Western Distributor Project Tolling Structure

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1. Introduction

This document sets out the approach taken to develop a tolling structure for the Western Distributor Project (the Project) and the various toll pricing alternatives considered.

The analysis presented in this document identifies a toll pricing structure that is reasonable based on the State's Base Case and on the current pricing regimes on Melbourne's existing toll roads.

2. Tolling Principles

The States tolling principles provide the assessment framework for evaluating various tolling options for the Project. These principles have been developed to help guide the development of tolling options that appropriately balance collecting toll revenues in conjunction will delivering superior road network management outcomes for the State.

The tolling principles are:

- Improve transport outcomes by optimising asset utilisation and managing traffic flows across the transport network; and
- 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 improvements.

3. Approach to forecasting toll revenues

3.1 Overview

The process of estimating the potential toll revenue from the project includes the following steps:

- Using a traffic model to forecast average daily traffic volumes across Melbourne's transport network at future points in time, given a range of defined inputs;
- 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; and
- Estimating the traffic growth profile over the Project life for that toll price in order to forecast whole of life revenues.

Further detail on each of these steps is outlined below.

3.2 Traffic modelling background

Transport models are complex mathematical models that use derived relationships between a range of inputs to generate predicted patronage levels on transport networks given a set of assumed future conditions.

Overall travel demand is then assigned to various alternative transport links based on their location/connections, relative cost, volume carrying characteristics and desirability. In this process the cost of the toll for a given link is considered against the various cost savings it might provide, such as travel time or vehicle operating costs. The result is a forecast of the travel demand for private vehicle, public transport and light and heavy commercial vehicle usage.

As part of the business case development, Veitch Lister Consulting (VLC), a major Australian transport modelling company, was engaged to develop a transport model to forecast the transport network impacts, traffic volumes and revenue potential.

VLC's 'Zenith' four-step model has been proven in the area of toll road forecasting both in Victoria and other Australian states. It was used by the Victorian Government in the planning and delivery of Melbourne's existing toll roads (CityLink and EastLink) and for many other Victorian Government projects.

Toll pricing on Melbourne's toll roads is structure around four vehicle classes:

- Cars;
- Light Commercial Vehicles;
- Heavy Commercial Vehicles; and
- Motorcycles.

The traffic modelling undertaken does not account for motorcycles and it is expected that the benefits / revenue accrued from this class on a project of this scale would be negligible.

3.3 Traffic modelling assumptions

The transport model used for the business case relies on a number of significant forecasting assumptions, including:

- 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 some large scale, unfunded network augmentations.
- Transport cost growth forecasts for both public and private transport modes, as developed by DEDJTR.

These have been discussed and agreed across all relevant Victorian Government departments and agencies, including DEDJTR, VicRoads and DTF.

3.4 The impact of tolling

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 conjunction with the monetary value of the toll.

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.

On most inner urban toll facilities, maximising the revenue can be obtained through high toll prices as the network is congested, particularly in the peak periods, and therefore the value of time savings offered by the toll road are high.

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 for the Project.

3.5 Annualisation factors

The traffic model produces forecast traffic volumes for a typical week day, exclusive of public and school holidays. In order to convert these daily projected volumes into yearly volumes annualisation factors are applied.

The annualisation factors used for the purposes of the revenue calculation for business case have been determined from analysing historic trends for roads of a similar nature and use, such as CityLink and EastLink. The assumed factors are documented in the Table 1 below.

Table 1 Annualisation Factors

Vehicle Class	2021	2031
Car	[redacted]	[redacted]
LCV	[redacted]	[redacted]
HCV	[redacted]	[redacted]
All Vehicles	[redacted]	[redacted]

Additional annualisation factors may be required when considering alternate tolling structures, such as tolls which might only be applied on weekdays. These would also need to take into consideration the reduction in traffic volumes due to public holidays. As such, the assumed factor for a weekday only toll would be [redacted] for Cars and LCV's.

3.6 Ramp up period

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 / or the relative value the new road offers.

Developing an appropriate profile for traffic volume growth on the Project during the ramp up period is relevant to the forecasting of revenue in the early years of operations.

Ramp up is often very difficult to predict as it varies depending on the savings the road may provide, who is likely to use it 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 (CityLink and EastLink) and Australia have been reviewed to understand their trends and the application of those trends to the Project.

Table 2 reflects an average of existing toll road ramp-up behaviour in Melbourne, and is proposed for the Western Distributor tunnels. Ramp-up occurs over a 2 year period, with most of the growth in the first 12 months.

Table 2 Project ramp up period – Western Distributor Tunnel and Viaduct

Month after opening	% of steady state volume	Month after opening	% of steady state volume
[redacted]			

Table 3 shows the recommended ramp-up for the West Gate Freeway HCV traffic. The profile follows the ramp-up profile for the Tullamarine Freeway section of CityLink. The CityLink project widened the Tullamarine Freeway and applied a toll which is similar to the proposed treatment of this section of the West Gate Freeway.

Table 3 Project ramp up period – West Gate Freeway for HCVs

Month after opening	% of steady state volume	Month after opening	% of steady state volume
[redacted]			

4. Project tolling structure

4.1 Overview

The Project tolling structure has been developed based on the tolling principles in Section 2. Considering these, therecommended toll price for modelling has examined the current and projected tolls on the network.

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.

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

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 in subsequent stages of the Project development. This further refinement post Business Case will look to recommend an optimised toll price structure which ensures that the forecast economic benefits are not eroded.

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.

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

The following sections provide details on how the tolling structure was developed and the tolling options that have been considered.

