



## Infrastructure Australia

### Project Business Case Evaluation

<b>Project name</b>	M1 Pacific Motorway – Mudgeeraba to Varsity Lakes widening from four to six lanes
<b>Rating</b>	Priority Project
<b>Date of IA Board rating</b>	May 2016

<b>Location</b>	Gold Coast, Queensland
<b>Proponent</b>	Queensland Government
<b>Project timeframe</b>	<ul style="list-style-type: none"><li>• Detailed design late 2016</li><li>• Early works late 2017</li><li>• Contractor procurement early 2018</li><li>• Construction mid-2018 to late-2019</li></ul>

#### Evaluation Summary

The Mudgeeraba to Varsity Lakes section of the M1 Pacific Motorway carries up to 90,000 vehicles per day, a volume which exceeds the practical capacity of the current four lane motorway. Traffic demand for this section of the motorway is growing, and is expected to exceed 110,000 vehicles per day by 2036. The *Australian Infrastructure Audit* (the Audit) projected that, in the absence of intervention, the cost of congestion in the corridor would increase from \$26 million in 2011 to \$125 million in 2031. The freight task on this section, currently 7,000 heavy vehicles per day, is growing at 3–4% per year.

The project proposes to widen a 5km section of the motorway from four to six lanes between Mudgeeraba Road/Robina Town Centre Drive (Mudgeeraba) and Reedy Creek Road (Varsity Lakes). This will involve widening the motorway into the central median area, providing a central concrete barrier, reconstructing the Mudgeeraba Creek bridges, and lengthening entry and exit ramps. The upgrade proposal includes installation of managed motorway enabling technologies which are proposed to become operational when the entire Nerang to Tugun section is upgraded.

The project would provide an additional 50% in traffic capacity, which is expected to address congestion on the section for the next 15–20 years. It would complement recently completed upgrades between Nerang and Tugun.

The benefit-cost ratio (BCR) stated by the proponent is 3.5, using a 7% discount rate and P90 capital cost estimate. Infrastructure Australia has identified a number of risks to achieving this BCR, primarily relating to the traffic modelling used in developing the business case, and the calculation of time savings. However, after allowing for adjustments to the BCR to account for these risks, Infrastructure Australia remains confident that the benefits of the project would exceed its costs.

The P90 estimated capital cost for the project is \$220 million. The proponent is seeking an Australian Government contribution of 80%.

## Context and Problem Description

### 1. Strategic context

The M1 Pacific Motorway between Brisbane and Tugun is part of the National Land Transport Network connection between Sydney and Brisbane. It is an important link for freight, providing a connection between northern NSW and the Gold Coast, Acacia Ridge freight terminal, Brisbane CBD, the Port of Brisbane/Australia Trade Coast precinct, and Brisbane Airport. It is also a key connection to the Gold Coast for international and domestic tourists. The Nerang to Tugun section of the corridor, which encompasses the Mudgeeraba to Varsity Lakes section, is one of the most congested sections on this corridor.

The Gold Coast population is growing rapidly. Queensland Government projections (medium growth) show that the area's population could grow by more than 350,000 people, or 68%, between 2011 and 2031.

### 2. Problem description

The Mudgeeraba to Varsity Lakes section of the M1 currently carries 90,000 vehicles per day, which exceeds the practical capacity of the four lane motorway. Analysis conducted by the proponent indicates that during peak periods, which include weekends, the motorway is operating at capacity, causing irregular traffic flow. This is broadly consistent with modelling undertaken as part of the Audit, which found the section is operating at capacity across much of the day.

Traffic demand for this section of the motorway is forecast to exceed 110,000 vehicles per day by 2036. This will result in additional congestion on the corridor. The freight task in the corridor is expected to increase by 3–4% per year over this period, compared to growth of 1–2% per year for traffic overall. This reflects the growing importance of freight on the route.

Congestion on the M1 Pacific Motorway is a nationally significant problem because of both its scale and its impact on the National Land Transport Network. The high volume of traffic on the section leads to:

- Unreliable travel times
- Higher risk of accidents
- Heavy congestion during peak periods, increasing vehicle operating costs and air pollution
- Accelerated deterioration of the road asset due to overuse.

## Project description

### 3. Project overview

The project proposes to widen a 5km section of the motorway from four to six lanes between Mudgeeraba Road/Robina Town Centre Drive (Mudgeeraba) and Reedy Creek Road (Varsity Lakes). This will involve widening the motorway into the central median area, providing a central concrete barrier, reconstructing the Mudgeeraba Creek bridges, and lengthening entry and exit ramps. The upgrade proposal includes installation of managed motorway technologies, which are proposed to become operational when the entire Nerang to Tugun section is upgraded.

The project would provide an additional 50% in traffic capacity, which the proponent expects will address congestion on the section for the next 15–20 years. It would complement recently completed upgrades between Nerang and Tugun.

The proponent's objectives for project are to:

- Reduce congestion
- Improve travel time reliability
- Improve safety
- Maximise freight efficiency and allow adequate capacity for freight
- Service the increase in traffic using the Pacific Highway corridor in preference to the New England /Cunningham Highway inland corridor following ongoing upgrades to the Pacific Highway in NSW
- Integrate with Gold Coast City Council planning directions.

