

# Project Evaluation Summary

## M1 Pacific Motorway (Eight Mile Plains to Daisy Hill)

**Proponent** Queensland Government  
**Evaluation date** 13 June 2019

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### 1. Summary

Infrastructure Australia has added the **M1 Pacific Motorway (Eight Mile Plains to Daisy Hill)** project to the Infrastructure Priority List as a **Priority Project**.

The 2015 *Australian Infrastructure Audit* (the Audit) identified the lack of capacity on the road network between Brisbane and the Gold Coast as a significant problem for business, tourist and commuter travel. A program of M1 Pacific Motorway capacity improvements (Eight Mile Plains to Tugun) is listed as a High Priority Initiative on the Infrastructure Priority List.

The project is the second stage of the M1 Masterplan, which commenced with the Stage 1: M1/M3 Gateway Merge project, a former Priority Project on the 2016 Infrastructure Priority List. The proponent has advised that planning is underway for Stage 3 (Daisy Hill to Loganholme).

The M1 Motorway (Eight Mile Plains to Daisy Hill) project proposes to improve one of the busiest sections of the M1 Pacific Motorway. This section of the M1 Pacific Motorway currently carries more than 150,000 vehicles per day, and is projected to carry around 202,000 vehicles per day by 2041 (an increase of 1%-2% per year). At present, 12,000 freight vehicles travel on this section of the corridor each day. This is expected to grow by 3%-4% per year over the same period. Much of this traffic growth is being driven by population growth in South-East Queensland (SEQ), with an expected increase of 1.7 million people in this area between 2016 and 2041.

The project would provide additional road capacity by widening an 8.5 km northbound section of the motorway between the Gateway Motorway (at Eight Mile Plains) and Paradise Road (at Daisy Hill), and provide southbound capacity improvements between Rochedale Road and Fitzgerald Avenue (in Springwood). The project would also extend the South East Busway from Eight Mile Plains Busway Station to Springwood Bus Station, providing a new Rochedale Busway Station and park 'n' ride facilities. These capacity enhancements would accommodate an additional 25% traffic demand and are expected to relieve congestion in this area for the next 15–20 years.

The benefit-cost ratio (BCR) stated by the proponent for the project is 1.40 with a net present value (NPV) of \$212.9 million, using a 7% real discount rate and a P90 capital cost estimate. Infrastructure Australia identified some limitations in the cost-benefit analysis, but considers that the benefits of the project are likely to exceed its costs.

Furthermore, the project has strong strategic merit, providing improved access for people travelling between the Gold Coast and Brisbane on this section of the National Land Transport Network (NLTN). The project includes a range of complementary initiatives, including an extension of the South East Busway, enhancement of the Veloway Cycle network, and the use of managed motorways technology to optimise the performance of the motorway.

## 2. Strategic context

The M1 Pacific Motorway is the primary transport corridor linking the population centres of Brisbane, the Gold Coast, Logan and a number of surrounding regional economic clusters. The motorway is part of the NLTN connection between Sydney and Brisbane and is an important link for freight, providing connectivity between northern NSW and the Gold Coast, the Acacia Ridge freight terminal, Brisbane CBD, the Port of Brisbane/Australia Trade Coast precinct and Brisbane Airport. The Eight Mile Plains to Daisy Hill section of the motorway is one of the most congested sections of the corridor.

Over the next 10 years, the population of South-East Queensland (SEQ) is expected to grow from 3.7 million in 2016 to 5.4 million in 2041, with many of these new residents being reliant upon the motorway to provide access to services and employment. Population and employment growth, combined with land-use changes to suburbs near the Eight Mile Plains to Daisy Hill section of the M1 Pacific Motorway (the Ormeau-Oxenford areas to the south of Brisbane), will generate significant increases in travel demand. The *Australian Infrastructure Plan (2016)* highlighted that alleviating congestion on the M1 Pacific Motorway would improve the efficiency of the NLTN in SEQ, delivering significant economic benefits through reduced travel times and improved reliability for freight movements.