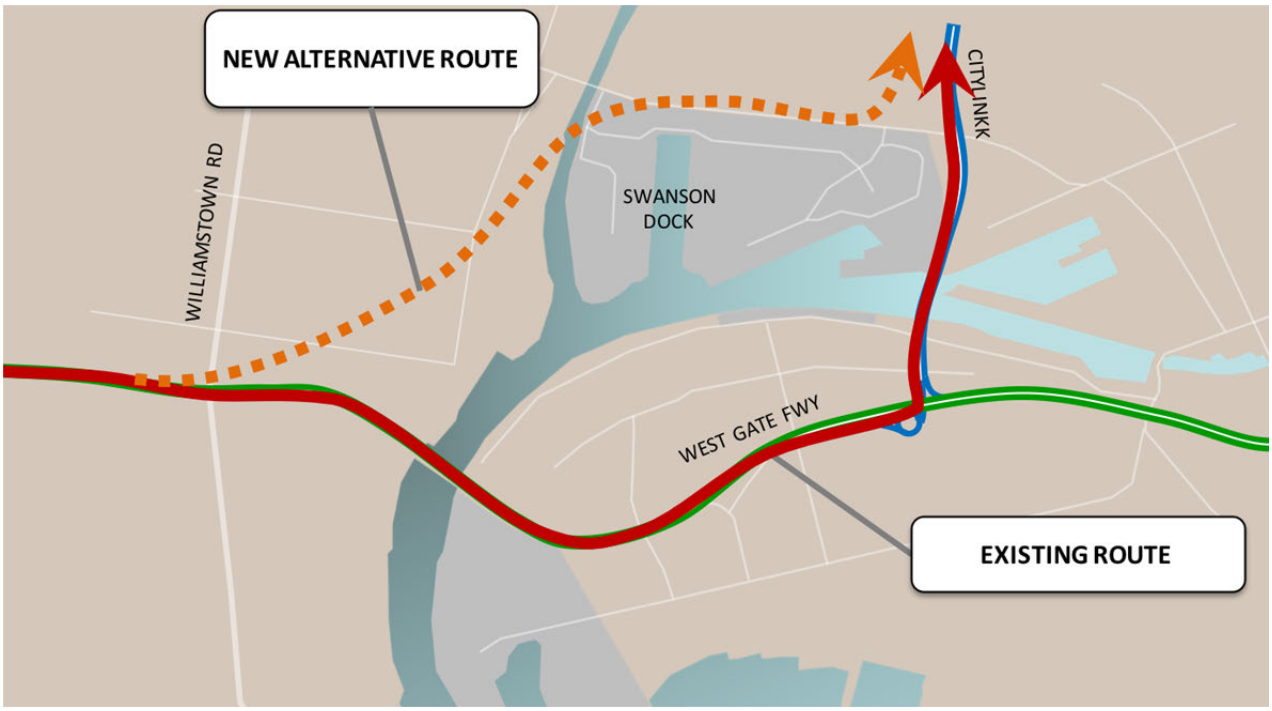
4.2 Tolling balance on network

The proposed tolling structure takes into consideration the toll rates on adjacent roads in order to provide 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 tolled alternatives to develop the appropriate pricing structure to avoid potential redistribution onto alternate routes and the subsequent unbalanced network outcomes.

As shown in Figure 1 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 is not harmonised with the prices on the Bolte Bridge, there is potential for unbalanced flows on the network and under/over utilised assets.

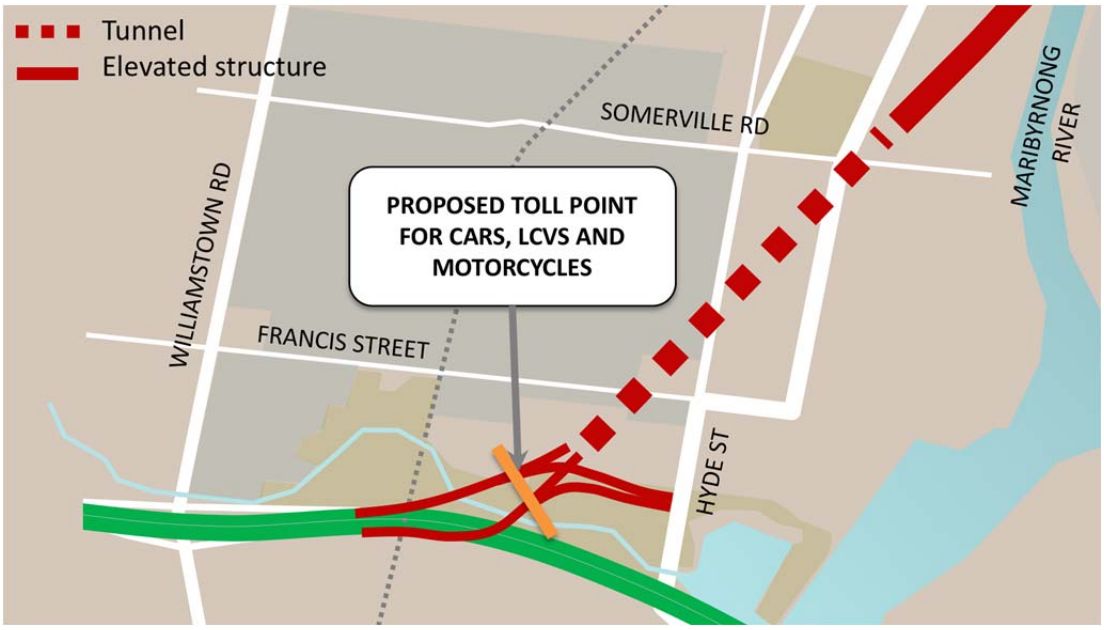
To avoid the potential for this issue to materialise, the toll price for use of the Western Distributor tunnel has been initially set at a similar price as the Bolte Bridge for Cars and Light Commercial Vehicles (LCV). That is $2.77 for cars and $4.43 for LCVs (June 2015 prices).

Figure 1 Aligning toll prices through inner west



The toll gantry for this toll would be located prior to the tunnel and Hyde Street ramps exit/entry as shown in Figure 2. This would effectively charge the same price for use of the tunnel as the use of the Hyde Street ramps. This would limit the likelihood for vehicles to use Hyde Street to rat-run through local roads in the inner west to avoid the tolled tunnel.

