

# Toowoomba Bypass Project Business Case

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## 1. Summary and Conclusions

### 1.1. Purpose

This chapter provides a summary of the key outcomes from the Toowoomba Bypass Project Business Case Study and presents the conclusions that flow from these outcomes for consideration by both the federal and state governments.

The primary consideration of the Business Case study relates to the viability of the project to be delivered as a Public Private Partnership (PPP).

### 1.2. Summary

The Toowoomba Bypass Project (the Project) has been rigorously analysed in accordance with Queensland's PPP Value For Money (VFM) Framework. The conclusions arising from the Business Case study are:

- The analysis indicates that a PPP delivery option does not represent better value for money in comparison to a traditional government delivery option (the Public Sector Comparator (PSC));
- The magnitude of the upfront government contribution required under a PPP Build Own Operate Transfer (BOOT) delivery model would render the project commercially unattractive to government;
- The Toowoomba Bypass project is an important project for the Toowoomba region and South East Queensland due to:
  - its importance as a national freight route;
  - the deficiencies of the existing route with respect to safety, freight efficiency and urban amenity;
  - the limited scope for cost-effective short-term improvements on the existing route; and
  - the absence of an alternative viable long-term option.
- The proposed construction of an Inland Rail link terminating at Toowoomba presents a strategic opportunity for the effective integration of road and rail freight activities in the region;
- The identified Reference Project has a capital cost of \$1.75B (risk adjusted, escalated) based on construction scheduled between 2010 and 2013;
- At the toll levels proposed, the Project generates a small amount of toll revenue relative to its capital cost, and as a result, will still require a considerable amount of government contribution regardless of the tolling strategy adopted;
- The Business Case considers an option that mandates heavy vehicles travelling to or through Toowoomba use the Bypass unless they have an origin or destination on the eastern side of Toowoomba. This option does not affect the VFM assessment that the PPP is a less favourable option than the PSC;

- The tolled mandated use option involving toll levels of \$3.00 for light vehicles, \$15.02 for rigid body trucks and \$20.61 for combination heavy vehicles (\$2006, escalated annually at CPI) results in a net cost to government of some \$1.4B (net present cost \$2010, risk adjusted whole of life costs); and
- The best method of tolling, were it to be adopted, would be full free flow electronic toll collection.

### **1.3. Background**

The city of Toowoomba acts as a regional hub for the Darling Downs and beyond. It is located at the convergence of the Warrego, Gore and New England Highways and consequently has become the main South East Queensland highway crossing of the Great Dividing Range, linking Brisbane with the Warrego Highway to the west and the Gore Highway to the south west. This road network services all of south west Queensland, the whole of the Darling Downs region and interstate movements from Queensland into western New South Wales, Victoria and the Northern Territory.

Previous studies have indicated that the existing traffic network through the range and within the city is unsuitable for the expected growth in freight vehicle movements.

Consequently, the purpose of this project is to investigate potential options for a new road that bypasses Toowoomba City, incorporating a new range crossing. The Bypass and crossing are to be of sufficient capacity and design (i.e. curves and gradients) to allow for the efficient movement of freight traffic on the road network around Toowoomba.

The project has been jointly developed by the federal and state governments over a number of years, with previous phases covering concept planning (including Environmental Impact Assessment), detailed planning and acquisition of land for the road corridor.

Previous planning work on this project has now culminated in the development of this Business Case, prepared using Queensland's PPP Policy and VFM Framework. The Business Case stage of the VFM framework is specifically designed to:

- identify the project delivery option most likely to provide the best value for money outcome; and
- provide information regarding the delivery options so that government may determine the preferred delivery option and make funding decisions regarding priority and affordability of the Project.

### **1.4. Viability of the Project as a PPP**

#### **VFM Analysis**

A key element of the Business Case is to provide an indicative view of whether there is potential to achieve a VFM outcome for governments by delivering the Project under a PPP arrangement as opposed to a traditional (PSC) delivery. The VFM assessment for the Project has been undertaken in accordance with the principles outlined in the Queensland PPP VFM Framework.

The approach to the VFM assessment for the Project is outlined below:

- **Qualitative assessment.** An assessment of the extent to which key VFM drivers are inherent in the preferred PPP Option including review of empirical data; and
- **Quantitative assessment.** A comparison of the results of the PSC against those of a hypothetical Partnership Model.