This project is the second stage of the M1 Masterplan, which aims to improve capacity and reliability on the motorway between the Gateway Motorway and the Logan Motorway. The M1 Masterplan has three stages:

- Stage 1: M1/M3 Gateway Merge (Eight Mile Plains to Springwood) – currently being delivered
- Stage 2: M1 Pacific Motorway (Eight Mile Plains to Daisy Hill) – this project
- Stage 3: M1 Pacific Motorway (Daisy Hill to Logan Motorway) – planning underway.

There is strong strategic merit in upgrading this section of the NLTN to support passenger and freight movements, increasing the capacity of this primary transport corridor, and facilitating public and active transport options along the route.

## 3. Problem description

The Eight Mile Plains to Daisy Hill section of the M1 Pacific Motorway currently carries more than 150,000 vehicles per day, with at least 12,000 of those being freight vehicles, making the road one of the busiest corridors in SEQ and one of the most freight intensive routes in Queensland.

Without intervention, average traffic speeds are expected to decrease from 70 km/h to 56 km/h by 2041. This, in turn, would affect the productivity of SEQ by reducing the performance and reliability of freight and passenger movements. Providing additional capacity between Eight Mile Plains and Daisy Hill will enable average speeds on the motorway to remain at acceptable levels, particularly during peak periods, in addition to helping to reduce the rates of accidents associated with congestion.

Congestion on the motorway is a significant problem because it impacts on the reliability of the NLTN. Infrastructure Australia has identified the M1 Pacific Motorway (Eight Mile Plains to Tugun) capacity upgrades as a High Priority Initiative, of which this project is a material component.

In addition to improving the capacity of the motorway, the project also proposes to improve public and active transport capacity in the corridor. The South East Busway currently terminates at Eight Mile Plains, with passengers travelling south of this station transferring to other bus services, increasing average travel times. There is also currently a “missing link” on the Veloway 1 (V1) Cycleway between Eight Mile Plains and Daisy Hill, reducing journey opportunities and amenity for cyclists.

Further to these issues, the current motorway does not comply with contemporary flood immunity standards, which impacts on the reliability of the motorway during heavy rainfall events.

## 4. Proposal

The primary objectives of the project are to improve the capacity, safety and reliability of the M1 Pacific Motorway to deliver benefits for business, tourist and commuter travel. In addition, the project seeks to improve the condition of the motorway to provide safer travel, and to improve public transport capacity to encourage mode shift.

To deliver these objectives, the scope of the project is to:

- Widen 8.5km of the northbound section of the motorway by providing five lanes between Paradise Road (at Daisy Hill) and Logan Road (at Springwood), four lanes between Logan Road and a new on-ramp at Lexington Road (at Underwood) and five lanes between Lexington Road and the Gateway Motorway (at Eight Mile Plains), in addition to the closure of the on-ramps at Sports Drive (at Underwood) and Paradise Road.
- Widen 1.1km of the southbound sections of the motorway by providing four lanes between Rochedale Road (at Springwood) and Fitzgerald Avenue.
- Extend the South East Busway by 3.8km from Eight Mile Plains Busway Station to Springwood Bus Station, and construct the new Rochedale Busway Station with park 'n' ride facilities.
- Extend the V1 Cycleway by constructing an off-road cycle path between Gateway Motorway (at Eight Mile Plains) and Logan Road (at Daisy Hill) and providing connections with nearby existing facilities.

The proponent states that the project, once delivered, will relieve northbound travel congestion in this section during the peak periods for the next 15 years, materially increase the average trip speed and provide capacity for more than 50,000 additional daily trips by 2041, a capacity increase of nearly 25%.

The project aims to improve the capacity, reliability and safety of the motorway, while also enhancing the capacity of the South East Busway and the Veloway 1 Cycleway. On this basis, it aligns with a range of Queensland Government policies, including *Our Future State: Advancing Queensland's Priorities (2018)*, *ShapingSEQ - South East Queensland Regional Plan (2017)* and *Queensland Plan (2014)*. The project also aligns with Infrastructure Australia's recommendations to make better use of existing assets and optimising infrastructure using technology.

## 5. Options identification and assessment

The base case is a 'do minimum' scenario, including committed and funded projects. The proponent has confirmed that the base case also includes unfunded projects. At a strategic level, these projects are not expected to have a material effect on the benefits of the proposed project.