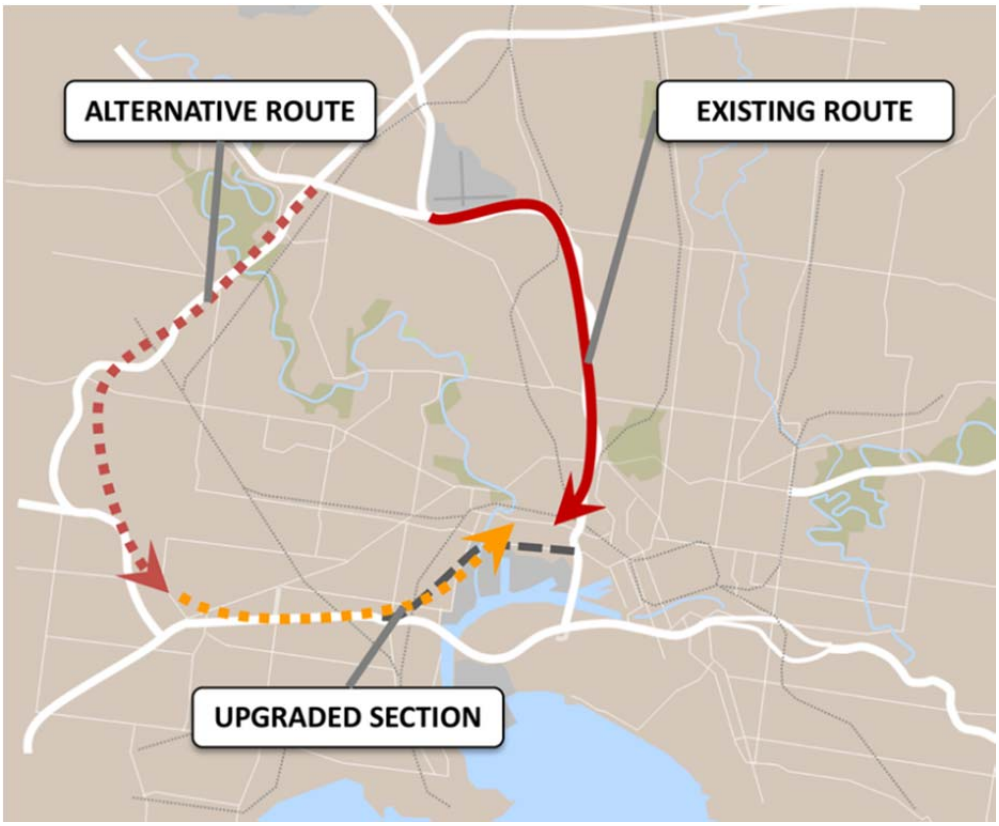
Figure 2 Tunnel toll point location



Currently Heavy Commercial Vehicles (HCV) 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 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 HCV's using the upgraded section of the West Gate Freeway will be tolled.

In developing the toll rate for HCV's along the West Gate Freeway, consideration has been given to the toll rate on the adjacent Western Link and maintaining a balance between the two routes as indicated in Figure 3. The assessment includes the change in HCV toll multipliers along Western Link due to the CityLink Tullamarine Widening (CTW) project.

Figure 3 Aligning toll prices across network



The toll rate for vehicles travelling to Footscray Road from the Tullamarine Freeway along an upgraded Western Link will be $13.26 (at June 2015 prices) with the CTW agreed HCV multiplier of 3. For the purposes of the Western Distributor Business Case, a similar toll rate will be applied to HCVs travelling to Footscray Road via an upgraded West Gate Freeway and Project tunnel. This is assumed to be $13.30 for simplicity.

The toll gantry for this toll woild be located in between Millers Road and Williamstown Road so as not to encourage HCVs to avoid the toll to access the Port and therefore still use the local road network.

Further modelling and toll revenue optimisation work could be undertaken to determine a different toll price for both of these tolling locations that further considers the user's willingness to pay. It is likely that in this situation the toll prices would increase to reach an optimum toll level before the loss of traffic, diverted away due the high price, outweighs the increased toll revenue. Given the high level of demand on CityLink today, it could be expected that this revenue optimising toll price could be quite high.

This type of toll price determination has not been undertaken for this project. The state is considering this project with the aim of appropriately balancing 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.

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 in subsequent stages of the Project development. This will look to recommend an optimised toll price structure which ensures that the forecast economic benefits are not eroded.

4.3 Tolling considerations

The tolling analysis undertaken here provides an indication of what a reasonable tolling structure might deliver, with the final selection of a preferred toll pricing regime likely to be completed in conjunction with the Project's tender process.

The contractual mechanisms governing tolling will need to retain the flexibility to accommodate the Government's broader road pricing agenda as it may develop over time.

In investigating possible toll structures for the Project, and determining a base case tolling structure for the purposes of business case analysis, the impacts of a number of key factors on project objectives and toll revenue generation have been analysed. These include:

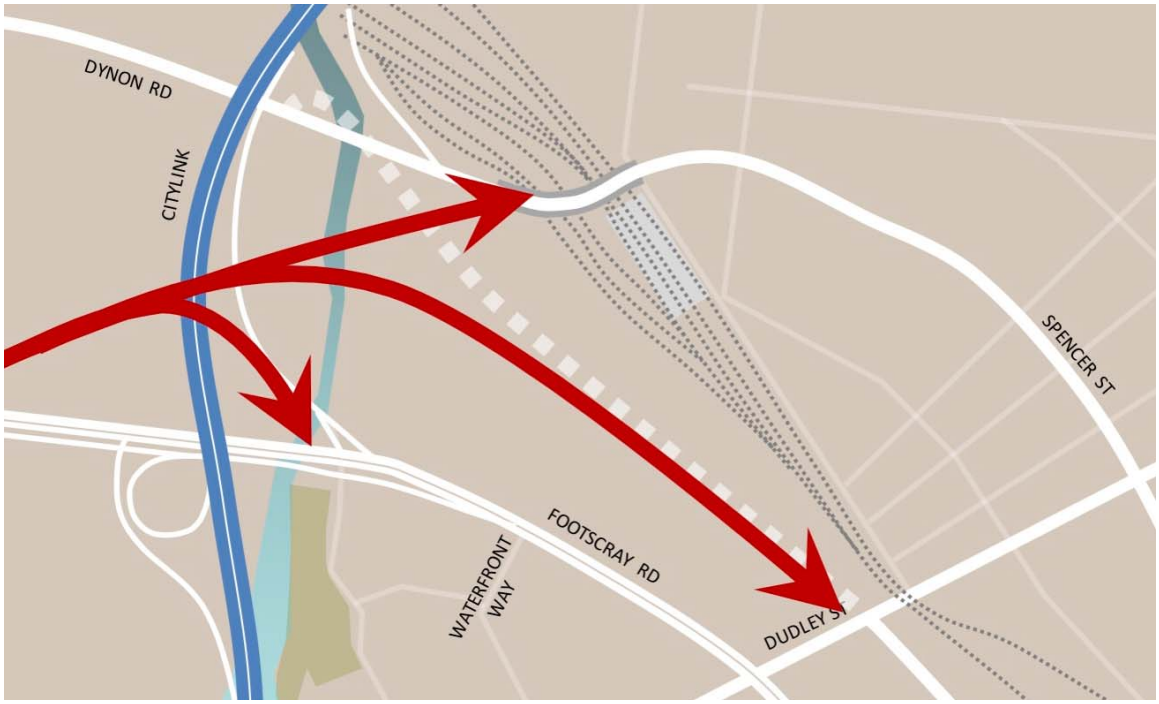
- An inner urban access toll;
- A Port shuttle (HCV only) discount;
- Sectional tolls on the West Gate Freeway for HCVs;
- A new toll class for High Productivity Freight Vehicles (HPFVs);
- A unified toll cap for multiple toll road use; and
- Time of day tolling.