The PPP model considered in the VFM analysis was a BOOT model and included full traffic risk transferred to the private sector, with an upfront contribution from government required. The BOOT model was selected after consideration of both the federal and state government's views and policies. The federal government representatives advised that consideration of any availability payment options for any federal government contribution was unlikely to be accepted due to policy reasons. The state representatives advised that availability payment models for any State contribution would only be considered if the BOOT delivery option presented better potential value for money over the PSC.

### **Qualitative Results**

Based on the qualitative assessment, the Business Case can conclude the following:

- The qualitative analysis suggests the PPP model is unlikely to provide improved innovation, asset utilisation or economies of scale over and above the PSC, which is the form of delivery which represents the most likely and efficient method that government would have used to deliver the project.
- The potential for VFM is therefore via the greater risk transfer under the PPP model (including the transfer of traffic risk) and the potential for the private sector to provide an improved approach to the Whole of Life costing.
- On a qualitative basis, it was determined there was limited scope for value for money under the BOOT model for this Project.

### **Quantitative Results**

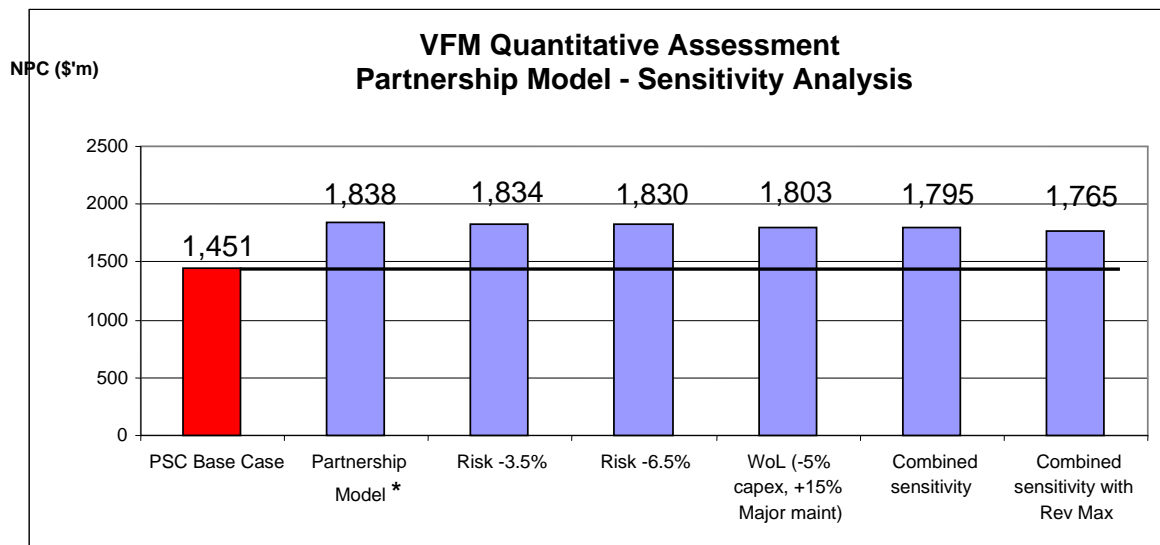
The quantitative assessment has been designed to test several scenarios based on the results of the potential value drivers identified under the qualitative VFM assessment.

The key value drivers identified were:

- Risk Allocation - The private sector typically takes a more aggressive approach to the pricing of risk in order to enable a more competitive bid. Also taken into account is the private sector's ability to better manage certain risks; and
- Whole of Life Costing - This assumes that the private sector will reduce the amount of capital expenditure spent during the construction period, instead favouring more intensive major maintenance during the operations period in order to optimise the Net Present Cost of their bid.

Figure 1-1 below summarises the output (in NPC terms) of the efficiency scenarios described above. The stated NPC is the net present cost to government under the partnership model (represented as upfront payment and retained risk); compared to the base case (P90 risk) PSC (represented as the NPC of the risk adjusted cash flows from government).

Figure 1-1 VFM Quantitative Assessment



The cost to government (in NPC terms) under the hypothetical BOOT model (without efficiencies) is greater than under the base case PSC model. The primary reason for this is due to the private sector financing and taxation costs that are incurred under the BOOT model.

However, the sensitivity analysis tests the BOOT model's ability to deliver a VFM outcome (compared to the PSC) when VFM efficiencies are factored in. The results of this can be seen in the diagram above, which demonstrates that even when the potential VFM efficiency scenarios are taken into consideration, the upfront contribution required from government under the BOOT model considered still represents a significantly higher cost in NPC terms than the cost associated with the PSC.

