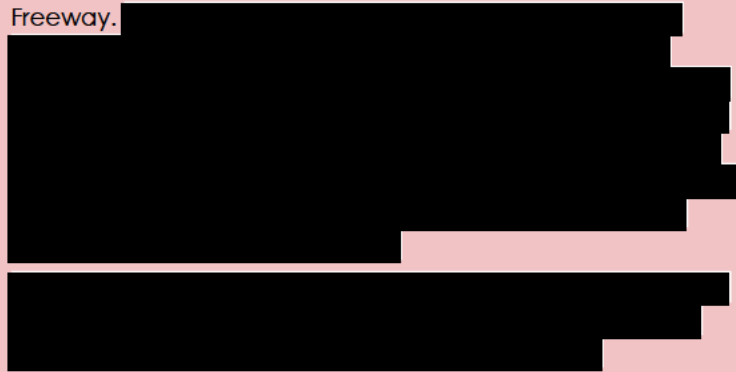
A reduced toll price for shuttle vehicles with a capped price for multiple trips would help remove trucks from residential streets. A sliding scale for shuttle movements over a 24 hour period could be set as:

- First 4 trips full toll rate
- Next 4 trips at 50 per cent toll rate
- Any additional trips free

Unified Toll Cap A unified toll cap avoids toll fatigue where users are charged multiple tolls for using multiple toll roads in a single trip.

The likelihood of reaching any unified toll cap for cars or LCVs is very low. Currently on CityLink, vehicles will only reach the toll cap (cap-out) when they travel on both the Western and Southern Links of CityLink. Due to the alignment/configuration of the Project, this is unlikely. For a car or LCV to reach the toll cap it would require vehicles to use the Project eastbound, then join CityLink prior to the Bolte Bridge and travel south, then continue to travel east along CityLink SouthernLink, avoiding the West Gate Bridge. This is an unlikely movement. If vehicles were just to travel on the Project and join CityLink WesternLink, they would not reach the toll cap.

However, there may be value in a unified toll for HCVs, as HCVs are proposed to be tolled for use of the West Gate Freeway.



Tolling option	Description/Assessment
	<p>Preferred solution:</p> <p>A HCV toll cap price (all prices are June 2015) for using the West Gate Freeway and CityLink Southern Link has been assumed at \$30.50 [REDACTED]</p> <p>[REDACTED]</p> <ul style="list-style-type: none"> ■ [REDACTED] ■ [REDACTED] ■ [REDACTED] <p>[REDACTED]</p> <p>[REDACTED]</p>

Table 40: Broader network tolling

Tolling option	Description/Assessment
Extension/new contract for tolling on CityLink (upon expiry of existing concession)	<p>Typically, with any form of toll road, the tolls would be in place for at least a 25 to 30 year period. A key focus on establishing the toll structure for this Project, due to its proximity to CityLink, is to balance the toll prices and structure to create a balanced traffic and transport network outcome and optimise asset utilisation.</p> <p>The CityLink concession is due to expire in 2035, after which tolls could be removed.</p> <p>However, traffic modelling has shown that these two routes would experience severe congestion if the tolls were removed. The removal of tolls from the Bolte Bridge would result in a network imbalance, with trips redistributing away from the Project and underutilising the asset.</p> <p>To manage congestion along Southern Link and Western Link, and to maintain balance on the network, tolling should continue on CityLink.</p>

Escalation of tolls

For any extension of tolls on CityLink as described above, toll rates have been assumed to increase yearly in line with CPI, despite average weekly earnings increasing at a higher rate.

For the purposes of the business case, a rate higher than CPI has not been used to calculate revenue here. However it may be considered at later stages of the Project.

To maintain the balance of the network outcome any proposed change to the pricing structure for this Project would require consideration of the CityLink pricing structure.

Tolling is proposed to balance transport network use and as a funding source

7.6. Assumed tolling structure

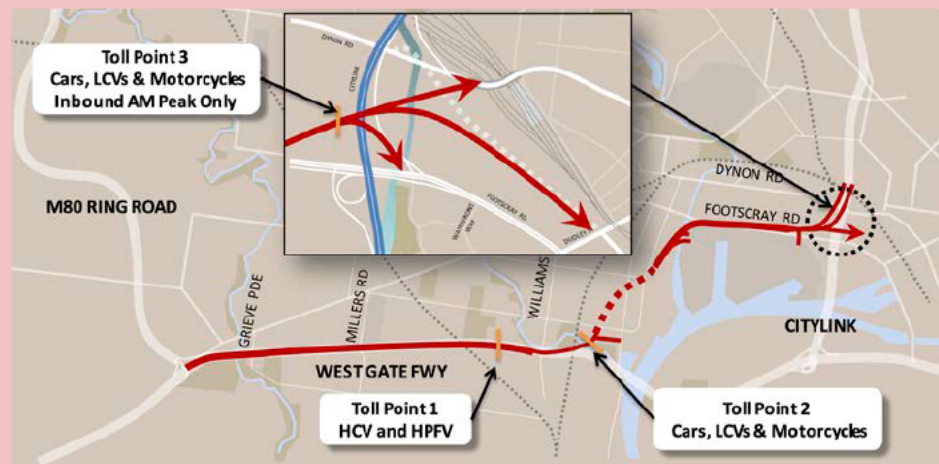
The assumed tolling structure for the purposes of the business case is provided in the table below.

Table 41: Assumed tolling structure

Tolling of New and Upgraded Assets

Toll Points

- Toll Point 1 - West Gate Freeway between Millers Road and Williamstown Road.
This will apply to HCVs and HPFVs travelling in both directions along the West Gate Freeway;
- Toll Point 2 – On the Western Distributor ramps prior to the exit/entrance from Hyde Street. This will apply to cars, LCVs and motorcycles in both directions, either using the tunnel or Hyde Street ramps.
- Toll Point 3 – Toll points will be located on the ramps connecting to Footscray Road, Dynon Road and Wurundjeri Way. This will apply to cars, LCVs and motorcycles in the citybound direction during the AM peak only. Tolls will not be applied to westbound traffic.



Toll Price (\$ June 2015)

Vehicle type	Toll Point 1	Toll Point 2	Toll Point 3
Cars	-	\$2.77	\$4.43*
LCV	-	\$4.43	\$7.09*
HCV (day)	\$13.30	-	-
HCV (night)+	\$8.90	-	-
HPFV (day)	\$20.00	-	-
HPFV (night)+	\$13.30	-	-

*Only applicable during the morning peak for eastbound (inbound) trips

+Night time periods would be similar to CityLink definitions 8:00pm to 6:00am

Tolling of New and Upgraded Assets

Toll Cap

A toll cap would be applied for HCVs travelling from the M80 to Toorak Road utilising both the West Gate Freeway and CityLink Southern Link. This cap would be:

- HCVs
 - \$30.50 during the day (6:00am to 8:00pm)
 - \$19.00 during the night (8:00pm to 6:00am)
- HPFVs
 - \$35.00 during the day (6:00am to 8:00pm)
 - \$21.35 during the night (8:00pm to 6:00am)

7.7. Toll collection system

7.7.1. Trip capture

A range of existing tolling system technologies could be implemented including:

- Tag based tolling
- Video tolling
- GPS based tolling.

Each system has its benefits, however, a tag based toll collection system is recommended for the Project, as it is currently used across Melbourne with an estimated 1.8 million vehicles registered to use CityLink and approximately 300,000 vehicles registered to use EastLink.

Like the toll collection systems used for CityLink and EastLink, it is recommended that the tag-based system for the Project be supported by a video-based system. This is important from an enforcement perspective, increasing accuracy and reducing revenue leakage.

7.7.2. Back office and accounts management

The 'back office' computer system performs processing of tolling transactions and revenue activities. All audits, data and revenue reporting, statistical reporting and supporting activities are also coordinated by the back office computer system.

However, ownership and management of user accounts do not need to be tied to operating a tolling facility; this could be provided by third parties.

Further consideration will be given to the back office functions (including arrangements for contracting with existing toll collection service providers) in the context of the tolling structure for the Project and the selected procurement model. This may require consultation with the operators of both EastLink and CityLink with a view to leveraging from their back office computer systems.

7.8. Toll optimisation and sensitivities

7.8.1. Toll revenue optimisation

The above discussion and the description of the preferred tolling structure represent the current tolling considerations. Further modelling and toll revenue optimisation work could be undertaken to determine different toll pricing at these tolling locations that further considers the user's willingness to pay and optimising network outcomes.

Using Melbourne's existing pricing structures allows the Project to be developed in accordance with previously understood tolling principles, such as optimising asset utilisation and managing traffic flows across the transport network.

The endorsed tolling principles aim to appropriately balance economic benefits for the State and revenue generated to assist in funding the high capital cost. Material differences in the overall toll prices compared to the existing network alternatives may create undesirable traffic network distortions and risk reducing the economic benefits of the Project.

Detailed toll price modelling to determine the toll level which maximises revenue has not been undertaken. Further modelling will be undertaken to test the revenue and economic benefit sensitivity of the options for proposed toll price structures.

The proposed toll price structure at this stage provides an indicative structure for the purposes of modelling and assessing the economic and financial merit of the Project in the business case. Further detailed assessment is expected to be undertaken post business case in subsequent stages of the project development, post business case approval. This will look to recommend an optimised toll price structure which ensures that the forecast economic benefits are not eroded.

7.8.2. Tolling sensitivity

Further modelling will be undertaken in the next stages of the project development to gain further confidence around these assumed toll structures and toll prices. As part of this further work, sensitivity testing will be undertaken to have a greater understanding of the likely variances of traffic volumes, network distribution, revenue and benefits with respect to small changes in the toll price.



8. Project scope: Key risks

This section sets out the key risks associated with the preferred physical scope and tolling structure.

An initial risk identification, quantification and risk management review has been undertaken in relation to key risks for delivering the Project. This section provides a summary of the risk identification review and the key risks associated with design and construction of the business case project scope.

A further detailed risk identification and assessment review will be undertaken as part of the next stages of the Project including through the planning approvals process. This will include extensive stakeholder and community engagement.

Details in relation to the risk management approach based on the preferred procurement method, including considerations of key strategic and procurement risks are discussed in Section 15: Risk Management.

The following information has been redacted in this chapter:

- Summary of the State's assessment of risks in relation to Project interfaces with CityLink and EastLink

This information has been redacted as it is considered to represent commercially sensitive information that, if published prior to the conclusion of the procurement process, would likely prejudice the State's ability to deliver a value for money outcome for the Project.

8.1. Overview

As part of the business case, risks were identified and assessed separately for the Western Distributor scope, the Monash Freeway Upgrade and the assumed tolling structure, with slight differences in approach.

A summary of the risk assessment process and its phases is provided below.

Table 42: Risk assessment process

Phase 1 Risk Identification	A series of risk identification workshops were held involving members of the project team from a variety of disciplines.
Phase 2 Risk Quantification	<p>A risk quantification process was undertaken by the project team for both inherent risks and contingent risks:</p> <ul style="list-style-type: none"> • Inherent risks are "business as usual" risks that are expected to occur during the implementation. While project estimates are prepared on the basis of a set of assumptions that define a 'business as usual' case, inherent risks arise when there is uncertainty in scope, uncertainty in the metrics that can be achieved, or uncertainty in unit pricing. • Contingent risks are risks that arise if the assumptions that form the basis of the estimate do not prove to be valid or constant, or if there are events that were

**Phase 3
Monte Carlo Analysis**

not foreseen and accounted for in the estimate.

In the case of both inherent and contingent risks, three pointed estimates are generally made which are then used in the quantitative analysis:

- Best (most favourable outcome or minimum)
- Most Likely (anticipated outcome)
- Worst (least favourable outcome or maximum).

**Phase 4
Review**

From the risk quantification process a Monte Carlo simulation¹⁴ was undertaken to calculate a range of probable financial outcomes based on the probability of the risk occurring and the estimated financial impacts. The accumulated output values are aggregated into a single frequency distribution that forms the basis of the risk quantification for the identified project risks.

As a final step in the process, the results of the 'bottom-up' quantification of risks were reviewed from a 'top down' perspective to assess the overall reasonableness of results based on the collective experience and judgement of senior members of the project team (and its advisers).

In addition, DTF engaged an independent peer reviewer, APP, to review the capital cost estimate and risk adjustments identified in this business case.

The following sections summarise the key risks and outline the strategic risk management plans for the following:

- Western Distributor
- Monash Freeway Upgrade
- Tolling structure.

A copy of the risk register is provided within the Advisian Cost Report, provided in Attachment E.

¹⁴ Monte Carlo simulation performs risk analysis by building models of possible results by substituting a range of values—a probability distribution—for any factor that has inherent uncertainty. It then calculates results over and over, each time using a different set of random values from the probability functions.

8.2. Western Distributor risks

Table 43: Western Distributor key risks

Risk Category	Description	Risk management approach
Scope specification risks	<p>The risk that the State inadequately defines the required project scope in terms of the network connections and road capacity.</p> <p>The risk of changes in the required scope over the Project's life due to factors that underpin the initial scope specification ultimately differing to assumptions (including for instance population growth differing to assumed rates).</p>	<p>The business case has included the use of a detailed traffic model to test a range of project scope options.</p> <p>Inputs to this model (which represent key drivers for forecast demand) have been developed in close collaboration with DEDJTR, VicRoads, DTF and DPC, with key inputs and review from the Project's technical advisors, VLC, GHD and Advisian. Both the model and the inputs have also been the subject to an independent peer review.</p> <p>Further, extensive intra-government consultation will help to mitigate this risk.</p>
Planning approvals	<p>The risk that necessary planning and statutory approvals are not obtained in the timeframe or in the form and conditions anticipated.</p>	<p>It is likely that the approvals process will be on the critical path for delivery, and that the approvals process will run concurrently with the procurement process.</p> <p>A parallel process will need to be carefully managed to facilitate efficient transfer and pricing of associated risks (where relevant under the preferred procurement model).</p> <p>This proposed approach has been the subject of extensive consideration and review and is discussed further in Section 16.3.2.</p>

Risk Category	Description	Risk management approach
Land acquisition	<p>The risk that the actual land acquisition costs differ from those forecast, either due to:</p> <ul style="list-style-type: none"> • additional land being required • compensation payable to land owners exceeds expectations. <p>There is also a risk the Project is delayed due to land acquisition.</p> <p>Given the extent of tunnelling and the use of existing road corridors for the upgrade of the West Gate Freeway proposed, land acquisition requirements are generally limited to the location of tunnel portals (rather than extending along the full route alignment). However, it is likely that subsurface strata acquisition may be required along the alignment as 'centre of the earth' land titles exist.</p> <p>No consultation has been undertaken with individual land owners to date. As such, estimates for compensation payable to businesses (in particular) are of a preliminary nature only.</p>	<p>The scope options assessment work completed as part of the business case has included initial assessments of the Project's footprint during and after construction to identify the extent of required land.</p> <p>The state concept design does not require any homes to be compulsorily acquired.</p> <p>Acquisition cost estimates have then been developed based on the specific current use of each parcel of land (with additional risk allowances included).</p>
Site risks	<p>The risk that site access and conditions will be less advantageous than that assumed in the underlying cost estimates.</p>	<p>This risk has been partially mitigated through the underlying cost estimates taking into account the existing developed urban environment and the impacts of construction activities (including on-site access, traffic management requirements and productivity rates, particularly where works need to be delivered in close proximity to other transport infrastructure such as rail lines).</p>

Risk Category	Description	Risk management approach
Ground conditions	<p>The risk of additional cost or time delays during construction as a result of:</p> <ul style="list-style-type: none"> • Geotechnical conditions differing from those anticipated when developing the underlying D&C cost estimate (resulting in tunnelling rates being slower than expected and/or more costly tunnelling build solutions needing to be adopted) • Ground contamination – with several sites along the proposed Project route likely to be contaminated due to their past uses • Poor ground conditions along the West Gate Freeway corridor. 	<p>Generally the tunnelling equipment and techniques assumed for the purposes of the underlying D&C cost estimates are able to deal with a wide range of geotechnical conditions.</p> <p>Limited geotechnical investigations have been undertaken to date. As such, appropriate risk allowances have been included in the cost estimate.</p> <p>A key next step post business case will be to undertake substantial bore-hole investigations to better understand ground conditions, refine existing risk allowances and develop detailed risk management and allocation plans.</p>

Risk Category	Description	Risk management approach
Design and construction risks	<p>The risk that the detailed design solution does not adequately address the requirements of the Government's specified project scope.</p> <p>The broad range of risks that may occur during the construction period, resulting in additional cost and/or time being required to deliver the design solution include:</p> <ul style="list-style-type: none"> • Programming and project management risks • Industrial relations risks (including as they affect both labour cost and productivity) • Plant and equipment procurement risks (including the cost of major equipment such as tunnel boring machines) • Material prices and procurement risks • Interface risks (between the different components of the overall project construction, including utilities) • Spoil removal (in relation to the transport and disposal costs for the spoil created by tunnelling) • Wet weather risks • Traffic management risks (including on key routes such as the West Gate Freeway, CityLink, Footscray Road and roads that cross the West Gate Freeway). • Existing asset condition risk, particularly in relation to the West Gate Freeway upgrade, • Commercial D&C risks such as the risk of counterparty default and/or contractor claims. 	<p>A key element of the state's overall management plans for these risks will be the preferred procurement model (discussed in Section 13.3).</p> <p>Generally it is expected that the majority of these risks will be most efficiently addressed through transfer to the private sector.</p> <p>Once a preferred model has been developed in more detail post business case, detailed management/mitigation plans for risks shared with or retained by the State will be developed (these risks are discussed further in Section 15).</p>

Risk Category	Description	Risk management approach
Community impact risks	<p>The risk that some local community groups do not support the project scope.</p>	<p>A detailed communications and stakeholder engagement strategy has been developed (refer to Section 16.8).</p> <p>A preliminary social and environmental assessment has also been undertaken, discussed in Section 11, which will be developed further during the planning approvals phase.</p>
Efficient transport network integration risks	<p>The risk that the Project is not effectively integrated and optimal for Melbourne's broader transport network either as a result of:</p> <ul style="list-style-type: none"> • inefficient network connections and/or capacity augmentation being delivered • delay to delivery that impacts on achieving the full benefits 	<p>As outlined above, the business case has used a detailed traffic model to test a broad range of network connection, route alignment and toll pricing options (discussed in Sections 7 and 8 and supporting attachments).</p>
Interface with CityLink	<p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>	<p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>

Risk Category	Description	Risk management approach
Operations and maintenance risks	<p>In addition to the specific risks outlined above, the full range of risks over the Project's operating period, including:</p> <ul style="list-style-type: none"> • Road availability and performance risks • Customer service performance risks • Lifecycle risks (in relation to the extent, timing and cost of major refits). 	<p>The business case has been developed with the assistance of specialist advice in connection with operating and maintenance costs and risks.</p> <p>Appropriate risk allowances have been included in the financial impacts set out in Section 12.</p>

8.3. Monash Freeway Upgrade Risks

Table 44: Monash Freeway Upgrade: Key risks

Risk Category	Description	Risk management approach
Interface with EastLink		
Existing conditions - pavement	Existing pavement between EastLink and South Gippsland Freeway is insufficient to support additional traffic	<ul style="list-style-type: none"> • Additional pavement testing and assessment post business case • Appropriate allowances have been made in the cost estimate
Traffic Management	Traffic management or reduced speed over extended lengths frustrates motorists	<ul style="list-style-type: none"> • Review and adopt new freeway construction site management guidelines • Further develop and review stakeholder and communications management plan • Undertake constructability management plan review

Risk Category	Description	Risk management approach
		<ul style="list-style-type: none"> • Use of variable speed limit sign trailers to reduce construction set up time. • Maintain 100kph work zone when no workers are onsite.
Design & Construction	Works are designed and constructed in accordance with the scope of works/technical requirements so they are fit for purpose	<ul style="list-style-type: none"> • Undertake preliminary testing prior to tender process including geotechnical investigations, surveys and other assessments of existing conditions • Appropriate risk allowances have been made in the cost estimate based on the current level of information
Operations	Traffic flows are not as expected during operations leading to a poor network outcome	<ul style="list-style-type: none"> • Substantial traffic analysis has been undertaken giving the State a reasonable level of understanding on the likely traffic volumes • Further traffic analysis and modelling will be undertaken as part of the design development • The extension of managed motorways operations on the Monash Freeway will enable VicRoads to better control traffic flows to improve operations.

8.4. Tolling structure key risks

A summary of the key risks in relation to traffic demand and toll collection are outlined in the table below, including the proposed risk management approach.

Table 45: Key tolling risks

Risk Category	Description	Risk Management Approach
Traffic demand	<p>The risk that actual traffic volumes differ to those forecast in this business case. For a new toll road such as the Western Distributor component of the Project, this risk includes three broad elements:</p> <ul style="list-style-type: none"> • Base demand risk – the risk associated with predicting the number of vehicles that will use the new road once traffic levels have reached a consistent level for a given toll charge (i.e. once the ramp-up period has been completed). Forecasting base demand for new urban toll roads presents particular challenges where there are multiple alternatives (in terms of both route and transport model) • Ramp-up period risk – the risk associated with predicting how rapidly traffic volumes grow from day one volumes to base demand forecasts over the ramp-up period • Long-term growth risk – being the risk associated with how general traffic volumes will grow in the medium to long-term. <p>The extent of these risks change over time as traffic volumes on a toll road are proven (with the risk associated with forecasting long-term growth rates for an established toll road being lower than the risk associated with forecasting base demand and ramp-up volumes for a new toll road).</p>	<p>As outlined earlier in this section, toll revenue forecasts have been based on Average Annual Weekday Traffic volume and toll revenue outputs from the VLC Zenith detailed traffic model, together with key assumptions (e.g. annualisation factors, ramp-up period profiles, etc), all of which have been independently peer reviewed.</p> <p>Discussion on how best to manage/allocate demand risk between the State and the private sector is a key consideration as part of the procurement and funding options in Section 12.</p>

Risk Category	Description	Risk Management Approach
Toll pricing	Risks in relation to the toll pricing strategy adopted for the Project that could impact on traffic volumes and/or cause distortionary impacts on the network.	<p>Setting equitable toll prices is particularly relevant given the need to integrate the Project into Melbourne's existing partially tolled and partially untolled freeway network. This will continue to be a key consideration as part of the toll structure development post business case.</p> <p>The analysis which has been completed as part of the Business Case to date is detailed in Section 7.</p>
Toll collection risks	<p>Risks in relation to the toll collection system include:</p> <ul style="list-style-type: none"> • Toll collection system performance and interoperability risks • Toll enforcement risks 	<p>The business case has been developed with the assistance of specialist advice in relation to toll collection system costs and risks.</p> <p>The preferred toll collection system minimises risks associated with lost revenue through collection.</p> <p>Reference has also been made to the prevailing toll collection system and interoperability arrangements on CityLink and EastLink.</p> <p>Appropriate risk allowances have been included in the financial impacts set out in Section 12.</p>
Diversion impact of HCVs	The introduction of tolls on any existing road can create toll diversion as vehicles attempt to use non-tolled roads to access their destination. As the upgraded West Gate Freeway will be tolled for HCVs, it is possible that these vehicles may attempt to travel through the inner west to avoid the tolls. This may occur through vehicles delaying their entry to the West Gate Freeway or exiting the freeway early to avoid the tolls which may result in higher levels of trucks using local roads.	<p>Consideration has been given to this issue when establishing the proposed base toll price and gantry locations for the project. Toll prices should be set at a level that will not encourage HCV toll diversion.</p> <p>In addition, due to the upgraded facility and new accessibility provided by the project, a Truck Management Strategy will be developed to consider the extension of truck curfews in the inner west. This could assist in redirecting heavy vehicles to</p>

Risk Category	Description	Risk Management Approach
		the freeway network and using the new connections provided as part of the Project.

8.5. Risk management and preferred allocation

The proposed allocation of risks between the State and the private sector plays a key part in the overall management and mitigation of risks. The procurement options assessment has considered a range of risk allocation options between the State and the private sector (consistent with the principle that risks should be allocated to the party best able to manage or mitigate them at least cost).

The management of the risks identified above and the proposed allocation under the recommended procurement method is discussed in Section 15.

Section 15 also outlines the key risks associated with the procurement phase of the project and the risk management strategy for the identified risks.



9. Network impact assessment

This section outlines the impacts of the Project on the performance of the transport network. This analysis considers the future traffic volumes, travel patterns and travel times under Project and 'do nothing' scenarios to highlight the travel benefits achieved by the Project.

This section outlines the impacts of the Project on the performance of the transport network. It provides a summary of the following technical reports, both of which are attached to the business case:

- Network Impact Assessment Report (GHD) – Attachment E
- Freight Impact Assessment Report (GHD) – Attachment F

The network impact assessment has three scenarios:

- A 2014 base case
- A 2031 base case ('do nothing' scenario)
- A 2031 project case.

The assessment of each scenario includes traffic volumes, travel times along key routes and an assessment of mid-block capacities of the freeway and arterial road network.

9.1. Methodology

The network impact assessment consists of three scenarios:

- A 2014 base case detailing existing conditions
- A 2031 base case assessing network performance under a 'no project' scenario
- A 2031 project case assessing the future performance of the network with the proposed Western Distributor and Monash Freeway Upgrade Project.

The assessment of each scenario includes traffic volumes and travel times along key routes on the freeway and arterial road network. The assessment also considers the impacts of incidents and overall network resilience.

The existing 2014 base case has been established from existing traffic data provided by VicRoads. The 2031 base case and project case scenarios have been derived from data extracted from the VLC Zenith model which contain 2011 and 2031 base and project year scenarios. An annual percentage change between the two Zenith model time periods has been used to interpolate the estimated change between the 2014 and 2031 network volumes and travel times. The growth rate from the strategic model has then been applied to the observed 2014 data to estimate 2031 volumes.

The assessment focuses on the AM peak period as this is typically the critical peak in regards to traffic volumes and congestion. However it is acknowledged that similar problems occur in the PM peak period.

This is a suitable approach to investigate the potential impacts of the Project to the transport network. It is acknowledged that this approach differs from the economic methodology which requires broader strategic level inputs, and accordingly uses outputs directly from the Zenith model.

It is noted that detailed assessment of traffic flow and intersection performance has not been undertaken at this stage of the Project. This current approach is believed to be appropriate for the business case stage. Should the Project proceed beyond the business case, further analysis, such as microsimulation modelling will be required.

9.2. Western Transport Corridor

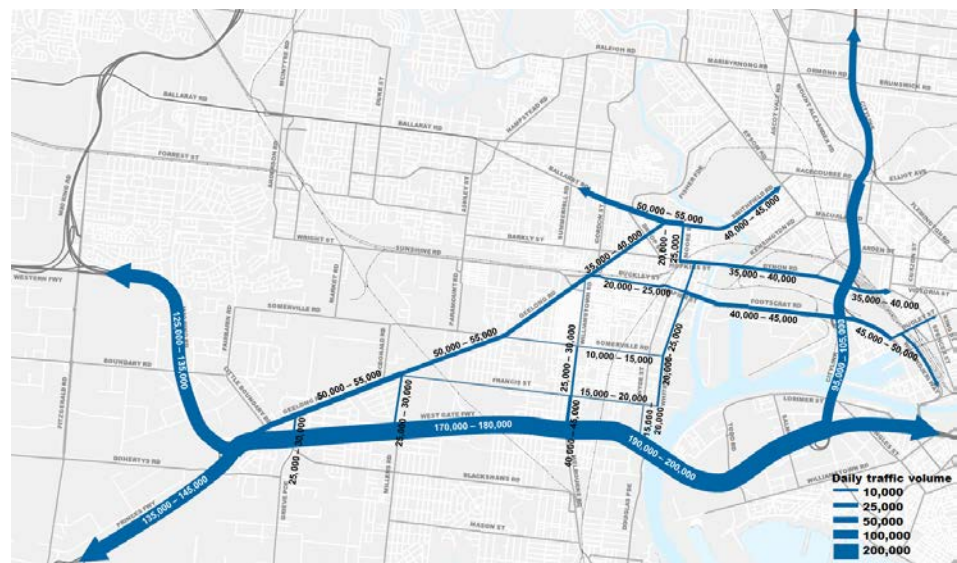
9.2.1. 2014 base case – existing conditions

Traffic volumes

The road network in the west of Melbourne relies heavily on a limited number of key routes such as the West Gate Freeway and Geelong Road (Princes Highway). The West Gate Freeway is the key east-west link, providing a direct connection from the city and eastern suburbs to western suburbs such as Altona, Laverton, Point Cook, Hoppers Crossing, Werribee and the city of Geelong via the Princes Freeway. The West Gate Freeway also serves the industrial precincts in the west and provides a connection to the M80 Western Ring Road and Western Freeway further west. Geelong Road provides an alternative to the West Gate Freeway, however, limited freight connectivity at its northern end results in the road being under-utilised as a strategic freight route.

Average weekday volumes are presented in Figure 50.

Figure 50: 2014 base case volumes (two-way, 24 hour weekday volumes)



West Gate Freeway

The West Gate Freeway carries greater than 60 per cent of all trips across the Maribyrnong River and Yarra River screenline (referred to within this document as the Maribyrnong River screenline). With such high demand, the Freeway currently experiences very heavy peak period volumes.

The critical peak period that experiences the concentration of high volumes and regular flow breakdown is the AM peak period in the inbound direction.

The existing, general operating conditions on the West Gate Freeway inbound during the AM peak are summarised below for the section between M80 and the West Gate Bridge.

- The AM peak period is typically 3.5 to 4 hours (6am to 10am)

- Hourly flows are generally in the range of 6,000 to 8,000 vehicles per hour across the 4 lanes
- Commercial vehicle proportions using the West Gate Freeway vary between 11 and 15 per cent. It is noted that due to the size of larger commercial vehicles this can represent up to 30 per cent of the utilised lane space when considering standard passenger car unit sizes
- Congestion (low speeds and reduced flows) are experienced on a daily basis
- Following the onset of congestion and subsequent flow break down, traffic speeds are regularly below 30 km/h (level of service of F)
- These reduced speeds are regularly experienced for between 1 to 2 hours during the morning peak
- The locations where existing operational bottlenecks occur are:
 - M80 Ring Road/Princess Freeway interchange: Two system traffic streams come together and lane changing (weaving) occurs to access Millers Road, Williamstown Road and the West Gate Bridge
 - Millers Road Entry: Merge bottleneck interacting with traffic exiting to Williamstown Road
 - Williamstown Road Entry: Merge and uphill grade bottleneck.
- As a result of the ramp metering operating on the M1 corridor, reasonably high mainline flow rates can be achieved for periods within the peak, sometimes as high as 2000 vehicles per hour per lane; however, the high demands on the M1 Corridor still result in significant flow break down and productivity losses. This results in excessive queuing on arterial roads as demand cannot be met. Queues on arterial roads such as Williamstown/Melbourne Road can extend up to one kilometre in the AM peak
- Congestion and associated queues can extend back to upstream sections of the Princes Freeway West, even as far as Hoppers Crossing on some occasions. This can be partly attributed to downstream congestion on the West Gate Freeway, as queues at the city exits affect mainline flows.

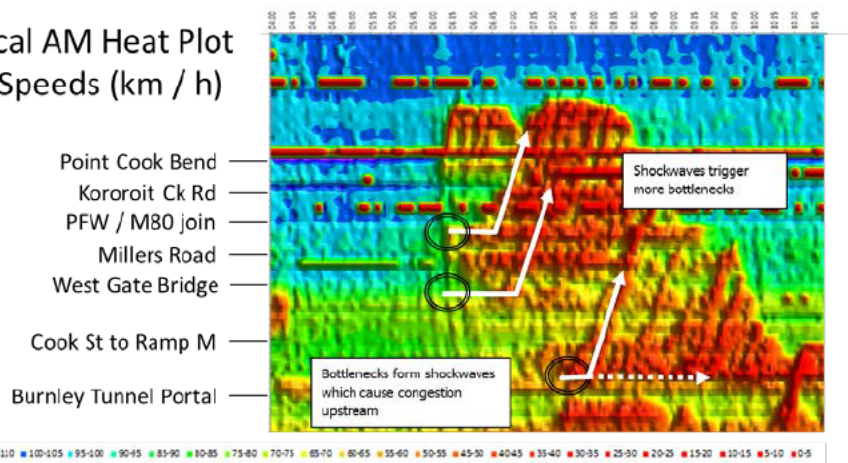
Figure 51 is a heat plot of the Princes Freeway West and West Gate Freeway inbound demonstrating typical AM peak operation. The direction of travel is down the plot and the time scale is left to right (from 4AM to 11AM). Red/orange indicates slow speeds while blue/green indicate high speeds. The white arrows highlight the occurrence of shockwaves. Shockwaves are the ripple effect of congestion in one location, rapidly impacting upstream traffic and affecting a far greater traffic volume.

Shockwaves typically occur when there are high volumes of traffic travelling with minimal headways and gaps to other cars (a typical scenario on the West Gate Freeway in the AM peak). In this situation something as simple as tapping the brakes or changing lanes can slow or stop the traffic flow. These shockwaves have large impacts on the performance of the network and can affect thousands of people each day.

Figure 51: West Gate Freeway heat plot showing the speed along the Princes/West Gate corridor during a typical weekday AM peak

Typical AM Heat Plot

- Speeds (km / h)



Over reliance on the West Gate Bridge

The limited availability of jobs in the western suburbs has led to a situation where a high proportion of residents from the west travel across the Maribyrnong and Yarra Rivers to work in the city and eastern suburbs each day. This is placing increasing pressure on the existing river crossings especially as the population of the inner west grows.

Table 46 lists the existing road crossings of the Maribyrnong River screenline that serve the western road corridor and presents the proportion of the 305,000 to 330,000 trips per day that use each crossing. It shows that nearly two thirds of all trips to/from the west rely on the West Gate Freeway. When the West Gate Freeway is congested it affects the majority of trips from the west.

Accordingly, any incident that occurs along the West Gate Freeway has a significant disruptive impact on the ability to efficiently and reliably move people and goods between the west, the city, the Port of Melbourne and other surrounding locations of employment and education. There is little spare capacity on other parallel routes to cater for redistributing demands during periods when an incident has occurred.

Table 46: Maribyrnong River screenline assessment

River crossing	Number of lanes (inbound)	Percentage of traffic 2014 base case
West Gate Freeway (West Gate Bridge)	5 ¹⁵	59% - 63%
Footscray Road (Shepherds Bridge)	2 ¹⁶	12% - 15%
Dynon Road (Hopetoun Bridge)	2	11% - 13%
Ballarat Road (Lynchs Bridge)	2	12% - 15%
Total	11	100%

¹⁵ Typical capacity of a freeway is 1,800 vehicles per hour per lane

¹⁶ Typical capacity of an arterial road is 800 vehicles per hour per lane

Network resilience – day to day variability

Resilience refers to how flexible the network is to changing conditions such as increased demand, congestion or incidents on the networks. Variability is further discussed in the travel time section below.

Incidents on the West Gate Bridge and West Gate Freeway are relatively commonplace and are therefore a strategic consideration in future planning for the Western Corridor.

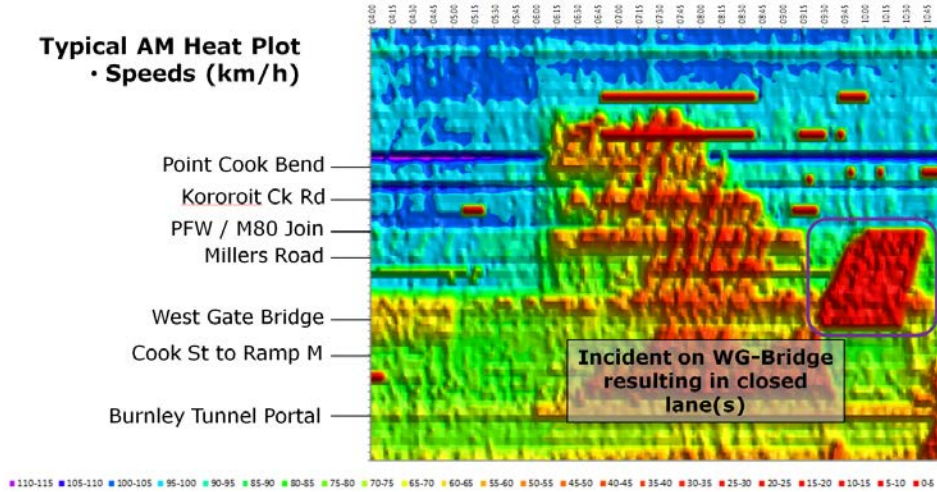
Data from the VicRoads Road Crash Information System shows that there were approximately 850 incidents (including vehicle breakdowns, collisions or obstacles on the road) on the West Gate Bridge in 2014 and an additional 1,300 incidents on the remainder of the West Gate Freeway between M80 and Todd Road (2,150 incidents in total). This equates to an average of approximately six incidents per day on the West Gate Freeway. It is estimated that a single lane closure on the freeway accounts for 90 per cent of incidents while closures of two or more lanes occur 10 per cent of the time.

VicRoads advises that it takes approximately 10 minutes to respond to an incident on the West Gate Freeway/West Gate Bridge and an additional 16 minutes to clear from the carriageway. Lane closures can vary from short momentary closures to complete freeway closures of up to six hours in the event of a fatal or major collision.

When incidents occur, the flow-on impact can be felt across the network, with the resulting congestion lasting much longer than the time taken to clear the original incident. The speed heat plot in Figure 52 below shows an incident on the West Gate Bridge that resulted in a reduction of one lane. The large red patch represents a very slow/stationary queue on the West Gate Freeway from the West Gate Bridge back to the M80 interchange, lasting from 9:30 AM to 10:45 AM. This demonstrates that when an incident occurs it can take hours for the freeway to recover. If this incident occurred during the middle of the peak at 8am, it is likely that it would take more than two hours for the network to recover.

The speed heat plot also shows congestion generated prior to the Burnley tunnel around 6am and then extending back to the West Gate Bridge and joining with the congestion on the West Gate Freeway some 90 minutes later. This demonstrates how the flow on the West Gate Freeway can be influenced by downstream conditions.

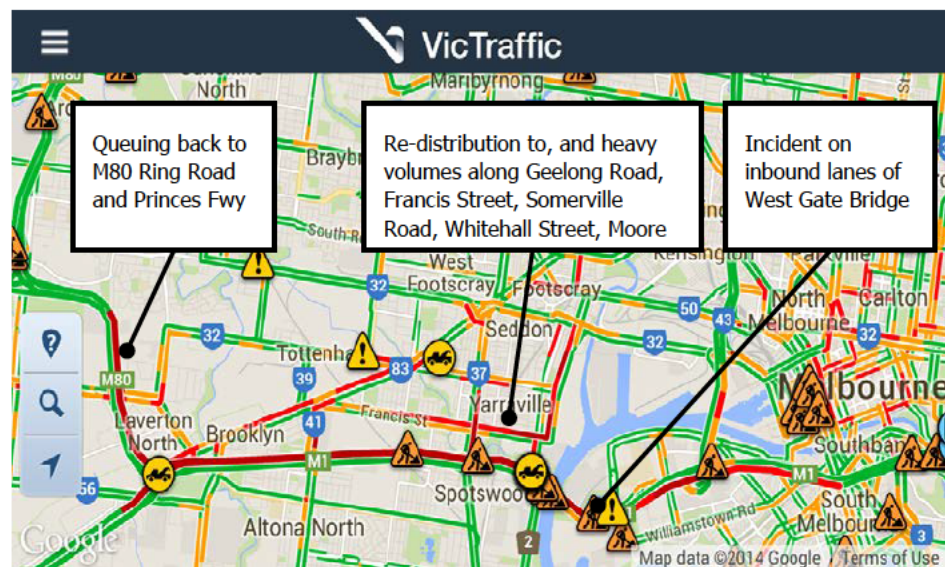
Figure 52: Impact on speeds and congestion as a result of an incident on the West Gate Bridge



When incidents do occur on the West Gate Freeway this can have a significant flow-on effect on other routes. As an isolated example, Figure 53 presents a

screenshot from VicRoads' VicTraffic application for an incident that occurred on Wednesday, 2 December 2014. The image was taken at 11:18 am (an off-peak time) when three inbound traffic lanes were closed on the West Gate Bridge due to a vehicle collision that occurred just before 10:00 am. The image shows the roads in the inner west that were most impacted by the lane closures during this off-peak time. Specifically, it shows that when an incident occurred on the West Gate Bridge during the middle of the day that traffic congestion was created along the West Gate Freeway beyond the M80 interchange and onto the M80 as well as on roads including Geelong Road, Francis Street, Somerville Road, Whitehall Street and Moore Street.

Figure 53: Impact of an incident on the West Gate Bridge



Source: VicRoads' VicTraffic application

Travel times

Currently, travel times along the West Gate Freeway vary significantly from day to day. Based on observed travel time data, a trip between Grieve Parade and Montague Street (route A to C in Figure 54) in the AM peak period takes 14 minutes on average, although it can vary between 8 and 19 minutes in length (averaging less than 35 km/hr) depending on freeway conditions.

Similarly, trips between Grieve Parade and Footscray Road via the West Gate Freeway and the Bolte Bridge (route A to B in Figure 48) also experience similar levels of variability in travel times. Trips along this route generally take 18 minutes on average and can vary between 14 minutes and 26 minutes.

AM and PM peak travel times along four freeway and arterial road routes are presented in Table 47.