Alternative toll pricing scenarios were developed to inform the Government about the potential revenue that might be derived from the Project, as well as to understand the impacts on the adjacent transport networks.

4.3.1 Inner urban access

The Project will provide for a high quality connection from the western suburbs of Melbourne to key arterial roads at the edge of the city through three dedicated inner urban access ramps (Footscray Road, Dynon Road and Wurundjeri Way) as indicated in Figure 4 below.

Figure 4 Proposed inner urban access



The City of Melbourne's *Inner Melbourne Action Plan* (2005) identifies the impacts of congestion as increasing the cost for inner Melbourne businesses and residents, and identifies a number of strategies to modify travel behaviour to decrease the reliance on private vehicles. These include encouraging alternatives to car travel and using pricing mechanisms to manage non-residential parking, both of which attempt reduce private car travel to the city. This is important to consider with any project which will improve access to the city.

The inner urban access ramps for the Project have been configured to provide access to key destinations around the City rather than require these trips to pass through the CBD itself. However, in consideration of the high quality of the access, the need to manage vehicle demand for inner urban access and the desire to balance traffic flows across the network, a higher toll price for inner urban access has been considered.

Melbourne currently has a inner urban access toll for vehicles accessing the CBD via the Exhibition Street Extension of CityLink. The toll that is charged to access the CBD from the Monash Freeway is similar to the toll charged to travel through the tunnels to access the West Gate Freeway (from CityLink), highlighting the 'premium' that City bound drivers pay to use a high quality direct connection.

Other locations where inner urban access tolling is used is the Sydney Harbour Bridge and Harbour Tunnel. These two locations only toll southbound traffic heading into the Sydney CBD. They also apply time based tolling, where tolls are higher in the peak periods to manage congestion and encourage motorists to travel outside of the peak periods where possible.

In applying any tolling structure to the Project inner urban access, 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:

- If the increased toll were to be applied throughout the day (in either direction) it would have the potential to limit use of the project (other than during the peak period, other roads are less congested and hence the Project is less attractive as a tolled option during the off peak and inter-peak), reducing asset utilisation and therefore reducing the

economic value for the project. Initial traffic modelling supports this view, that travel time savings benefits would be significantly reduced.

- If the increased toll is applied during the PM peak outbound where demand is high, it would have the potential to divert trapped vehicles originating in the City to other more congested City roads thereby limiting any significant benefits of the improved access. However, providing the high quality inner urban access without the additional toll price in the PM peak would have the benefit of assisting to flush vehicles out of the City during the afternoon thereby reducing the congested PM peak.
- If the increased toll price were only applied inbound during the AM peak it would have the potential to influence travel mode choices and limit demand for car access to the City. 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.

Due to the considerations outlined above, it was assumed that at this stage of the project the most suitable tolling structure was to apply a higher toll price for inner urban access inbound during the AM weekday peak. While the commentary provided above indicates concerns if this were to be applied to the PM peak outbound, there may be merit in investigating this option further in future stages of the project.

The determination of the actual price for the inner urban access should consider the value offered by the high quality access as well as the equity of travel across the network.

A similar travel for a car 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).

The estimated travel time savings for this project to access the City from the west during peak periods varies from an average of around 12 minutes to 20 minutes, depending on the departure time during the peak and the daily conditions. If the similar price of $7.20 were to be applied it would result in a price ranging between $0.60 per minute saving to around $0.36 per minute saving. These are reasonable rates for a trip as important as inner urban access during the weekday morning peak and are similar to other toll roads in Australia.

For consistency and equity of toll prices across the network, the same price has been assumed to be applied to the inner urban access ramps. That is $4.43 car toll for the ramps as the Western Distributor tunnel itself would be set at $2.77, bringing the total price of the journey to $7.20 (June 2015 prices). However, as noted above, to optimise benefits of the project to the community, this toll would only be applied inbound during the weekday AM peak period.

[redacted]

If the project is to proceed beyond the business case, further tolling development would need to consider the issues around the specific times that this price would be implemented, how drivers were to be notified of the price change during the day and the issue of drivers being impacted at the time when the prices changes. More detailed traffic, revenue and economic analysis should be undertaken to refine the toll price or give greater validity to its value.

The Project should protect the potential to apply an inner urban access toll to the PM peak direction outbound, once this further analysis has been undertaken.

The location for the inner urban access toll gantry would be to ensure that all trips using these multiple exit ramps are tolled.