### Conclusion

This analysis suggests that even if the potential savings scenarios are taken into consideration, the BOOT model still fails to offer a VFM outcome under the quantitative assessment for this project. These results are purely hypothetical, and it is possible that the PPP bids may deliver greater efficiencies than modelled here, however the size of the upfront payment relative to the construction costs suggests that it is very unlikely that a VFM outcome to government would be delivered under a BOOT PPP delivery option.

In addition to the above analysis, it is important to note that due to the lower levels of traffic compared to other toll roads and the subsequent limited revenue generated, the BOOT delivery model would require an upfront government contribution of approximately 97% of total capital expenditure (including capitalised interest and financing costs). If governments were required to make an upfront payment of this magnitude, the BOOT model would not be commercially attractive to government, as the private sector would have the majority of its financial obligations repaid upon construction completion. As a result, the private sector would not have the incentive to efficiently manage the remainder of the concession term (this incentive is a key potential driver of the efficiencies possible through long-term PPP arrangements).

Given the particular characteristics of the project (i.e. a capital/BOOT style PPP, and the rural nature of the road, particularly lower traffic volumes than those that would be experienced on current and urban PPP projects), the outcomes of the Business Case reflect the fact that there is very limited scope for value adding risk transfer.

### **1.5. Project Need**

The Warrego Highway and Gore Highway representing the Brisbane - Darwin and Brisbane - Melbourne National Transport Corridors converge in Toowoomba. These highways run through the streets of Toowoomba City and cross the Great Dividing Range on the most heavily trafficked range crossing in South East Queensland. They carry significant traffic volumes and are particularly important freight routes.

Most of the existing range crossing has a 10% grade and tight horizontal curves. This results in high levels of congestion and a very poor accident record. Coupled with the section through urban Toowoomba City, the existing route falls well short of specified national highway levels of service.

Safety is a significant motive for project need. This is illustrated by 13 fatalities on the range since 1992. The Helidon to Toowoomba section of the Warrego Highway, which includes the existing range crossing, has an AusRAP<sup>1</sup> collective risk rating of 1.16 casualty accidents per kilometre for 2001-05. The range crossing on its own has a rating of 2.63 for 2001-05. 70% of the accidents between Helidon and Toowoomba occurred on the range for the same period. This compares with a threshold rating of >0.29 for the AusRAP high risk category.

The accident rate for heavy vehicles on the range descent is approximately 15 times higher than that for the Warrego Highway to the east, with heavy vehicles represented in 53% of casualty accidents.

Recent road investment has focused on improved safety on the range, and traffic management through Toowoomba. There is limited scope for further cost effective improvements on the existing route because widening to improve capacity and safety on the range:

- would not improve the steep grade;
- would provide only short-term relief;
- would be very expensive; and
- the route would continue to use Toowoomba streets, resulting in loss of urban amenity and continued freight inefficiency.

### **Economic Analysis**

The direct benefits generated by the project are measured by the Cost Benefit Analysis which shows that the project has a Benefit Cost Ratio (BCR) of between 0.63 and 1.17, depending on the scenarios or sensitivities modelled. The base case BCR

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<sup>1</sup> AusRAP is an initiative of the Australian Automobile Association which aims to provide a safety rating for roads across Australia.

was 0.85 for the untolled Bypass and 0.72 for the tolled Bypass. These results indicate that the project's direct economic costs outweigh the direct economic benefits, resulting in a negative economic net present value.

The indirect benefits produced by the project will increase annual Gross Regional Product (GRP) above its current level by \$3.08B, which includes 4,160 full time equivalent (FTE) jobs during the construction phase and 906 FTE jobs during the operations phase.

Furthermore, the Project provides a range of qualitative economic benefits that are difficult to measure, but are nevertheless significant.

Freight movements across Queensland are forecast to double between 2000 and 2020. Recognising this, the South East Queensland Integrated Regional Transport Plan was developed as a 25 year plan to manage the movement of people and goods west to Toowoomba, amongst other regions. The establishment of the Toowoomba Bypass (located along the Priority One freight corridor) facilitates the South East Queensland Integrated Regional Transport Plan as it seeks to accommodate and integrate both urban transport and freight needs.

The Bypass will assist regional industry, business and employment by facilitating opportunities from the derived time savings and reduced costs, allowing new business investment that will generate additional income and employment and promoting greater expenditure in the town centre.

Furthermore, by removing traffic on Toowoomba's city streets, the project is expected to improve pedestrian safety and general amenity of the town centre.