Further, when an incident occurs, travel time along this section can be even longer again. During one of the travel time survey days an incident occurred in Docklands which resulted in the closure of La Trobe Street and Wurundjeri Way. This impacted traffic conditions on the West Gate Freeway with travel times (between Grieve Parade to Montague Street; A to C) increasing to 36 minutes (averaging 18 km/hr) during an AM peak travel time run, more than double the average travel time. A trip between Grieve Parade and Footscray Road (A to B) during the same period took 30 minutes (averaging less than 23 km/hr).

An incident directly on the freeway can have similar or greater impacts on travel times. The variability in travel times and the effects of an incident can be seen in Figure 55 and Figure 56.

Figure 54: Travel time routes



Table 47: 2014 observed peak period travel times

Route	Distance	Time period	Direction	Min travel time	Average travel time	Max travel time	Max observed travel time during incident	Average speed
A to B	11.4 km	AM ¹⁷	Inbound	14 min	18 min	26 min	30 min	38 km/h
B to A	11.7 km	PM ¹⁸	Outbound	10 min	11 min	14 min	N/A	61 km/h
A to C	10.9 km	AM	Inbound	8 min	14 min	19 min	36 min	47 km/h
C to A	10.9 km	PM	Outbound	8 min	11 min	19 min	35 min	58 km/h
D to B	10.6 km	AM	Inbound	19 min	21 min	28 min	N/A	30 km/h
B to D	10.5 km	PM	Outbound	17 min	25 min	31 min	50 min	25 km/h
E to B	9.9 km	AM	Inbound	14 min	18 min	22 min	N/A	32 km/h
B to E	9.8 km	PM	Outbound	14 min	17 min	24 min	36 min	34 km/h

¹⁷ AM peak (7:00 am – 9:00 am)

¹⁸ PM peak (4:00 pm – 6:00 pm)

Figure 55: West Gate Freeway Existing 2014 AM peak travel times – Grieve Parade to Montague Street

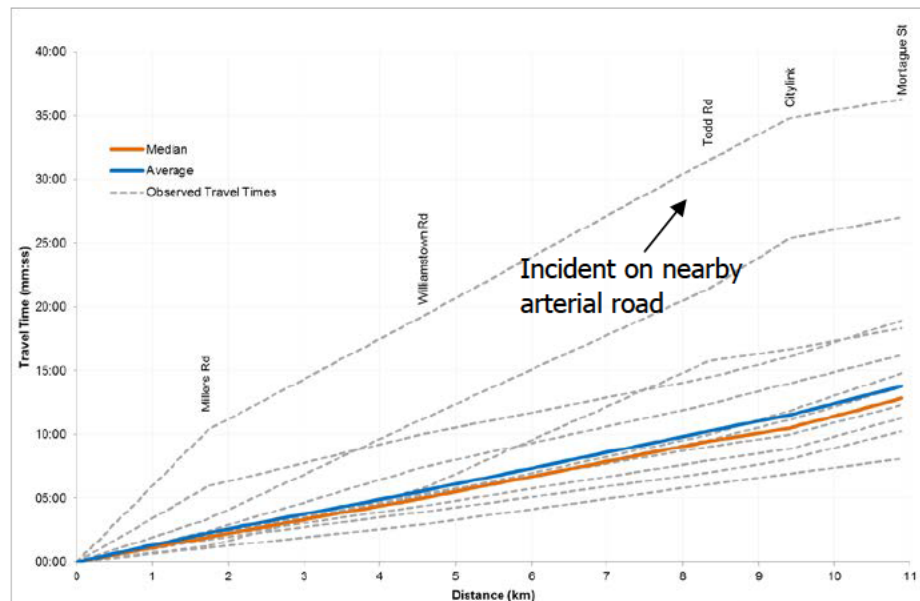
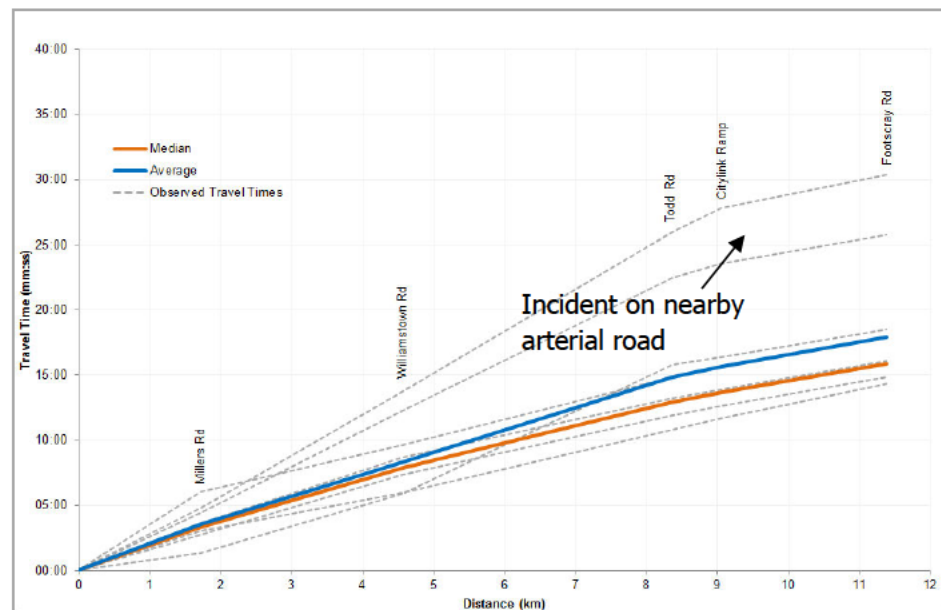


Figure 56: West Gate Freeway Existing 2014 AM peak travel times – Grieve Parade to Footscray Road via Bolte Bridge



Traffic from the west accessing the city

Vehicles travelling from the west currently have limited routes to access the city. Routes include Footscray Road, Dynon Road and the West Gate Freeway via Montague Street/Charles Grimes Bridge or Power Street. During the AM and PM peak periods, these roads often experience high levels of congestion.

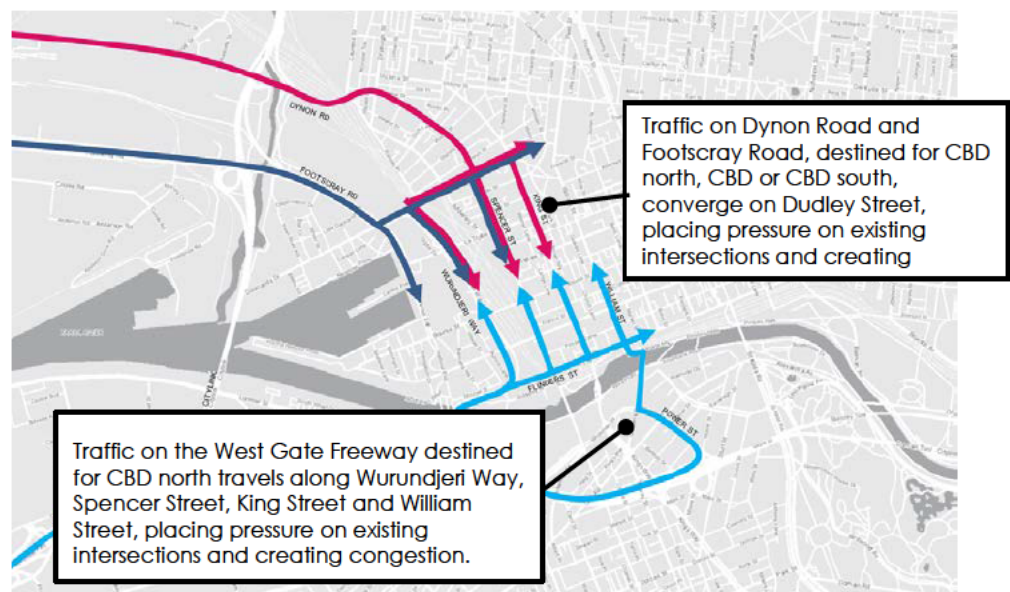
Travel time data provided by VicRoads show that the average vehicle speed on Footscray Road between CityLink and Dudley Street is 17km/h in the AM peak period.

Much of the traffic on Dynon Road and Footscray Road has an origin or destination within the inner north of Melbourne, the CBD or south of the CBD.

Those trips that are travelling to south of the CBD are currently using routes that include streets within the CBD, such as Spencer Street and King Street. At the same time, traffic exiting the West Gate Freeway via Montague Street/Charles Grimes Bridge or Power Street is also travelling north through the CBD with destinations in the inner north of Melbourne. These trips are essentially loading these inner city streets with through traffic that does not need to travel within the CBD.

These traffic flows converge on Dudley Street and, in particular, the intersections of Dudley Street with Wurundjeri Way, Spencer Street and King Street. This places significant pressure on these intersections to cater for demands from competing directions, as indicatively represented in Figure 57, resulting in delays and queues.

Figure 57: Footscray Road and Dynon Road - general traffic desire lines



Freight

Freight travel patterns have a strong relationship to industrial precincts where storage, freight and logistics facilities are located, providing services to the local manufacturing industry and distribution of goods to the broad population. Links to the Port of Melbourne are also critical to supplying industry and distribution needs, as well as for regional exporters.

The western road network provides a key gateway to and from the city and the Port of Melbourne for industrial and freight precincts across Melbourne including Altona, Laverton North, Truganina, Yarraville, Tottenham, Somerton and Airport West.

These precincts are presented in Figure 58. The outer precincts (coloured brown) typically use the West Gate Freeway as a main arterial corridor with the northern precincts potentially also using CityLink. The inner precincts of Tottenham and Yarraville (coloured blue) link to the Port of Melbourne and distribution locations through the local arterial roads of Francis Street, Somerville Road, Buckley Street and Moore Street (as presented in Figure 59).

Figure 58: Industrial/freight precincts in the west/north-west

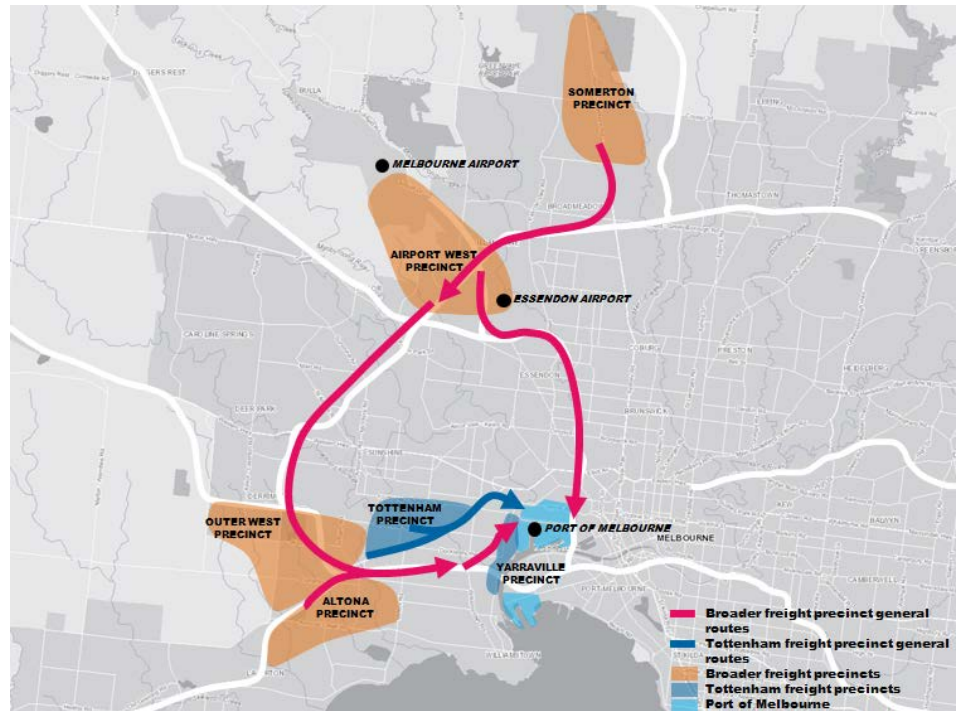
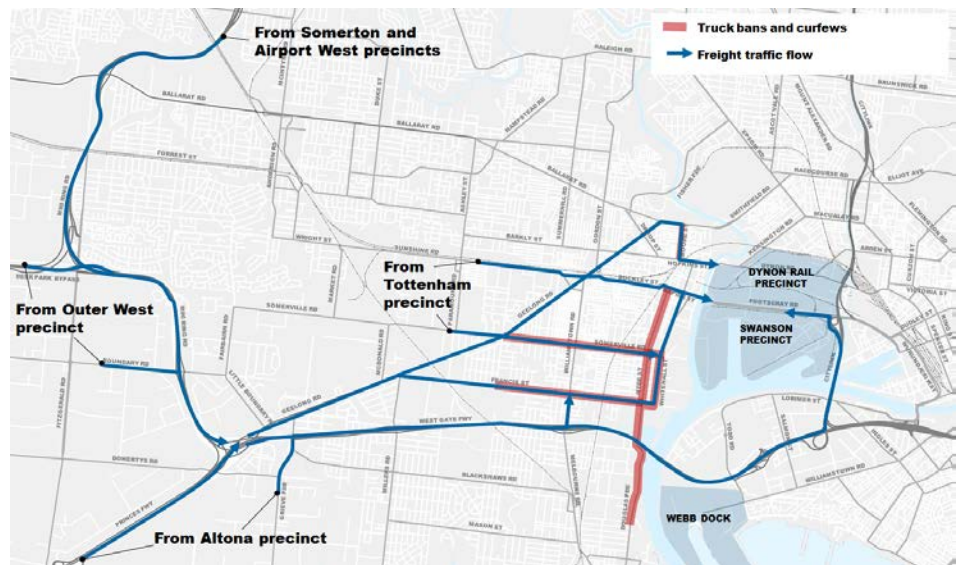


Figure 59: General Truck Flows to/from Swanson/Dynon Precinct



The West Gate Bridge currently carries around 24,000 to 28,000 trucks¹⁹ per day (approximately 11 to 15 per cent of total traffic volume). On the inner west arterial road network, trucks represent between 10 to 30 per cent of total traffic, with these residential arterial roads carrying up to 5,000 trucks per day (as presented in Figure 60).

¹⁹ Trucks are defined as vehicles that are Class 3 and above based on the Austroads Vehicle Classification System

Truck impacts on the inner west arterial roads have raised amenity issues for residents such as air quality, noise and road safety and subsequently curfews have been implemented on several routes including Francis Street, Somerville Road, Hyde Street, Whitehall Street and Moore Street.

Night-time truck curfews are currently in place in Francis Street, Somerville Road and Moore Street. A 24 hour ban on trucks is also in place in Hyde Street (north of Francis Street). It is noted that exemptions to these truck curfews exist for trucks with a local Yarraville origin or destination. Trucks with an origin or destination in the Tottenham Precinct are also exempt from the Moore Street curfew.

While approximately half of all truck trips within the inner west are estimated to be through trips and have no purpose within the local precinct, there is a significant proportion (e.g. up to 45 per cent of all truck trips along Francis Street) that have an origin or destination directly west of Geelong Road. For these trucks, routes via Francis Street, Somerville Road, Buckley Street or Moore Street represent the shortest and most direct route to the Port of Melbourne and associated land uses.

Existing truck volumes in the inner west are presented in Figure 60.

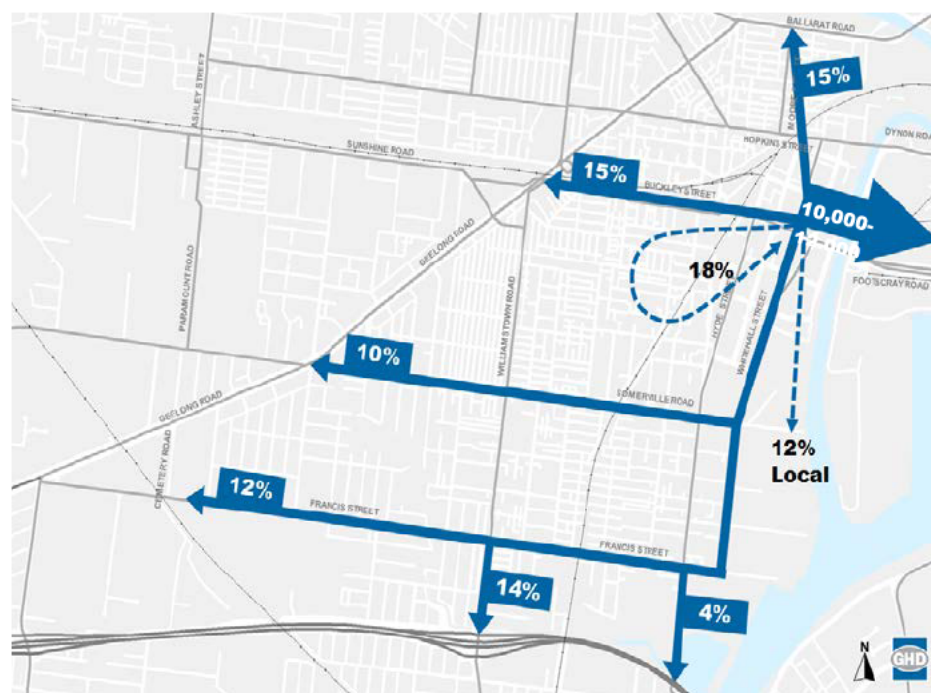
Figure 60: Existing truck volumes in the inner west (over 24 hours)



There are 10,000 to 12,000 trucks that cross the Maribyrnong River each day at Footscray Road and Dynon Road (two-way). These trucks then relatively evenly disperse across the inner west road network, with 10 to 15 per cent (1,000 to 1,800 trucks per day) travelling to each of Moore Street, Buckley Street, Somerville Road, Francis Street and Williamstown Road. A further 18 per cent (1,800 to 2,160 trucks per day) return via Footscray Road or Dynon Road, most likely with an origin or destination within the inner west. Twelve per cent of truck trips (1,200 to 1,440 trucks per day) that crossed the Maribyrnong River had an origin or destination within the inner west (i.e. only undertook one trip and did not re-enter or exit the inner west).

Figure 61 presents the observed routes through the inner west used by trucks that cross the Maribyrnong River at Footscray Road and Dynon Road.

Figure 61: Distribution of trucks trips crossing the Maribyrnong River (two-way)



The general growth of freight volumes and the need for more efficient and productive supply chains is leading to an increase in the size of trucks which need to be accommodated on the existing road network. High Productivity Freight Vehicles (HPFVs) are longer and can carry heavier loads. However, these type of trucks require stronger bridges than are currently in place on these routes. It is noted that the project scope includes upgrades to the bridges on the West Gate Freeway within the project area.

Logistics industry participants operate in a highly competitive, price-sensitive, sector and their focus on lower cost alternative equipment and operations provides a key pressure point for change to larger trucks and increased capabilities on the road network.

Public transport

The inner west area is well serviced by a range of public transport options, with coverage from bus, tram and train services.

There are 21 bus routes operating within the Maribyrnong local government area, with the majority providing connectivity between residential areas and the nearby activity centres. Four of the bus routes connect the inner west to the CBD and eastern suburbs.

Three train lines run through the western suburbs and the inner west; the Williamstown Line, Sunbury Line and Werribee Line. Trains on these lines operate at a high frequency during the AM and PM peak periods connecting the west with the CBD and eastern suburbs. V/Line (regional train) services also operate through the inner west, running on dedicated tracks from Geelong and Ballarat to the Melbourne CBD.

Cycling and walking

The inner west has a sizeable off-road shared path network providing accessibility to both commuter and recreational cyclists. Key routes include:

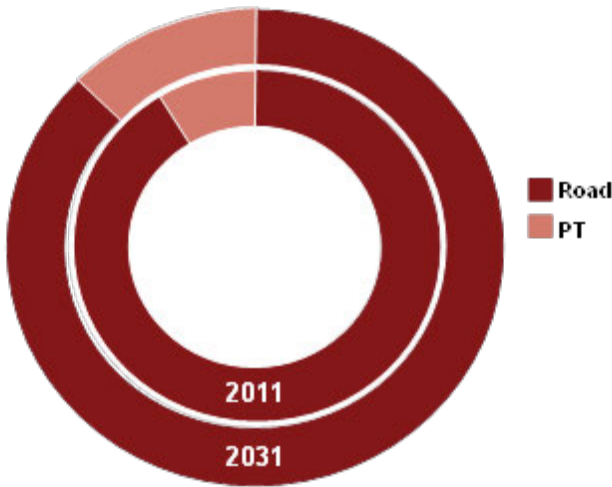
- The Federation Trail – a 23 kilometre off-road shared path running parallel to the Main Outfall Sewer reservation and the West Gate Freeway from Werribee to Yarraville. The trail connects to the Werribee River Trail, Skeleton Creek Trail and Western Ring Road Trail
- The Footscray Road Path – an off-road shared pedestrian and bicycle path that runs parallel to Footscray Road and Harbour Esplanade between the Maribyrnong River and Docklands. It is the main east-west path connecting the CBD, northern and eastern suburbs with the western suburbs
- The Maribyrnong River Trail and Hobsons Bay Coastal Trail – an off-road shared pedestrian and bicycle path starting from Williamstown, running parallel to the Yarra River, Hyde Street and Whitehall Street before following the Maribyrnong River north to Brimbank Park in Keilor
- The Dynon Road Trail – a narrow off-road shared pedestrian and bicycle path running parallel to Dynon Road between Sims Street (east of the Maribyrnong River) and the Moonee Ponds Creek Trail (CityLink)
- The Moonee Ponds Creek Trail – an off-road shared pedestrian and bicycle path running along Moonee Ponds Creek starting from Docklands in the south to Melbourne Airport in the north
- On-road bicycle lanes on Somerville Road, Hyde Street and Buckley Street.

9.2.2. 2031 base case – the ‘no project’ scenario

In the 2031 base case scenario without the Western Distributor (‘no project’), trips originating in the west²⁰ are forecast to increase significantly across all modes, with demand for public transport growing more than 140 per cent and road demand growing by 60 per cent between 2011 and 2031. The majority of trips will continue to be completed via road with the number of traffic trips expected to be nearly seven times greater than those completed by public transport in 2031 as presented in Figure 62. This reinforces the need for both road and rail transport solutions, with a road solution being the focus of this business case.

²⁰ LGAs of Melton, Wyndham, Hobsons Bay, Maribyrnong, Moonee Valley and Brimbank

Figure 62: Proportion of public transport trips compared to all traffic trips in the west (2031 base case vs 2011)

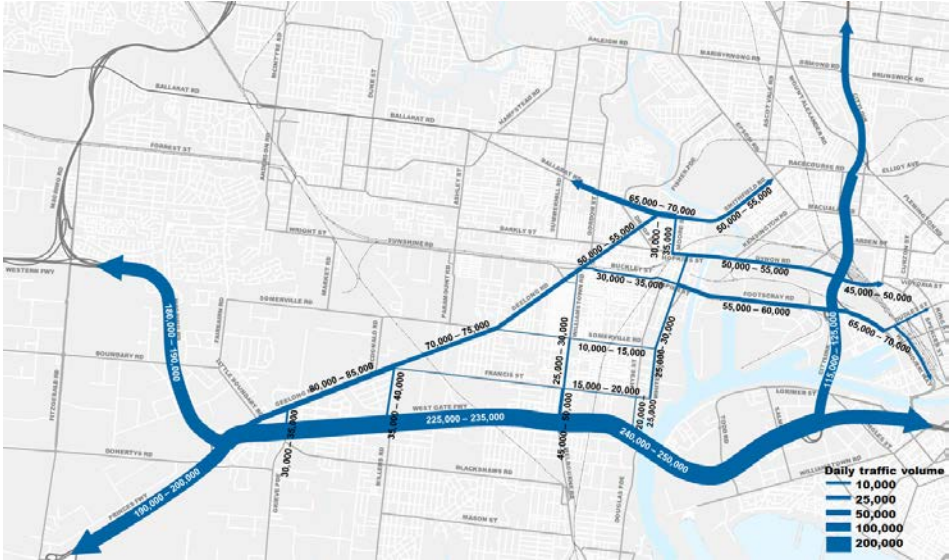


Traffic volumes

Forecast average weekday traffic demand in 2031 is presented in Figure 63. The volumes presented have been derived by multiplying observed traffic volume data from 2014 by growth factors derived from the VLC Zenith strategic model and, as a consequence, the estimated volumes may be higher than the practical capacities of the road links. Accordingly, the 2031 scenario volumes should be considered as demand for travel along these links.

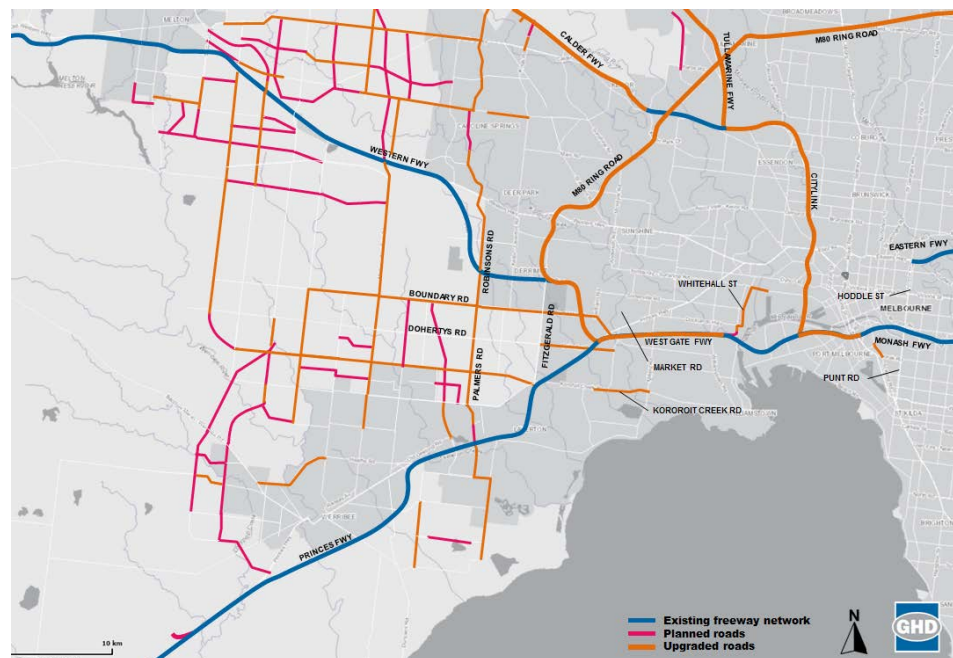
Taking the West Gate Bridge as an example, a two-way daily volume of 250,000 would result in this road operating under heavy traffic conditions for the majority of the day. This may or may not occur, however if we consider the volume of 250,000 as demand, we can understand the routes likely to be subjected to high levels of congestion.

Figure 63: 2031 base case traffic demand (two-way, 24 hour weekday volumes)



To accommodate the projected growth in population, the road network in the west is expected to expand, mainly west of the M80 Ring Road. DEDJTR has provided reference cases, showing assumed changes in the transport network. Major changes to the network between 2014 and 2031 are presented in Figure 65. Assumed changes to the public transport network include the completion of the Melbourne Metro rail project.

Figure 65: Indicative 2031 base road network



Vehicle speeds

The high demand for road travel in 2031 under a 'no project' scenario is expected to cause increased delays, lower vehicle speeds and subsequently significantly increased travel times. Vehicle speeds during the AM peak are generally expected to decline across the entire road network, in the vicinity of 10 to 20 per cent. On the freeway network between 2011 and a 2031 'no project' scenario, vehicle speeds are expected to:

- Reduce by approximately 30 per cent in the inbound direction on the West Gate Freeway between the M80 Interchange and Williamstown Road
- Reduce by 5 to 30 per cent in the inbound direction along the entire length of Geelong Road
- Reduce by approximately 35 per cent in the inbound direction on Ballarat Road across the Maribyrnong River
- Reduce by approximately 30 per cent in the inbound direction on Dynon Road across the Maribyrnong River
- Reduce by approximately 10 per cent in the inbound direction on Footscray Road.

Over reliance on the West Gate Bridge

The distribution of traffic across the Maribyrnong River screenline is not expected to change significantly between 2014 and a 2031 'no project' scenario. The West Gate Freeway will still be expected to carry a high proportion of traffic, with 58 to 61 per cent of all traffic across the Maribyrnong River, as presented in Table 48. The continued reliance on the M1 corridor and the West Gate Bridge means that a single incident will still impact the majority of vehicles trying to cross the Maribyrnong River to and from the west.

Table 48: Maribyrnong River screenline assessment

River crossing	Number of lanes (inbound)	Percentage of traffic 2031 base case
West Gate Freeway (West Gate Bridge)	5	58% - 61%
Footscray Road (Shepherd Bridge)	3	14% - 16%
Dynon Road (Hopetoun Bridge)	2	12% - 14%
Ballarat Road (Lynchs Bridge)	2	12% - 14%

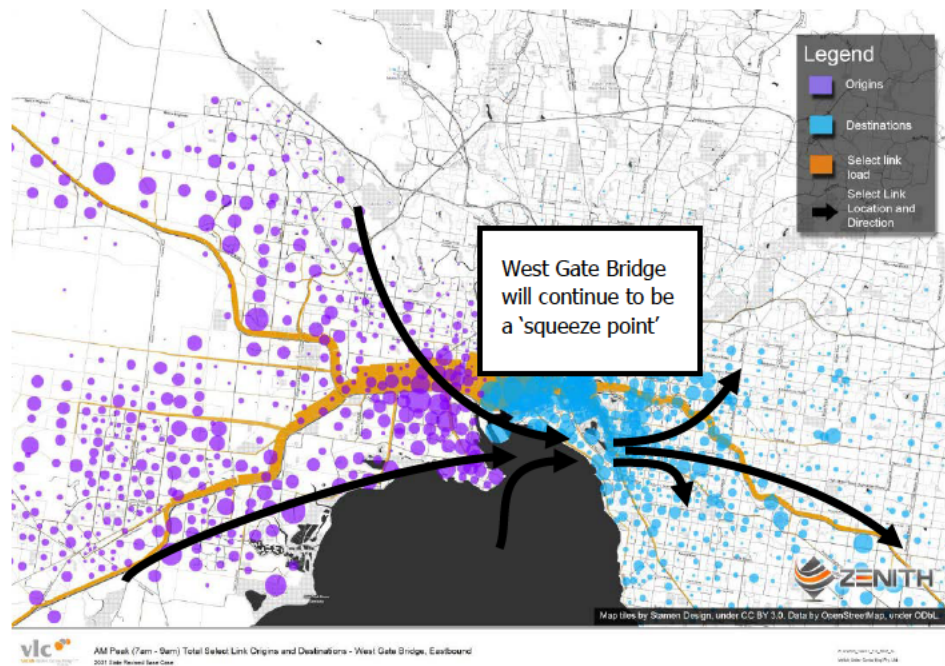
West Gate Bridge origins and destinations

In 2031 the West Gate Bridge will continue to carry the predominant load of trips to and from the west. The origins and destinations of vehicles travelling inbound across the West Gate Bridge during the AM peak period are presented in Figure 66. It highlights the high reliance placed on the West Gate Bridge in providing access between the western/north-western suburbs and the city, inner north and south-eastern suburbs.

The origins of vehicles on the West Gate Bridge, represented as purple circles are from a widely dispersed area, from the Princes Freeway in the west and the M80 Ring Road and Western Highway to the north-west. The destinations (represented as blue circles) are also equally dispersed as their origins.

This image depicts how the West Gate Bridge acts as a 'squeeze point', carrying movements to/from all over the metropolitan area. Accordingly, under a 'no project' scenario, in 2031 Melbourne will continue to not only be highly vulnerable to incidents along this corridor, but will also experience congestion in the precincts directly east and west of the West Gate Bridge as traffic channels to and disperses from this squeeze point.

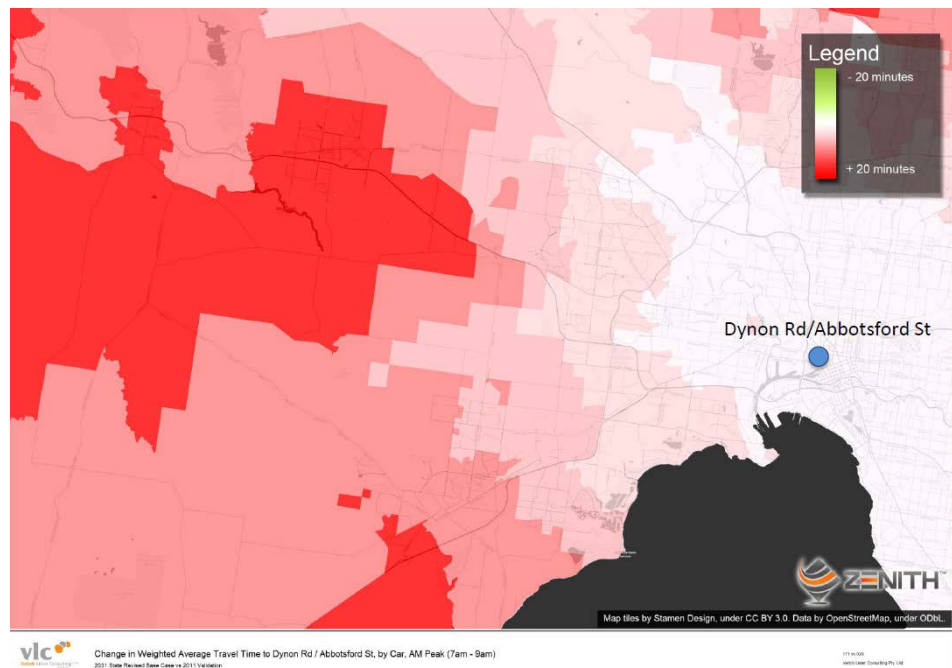
Figure 66: Origins and destinations of vehicles using the West Gate Bridge during the AM peak (inbound) – 2031 base case



Travel times

Under a 2031 'no project' scenario, west-east travel times are expected to increase significantly, with the network unable to accommodate the projected growth, especially in the outer west growth areas. Figure 67 presents the estimated change in weighted average travel times between 2011 and a 2031 'no project' scenario for vehicles with a destination to the inner west of the CBD. It highlights that travel times are expected to be up to 20 minutes longer during the AM peak between the west and the city, with the greatest increases in travel times to the south of the Western Freeway/Highway and south of the Princes Freeway. Travel times are expected to increase broadly across the wider western and north-western suburbs.

Figure 67: Change in AM peak travel times between 2031 base and 2011 to west of CBD



9.2.3. 2031 project case – with Western Distributor

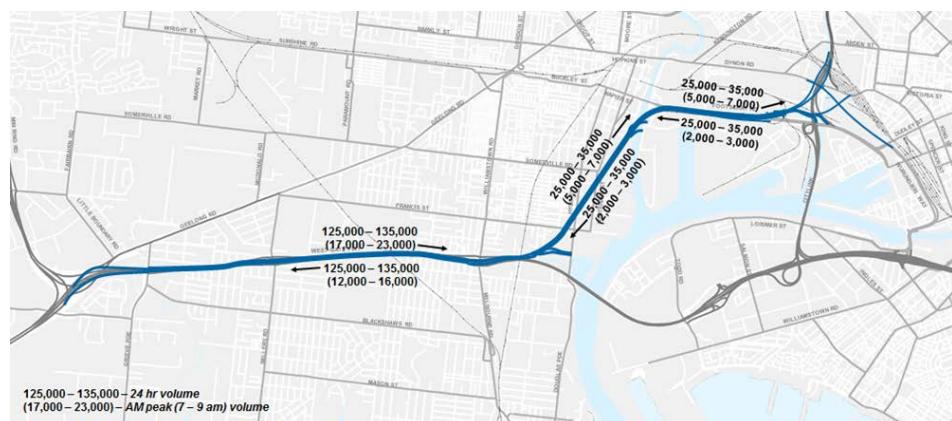
A concept alignment for the Western Distributor has been generated by the State for the purposes of this business case. This concept will not necessarily be the final alignment and connection options for the Project and may be amended following further development of the Project.

The initial concept alignment provides a connection from the West Gate Freeway to the Port of Melbourne, CityLink and the inner city through a combination of tunnel, at grade and elevated road sections.

Traffic volumes

The Western Distributor is forecast to carry approximately 50,000 to 70,000 vehicles per day across the Maribyrnong River by 2031. A summary of the forecast 2031 daily traffic volumes and AM peak volumes on the Western Distributor is presented in Figure 68.

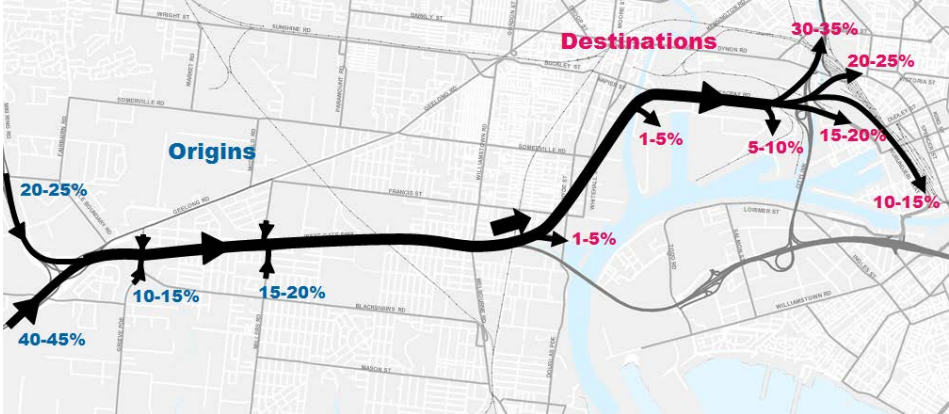
Figure 68: Western Distributor - forecast 2031 volumes



The majority of vehicles expected to use the Western Distributor originate from the outer western suburbs, with 20 to 25 per cent of vehicles in the AM peak coming from the M80 Ring Road or Deer Park Bypass and 40 to 45 per cent of vehicles coming from the Princes Freeway. Between 25 to 35 per cent of vehicles originate from the inner west via Millers Road and Grieve Parade. The origins and destinations of inbound traffic on the Western Distributor during the AM peak are presented in Figure 69.

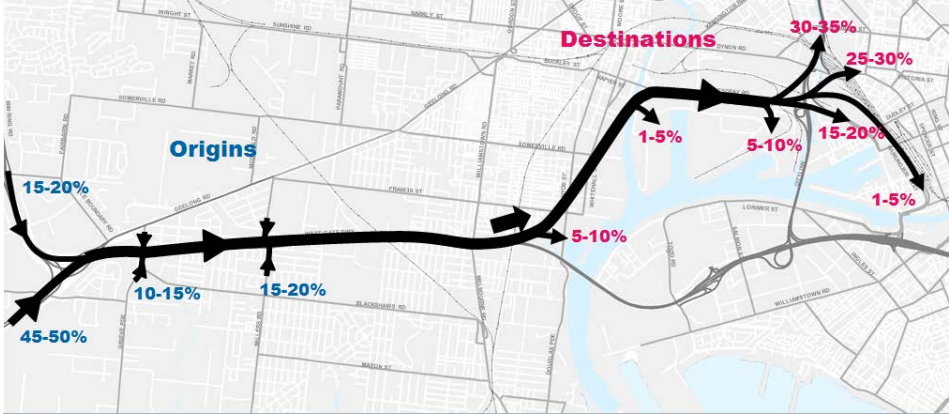
The figure shows that a high proportion of vehicles in the AM peak travel the entire length of the Western Distributor, exiting at CityLink and, depending on the final form of connections to the arterial road network, at Dynon Road, Footscray Road or the Wurundjeri Way extension. While volumes on the Hyde Street connection are lower than other exits, it is nevertheless a vital connection which will allow placarded loads to travel between the fuel refineries in Yarraville and the M1 Corridor. These vehicles are unable to use the Western Distributor tunnel and would otherwise be required to travel along residential sections of Francis Street and Williamstown Road.

Figure 69: Origins and destinations of Western Distributor traffic – inbound AM peak (7-9am)



The distribution of traffic across the exit ramps on the Western Distributor does not change significantly over a 24 hour period compared to the AM peak. The 24 hour origins and destinations presented in Figure 70, which shows that there is less traffic using the Wurundjeri Way extension outside the AM peak period (due to lower levels of congestion on the rest of the road network). Additionally, as a high proportion of traffic using the Hyde Street connection are placarded loads, which typically travel outside the AM peak period.

Figure 70: Origins and destinations of Western Distributor traffic – inbound (24 hrs)



Additional crossing of the Maribyrnong River Screenline

By 2031, the Western Distributor is expected to carry 11 to 16 per cent of all traffic crossing the Maribyrnong River screenline, as presented in Table 49. This will take considerable pressure off the West Gate Bridge, which will reduce its share of traffic from 58-61 per cent crossing the screenline to 49-54 per cent. It is expected that approximately 16,000-22,000 vehicles will be taken off the bridge in 2031 as a result of the Western Distributor. This reduces the reliance on the West Gate Bridge for travel between the west and the CBD and eastern suburbs, providing greater redundancy in the road network.