4.3.2 Port shuttle (HCV only) discount

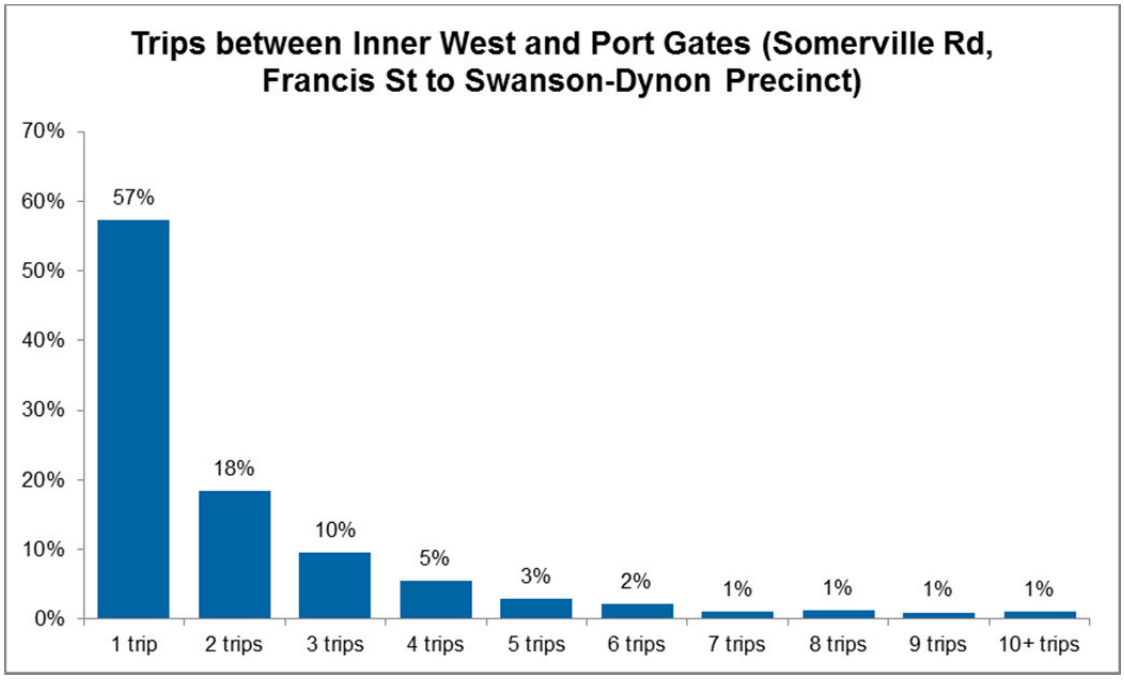
A key objective of the Project is to take truck traffic off local streets in the inner west. A key element of that truck traffic are those trucks that undertake multiple trips each day between the Port and the container yards in the west of Melbourne. These trucks, referred to as Port shuttles, are likely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

Due to the multiple trip nature of these vehicles, and hence multiple tolls, the daily cost for these trucks could be very high. For example, a truck making 6 trips per day would be tolled almost $80 a day. This toll would either have an overall impact on the cost of freight and be passed onto the client or consumer, or the high daily cost would be a disincentive for these trucks to use the project and thereby limit the reduction of truck traffic in the inner west. Either way, if the truck pricing is too high it creates the risk of reducing the freight competitiveness of Melbourne.

Truck surveys undertaken over a 24 hour period as part of the *Port of Melbourne Orign/Destination Study* (2012), 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 have potential 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.

The chart in Figure 5 below shows the number of vehicles making multiple trips between the inner west and the Port in a 24 hour period. This chart shows that 43% of vehicles make two or more trips per day, with the maximum number of 15 trips made by a single vehicle in a 24 hour period when accessing the Port via Francis Street or Somerville Road.

Figure 5 Port shuttle movements



To assist in reducing the cost of movement of freight, it is proposed to implement a reduced toll price structure for HCVs undertaking shuttle movements. This will limit the daily toll cost for a multi-trip HCV and would assist in removing these vehicles from the arterial road network.

This has been considered to be implemented with a sliding scale or graduated toll rate for shuttle movements. These vehicles would still be tolled for each movement that they make, however it would be discounted depending on the number of trips that they make throughout the day. The sliding scale could be setup as follows for a 24 hour period:

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

With the above reduced toll price structure for Port shuttle HCV trips, the toll avoidance from the Project would be reduced, increasing the ability to reduce truck traffic on local and arterial roads in the inner west.

[redacted]

It is recommended that a Port shuttle discount be applied to the Western Distributor project.

4.3.3 HCV Sectional Tolls on the West Gate Freeway

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.

There are essentially three sections as part of the upgraded West Gate Freeway in this area:

1. M80 to Grieve Parade;
2. Grieve Parade to Millers Road; and
3. Millers Road to Williamstown Road.

There is also the section of the West Gate Freeway from Williamstown Road to the West Gate Bridge but this has not been considered further for a tolling point as there would be some users of this section who enter from Williamstown Road and travel over the Bridge which would not gain a benefit from this project.

The first section provides no value as a sectional tolling point. Grieve Parade only has east facing ramps and therefore only travel to from the east of this location should be tolled a differential price. Those users on the freeway to the west of Grieve Parade will either travel through the next section or have come from the next section, thereby provided no real sectional price value.

Only sections 2 and 3 are appropriate for sectional tolling prices. 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. Therefore, the HCV toll price could be allocated as:

- Grieve Parade to Millers Road - $5.30
- Millers Road to Williamstown Road - $8.00

The total trip from Grieve Parade to Williamstown Road would still equate to $13.30 (June 2015 dollars).

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

freeway at Millers Road, rather than Williamstown Road to avoid the $13.30 toll, as the toll for this section is lower.

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 while it 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 the stages of project development.

4.3.4 A new class for HPFVs

Commercial vehicle multipliers, where the toll price charged for a commercial vehicle is higher than the toll price for a car, are common practice on most toll roads around the world. Melbourne's two existing toll roads have a differential toll base related to four vehicle classes: cars, light commercial vehicles (LCVs), heavy commercial vehicles (HCVs) and motorcycles.

The general industry practice adopted across Victoria and interstate is to charge multipliers for trucks on the following basis:

- LCVs are charged 1.6 times the unit price for a car; and
- HCVs are charged 3 times the unit price for a car.

While the HCV multiplier is less consistent (EastLink in Melbourne and most Brisbane toll roads use a 2.65 multiplier for HCVs), many roads are moving to the three times multiplier. In 2017 three more Sydney toll roads (with either full or partial ownership from Transurban) will be increasing the HCV multiplier from various bases to 3.