### **Australian Inland Rail Link**

The proposal to construct an inland rail link between Melbourne and Toowoomba has the potential to impact significantly on the number of heavy vehicles forecast for the Bypass. Traffic modelling estimates that heavy vehicle usage of the Bypass would increase by up to 45% if the Inland Rail is constructed (including associated high level development of Charlton Wellcamp industrial area).

The federal government has commissioned an engineering and scoping study, to be completed in 2009, that could allow possible construction of an inland rail link to begin in 2014 with completion by 2019.

Assuming the Inland Rail project was to occur, the BCR calculated for this Business Case has been estimated at 0.98 to 1.1, depending on whether the Bypass is tolled or untolled.

### **Conclusion**

Consistent with previous planning work, this analysis concludes that the Toowoomba Bypass project is an important project for the Toowoomba region and South East Queensland due to:

- its importance as a national freight route;

- the deficiencies of the existing route with respect to safety, freight efficiency and urban amenity;
- the limited scope for cost-effective short-term improvements on the existing route; and
- the absence of an alternative viable long-term option.

Analysis also demonstrates that the proposal to construct an Inland Rail terminating at Toowoomba will have a significant impact on the Toowoomba Bypass Project.

### **1.6. Reference Project**

The project identified in the Business Case Study as the one to best address the current deficiencies of the existing route and to provide a long-term solution, is a bypass route to the north of Toowoomba, approximately 42 km in length, running from the Warrego Highway at Helidon in the east to the Gore Highway in the south west.

Key features of the reference project include:

- Four-lane divided road between the Warrego Highway at Helidon to the Cecil Plains Road Interchange;
- Two-lane two-way grade separated road between the Cecil Plains Road Interchange and the Gore Highway;
- Provision for widening to six lanes between Gittens Road and the tunnel;
- Five interchanges to provide access to and from the Bypass;
- Twin two-lane tunnels approximately 735 metres long at the top of the range, capable of providing three lanes in the future if required; and
- Twenty-seven bridge structures at nineteen (19) locations.

### **Capital Costs**

The reference project capital cost is estimated at \$1.75B (escalated, risk adjusted), based on a construction program scheduled between 2010 and 2013. This cost represents a significant increase on the previous 2003 estimate, reflecting recent and ongoing construction cost increases.

It is important to note that, given the current construction climate and the escalation of costs over and above that of inflation, the cost of the Project has been estimated to escalate by approximately \$100m for each year that the Project is deferred.

### **Options Investigated**

A number of configuration options were investigated in order to assess whether the Reference Project could be de-scoped to reduce capital costs and provide an alternative 'value' option.

In particular, an assessment of the potential savings in providing a single two-way carriageway versus a divided dual carriageway, was undertaken: from Mort Street to Cecil Plains Road for the tolled base case scenario, and from Charlton to Cecil Plains Road for the untolled scenario.

The potential savings for the untolled case are approximately \$34m (nominal), and for the tolled case approximately \$97m (nominal). This represents only about 5% or less of the total capital cost.

The cost savings are marginal but the changes would cause a significant reduction in the level of service, and a very significant increase in accident risk. It was therefore concluded that there is limited potential to reduce the scope of the project.

### Conclusion

The analysis concludes that the project, as detailed in the Reference Project, best satisfies project objectives.

Based on a construction program scheduled between 2010 and 2013, the capital cost of the reference project is estimated at \$1.75B, including risk adjustments and escalation.

## 1.7. Traffic Forecasting and Tolling Options

The Business Case study investigated in detail a range of tolling scenarios which tested a number of critical factors including project objectives, user willingness to pay and value for money, diversionary effects on traffic and revenue optimisation.

### Tolling Scenarios

The four 'base' tolling scenarios considered are outlined in Table 1-1 below.

Table 1-1 Tolling Scenarios

<b>Tolling Scenarios/Options</b>	<b>Toll Level (\$2006)</b>	<b>Description</b>	<b>Est. Net Toll Revenue<sup>1</sup> \$2010</b>
<b>Scenario 1</b> "Untolled Base Case"	No toll	This scenario proposes free access to the Bypass.	Nil
<b>Scenario 2</b> "Tolled Base Case"	light vehicle: \$3.00 Heavy Vehicle 1: \$15.02 Heavy Vehicle 2: \$20.61	The base case toll scenario attempts a balance between revenue maximisation and achieving the Project's objective of attracting heavy vehicles onto the Bypass. It is the best relative "value for money" option - the toll is approximately 25% of the estimated value of the economic benefit accruing to those using the Bypass.	\$150m