Table 49: Maribyrnong River 2031 project case screenline assessment (24 hours)

River crossing	Number of lanes (inbound)	2031 base case percentage of traffic	2031 project case percentage of traffic
West Gate Freeway (West Gate Bridge)	5	58% - 61%	49% - 54%
Footscray Road (Shepherd Bridge)	3	14% - 16%	11% - 13%
Dynon Road (Hopetoun Bridge)	2	12% - 14%	11% - 13%
Ballarat Road (Lynchs Bridge)	2	12% - 14%	11% - 13%
Western Distributor (tunnel)	2	-	11% - 16%

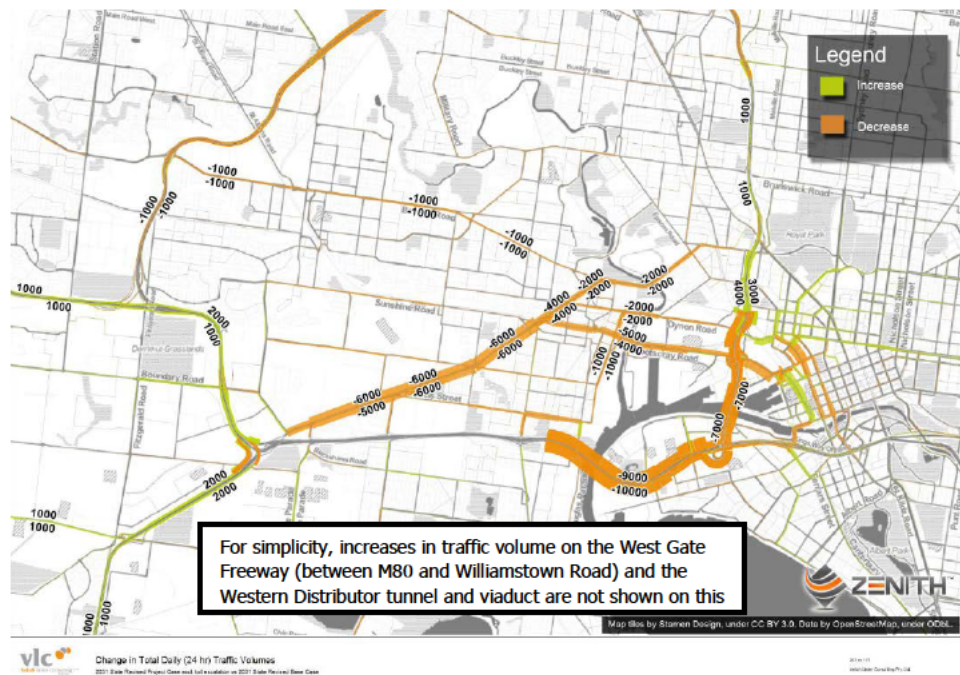
Network impacts

The Western Distributor will add additional network capacity for trips across the Maribyrnong River screen line and will help to relieve the pressure on the West Gate Bridge, Footscray Road, Dynon Road and Ballarat Road. A summary of the changes in volumes between the 2031 base case (no project) and the 2031 project case is presented in Figure 71.

Based on strategic modelling (accounting for tolling scenarios), traffic is expected to:

- Decrease on the West Gate Bridge and CityLink on the Bolte Bridge
- Decrease on the parallel routes of Geelong Road, Ballarat Road, Footscray Road and Dynon Road west of CityLink
- Decrease on the inner west arterial road network of Francis Street, Somerville Road, Buckley Street and Whitehall Street
- Decrease on arterial roads within the CBD and West Melbourne
- Increase at the western end of the Western Distributor, with traffic volumes increasing along the West Gate Freeway between the M80 Ring Road and Williamstown Road (the upgraded section) and increase marginally on the M80 Ring Road and Princes Freeway, and
- Increase at the eastern end of the Western Distributor including CityLink north of Footscray Road, and depending on the form of connections to the arterial road network, Wurundjeri Way and Dynon Road east of CityLink.

Figure 71: Change in total daily traffic volume between 2031 base case vs 2031 project case (24 hour average weekday model volumes)



The diagram above shows the change in volume as a direct output from the model. Elsewhere in this business case, volumes are reported in ranges to reflect the level of uncertainty of forecasting future scenarios out to 2031.

By 2031, the Western Distributor will remove approximately 16,000 to 22,000 vehicles per day from the West Gate Bridge and approximately 9,000 to 13,000 vehicles per day from Geelong Road (between Grieve Parade and Francis Street) compared to a 'no project' scenario.

Users of the Western Distributor - origins and destinations

The Western Distributor will provide an additional crossing of the Maribyrnong River, reducing the reliance on the West Gate Bridge 'squeeze point'. Figure 72 and Figure 73 present the origins and destinations served by both the Western Distributor and the West Gate Bridge, respectively.

Both the Western Distributor and West Gate Bridge will serve similar catchments in the west, however some of the key benefits of the Project are evidenced by the catchments served east of the Maribyrnong River.

The Western Distributor provides access to inner urban areas, the Swanson precinct of the Port of Melbourne, and the inner north. The majority of vehicles using the Western Distributor do not have destinations south of the CBD.

In contrast, the West Gate Bridge provides access to and from the city, the Webb Dock precinct of the Port of Melbourne, areas to the south of the city and the south-east, with a limited number of users of the West Gate Bridge with destinations in the north.

Figure 72: Origins and destinations of vehicles using the Western Distributor tunnel during the AM peak (inbound) – 2031 project case

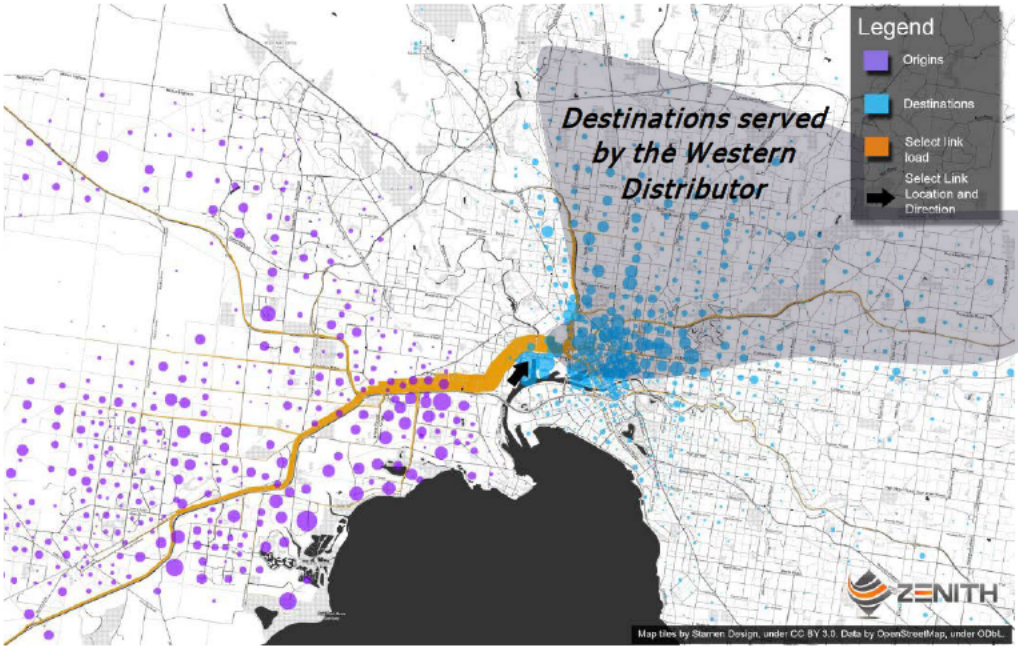
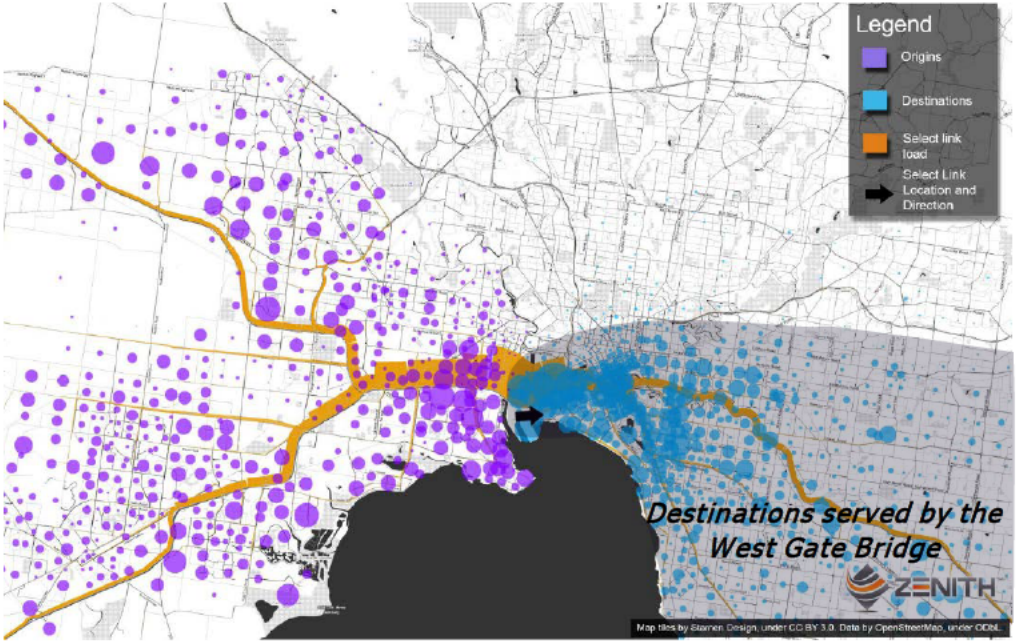


Figure 73: Origins and destinations of vehicles using the West Gate Bridge during the AM peak (inbound) – 2031 project case



Travel time savings

The Western Distributor will provide benefits for vehicles travelling between the west and the city by providing more reliable travel times, reducing the fluctuations in travel time on a day-to-day basis, and by reducing travel times across the western transport corridor. This will be achieved through a combination of:

- Increased lane capacity enabling more traffic to flow through the corridor
- Collector-distributor arrangement along the freeway reducing the turbulence created by merge and weave movements
- Two carriageway arrangement reducing the exposure to incidents that occur downstream of the Western Distributor (for example, if there is an incident on the West Gate Bridge, only the three inbound lanes on the Freeway approaching the West Gate Bridge would be affected, while the three lanes in the outer carriageway which serve the arterial roads and the Western Distributor tunnel would continue to flow)
- Provision of a Freeway Management System to manage and control traffic entering and travelling along corridor to optimise traffic flow under varying conditions.

By 2031, it is estimated that a trip starting from Grieve Parade on the West Gate Freeway and ending at the Footscray Road and CityLink interchange (route A to B in Figure 74) will be on average 7 to 12 minutes quicker via the Western Distributor in the AM peak compared to a West Gate Freeway and CityLink route in a 'no project' scenario. This saving could be as high as 20 minutes.

The Western Distributor is also expected to provide travel time benefits to the wider freeway network compared to the 2031 base case. Travel time benefits are expected in the AM and PM peak periods of approximately 2 to 4 minutes on average on the West Gate Freeway between Grieve Parade and Montague Street. While this number may seem small, it does represent an increase in average speed in the order of 5 km/hr and when this is considered with the high volumes that use this corridor in the AM peak, these benefits are significant. Further, compared to the maximum travel times recorded along the West Gate Freeway when an observed incident occurred, the average travel time could represent up to a 28 minute travel time saving.

A summary of changes in average travel times between 2014, the 2031 base case and the 2031 project case is presented in Table 50. It is noted that these average travel times do not reflect the additional improvements to travel time reliability that are also anticipated under the 'project case'.

Figure 74: Travel time routes

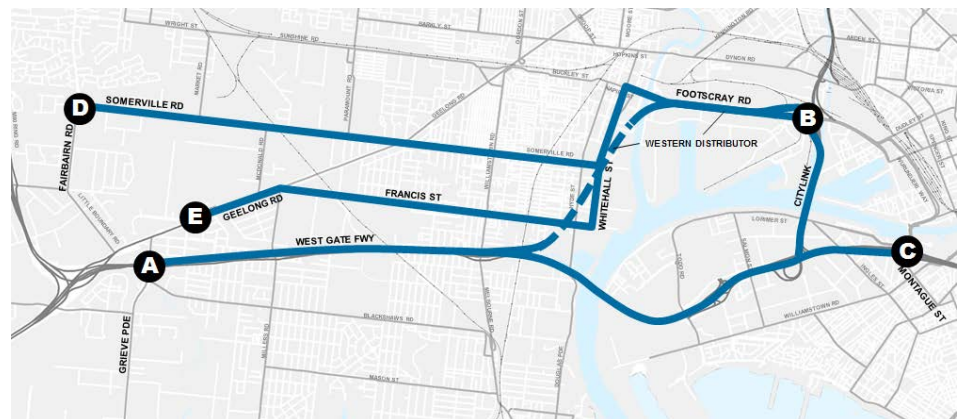


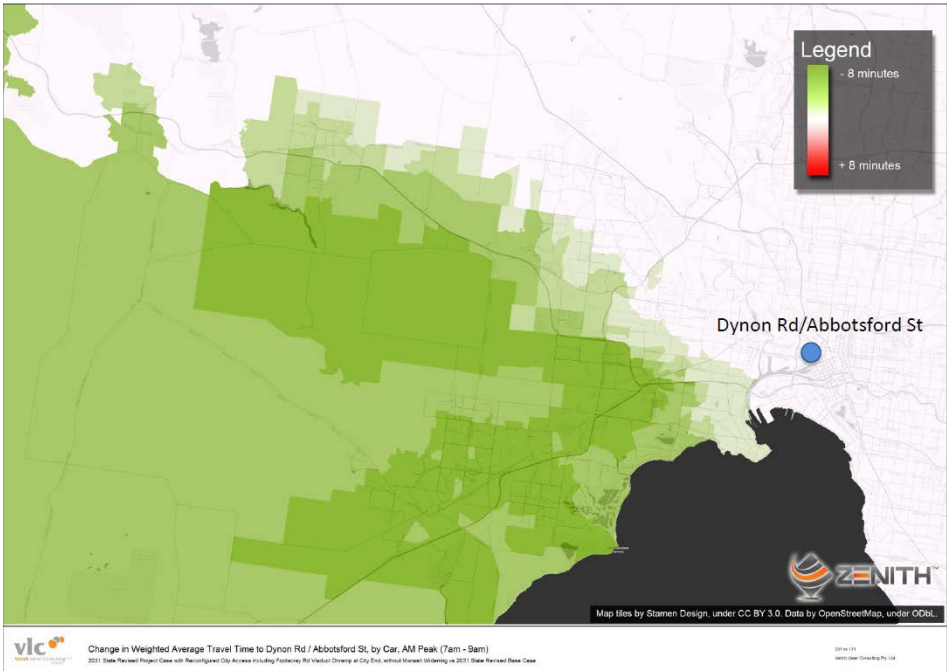
Table 50: 2031 base and project case average travel times

Route	Direction	Time period	2014	2031 base case [#]	2031 project case [#]	Travel time benefit (2031 project vs base)	Change in speed (2031 project vs base)
A to B	Inbound	AM	14 – 26 min	17 – 30 min	10 – 18 min	-7 to -12 min via Western Distributor	15 km/hr
	Outbound	PM	10 – 14 min	12 – 17 min	7 – 11 min	-5 to -7 min via Western Distributor	20 km/hr
A to C	Inbound	AM	8 – 19 min	10 – 23 min	8 – 19 min	-2 to -4 min	5 km/hr
	Outbound	PM	8 – 19 min	10 – 22 min	8 – 19 min	-2 to -3 min	5 km/hr
D to B	Inbound	AM	19 – 28 min	22 – 33 min	19 – 29 min	-3 to -4 min	5 km/hr
	Outbound	PM	17 – 31 min	20 – 37 min	18 – 33 min	-2 to -4 min	5 km/hr
E to B	Inbound	AM	14 – 22 min	17 – 27 min	15 – 23 min	-2 to -4 min	5 km/hr
	Outbound	PM	14 – 24 min	17 – 29 min	15 – 25 min	-2 to -4 min	5 km/hr

[#]The range of travel times represented does not indicate the expected travel time variability. Future 2031 travel times have been based on 2014 observed data. It is likely that in future years the variability will increase. This is discussed in the further in the next section.

Compared to a 2031 'no project' scenario, the Western Distributor is expected to improve travel times between the west and the city. Figure 75 presents the estimated change in weighted average travel times for vehicles with a destination to the west of the CBD. It highlights that travel times are expected to be faster during the AM peak between the west and the inner west, with the greatest travel time benefits achieved for vehicles with origins near the freeway corridors of the Princes Freeway, M80 Ring Road and Western Freeway.

Figure 75: Change in AM peak travel times between 2031 base and 2031 project case to west of CBD



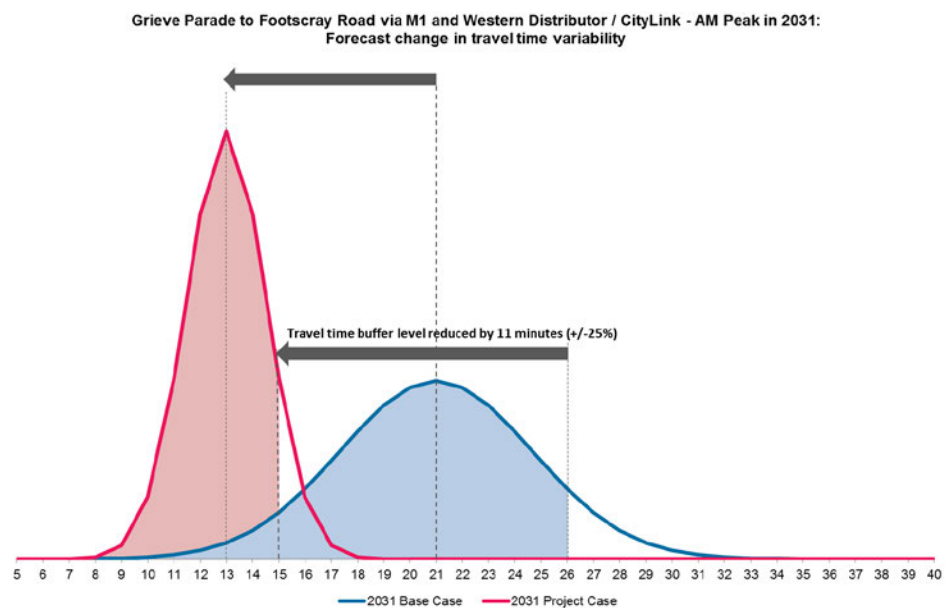
Travel time reliability

Variability in travel time will also reduce. The travel time variability is affected by many factors such as demand, congestion and operational issues. With increased capacity, reduction in over-reliance on the West Gate Bridge and the separation of traffic flows, it is expected that there will be significant reductions in travel time variability, providing more reliability in the expected travel times during peak periods.

Modelling analysis (presented in Figure 76) suggests that to travel from Grieve Parade to Footscray Road via the M1 and Bolte Bridge in 2031 without the project, the average travel time would be around 21 minutes. However due to the expected variability in travel time due to the congested conditions, drivers would need to allow 26 minutes to have confidence that they would reach their destination in time. With the Western Distributor, and the same level of confidence, drivers can now allow only 15 minutes to reach their destination, saving 11 minutes.

Travel time variability as shown in Figure 76 is represented by the width and height of the travel time distributions. The taller peak in the 2031 project case (pink curve) compared to the 2031 base case (blue curve) means that a higher number of trips in the project case are expected to be completed close or near to the average travel time. This means that in a scenario with the Western Distributor, a trip will not only be faster, but is also more likely to take the same amount of time each day.

Figure 76: 2031 base vs project case – change in travel time variability



Accessing Central Melbourne and surrounds

Traffic analysis indicates that access to inner areas solely from Footscray Road would lead to unacceptable levels of congestion, impacting on Footscray Road, Dudley Street and Docklands, as well as the Western Distributor and CityLink operation. Accordingly, a connection option that disperses traffic accessing central Melbourne and surrounds would be beneficial.

One option considered was to provide connections to both Footscray Road and Dynon Road. The analysis indicates that while this option would assist in reducing traffic demands along Footscray Road, it increases traffic demand along Dynon Road to a level that is likely to create significant and unacceptable congestion along Dynon Road and surrounding streets.

Strategic traffic modelling has shown that a large proportion of traffic from Dynon Road is destined for locations south of the Yarra River and this traffic travels through the CBD to access these locations. This through traffic places pressure on CBD roads and signalised intersections. In addition to Western Distributor connections to Footscray Road and Dynon Road, an extension of Wurundjeri Way which essentially extends the city bypass function of this important road could assist in relieving the pressure on Dynon Road. This approach would disperse and redistribute this traffic providing a better balance of trip distribution and diverting trips away from the CBD.

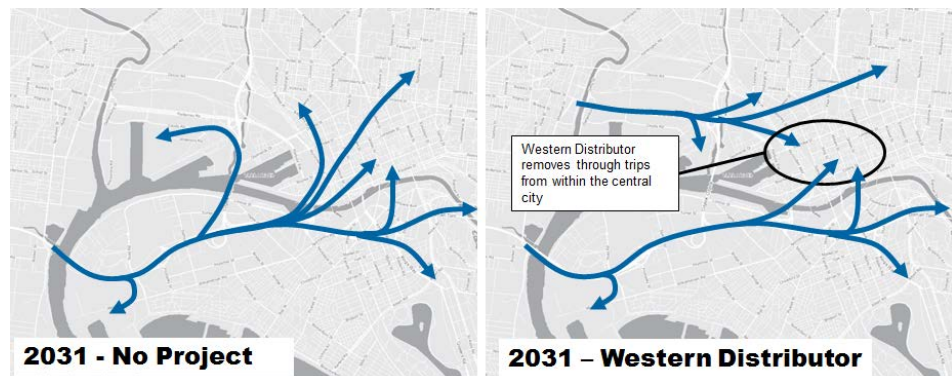
On that basis, the business case option is assumed to include a direct connection via ramps onto Footscray Road, as well as additional connections to Dynon Road and Wurundjeri Way via a new CBD bypass road extending between Wurundjeri Way and Dynon Road and connecting with the Western Distributor, grade separated over Dudley Street.

While this option has been adopted for the business case, the final network and connections outcome will be determined following extensive consultation with stakeholders (including the City of Melbourne) and the community.

At a broader level, the Western Distributor provides a new crossing of the Maribyrnong River and by doing so disperses and separates traffic travelling between the western suburbs, and north of the city from trips between the western suburbs, the city and south-east of the city. It also separates freight trips to and from Swanson Dock from those that will access Webb Dock.

A key benefit is that the Western Distributor (including the assumed central urban area connections) removes through trips from within the central city that would otherwise have used inner city arterial roads to travel between the West Gate Freeway and the inner north. With the project, trips destined for the north city area and inner north no longer need to travel through the city to reach these destinations as the Western Distributor provides a more direct route. This is presented in Figure 77.

Figure 77: Redistribution of traffic flows at eastern end of project



The Western Distributor CBD bypass would extend Wurundjeri Way to Dynon Road via a grade-separated connection over Dudley Street. This connection provides a link for Dynon Road traffic to access the southern parts of the city without the need to travel through the city grid to get there. This connection provides three points of access from the Western Distributor, to Footscray Road, to Dynon Road and to the Wurundjeri Way extension.

Figure 78 presents the difference in modelled volumes between the 2031 base 'no project' scenario and the full Western Distributor. Orange indicates that the Western Distributor will reduce traffic volume on that link relative to the base case. Green indicates that the Western Distributor will increase traffic volume on that link relative to the base case.

Figure 78: Western Distributor impact on city routes over 24 hours (2031 project case vs 2031 base case)



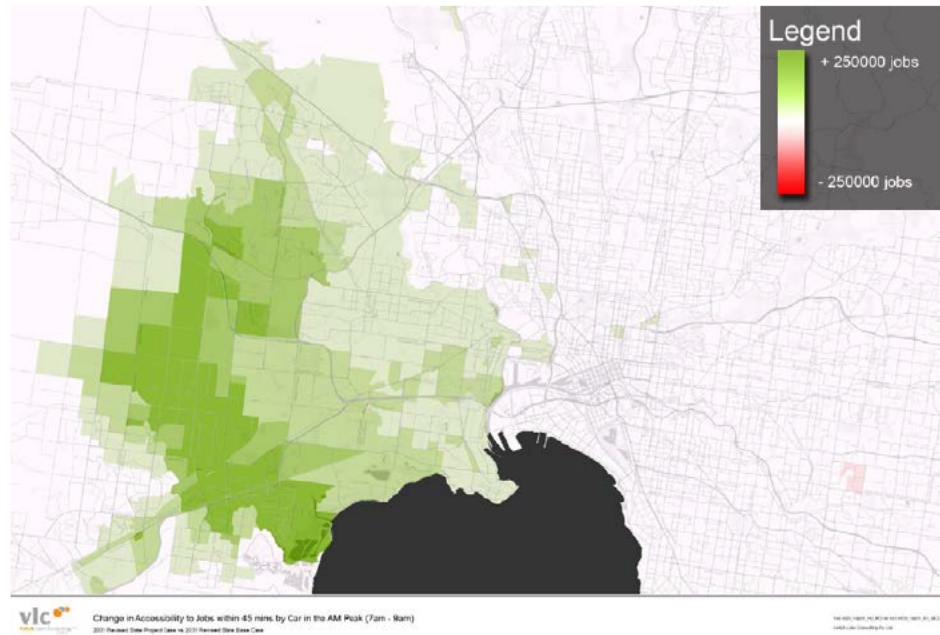
Of particular note, it is anticipated that the Western Distributor will result in a decrease in traffic demand along CBD streets such as Spencer Street and King Street. This is achieved by redistributing trips that have no purpose in the CBD away from Spencer Street and King Street and on to Wurundjeri Way or onto the Project.

Specifically, strategic modelling indicates that the Western Distributor, reduces vehicle kilometres travelled (vkt) per day in the CBD Hoddle Grid and city north area by almost 66,000 vkt.

Job accessibility

The Western Distributor will provide a more direct connection between the western suburbs and the city, inner north and eastern suburbs. This will have the potential to increase the number of jobs accessible to residents in the west by reducing travel times and providing a more direct route to the city and key job markets. Figure 79 presents an analysis of the additional accessibility to jobs within a 45 minute car trip due to the introduction of the Western Distributor.

Figure 79: Increased accessibility to jobs from the west – change in accessibility to jobs within 45 minutes by car (AM peak)



Network redundancy

An important benefit of the Western Distributor is that it increases network redundancy in the event of an incident on the West Gate Bridge that requires either lane closures or complete closure of the bridge. It offers a high quality alternative route when such incidents occur.

Under an incident situation a FMS will be activated well in advance on all strategic approaches to the West Gate Bridge and will direct traffic towards the Western Distributor.

Figure 80 and Figure 81 present an assessment of network alternatives in the event of an incident which closes one or all lanes on the West Gate Bridge in either the eastbound or westbound direction. Such an incident would otherwise cause severe flow breakdown during peak periods and take hours to recover. The Western Distributor provides some protection against this from occurring so only part of the stream is affected (due to the two carriageway arrangement of the reconfigured M1) and provides a viable bypass alternative.

Initial configuration of the project is to have two traffic lanes in the tunnel, but the design provides the ultimate width for three lanes in the future. In a scenario such as this where the West Gate Bridge affected, the third lane would be opened to maximise the alternative route capacity.

For westbound traffic (Monash Freeway to the West Gate Freeway), traffic will be diverted via CityLink, the proposed Wurundjeri Way extension and the Western Distributor. Placarded loads will be diverted to Hyde Street and Whitehall Street.

For eastbound traffic (West Gate Freeway to the Monash Freeway), traffic will be diverted via the Western Distributor and then CityLink or Wurundjeri Way. Placarded loads will be diverted to Hyde Street and Whitehall Street.

Figure 80: Network redundancy – eastbound traffic on the M1

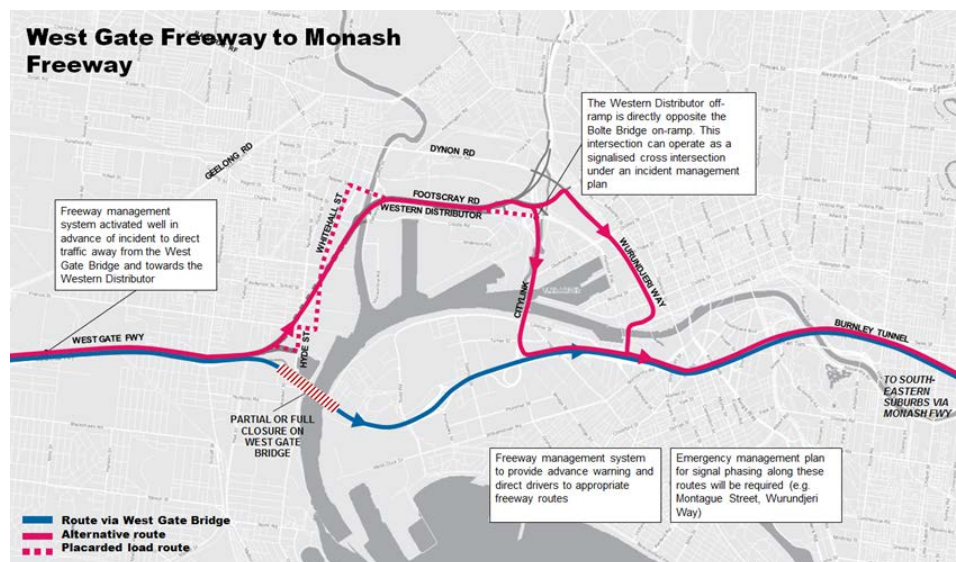
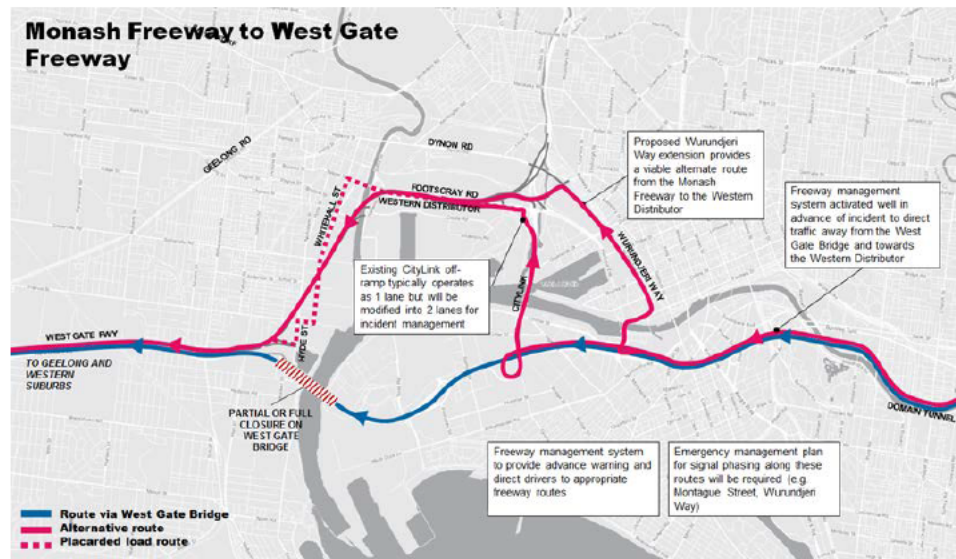


Figure 81: Network redundancy – westbound traffic on the M1



Freight

The Western Distributor Project provides a number of key benefits for the freight industry by providing more direct access to the Port of Melbourne and alternative routes across the Maribyrnong River.

Travel Time Benefits

Travel time benefits attributable to the Western Distributor are presented at Table 50. In 2031, a truck trip from Grieve Parade to the Port of Melbourne via the West Gate Freeway and Western Distributor will take between 11 to 19 minutes. This provides substantial benefit to the freight industry with origins in locations such as Altona North, Truganina, Airport West and Somerton that would typically use the West Gate Freeway to approach the Port of Melbourne.

For truck trips from the Tottenham and Brooklyn region, while the Western Distributor will not necessarily be on the direct 'desire line' to the Port of Melbourne, the Western Distributor will provide a viable and efficient connection for such trips. For example, a truck trip from the intersection of Boundary Road and Fairbairn Road to the Port of Melbourne via Somerville Road has been estimated to take between 21 and 31 minutes. Assuming it takes around 5 minutes to travel between this intersection and the Grieve Parade on-ramp (assuming an average speed of 30 km/hr) at the West Gate Freeway, a trip from the intersection of Boundary Road and Fairbairn Road to the Port of Melbourne via the Western Distributor would take between 16 and 24 minutes.

Table 51: Estimated travel time between Somerville Road/Fairbairn Road and the Port of Melbourne in 2031

Route	Estimated travel time
Boundary Road/Fairbairn Road to Port of Melbourne, via Somerville Road	21 to 31 minutes
Boundary Road/Fairbairn Road to Port of Melbourne, via Western Distributor	16 to 24 minutes (assuming a 30 km/hr average speed on Little Boundary Road and Fairbairn Road)
Summary of savings	Average of 6 minutes, up to 15 minutes

A number of trucks would exit the West Gate Freeway at Williamstown Road to access the Port of Melbourne via the arterial road network (Francis Street, Whitehall Road, Footscray Road). These vehicles travel slowly through the arterial road network due to signalised intersections and interaction with other traffic. As such, travel time can be highly variable and relatively long for a short distance (of approximately 6km).

Table 52 provides a summary of the forecast travel time of a truck using either the arterial road network or the Western Distributor to access the Port of Melbourne (via Appleton Dock Road) in 2031. It shows that trucks could take up to 21 minutes to access the Port of Melbourne compared to up to 11 minutes if they use the Western Distributor. The average travel time savings provided by the Western Distributor for this route is forecast to be nine minutes.

Table 52: Estimated travel time between Williamstown Road and the Port of Melbourne in 2031

Route	Estimated travel time
West Gate Freeway to Port of Melbourne, via arterial road network	15 to 21 minutes
West Gate Freeway to Port of Melbourne, via Western Distributor	7 to 11 minutes
Summary of savings	Average of 9 minutes, however could be up to 14 minutes

Benefits to HPFVs

All new structures constructed for the Western Distributor will be built to SM1600 and all existing bridges along the West Gate Freeway between the M80 interchange and Williamstown Road will be strengthened to 75 per cent of SM1600, which will accommodate up to 110 tonne loads.

Accordingly, constructing the Western Distributor will support the freight industry by enabling more productive and efficient vehicles to be used across the freeway network, contributing to a reduction in transport costs. Bridge strengthening to this section of the West Gate Freeway will connect with the M80, which is progressively being upgraded to accommodate higher productivity trucks. These works unlock the efficiency gains offered by HPFVs. By expanding the high mass limit network it is expected that HPFVs will increase from approximately 4 per cent of the truck fleet (350 trucks) that accesses the Swanson Dock Precinct at the Port of Melbourne to as high as 15 to 20 per cent (up to 4,100 trucks). Each HPFV on the network can be considered to be taking two other trucks off it.

This also leads to improved road safety outcomes. This is further benefited by HPFVs' safer on-road performance in comparison with standard vehicle combinations.²¹

As a larger proportion of the truck fleet moves to HPFV, the provision of infrastructure that supports these vehicles will further encourage greater use of the freeway network in preference to the local road network, leading to fewer trucks travelling through inner west roads such as Francis Street, Somerville Road, Williamstown Road and Moore Street.

²¹ Source: VicRoads: *Moving More with Less*

Impacts on overall truck flows

Indicative changes in commercial vehicle traffic flows after implementation of the Project are presented in Table 53. Compared to a 'no project' scenario, by 2031 the Project is estimated to remove between 4,000 to 6,000 trucks a day from the West Gate Bridge, and reduce truck volumes on other key arterial routes such as Geelong Road.

Table 53: 2031 base case vs 2031 project case change in commercial vehicles (24 hours)

Road	Modelled change in commercial vehicles (2031 project vs 2031 base)
West Gate Bridge	-4,000 to -6,000 trucks per day
West Gate Freeway (between Williamstown Road and Grieve Parade)	2,500 to 3,500 trucks per day
Geelong Road	-2,500 to -3,500 trucks per day
Western Distributor	9,000 to 11,000 trucks per day
Hyde Street Connection	800 to 1,200 trucks per day

Impacts on inner west truck flows and truck curfews

The Project is expected to reduce the number of trucks using local arterial roads facilitating improved amenity for residents in these inner west areas. Specifically, the Project has the potential to remove truck trips from the inner west arterial road network which originate from (or are destined for) the West Gate Freeway/M1 corridor and have no direct purpose (initial origin or final destination) within the inner west area.

Based on analysis of the origin-destination data collected from VicRoads' 2013 Inner West Truck Survey, it is estimated that the Project would redistribute up to 22% of all trucks from the inner west that cross the Maribyrnong River. Note that this assumes that there are no other interventions (such as extended arterial road curfews).

To realise further reductions in truck volumes from arterial roads in the inner west, extended truck curfews would be required. While there are multiple truck curfew pathways that may be possible, each with varying degrees of benefits and impacts to the local community and to the freight industry, applying full-time curfews to Francis Street and to Somerville Road are considered to provide a reasonable balance between the provision of improved amenity for the inner west and accessibility to the Port of Melbourne and Yarraville for the freight industry.

It is acknowledged that the implementation of truck curfews within the arterial road network is subject to approval by VicRoads under the *Road Management Act 2004 (Vic)*.

By applying full-time curfews to Francis Street and to Somerville Road, approximately 28 per cent of all trucks that travel through the inner west and cross the Maribyrnong River would be removed from the inner west and redistributed onto the Western Distributor. For Francis Street and Somerville Road, this results in a reduction of between 50 to 75 per cent of existing truck volumes being redistributed from those roads.

The distribution of truck trips with the Western Distributor and full-time truck curfews along Francis Street and Somerville Road is presented in Figure 82 and Figure 83. These figures show the anticipated distribution of all trucks that cross

the Maribyrnong River at Dynon Road or Footscray Road and travel through the inner west. The anticipated change in truck volumes are presented in Table 54.

Figure 82: Estimated truck redistribution from Western Distributor with full-time curfews applied to Francis Street and Somerville Road

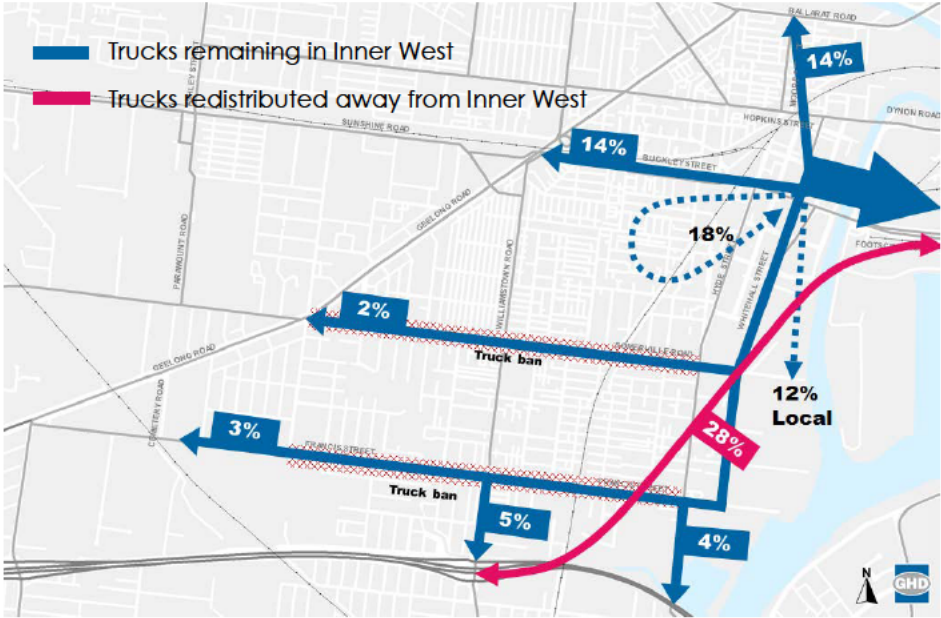


Figure 83: Estimated truck redistribution from Western Distributor with full-time curfews applied to Francis Street and Somerville Road (example of potential curfew option)

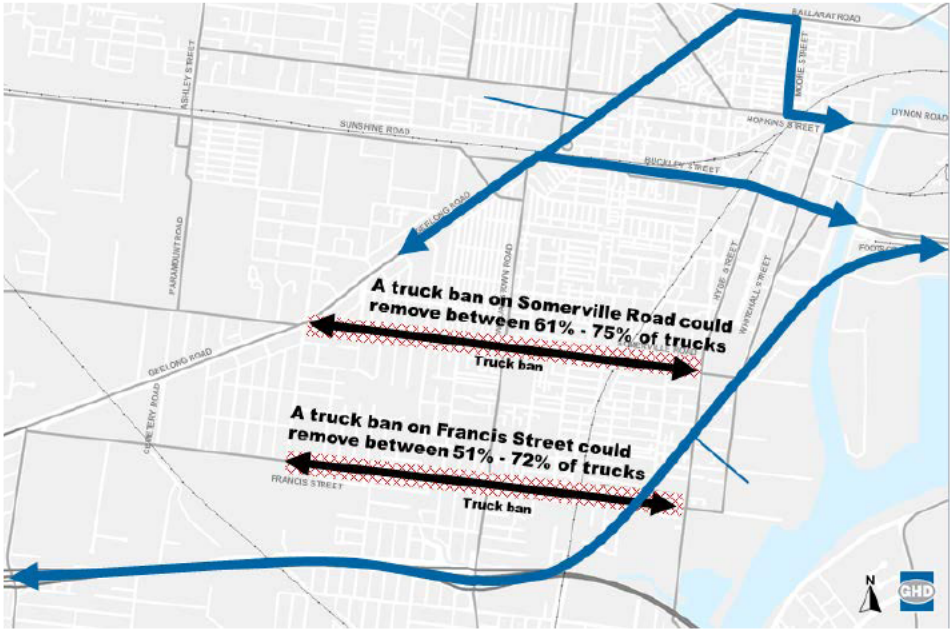


Table 54: Estimated change in truck volumes (24 hours)

Road	Estimated change in truck volumes (at opening, based on 2014 observed volumes)	Estimated change in truck volumes (2031)
Francis Street	-2,500 to -3,600 trucks per day	-4,000 to -6,000 trucks per day
Somerville Road	-1,000 to -1,300 trucks per day	-1,500 to -2,000 trucks per day
Hyde Street (south of Francis Street)	+700 to +1,000 trucks per day ⁽¹⁾	+700 to +1,000 trucks per day
Whitehall Street	-1,800 to -2,000 trucks per day	-3,000 to -4,000 trucks per day

Note: (1) no observed data for this proposed link. Adopts 2031 forecast volume.