These differential tolls are typically applied for the following reasons:

- To 'compensate' for higher wear and tear on the infrastructure including pavement and structural elements, and the operational aspects of operating tunnels;
- Commercial vehicles are physically larger than cars and therefore occupy a greater proportion of the capacity of the road; and
- Commercial vehicles typically have higher operating costs (fuel, maintenance and so on) and due to the commercial value of their travel, they attach higher value to travel time savings. Therefore, the higher toll is to reflect the relative benefit of the different vehicle classes.

Higher Productivity Freight Vehicles (HPFV), such as super B-doubles or B-triples, have the ability 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 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.

HPFVs also benefit Melbourne's road network by reducing the number of trucks required to transport the same volume of product leading to improved road safety outcomes. This is further benefited by HPFVs safer on-road performance in comparison with standard vehicle combinations (source: VicRoads: *Moving More with Less*).

VicRoads defines a HPFV as a vehicle:

- of 26m or greater in length; or
- one that can carry 68.5 tonnes or greater.

An intention of recent State Government policy has been to encourage more use of HPFVs and to do this by facilitating improved and broader access by HPFVs to the network, including during night-time off-peak periods. Further, the policy also seeks to allow access for increasingly heavier HPFVs over time.

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. Implementation of differential tolls should be straight forward and not present a barrier to the take up of larger trucks.

To determine the multiplier to be applied to this additional class, consideration should be given to the logistics costs of running HPFVs. These costs should further consider operational efficiencies such as running with full or empty loads and the need to incentivise the industry to move towards higher adoption rates for these vehicles. To fully consider these issues is an extensive undertaking and one which has not been possible in the time frames to date.

Data from 2012, which was collected as part of the Port of Melbourne Truck Origin-Destination Surveys (2013) provides an indication of the utilisation/efficiency of these vehicles. The data supports that HPFVs accessing the Port are typically twice as effective as the remainder of the HCV fleet, carrying on average slightly more than two TEU's per truck while the HCVs carry slightly more than one on average. Given these values then a 100% increase in the multiplier from HCV to HPFV would appear justified, 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, they 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.

Recent research which examined likely travel time savings for a range of freight classes when using toll roads and compared these with detailed operating and driver costs has suggested that a multiplier of between approximately 3.0 and 4.5 would be appropriate for the HPFV class. A toll multiplier within or below this range would represent a net financial benefit or break-even for HPFV operators. If the toll multiplier were to be set beyond this range, it would likely result in HPFV operators exceeding the savings in vehicle operating costs and driver costs that are gained by utilising a tolled freeway in preference to a non-freeway route. Consequently, HPFV operators would seek to pass on some or all of the additional toll to their customers. Where additional costs cannot be borne by customers this may ultimately impact the viability of industries.

Given the above considerations, the project has assumed a multiplier of 4.5 to be applied to the HPFV class for the purposes of this business case, a 50% increase of the HCV rate. Over time, as the carrying capacity of HPFVs increase (as supported by State 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.

To apply the 4.5 multiplier to the Western Distributor project for the HPFV class it needs to consider the HCV class price. The West Gate Freeway HCV price has been set considering the balanced objectives of the network, rather than applying a 3 times multiplier to the car toll. Since it is not proposed to toll cars in this section it is not possible to undertake that calculation. However, assuming that the $13.30 toll for HCVs is approximately equivalent to the 3 times multiplier, then the price for this new HPFV class would be around $20.00 (i.e. 4.5 times multiplier).

In 2012 approximately 350 HPFVs were recorded entering the Swanson precinct at the Port of Melbourne, which represents approximately 4% of all trucks entering Swanson Dock. As the Port approaches capacity, it has been estimated that the volume of HPFVs could increase to 4,100 trucks, with approximately 75% (3,100 HPFVs) travelling via the West Gate Freeway (and most likely the Western Distributor) and 25% (1,000 HPFVs) continuing to loop between the Dynon Rail,

Swanson Dock and Webb Dock precincts. [redacted]

This higher class toll would also be applied to those HPFVs on the West Gate Freeway not accessing the Port via the Western Distributor, however those numbers are not available at this stage.

It may be difficult to capture a HPFV using traditional roadside tolling systems such as vehicle registration or video cameras as these might not be able to accurately identify the length or the weight of vehicles. New systems may need to be implemented to be able to toll the fifth class of vehicles.

One such technology could be the application of the Intelligent Access Program (IAP). IAP is a national program whereby heavy vehicle operators agree to remote tracking of the movement and location of their vehicles. This ensures they are complying with agreed operating conditions, in return for access or less restrictive access to the road network.

It is understood that if IAP applies to all HPFVs, this presents a potential opportunity to expand the system to apply for toll capture on the basis of vehicle mass. This would enable future flexibility to toll at increasing increments on the basis of larger vehicle mass.

4.3.5 Unified Toll cap

The concept of a unified toll cap is intended to limit toll fatigue where users of the network are charged multiple tolls for use of multiple toll roads (in a single trip).

The likelihood of reaching any unified toll cap for cars or LCV's 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. To make a full trip on Western Link is $7.19 for a car. A full trip on Southern Link is also $7.19. The current car based toll cap is $8.31. Only when a vehicle travels on both sections would they reach the toll cap.

With the introduction of the Western Distributor, the car and LCV toll for using the new tunnel is intended to match that of the Bolte Bridge toll. Therefore, a car or LCV using the WGF then the Project onto CityLink's western link will not reach the current toll cap on CityLink. This trip would only cap-out if it exited the Western Distributor onto Footscray Rd, then travelled around via Wurundjeri Way to re-join the freeway network at Montague or Kingsway to continue on CityLink's Southern Link. An unlikely trip and one which should not be encourage through a 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. The maximum toll for a HCV using one section of CityLink (e.g., Western Link or Southern Link) will be $21.57 (using a 3 multiplier assumed for CTW on existing June 2015 toll prices) which would cap-out at $24.93 if using both sections of CityLink or part thereof. With the introduction of a $13.30 HCV toll for the West Gate Freeway, HCVs using both the West Gate Freeway and the Southern Link of CityLink would incur a toll price $34.87, absent a "unified toll cap".

It is estimated that around 50% of all HCVs that travel east of Williamstown Road on the West Gate Freeway would continue past Toorak Road on the M1 and therefore reach the toll cap.

