



Infrastructure Australia

Project Business Case Evaluation

Project name	Ipswich Motorway (Rocklea to Darra) Stage 1c (Package 1)
Rating	High Priority Project
Date of IA Board rating	May 2016

Location	Brisbane, Queensland
Proponent	Queensland Government
Project timeframe	Tender process April 2016 – October 2016 Design and construction 2016-17 to 2020-21

Evaluation Summary

The Ipswich Motorway is one of the three busiest freight corridors in Queensland. It is the principal corridor between Ipswich and Brisbane, and is a nationally recognised Key Freight Route. The section between Rocklea and Darra is used by 10,000–12,000 heavy vehicles a day, representing 15–18% of all traffic. The 7km section is a strategically significant link within metropolitan Brisbane. It connects the western sections of the Ipswich Motorway and the Centenary Motorway to the Brisbane Urban Corridor.

The project seeks to address the lack of road capacity along the corridor, which results in congestion and extensive delays. Congestion imposes considerable costs on the economy and the community. The *Australian Infrastructure Audit* (the Audit) projected that, in the absence of intervention, the direct cost of congestion along the Ipswich Motorway corridor would be around \$42 million in 2011 (\$2011) and is likely to increase over time to \$139 million (\$2011) in 2031.

A previous version of the business case was reviewed by Infrastructure Australia in June 2013 and was rated at the then *Threshold* rating. That business case costed the first stage of the Rocklea to Darra upgrade (Stage 1c – full Package 1) at \$558 million.

During 2015, a reference design was developed for a reduced scope (Stage 1c – Package 1) which has an estimated capital cost \$399.6 million (P90). This would deliver:

- An additional lane in both directions along an approximately 2 km section of the motorway between Oxley Road and Suscatand Street;
- The closure of three motorway ramps;
- The upgrade of three ramps;
- A new one-way southern service road from Boundary Road to Factory Road;
- Pavement rehabilitation along the section between Granard Road and Suscatand Street; and
- Upgrade of bridges over Oxley Creek and Little Doris Creek.

The benefit-cost ratio (BCR) stated by the proponent for the current project is 3.8 using a real discount rate of 7% and P90 cost estimate. Based on sensitivity analyses undertaken by the proponent and evaluation of the materials provided by the proponent, Infrastructure Australia is confident the benefits of the project would exceed the costs.

The Queensland Government is seeking \$199.8 million in Commonwealth funding for the upgrade of the Ipswich Motorway between Rocklea and Darra. The Rocklea to Darra section is the final stage of the six-stage upgrade of the Ipswich Motorway.

Context and Problem Description

1. Strategic context

The Ipswich Motorway is one of the three busiest freight corridors in Queensland. It is the principal corridor between Ipswich and Brisbane, and is a nationally recognised Key Freight Route. It connects western sections of the Ipswich Motorway and the Centenary Motorway to the Brisbane Urban Corridor.

Significant upgrades have recently been completed on these routes, including:

- The completed Ipswich Motorway Upgrades (Ipswich/Logan Interchange, completed in 2009, Dinmore to Goodna upgrade, completed in 2012, and Wacol to Darra upgrade, completed in 2010);
- Granard Road interchange and road widening (completed in 2006); and
- The Centenary Motorway Extension (Springfield to Yamanto, completed in 2009).

The section between Rocklea and Darra is used by 10,000–12,000 heavy vehicles a day, representing 15–18% of all traffic. The Motorway services the Acacia Ridge Intermodal Terminal, Archerfield Airport and the Brisbane Produce Market in Rocklea. Current levels of congestion are causing inefficiency in freight movements.

2. Problem description

The Ipswich Motorway upgrade is seeking to address the lack of road capacity along the corridor, which results in congestion, extensive delays and poor travel time reliability. Congestion imposes considerable costs on the economy and the community. The *Australian Infrastructure Audit* (the Audit) projected that, in the absence of intervention, the direct cost of congestion along the Ipswich Motorway corridor would be around \$42 million in 2011 (\$2011) and is likely to increase over time to \$139 million (\$2011) in 2031.

The proponent estimated that, by 2031, average travel times will increase to 25 minutes in eastbound AM peak and 23 minutes in westbound PM peak. The eastern section of the Ipswich Motorway between Rocklea and Darra is already at capacity and the western section is expected to reach capacity in the near future. The proponent also identified a high number of on/off ramps in the project area that encourage local trips on the motorway, which impose delays on longer distance trips.