<p><b>Scenario 3</b> "Revenue Maximisation"</p>	<p>light vehicle: \$3.86 Heavy Vehicle1: \$20.16 Heavy Vehicle2: \$27.47</p>	<p>The Revenue Maximisation toll is calculated by conducting a number of iterations of the traffic model at increasing toll levels and establishing from the results a demand curve that indicates the maximum revenue earning position for the Project.</p>	<p>\$180m</p>
<p><b>Scenario 4</b> "Minimum Diversion"</p>	<p>light vehicle: \$0.89 Heavy Vehicle 1: \$5.15 Heavy Vehicle 2: \$6.86</p>	<p>Represents a toll level that produces minimum diversion (5-10%) of heavy vehicles away from the Bypass.</p>	<p>\$11m</p>

Note: Refer Chapter 10: Tolling Chapter for toll levels represented in 2010 dollars.

The limited toll revenue (relative to total project costs) reflects traffic volumes which are low when compared to other toll roads in Australia.

Approximately 25% of toll revenue is generated from light vehicles and 75% from heavy vehicles.

Economic analysis shows there is marginal difference in economic outcome between the untolled and tolled base case scenarios with BCRs of 0.85 and 0.72 respectively.

Full free flow electronic tolling has been assumed in each of the scenarios investigated.

Approval to use a fees and charges regime as a means to recover full free flow electronic toll collection costs, as per the State's recent decision on the Gateway and Logan Motorways, would add approximately \$74m in toll revenue to the estimates reported in the table above.

The Business Case Study did not investigate potential toll operators under a government delivery option. Further analysis should be undertaken to determine the most appropriate toll operator should government decide to proceed with the project under a tolled arrangement.

### Sensitivity

The Melbourne – Toowoomba inland rail link has the potential to significantly change patterns of land transport in eastern Australia.

A sensitivity analysis was performed based on the assumption that an inland rail project terminating at Toowoomba is complete by 2013 accompanied by an associated

high level of development at Charlton Wellcamp. The purpose of this scenario was to provide a range of sensitivity parameters. The Upper Limit sensitivity case results in an increase of heavy vehicle traffic numbers on the Bypass of 45% when compared to the Base Case untolled scenario, with light vehicles remaining virtually unchanged.

Table 1-2 Tolling Sensitivity

Tolling Scenarios/Options	Toll Level (\$2006)	Description	Est. Net Revenue \$2010
<b>Sensitivity 1</b> "Upper Limit Case"	light vehicle: \$3.00 Heavy Vehicle1: \$15.02 Heavy Vehicle 2: \$20.61	Assumes inland rail project terminating at Toowoomba is complete by 2013 <sup>2</sup> accompanied by an associated high level of development at Charlton Wellcamp.	\$235m

The Upper Limit sensitivity case produced a BCR of 1.10 for the untolled scenario and 0.98 for the tolled scenario.

### Traffic Forecasts

The origin/destination data from the Automatic Number Plate Recognition (ANPR) Survey carried out in April 2007 showed for heavy vehicles approaching Toowoomba:

- Approximately 30% are through traffic;
- Approximately 30% are u-turns involving a return trip;
- Approximately 40% have a destination in Toowoomba.

Traffic forecasts show:

- All heavy vehicles and approximately 87% of light vehicles involved in through trips will use the Bypass if it is not tolled.
- Heavy vehicle through trips using the Bypass will reduce by about 20% if the route is tolled.
- Light vehicle through trips using the Bypass will reduce by a further 10% - 20% if the route is tolled.
- Approx. 39% of heavy vehicles on the existing Range will use the Bypass if it is untolled. This will reduce to 33% if it is tolled – a reduction of approximately 15%.
- Approx. 33% of light vehicles on the existing Range will use the Bypass if it is untolled. This reduces to 14% if it is tolled – a reduction of approximately 60%.

<sup>2</sup> Australian Transport and Energy Corridor Ltd have announced in late 2007 that they intend to pursue an unsolicited PPP with a view to constructing the Inland Rail Link by 2013.

### **Mandated Use Option**

Almost all of the deficiencies of the existing route relate to heavy vehicle usage on that route and consequently almost all of the project objectives for the Toowoomba Bypass depend on attracting heavy vehicles away from the existing route and onto the Bypass.

As the traffic forecasting results highlighted above demonstrate, only approximately 39% of heavy vehicle traffic on the existing range would divert to use the Toowoomba Bypass, even if it was untolled. This is a result of a large number of heavy vehicle origins/destinations being Toowoomba City itself. Clearly, this creates an issue in terms of the Toowoomba Bypass Project meeting its proposed objectives.