The proponent previously submitted a Stage 2 submission (Initiative Identification and Options Development) to Infrastructure Australia, which identified and assessed a wide range of options to address the identified problem. This approach arrived at a shortlist of four preliminary options, and Infrastructure Australia recommended that the two best performing preliminary options should be investigated further in the Detailed Business Case.

The business case considered one of the best performing preliminary options (Project Option 1) against a public transport focussed option (Project Option 2), which was not part of the shortlist of options:

- Project Option 1 is the provision of northbound and southbound capacity improvements between Eight Mile Plains and Daisy Hill in addition to the extension of the South East Busway, upgrades to the V1 Cycleway and reconstruction of the existing motorway.
- Project Option 2 would extend the South East Busway and implement ramp metering upgrades, but exclude the widening of the existing motorway. The proposed alignment of the busway extension under the second project option utilises an alternative path to the preferred option to reflect the availability of land not being utilised by the widening of the motorway.

While it is important to consider a range of modal solutions, Infrastructure Australia recommends that the best performing options be identified through increasingly quantitative assessment tools during the shortlisting process. This is to ensure that the best performing options are assessed in the business case.

Notwithstanding the shortlisting issue above, the proponent has considered a wide range of sub-options in the appraisal, including various ramp and interchange configurations. The proponent has selected Project Option 1 as the preferred option.

## 6. Economic, social and environmental evaluation

The proponent's economic evaluation of the proposed project shows a NPV of \$212.9 million and a BCR of 1.40 at a 7% real discount rate using P90 capital costs, and excluding WEBs and travel reliability benefits.

Infrastructure Australia's analysis found that the assumptions and methodology used by the proponent in the economic evaluation are generally consistent with the Infrastructure Australia Assessment Framework.

Transport demand and traffic analysis was performed using two models: a strategic transport model to estimate regional network-wide demand changes; and a mesoscopic traffic model to estimate the local traffic performance of the proposed design. This approach is appropriate for estimating the impacts of a motorway project.

The variable trip matrix was adopted for the economic appraisal, which is a standard approach for this type of project. This approach allowed for some, but not all, of the induced demand effects (e.g. new trips) identified in the Australian Transport Assessment and Planning (ATAP) guidelines. Specifically, this model did not allow for people making additional trips or changing the time that they travel.

The benefit categories measured in the cost-benefit analysis are mostly typical for a road project. Over two-thirds of the benefits relate to travel time savings for cars, light vehicles and heavy vehicles. The balance of the benefits relate to fuel consumption savings, safety benefits, residual value and public transport user benefits.

During the evaluation, Infrastructure Australia noted the following limitations in the analysis:

- Fuel consumption benefits appear high for the project, compared with standard methods of calculation.
- Vehicle operating costs (excluding fuel) for the project appear high. These costs represent the estimated increase in maintenance, repairs and depreciation costs for vehicles following the delivery of the project. The proponent's modelling indicates that any fuel efficiency gains to all users from less stop-start driving are offset by these extra costs.
- The business case suggests that public transport station amenity improvements will result in 12% of total project benefits. Given that the primary objective of the project is to improve road capacity, this benefit appears high for a project of this nature. These benefits are primarily driven by the proposed new busway station at Rochedale, suggesting that there is significant amenity benefit between existing bus stations and the proposed busway station.
- Construction disbenefits have not been estimated for the project, even though the motorway is likely to have speed reductions in place for the duration of the construction period.
- The proponent has not measured the active transport benefits which should arise from addressing the "missing link" on the V1 Cycleway between Eight Mile Plains and Daisy Hill. These benefits may make a contribution to the overall economic benefit of the project.

After allowing for adjustments to the benefits to reflect these issues, Infrastructure Australia expects that the benefits of the proposed project will exceed the project costs.