To accommodate existing and growing freight demand and continuing to support residential amenity, additional infrastructure investment may be required. However, until further projects are initiated there will be a need for ongoing monitoring, management and implementation of measures to balance the needs and interests of the transport industry with those of the community. For example, a freight management strategy will be developed with stakeholders to proactively plan for the long-term management of truck movements in the vicinity of the Western Distributor and surrounding precincts.

Such measures will require extensive engagement with the freight industry, local community and other key stakeholders.

Cycling Connections

The Project proposes to significantly enhance a major Strategic Cycling Corridor and provides both new cycling links and opportunities to enhance existing cycling connections. The scope of works includes:

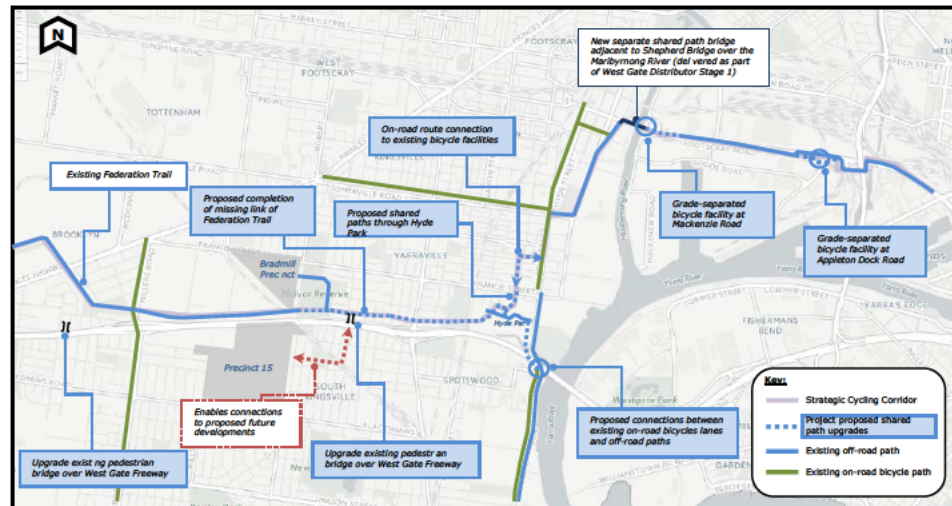
- Extending the Federation Trail east of Fogarty Avenue through a combination of on-road and elevated sections of the alignment
- Constructing a grade-separated facility at Mackenzie Road connecting to the Shepherd bridge shared path
- Constructing a grade-separated facility at Appleton Dock Road
- Upgrade of two pedestrian bridges over West Gate Freeway
- Providing connections between existing on-road facilities on Douglas Parade and off-road paths in Hyde Park.

The benefits offered by the proposed cycling connections and network enhancements include:

- Providing cycling connections to and from the western parts of Melbourne by completing the Federation Trail and associated Strategic Cycling corridor;
- Providing opportunities for bicycle connections to nearby sites earmarked for major redevelopment, specifically the former Bradmill site located on Francis Street (referred as the Bradmill Precinct) and the site formerly occupied by Don Smallgoods and other industrial uses located on Blackshaws Road (referred as Precinct 15)
- Addressing the network gap between Hyde Street and Douglas Parade
- Providing alternative cycling facilities for locations where on-road cycling facilities are undesirable for safety reasons (specifically Hyde Street in the vicinity of Francis Street)

- Physically separating cyclists from general traffic at Mackenzie Road and Appleton Dock Road.

Overall the Cycling upgrades as part of the Western Distributor project will assist in providing active and sustainable transport choices for both commuter and recreational cycling in the inner west.



Webb Dock Access

Webb Dock access improvements have arisen from the need to improve safety and efficiency of truck access to the new Webb Dock container berth. Inadequate access and egress capacity at the Port of Melbourne threatens freight efficiency and productivity. Furthermore, the route currently available to trucks leaving the Webb Dock and bound for CityLink has safety and reliability impacts for the road network in this area.

Currently heavy vehicles from Webb Dock wishing to travel north over the Bolte Bridge have to enter the West Gate Freeway at Cook Street. The entry of slow moving heavy vehicles, combined with a weave movement from the West Gate Freeway to the Bolte Bridge exit, can result in reduced speeds and congestion on the inbound carriageway of the West Gate Freeway.

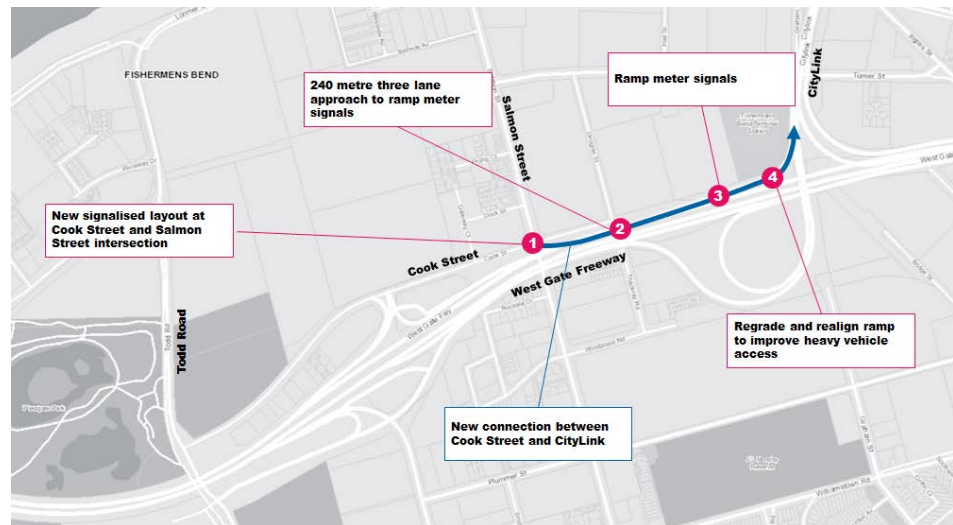
There is also a history of crashes on the tight curve on Ramp M (connection from West Gate Freeway eastbound to Western Link northbound) prior to the CityLink entry nose (City bound exit from West Gate Freeway). With increased traffic volumes, including high proportions of trucks, there is an increased potential for truck roll overs to occur on Ramp M if left untreated.

Part of the proposed works includes an upgrade of the ramp from the West Gate Freeway to the Bolte Bridge (west to north), improving the grade of the ramp and providing direct access from Cook Street to the Bolte Bridge. Proposed works are presented in Figure 84.

The proposed realignment of Ramp M will not have an adverse impact on vehicle travel times, particularly in the critical AM peak period. Microsimulation modelling of the proposed changes found:

- Travel times for vehicles travelling between the West Gate Freeway (inbound) and CityLink (northbound) are expected to increase
- There are very minor differences in travel times for traffic travelling along the West Gate Freeway and between Cook Street and the West Gate Freeway.

Figure 84: Proposed layout of Cook Street and Ramp M



9.3. Monash Freeway

9.3.1. 2014 base case – existing conditions

The Monash Freeway is a key corridor, providing a connection between high growing municipalities in the south-east, the CBD and freight distribution areas in the west. However, increasing traffic volumes along the Monash Freeway are creating higher levels of congestion resulting in longer trip times and unreliable journeys. The increased congestion is also increasing the risk of serious or fatal crashes.

The Monash Freeway between Warrigal Road and Clyde Road carries over 200,000 vehicles per day along its busiest sections and approximately 30,000 vehicles during the AM peak period (7 am to 9 am).

Traffic volumes are highest between the South Gippsland Freeway and Warrigal Road, carrying between 160,000 and 210,000 vehicles per day, with lower volumes east of the South Gippsland Freeway interchange (approximately 100,000 vehicles per day).

The average weekday traffic volumes during the peak periods and over a 24 hour period are presented in Figure 85. The average weekday traffic volumes show the heavy reliance on the Monash Freeway with it operating close to capacity in the peak direction in the peak periods.

The average weekday vehicle speeds during the peak periods, in the peak direction, are presented in Table 55. This shows that vehicles are travelling below the posted speed limit in the peak periods, with the lowest speeds recorded east of the EastLink interchange indicating higher levels of congestion and longer travel times. Data has also shown that there is a high variability in travel times along the corridor due to the high levels of congestion and the impact of incidents on traffic flow.

Table 55: Existing travel time and vehicle speeds

Peak	Direction	Section	Distance	Travel Time (2014)	Speed
AM Peak (7-9am)	Inbound	Clyde Road to South Gippsland Freeway	9.9	16	42
		South Gippsland Freeway to EastLink	7.6	11	47
		EastLink to Warrigal Road	12.6	14	57
PM Peak (4-6pm)	Outbound	Warrigal Road to EastLink	12.3	13	58
		EastLink to South Gippsland Freeway	8.3	12	45
		South Gippsland Freeway to Clyde Road	9.4	13	49

Figure 85: 2014 average weekday volumes – 24 hour, AM peak and PM peak

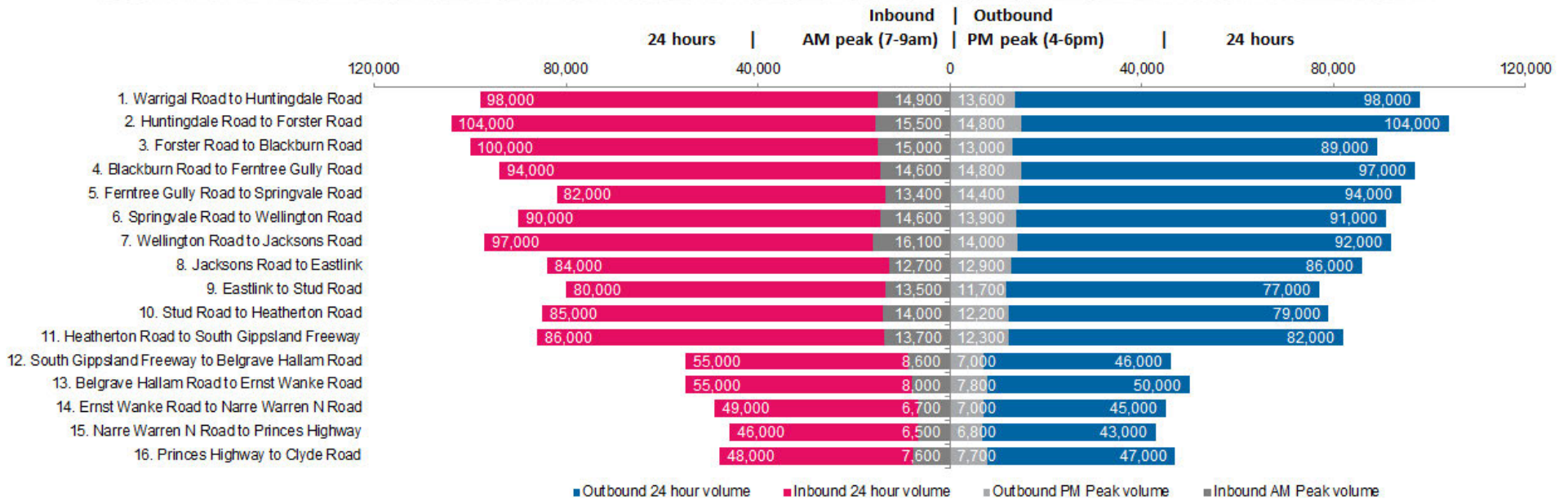
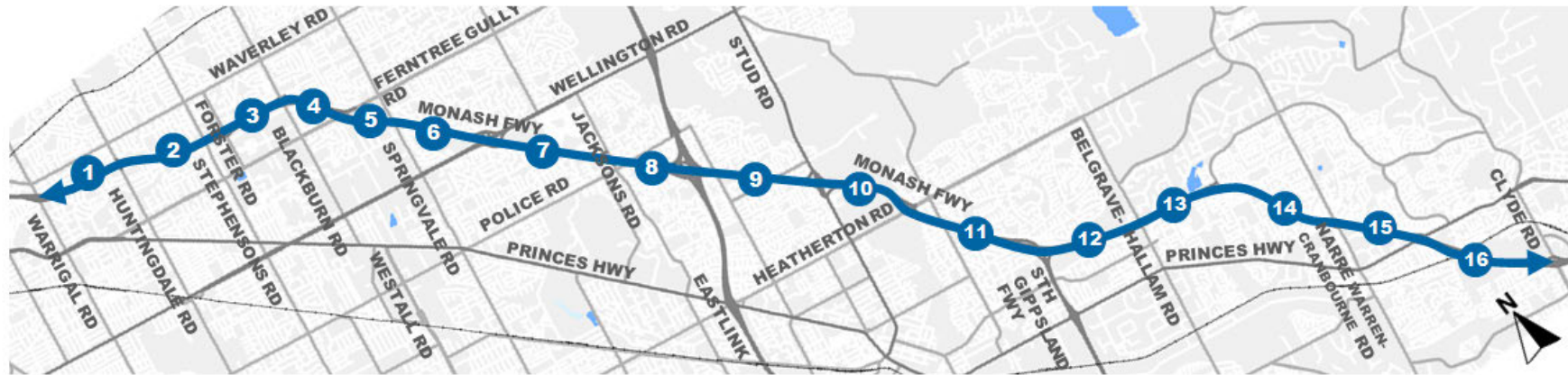
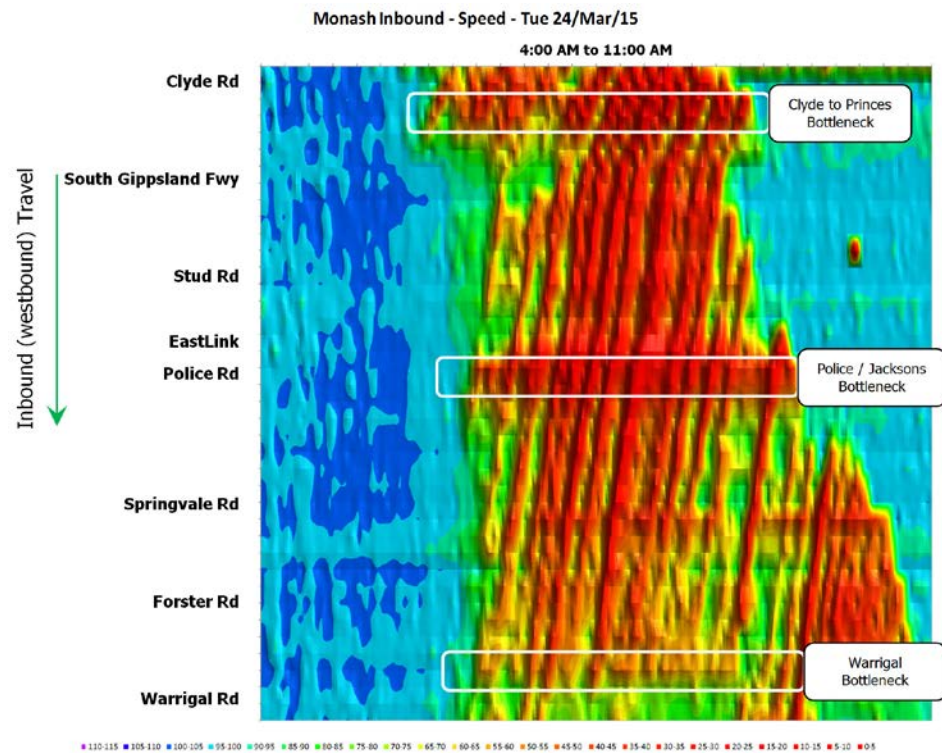


Figure 86 shows the typical speed contours for the inbound direction between Warrigal Road and Clyde Road. The figure demonstrates the locations where congestion causes flow breakdown and the subsequent reductions in speed and as a result, reduced throughput.

Figure 86: Monash Freeway inbound heat plot showing the speed between Clyde Road to Warrigal Road during a typical weekday AM peak

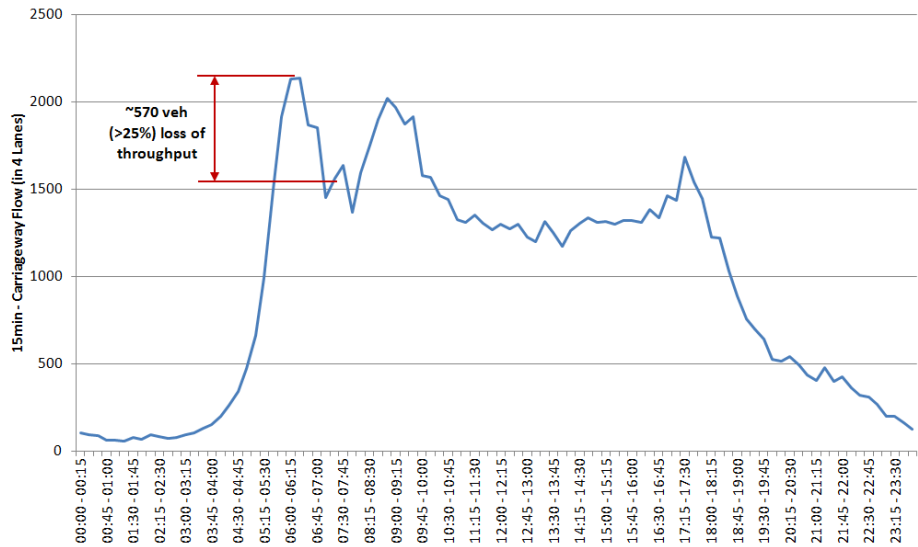


Note: The speed contour plots in this figure show the speed of traffic along the Monash Corridor. The direction of flow is down the page (key locations are notated) and the time scale is from left to right. The parallel diagonal lines propagating up from the large red bottlenecks are shockwaves indicating that drivers are experiencing stop-start conditions.

Source: VicRoads (2015) The inbound bottlenecks highlighted above have various causes. The Clyde Road to Princes Freeway bottleneck is a result of insufficient capacity along Hallam Bypass and no control upstream of the freeway section. The Police Road / Jacksons Road bottleneck occurs where high traffic volumes enter from EastLink in an uncontrolled manner and flow breaks down at the merge location. Both of these two bottlenecks described result in significant reductions in traffic flow throughput during the AM peak period. The uncontrolled nature of traffic that then continues downstream from the Police Road / Jacksons Road bottleneck then triggers more bottlenecks downstream such as the Warrigal Road bottleneck highlighted. While speeds and travel times are impacted and become less reliable for commuters between Wellington Road and Warrigal Road, the volume throughput is maintained at reasonably high levels due to the existing ramp meters that do manage entering flows to compensate for the large uncontrolled EastLink entry flows.

Figure 87 below shows the throughput reduction due to the Police / Jacksons bottleneck during the AM peak period.

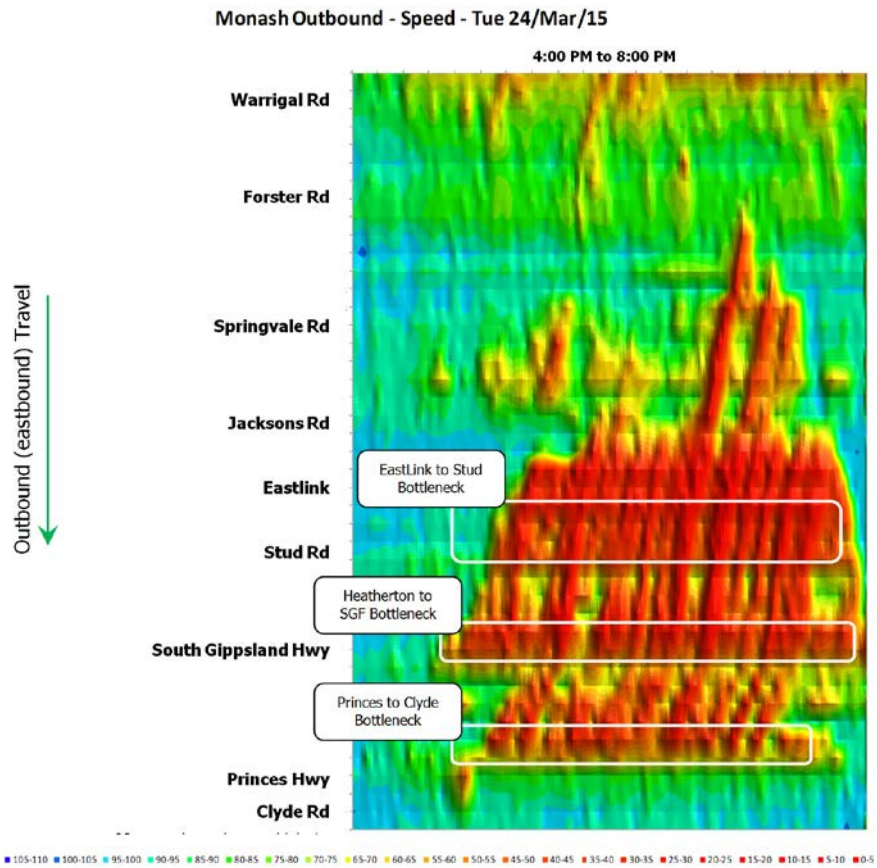
Figure 87: Monash Freeway inbound, midblock between Wellington Road and Jacksons Road, throughput reduction during AM peak



Source: VicRoads (2015)

Similarly, Figure 88 shows speed contour plots for the outbound direction highlight the existing bottlenecks and the associated throughput impacts.

Figure 88: Monash Freeway outbound heat plot showing the speed between Clyde Road to Warrigal Road during a typical weekday AM peak

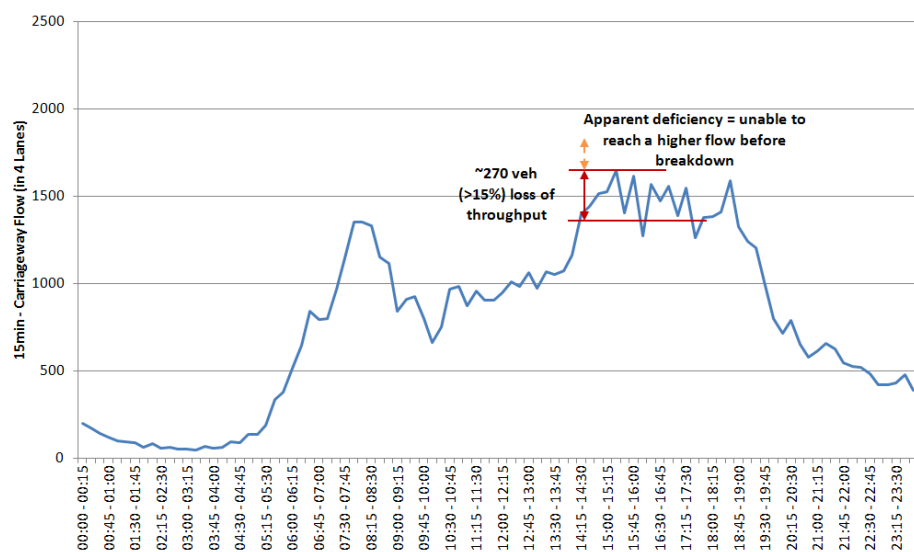


Source: VicRoads (2015)

The outbound bottleneck between EastLink and Stud Road results in slow speeds and significantly reduced throughput. It is evident from the available data the flow throughput is unable to reach high flows before flow breakdown due to the heavy uncontrolled flows from EastLink and the weaving occurring in the section which is demonstrated in the volumes profile figure below. The Heatherton Road to South Gippsland Freeway bottleneck similarly experiences weaving movements as vehicles get positioned for the major freeway fork, combined with lack of upstream control from EastLink. The Princes Freeway to Clyde Road bottleneck on Hallam Bypass is due to a combination of insufficient capacity (only two lanes) and uncontrolled entry ramps in the outbound direction on the Hallam Bypass.

Figure 89 below shows the throughput cap and breakdown flow reduction due to the EastLink to Stud Road bottleneck during the PM peak period.

Figure 89: Monash Freeway, EastLink to Stud Road, throughput during PM peak



Source: VicRoads (2015)

It is also worth highlighting that high demands of more than 4,000 vehicles per hour on the two lane section last around four hours a day in both directions between South Gippsland Freeway and Clyde Road. Some of the ramps in this section feed more than 1,000 vehicles per hour for up to 12 hours a day, meaning that the impacts of freeway congestion quickly begin to affect arterial roads.²²

Currently, the Thompson Road duplication upgrade is the only funded road project aimed at assisting and managing the problems faced by increasing demand in the outer south-eastern suburbs which will further increase the ability for traffic demand to access the Monash Freeway corridor. Even at current demand levels, existing congestion on the Monash Freeway indicates significant issues with the operation of transport routes through the south-east corridor.

²² VicRoads statistical data collected on 19 March 2015.

9.3.2. 2031 base case – the ‘no project’ scenario

By 2031, daily traffic volumes are expected to increase across the entire length of the Monash Freeway by approximately 10 to 30 per cent. Growth is expected to be lower in the peak direction during the AM peak, due to existing capacity constraints. Growth in the AM peak is forecast to be highest between Clyde Road and the South Gippsland Freeway interchange.

Table 56: 2014 and 2031 base case travel times

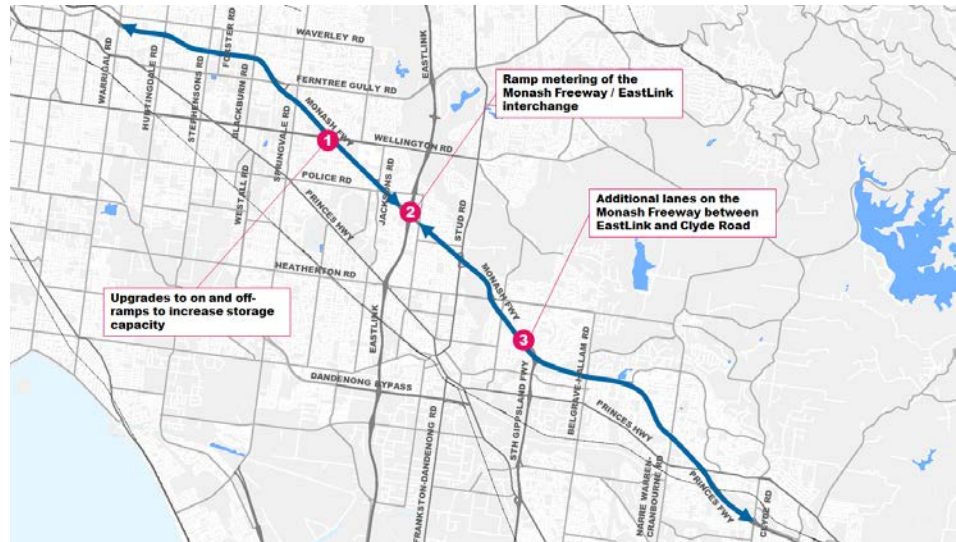
Peak	Direction	Section	Distance	Travel Time (2014)	Travel time (2031 base)
AM Peak (7-9am)	Inbound	Clyde Road to South Gippsland Freeway	9.9	16	26
		South Gippsland Freeway to EastLink	7.6	11	16
		EastLink to Warrigal Road	12.6	14	17
PM Peak (4-6pm)	Outbound	Warrigal Road to EastLink	12.3	13	16
		EastLink to South Gippsland Freeway	8.3	12	18
		South Gippsland Freeway to Clyde Road	9.4	13	22

Average weekday travel times between Clyde Road and Warrigal Road during the AM peak are approximately 41 minutes in the city bound direction, with average speeds of 49 kilometres per hour. During the PM peak, travel times away from the city were approximately 38 minutes, with average speeds of 52 kilometres per hour.

9.3.3. 2031 project case

The Monash Freeway Upgrade (as presented in Figure 90) will provide additional capacity between Clyde Road and EastLink. As a result, it is expected that traffic volumes in the 2031 project case will increase along this section of the M1 compared to a 2031 base (no project) scenario. Parallel and surrounding roads are expected to benefit from the widening works, with a redistribution of traffic towards the Monash Freeway.

Figure 90: Monash Freeway Upgrade: business case project scope



The proposed works on the Monash Freeway are expected to reduce travel times and increase vehicle speeds between Clyde Road and EastLink during the AM peak and PM peak periods, with no changes in travel time or vehicle speeds between EastLink and Warrigal Road. A summary of the changes in travel times are presented in Table 57.

The proposed works are forecast to reduce travel time by approximately four minutes in the AM peak period for inbound vehicles and five minutes for outbound vehicles in the PM peak period.

The installation of ramp meeting from EastLink to Clyde Road will assist in reducing flow breakdown along the freeway, maintaining vehicle speeds and reducing travel time variability. That means the project will make it less likely that travel times will be significantly higher than the average travel time on a given day.

Table 57: 2031 base case vs project case travel times

Peak	Direction	Section	Distance	Travel Time (2014)	Travel time (2031 base)	Travel time (2031 project)
AM Peak (7-9am)	Inbound	Clyde Road to South Gippsland Freeway	9.9	16	26	23
		South Gippsland Freeway to EastLink	7.6	11	16	15
		EastLink to Warrigal Road	12.6	14	17	17
PM Peak (4-6pm)	Outbound	Warrigal Road to EastLink	12.3	13	16	16
		EastLink to South Gippsland Freeway	8.3	12	18	17
		South Gippsland Freeway to Clyde Road	9.4	13	22	18



10. Economic assessment

The Project will generate direct benefits for road users and Melbourne communities and create macroeconomic benefits for Victoria and Australia.

Economic assessment incorporating both a cost benefit analysis and economic impact assessment has been undertaken to understand and assess the benefits.

The economic appraisal undertaken for the business case incorporates both a cost benefit analysis and economic impact assessment. The cost benefit analysis assesses the community-wide social, environmental and financial impacts of the Project. The benefits include direct benefits to road users (such as travel time savings) and wider economic benefits (such as agglomeration and labour supply benefits).

Economic impact assessment applying economy-wide modelling has also been undertaken to identify the indirect effect on macroeconomic variables, including gross state product (GSP), employment and household consumption, as direct benefits flow through the economy.

Further details are provided in the following attachments:

- Attachment J – Economic Assessment Report
- Attachment M – Land Use Report

10.1. Nature of the economic assessment

The cost benefit analysis assesses whether there are net benefits from a community-wide perspective considering directly attributable benefits. This compares costs with economic benefits, including:

- direct benefits to road users (productivity and growth for Melbourne as a result of reduced congestion and a more competitive freight sector)
- direct benefits to the broader community (greater resilience in the transport network as a result of reduced reliance on the West Gate Bridge and a more liveable Melbourne through reduced crashes and air emissions, and improved amenity for local communities)
- wider economic benefits (economic development in the west from productivity-increasing clustering or agglomeration of businesses and improved accessibility to labour markets).

The main cost benefit analysis indicators are the net present value (NPV) of costs and benefits, and the benefit-cost ratio (BCR).

The economic impact assessment applying CGE modelling identifies macroeconomic benefits. The macroeconomic benefits of the Project include job creation and increased GSP.

10.1.1. Approach to economic assessment

The approach to estimate net economic benefits and macroeconomic benefits is as follows:

- Scenarios were specified to enable the economic assessment to calculate benefits incremental to a base case or a scenario without Project proceeding.



- The base case was developed as part of the traffic modelling undertaken by Veitch Lister Consulting, based on the State's forecast land use, population and employment for Melbourne and a reference transport network developed by the State for consistency across Victorian initiatives. The reference network includes key planned initiatives for Melbourne including Melbourne Metro, CityLink-Tulla Widening, and expansion of Swanson Dock at the Port of Melbourne.²³
- The project scenario considered in the economic analysis is the same as the base case except that investment in the Project is assumed over the period 2015/16 to 2071/72 with 2022/23 the first year of benefits.
- Direct benefits were estimated using outputs of traffic modelling, Victorian and Australian parameters to monetise economic benefits, and relevant international research. Benefits include user benefits, such as travel time savings, reduced vehicle operating costs and fuel savings, and non-user benefits, such as reduced congestion and environmental effects, reduced crashes and improved amenity.
- Capital, operating and maintenance costs were estimated that include risk adjusted design and construction costs, land acquisition, state procurement and management costs, operating and maintenance costs, and toll collection costs.
- Macroeconomic benefits were estimated by incorporating relevant direct impacts in a CGE model in order to estimate the flow-on and total impacts across the economy. The direct impacts used as first-round inputs to the modelling include cost estimates and the major measures of productivity change estimated in the CBA (travel time savings, vehicle operating costs, agglomeration, and accident costs).

10.1.2. Key assumptions and parameters

The economic appraisal has been developed based on Australian guidelines and current Victorian practice, and draws on Australian and international research papers.

The BCR has been assessed based on current Victorian practice, taking into account Victorian Government guidelines and the Victorian Auditor-General's Office recommendations for traffic modelling.²⁴ BCR results have also been developed consistent with Infrastructure Australia December 2013 published economic guidelines.²⁵ These have been recently applied for consideration of other nationally significant infrastructure.

There are elements of Victorian current practice that are more conservative than the Infrastructure Australia guidance, including:

- The Victorian Auditor-General's Office recommended approach to consider induced demand is more conservative than the approach set out in Infrastructure Australia's Guidelines which does not specify this requirement.

²³ DEDJTR Reference Case, 2015

²⁴ Economic analysis using current Victorian practice takes into account DTF's (2013) Economic Evaluation for Business Cases Technical Guidelines (State Government of Victoria) and the Victorian Auditor-General's Office recommendations for traffic modelling (Victorian Auditor General's Report (June 2011), Management of Major Road Projects

²⁵ Infrastructure Australia, December 2013, Reform and Investment Framework, Templates. For Stage 7 Solution evaluation (Transport Infrastructure) available at: http://infrastructureaustralia.gov.au/projects/files/Infrastructure_Priority_List_Submission_Template_Stage_7_Transport.pdf

- The residual value calculation approach is more conservative based on Victorian Government guidance which requires residual value to be calculated on the lower of either a straight-line depreciation or future benefits approach, whereas Infrastructure Australia supports either approach.
- The appraisal period approach is less conservative based on Victorian Government guidance, which supports an assessment period equivalent to asset life (50 years in the case of a long-life asset such as a tunnel or road pavement), whereas Infrastructure Australia supports a 30 year period for comparative purposes across initiatives.
- Both the Victorian and Infrastructure Australia guidelines suggest that wider economic benefits are reported separately to the core BCR.

Key appraisal assumptions underpinning the analysis include:

- *Discount rate* – applies a real discount rate of 7 per cent as the core rate for discounting cashflows
- *Appraisal period* – begins in 2015/16 and extends 50 years from the operation start date of 2022/23 to 2071/72 based on Victorian guidelines and practice. This reflects the weighted average design life/useful life of the project assets. When applying Infrastructure Australia December 2013 Guidelines, a 30-year appraisal period from the first full year of operations is assumed (2015/16 to 2051/52).
- *Residual value* – estimated based on a future stream of future net benefits based on Infrastructure Australia December 2013 Guidelines. When applying current Victorian practice, straight-line depreciation is used.
- *Confidence level of costs* – applying P50 costs (as the median or most likely value).

Key elements of the CBA methodology include:

- *Transport network* – traffic impacts have been estimated across the transport network (all of Melbourne plus Geelong, Bendigo, Ballarat and the Mornington Peninsula) as defined by Veitch Lister Consulting's model boundaries.
- *Induced demand* – Traffic model outputs used in economic appraisals in Australia have traditionally only analysed route and/or mode changes by travellers. VAGO recommends accounting for other potential sources of behaviour change such as changing mode, making additional journeys, changing destination, changing time of travel, and reallocating trips²⁶. The Infrastructure Australia December 2013 guidelines do not specify these induced demand requirements, so they have not been considered for the core results. For BCR results based on Victorian requirements, induced demand outputs have been used to capture changes in route, mode and destinations²⁷ as modelled by Veitch Lister²⁸.

²⁶ Victorian Auditor-General's Report (June 2011), Management of Major Road Projects

²⁷ In the Veitch Lister model, each destination has a different utility or benefit attached to it. The traffic demand model measures the number of users who change their trip destination when the Project makes it easier to reach a destination of higher gross utility (that is, where it improves accessibility).

²⁸ The ability to forecast time of travel and reallocated trips remains under development nationally and internationally as part of strategic traffic modelling. The variable approach applied in this business case is considered more conservative than fixed matrix approaches. The approach may understate economic benefits relating to outstanding areas of behaviour change. This is because the traffic model measures benefits in the form

- *Ramp-up benefits* – recognising that traveller behaviour will not change immediately, adjustments have been made to incorporate traffic model outputs into the economic appraisal including a ramp up of benefits over the first three years as travellers take time to divert trips onto the Western Distributor or M1 corridor.
- *Interpolation and extrapolation of benefits* – between modelled years compound annual growth rates are applied and beyond the last modelled year, benefits have been estimated by extrapolation. Beyond 2045/46 this is equivalent to a compound annual growth rate in trips and vehicle kilometres travelled of 1.15 per cent and 1.38 per cent per annum respectively.

10.1.3. Economic indicators

The following indicators are used to present economic results:

- **Economic net present value (NPV)** – the difference between the present value (PV) of total incremental benefits (avoided road user costs) and the PV of the total incremental costs
- **BCR** – ratio of the benefits relative to costs in PV terms: that is, a BCR greater than 1.0 indicates PV benefits outweigh PV costs
- **Gross State Product (GSP)** – the sum of value added (i.e. returns to primary factor inputs – capital, labour and land) for all Victorian industries
- **Employment (FTE)** – additional full-time-equivalent employment generated over the construction and operation phases.

10.2. Results

Economic analysis indicates that the Project delivers substantial direct benefits (see Table 58). The benefits for road users and freight are significant due to reduced travel times, lower vehicle operating costs, and higher load capacities. The broader community will also benefit from improved transport network resilience and redundancy, improved liveability, as well as agglomeration benefits and improved accessibility to jobs.

As discussed above, the BCR has been estimated based on current Victorian guidelines and practice, and based on Infrastructure Australia’s December 2013 published economic guidelines. While there are elements of the Victorian approach that result in more conservative economic results, the Project is estimated to deliver net economic benefits under both approaches.

The Project will deliver economic activity, jobs and net benefits for the community

Table 58: Economic appraisal of the Project (\$ June 2015 millions, real, discounted present values)

		A. Consistent with Victorian guidelines and practice		B. Consistent with December 2013 IA guidelines for national comparison	
Costs and benefits		PV \$m	%	PV \$m	%
Costs	Capital costs*	\$3,283	92%	\$3,283	93%
	Operating and maintenance costs	\$287	8%	\$258	7%

of lower/higher travel time as opposed to, for example, disutility from being unable to travel at the desired time of day or the utility possible from being able to relocate work/residence to superior locations due to improved accessibility and lower costs of travel. Even if modelling was able to estimate these changes, economic parameter values are not readily available to enable quantification of this change.

		A. Consistent with Victorian guidelines and practice		B. Consistent with December 2013 IA guidelines for national comparison	
	Sub-total costs	\$3,570	100%	\$3,541	100%
Benefits	Productivity and growth for Melbourne	\$2,931	50%	\$3,627	47%
	Travel time savings – car	\$1,578	27%	\$1,880	24%
	Perceived cost of congested travel time - car	\$579	10%	\$778	10%
	Reliability – car	\$145	2%	\$208	3%
	Vehicle operating cost savings – car	\$628	11%	\$761	10%
	More competitive port and freight sector	\$910	16%	\$972	13%
	Travel time savings – light and heavy commercial vehicles	\$388	7%	\$356	5%
	Vehicle operating cost savings – light and heavy commercial vehicles	\$237	4%	\$380	5%
	Reliability – light and heavy commercial vehicles	\$64	1%	\$65	1%
	High productivity freight vehicle user benefit	\$221	4%	\$171	2%
	Reduced reliance on the West Gate Bridge	\$440	8%	\$341	4%
	Resilience to lane closures on the West Gate Bridge	\$440	8%	\$341	4%
	A more liveable Melbourne	\$325	6%	\$416	5%
	Travel time savings – public transport	\$34	1%	\$11	0%
	Crash cost savings	\$210	4%	\$270	4%
	Reduced air emissions and other environmental externalities	\$53	1%	\$98	1%
	Improved amenity	\$28	1%	\$37	1%
	Residual value (future benefits vs straight-line depreciation)	\$36	1%	\$1,260	16%

		A. Consistent with Victorian guidelines and practice		B. Consistent with December 2013 IA guidelines for national comparison	
	Sub-total benefits excluding WEBs	\$4,642	79%	\$6,615	84%
Results	Benefit Cost Ratio	1.3		1.9	
	Net Present Value	\$1,072		\$3,074	
Wider Economic Benefits	Economic development in Melbourne and in the west	\$1,213	21%	\$1,076	14%
	Agglomeration	\$1,139	19%	\$993	13%
	Labour Supply	\$13	0%	\$23	0%
	Imperfect competition	\$60	1%	\$60	1%
Results including WEBs	Benefit Cost Ratio including WEBs	1.6		2.2	
	Net Present Value including WEBs	\$2,285		\$4,149	

**Note: the costs differ from out-turn capital cost estimates as they have been adjusted for inclusion in the economic appraisal to represent real, discounted (present value) costs over the lifecycle*

Note: estimated incremental to the base case, discounted based on a 7% real discount rate, based on P50 capital and operating costs; (A) Consistent with Victorian Government economic guidelines therefore analysed over the period 2015/16 – 2071/72, and applying Victorian Auditor-General's Office recommendations for traffic modelling; (B) Consistent with Infrastructure Australia December 2013 published economic guidelines therefore analysed over the period 2015/16 – 2051/52 and not applying VAGO recommendations for traffic modelling;

Source: PwC, 2015

10.3. Economic benefits

The Western Distributor and Monash Freeway Upgrade will generate a number of benefits for road users, the Melbourne community and the economy more broadly. The benefits quantified and monetised in the CBA and economic impact assessment (EIA) are outlined below.