A potential solution to this issue is to consider an option where all heavy vehicles travelling across the Toowoomba Range would be obliged to use the Toowoomba Bypass crossing unless they have an origin or destination in the eastern side of Toowoomba. The mandate would apply only to the link which crosses the Range.

The rationale behind this proposal is:

- There are relatively few industrial or commercial destinations likely to attract or generate heavy vehicle trips on the eastern side of the city;
- Access to the eastern side of the city could not be conveniently provided by the new Bypass.

This mandated option results in a forecast 92% of heavy vehicles diverting from the existing range crossing onto the Bypass. This would deliver improved project outcomes such as improving safety for road users and freight efficiency as well as improving the public amenity of Toowoomba's streets. This option would also contribute to project affordability by generating almost \$100m<sup>3</sup> in additional toll revenue. However, even with this mandated use option, involving base toll levels of \$3.00 for light vehicles, \$15.02 for rigid body trucks and \$20.61 for combination heavy vehicles (\$2006, escalated annually at CPI) the net cost to government is some \$1.4 billion (net present cost \$2010, risk adjusted whole of life costs). The mandated use option also does not affect the outcomes of the PPP VFM assessment in terms of making it better value for money in comparison to the PSC.

The State's tolling policy requires that the toll facility does not disadvantage users of the existing network (i.e. a free alternative route is available). However it may be considered acceptable to mandate heavy vehicles to use the Bypass due to the poor safety record of the existing range crossing and the clear benefits that would accrue to the community if heavy vehicles are diverted to the Bypass.

The issues of policy, enforcement, legislation and technology which would arise for the Toowoomba Bypass are very similar to those which have been addressed in the Brisbane Urban Corridor (BUC). For example, monitoring and enforcement could be carried out using Automatic Number Plate Recognition (ANPR) cameras.

Because a mandated option may be considered onerous to heavy vehicle users, it should be noted that total road user benefits estimated by the economic analysis in the form of travel time savings, vehicle operating cost savings and accident cost savings are estimated to be approximately four times the cost of the base case toll to be paid

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<sup>3</sup> Net present value \$2010.

by road users. However, given the sensitive nature of this option, it is imperative that appropriate government, community and industry consultation is conducted and a detailed proposal is developed prior to any decision to implement.

### **Total Project Costs**

Total project costs<sup>4</sup> (NPC \$2010) under a government delivery option represented by the (PSC) for each of the scenarios investigated are presented in

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<sup>4</sup> Toll revenue less capital, whole-of-life, operating and MR non-construction costs.

Table 1-3 below:

Table 1-3 Total Project Costs

Untolled	Base Case	Revenue Max	Minimum Diversion	Upper Limit	Mandated Use
\$1,662m	\$1,511m	\$1,481m	\$1,651m	\$1,427m	\$1,414m

## Conclusion

The decision to toll the Project, and at what level, is ultimately a decision for government, however, the analysis highlights the following:

- Relative to its capital cost, the Project generates a small amount of toll revenue and as a result will require a considerable government contribution, regardless of the tolling strategy adopted,
- Tolling the Project has a minor negative impact on the economic benefits provided by the Project,
- The best method of tolling, were it to be adopted, would be full free flow electronic toll collection,
- Revenue Maximisation and Minimum Diversion scenarios are not considered to be viable options because:
  - revenue Maximisation raises only marginally more revenue (relative to total project cost) than the tolled base case, yet results in far less heavy vehicle diversion from the existing Range onto the Bypass;
  - minimum Diversion generates minimal toll revenue and does not increase heavy vehicle use of the Bypass significantly.
- The proposed Australian inland rail link, if constructed, has the potential to create significant additional freight traffic and toll revenue,
- Appropriate government, community and industry consultation would need to be conducted and a detailed proposal developed prior to any decision regarding a mandated use option. Such an option would assist the Toowoomba Bypass Project in delivering against project objectives but does not affect the outcomes of the PPP VFM assessment in terms of providing a better relative value for money in comparison to the PSC,
- The tolled mandated use option involving toll levels of \$3.00 for light vehicles, \$15.02 for rigid body trucks and \$20.61 for combination heavy vehicles (\$2006, escalated annually at CPI) results in a net cost to government of some \$1.4B (net present cost \$2010, risk adjusted whole of life costs).<sup>5</sup>

<sup>5</sup> Refer Chapter 10: Tolling Analysis for further detail on toll levels in 2010 dollars.