## Benefits and costs breakdown

Proponent's stated benefits and costs		Present value (\$m, 2018) @ 7% real discount rate	% of total
<b>Car users</b>		<b>429.0</b>	<b>58%</b>
	Travel time savings	397.9	54%
	Car user Vehicle operating costs (excluding fuel)	-55.9	-8%
	Fuel consumption benefits	87.0	12%
<b>Light Goods Vehicles</b>		<b>37.3</b>	<b>5%</b>
	Travel time savings	37.0	5%
	Vehicle operating costs (excluding fuel)	-4.9	-1%
	Fuel consumption benefits	5.2	1%
<b>Heavy Goods Vehicles</b>		<b>84.0</b>	<b>11%</b>
	Travel time savings	70.7	10%
	Vehicle operating costs (excluding fuel)	3.3	0%
	Fuel consumption benefits	10	1%
<b>Public transport user benefits</b>		<b>108.4</b>	<b>15%</b>
	Trip time savings	21.3	3%
	User station amenity benefits	85.7	12%
	Fare benefits	1.4	0%
<b>Consumer Surplus as reflected in</b>		<b>24.0</b>	<b>3%</b>
	Government impacts – excise and GST on fuel	8.2	1%
	Government impacts – fare revenue	15.8	2%
<b>Other benefits</b>		<b>61.2</b>	<b>8%</b>
	Safety benefits	66.0	9%
	Emissions impacts	-11.7	-2%
	Residual value of assets	6.9	1%
<b>Total Benefits<sup>1</sup></b>		<b>\$743.8</b>	<b>100%</b>
<b>Costs</b>			
	Capital costs (P90)	\$491.9	90%
	Operating costs	\$39.1	10%
<b>Total Costs<sup>1</sup></b>		<b>\$530.9</b>	<b>100%</b>
<b>Core results</b>	<b>Net benefits - net present value (NPV)<sup>2</sup></b>	<b>\$212.9</b>	n/a
	<b>Benefit–cost ratio (BCR)<sup>3</sup></b>	<b>1.40</b>	n/a

Source: Proponent's Business Case Submission (Stage 4 Template)

Notes:

(1) Totals may not sum due to rounding.

(2) The net present value is calculated as the present value of total benefits less the present value of total costs.

(3) The benefit cost ratio is calculated as the present value of total benefits divided by the present value of total costs.

A breakdown of the proponent's reported capital costs and funding is presented in the table below.

### Capital costs and funding

Total capital cost (P90, nominal, undiscounted)	\$746.9 million
Proponent's proposed Australian Government funding contribution	\$373.5 million (50:50 Australian Government to State Government split)
Other funding (source / amount / cash flow) (nominal, undiscounted)	\$373.4 million from the Queensland Government

## 7. Deliverability

The proponent states that the project is anticipated to take approximately five years to complete and will be delivered through multiple works packages, including an early works package and two primary construction packages. This packaging approach appears appropriate given the differences in the scope of the packages and the timing of the works. Construction is currently planned to commence in 2020.

The two primary packages will be delivered as Construct Only contracts in order to allow the proponent to address known project risks during the detailed design phase. The delivery model was selected with consideration given to the characteristics of the project, namely the delivery of the project within a constrained corridor with known design and environmental issues. In selecting the Construct Only contract approach, the proponent considered a range of other procurement approaches, including Alliance and Public Private Partnership models.

The project will be delivered by the Queensland Government, in consultation with local councils who are the owners and operators of several road connections impacted by the project. The proponent intends to consult with the community during design development for the project, particularly related to the closure of existing off-ramps, which have been identified as a key project risk. The proponent has identified other major risks for the project as geotechnical and pre-construction risks, and these have informed the early works packaging approach adopted for the delivery of the project.

The cost estimate peer review report concluded that no significant omissions were identified in the cost estimate, that the cost estimate had been prepared in accordance with the relevant cost estimating manual, and that unit item costs within the capital cost estimate were generally reflective of efficient prices for Queensland road construction.

As part of best practice project development, Infrastructure Australia recommends a Post Completion Review of the project be conducted to accurately gauge whether it delivered the expected levels of service, and to identify any lessons that could be used to inform future projects. This will be particularly important for this project, given that it is part of a broader program of works on the M1 Pacific Motorway.

The business case includes a strategic benefits realisation plan that recommends the outcome of the Reference Project's benefits evaluation be presented to the proponent at project closure, but does not include a full Post Completion Review Plan.

The proponent has considered a range of funding approaches, including road user charges. The proponent considered the application of a toll on this section of the M1 Pacific Motorway to be inappropriate as the M1 Pacific Motorway is part of the NLTN and there is no practical alternative route.