10.3.1. Productivity and growth for Melbourne

The Project will reduce congestion, improve travel times, improve travel time reliability, and lower vehicle operating costs. As shown in Figure 91 and Figure 92, travel time benefits will be experienced by travellers whose journey originates in the inner west, north-west and south-west, accessing central, eastern and northern Melbourne due to decongestion.

Travel times in the morning peaks will be up to 12 minutes faster for trips from the west. In the south-east, the Monash Freeway Upgrade will improve traffic flow and ease congestion, reducing travel time by approximately four minutes in the AM peak period for inbound vehicles and five minutes for outbound vehicles in the PM peak period.

An improvement for trips in the west will be the reduction in travel time variability. Commuters, businesses and other travellers will be able to plan the time for their journey with more certainty. This means that some travellers will be able to reduce the travel time buffer allowance (the extra time travellers allow to make sure they will reach their destination on time) by up to 11 minutes.

Average speeds for some journeys will be up to 15 km/h hour faster in the morning and up to 20 km/h faster in the afternoon peak.

Melbourne's CBD will have improved amenity be more efficient with a reduction of more than 60,000 vehicle kilometres travelling through it each day. With the project, trips destined for the north city area and inner north no longer need to travel on the West Gate Bridge and through the city to reach these destinations as the Western Distributor provides a more direct route.

Figure 91: Travel Time Benefits by Origin – Car, AM Peak (7am - 9am), 2030/31



Source: Veitch Lister Consulting, 2015

Figure 92: Travel Time Benefits by Destination – Car, AM Peak (7am - 9am)



Source: Veitch Lister Consulting, 2015

10.3.2. More competitive port and freight sector

As a national import and export logistics hub, the Project delivers significant improvements to the competitiveness of Australia's busiest container port. The Project will improve freight efficiency, particularly through the construction of a new, high productivity freight vehicle compliant freeway link to the Port of Melbourne. These cost savings flow through in the form of lower consumer prices and productivity benefits across the wider economy.

Figure 93 and Figure 94 illustrate that benefits will be realised by freight using the Western Distributor to access the Port of Melbourne precinct, inner western suburbs and Brooklyn/Laverton North. It also shows the freight travelling to Tullamarine and Craigieburn will benefit from decongestion.

The construction of high productivity freight vehicle compliant freeway links to the Port of Melbourne will bring significant time and operating cost savings to the freight industry. More than a third of the national containerised trade in Australia will have direct freeway access to the port precinct by 2031.

Superior freight links, with unimpeded access for 110 tonne mass limit trucks to the Port, will deliver \$15 to \$20 per trip efficiency savings for high productivity freight vehicles. Some 28 per cent of trucks that currently use local inner west roads will also have a safer and more efficient option to reach the port precinct.

Freight using the Western Distributor to access the port precinct from Melbourne's west will enjoy travel time savings, some up to 50 per cent.

Freight sector savings are expected to flow through to consumer prices and bring wide community and economic benefits.

Figure 93: Travel Time Benefits by Origin – Commercial vehicles, AM Peak (7am - 9am), 2030/31



Source: Veitch Lister Consulting, 2015

Figure 94: Travel Time Benefits by Destination – Commercial Vehicles, AM Peak (7am - 9am), 2030/31



Source: Veitch Lister Consulting, 2015

10.3.3. Reduced reliance on the West Gate Bridge

The M1 (Princes Freeway–West Gate–CityLink–Monash) freeway corridor, the M2 (CityLink–Tullamarine) freeway corridor and the equivalent rail corridors are Melbourne’s most important transport connections, underpinning Melbourne’s economy.

Building the Western Distributor will create an alternative river crossing, improve the resilience of the city’s transport network, and make Melbourne less vulnerable to shut down when major incidents occur.

While the West Gate Bridge will remain a critical element in the city’s transport network, building an alternative new crossing of the Maribyrnong River will give Melbourne more options to reduce delays and congestion from affecting the entire road system (known as ‘redundancy’).

The Project will free up capacity on the Bridge by taking up to 22,000 vehicles off it (including 4,000-6,000 trucks a day).

Data from the VicRoads Road Crash Information System shows that there were approximately 850 incidents (including vehicle breakdowns, collisions or obstacles on the road) on the West Gate Bridge in 2014 and an additional 1,300 incidents on the remainder of the West Gate Freeway between M80 and Todd Road (2,150 incidents in total). This equates to an average of approximately six incidents per day on the West Gate Freeway.

VicRoads advises that it takes approximately 10 minutes to respond to an incident on the M1 and an additional 16 minutes to clear from the carriageway, however lane closures can vary from short momentary closures to complete freeway closures of up to six hours in the event of a fatal or major collision. It is estimated that a single lane closure on the West Gate Freeway accounts for around 90 per cent of incidents while closures of two or more lanes occur 10 per cent of the time.

When incidents occur, the flow-on impact can be broad across the network, with the resulting congestion lasting much longer than the time taken to clear the original incident.

Having an alternative to the West Gate Bridge will help 50,000 to 70,000 vehicles per day avoid lane closures on the Bridge and reduce the number of incidents and accidents that can cause traffic to block up across the wider network. It is also expected to result in up to 50 fewer incidents per year and extend the life of the road network in the west by 15 years.

10.3.4. A more liveable Melbourne

The Project will better connect people to jobs, shopping and other destinations. The Project will reduce noise, crashes and pollution, particularly on residential streets. Increased community wellbeing, safer and less-congested arterial roads, and lower truck volumes on local roads will make the inner west a more appealing prospect for urban renewal and residential development. Figure 95 demonstrates the connectivity benefits expected along the entire M1 corridor.

The Project will reduce 50 to 75 per cent of trucks along Francis Street and Somerville Road in Yarraville and up to 28% of trucks more broadly across the inner west roads. This will make Melbourne’s west far more attractive for communities.

Cycling will be further encouraged with the completion of the main cycling route, the Federation Trail, which is already used by more than 6,000 cyclists in the west, along with greater connectivity of other shared pathways.

Air pollution will be reduced by 2.3 million tonnes a year, and safety improvements along the M1 are estimated to help avoid up to 55 serious crashes a year.

Figure 95: Travel Time Sectorised Benefits – Car, Inter Peak (9am – 4pm), 2031



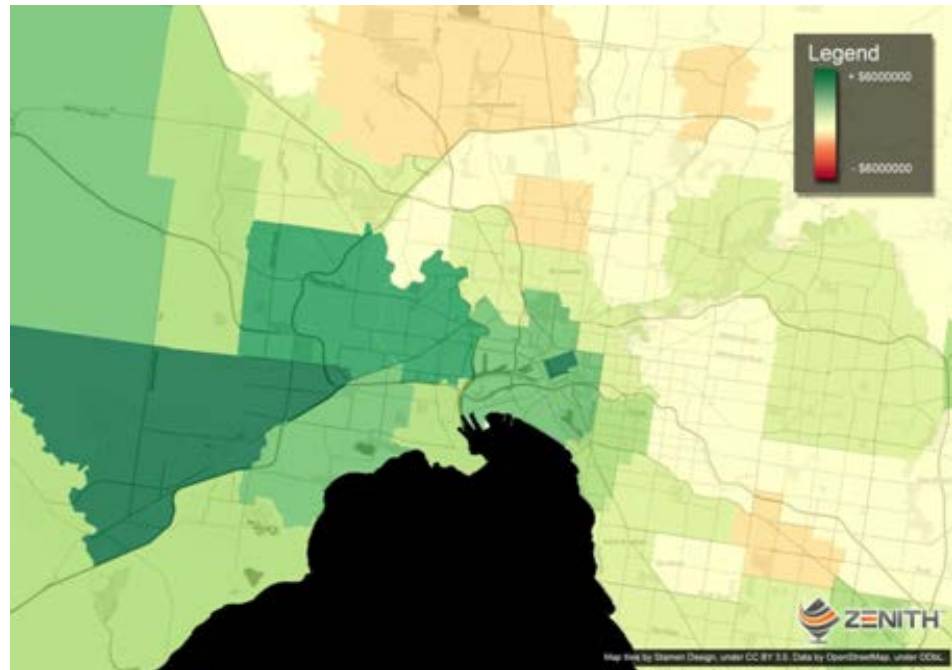
Notes: The green lines connect origins and destinations for each defined sector, as marked by the black boundary lines. The thickness and concentration of line corresponds with the level of benefits.

Source: Veitch Lister Consulting, 2015

10.3.5. Economic development in the west

The Western Distributor and Monash Freeway Upgrade will boost inter-peak connectivity between businesses, making business more productive. Figure 96 maps these agglomeration benefits. It shows the increase in economic output in each statistical local area.

Figure 96: Distribution of additional output from agglomeration economies – by Statistical Local Area

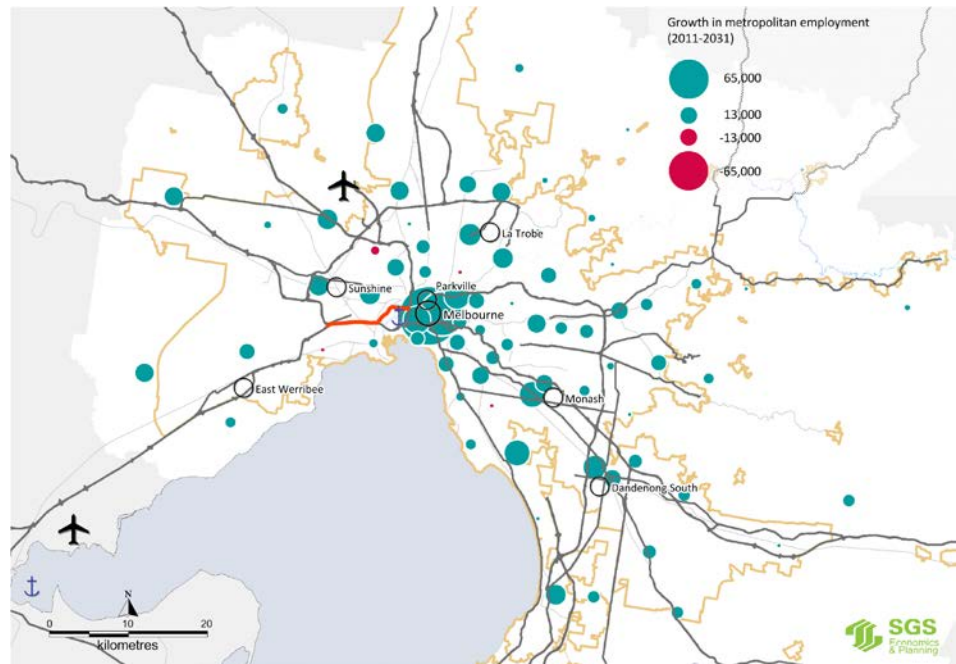


Notes: The shading indicates the change in economic output (ie gross regional product) resulting from the agglomeration benefits of Project (eg the dark green coloured areas experience the largest boost in economic output)

Source: Veitch Lister Consulting, 2015

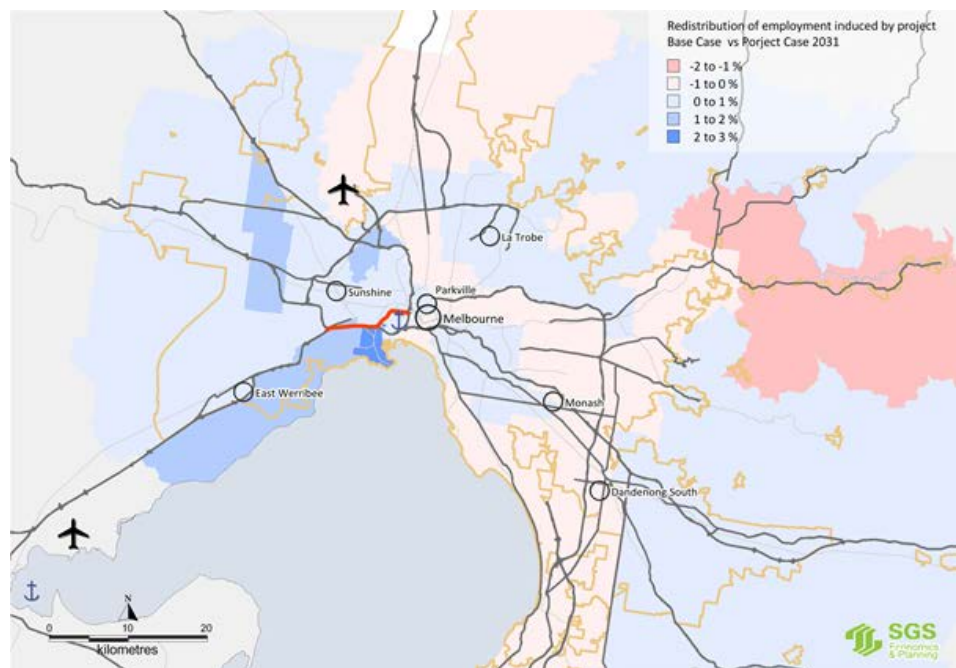
In addition, to result in the productivity increases detailed above, significant transport network developments can also impact the distribution of employment opportunities. Figure 97 highlights the forecast growth in employment opportunities between 2011 and 2031, the majority of the growth is expected to take place in central Melbourne and the south-east. The construction of the project is expected to redistribute some of the expected growth towards Melbourne's west as indicated in Figure 98.

Figure 97: Growth in metropolitan employment (2011-2031)



Source: SGS Economics and Planning, 2015

Figure 98: Redistribution of employment induced by the project (base case vs project case 2031)



Source: SGS Economics and Planning, 2015

Overall, the employment impact to the Western region raises employment levels by 2,200 in 2031. While this represents quite a modest impact compared to the total growth expected to take place, it does show a redistribution of employment towards the west. The inner western SLAs of Hobsons Bay – Williamstown and Maribyrnong will experience the most significant uplift in total employment.

10.3.6. Macroeconomic impacts

The Western Distributor and Monash Freeway Upgrade are expected to generate macroeconomic activity induced by improvements to transport productivity and increased expenditure throughout the economy. The CBA does not measure these benefits, as they are indirect measures not easily attributed to a particular project.

The macroeconomic impacts of the Project are set out below.

Table 59: Macroeconomic impact assessment (\$ June 2015 millions, real, discounted present values)

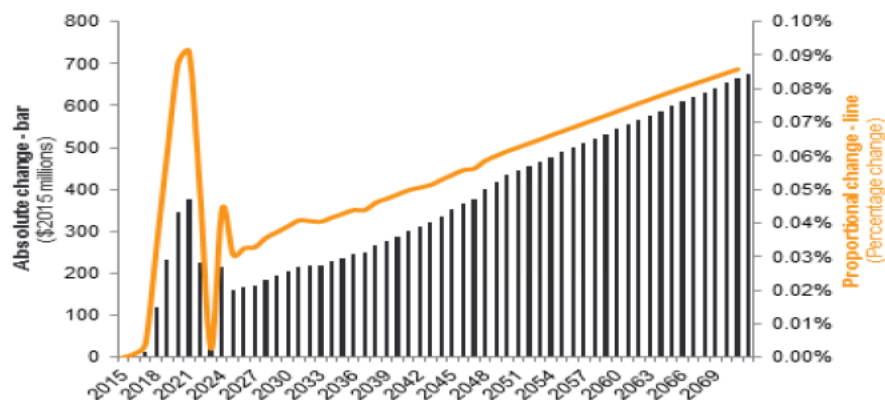
Economic impact (direct and indirect)		Construction period 2017/18 – 2021/22	Operating period 2022/23 – 2071/72	Total period 2017/18 – 2071/72
Increase in Gross State Product		\$1,126	\$9,681	\$10,807
Jobs created (FTE)	Maximum	5,600	2,700	5,600
	Average	2,400	700	900

Note: estimated incremental to the base case, analysed over the period 2015/16 to 2071/72, GSP discounted based on a 7% real discount rate and provided in \$ June 2015, jobs estimated on Full Time Equivalent basis.

Source: PwC, 2015

As indicated in Figure 99 and Figure 100, the Project will significantly increase economic activity in Victoria—observed in the increase in GSP, as well as employment. As a result of the Project, Victoria’s real GSP will be \$11 billion (\$ June 2015, real, discounted present value over 50 years of operation 2016-2072) higher than in the base case reflecting the productivity improvements associated with the Project. Employment remains above the long term average in Victoria for most of the period due in part to the productivity gains achieved from the Project.

Figure 99: Impact on Victoria’s Gross State Product

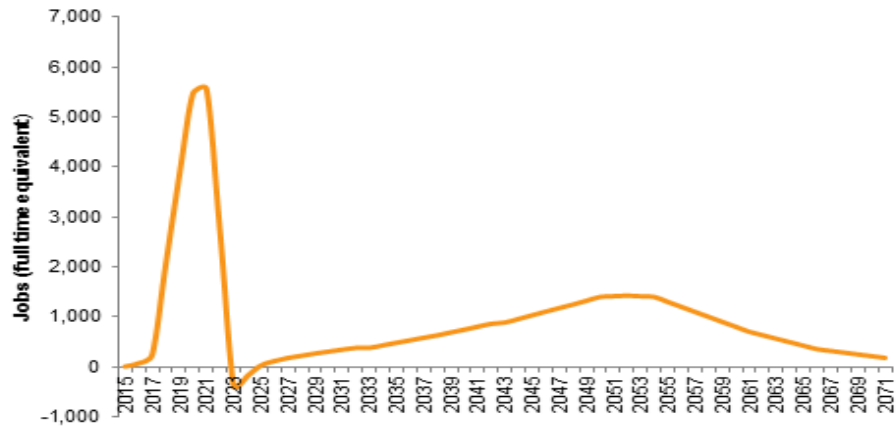


Source: PwC

This is caused by expenditure during the construction period, which continues into the operation period as productivity improvements spur further economic growth (for example, as a result of travel time savings for service industries such as transport, postal and warehousing).

GSP and employment spike during the construction phase reflecting the impact of the construction phase. On an ongoing basis, however, productivity improvements associated with the Western Distributor and Monash Freeway Upgrade continue to increase employment and activity.

Figure 100: Impact on Victoria's employment²⁹



Source: PwC

10.4. Capital, operating and maintenance costs

The economic analysis requires an estimate of the costs to understand the whole of life impacts to inform the economic CBA for the Project.

Capital costs are included during construction of the project (2015/16-2021/22) and ongoing operating and maintenance costs will be included from the first year of operations (2022/23) to the end of the appraisal period. Capital costs include state management, statutory planning and land acquisition costs.

Nominal costs are adjusted for inclusion in the economic appraisal by removing escalation to convert cash flows to real (June 2015) dollars.

The economic appraisal excludes benefits derived and costs incurred both prior to a decision being made on whether to proceed with the Project and beyond the economic appraisal period. Operating and maintenance costs for the West Gate and Monash Freeways which would be incurred regardless of the Project are excluded.

²⁹ In 2023, there is a small increase in Victoria's unemployment. This is a product of the CGE model assumptions and the timing of project's impacts. By 2023, the construction sector's demand for labour has peaked and fallen away but the greater demand for labour during the construction phase means wages have ratcheted upwards. As wages are assumed to adjust with a lag (ie they are 'sticky'), the lower demand for labour and higher wages means unemployment is slightly above the base case in that year.

10.5. Exploring alternative scenarios and assumptions

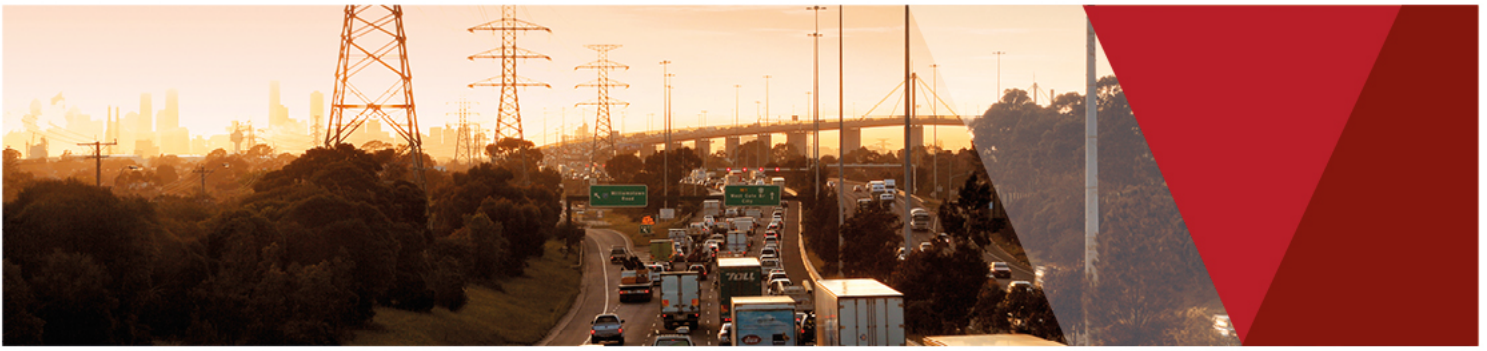
Initial sensitivity testing of key economic appraisal inputs and assumptions is provided in Table 60. This suggests that compared to the core scenario based on the Victorian Government and VAGO guidelines/recommendations, or the Infrastructure Australia December 2013 guidelines, most sensitivity tests (the exception being a 10 per cent discount rate applying Victorian Government practice) still result in estimated benefits that exceed costs. Further details can be found in Attachment J – Economic Assessment Report.

Table 60: Sensitivity testing of economic appraisal results

Sensitivity test	A. Consistent with Victorian guidelines and practice	B. Consistent with December 2013 IA guidelines for national comparison
	BCR	BCR
Core results (from Table 58)	1.3	1.9
Discount rate		
4% discount rate	2.3	3.1
10% discount rate	0.8	1.2
Project cost		
P90 Costs	1.2	1.8
+ 20% Costs	1.1	1.6
- 20% Costs	1.6	2.3
Technical scope		
Western Distributor Project only <i>West Gate Freeway widening, Western Distributor tunnel and improved access to Port of Melbourne/Webb Dock</i>	1.1	1.3
Monash Freeway Upgrade only <i>Monash Freeway widening and improved ramp metering between Warrigal and Koo Wee Rup Road</i>	4.2	8.4
Western Distributor tunnel <i>Constructed as a surface road instead of a tunnel</i>	1.8	2.6
Tolling scope		
Western Distributor tunnel tolls +20% <i>A 20% increase in tolls on the Western Distributor including the West Gate Distributor ramp and Footscray/Dynon Road ramps</i>	1.3	1.9

Sensitivity test	A. Consistent with Victorian guidelines and practice	B. Consistent with December 2013 IA guidelines for national comparison
No extension of CityLink tolls in the base case <i>In the base case tolls on CityLink are assumed to lapse rather than continue after the current concession ends (assumed from 2036)</i> Change in land use	2.1	2.4
Indicative land use change <i>Assumes land use change expected as a result of the Project (with the appraisal accounting for traffic impacts as well as amenity improvement from attracting households and employment to preferred locations)³⁰</i> <i>Note: estimated incremental to the base case, discounted based on a 7% real discount rate, based on P50 capital and operating costs; (A) Consistent with Victorian Government economic guidelines therefore analysed over the period 2015/16 – 2071/72, and applying Victorian Auditor-General's Office recommendations for traffic modelling; (B) Consistent with Infrastructure Australia December 2013 published economic guidelines therefore analysed over the period 2015/16 – 2051/52 and not applying VAGO recommendations for traffic modelling.</i> Source: PwC, 2015	1.3	1.9

³⁰ Based on SGS Economics forecasts of the change in population and employment as a result of the improved accessibility (population) due to the Project (see attachment M – Land Use Report). See Attachment J – for further details on approach to estimating land use impacts. While the BCRs are the same as the core to one decimal place, the NPV's are higher both based on Victorian guidelines and practice and Infrastructure Australian 2013 guidelines (\$1,086M and \$3,083M respectively in real \$ June 2015, discounted, net presented values).



11. Social and environmental assessment

The Project is expected to provide a number of social and environmental benefits as well as some potential impacts, particularly during construction.

This section discusses the various social and environmental effects, and how the benefits will be enhanced and the impacts minimised where possible.

This preliminary social and environmental assessment will be developed further during the planning approvals phase.

11.1. Social appraisal

11.1.1. Western Distributor

Potential Social Benefits

Potential social benefits include higher levels of productivity, reduced congestion, improved access to jobs (especially for residents in the city's growth areas in the west), and improved neighbourhood amenity, with reduced congestion and traffic on local streets.

A key social benefit will be the removal of heavy vehicle traffic from local streets in the inner west. By redirecting the growing number of trucks and other vehicles from these streets, the inner suburbs will be safer, less polluted and more attractive places to live and work.

With reduced traffic on local roads, residents will enjoy better access to local parks, shops, schools, recreation facilities, other services and each other.

The opportunity to connect sections of the Federation Trail to Yarraville, and improve local and regional links for pedestrians and cyclists will support better health and wellbeing.

Removing truck traffic also offers the potential to:

- Relieve congestion and improve noise and air quality
- Provide more capacity for public transport
- Create more opportunities for cycling and walking
- Improve the viability of urban renewal projects and assist in creating more compact, accessible and liveable communities.

Development 'uplift' and property value increases are expected over the longer term, as inner western suburbs become increasingly attractive to a greater number of households and businesses.

The reduction of trucks from the inner-west would be expected to generate productivity benefits for local businesses including:

- Improved travel times, lower transport and operating costs, faster and more reliable business-to-business connections and better access to business services
- Improved freight efficiency through more timely, reliable and cost-effective delivery of freight and the ability to store containers in less expensive locations



- Improved safety through a more steady flow of traffic at constant speed, reducing the likelihood of crashes.

There is an opportunity to involve the community to improve Stony Creek Reserve. Parts of the reserve are degraded and not utilised to their full potential. There is significant opportunity through a focus on quality technical and urban design and meaningful local engagement to create a community-led upgrade of the reserve which has the potential to leave a lasting legacy.

As with any large scale infrastructure project, there will be some adverse social impacts. However, most are short-term and localised, existing only during the construction phase.

Potential Social Impacts

Many of the impacts with the greatest potential for significance within the Yarraville community have been avoided or minimised by the tunnelled component of the Western Distributor. Communities and businesses most susceptible to residual social impacts include those located immediately adjacent to tunnel entrance and exit points, ventilation structures and elevated road structures.

The potential impacts on communities and businesses have been identified at regional and local levels for the construction and operation phases.

For adjacent communities, the potential impacts include:

- Project elements that reduce or compromise the public open space in the inner west
- Disruption to recreational facilities including the West Gate Golf Course, Stony Creek Reserve, McIvor Reserve and Donald W McLean Reserve
- Relocation of pedestrian over-bridges, re-routing of bicycle and pedestrian pathways, and re-distribution of traffic on the local road network which could affect accessibility and connectivity
- Widening of the freeway may reduce the distance between some residential areas and the road, potentially reducing amenity through changes to local noise, air quality and landscapes. These impacts will be carefully assessed and appropriate mitigation measures incorporated into the project design. In some areas the freeway widening may also lead to loss of local street connections
- Increased traffic (once operational) along the Western Distributor has the potential to negatively impact amenity values for immediately adjacent communities through increased noise and some changes to air quality, with mitigation measures anticipated to address some of these impacts
- The elderly, people with a disability, social housing tenants, Indigenous people and people from culturally and linguistically diverse backgrounds may be more vulnerable to changes to local roads and access, and will need to be considered in developing management and mitigation measures.

Significant emphasis will be placed on identifying opportunities to mitigate potential social impacts through an extensive consultation process and a strong emphasis on high quality technical and urban design.

As is typical of projects of this nature and size, some property acquisition will be inevitable, however no homes will need to be acquired. Concerted efforts have been made in the concept design development to minimise the number of residential and commercial properties affected. This will also be an important consideration post business case as the design is further developed.

Community members who may be directly affected by potential property acquisition impacts will be notified before land is reserved and given an opportunity to express their views. Where land acquisition is required, affected

owners and occupants would be contacted to discuss proposals, provide support and supply information on compensation procedures and possible timeframes.

Construction activities can result in temporary impacts including loss of amenity from noise, dust, odour and vibration, site occupation, traffic and access arrangements and spoil management. An extensive suite of targeted mitigation measures will be implemented to manage these impacts to within acceptable limits. These measures will include detailed environmental, construction and traffic management plans.

Detailed socio-economic impact assessments and management plans, complemented with a comprehensive community engagement program, will ensure that potential social issues are identified and managed promptly and appropriately during all phases of development.

11.1.2. Monash Freeway Upgrade

The proposed works would improve the performance of the Monash Freeway bringing a number of social benefits for communities in south-eastern Melbourne, including less traffic congestion and improvements in travel time.

However, as a large infrastructure project there will be social impacts that should be mitigated before construction begins. These include engaging with stakeholders about the likely impact and managing community expectations of what the project involves. The widening east of EastLink only or noise wall upgrades, freeway to freeway ramp metering at EastLink, and upgrading of the Monash Freeway so soon after the 2010 upgrade, are all issues that require a robust and wide ranging community engagement strategy.

Most social impacts would be experienced during the construction phase and their careful management will be important. While this is the responsibility of the construction contractor, contractual arrangements and project scope all feed into how these social impacts are managed and should be part of the overall project delivery strategy.

Key social impacts expected during construction include general construction issues (traffic delays, increased trucks, noise and dust), reduced traffic speeds to ensure a safe work environment, and extended construction locations and delivery times.

A number of social impacts are likely to occur during the operational phase, which can be mitigated with careful planning that begins well in advance of project completion. Generally these impacts are limited to a lack of understanding of the importance of ramp metering to accessibility and connectivity, increased arterial traffic, potential for reduced air quality, and a risk of increased noise.

Appropriate planning and resourcing of a comprehensive stakeholder engagement program is key to increasing community understanding and delivering a successful project.

Detailed noise monitoring is currently being conducted to identify any necessary noise wall improvements to address noise impacts on communities close to the freeway.

11.2. Environmental appraisal

11.2.1. Western Distributor

Overview of potential environmental impacts

The Project offers the potential to achieve significant environmental benefits, and some negative impacts, particularly during the construction phase.



The broader environmental benefits and impacts are summarised overleaf. The specific regional and local impacts associated with each section of the Project are identified in following sections.

Potential benefits

The potential environmental benefits arise from the Project's contribution to:

- Reducing the number of trucks using local streets in the inner west, making these areas safer, quieter and more attractive places to live
- Relieving congestion on inner city streets, allowing for improvements in noise and air quality
- Freeing up road space at surface level, providing space for more for public transport
- Reducing greenhouse gas emissions through more efficient vehicle movements and innovation in tunnel operational energy consumption
- Generating opportunities to clean up contaminated land and industrial sites
- Opening up prospects for urban renewal to create more compact, accessible and liveable communities
- Improving cycling and walking routes, with new shared use paths and urban public spaces
- Making general improvements to existing shared use paths, access to public open space and recreational facilities.

Potential Impacts

Environmental impacts potentially occur where a major infrastructure project interfaces with residential activities, open spaces, parkland, recreational areas and waterways. Many of these potential impacts will be avoided or minimised by the proposed tunnelling of a large section of the Western Distributor, however the West Gate Freeway upgrade will generate additional interface issues.

Some environmental issues will be associated with surface works and above ground structures such as surface and elevated roadways, tunnel ventilation structures and tunnel portals. Construction activities can also generate temporary impacts in relation to amenity (noise, odour, dust and vibration), traffic and access arrangements and site occupation.


A number of specialist studies and management plans will assist in ensuring these impacts are clearly identified, fully explored and mitigated.

Air quality

In a part of Melbourne once dominated by industrial land uses, a growing residential population now has higher expectations for improved air quality.

Dust generated by construction activity represents the principal air quality issue during the construction phase. There are a range of well understood and complementary dust management measures that would be implemented as part of a Dust Management Plan. These measures could include the use of dust suppressants (such as water), covered loads when transporting spoil from tunnelling activity, and real-time reactive dust monitoring measures. During spoil transport, routes can also be selected, where practicable, to minimise distances travelled, co-mingled traffic and to avoid areas that may be sensitive to dust (such as residential areas).

During the operational phase, localised improvements in air quality are expected by improving the composition of the traffic and traffic flows. On the West Gate Freeway improvements to traffic flows, along with improvements over time in the emissions performance of the overall vehicle fleet can be expected to result in net benefit in terms of vehicle emissions. In the inner west, the reduction in truck movements on suburban streets is expected to result in improvements in air



quality, especially in relation to particulates and NO₂ emissions. In other areas, there may be a localised reduction in air quality associated with traffic lanes in closer proximity to existing residential activity (along the West Gate Freeway). Near-road dispersion modelling would need to be undertaken to quantify the expected improvement in air quality.

The tunnel ventilation structures would introduce a new source of air emissions. Recent experience with similar structures on road tunnel projects in Brisbane and Sydney suggests that emissions can be managed to meet all relevant air quality criteria. This would be demonstrated through a monitoring programme approved by EPA Victoria.

Greenhouse gas emissions

Greenhouse gas (GHG) emissions will unavoidably be produced due to the construction of the project. These can be minimised through the use of low embodied energy materials and the use of energy efficient equipment.

It is likely that there will be a small reduction in GHG emissions across the Melbourne metropolitan transport network as a result of operation of the Project. The reduction in vehicle GHG emissions due to more efficient vehicle movements will be offset to some degree over time by operational energy use, particularly for tunnel ventilation and lighting. These operational systems will be a major focus of emissions reduction efforts.

A greenhouse gas assessment in accordance with relevant standards would help identify opportunities to reduce energy consumption. A best practice approach to energy consumption and greenhouse gas management would be adopted in accordance with the EPA's *Protocol for Environment Management – Greenhouse Gas Emissions and Energy Efficiency in Industry*.

Noise and vibration

Traffic noise has long been a significant issue for residential communities adjacent to Francis Street and Somerville Road in the inner west, and near major freight routes or industrial areas. The anticipated reduction in truck movements on arterial roads such as Francis Street and Somerville Road (augmented by continued truck curfews) will result in a noticeable reduction in noise levels.

Other communities may be exposed to increased noise levels because of their proximity to the widened West Gate Freeway and new elevated structures. Vehicle noise from the existing freeway is already mitigated using a series of noise walls. It is anticipated that the greater proportion of these would be replaced or relocated, and increased in height in some sections to achieve better noise attenuation.

Road surfacing treatment and engine braking signage could also be used to mitigate noise impacts.

The tunnel ventilation structures are a potential noise source. These would be designed to meet relevant noise standards and be subject to regulatory licensing. Noise would be dependent on equipment selection, installation/structure locations and operating conditions.

The widening of the West Gate Freeway will generate construction noise impacts for residential properties immediately adjacent. The relative impact will depend on the type of construction activity, the plant and equipment required, and the anticipated hours of operation.

Short-term vibration impacts could also occur for some properties during the construction phase. The potential vibration impacts on any nearby properties, heritage structures, underground services and buildings would require investigation. Regenerated noise from a tunnel boring machine has the potential to temporarily affect individual properties as the machine passes beneath them.



This would be fully investigated to ensure that appropriate mitigation measures are implemented

There is a well-developed range of mitigation measures to minimise the impacts of construction noise, typically delivered through a Construction Environmental Management Plan (CEMP).

Further investigation and modelling will determine the potential noise and vibration impacts to inform the most effective mitigation measures.

Contaminated land

Poor waste management and other industrial practices over many decades have contaminated soils and groundwater in Melbourne's west. Management of residual contamination is a key issue as land uses change with redevelopment and residential growth.

A large-scale infrastructure project has the potential to disturb contaminated land, and provides an opportunity to remediate sites.

A number of former industrial sites known to have associated contamination, are in the Project area. For example, historical quarrying of clay and basalt rock occurred throughout metropolitan Melbourne and the resulting pits were often used for uncontrolled filling.

Contamination issues are commonly site specific and require assessment at the planning stage, particularly for areas where extensive earthworks would occur, such as at tunnel portals and piling locations.

Construction of the tunnel and other structures would require the removal of spoil, which could be contaminated. If spoil is not managed appropriately, it can result in environmental impacts. Any contaminated spoil will be managed under a CEMP, where spoil will be treated prior to being transported from the site, and disposed of accordingly.

Detailed investigations would be undertaken and appropriate measures adopted to manage potential impacts to meet all relevant EPA requirements.

Groundwater and surface water

As with contaminated land, the management of groundwater presents both risks and opportunities. The construction of tunnels will involve the extraction, treatment and disposal of groundwater in an environment which has been subject to industrial activity over an extended period of time.

There is a risk that groundwater in the vicinity of the tunnel may be contaminated by hydrocarbons from nearby oil terminals, or from residual contamination from previous industrial activity. Groundwater will be further characterised as part of geotechnical and contamination studies undertaken to support tunnel and portal design, and planning process.

Groundwater issues can be effectively managed using common construction techniques well understood by the tunnel construction industry. Specific measures to manage groundwater and contamination issues during the construction phase would be set out in Environmental Management Plans.

New bridge works are proposed over Kororoit Creek, Stony Creek, the Maribyrnong River and Moonee Ponds Creek. As a general principle, bridge spans over the Kororoit, Stony and Moonee Ponds Creek would be designed to avoid permanent in-stream structures. While this general principle also applies to the span over the Maribyrnong River, due to the length of the bridge span, it is possible that at least one pier would be required within the Maribyrnong River. All bridge works would be designed to meet Melbourne Water's requirements.

Under existing conditions, a 1-in-100 year storm event would result in flooding of some land adjacent to all of these waterways, as well as causing overland

flooding through inundation of the drainage network. At certain locations, flooding of residential and industrial properties currently occurs under 1-in-100 year Australian Rainfall Intensity conditions. Project works within and adjacent to these waterways would be designed to minimise any changes to the existing frequency and depth of flooding, and to protect private property.

Water Sensitive Road Design techniques would be used to minimise the potential for any impacts on water quality. This would include the treatment of road runoff prior to entering waterways. Sediment and runoff control measures would be implemented during construction. The river and creek banks would be revegetated and stabilised following construction to reduce the potential for erosion and any associated reduction in water quality.

Measures would be put in place through Environmental Management Plans to manage and minimise impacts from the construction and operation on the ecological, recreational and amenity values of Kororoit Creek, Stony Creek, the Maribyrnong River and Moonee Ponds Creek.

The Project is an opportunity to enhance these values through revegetation and improvements to open space, in line with *Melbourne Water's Healthy Waterways Strategy (November 2013)*.

Flora and fauna

The heavily industrialised and urbanised landscape has left little remnant vegetation or potential to support threatened fauna populations. There is remnant native coastal saltmarsh and mangrove vegetation along Stony Creek, the Stony Creek Reserve and the Stony Creek Backwash area. The Subtropical and Temperate Coastal Saltmarsh vegetation community in this location is listed as being vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Kororoit Creek supports a small area of riparian woodland, and brackish wetland vegetation lines Moonee Ponds Creek between Dynon Road and Footscray Road.

Careful placement of above ground infrastructure, such as surface roads and tunnel portals, would minimise any loss of native vegetation. Tunnelling would avoid impacting most areas of native vegetation and habitat for threatened flora and fauna species in the Yarraville area.

The waterway corridors, parklands and road reserves provide some limited habitat for threatened species. Bridge spans over the Kororoit, Stony and Moonee Ponds Creeks would be designed to avoid permanent in-stream structures.

It is possible that pier/s may be required within the Maribyrnong River. While highly modified, threatened and other aquatic fauna are present in the Maribyrnong River or use it as a migratory pathway, including the Commonwealth EPBC Act-listed Australian Grayling and the Australian Mudfish, which is listed under the Victorian *Flora and Fauna Guarantee Act 1988*.

Free passage for aquatic species would be maintained along waterways throughout construction and operation and water quality would be monitored and protected through measures specified in Environmental Management Plans.

Threatened and migratory bird species have been recorded in the Stony Creek Backwash area, including the Nankeen Night Heron (considered to be near-threatened in Victoria) and the Caspian Tern (listed as migratory under the EPBC Act). The threatened Grey-headed Flying-fox (EPBC and FFG Act listed), Swift Parrot (EPBC and FFG Act listed) and the Powerful Owl (FFG Act listed) may use some of the flowering eucalypts in the project area, but these are not considered critical habitat for species survival.