A HCV toll cap price (all prices are June 2015) for using the West Gate Freeway and the Southern Link of CityLink has been assumed at $30.50 [redacted]

[redacted]

4.3.6 Time of day tolling

Time-of-day tolling is where the toll price varies based on the demand for the road at different times of the 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:

- reduce peak period congestion by encouraging some trips to change their time of travel from the peak to off-peak and inter-peak period;
- 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 of using the toll road would not be as high;
- charge a premium price for usage of the road in peak periods when demand is high, particularly for access to a CBD location where viable alternatives may exist, including public transport; and
- 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.

The implementation of time of day tolling would be beneficial to the Project as it provides a balance between usage and revenue.

A key consideration for the toll structure on this Project is to provide overall balance on the network. The toll prices set 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 challengers to introducing this concept on this Project without creating the risk of undesirable imbalances on the network.

While not further progressed at this stage, the project should protect 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.

This project has considered time of day tolling for the inner urban access, as this location is not a direct tolled alternative to CityLink providing the same quality of access. In this case, the high price during the peak period can be applied without creating network imbalance.

As noted above, CityLink does provide discounts for HCVs at night. This discount, agreed as part of the CTW deal, is a 33% discount applied between 8:00pm and 6:00am. Effectively the multiplier moves from 3 time to 2 times. This is applied to both sectional tolls and the toll caps.

Time of day tolling is beneficial in supporting recent State Government policy to encourage greater use of the road network by freight at night when spare capacity exists across the network.

The time of day that truck operators chose to utilise the network is typically based on a commercial balance of cost, vehicle productivity time, and customer service needs. They will tend to avoid travel in commuter peak directions due to the built-in disincentives of higher costs associated with fuel and wages caused by slower and less reliable travel times. Further, when trucks travel during the day the impact of poor truck performance or truck breakdowns during the commuter peak periods can have a significantly disruptive and costly impact to the operation of the road network.

However, whilst travel at night-time is typically quicker and more reliable, truck operators are heavily influenced by the need to provide their customers with deliveries at convenient times that suit their customers' business operations, often during the day. Freight customers are more likely to support accepting freight at night-time where there is a cost or time incentive to do so.

Accordingly, the provision of an off-peak toll discount for the movement of freight will be necessary to encourage any greater use of the road network at night. The success of a night-time 'discount' would require the support of the freight industry. That is, for truck operators to choose to use the Western Distributor at night-time they must recognise that the value of using the new freeway and paying a premium for driver costs is preferable to travelling during the daytime and/or using a non-freeway route, and that this is a saving that can be passed on to the freight customer.

Further with this project providing direct linkages to the port consideration needs to be given to the 24/7 operation of the port. 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.

Similar to the baseline toll establishment, any night time discount needs to consider the issue of network balance and asset utilisation. If the discount applied is not similar to CityLink, there is the potential to create an unbalanced network.

For that reason it is proposed to apply a similar night time discount for this project as CityLink so as to avoid creating a tolling imbalance between the Western Link and the M80/West Gate Freeway/Western Distributor routes (as depicted previously in Figure 3).

A 33% discounted toll price for use of the network between 8:00pm and 6:00am assists to encourage use of the asset at night, incentivises the industry to move to a more even 24/7 operation and does not create an imbalance on the network.

It is acknowledged that a reduced discount (e.g. to 25%) could be negotiated with Transurban at a later stage to increase the toll value at night while limiting imbalances. Whilst this could be explored further in the future, it is not considered necessary at this stage.

5. Recommended tolling structure

The following provides a summary of the recommended tolling structure for the Project including the approximate location of the tolling gantries and the toll price.

5.1.1 Toll point structure and gantry location

Due to the multiple connection points to the surrounding road network, a number of toll points will be implemented as part of the Project. These are as follows:

- Toll Point 1 - West Gate Freeway between Millers Road and Williamstown Road.

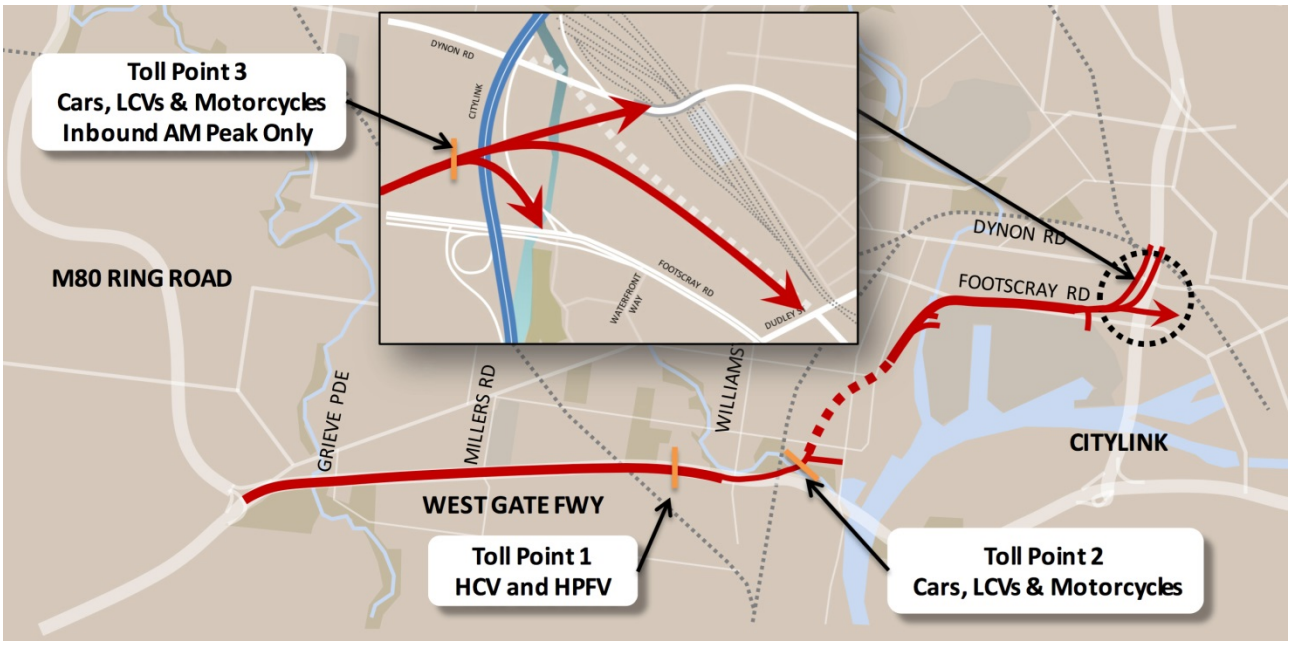
This will apply to HCVs and HPFVs travelling in both directions along the West Gate Freeway;

- Toll Point 2 – On the Western Distributor Ramps prior to the exit to / entrance from Hyde Street.