The project primarily addresses the lack of road capacity along the corridor, which results in congestion. The problems identified by the proponent are:

- Lack of capacity: The existing four lane motorway does not provide adequate capacity to meet travel demand. The Rocklea to Darra section of the Ipswich Motorway also has sub-standard ramp arrangements with a high number of access ramps and closely spaced interchanges. These factors have led to increased traffic congestion and travel delays.
- Unreliable travel times: Road users experience unreliable travel times due to frequent flow breakdown and stop-go conditions during peak periods and when crashes occur.
- Poor safety record: 485 crashes occurred along the project area between 2000 and 2008. The high number of crashes is in part a result of high traffic volumes, high percentage of local trips being made on the motorway, poor geometry and sub-standard on and off ramp arrangements.
- Poor local connectivity and cross-motorway connections: The broader network has poor access and connectivity and missing service roads (i.e. local roads).
- Poor flood immunity: The Ipswich Motorway spans the Oxley Creek floodplain between Boundary Road at Rocklea and the Blunder Road/Oxley Road intersection at Oxley. The Ipswich Motorway is susceptible to flooding, either by flood waters backing up from a flood in the Brisbane River; from local flood flows in the Oxley Creek catchment; or a combination of both.
- Poor active transport opportunities: Missing service road links, poor connectivity in the area and a high crash environment currently do not encourage active transport, such as walking and cycling.

Managed motorway works have not been included in the current scope of the project, but have been included in the master plan for the corridor. The Queensland Department of Transport and Main Roads is seeking to implement a

managed motorway program across South East Queensland. Managed motorways will help to ease congestion along existing transport corridors, and will likely ease congestion in the project area.

Project description

3. Project overview

The proponent has developed a master plan for the full upgrade of the 7km Rocklea to Darra section of the Ipswich Motorway to six lanes. The Stage 1c (Package 1) works proposed in the 2016 submission will deliver only part of the master plan.

The first stage of the upgrade (Stage 1c) consists of three packages:

(1) *Package 1*. During 2015, a reference design was developed for a reduced scope (Stage 1c, Package 1) upgrade project, with an estimated capital cost of \$399.6 million (P90 outturn). It includes:

- An additional lane in both directions along an approximately 2km section of the Ipswich Motorway between Oxley Road and Suscatand Street;
- Upgrade of bridges over Oxley Creek and Little Doris Creek;
- Pavement rehabilitation along the section between Granard Road and Suscatand Street;
- Construction of a one way southern service road from Boundary Road to Factory Road across Oxley Creek flood plain;
- Ramp rationalisation (removal of three motorway ramps);
- Upgrade of off-ramps at Suscatand Street and Factory Road westbound; and
- Upgrade of Oxley Road eastbound on-ramp.

This package does not include managed motorway works, which is part of the master plan upgrade.

The proponent has indicated that the balance of works in the original Package 1 will need to be implemented before 2026 to maintain a reasonable level of service along the motorway. These works include:

- Managed Motorway treatments;
- Factory Road local road improvements;
- Additional ramp rationalisation;
- Northern service road across the Oxley River; and
- Granard Road intersection connection with northern service road.

The proponent has indicated that these works will be considered during procurement as possible additional modifications to the scope of the project, where they can be completed within the proposed funding envelope. Approval for any extension of the scope of the project would be sought by the proponent from the Commonwealth Government.

(2) *Package 2* proposes to upgrade the Oxley/Blunder road interchange.

(3) *Package 3* proposes to construct a new Boundary Road connection across Oxley Creek.

Following completion of Stage 1c, the remainder of the Ipswich Motorway from Oxley to Darra would be upgraded in accordance with the master plan. The staging of future works has not been developed and these works would not be required until 2031.

Business Case and Economic Evaluation

4. Options identification and assessment

The project option assessed in the cost-benefit analysis was shortlisted by the proponent using two steps:

- Development of the preferred master plan scheme for the whole Rocklea to Darra section on Ipswich Motorway; and
- Evaluation of staging options to deliver the master plan.

This options analysis was previously evaluated by Infrastructure Australia in June 2013.

Development of the master plan

During the preliminary evaluation stage, the proponent evaluated a range of engineering options to address the stated problems and reviewed a planning concept study to upgrade the entire Ipswich Motorway from Dinmore to Rocklea, which was prepared in 2003. This resulted in the development of two master plan schemes. The preferred master plan had lower costs and was assessed by the proponent to have superior operational performance.

The options assessment did not consider a range of options beyond the proposed motorway upgrade. Broader options such as governance and regulatory reform were not considered, nor was there any assessment of public transport options to address the identified problems. In particular, the proponent has not evaluated the impact of efficient road pricing on the project. Infrastructure Australia encourages proponents to investigate regulatory solutions to addressing road congestion, including road pricing.

Evaluation of staging options

From the master plan, the proponent initially developed two first stage options (Stages 1a and 1b) and five smaller and more affordable options.

The five smaller options were evaluated against a number of key performance criteria, including extending asset life, reliability improvements, safety, cost, and BCRs developed under a rapid cost-benefit analysis. Two options were rejected. The remaining three options were combined to form a third first stage option (entitled "Stage 1c").

In the 2012 business case, the proponent evaluated the three first stage options: Stages 1a, 1b and 1c. Stage 1c was selected as the preferred project option as it had the highest BCR, and was most consistent with the master plan upgrade.