Management plans specific to threatened species would be developed. Any unavoidable loss of native vegetation would be offset, and disturbance to riparian and aquatic environments and habitat for threatened species



minimised. A referral would be required to the Commonwealth Minister to consider if approval is required under the EPBC Act.

Aboriginal cultural heritage

While a highly modified urban environment, intensely developed regions can still retain physical evidence of Aboriginal occupation.

If present, Aboriginal places will most likely be present in proximity to waterways, but may also occur in pockets of relatively undisturbed land away from water. Due to the modified nature of the project area, the potential for undisturbed Aboriginal places to be present is low.

Under the *Victorian Aboriginal Heritage Act 2006*, areas of cultural heritage sensitivity are “registered Aboriginal cultural heritage places, as well as landforms and land categories that are generally regarded as more likely to contain Aboriginal cultural heritage”. Waterways and the areas in proximity to waterways (within 200 metres) are considered areas of cultural heritage sensitivity.

No registered Aboriginal places have yet been identified in the project area, however, they are present in the wider region, indicating that undiscovered Aboriginal places could be present in the project area. Creeks and rivers are known to have increased potential to contain Aboriginal places.

The project area includes areas of cultural heritage sensitivity with Kororoit Creek, Stony Creek, Moonee Ponds Creek and the Maribyrnong River. Some of these waterways have been modified, reducing the likelihood that cultural heritage artefacts have been retained. The limited areas of remnant vegetation, particularly along Kororoit Creek, have a higher likelihood of containing material of Aboriginal cultural heritage value.

In order to fully understand any risks to Aboriginal cultural heritage values, a cultural heritage assessment would be undertaken, with a focus on areas adjacent to waterways and remnant vegetation where the probability of finding Aboriginal cultural heritage is highest.

Under the *Aboriginal Heritage Act 2006*, an approved Cultural Heritage Management Plan (CHMP) is required if all or part of a proposed activity is in an area of culture heritage sensitivity, and all, or part of the activity is a high impact activity or if an environment effects statement is required under the *Environment Effects Act 1978*.

A cultural heritage advisor would undertake desktop and field assessments and work with Aboriginal community representatives to identify and assess cultural heritage values. The CHMP would contain the results of an assessment of the potential impacts on Aboriginal cultural heritage and measures to be taken before, during and after the project in order to manage and protect Aboriginal cultural heritage values.

Historic heritage

Melbourne’s west has several heritage sites associated with the city’s industrial and maritime history. These include State-listed archaeological sites listed in the Victorian Heritage Inventory (VHI) and a small number of Victorian Heritage Register (VHR) sites, as well as sites included in the Schedule to the Heritage Overlay under the Wyndham, Hobsons Bay and Maribyrnong Planning Schemes. Of these, relatively few sites are actually within the project area.

State-listed sites within the vicinity of the project area include the VHR-registered (H1932) and VHI-listed (H7822-0273) Main Outfall Sewer, in close proximity to the western end of the project area. In the vicinity of the proposed southern portal are a number of archaeological sites included in the VHI associated with Stony Creek and its backwash. To the north of the proposed southern portal location is the VHI-listed Yarraville Woollen Mills (H7822-0589). Just south of the proposed

southern portal location is the VHR and VHI-registered Spotswood pumping station (H1555; H17822-0145).

There are a number of archaeological sites on the adjacent to the Maribyrnong River near the proposed river crossing. Those that are within the project area are the VHR-listed Saltwater River Crossing and Footscray Wharves H1397, the Sims Street unidentified timber slipways and boatyard (H7822-0487), the Shepherd Swingbridge abutment foundations (H7822-0434) and the Botterill and Fraser slipways, concrete landing and boatyard (H7822-0442).

There may also be archaeological sites in the Maribyrnong River, such as the shipwrecks Ecina Bow (S199) and an unidentified Maribyrnong River mud hopper barge wreck (S781) and there may be others not previously identified.

In the vicinity of the proposed Footscray Road elevated structure and CityLink are the VHI-listed archaeological sites the West Melbourne Rubbish Tips (H7822-0312) and the Dudley Flats rubbish dump and ash tipping site (H7822-0167).

At the eastern end of the project area the North Melbourne Locomotive Shed is identified in the VHI (H7822-0166).

Some distance east of the project area is the VHR-registered CSR complex (H1311; HO75) and the VHI-registered Yarraville Sugar Refinery wharves (H7822-0527; HO75).

Impacts on heritage sites could be minimised by avoiding physical or visual impacts on sites where possible and through a range of other measures. These would include expert archaeological investigations, management of impacts associated with vibration and ground settlement, a program of community involvement in heritage and archaeological investigations, and provisions in the Environmental Management Plan for specific processes to be followed if a previously unknown heritage site is found during construction. Actions to mitigate losses where destruction occurs would include the preparation of measured drawings and an archival photographic record.

Urban form and visual impact

The project corridor has a range of urban landscapes and precincts, from industrial and commercial sites with long histories of development, through residential developments and open space areas with rivers, reserves and recreational areas.

Areas of current and former industrial activity have generally been considered to have low landscape and visual significance. However, recent growth in residential and mixed use commercial activities has led to higher community expectations relating to visual amenity.

In addition, there are significant areas of existing or proposed urban renewal within close proximity to the corridor, including North and South Dynon precincts, E-Gate and the Arden-Macaulay precincts.

High quality urban design principles would be applied to ensure that any new elements introduced into the landscape, such as ventilation structures, noise barriers and bridges, minimise potential visual impacts and complement existing local characteristics.

The following urban design principles are relevant and align with other Melbourne freeway developments:

- A distinctive identity for the freeway corridor and the surrounding areas
- Clear and legible wayfinding
- Flexibility to support changes in land use of surrounding areas over time
- Positive integration of the freeway corridor into the surrounding environment



- Enhanced visual and functional amenity along and adjacent to the freeway corridor.

As a general principle, the Project should mitigate adverse impacts by improving the functionality of existing and surrounding precincts, improving local environments and enhancing opportunities for urban renewal and investment.

The widening of the West Gate Freeway places pressure on residential amenity through relocating access ramps and noise walls and the possible reconfiguration or removal of landscape buffers. The potential increase in height of noise walls and loss of landscape planting have the potential to reduce visual amenity, particularly in visual dominance, shading and loss of green buffer characteristics.

There are significant opportunities to improve access and urban renewal on former industrial sites close to the freeway. These include new high density residential developments proposed at the Bradmill Site on Francis Street in Yarraville (1,900 dwellings and mixed use) and the former Don's Small goods factory in Altona North (2,000 dwellings).

There are a number of issues relating to urban form and visual impact that will need to be resolved, particularly in the vicinity of elevated structures and at-grade components linking the West Gate Freeway to the tunnel portals.

The most significant impacts involve the Jemena site at Hyde Street and Stephens Street, and the Stony Creek Reserve, near the proposed southern portal.

The Project presents an opportunity to improve the Stony Creek Reserve, by integrating it with Francis Street via Hughes Street, Lorimer Street and Stephens Street, and incorporating design features to mitigate the visual impacts.

Stony Creek Reserve could be refocused towards the creek and Hyde Street. Potential enhancements include incorporating the land on the opposite side of Stony Creek within the City of Hobson Bay; accelerating planning and rehabilitation; and building a shared bicycle and pedestrian pathway to maintain the critical route corridor.

The proposed bridge across the Maribyrnong River will have limited impact on urban form within the immediate vicinity, but a visual impact over a relatively wide area depending on the nature of its design. A design concept based on a clear span of the river provides the best opportunity for a dramatic structural engineering and architectural response, to positively integrate project elements into the surrounding urban environment.

Ancillary bridging of the Maribyrnong River to provide direct access to the Port of Melbourne will also need to be integrated in a design sense with local urban form. The location of these bridges may have a marginal visual impact in the Shepherds Bridge area. Again, there is an opportunity for a specific design response for separate lengths of the river immediately upstream and downstream of these structures, linked back to Whitehall Street.

The elevated structure on Footscray Road will become a significant element in the local urban environment. The proposal should establish a memorable arrival sequence when approaching the city from the west. This includes providing drivers with a unique elevated view of the city over the Maribyrnong River.

The extent of the impacts will depend on the future use of the Melbourne Markets site, now being de-commissioned. Elevated structures should be set back as far as possible from property boundaries to safeguard potential future development precincts between Footscray Road and Dynon Road.

The visual impacts of the proposed structure will be more significant when approached from Footscray (from Footscray Road west of Shepherds Bridge towards the Melbourne CBD).

There are significant areas of existing or proposed urban renewal within close proximity to the corridor, including North and South Dynon precincts, E-Gate and the Arden-Macaulay precincts. These urban renewal precincts are potentially affected by changes to accessibility and traffic flows in the vicinity of the north-eastern side of the Melbourne CBD.

Precinct Structure Plans for areas such as Arden-Macaulay have emphasised the development of less car-dependent communities with more integrated public transport or active transport choice. The Precinct Structure Plan also acknowledges the need for through traffic to be accommodated on arterial streets.

The road connections at the eastern end of the Project have the potential for significant impacts on urban form, particularly the development of E-Gate, with more direct connections to Wurrundjeri Way, Dynon Road and Footscray Road.

High quality urban design principles would be applied to any new elements introduced into the landscape, such as ventilation structures, noise barriers and bridges, to minimise potential visual impacts and complement existing local landscape characteristics.

Land use planning

The widening and upgrade of the West Gate Freeway places the greatest pressure on existing land uses within commercial and industrial precincts on the northern side of the alignment. This includes Crown Land north of the existing Princes Freeway and West Gate Freeway, and industrial land between Grieve Parade and Millers Road. While a Planning Scheme Amendment (PSA) and Public Acquisition Overlay (PAO) would be required to rezone the land to Road Zone 1 (RDZ1), there are no particular planning issues triggered by the rezoning.

On the opposite side of the freeway between Freemans Road and Irwin Avenue in Altona North, there will be pressure on land zoned for residential purposes at the road ends. Widening of the freeway, the relocation or extension of a pedestrian overbridge (and work to make the overbridge DDA compliant), relocation of utilities and the relocation and possibly raising the height of noise walls may bring this infrastructure closer to existing residential activities. A similar situation exists west of the Williamstown Road interchange near Hick, Vernier and Durham Streets.

The principal planning issue from Williamstown Road through to the southern portals at Hyde Street/Stephens Street in Yarraville will be the re-zoning of land in Stony Creek Reserve from Public Park and Recreation Zone (PPRZ) and from Special Use Zone 2 (SUZ2) to RDZ1 on the northern side.

The at-grade components of the approaches to the tunnel portals and the connections to Hyde Street would result in the loss of east-west connectivity as proposed in the Stony Creek Future Directions Plan. However, a potential reconfiguration of the reserve would offset these impacts. This could include using the balance of the land around the tunnel portals to provide complementary open space, better connections through to Francis Street via Stephens Street, Lorimer Street and Beverley Street.

The proposed portal site is zoned SUZ4 and forms part of the Yarraville Terminal Station site. This land is vacant apart from two HV transmission towers.

At the northern portals, the land required for the at-grade tunnel approaches and ramps to the elevated structure over the Maribyrnong River is consistent with current zoning as either Industrial Zone 1 (INZ1) or Public Utility Zone 4 (PUZ4). It is likely that land in the immediate vicinity of the tunnel portals will be required for laydown and construction purposes and for the launching of tunnel boring machines (assuming that this is the preferred construction method).

Temporary occupation of land is not inconsistent with the long term objectives for the zone. Given the accessibility to the site from Youell, Whitehall and



Somerville Road (east of Whitehall Street) the medium to long term development of land not required for the project would not be compromised.

At grade and elevated components of the direct access to the Port of Melbourne across the Maribyrnong River will require acquisition of land and the relocation of a number of existing businesses. Reconfiguration of titles in this area could trigger consideration of the most appropriate long term zoning for the balance of the land between Youell and Lyon Street.

The elevated structure along Footscray Road and the proposed connections to Appleton Dock Road and CityLink are largely consistent with the existing RDZ1 zoning for Footscray Road. The intention is for the structure to be located in the centre of the road reserve, with the at-grade lanes on Footscray Road reconfigured on either side of the piers. The proposed connections at Appleton Dock Road may require some reconsideration of the extent of the Public Use Zone 7 (PUZ7), which currently provides for activities associated with the former Melbourne Wholesale Markets and the Fish Markets site. It is assumed that at-grade components will be rezoned RDZ1, while elevated components will be the subject of an Overlay.

The connections to the wider road network on the north-western side of the Melbourne CBD, may require an extensive land use planning response. There are a number of significant interface issues to be considered when distributing traffic at the edge of the CBD. The planning issues include the degree to which:

- The distribution of traffic would benefit/impact upon existing communities and arterial roads in North Melbourne
- Connection options would enhance the continued development or re-development of Docklands, E-Gate, and North and South Dynon precincts
- Connections are consistent with the objectives of the PSP for the Arden-Macaulay urban renewal area.

Transport and traffic


As well as delivering broader benefits across the metropolitan transport network, the Project would remove a proportion of heavy vehicle traffic from local and arterial roads in the city's inner west and improve access to the Port of Melbourne.

The potential impacts of the project on transport and traffic are likely to be:

- Construction phase impacts on local accessibility, traffic movements and temporary road closures
- Potential impacts caused by construction related traffic, particularly from the cartage of spoil generated by tunnelling activity
- Changes to the distribution of traffic, particularly in the western and northern parts of the CBD
- Changes to the distribution of arterial traffic in the inner west and in the urban renewal precincts adjacent to the project area
- Benefits from removing some of the heavy vehicles from local streets with a reduction in truck movements on Francis Street and Somerville Street in Yarraville and better connectivity to the Port of Melbourne.

Once operating, traffic patterns on other roads throughout the inner west will change, particularly from the eastern end of Footscray Road. This has implications for the performance of arterial roads such as Dynon Road, Dudley Street and Wurundjeri Way. There may also be flow on effects for the future development of urban renewal precincts, particularly E-Gate, Dynon Road North and South precincts, and the Arden-Macaulay precinct.

These changes will require the development and implementation of appropriate traffic management measures and ongoing monitoring.



Construction activity may have an impact on the West Gate Freeway and the local road network. The management of freeway traffic flows need to be integrated with construction activity to maintain as far as possible the efficiency of the freeway.

Environmental management framework

Environmental assessment documentation would consider the potential impacts associated with its construction and operation phases, and provide a management framework to ensure that any impacts are mitigated, monitored and managed appropriately.

Each section of the project will be subject to an Environmental Management Framework (EMF), a transparent and accountable framework for managing environmental aspects during delivery. Two central themes of the EMF are legislative compliance and ongoing community engagement.

The framework will guide the development of an environmental management system (EMS) and environmental management plans (EMPs). The EMS ensures that performance requirements and approval conditions are implemented appropriately. EMPs demonstrate how impacts will be managed and mitigated during construction and operation. A Construction EMP and an Operation EMP will be developed and implemented for each section of the Project, with clear commitments on how environment issues will be managed and mitigated during construction. The results of various specialist studies will be incorporated into the EMP where appropriate.

The content of the Operations EMP will be determined following the results of further specialist studies.

The Construction EMP would address specific Project issues, such as:

- Dust, noise and vibration from construction activities which could potentially cause disturbance to the community
- Potential impacts to Kororoit Creek, Stony Creek, Maribyrnong River (including navigation) and Moonee Ponds Creek
- Management, handling and transport of extracted groundwater and spoil which may be contaminated
- The potential for acid sulphate soils and contaminated land to be encountered and disturbed during construction
- Erosion, soil stability and sedimentation hazards
- Temporary disruption to businesses during the construction period
- Temporary disruption to Port of Melbourne infrastructure
- Potential impacts on road network function as a result of construction activities
- Potential impacts to rail infrastructure
- Potential impacts to utilities and services
- GHG emissions from construction activities
- Waste management.

Standard measures available to manage these issues will be incorporated into the Construction EMP.

A separate Communications Strategy will support ongoing community engagement with the project.



11.2.2. Monash Freeway Upgrade

Ecological and Cultural Heritage Due Diligence Assessment

Ecology and Heritage Partners Pty Ltd were engaged by VicRoads to undertake an Ecological and Cultural Heritage Due Diligence Assessment for the potential upgrades to the Monash Freeway alignment between Warrigal Road, Chadstone and Clyde Road, Berwick. This section summarises their findings and the full report is provided as Attachment L.

The assessment has determined the key natural and cultural heritage values within the study area and provides a summary of associated legislative and policy implications to assist in the planning and design process.

The study area is located in an urban setting surrounded by high density residential, commercial and industrial development. Based on the preliminary project information, the following key areas of constraint have been identified within or immediately adjoining the site:

- Natural Heritage:
 - Waterways including the Dandenong Creek, Eumemmerring Creek and Troups Creek
 - Remnant native vegetation (Swampy Riparian Woodland Ecological Vegetation Class (EVC) 83 and Grassy Woodland EVC 175)
 - Planted native (indigenous) vegetation
 - Land included in Environmental Significance Overlay boundaries.
- Cultural Heritage:
 - Nine areas of cultural heritage sensitivity (*Aboriginal Heritage Regulations 2007*) and four areas of Aboriginal likelihood
 - One tree planting of local significance (Heritage Overlay 90).

Conclusions and recommendations relating to the natural and cultural heritage assessments are provided in the following sections.

Natural Heritage

The study area is significantly modified, with vegetation generally limited to slashed introduced grassland, planted trees and shrubs, and fragmented remnant vegetation communities. Remnant vegetation within the study area is limited to small fragmented patches of Swampy Riparian Woodland (EVC 83) and Grassy Woodland (EVC 175).

Although the study area contains sufficient habitat characteristics to support a moderate diversity of flora and common urban-adapted fauna species, the general scarcity of structural diversity and density within most vegetated areas represented limited niche availability for supporting high species diversity. The likelihood of occurrence assessment determined the following:

- There is no suitable habitat within the study area for any flora species of national or state conservation significance
- Three nationally significant species may use habitat within or adjacent to the study area (low to moderate likelihood), including Grey-headed Flying-fox (regular visitor), Growling Grass Frog and Dwarf Galaxias (with aquatic species having restricted habitat use specific to the Dandenong Creek and Eumemmerring Creek)
- Five state and 17 regionally significant fauna species may also use habitat within or adjacent to the study area with low to moderate likelihood of occurrence and typically associated with waterways.

Further detailed flora and fauna assessment is recommended.

Cultural Heritage

Good quality waterways along the entire length of the alignment means it is likely that Aboriginal and historical heritage was once concentrated in this area. However, it has been highly modified by the construction of the existing Monash Freeway and associated infrastructure and the majority of intact Aboriginal and/or historical archaeological deposits is likely to have been destroyed.

There are identified areas of Aboriginal heritage likelihood and one historical heritage place within the study area that requires further assessment.

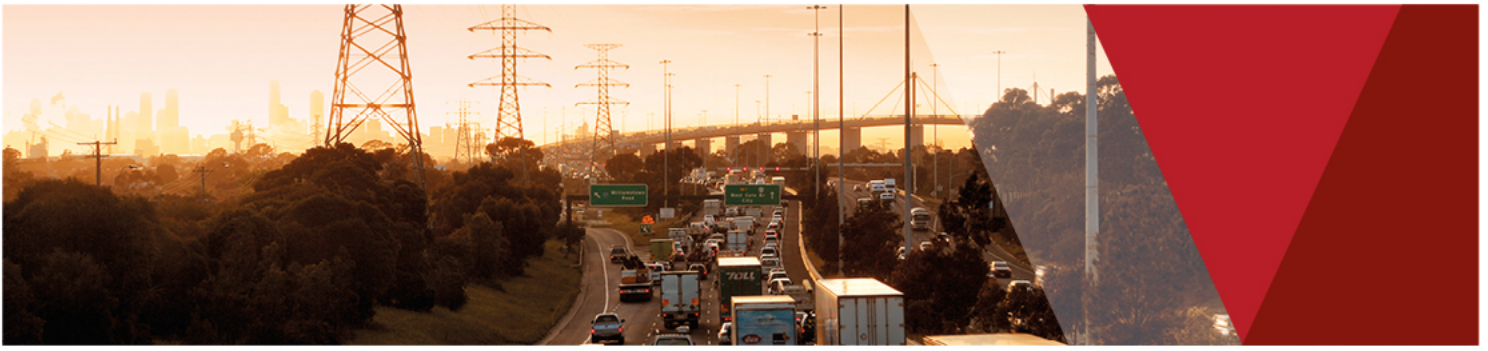
Acoustic assessment

An acoustic assessment of the proposed solution was undertaken by Arup in August 2015 to inform VicRoads of any additional noise mitigation required to comply with its noise policy (the full report is at Attachment L).

Arup's assessment investigated the noise impact of widening the Monash Freeway between EastLink and Clyde Road, and ramp widening between Warrigal Road and Clyde Road. The assessment was conducted using an acoustic model of the Monash Freeway that has been calibrated based on road traffic noise measurements conducted in August 2015.

Based on the existing noise barriers for the design year (2031), the proposed widening is predicted to result in noise excesses adjacent to the outbound off-ramp at Heatherton Road. To meet the design year acoustic criteria (68 dBLA10,18hr), an additional noise barrier is required adjacent to the outbound off-ramp at Heatherton Road, with a height of 2 metres and a length of 100 metres.

The predicted change in the noise level on the VicRoads LA10, 18 hour assessment parameter due to ramp widening is negligible.



12. Financial impacts

This section outlines the approach used to perform the financial impacts analysis of the Project

This section identifies:

- the extent to which the forecast toll revenues for from the Western Distributor are able to fund whole of life project costs and risks and the resulting Funding Gap,
- options for reducing the Funding Gap, and
- opportunities for government funding.

The following information has been redacted in this chapter:

- Elements of project cost and funding information have been redacted.
- The forecast values of Western Distributor and West Gate Freeway toll revenue, and the difference between total Project Cost and this value have been replaced with approximate values.

This information is considered to be commercially sensitive and if published in full detail prior to the conclusion of the procurement process, would likely prejudice the State's ability to deliver a value for money outcome for the Project.

12.1. Nature of the financial impacts

This section assesses the extent to which the forecast toll revenues from the Western Distributor are able to fund whole of life project costs and risks and provide a commercial rate of return.

The analysis effectively splits the Project into two components:

- a component that is able to be funded through net toll revenues, similar to a "self-funding" toll road such as EastLink or CityLink
- a component that is to be funded from other sources, such as a government contribution. This component is similar to a non-tolled road such as Peninsula Link or the M80.

The component that is to be funded from other sources is to be referred to as the "Funding Gap".

12.2. Approach to determining the Funding Gap

The Funding Gap has been calculated using the following assumptions:

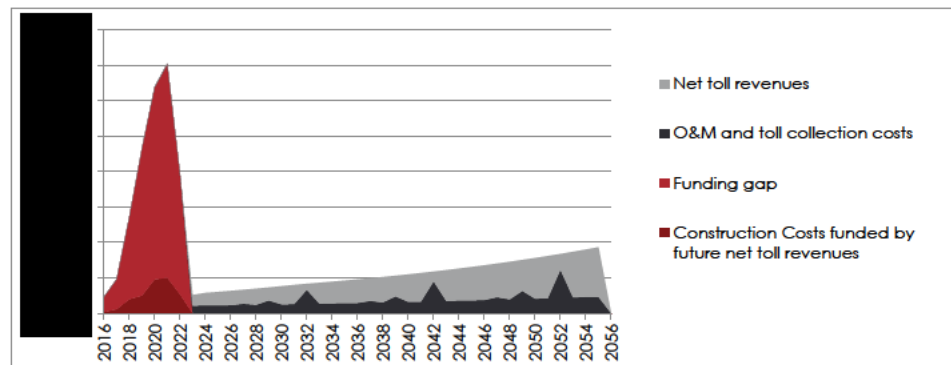
- Total project costs during both the construction and operating periods have been estimated, including:
 - risk adjusted design and construction costs
 - land acquisition
 - state procurement and management costs
 - operating and maintenance costs
 - toll collection costs.

- Toll revenues forecast for the Western Distributor and West Gate Freeway for an assumed period of 33 years (40 years from 1 June 2015).
- For the entity receiving the toll revenues, a commercial rate of return of [REDACTED] has been assumed. This rate represents the weighted average cost of capital that a commercial entity (irrespective of State or private sector ownership) would require in order to design, build, finance and operate a greenfield toll road project.

Using these assumptions the Funding Gap is calculated as the amount of upfront capital costs that must be funded from other sources to allow forecast future Western Distributor toll revenues to be sufficient to repay forecast operating, maintenance, toll collection and the balance of capital costs while providing the required commercial rate of return for the self-funding component of the Project.

Toll revenues from the Western Distributor impose a levy on the users and as such are considered to represent a source of state funding. For the purposes of calculating the Funding Gap they are identified as a separate source of value because they are realised by the construction of the road.

Figure 101: Project cash flows (\$ millions, nominal, P50)



12.3. Key inputs

The financial impacts analysis has drawn information from a broad range of sources and has benefited from consultation with the relevant Victorian Government stakeholders. Key inputs are as follows:

- Timing assumptions
- Escalation factors
- Design and construction costs
- Operating, maintenance and lifecycle costs
- Toll collection costs
- State costs, including procurement, management and land acquisition
- Risk adjustments
- Toll revenue forecasts.

Further details regarding the key inputs are included in Attachment O (*The Financial Analysis report*).

12.4. Funding gap

Figure 102 summarises the total project costs during the construction period and the extent to which these costs can be funded from net toll revenues.

Figure 102: Funding of project cash flows (\$ millions, nominal, P50)



The following tables summarise the amounts shown in Figure 102 and also provides sensitivity analysis in respect of the P90 costs. In this figure:

- Construction period costs represent the total nominal costs estimated over the construction period, assuming construction commences during the year ended 30 June 2018.
- Funding sources identifies how the construction period costs will be funded during the construction period.

Table 61: Total project costs during construction period (from Jan 2018 to June 2022)

Total project costs during construction period	P50 Nominal ¹ \$ million	P90 Nominal ¹ \$ million
Design and construction costs		
Risk and contingencies		
State procurement, management and land acquisition costs		
Total project costs during construction period	5,226	5,548

Note: Total nominal dollars over the construction period, assuming construction commences during the year ended 30 June 2018.

A breakdown of the NPV of net toll revenues is provided in the table below. This NPV is also expressed as a nominal funding amount based on pro-rata construction contributions in order to assess the nominal Funding Gap for the Project.

Table 62: Net project revenues – during operation period

Net project toll revenues during operation period	P50 NPV ¹ \$ million	P50 Nominal ² \$ million	P90 NPV ¹ \$ million	P90 Nominal ² \$ million
Gross toll revenues during operating period				
Operating period costs				
Operations, maintenance and lifecycle				
Toll collection				
Risk adjustments during operations				
State management				
Net toll revenues				
Nominal funding amount attributable to net toll revenues		Less than 1bn		Less than 1bn

Table note

1 NPV calculated as at 1 July 2016 using discount rate equal to the required commercial rate of return of [REDACTED]

2 Total nominal dollars over the construction period, assuming construction commences during the year ended 30 June 2018

The following table identifies the Funding Gap.

Table 63: Funding Gap

Funding or project costs during construction period	P50 Nominal* \$ million	P90 Nominal* \$ million
Total project costs during construction period	5,226	5,548
Less project costs during the construction period that can be funded from net toll revenues	Less than 1bn	Less than 1bn
Funding Gap	Greater than 4bn	Greater than 4bn

* Total nominal dollars over the construction period, assuming construction commences during the year ended 30 June 2018

12.5. Addressing the funding gap

As identified in Section 12.4, toll revenues from the Western Distributor are insufficient to cover project costs. The State has two high-level options to address to the Funding Gap:

- Reduce project costs
- Leverage other government funding sources through the:
 - Introduction of additional road user charging, and/or
 - Application of government budget funding.

12.5.1. Reduce project costs

The project team has considered a number of options to deliver the Project at a reduced cost. These are set out in Chapter 6. The opportunity to deliver project cost savings while delivering the same benefits is constrained by the developed urban environment into which the Project must be accommodated.

At this stage there are considered to be limited opportunities to reduce project costs without reductions in the level of network connectivity or reduction in the amount of extra capacity delivered by the Project. Optimisation of the project scope will be considered post business case as part of the further development of the State Reference Design.

12.5.2. Other Government funding sources

Introduce additional road user charging

Chapter 7 summarises the analysis undertaken by the project team to develop an optimal tolling structure for the Project. Table 40 in Chapter 7.5 identifies a range of broader opportunities to realise value from road user charging, including:

- An extension of tolls on CityLink after the current concession expires in 2035
- A coordinated increase in escalation of toll revenues on Western Distributor and CityLink

Such opportunities are considered to represent an alternative to the imposition of new state taxes (such as broader project specific levies), and therefore represent a source of state government funding.

Further consideration of such funding is considered in Chapter 13.5 (*Funding Solution*) and Chapter 14.7 (*Budget Impacts*).

Budget funding

The Commonwealth and State Governments have both indicated their appetite to invest in projects of this type, and it is expected that both Governments will contribute an element of budget/grant funding to the Project.

Further consideration of what might represent the appropriate amount of such funding is considered in Chapter 13.5 (*Funding Solution*) and Chapter 14.7 (*Budget Impacts*).



13. Deliverability

This section considers the deliverability of the Project including consideration of various packaging and procurement options for the scope of works. This section also discusses the proposed funding solution for the Project, based on the preferred procurement and packaging options identified.

This section considers the deliverability of the business case project scope, including the following:

- Project packaging: Assessment of various 'packages' of work and whether value can be achieved through separate delivery
- Procurement of each works package: Considers various procurement options for each of the works packages identified
- Uncertainty of toll revenues: Considers risks in relation to the uncertainty of traffic volumes and how this may impact on the preferred procurement options identified
- Funding solution: Identifies the preferred funding solution to deliver the Project.

The following information has been redacted in this chapter:

- Information in relation to the proposed funding solution for the Transurban Proposal has been redacted as the State is obliged to keep confidential information considered commercially sensitive by Transurban.
- The names of participants in, and detailed feedback received through, the market engagement process has been redacted as it is considered commercially sensitive to the participants in the process.

Key conclusions in respect of the nature and significance of demand risk associated with the Project have been redacted as it is considered to represent commercially sensitive information that, if published prior to the conclusion of the procurement process, would likely prejudice the State's ability to deliver a value for money outcome for the Project.



13.1. Introduction

The assessment criteria in this chapter considers how well the preferred state-led delivery solution meets the Assessment Framework, which includes the Project Objectives.

As previously identified in Section 6.3, the Project Objectives incorporate the following delivery based criteria:

1. Maintaining sufficient long term flexibility to manage the road network as required
2. Achieving value for money outcomes for the State and road users, while leveraging alternative funding sources that help limit the impact of the Project on the State's balance sheet.

The approach to identifying the preferred state-led delivery solution also considers:

- Key project characteristics
- Information provided by the State's advisors on the project scope, scale, risk profile, interfaces (from a whole of life perspective) and potential market appetite
- Proposed route options and network connections (as outlined in Chapter 6)
- the Project's financial feasibility (based on projected whole of life costs and revenues, together with the results of the limited market engagement on the private sector appetite for the associated risks/return equation).

13.1.1. Project characteristics

The delivery options analysis considers the potential service procurement and funding structures available given that:

- The Western Distributor combines:
 - New assets: the connection from the West Gate Freeway to a tunnel connecting to the elevated section over the Maribyrnong River and along Footscray Road connecting to CityLink and the city
 - Upgrades to existing assets: widening the West Gate Freeway from the M80 and Princes Highway interchange in the West to Williamstown Road (referred to as the upgrade to the West Gate Freeway).

Whether these aspects of the Project should be delivered separately or as one package has also been considered.

- The project scope also includes network upgrades to the Monash Freeway and CityLink ramp M (to provide additional access to Webb Dock). The timing and location of these components of the Project are distinct from the Western Distributor scope of works. Whether these components should be procured separately or as part of the core Project has been considered.

The following sources of funding have also been assumed for the purposes of the deliverability analysis:

- The Project is proposed to be partially funded by the extension of tolling on the current CityLink assets. The funding structure has been developed to allow the most efficient leveraging of this revenue stream for the State.
- The business case assumes that tolls will be imposed on all users of the Western Distributor and elevated sections of the Project, and on HCVs using the upgraded West Gate Freeway.

The business case considers:

- How demand risk should best be allocated between the State and the private sector, and the overall funding structure developed to reflect the preferred risk allocation.
- The extent to which this tolling strategy creates the need for higher levels of operating performance on the West Gate Freeway to realise benefits relative to other non-tolled options. Higher levels of operating performance are likely to require a greater amount of investment in the West Gate Freeway over the life of the concession than may otherwise be contemplated by the State.

13.1.2. Overview of approach to options assessment

Three strategic pathways for procuring and funding the Project have been identified:

Option 1:

The Transurban Proposal provides an existing reference point and pathway to deliver the Project. This pathway can be used if the Stage 3 Market-led proposal assessment process determines that the Transurban proposal represents a unique value proposition for the State. This assessment is ongoing. The State cannot proceed with certainty in respect of that delivery option in the interim.

Option 2:

The State has developed an alternative delivery structure which can be implemented regardless of whether an agreement can be reached with Transurban. This structure will realise value from many of the same funding sources as the Transurban Proposal (excluding some funding sources that are specific to the current CityLink concession).

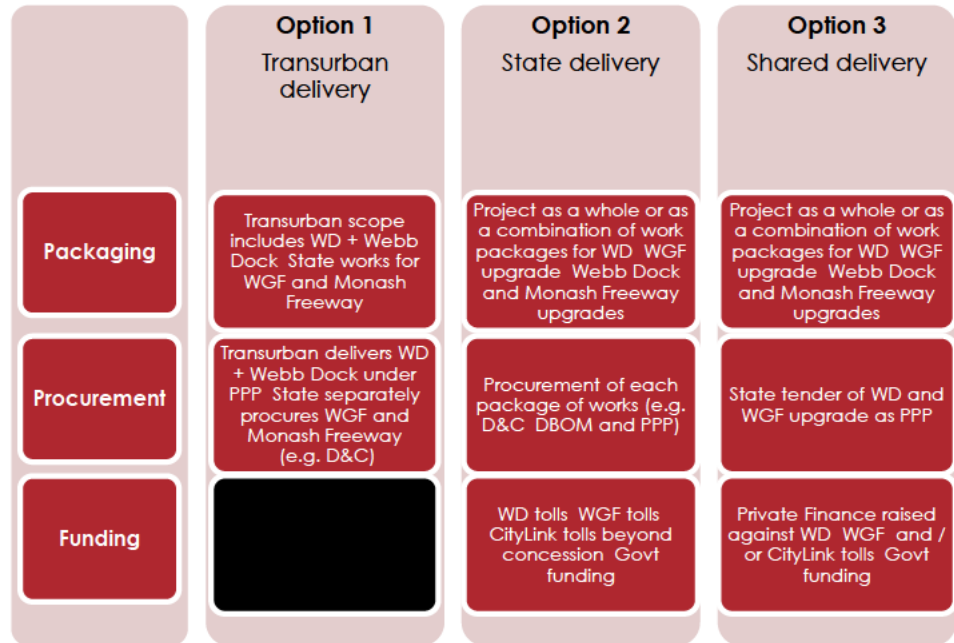
Option 3:

The State's assessment of the Transurban Proposal may not identify sufficient value for money or demonstrate sufficient unique opportunities to support Transurban's delivery of the whole Project. In this situation the State may identify some discrete elements that can be considered to be unique and offer value to the State and users. Once identified, the State may choose to enter into negotiation with Transurban to access these opportunities and deliver the remaining elements of the Project through alternative State led delivery options identified in this business case.

Figure 103 below summarises these alternative options:



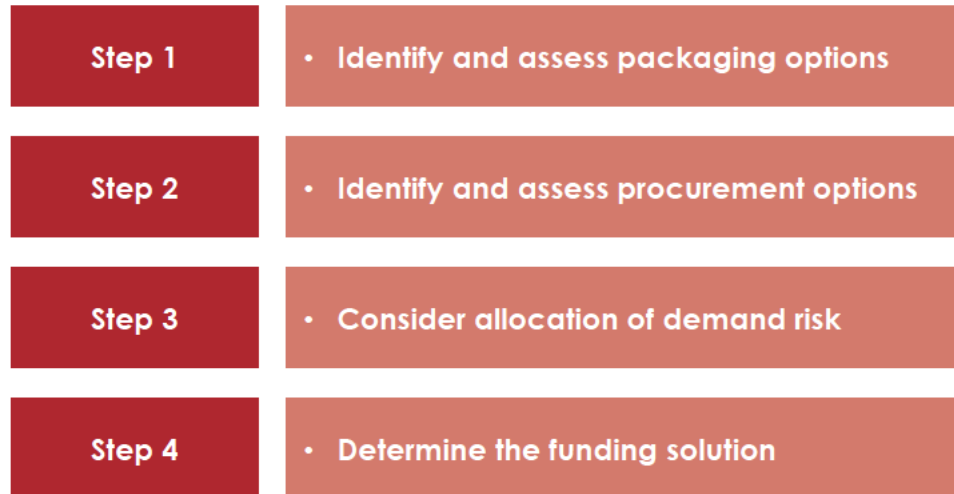
Figure 103: Delivery options



For the purposes of this business case, state delivery is assumed as the default pathway (in essence acting as a default public sector comparator), unless and until the Transurban Proposal is assessed as unique and offering value for money (either in whole or in part).

The diagram below outlines the key aspects of this process.

Figure 104: State delivery options assessment approach



13.2. Project packaging

13.2.1. Packaging assessment criteria

There are a variety of factors that influence how the Project can be packaged and offered to the market. The following criteria were used to assess the functional scope:

- **Functionality interdependence** – the extent to which the elements of the Project have inherent functional interdependencies that need to be managed through construction and operations. Significant

interdependencies tend to limit the extent to which elements of project works could be separately procured without introducing significant interface risk.

- **Independent project benefits** – the extent to which elements of the project works can achieve project benefits (e.g. improved traffic and amenity outcomes) independently and should be delivered on a 'stand-alone' basis.
- **Defined area to deliver project works** – the extent to which the relevant project works present significant planning issues including any timing, legal or commercial implications presented by the planning approval pathway.
- **Land availability** – the extent to which land acquisition is required, resulting in more extensive planning processes (that limit the opportunity to disaggregate the works).
- **Market capacity** – the extent to which the scale of the Project limits the market's ability to provide a competitive process.

The scheduling of works and multiple interfaces between functional works packages will be key risks to be managed in each package of works. As a general rule, a more limited number of larger packages of work is likely to drive innovation and better management of interface risks by the private sector, in turn helping to deliver overall better value for money outcomes.

13.2.2. Potential scope packages

The Project's functional scope elements (chapter 7) include:

1. West Gate Freeway
2. Western Distributor
3. Port of Melbourne Access
4. Webb Dock Access
5. CityLink Connection and Inner Urban Access
6. Monash Freeway Upgrade.

Testing each of these against the identified packaging assessment criteria identifies three separate packages of work:

Table 64: Recommended delivery packages

Delivery package	Functional scope items
Western Distributor Works	This package consists of: <ul style="list-style-type: none"> • West Gate Freeway • Western Distributor – tunnel and viaduct • Port of Melbourne Access • CityLink Connection & Inner Urban Access
Monash Freeway Upgrade	This package consists of: <ul style="list-style-type: none"> • Widening of the Monash Freeway between EastLink and Clyde Road • Ramp metering and storage capacity upgrades along the Monash Freeway out to Koo Wee Rup Road
Webb Dock Access Improvement Works	This package consists of: <ul style="list-style-type: none"> • Cook Street widening • CityLink northbound connection and Ramp M works

The key rationales for this packaging strategy are discussed below.

The Webb Dock Access Works and Monash Freeway Upgrade have been identified as separate packages because:

- The works are located in physically separate and contained areas to the other functional scope items
- There are no significant construction or operating interfaces with the other functional scope items.

The packaging considerations in respect of functional scope items 1, 2, 3 and 5 are considered further below:

1. Functionality interdependence

The functional scope items 1, 2, 3 and 5 form an end-to-end infrastructure solution that joins the West Gate Freeway to CityLink and the CBD at the eastern end of the Project. Procuring the relevant functional scope items as separate packages would introduce an undesirable level of technical and commercial interfaces (exposing the State to greater risk) and would diminish the scope for the private sector to deliver better value through innovative D&C solutions.

2. Independent project benefits

The West Gate Freeway widening scope is capable of providing some improved traffic outcomes independent of the broader Project, but is of little value on its own without a new or modified connection through the Western Distributor.

3. Defined area to deliver Project works

Given the high degree of independency between the West Gate Freeway and the Project, procuring the West Gate Freeway widening works as a separate package has the potential to prejudice the outcome of the planning assessment for the broader project. Further detail on the planning process for the Project is included in Attachment S.

4. Market capacity

The Western Distributor works package is considered a reasonable size (relative to other recent project precedents) and is expected to achieve a competitive bidding process from the market.

The preferred response to procure separately the Western Distributor, Monash Freeway and Webb Dock scope items minimises the extent of interface and planning issues and provides opportunities for the private sector to deliver innovative solutions for the separate works packages.

13.3. Procurement options assessment

The following section sets out the key considerations in determining the proposed procurement approaches for each of the three delivery packages identified in Section 13.2.2.