## **Business Case and Economic Evaluation**

### **4. Options identification and assessment**

The Mudgeeraba to Varsity Lakes upgrade project is part of Queensland's overall plan to improve capacity on the M1 Pacific Motorway between Brisbane and Tugun.

The preferred option between Mudgeeraba and Robina was selected from five options, which were assessed against a range of criteria and compared using a rapid BCR. The project options all had similar BCRs, with the preferred option having lower capital costs. Based on this outcome, the proponent then developed four options for the Robina to Varsity Lakes section of the project corridor. The preferred option had the highest BCR and was generally more closely aligned with the qualitative criteria.

The options analysis conducted by the proponent has evaluated a range of engineering options consistent with the Department of Transport and Main Roads' eight-lane master plan configuration for the M1 between Nerang and Varsity Lakes. The options assessment methodology appears to have selected the option which maximise economic benefits relative to costs, and is consistent with the master plan.

The options assessment did not consider options beyond the proposed motorway upgrade. The proponent did not consider non-motorway solutions, however the Queensland Government has recently delivered major infrastructure upgrades to the Gold Coast and Beenleigh rail lines, as well as the Gold Coast Light Rail. The proponent did not assess non asset solutions. Infrastructure Australia encourages proponents to investigate regulatory solutions to addressing road congestion, including road pricing.

### **5. Economic evaluation**

Traffic demand was estimated using two separate traffic models: a micro simulation model, and a strategic model. This approach was taken to ensure both local traffic redistribution and broader network impacts could be assessed. The two models yielded different results, reflecting their different approaches.

The proponent used results from both models in developing the BCR. The stated BCR is 3.5, using a 7% discount rate and P90 costs. The BCR does not include wider economic benefits.

The two underlying models produced different BCRs. The stated BCR for the project using the micro simulation model is 2.6 (7% discount rate and P90 costs). This model indicates a decrease in vehicle hours travelled and a small decrease in vehicle kilometres travelled compared to the base case. The stated BCR for the project using the strategic model is 4.3 (7% discount rate and P90 costs). The strategic model indicates a decrease in vehicle hours travelled and an increase in the vehicle kilometres travelled.

Neither model considered induced demand across the network. The inclusion of induced demand in the modelling can reduce project benefits if the expanded network in the project option reaches capacity before the end of the evaluation period.

The benefits measured in the cost benefit analysis are standard for a road project. However, analysis indicates that:

- Vehicle operating cost savings were estimated using a stop-start model, where a free flow model may have been more appropriate. Use of a stop-start model would likely overstate the project benefits.
- Vehicle operating costs savings are relatively small for a project of this type. It is unclear why the estimate is so low, and it is possible that this benefit has been understated.
- The proponent assumed that widening the motorway from four to six lanes would reduce the accident rate by more than half. This is not consistent with the Department of Transport and Main Roads appraisal guidelines, or demonstrated with substantive evidence.
- The time savings applied in the strategic model are likely to overstate the benefit as, in the analysis, the benefit grows at a faster rate than the time saving.

The cost estimates provided are estimated on a P90 and P50 basis. Costs used by the proponent in the economic analysis excluded real escalation, which could lead to costs being slightly understated.

These issues could impact the BCR. However, after allowing for adjustments to the lowest of the three stated BCRs to reflect these issues, Infrastructure Australia is confident that the project will realise a BCR higher than 1.

### Major cost items

- Capital costs: \$220.6 million (nominal, P90)
- Operating costs: Not provided by the proponent

Total capital cost (nominal, undiscounted)	\$220.6 million (P90)
Proponent's proposed Australian Government funding contribution (nominal, undiscounted)	\$176.4 million (80:20 Australian Government to State Government split)
Other funding (source / amount / cash flow) (nominal, undiscounted)	\$44.1 million from Queensland Government

### Major sources of benefit

- Travel time savings (\$481.3 million present value in proponent's business case; 91% of benefits);
- Vehicle operating cost savings (\$398,000 present value in proponent's business case; less than 1% of benefits);
- Crash cost savings (\$29 million present value in proponent's business case; 6% of benefits);
- Residual value and environmental benefits (\$16.1 million present value in proponent's business case; 3% of benefits).

### Deliverability

Project development is still at an early stage, so much of the work relating to deliverability has yet to be completed. Detailed design for the project is scheduled to be completed by late 2016, so risk assessments and construction timelines are preliminary at this stage. Once the final design is completed, the proponent will be able to provide more detail.

A benefits realisation plan has been developed for the project, which includes reporting and monitoring of actual benefits to address Australian and Queensland Government performance reporting requirements. Should the project proceed, Infrastructure Australia recommends the proponent undertake a post-completion review after the project has commenced operations, to assess whether projected benefits have been realised.

The overall upgrade of the M1 Pacific Motorway has been broken down into short segments. This provides packages of work for which there is considerable competition between contractors. This approach has generated savings in the order of 20–30% in delivering other sections of the M1 Pacific Motorway upgrade. The full benefits of the managed motorways component of the project will not be realised until the overall corridor upgrade is complete.

The proponent has not investigated opportunities for user charging for the project, arguing that options are limited given the project relates to improving existing infrastructure. The proponent also argues that the opportunity to seek developer contributions is also limited as the surrounding area is already well developed.