The preferred option (Stage 1c) is to be delivered in the following order:

- Package 1 – as defined in Section 3 above;
- The remainder of works in the original Full Package 1 – as defined in Section 3 above;
- Package 2 – the upgrade of the Oxley/Blunder road interchange; and
- Package 3 – the construction of a new Boundary Road connection across Oxley Creek.

5. Economic evaluation

The proponent's stated BCR for Stage 1c (Package 1) of the project is 3.8 using a real discount rate of 7% and P90 cost estimate. The proponent has not estimated wider economic benefits (WEBs) in the cost-benefit analysis; however, WEBs are not expected to be large or significant for this project.

Traffic modelling has been conducted examining the performance of Stage 1c (Package 1). Demand has been modelled using a fixed matrix micro simulation model. This method does not allow for induced demand. This might overstate the benefits if the road corridor reaches network capacity before the end of the evaluation period. The traffic modelling results have been incorporated into the cost-benefit analysis using standard approaches to estimate the benefits.

Costs, however, have been incorrectly incorporated into the cost-benefit analysis. Nominal costs have been used instead of real costs (i.e. costs after inflation has been excluded). This will overstate the present value of costs. Also, the timings of the capital costs in the cost benefit analysis do not match the timings of capital costs from the cost report.

The key risks in the proponent's stated BCR for Stage 1c (Package 1) are as follows:

- The transport modelling has not allowed for induced demand, which may reduce net benefits if the expanded network reaches capacity before the end of the evaluation period;
- The proponent has assumed that benefits will remain constant from 2026 onwards. As demand continues to increase, average speeds may converge to those in the base case and reduce future benefits; and
- A project of this type would normally result in avoided crash costs as a result of reduced weaving in traffic and rear end congestion related crashes. This is not reflected in the cost-benefit analysis as the proponent has assumed the crash rate remains constant under both the base case and the project case, resulting in additional crash costs in the option.

Taking into account the risks noted above, Infrastructure Australia is confident that the BCR exceeds 1.

Major cost items

- Capital costs: \$399.6 million nominal (P90)
- Operating costs: \$2.2 million per annum.

Total capital cost (nominal, undiscounted)	\$399.6 million (P90)
Proponent's proposed Australian Government funding contribution (nominal, undiscounted)	\$199.8 million
Other funding (source / amount / cash flow) (nominal, undiscounted)	\$199.8 million from the Queensland Government

Major sources of benefit

- Travel time savings (\$884.7 million present value, 72% of benefits);
- Vehicle operating cost savings (\$341.3 million present value, 28% of benefits);
- Other dis-benefits (causality crash costs and environmental benefits) (-\$3.3 million present value, 0% of benefits); and
- Reduced flood risks (not quantified by the proponent).

Deliverability

The delivery of Ipswich Motorway (Rocklea to Darra) upgrade is to be undertaken in stages, with Stage 1c divided into three packages. The 2016 submission is concerned with the delivery of Package 1, the first works to be undertaken in the project. The preferred delivery arrangement is "double" early contract involvement due to the risk profile and complexity of the upgrade. This procurement approach involves selecting two design and construct companies to prepare concept designs and undertake pricing. One of the tenderers is then selected to undertake the project, while the unsuccessful party is compensated for their efforts and for their project-related intellectual property.

The proponent has indicated that if the project can be delivered in small staging packages, the preferred delivery method would be reviewed to determine the most appropriate development stage.

The Queensland Government has committed funding for 50% of the Stage 1c (Package 1) budget with the expectation of the Commonwealth Government contribution of 50%. 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.

A risk assessment was conducted in the 2012 business case for the master plan upgrade. This was updated in 2015 as part of the reference design process, based on a high-level constructability program, further geotechnical investigations, public utility plant potholing investigations, and other technical analysis. Most of the project's risks relate to pre-construction and during the delivery stage. Key specific risks to the delivery of project benefits include:

- changes in scope – due to external government requirements, reduction in the amount of funding available or other reasons; and
- extended delivery time.

The proponent has indicated that increases in the scope of the project, such as managed motorways, will be investigated during procurement to determine if they could be delivered within the proposed funding envelope. Approval for these changes to the scope of the project would be sought by the proponent from the Commonwealth Government, but may also add some upside gains to the benefits of the project.

The proponent also notes that there are considerable risks around the delivery of the master plan upgrade due to uncertainty around the funding of future stages of the project. The proponent has indicated that further upgrades will be required to maintain an adequate level of service along the corridor, as this Stage 1c (Package 1) will not completely resolve the identified problems.

As part of best practice project development, Infrastructure Australia recommends that a post-completion review be undertaken after the project has commenced operations to assess if the proposed works have led to higher levels of network performance on the Rocklea to Darra section of Ipswich Motorway and the proposed project objectives have been achieved.