The Project's toll revenue is considered separately in Section 13.4.

13.3.1. Procurement options assessment criteria

The following procurement assessment criteria have been identified based on the key project characteristics and objectives.

Table 65: Procurement assessment criteria

Market appetite and capacity	The extent to which an option is likely to attract broad market interest (and drive a competitive process and optimal outcomes) without resulting in inflated risk pricing.
Effective and efficient risk management	The extent to which an option provides a sound basis for allocating, pricing and managing design, construction, financing, operation, maintenance and revenue risks on a whole of life basis (noting the significance of such risks for a project of this scale and complexity).
Innovation and whole-of-life	The extent to which an option allows for the introduction of new ideas and approaches over the whole of the life of the Project that generate additional value to the State and users (through cost savings, optimising toll revenues, additional sources of revenue, enhanced user experience, innovative technical solutions, improved social amenity and environmental outcomes).
Budget certainty	The extent to which an option allows the State to confidently predict its contribution to the whole of life costs of the Project.
Transport network integration	The extent to which an option allows for sufficient flexibility to: <ol style="list-style-type: none"> Manage the new assets as part of the existing transport network (including flexibility to implement operational changes to the network over time) Optimise the technical scope of the Project and future connectivity Accommodate the technical requirements of other transport projects as required (including public transport initiatives).
Simplicity	The extent to which an option helps minimise the need to implement overly complex or internationally unprecedented commercial structures and allows for genuine transparency over the true cost of the bid and fair comparison of bidder proposals.

In addition to the above, the preferred funding solution (section 13.5), considers how the delivery approach can help the State realise best value from the Project's toll revenue streams.

13.3.2. Procurement Assessment criteria ratings

The following ratings system has been used to rank the procurement options:

Table 66: Procurement Assessment criteria ratings

Rating	Description
✓✓✓	Option is extremely effective in satisfying the criterion
✓✓	Option is effective in satisfying the criterion
✓	Option satisfies the criterion

Rating	Description
*	Option is ineffective in satisfying the criterion
**	Option is extremely ineffective in satisfying criterion

13.3.3. Western Distributor Works

A number of potential options were identified for procuring the design, construction, operation and maintenance of the Western Distributor Works, including:

- Traditional Design and Construct (D&C) – clear output specification and identified risk allocation, with the State retaining whole of life risk
- Alliance – collaborative based risk sharing
- Design, Build, Operate and Maintain (DBOM) – extension of D&C to include O&M services, enhancing the State's risk position in relation to whole of life outcomes
- Public Private Partnership (PPP) – fixed risk allocation on a whole of life basis. This model also provides a range of options for allocating demand risk between the State and the private sector (explored further in section 13.4).

The table below summarises the outcome of the options assessment (considered on a whole of life basis) for the Western Distributor package of works.

Table 67: Western Distributor package procurement options assessment

Assessment criteria	D&C/O&M	Alliance/O&M	DBOM	PPP
Market appetite and capacity	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Risk management	✓	*	✓✓	✓✓✓
Innovation (whole of life)	✓	✓	✓✓	✓✓✓
Budget certainty	✓	*	✓✓	✓✓✓
Transport network integration	✓✓✓	✓✓✓	✓✓	✓✓
Simplicity	✓✓✓	✓✓	✓✓	✓

Recommended procurement approach

This analysis above indicates that the Western Distributor package of works will be best delivered as a PPP. The key attributes supporting the recommendation of a PPP are provided below.

Table 68: Key attributes

Criteria	Key attributes
Risk management	<ul style="list-style-type: none"> • The project scope is large and complex and includes significant interfaces. A PPP provides the opportunity for the State to transfer or manage the risks associated with the Project and reduce the likelihood of these risks being realised by the State • Previous large scale tunnelling projects of a similar technical scale (CityLink and EastLink) were delivered using the PPP model • Introducing private finance offers a high level of protection from risk for the State and provides for multiple extra levels of discipline and scrutiny of risk compared to traditional

Criteria	Key attributes
	<p>procurement (e.g. credit and investment reviews associated with private sector debt and equity funding)</p> <ul style="list-style-type: none"> • Competition between bidders focuses on minimising whole-of-life costs where the private sector is at risk for integrating design, construction, operations and maintenance to achieve forecast costs on a whole of life basis (reflecting a substantial degree of risk transfer) • The State will retain certain risks that the private sector cannot manage as effectively (e.g. statutory approvals and land acquisition) and a degree of residual risk is unavoidable. However, these represent risks which are common to all options, not additional risks specific to the PPP approach.
Scope for innovation	<ul style="list-style-type: none"> • The scale and location of the Project provides significant opportunities for innovative solutions. A PPP will allow the State to access these solutions. The PPP model provides significant scope for D&C and whole of life innovation • The presence of long term private finance results in very significant incentives to drive value through an integrated, whole of life approach to design and costing.
Budget certainty	<ul style="list-style-type: none"> • Realisation of the Project's benefits will require significant investment of capital. A PPP provides the State with the opportunity to manage the costs of the Project over the life of the asset. • The impact on the state budget will depend on the degree of demand risk exposure retained by the State. This is considered further in section 13.4.2 • PPP projects are not immune to delays or cost overruns, but there are extremely strong financial incentives to complete on time, or early so that the private sector benefits from a revenue stream (service payments or user charges) prior to debt financing costs becoming payable. The State's financial position and budget commitments benefit from rigorous risk transfer to the private sector and payments being linked to the provision of services to defined standards • The PPP option gives the highest degree of certainty over delivery with third parties such as financiers being aligned with the State's budgetary objectives and actively monitoring delivery.
Transport network integration	<ul style="list-style-type: none"> • Completion of the Project will significantly augment a critical area of the existing transport network. • The State may have some additional obligations to collaborate with the concessionaire on network changes that impact the operational performance of the project road. These obligations depend on the performance regime and detailed risk allocation adopted in the PPP.

Market capacity and simplicity do not represent material points of difference between the various procurement approaches. All models have precedent and are well understood by the market and state agencies. They can be efficiently implemented and would attract a competitive bidding field.

13.3.4. Monash Freeway Upgrade

The project team considered a number of options for procuring the design, construction and maintenance works and for introducing private finance.

The scope of works contemplated in the business case does not include a material operating component. From an operating perspective, the nature of the proposed improvement works are assumed to represent a relatively minor augmentation to the existing network.

Accordingly, the following procurement options have been considered:

- Construct only and separate maintenance (M)
- Traditional design and construct (D&C) and separate maintenance (M)
- Alliances for design and construction (All. D&C) and maintenance (All. M)
- Design, build and maintain (DBM)
- PPP (i.e. privately financed).

These models are well understood and are commonly used in state business cases for road projects. The table below shows the outcomes of the procurement assessment for the Monash Freeway Upgrade.

Note, the analysis outlined below is predicated on the scope of works identified in this business case. Further work is proposed to consider whether additional service delivery efficiencies can be realised by expanding the scope of the Project to include a broader range of operating and maintenance activities (for example, one that includes full responsibility to maintain and/or undertake incident response on an expanded section of the Monash Freeway). If additional scope is to be included, then this may also present the opportunity to deliver even greater value through the adoption of alternative procurement options.

Table 69: Monash Freeway Upgrade procurement options assessment

Assessment criteria	Construct only/M	D&C/M	All. D&C/All. M	DBM	PPP
Market appetite and capacity	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓
Risk management	✓	✓✓	✗	✓✓	✓
Innovation (whole of life) ¹	✗	✓	✓	✓	✓
Budget certainty	✓	✓	✗	✓	✓✓✓
Transport network integration	✓✓✓	✓✓✓	✓✓✓	✓✓	✓
Simplicity	✓✓✓	✓✓✓	✓✓	✓✓	✓

1. The assessment of innovation and whole of life cost reflects the scope of works and the limited opportunities for any model to deliver material benefits

Procurement options recommendation

The D&C model has been identified as the preferred option to procure the Monash Freeway Upgrade. Maintenance is expected to be incorporated into VicRoads' existing roads maintenance contracts.

The preferred approach was based on the following reasons:

- The Monash Freeway Upgrade does not include any tunnelling or similar complex construction techniques. The risk with the construction and whole of life management is considered to be relatively low when compared to the Western Distributor and other large PPP projects. Further the key risks are reasonably well understood and can be allocated to the appropriate party – they generally do not warrant ongoing sharing that might otherwise necessitate the use of the alliance model.
- The proposed scope of maintenance activities is very small and unlikely to drive material value through innovation and/or whole of life cost management (normally associated with a PPP or DBM)
- Delivery will need to be integrated within the existing network along the corridor and with EastLink. This suggests there is a benefit in involving the contractor in design (rather than in construction only).

The key attributes of the D&C model that support this recommendation are provided below.

Table 70: Key attributes of D&C procurement for Monash Freeway Upgrade

Criteria	Key attributes
Market appetite	<ul style="list-style-type: none"> • Projects of similar scale have been delivered as a D&C and sufficient market appetite is expected to drive competitive tension • The smaller scale and risk of the Monash Freeway Upgrade would be less attractive to investors in a PPP model
Risk management	<ul style="list-style-type: none"> • The risks associated with the Monash works are likely to be well understood prior to procurement, negating the need for an Alliance style contract. The relative complexity of this type of project does not warrant the inclusion of private finance. A traditional D&C contract should provide the State with sufficient contractual protection from the key risks
Scope for innovation	<ul style="list-style-type: none"> • This model provides opportunity for private sector input into the design process compared to a construct only contract. The level of innovation would benefit the technical solution in respect of drainage, bridge design and integration with the network • The PPP model fosters a more rigorous approach to whole of life risk management, but would not drive further value for money given the nature of the works
Transport network integration	<ul style="list-style-type: none"> • The D&C contract allows the State to retain control over the management of the network and the integration of the upgraded road with EastLink (noting this needs to be managed by the State in accordance with the EastLink Concession Deed • Given the likely scale of maintenance, it is more efficient (financially and practically) to incorporate them into existing maintenance contracts rather than creating a separate arrangement in a PPP or DBM style model.

13.3.5. Webb Dock Access Improvement Works

As identified in Section 13.2, the Webb Dock Access Improvement Works have been identified as a separate works package.

The scope of works stand alone and will deliver benefits for access to/from Webb Deck regardless of whether the broader Western Distributor proceeds.

Delivering these works as a separate package enables faster delivery with additional benefits:

- Early commencement of these works will better align with the completion of the new Webb Dock container terminal in 2016-17
- Aligning construction with the CityLink Tulla Widening Project (CTW) being undertaken by Transurban would minimise disruption to the Webb Dock area.

As part of the Stage 3 assessment of the Transurban Proposal and the development of the business case, the State has undertaken a procurement options analysis for delivery of these works. This analysis included engagement with Transurban regarding the option to deliver parts of these works as a variation to the existing CTW contract.

It was determined that the Webb Dock Access Improvement works be split into two elements and delivered as outlined in the table below:

Table 71: Preferred delivery method for Webb Dock Access Works

Scope Element	Delivery Method
Widening of Cook Street from Todd Road (eastbound) to the entrance to the M1.	<p>VicRoads is considered best placed to deliver the works as a construct only contract as:</p> <ul style="list-style-type: none"> • These works are an upgrade to the existing arterial road network and interface with work currently being procured for the Port of Melbourne Corporation at Todd Road • The preferred design does not have a direct physical interface with the connection to CityLink.
A dedicated new connection to CityLink (northbound) and an upgrade to Ramp M	<p>There are potential benefits from the remaining scope of works being delivered by Transurban as:</p> <ul style="list-style-type: none"> • They could have a direct interface and impact on the performance of CityLink (Western Link). Transurban should manage the risks associated with the design and delivery • The proposed construction timeframes for the CTW works would enable the Webb Dock works to be carried out earlier than the rest of the Western Distributor project, as part of the CTW project. <p>Further analysis is currently being undertaken by the CTW project team to confirm that a variation to the CTW contract represents value for money. The current status of the procurement of Webb Dock works is discussed in Section 16.5.</p>

13.4. Uncertainty of toll revenues

Section 13.3.3 identifies a PPP as the preferred procurement model for the Western Distributor package of works. A central feature of this model in a road project is the opportunity to consider a range of options for allocating toll revenue rights between the State and the private sector.

13.4.1. The nature and extent of uncertainty of toll revenues for the Project

The Project will have access to revenues from imposing tolls on the users of the Western Distributor, West Gate Freeway and, after the existing concession expires, the CityLink assets. Each of these revenue sources has a different risk profile. The table below summarises each revenue source and the associated demand risk profile.

Table 72: Sources of toll revenue uncertainty

Revenue source	Key attributes	Assessment of level of uncertainty of revenues
Toll revenues on the Western Distributor	[Redacted]	[Redacted]
	[Redacted]	[Redacted]
	[Redacted]	[Redacted]
	[Redacted]	[Redacted]
HCV toll revenues on the West Gate Freeway	[Redacted]	[Redacted]
	[Redacted]	[Redacted]
	[Redacted]	[Redacted]

Revenue source	Key attributes	Assessment of level of uncertainty of revenues
Toll revenues from the extension of tolls on the CityLink beyond the current concession	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]

13.4.2. Allocation of toll revenue risk

Traditionally, road PPP projects in Australia have been delivered as privately financed toll roads (for example CityLink and EastLink) where the private operator takes responsibility (and substantially all risks) for the design, construction, finance, maintenance and demand risk of the road in return for the right to collect toll revenue (**Economic PPP**).

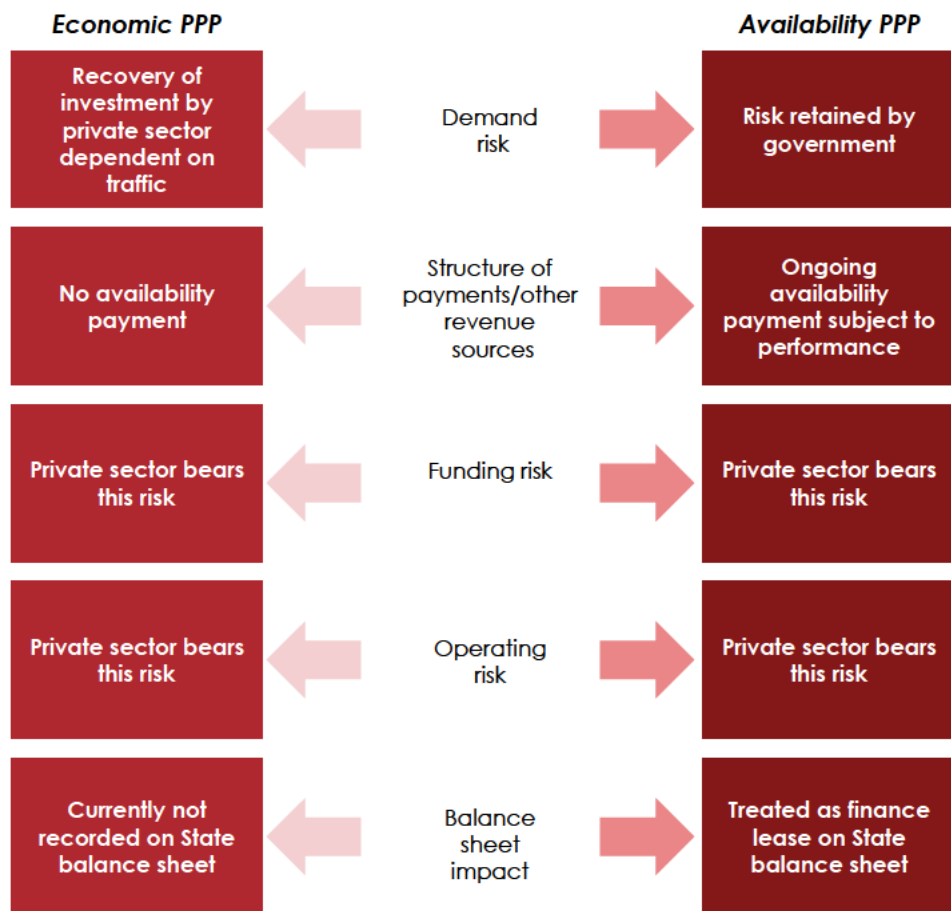
In more recent times, several toll road projects, most notably the Toowoomba Second Range Crossing in Queensland, have been delivered using the availability style PPP model (**Availability PPP**). For these projects, government collects toll revenue (retaining demand risk) and is responsible for making service payments to the private sector regardless of the level of traffic but subject to the private sector meeting defined availability and performance standards during operations. Under this model the private sector still remains responsible for (and bears substantially all the risk) associated with design, construction, finance, operation and maintenance. Peninsula Link in Victoria is also an Availability PPP, however there are no toll revenues collected.

Under the Economic PPP model, at least for the time being,³¹ no asset or liability is recorded on the state balance sheet as the private sector bears full responsibility for toll revenues and exposure to demand risk.

However, under the Availability PPP model the State has a financial obligation to make service payments, and a finance lease is recorded on the state balance sheet.

The figure below illustrates the distinction between the Economic PPP and Availability PPP models depending on the allocation of key risks and the impact on the state balance sheet.

Figure 105: Economic PPP versus Availability PPP



Victoria's two existing toll roads (CityLink and EastLink) have successfully been contracted under an Economic PPP model. This precedent forms a natural starting point to consider how to allocate the toll revenues in the funding structure.

The model was also adopted for the majority of toll roads delivered around Australia since CityLink (with the exception of the Gateway Upgrade Project, Legacy Way and the Toowoomba Second Range Crossing projects in Queensland). However, overly optimistic traffic volume forecasts led to a number of high profile financial failures of traditional toll road projects, including Cross City Tunnel, Lane Cove Tunnel (in Sydney) and Clem7 (in Brisbane).

³¹ There are proposed changes to accounting standards as early as 2017 which would, if adopted, bring an asset and liability back "on balance sheet".



13.4.3. Consideration of market perspective

The value that can be realised from project toll revenues under the Economic PPP model depends on how efficient debt and equity markets are in estimating future traffic volume and whether they choose to apply an appropriate discount rate to the resulting cashflows. The project team undertook a targeted engagement process to assess the potential to realise value from toll revenues for the State and update feedback from recent projects.

Market engagement

To test the depth of the market appetite for demand risk beyond the Transurban Proposal, market sounding interviews were held with global and national market participants based on publicly released information about the Project.

[REDACTED]

Benchmarking of private financing costs for the Project

A benchmarking study and market analysis was undertaken to determine the difference in private sector financing costs between an Availability PPP and Economic PPP for each toll revenue source.

The following was identified:

- The price for transferring demand risk to the private sector is expected to result in an increase in the private sector financing costs or the weighted average cost of capital (WACC) relative to an Availability PPP in the range of approximately [REDACTED] basis points (bps) for the West Gate Freeway and Western Distributor toll revenues³²

[REDACTED]

³² The capital asset pricing model says that the appropriate discount rate for an asset does not vary depending on who owns the asset (here the rights to toll revenue) but should be determined by the underlying non diversifiable risk. If the private sector assumes demand risk, then the public sector residual risk is less but total risk remains the same but is transferred. An alternate argument is that risk is most efficiently priced by the party best able to manage, control and absorb the risk.

13.4.4. Proposed response

The targeted market engagement suggests that the private sector is able to accept traffic and tolling risks on the Western Distributor and the West Gate Freeway under an Economic PPP (although whether the price achievable would be value for money for the taxpayer relative to other procurement models would need to be tested further).

The Availability PPP model (under which the State retains demand risk) may ultimately provide the opportunity for the State to realise greater value from the project toll revenues from a more efficient view on the traffic and tolling risk on all the toll roads.

- [Redacted]
 - [Redacted]
 - [Redacted]
- [Redacted]

Noting that for the purposes of this business case, a PPP is the preferred delivery option for the Western Distributor, it is not definitive whether an Economic or Availability PPP will deliver a better value for money outcome. This will be further assessed post-business case.

This business case focuses on developing options which efficiently implement the Project (including realising the value of toll revenues to fund some or all of the works). Both Economic and Availability PPP models remain feasible, and provide different opportunities to realise the value of the toll revenue. However, for the purposes of this business case, an Availability PPP is assumed to be the preferred procurement model.

13.5. Funding solution

13.5.1. Western Distributor

As outlined in Chapter 12, the business case assumes toll revenues realised from the Western Distributor and West Gate Freeway will be used to fund the Project. Chapter 12 also identifies that a significant amount of additional government (State and Commonwealth) funding will be required.

While the State may choose to provide these funds from existing cash balances or through borrowings, it also has the opportunity to realise further revenue through the extension of tolls on users of the CityLink assets, beyond expiry of the current concession with Transurban. However, while there is significant precedent for government using the private sector to raise capital against revenues equivalent to those from Western Distributor and West Gate Freeway, the

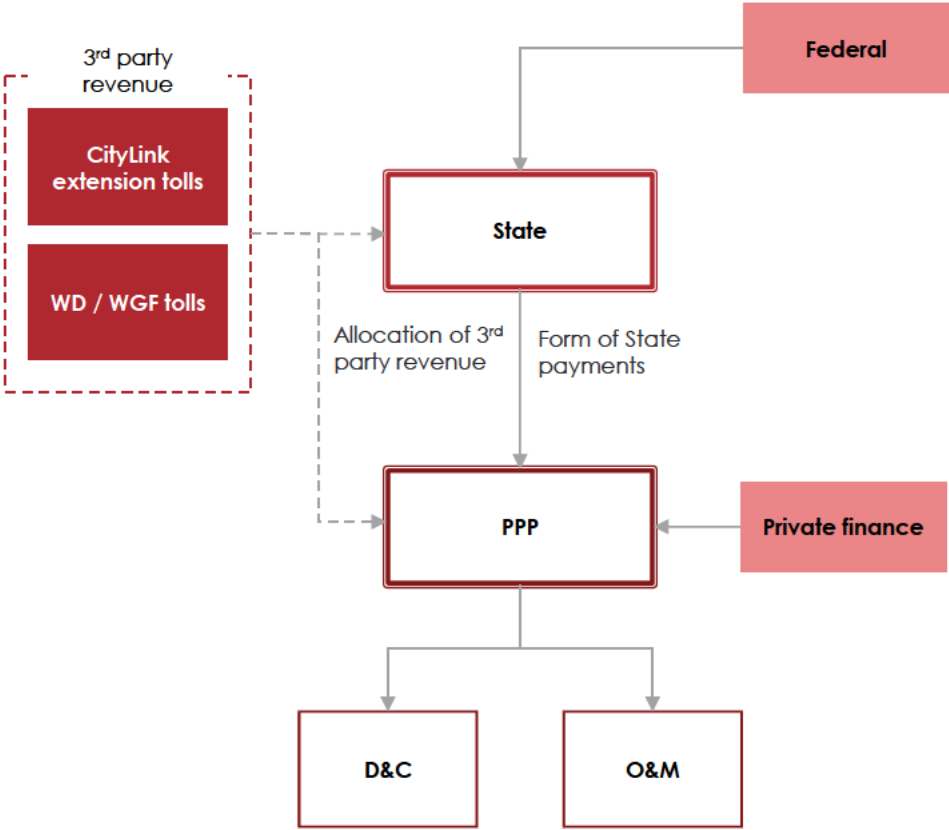
deferred nature of the toll revenues from the CityLink toll extension provides uncertainty as to whether private debt financing can be raised against these cashflows initially.

The assessment framework for the Project is outlined in Section 6.3 identifies the following criterion:

“Achieving value for money outcomes for the State and road users, while leveraging alternative funding sources that help limit the impact on the State balance sheet.”

To address this, an alternative approach to using these future revenue sources and reducing the level of direct budget funding required has been considered. In particular, consideration has been given to how the State might structure its own payment obligations in respect of the Project, and what this means for the allocation of the rights to toll revenues. The proposed approach is outlined below.

Figure 106: Funding structure considerations



Proposed response

An alternative structure has been identified which entails establishing a State Owned Entity (SOE). In simple terms, the SOE³³ would be self-sustaining (able to support its own debt), similar in commercial substance to other SOEs such as the Port of Melbourne Corporation and Melbourne Water.

This structure provides further options to leverage the available toll revenues to fund the upfront cost of the works:

³³ The SOE is expected to be classified as a Public Non-Finance Corporation (PNFC)

- It provides a solution to the potential market issues with respect to raising private debt finance initially against future CityLink revenues, through the provision of debt to the SOE by the State (raised against future revenues)
- While the opportunity to implement an Economic PPP remains for the Western Distributor and West Gate Freeway, this structure provides an alternative option for the State to provide capital against these revenues.

A key aspect of the SOE is its self-sustaining nature. To give the entity substance (and achieve the desired financial outcomes), it will need substantive operating cash flows prior to CityLink tolls from 2035. To achieve this outcome, the toll revenues derived from the West Gate Freeway and Western Distributor could be allocated to the SOE.

A traditional General Government Sector (GGS) Availability PPP structure would result in a lease liability on the GGS balance sheet and impact the GGS net debt after construction completion.

However under the SOE structure, the obligation to pay availability payments to the PPP would reside solely with the SOE. The SOE rights to toll revenues, supported by the proposed capital structure, would repay these obligations.

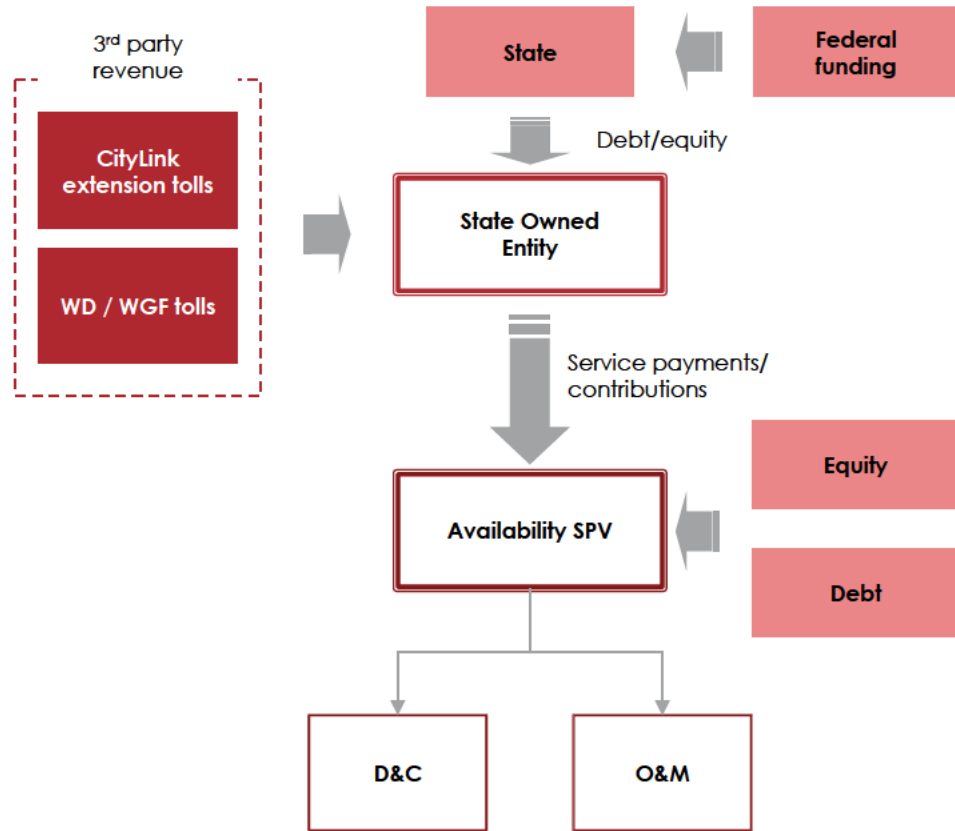
Specifically the SOE would:

- Be responsible for toll revenue collection on the Western Distributor and the West Gate Freeway and on CityLink assets (beyond current concession expiry)
- Be responsible for making any availability payments
- Be capitalised (on an arms-length basis) upfront with debt and equity from the State (in part using any Commonwealth Government's contribution), and would have access to an "on-call" debt facility, such that it has access to sufficient funds to cover future payments to the Availability PPP, including milestone state contributions and availability payments net of toll revenue
- Use future toll revenues from the West Gate Freeway, Western Distributor and the CityLink toll extension to repay the state debt and pay a return on the State's investment.

To the extent the SOE's entitlement to future toll revenues results in it being considered self-sustaining, a lease liability in the GGS balance sheet is not expected to be created.

The diagram below illustrates the funding flows for a SOE in an Availability PPP funding model.

Figure 107: Availability PPP model via SOE



Further detail on the potential capital structure of the SOE, including the extent to which it might access private finance, is included in Attachment N.

13.5.2. Funding of Monash Freeway Upgrade, Webb Dock Access Improvement Works, procurement and development costs

The SOE is expected to be established prior to contract close of the Western Distributor. However, given the relative timing of the SOE establishment and delivery of the Monash Freeway Upgrade and Webb Dock Access Improvement Works, it is expected that the State will directly fund those two components of the overall project.

Similarly, costs associated with procuring and developing the Western Distributor would be funded by the State. Although, subject to the timing of requisite land acquisition for the Project, land acquisition costs would be funded by the SOE.

13.6. Preferred state-led delivery solution

In summary, the Project is proposed to be procured through three separate packages:

Western Distributor Works

The Western Distributor package forms a toll road asset from the West Gate Freeway interchange with the M80 and Princes Freeway at the western end of the Project, to the CityLink Connection and central access at the eastern end.

There remains the potential to use an Economic PPP, however this business case assumes the Western Distributor package will be procured as an Availability PPP, and funded via a combination of toll revenues from the Western Distributor, Commonwealth funding and state funding (in the form of an extension of tolling

on the existing CityLink assets). To facilitate tolling, the State (or SOE) will also need to procure a toll collection capability.

Monash Freeway Upgrade

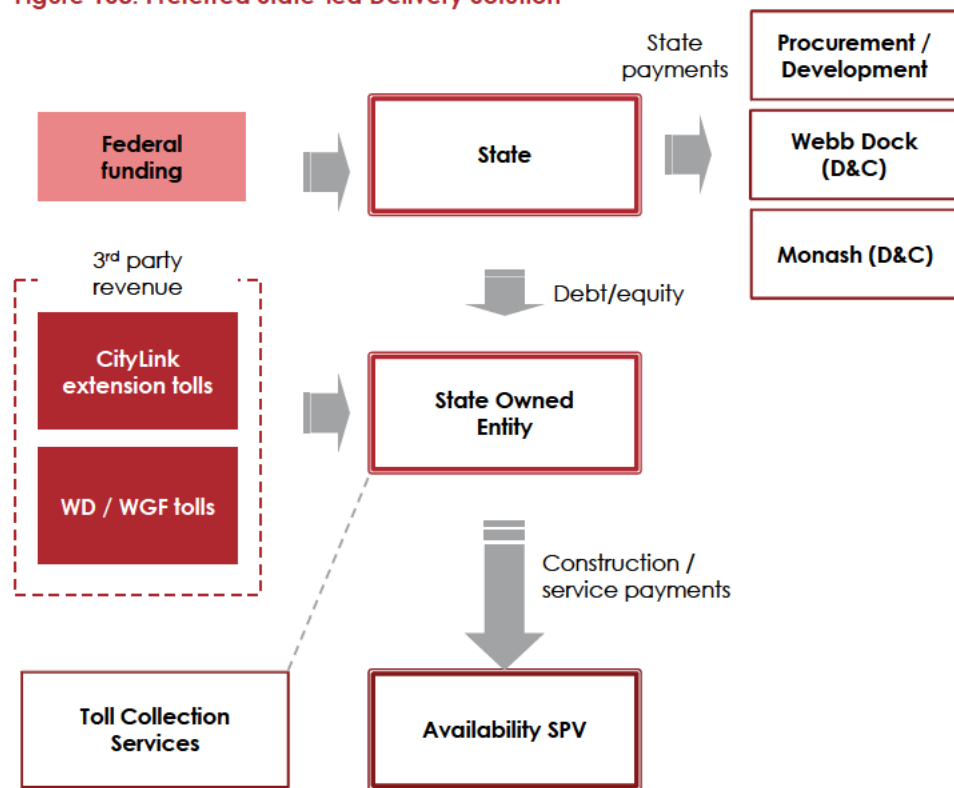
The Monash Freeway Upgrade will be delivered as a single package procured as a D&C contract funded by direct construction payments from the State.

Webb Dock Access Improvement Works

The Webb Dock Access works will be delivered as two packages of work: the State delivered works (Cook Street widening works) and a proposed variation to the CTW Project (CityLink connection and Ramp M). This package is expected to be funded using state budget funding.

The diagram below shows the proposed overall delivery structure.

Figure 108: Preferred State-led Delivery Solution



13.6.1. Public Interest Test

Acknowledging that a PPP is the recommended procurement method for the Western Distributor Works, a Public Interest Test has been completed.

The purpose of the Public Interest Test is to ensure that:

- procuring the project as a PPP is in the public interest
- after a decision has been made to procure a project as a PPP, the process is structured so that the project continues to be in the public interest.

The Partnership Victoria framework requires that a Public Interest Test be completed as various phases of project development, including firstly at the business case phase as part of the procurement options analysis.

The Public Interest Test has determined that the public interest can be adequately protected through a PPP delivery of the Western Distributor works.

A copy of the Public Interest Test is provided in Attachment R.



14. Budget impacts

An assessment of the budget impacts of the preferred state-led delivery and funding solution has been completed to support Government's investment decision.

This section summarises the assessment of budget impacts, key findings and related sensitivity testing.

It sets out the potential cost of, and funding approach to, the Availability PPP, an indicative financing structure of the SOE, the funding costs for the Monash Freeway and Webb Dock works packages.

The analysis demonstrates that an Availability PPP is feasible, and establishes a robust and conservative basis for implementation of the SOE delivery structure. Following approval of this business case, the structure will be further optimised to ensure the most efficient allocation of capital to the Project from the State's balance sheet.

The following information has been redacted in this chapter:

- **A number of key financial assumptions have been redacted as it is considered to represent commercially sensitive information that, if published, might prejudice the State's ability to deliver a value for money outcome for the Project.**

14.1. Overview of approach

Section 13.6 identified the preferred state-led delivery solution for the Project and qualitative reasoning to support the recommendation. This section provides further detail on the proposed structure and its financial feasibility in the context of the project costs and revenues identified in chapter 12. It provides an overview of:

- The potential cost to the State (funded via the proposed SOE) of the Availability PPP and the likely approach to funding it (including the potential split between upfront contributions and availability payments)
- An indicative financing structure for the SOE, and how toll revenues could be used to fund the Availability PPP (and by extension the D&C and O&M costs of the Project)
- Other state funding costs including the Monash Freeway Upgrade Works and the Webb Dock Access Improvement Works
- The accounting and budget impacts of the proposed approach.

Following approval of this business case, the structure will be optimised to ensure the most efficient allocation of capital to the Project from the State's balance sheet.

The table below provides a summary of the D&C costs to be funded:

Table 73: D&C cost expenditure profile (\$ millions, Nominal, P50)

	Total	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Western Distributor								
D&C Costs (risk adjusted) ³⁴								
Land acquisition								
Western Distributor delivery costs								
WD Subtotal								
Monash Freeway Improvements D&C Costs (risk adjusted) ³⁴								
Webb Dock Access D&C Costs (risk adjusted) ³⁴								
Subtotal								
Planning costs								
Procurement / Management costs								
Subtotal								
Total (P50)	5,226	91	192	544	931	1,275	1,407	786

As noted previously, while the State may choose to fund this expenditure from existing cash balances or through additional borrowings, the funding structure outlined in this chapter proposes to leverage the toll revenues from the Project and from an extension of tolling on the CityLink assets to fund the delivery of the Western Distributor Works.

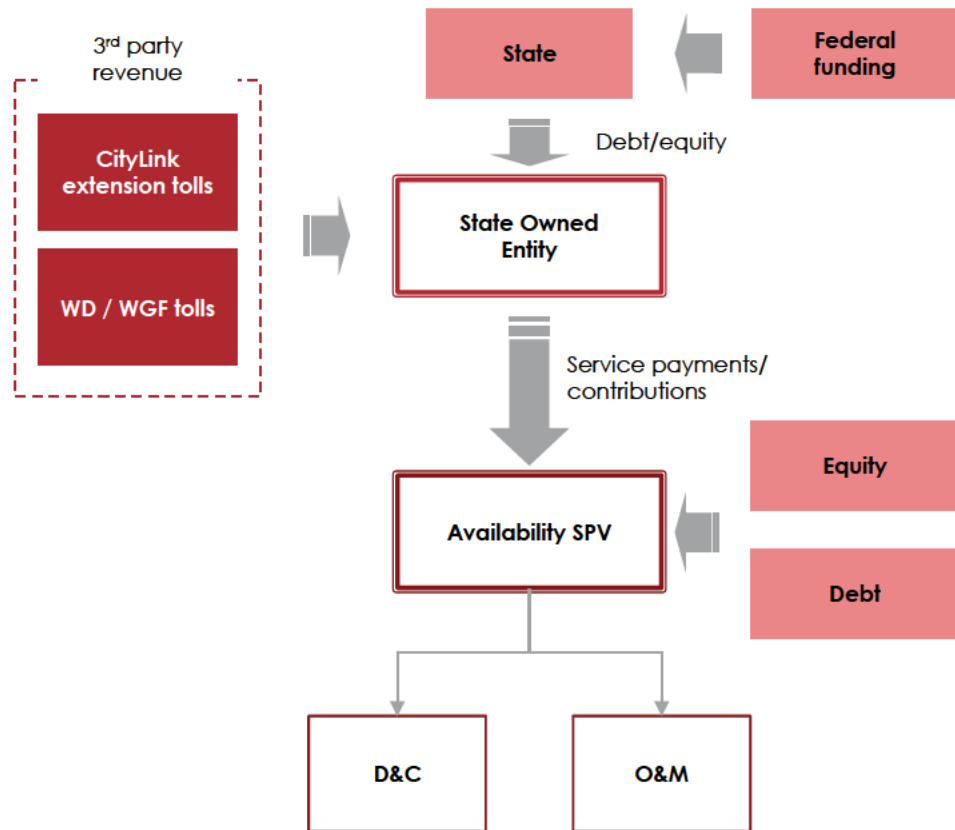
For the purposes of the analysis outlined in this chapter, it has been assumed that the Commonwealth and State Governments will each fund **50 per cent** of the Funding Gap (identified in Chapter 12). In the event that the Commonwealth Government contributes a different amount, it is expected that the State will adjust its contribution to ensure the Project remains fully funded. The resulting budget impacts may be different from those identified in this business case.

A financial model has been developed to test the financial viability of the SOE for delivery of the Western Distributor Works and its ability to sustain the capital required to fund the Project without ongoing state support. The model incorporates a range of commercial and financial assumptions developed by the Project team and its advisors, and is intended to provide an indicative view of the potential project cash flows. The underpinning financial analysis report prepared by PwC is contained in Attachment K. Unless otherwise stated, the analysis presented in this section is based on P50 cost estimates.

³⁴ Real costs as per the Advisian cost report escalated at [REDACTED]. This total also includes construction insurance costs.

The diagram below summarises the key elements of this financial analysis.

Figure 109: Financial model structure



14.2. Availability PPP

The preceding analysis recommends an Availability PPP for the Western Distributor Works.

The Availability PPP will be undertaken by a Special Purpose Vehicle (SPV) owned by the private sector. The SPV will have the rights to design, construct, finance, maintain and operate the assets over the life of the concession.

The key assumptions that underpin the analysis of the Availability PPP include:

- A concession period of [REDACTED] (including a construction period of [REDACTED]), starting on financial close. This period has been determined based on recent precedents for Availability PPPs in Australia
- A D&C cost of [REDACTED] (nominal) (being the real, 2016 risk adjusted costs for the Western Distributor Works escalated at [REDACTED] per cent per annum over the course of construction) plus other costs during construction³⁶ [REDACTED] (nominal)

[REDACTED]

³⁶ Costs during construction include; Independent Reviewer, SPV costs and upfront development costs.



- O&M costs (including Lifecycle costs) of [REDACTED] per annum (average real 2016 prices), including risk adjustments
- SPV costs of³⁷ [REDACTED] per annum (average real 2015 prices)
- Financing assumptions (including interest rates and gearing) of debt and equity that are consistent with recent market precedent for Availability PPPs. Note, in order to achieve this outcome it is important that the SOE can demonstrate (to the Availability PPP investor) that it can meet its ongoing availability payments obligations, insulating the Availability PPP from any indirect exposure to demand risk. The mechanism proposed to achieve this is outlined further in section 14.3
- A [REDACTED] (nominal) contribution from the SOE during construction, drawn in a manner that is broadly consistent with other recent Victorian PPPs.

Further detail on the precise assumptions used is included in Attachment O.

Based on the analysis undertaken it is estimated that the PPP would require ongoing availability payments of [REDACTED] per annum (average real 2016 prices), or [REDACTED] (nominal) in the first full year of operation.