  This will apply Cars, LCVs and Motorcycles in both directions, either using the tunnels or the Hyde Street ramps.

- Toll Point 3 – Inner urban access, 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 weekday AM peak only. Tolls will not be applied to westbound traffic.



5.1.2 Sectional Prices

The sectional prices for each of the toll gantries identified in Section 5.1.1 is provided in Table 4.

Table 4 Sectional prices (June 2015 Prices)

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)+	$8.87	-	-
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

5.1.3 Toll cap

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

- HCV's
  - $30.50 during the day (6:00am to 8:00pm)
  - $19.00 during the night (8:00pm to 6:00am)
- HPFV's
  - $35.00 during the day (6:00am to 8:00pm)
  - $21.35 during the night (8:00pm to 6:00am)

5.1.4 Toll Products

Port Shuttle Discount (HCVs only)

HCV's detected travelling on the West Gate Freeway (Toll Point 1) in a 24 hour period (midnight to midnight), would incur the following costs:

- Each trip up to 4 trips –$13.30 (full price)
- Each trip from 5 to 8 trips –$6.65 (50% discount)
- Any additional trip in the 24 hour period at no cost.
- Total 24 hour cost capped at $79.80

5.1.5 Price matrix

The following tolling pricing regime has been used for the purposes of the business case.

Table 5 Toll Price Matrix, Eastbound

Starting on the West Gate Freeway	Western Distributor		West Gate Bridge	CityLink Western Link		CityLink Southern Link	
	Port Of Melbourne	Inner urban access+	Todd / Cook	Racecourse Road	Bell St / Moreland Rd / Tulla	Burnley St / Tunnel	Toorak Rd / Monash
Cars	2.77	7.20 (AM Peak) 2.77 (other times)	0.00	4.98	7.19	4.98	7.19
LCV	4.43	11.52 (AM Peak) 4.43 (other times)	0.00	7.97	11.50	7.97	11.50
HCV (day)	13.30	13.30	13.30	19.10	25.73	27.41	30.50
HCV (night)*	8.87	8.87	8.87	13.29	17.71	18.83	19.00
HPFV (day)	20.00	20.00	20.00	26.63	33.26	35.00	35.00
HPFV (night)*	13.30	13.30	13.30	17.72	21.35	21.35	21.35

*Night time is defined as 8:00pm to 6:00am

+Inner urban access is defined as the ramps to/from Footscray Road, Dynon Road and the Wurundjeri Way Extension

Table 6 Toll Price Matrix, Westbound

Origin		WGF (Millers / Grieve / M80 / Princes)					
		Cars	LCV	HCV (day)	HCV (night)*	HPFV (day)	HPFV (night)*
CityLink Southern Link	Toorak Rd / Monash	7.19	11.50	30.50	19.00	35.00	21.35
	Gibdon St / Tunnel	4.98	7.97	27.41	18.83	35.00	21.35
CityLink Western Link	Bell St / Moreland Rd/ Tulla	7.19	11.50	25.73	17.71	33.26	21.35
	Racecourse Road	4.98	7.97	19.10	13.29	26.63	17.72

West Gate Bridge	Todd/Cook	0.00	0.00	13.30	8.87	20.00	13.30
Western Distributor	Inner urban access+	2.77	4.43	13.30	8.87	20.00	13.30
	Port Of Melbourne	2.77	4.43	13.30	8.87	20.00	13.30

*Night time is defined as 8:00pm to 6:00am

+Inner urban access is defined as the ramps to/from Footscray Road, Dynon Road and the Wurundjeri Way Extension

CityLink Tolls

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.

The CityLink contract is due to expire in the mid 2030's, after which tolls could be removed.

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.

To manage congestion along Southern Link and Western Link, and to maintain balance on the network, tolling should continue on CityLink until at least the end of the operational period of the Project.

If the tolls on CityLink were to be extended for this reason, a significant analysis would be required to understand toll prices, revenue, network impact and operational handover issues.

For any extension of tolls on CityLink as described above, the toll rates would increase yearly in line with CPI. However, average weekly earnings is increasing at a higher rate than CPI and as such, there is an opportunity to increase toll rates higher than CPI. This may assist in managing demand on highly used areas and provide an ability to increase Project revenue.

A higher escalation rate has not been used to calculate revenue for the Project, however it is expected to have a minimal impact on network benefits, and therefore it is worth further consideration at later stages.

Any change to the pricing structure for this Project would need to be mirrored on CityLink to maintain the balance network outcome. Therefore, if toll prices were to increase above CPI on the Project, then a similar outcome would need to be negotiated with CityLink.

6. Toll collection systems

6.1 Trip capture

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

- Tag based tolling;
- Video tolling; and
- 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.

6.2 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.

After the Government's considers the Project scope it should then also consider the back office functions (including arrangements for possibly sub-contracting services to existing toll collection service providers), the tolling solution for the Project and select a 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. Legislative considerations

There is no existing legislative framework in Victoria currently available to establish a tolling solution for the Project. In particular, there is currently no mechanism by which a privately owned concessionaire or State entity could enforce tolls in respect of the Project. As such, legislative enactment or amendment will be required.

In implementing this legislative framework, the State could amend existing legislation (such as the MTPFA) or enact new, standalone legislation.

This legislative framework could be drafted to apply only to the Project or could be drafted to create a more flexible regime whereby other roads can be brought within the tolling framework at future points in time (such as tolling of parts of the existing road network or future road projects that are to be tolled). There is precedent within Australia (NSW and QLD) for this more flexible approach.

A period of 12 to 18 months is a reasonable guiding estimate of the timeframe required for drafting and passing legislation for a tolling solution for the Project. The time by which this legislation needs to be in place will be guided in part by the procurement model adopted for the Project.