14.3. State Owned Entity

The SOE structure would allow the State to realise the value of future toll revenues from the Project (Western Distributor, West Gate Freeway and a [REDACTED] extension of tolling on the CityLink assets). The following key considerations have underpinned the proposed approach to structuring the SOE:

- The SOE is proposed to be structured to meet the requirements for treatment as a Public Non-Finance Company (PNFC)
- The SOE is structured to be self-sustaining – it is structured not to require ongoing financial support from the State and must manage its ongoing financial obligations (including the payment of upfront contributions and ongoing availability payments to the PPP) through the collection of toll revenue and debt and equity received from the State, and
- The SOE must always have sufficient cash or undrawn and available debt to meet its obligations to the PPP, such that there is no more credit risk in relation to the availability payments to the SPV than there would be if the payments were coming direct from the State. For the purposes of the business case, the financial model assumes this will be achieved through:
 - The provision of equity from the State of [REDACTED], funded using the monies from the Commonwealth, which is assumed (for this analysis) to be provided to the State in the form of a grant.
 - The provision of debt funding from the State (directly from General Government (GG) or from TCV) during construction, to fund any remaining construction period costs (including [REDACTED]³⁸ of management and delivery costs)
 - The use of an “on-call” debt facility (again provided from GG or TCV), which will be drawn upon to fund the difference between the SOE’s net operating revenue and the cost of the PPP availability payments. The facility is sized to an amount equal to the nominal value of the forecast availability payments.

³⁷ SPV management costs and insurance

³⁸ State retained risk and SOE management fees

All debt (including the “on-call” facility) is assumed to be made available on a commercial, arms-length basis. Further detail on the funding terms is included in Attachment O.

- The SOE should pay a reasonable rate of return to the State.

The SOE is also assumed to:

- Receive toll revenue in the order of ██████ per annum (average, nominal) from the Western Distributor until 2035. In 2035, toll revenue in the order of ██████ (nominal) will be earned from the CityLink concession extension and Western Distributor combined. By 2045 this revenue is forecast to increase to ██████ (nominal)
- Have ongoing management costs of ██████ per annum (real 2015 prices), noting that an element of ongoing management cost is separately included as part of the toll collection costs.
- Fund the operation and maintenance of the Western Distributor from the expiry of the Availability PPP (██████³⁹ per annum, real 2016 prices).
- Fund the operation and maintenance of the CityLink assets for the period of the extension of tolling post the expiry of the current concession (██████ per annum, real 2015 prices).
- Fund toll collection costs of ██████ per annum (real 2015 prices) prior to 2035 and ██████ per annum (real 2015 prices) for the period of the extension of tolling post the expiry of the current concession.

The proposed ██████ extension of tolling on the CityLink assets post the expiry of the current concession has been sized to ensure the SOE can be capitalised on robust commercial basis (able to meet its debt obligations and pay a commercial rate of return). This period is based on the P50 construction and operating costs. If the P90 costs are assumed the analysis indicates that, all else being equal, tolls on the CityLink assets would need to be extended for a further ██████ to achieve a similar rate.

14.4. Monash Freeway Upgrade and Webb Dock Access Improvement Works

The Monash Freeway Upgrade ██████ (nominal D&C) are planned to be delivered as a D&C contract. The Webb Dock Access Improvement works ██████ (nominal D&C) are planned to be delivered as a variation to the CTW Project for the Ramp M works and by direct procurement by VicRoads for the Cook Street works. These works are forecast to start before financial close is achieved for the Western Distributor and prior to establishment of the SOE. As a result these works are assumed to be funded directly by the State.

In addition, VicRoads expect to incur additional O&M and lifecycle costs in respect of the Monash Freeway Upgrade Work of ██████ per annum (average, real 2015 prices).

14.5. Other state costs

It is also assumed that the State will fund procurement and project management costs of ██████ (nominal) prior to establishment of the SOE.

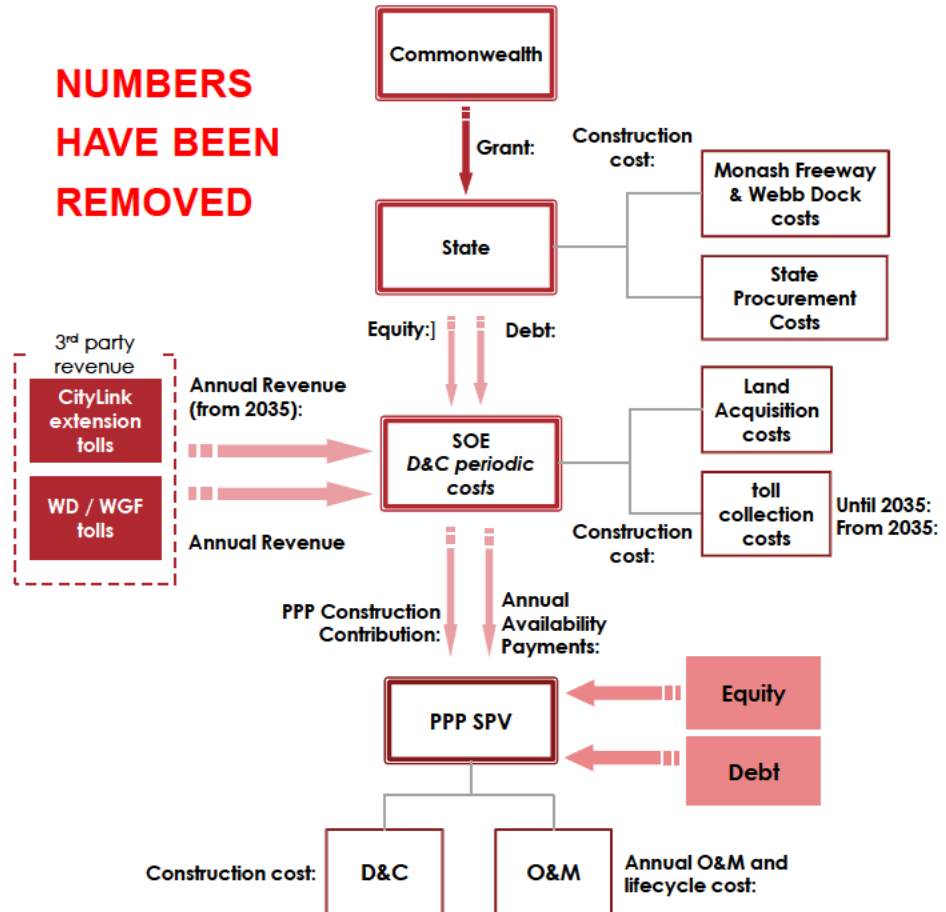
Further detail on the assumptions underpinning these costs are included in Attachment O.

³⁹ Risk adjusted O&M cost and insurance

14.6. Cashflow summary

The diagram below provides a further summary of the key cashflows outlined above.

Figure 110: Cashflow summary



Notes:

1. Unless otherwise stated the numbers above are nominal.

14.7. Budget impacts

Overview

This section sets out the forecast budget impacts. These impacts are a function of:

- The underlying costs risks and revenues
- The delivery models adopted for each of the packages of work
- The accounting treatment adopted by the SOE
- The nature and extent of the funding support provided to the SOE by the GGS.

The following principles have been applied:

- The Western Distributor works are assumed to be delivered as a PPP and accounted for as a finance lease in the accounts of the SOE

- The Monash Freeway Upgrade and Webb Dock Access Improvement Works are assumed to be delivered as state works, funded directly by the GGS on a milestone basis
- The State will also fund the procurement and planning costs of the Project
- Toll revenues will be recorded in SOE's P&L when customers use the roads
- The State (GGS) will have an "Investment in Subsidiary" for its equity investment in the SOE
- Any debt provided by the State to the SOE will be recognised as a financial liability (loan payable) by the SOE and as a financial asset (loan receivable) by the State. The undrawn portion of the "on-call" debt facility will be disclosed and not recorded by both the State and the SOE.
- The Commonwealth Government is assumed to provide a grant of [REDACTED]. This will be used to fund 50 per cent of the Monash Freeway Upgrade and Webb Dock Access Improvement Works and a tranche of the State's capitalisation of the SOE.
- The State will control the SOE. The SOE's assets and liabilities will be consolidated in the State's consolidated (whole of government) balance sheet. On consolidation:
 - The whole of government balance sheet will recognise the finance lease liability and asset (in respect of the Availability PPP after completion) and the cash amounts held on reserve in the SOE
 - The GGS's equity investment will be eliminated against the SOE's equity and State's loan receivable will be eliminated against the loan payable recognised by the SOE. This will leave the State to recognise the cost/impact of funding the equity loan amounts
 - Toll revenue will be recognised during the Western Distributor concession term in the consolidated financial statements of the State.

Further detail on the key accounting and budget impact considerations is included in Attachment Q.

Net Impact on the state budget

The SOE will be outside the GGS but consolidated into the whole of the State's accounts. The impact on accounts can also be measured by reference to the view of various credit rating agencies, namely Standard & Poor's (S&P) and Moody's Investor Services (Moody's) of the Project's impact on the State's net debt.

The ability of the SOE to repay its future financial obligations is, in different ways, a key focus of the credit rating agencies.

Provided the State is able to demonstrate that the proposed SOE is self-sustaining then Moody's could potentially exclude the debt held by the SOE from its net debt assessment while S&P would consider the higher level of NFPS debt in light of the expected new toll revenues.

The tables below summarise the key impacts of the Project on the state budget prior any accounting consolidation, but is not intended to be a comprehensive list of all impacts.

Table 74: GGS Budget impacts to completion of the Western Distributor Works assuming P50 cost estimate (\$ millions, nominal, P50)

	Total	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Increases in borrowing/reductions in cash to fund:								
Western Distributor Works								
Investment in SOE ²								
Loan to SOE ³								
Loan Asset								
Western Distributor Works sub-total								
Monash Freeway Upgrade								
Webb Dock Access Improvement Works								
Procurement and Planning Costs								
Sub total								
Total project impact								
Commonwealth Grant ¹								
Net impact⁴	(236)	(46)	(96)	(70)	(24)	0	0	0

Table notes: 1. Commonwealth Grant assumes funding applied to 50% of the Monash Freeway Upgrade and Webb Dock Access Improvement Works; 2. This funding amount could be split to include a grant from the State if required; 3. During this period the State will also accrue interest and fees on the state loans; 4. The State would also need to disclose a Financial Commitment for the value of the on-call deficit facility from construction completion.

As noted above, the funding of the Western Distributor Works is not expected to impact the state budget. The table below presents the forecast budget impacts of other aspects of the Project assuming P90 costs. For the purposes of the business case it is assumed that the State will fund any cost increases above the P50 costs.

Table 75: GGS Budget impacts to completion of the Western Distributor Works assuming P90 cost estimate sensitivity (\$ million, nominal, P90)

	Total	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Increases in borrowing/reductions in cash to fund:								
Monash Freeway Upgrade								
Webb Dock Access Improvement Works								
Procurement and Planning Costs								
Total project impact								
Commonwealth Grant ¹								
Net impact⁴	(262)	(49)	(106)	(79)	(28)	0	0	0

Table notes: 1.

Table 76: GGS Budget impacts during operations (\$ million, nominal, P50)

	2022/23	2023/24	2024/25	...	2046/47	2047/48	2048/49	2049/50
Balance Sheet:								
Loan Asset								
Cash								
P&L								
Interest received								
Dividends								

Self-supporting classification is ultimately determined by Moody's. It is important to note that the self-supporting assessment is a case-by-case assessment where the credit rating agencies will consider quantitative and qualitative factors reflecting the individuality of the arrangement. No consultation has been undertaken with the rating agencies as part of the business case development. There remains a risk it will not be considered a self-sustaining entity. It is expected that consultation with the rating agencies will occur post business case approval.

Accounting for the SOE

Under the current accounting framework, the high level accounting impacts for the SOE may be illustrated as follows:

Table 77: SOE level (Public Non-financial Company)

Description of accounting impact	Construction Phase	Operation Phase
<p><i>Loan payables (i.e. financial liability) to the State</i></p> <p>Any loan entered into between the State and SOE will be recorded as a loan payable by SOE. The SOE will record the loan payable when it receives the cash.</p> <p>Any 'on-call' debt facility provided by the State will be recorded as a financial liability as funds are drawn down. The undrawn portion will be disclosed but not recorded by the SOE.</p> <p>This will eliminate upon consolidation in the State's consolidated financial statements.</p>	<p>Dr Cash</p> <p>Cr Loan Payables</p>	
<p><i>Equity for the State</i></p> <p>Any equity investment between the State and the SOE will be recorded as an equity contribution. SOE will record the equity contribution when it cash is received.</p> <p>This will eliminate upon consolidation in the State's consolidated financial statements.</p>	<p>Dr Cash</p> <p>Cr Equity Contribution</p>	
<p><i>Prepaid asset to PPP consortium</i></p> <p>Any contributions made in the construction phase to the PPP consortium will be recognised as a prepayment of the finance lease.</p>	<p>Dr Prepayment of lease</p> <p>Cr Cash</p>	
<p><i>Finance lease asset and liability</i></p>		<p>Dr Leased Asset</p>

Description of accounting impact	Construction Phase	Operation Phase
<p>A finance lease asset and lease liability will be recognised on the date the asset is available for use.</p> <p>The asset and liability is recognised on the date the asset is available for use, which is expected to be day one of the operation phase. Under the State's existing accounting policy, no road asset or financial liability is recognised until the road asset is ready for use. Disclosure of the lease liability commitments will be included in the financial statements as a note to the accounts from the inception of the lease.</p>		Cr Lease Liability
Allocation of prepaid lease payments against lease liability on day one of the operation period.		Dr Lease Liability Cr Prepayment
<p><i>Revenue from tolls</i></p> <p>Recognition of revenue from tolls during the operations and maintenance phase.</p>		Dr Cash/Deferred revenue Cr Revenue
<p><i>Interest expense</i></p> <p>Interest expense incurred in relation to the loan from the State and the finance lease liability will be recognised using the effective interest rate method.</p> <p>The interest expense on the loans from the State will eliminate upon consolidation in the State's consolidated financial statements.</p>	Dr Interest Expense Cr Interest Payable	Dr Interest Expense Cr Interest Payable/Lease liability
<p><i>Availability payments throughout the operations phase</i></p> <p>Availability payments will be made to the PPP consortium throughout the concession term. This will reduce the finance lease liability.</p>		Dr Lease liability Cr Cash/Payables
<p>Note the following accounting impacts have not been reflected in the journal entries above;</p>		

- revaluation of PPE
- depreciation of PPE
- operating expenses
- transaction costs
- repayments of loans to State and Commonwealth
- support received from the Commonwealth as the form of the support has not yet been determined
- dividends
- gains/losses on derivative financial instruments.

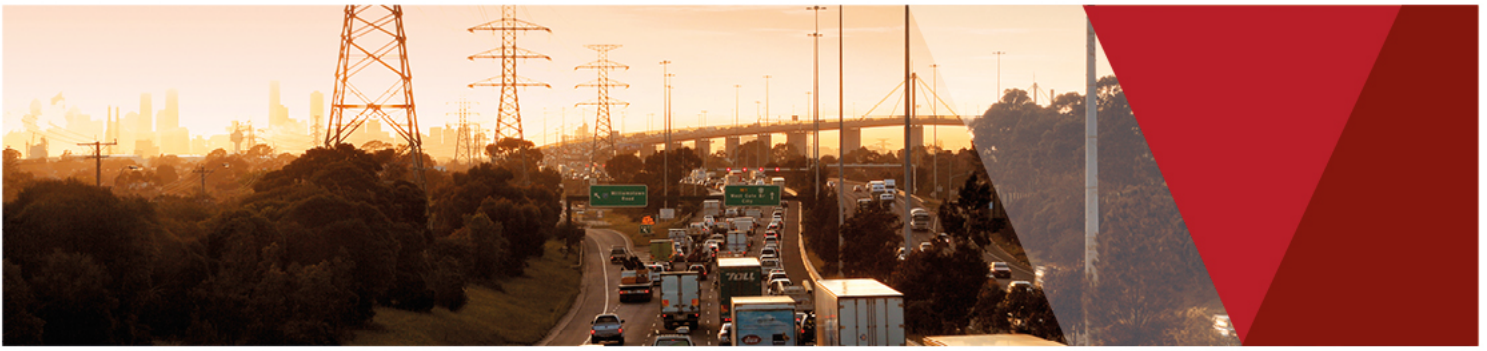
Accounting at a state level

Under the current accounting framework, the accounting consequences for the State (prior to consolidation) may be considered to be as follows:

Table 78: State level

Description of accounting impact	Construction Phase	Operation Phase
<p><i>Commonwealth grant</i></p> <p>Any Commonwealth support will be recognised as grant income when it is received.</p>	<p>Dr Cash</p> <p>Cr Grant income</p>	
<p><i>Equity investments</i></p> <p>Any equity investment between the State and the SOE will be recorded as an investment in a Subsidiary by the State. The State will record the investment when cash is paid to the SOE.</p> <p>This will eliminate upon consolidation in the State's consolidated financial statements.</p>	<p>Dr Investment in Subsidiary</p> <p>Cr Cash</p>	
<p><i>Loan receivable (i.e. financial asset) from the SOE</i></p> <p>Any loan entered into between the State and SOE will be recorded as a loan receivable from the SOE. The State will record the receivable when it provides the cash to SOE.</p> <p>Any "on-call" debt facility provided to the SOE will be recorded as a financial asset as funds are drawn down. The undrawn portion will be disclosed as a financial commitment.</p> <p>This will eliminate upon consolidation in the State's consolidated financial statements.</p>	<p>Dr Loans receivable</p> <p>Cr Cash</p>	

Description of accounting impact	Construction Phase	Operation Phase
<i>Interest income</i>	Dr Cash	Dr Cash
Interest income will be recognised in relation to the loan receivable from the SOE.	Cr Interest income	Cr Interest income/Loan receivable
This will eliminate upon consolidation in the State's consolidated financial statements.		
<i>Note the following accounting impacts have not been reflected in the journal entries above;</i>		
<ul style="list-style-type: none"> • repayments of loans granted to SOE • dividends received from SOE • external borrowings • gains/losses on derivative financial instruments. 		



15. Risk management

A project of this scale and complexity involves a number of key risks that need to be managed and/or mitigated to successfully deliver the Project on a whole of life basis.

Section 8 summarises the key risks for the State's preferred scope and tolling structure for the purpose of the business case.

This section outlines the risk management principles and the preferred risk allocation for each works package. Each of the key state retained risks, including key procurement and planning risks identified in a separate risk identification process are discussed in Section 15.6.

The following information has been redacted in this chapter:

- The State's preferred risk allocation for each package of works
- Summary of the State's assessment of risks in relation to Project interfaces with CityLink and EastLink

This information has been redacted as it is considered to be commercially sensitive and if published prior to the conclusion of the procurement process would likely to prejudice the State's ability to deliver a value for money outcome for the Project.

15.1. Overview

The preferred delivery methods for the three packages of work have, in part, been selected on the ability to achieve value for money by allocating risks to the party best able to manage them. This results in risks either being retained by the State, transferred to the private sector or shared. This section outlines the risk management principles and the risk management approach under each delivery method for the three works packages.

Having identified the preferred procurement approach for each works package, a risk identification exercise has been undertaken in relation to key state risks that will be need to be managed during the project development (post business case) and procurement phases.

The planning and procurement phase risk register is provided in Attachment Q. The construction risk register forms part of the Advisian Cost Report provided in Attachment E. These risk registers will be monitored and updated through the development and delivery of the Project.

15.2. Risk management principles

Risk management will be applied for each of the works packages in accordance with the following principles:

- Risk management will be fully integrated with broader project governance frameworks, fully embedded in management processes and consistently applied at all levels.
- A risk management plan and all related risk management guides and methodologies will include a clear context statement and be consistent with AS/NZS ISO 31000:2009 and other best practice approaches, including the

Victorian Government Risk Management Framework. The plan will detail key accountabilities (including those responsible for risk oversight and risk ownership) and provide for transparent, accurate and timely risk reporting and escalation processes.

- The risk management plan will allocate accountability for all risks identified, risk controls and risk mitigation strategies.

15.3. Western Distributor

Key features

Procured as a PPP, the Western Distributor has a number of defining features that have a significant influence on its overall risk profile:

- The Western Distributor needs to be retrofitted into an existing developed urban environment, without the benefit of any existing land reservation or any significant greenfield component along its alignment (noting that the West Gate Freeway works will largely be delivered within the existing road corridor). It has also resulted in the proposed scope solution including a significant tunnelling component (introducing associated geotechnical risks).
- It has a high capital cost, as set out in Section 12. This has a multiplying effect on a range of design and construction risks.
- Consistent with other recent major and complex road projects, the Western Distributor will include the imposition of tolls on users. While this is a source of funding, it introduces revenue risks into the overall risk profile. As an Availability PPP is proposed, the State will assume demand risk. This is a significant point of difference to other major government infrastructure projects (which are typically non-user pays), where 'demand risk' is limited to government appropriately sizing the capacity of new infrastructure.
- The interfaces between the Western Distributor (as a new toll road) and the existing privately financed toll roads on Melbourne's transport network.
- The formal planning and approval processes for the Western Distributor have not begun and further community consultation is required.

Risk allocation under preferred state-led delivery option

Table 79 outlines at a high-level the State's preferred risk allocation for the key risks of the Project.

Table 79: Preferred risk allocation for Western Distributor

Risk Category	Description	Risk allocation	
		State	Private Sector/ Contractor
Site conditions	Risks associated with: <ul style="list-style-type: none"> • physical characteristics of the land and its surroundings • tunnelling • treatment and/or removal of contamination and remediation of land • existing asset condition risk, particularly the West Gate Freeway. 		

Risk Category	Description	Risk allocation
Design and construction risks	Works are designed and constructed in accordance with the scope of works/technical requirements so that the works are fit for purpose	
Planning approvals	Obtaining and maintaining key planning approvals Obtaining additional approvals and compliance with approvals and approval conditions	
Land acquisition and access	Responsibility for provision of access (temporary and permanent) to the agreed site	
Traffic management	Responsibility for minimising disruption to the capacity and flow of traffic on the surrounding road network during construction	
Community impact risks	The risk of local community opposition to the Project, particularly in respect of impacts on Stony Creek (during and after construction)	
Interface risks	Interface risks with surrounding transport network	
Interface with CityLink		
Commercial/ Financial	Risks associated with: <ul style="list-style-type: none"> private financing compliance with State contribution requirements inflation 	
Operations and maintenance	Risks associated with: <ul style="list-style-type: none"> Carrying out the O&M activities Handover condition 	
Benefits realisation	The risk that benefits including traffic time savings are greater, less or different to anticipated	

Risk Category	Description	Risk allocation
Toll revenue uncertainty	The uncertainty as to future toll revenues from traffic flow, vehicle mix and volume being greater, less or otherwise different than anticipated	[Redacted]
Toll collection risks	Operational risks associated with the collection of tolls	

15.4. Monash Freeway Upgrade

Key features

This scope of works is broadly consistent with similar projects delivered under a D&C procurement method.

One unique risk of this scope of work is the interface with EastLink and the commercial interface relevant to the implementation of ramp metering at the Monash Freeway and EastLink interchange.

Risk allocation under preferred delivery option

Table 80 outlines at a high-level the State's preferred risk allocation for the key risks of the Monash Freeway Upgrade. This allocation reflects the preferred delivery option of D&C procurement.

Table 80: Preferred risk allocation for Monash Freeway Upgrade

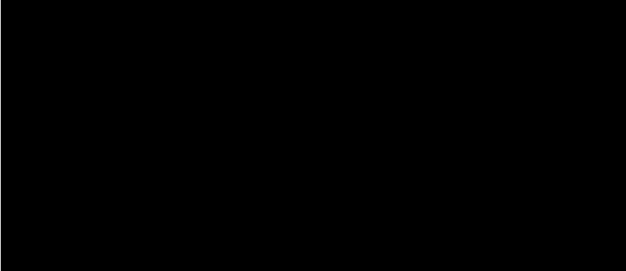
Risk Category	Description	Risk allocation	
		State	Contractor
Interface with EastLink	[Redacted]	[Redacted]	[Redacted]
Existing conditions - pavement	Existing pavement between EastLink and South Gippsland Freeway is insufficient to support additional traffic	[Redacted]	[Redacted]
Traffic Management	Traffic management or reduced speed over extended lengths frustrates motorists	[Redacted]	[Redacted]
Scope specification risks	Risk that the project scope inadequately defines the network connections and road capacity required	[Redacted]	[Redacted]
Design & Construction	Works are designed and constructed in accordance with the scope of works/technical requirements so they are fit for purpose	[Redacted]	[Redacted]
Traffic impacts during operations	Traffic flows are not as expected leading to a poor network outcome	[Redacted]	[Redacted]

15.5. Webb Dock Access Improvement Works

Key risks

The key risks associated with the Webb Dock Access Works are summarised in the table below, and separated for the VicRoads and Transurban components.

Table 81: Webb Dock Access Improvements Key Risks

Scope Element	Key Risks
<p>VicRoads Delivery</p> <p>Widening of Cook Street from Todd Road (eastbound) to the entrance to the M1.</p>	<ul style="list-style-type: none"> Existing pavement condition is worse than anticipated requiring additional works Issues with native title claims and/or crown land Traffic management impacts during construction (including road closures) are poorly received by stakeholders Delay in securing planning approval and land access.
<p>Transurban Delivery</p> <p>The remainder of the Webb Dock works, which provides a dedicated new connection to CityLink (northbound) and an upgrade to Ramp M</p>	

Risk allocation under preferred delivery option

[Redacted content]

15.6. Management of State Risks

The preferred risk allocation under delivery of each of the works packages has identified some risks that will either wholly or in part be retained by the State.

The project team has developed a risk register to identify, monitor and manage these State retained risks through the project development, procurement and delivery phases of the Project.

The project risk register will be maintained throughout the project life cycle and will change regularly as existing risks are re-graded in light of the effectiveness of the management strategy, and new risks are identified. It will form the basis for regular reporting and reviews.

A summary of the state retained risks and the proposed risk management approach for these risks is summarised in the table below. This table includes some additional risks identified that relate to the procurement phase.

Table 82: Management of state retained risks

Risk description	Risk management approach
[Redacted]	[Redacted]
[Redacted]	[Redacted]
[Redacted]	[Redacted]



Risk description	Risk management approach
[Redacted]	[Redacted]
[Redacted]	[Redacted]
[Redacted]	[Redacted]
[Redacted]	[Redacted]
[Redacted]	[Redacted]
[Redacted]	[Redacted]



Risk description	Risk management approach
[Redacted]	[Redacted]
[Redacted]	[Redacted]
[Redacted]	[Redacted]
[Redacted]	[Redacted]



This business case is primarily concerned with how the State may implement the Project in the absence of an agreement with Transurban

16. Implementation

Implementing this complex project will require a robust tender strategy, managing risk and ensuring transparency in procurement. The ongoing assessment of the Transurban Proposal presents unique considerations.

This section of the business case presents the implementation plan for the Project, including:

- Immediate next steps post business case noting the ongoing assessment of Transurban's proposal and the tasks identified for project development
- Proposed timelines, including any necessary statutory planning processes, procurement process and design and construction phase
- Tender strategy
- Project governance considerations
- Stakeholder engagement strategy
- Performance management.

The following information has been redacted in this chapter:

- The State's implementation strategy for the Project, including:
 - Proposed project development timelines
 - Tender strategy
 - Tender and planning phase timelines
 - Implementation plan for the State Owned Entity
 - Governance arrangements

This information is considered to be commercially sensitive and if published prior to the conclusion of the procurement process might prejudice the State's ability to deliver a value for money outcome for the Project.

16.1. Overview

This section considers the implementation strategy for each of the three identified packages of work:

- Western Distributor
- Monash Freeway Upgrade
- Webb Dock Access Improvement Works.

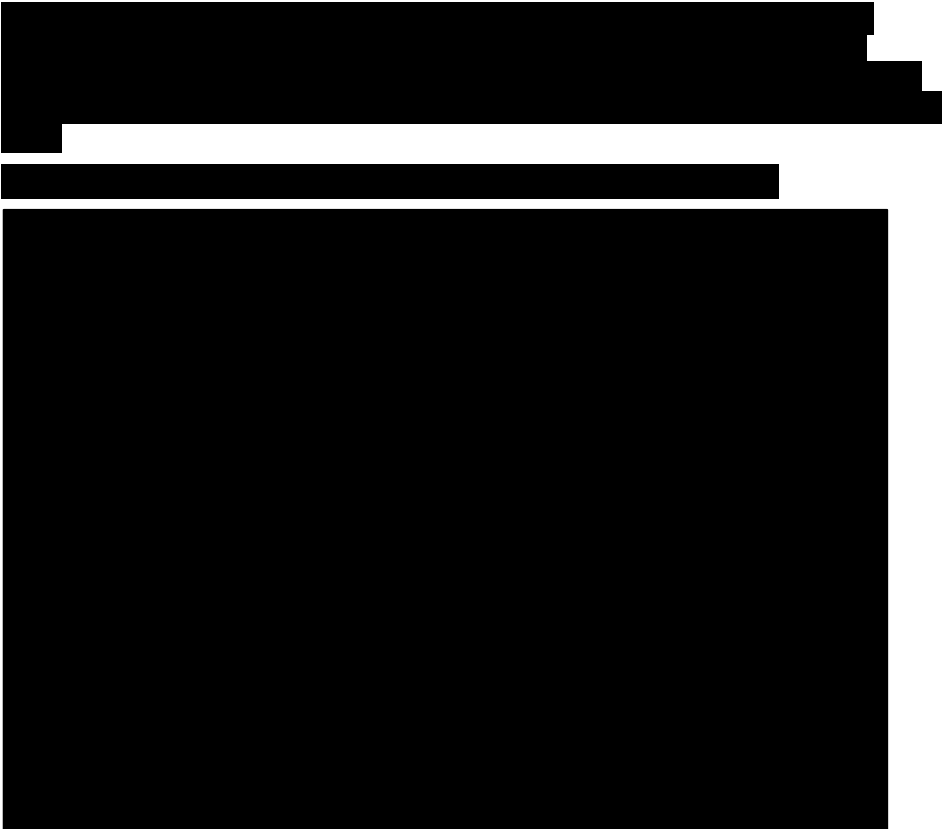
It also outlines the key requirements to forming the SOE.

The implementation strategy includes an overview of:

- Tender strategy
- Approvals
- Timelines
- Governance
- Stakeholder engagement and management
- Performance management frameworks.

16.2. Next steps post business case approval

This business case is primarily concerned with how the State may implement the Project in the absence of an agreement with Transurban, while the assessment process of the Transurban Proposal is ongoing.



Based on the above timelines, the following key tasks have been identified for the period between business case approval and the final assessment of the Transurban Proposal.

Table 83: Key next steps post business case approval

1. Transurban Market-led Proposal

Transurban will submit its revised proposal for Western Distributor to the State for assessment in mid-October 2015. This process will be led by the team that has developed the business case and undertaken the Stage 3 assessment of the Transurban Proposal to date.

It may include further interaction with Transurban through clarification questions, design workshops and commercial negotiations.

2. Western Distributor

The following tasks are expected to facilitate timely state delivery of the Project once a decision is made:

- Engagement with ratings agencies on the SOE structure and further refinement to the financing approach
- Confirm appropriate legal form of, and legislative framework for, the SOE
- Continued development of State Reference Design as part of the statutory approvals process. This may include geotechnical and groundwater investigations undertaken by the State (in addition to those undertaken by Transurban)
- Further targeted market engagement on the preferred procurement model (Economic PPP vs Availability PPP) to 'warm-up' the market should Government proceed to a public tender process
- Undertake additional traffic modelling to refine the optimal tolling structure (including toll pricing) and further understand where sensitivities may exist (in respect of network impacts, social and economic benefits and revenue generation)
- Planning and development in relation to the separate procurement of the toll collection system. This will include consideration of various toll collection options in relation to CityLink upon expiry of the current concession
- Confirm the preferred governance structure
- Consideration of the Victorian Industry Participation Policy (VIPPP), which will include consultation with the Industry Capability Network (ICN) to determine appropriate requirements for the Project.

3. Webb Dock Access Improvements

- VicRoads to finalise detailed design and undertake tender process for the Cook Street works
- Transurban to submit a variation proposal to the State to undertake the Ramp M works as part of the CTW Project

4. Monash Freeway Upgrade

- Review and finalise the scope of works, including consideration of an expanded scope of operating and maintenance activities
- Undertake further analysis of the procurement approach (in response to any proposed changes in scope)
- Undertake design development and pre-construction works including tender planning and preparation
- Start engagement with ConnectEast on the interface works with EastLink, particularly the ramp metering works proposed at the Monash/EastLink interchange.

Assuming the State elects to proceed under the state delivery option, the remainder of this section sets out the proposed implementation strategy, including:

- **Western Distributor** – procurement via Availability PPP through a public tender process
- **Monash Freeway Upgrade** – D&C procurement
- **Webb Dock Access Improvement Works:**
 - Cook Street Widening (Construct only procurement led by VicRoads)
 - Ramp M Works (Variation to the CTW Project).

16.3. Western Distributor Works

This section sets out how the Western Distributor would be delivered as an Availability⁴⁰ PPP through an open tender process.

16.3.1. Tender strategy

The tender process is expected to accord with the Partnerships Victoria framework (generally adopting the standard tender process outlined in the figure below).

Figure 112: Standard tender process



⁴⁰ While this section focuses on a state delivery option based on an Availability PPP, alternate forms of procurement (such as an economic PPP) could be implemented if the State considers that these will provide a beneficial project outcome.

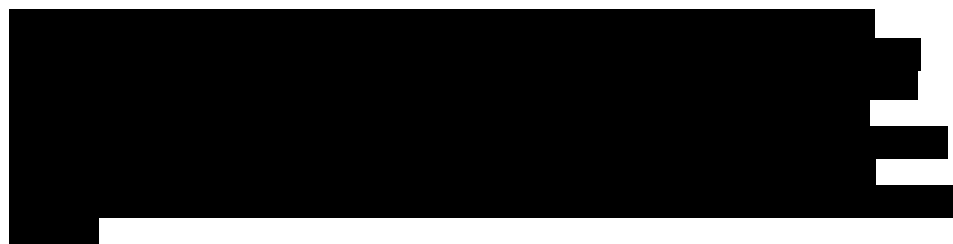
Assessment under the Planning and Environment Act 1987 (P&E Act) by way of a planning scheme amendment (without an EES) was considered and rejected given the range and complexity of potential issues associated with the Project.

Both the EES and CIS processes provide comprehensive approval pathways.

Based on a comparison between the two pathways, the EES process is preferred for reasons which include:

- The EES better accommodates the proposed approach of concurrent procurement and planning approval processes
- The EES process is a well-established and more widely understood process than the CIS process and one which has been successfully applied to many State and private sector development and infrastructure projects
- An EES is more flexible than the CIS assessment process as it separates the assessment of the environmental effects of a project from the grant of key approvals for the project which occurs subsequent to the Minister's assessment
- Has arguably less risk of legal challenge to the subsequent approval decisions by statutory authorities following an EES assessment process than the Minister's approval decision under the MTPF Act following a CIS assessment process
- There is greater potential for the project's design to be developed concurrently with an EES, than a CIS
- There are additional documentation requirements in the preparation of a CIS over an EES which requires greater resources during the initial phase, and
- While not expected, if the Project was a controlled action under the Commonwealth's Environment Protection and Biodiversity Conservation Act 1999, the EES assessment process would not require the preparation and exhibition of a revised EES (which is required under a CIS process and which may add two to three months to the assessment and approval program).

16.3.3. Timelines





[Redacted text block]

16.4. Monash Freeway Upgrade

As identified in Section 13.2, the Monash Freeway Upgrade will be delivered through a traditional design and construct (D&C) procurement.

[Redacted text block]

16.4.1. Approvals

Based on initial assessments, no planning permission is considered necessary. The works are to be constructed entirely within the existing freeway reserve, previously cleared of native vegetation and with no potential for significant environmental effects.

16.5. Webb Dock Access Improvement Works

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]	[Redacted]
[Redacted]	[Redacted]
[Redacted]	[Redacted]
[Redacted]	[Redacted]

[Redacted]
[Redacted]
[Redacted]
[Redacted]

[Redacted]

[Redacted]

[Redacted]



[REDACTED]

[REDACTED]

16.6. State owned entity

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] a new tolled road) to be implemented without further additional legislation.

[REDACTED]

16.8. Stakeholder engagement strategy

16.8.1. Overview

Public participation in the planning and delivery of large scale infrastructure projects helps achieve high quality outcomes and builds community support. A communications and engagement strategy is being implemented to raise awareness of the Project and guide engagement with stakeholders to build trust, gather information about community values and encourage public participation in its development. A copy of the strategy is provided in Attachment U.

The stakeholder engagement strategy is based on the following principles:

- **Open communication** – actively seeking diverse opinions and perspectives to broaden understanding of views and assist our decisions
- **Transparency** – sharing information broadly and establishing and maintaining agreed channels for communication and feedback
- **Collaboration** – working to seek mutually beneficial outcomes where feasible
- **Inclusion** – seeking to identify and involve stakeholders in planning and decisions.

16.8.2. Key Stakeholders

The Project will attract interest from a broad cross-section of the Victorian community, particularly people who live, work, own land and travel through the project corridors. Stakeholders with an interest in transport and freight movement, as well as those which play an advocacy role for the development of Melbourne will also have an interest. This strategy is designed to target these stakeholders:

- State Government, including:
 - Project steering committee representatives including DTF, DEDJTR, DELWP, VicRoads, PTV and DPC
 - Other agencies including EPA Victoria, Parks Victoria, Yarra Trams, Metro, Melbourne Water, Heritage Victoria, Port of Melbourne Corporation, emergency services organisations, utilities.
- Federal Government
- Local Government
- Private road operators
- Financiers
- Port of Melbourne precinct
- Directly/potentially impacted landowners
- Business owners
- Road users
- Community facilities
- Transport advocacy stakeholders
- Interest groups
- Heritage stakeholders
- Social service providers
- Culturally and linguistically diverse communities
- Disadvantaged groups
- Media

16.8.3. Engagement Approach

The communications and engagement strategy proposes the following phases as summarised in the table below.

Phase 1 Early Engagement	<p>Key objective:</p> <ul style="list-style-type: none">• <i>Explain the problem</i>• <i>Explain the project planning and development process</i> <p>Purpose:</p> <p>Hold high level discussion with stakeholders and the community about the transport problems facing Melbourne and how the Project can help address these, including its opportunities and challenges.</p> <p>Once formal planning starts, the focus will be on establishing Government relationships with community and stakeholders to explain the project planning, development and procurement processes.</p> <p>Key engagement tools:</p> <ul style="list-style-type: none">• Establish Community Reference Group• Online engagement forums• Engage with landowners to confirm high level feedback from Transurban and capture any additional issues for consideration
Phase 2 Concept Project	<p>Key objective:</p> <ul style="list-style-type: none">• <i>Seek stakeholder views on the concept including opportunities for refinement and ensuring impacted stakeholders are informed</i> <p>Purpose:</p> <p>Seek feedback on any issues or concerns that need to be considered by the project team in relation to the reference design. This will be a more detailed design than the high level proposals the community has seen to date.</p> <p>Key engagement tools:</p> <ul style="list-style-type: none">• Hold community workshops and information sessions• Online and social media engagement• Distribute project newsletter• Formal feedback period to receive written submissions• One-on-one engagement and support with landowners
Phase 3 Submission	<p>Key objectives:</p> <ul style="list-style-type: none">• <i>Support the engagement process as part of the statutory planning process</i>• <i>Generate public awareness about the project benefits and outcomes</i>• <i>Ensure that stakeholders are kept informed about the project development in a timely manner</i>

Phase 4 - procurement

Purpose:

Present the findings of the planning studies to the community and encourage participation in the formal statutory planning approval process e.g. making a submission.

Key engagement tools:

- Public displays
- Project newsletter
- Online engagement
- Establishment of independent planning panel to review submissions and to host a public hearing for submitters to present their views.

Key objectives:

- ***Raise awareness and generate support for the Project and ensure stakeholders are kept informed about the development in a timely manner***

Purpose:

Should the project move into procurement, this phase would aim to maintain a high level of community support for the project and its benefits, explain the potential procurement model, maintain advocacy from key stakeholders, ensure directly impacted landowners are supported during the acquisition process, and provide regular information updates to reduce any concern or uncertainty in the project corridor.

Communications would be undertaken to announce and explain the winning tender and its features, and engage with stakeholders about any variations to the concept project.

Key engagement tools:

- One-on-one engagement and support with landowners
- Community information sessions.

16.9. Performance management

As noted in Section 4, a set of preliminary KPIs have been developed to assess the performance of the Project, and the associated benefits. Ultimately, a performance management plan will be developed. The measures adopted will depend on the physical scope and the toll pricing solution adopted by the Government and the preferred procurement approach selected. At this stage, the performance section seeks to identify the general nature of KPIs and the measures to be achieved. More specific targets, and the responsibility for achieving them, can only be developed once the final project scope, tolling structure and delivery method have been determined.



Attachment A	Investment Logic Map
Attachment B	Summary of Transurban's March 2015 Proposal
Attachment C	Reference List
Attachment D	Technical Options Report
Attachment E	Costing Report
Attachment F	Tolling Options Report
Attachment G	Tolling Cost Report
Attachment H	Network Impact Assessment
Attachment I	Freight Impact Assessment
Attachment J	Economic Assessment Report
Attachment K	Social Impact Assessment Report
Attachment L	Environmental Impact Assessment Report
Attachment M	Land Use Report
Attachment N	Delivery Options Report
Attachment O	Financial Analysis Report
Attachment P	Accounting Treatment Paper
Attachment Q	Planning and Procurement Risk Register
Attachment R	Public Interest Test
Attachment S	Planning Approval Pathways Report
Attachment T	Governance Model Options
Attachment U	Proposed Communications and Stakeholder Engagement Strategy