

BRUCE HIGHWAY—CAIRNS SOUTHERN ACCESS CORRIDOR
STAGE 4—KATE STREET TO AUMULLER STREET
DETAILED BUSINESS CASE 2017

BUSINESS CASE SUMMARY



Purpose of this document	This document provides an overview of the Bruce Highway—Cairns Southern Access Corridor Stage 4—Kate Street to Aumuller Street Detailed Business Case 2017. The objectives of this document are to outline the key aspects of the project and provide transparency as to how the business case was developed and may be implemented.
Status	This summary was prepared based on the contents of the detailed business case presented to the Building Queensland Board in Q3 2017. The information presented may be subject to change as the proposal progresses through future stages of development, delivery and operations.



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1 Summary information

Project name	Bruce Highway—Cairns Southern Access Corridor Stage 4—Kate Street to Aumuller Street (K2A)	
Proposal owner	Department of Transport and Main Roads	
Proposed delivery agency	Department of Transport and Main Roads	
	P50	P90
Capital cost of proposal ¹	\$97 million	\$104 million
Incremental ongoing costs of proposal ²	\$1.4 million	\$1.4 million
Economic net present value (NPV)	\$103 million	\$96 million
Benefit cost ratio (BCR)	2.4	2.2

¹ Nominal capital cost estimates are undiscounted 2017 dollars and have been rounded to the nearest million.

² Incremental ongoing costs estimates are for the 30 years following construction period of the infrastructure initiative.



2 Proposal overview

The Bruce Highway is part of the National Land Transport Network, connecting Cairns to the vast majority of Queensland and servicing both intra and inter-regional movements. It is the primary freight access to Cairns, handling more freight than the Port of Cairns and the North Coast Rail Line.

The Cairns Bruce Highway Upgrade Master Plan (CBHUMP)³ is the strategic planning instrument under which the Cairns Bruce Highway projects are based. This planning instrument provides an assessment of the future needs of the Bruce Highway between Gordonvale and Cairns, and a strategy for how these needs should be met by a targeted, as well as progressive upgrade of the link.

The Kate Street to Aumuller Street (K2A) upgrade of the Bruce Highway (Ray Jones Drive) was identified in the CBHUMP as Stage 4. Stage 1 has been implemented, Stage 2 (Foster Road to Robert Road) is under construction, and Stage 3 (Edmonton to Gordonvale) is the subject of a detailed business case developed in a partnership with Building Queensland and the Department of Transport and Main Roads. Also identified within the CBHUMP was the Earville Bypass (stage 6). The staging sequence is still very relevant, although the economic downturn has reduced traffic growth and extended the initial delivery time frames.

K2A is identified in the National Partnership Agreement on Land Transport Infrastructure Projects⁴ 2014 (NPA). The NPA committed funding of \$135 million to K2A, which was timed to be delivered beyond 2019. However, more recently the Minister for Main Roads announced on 7 June 2016, "... acceleration would bring forward construction to mid-2018 ...".

The key objectives of the proposal are to:

- alleviate current and future delay and queueing experienced on Ray Jones Drive from Kate Street to Aumuller Street and the associated intersections
- provide priority for efficient freight movements and tourism traffic
- improve and maintain safety for users including motor vehicles, cyclists, and pedestrians
- improve reliability of the link through reduction in the frequency of accidents and travel time.

A schematic map of the project area is presented in Figure 1.

³ 2010 published by the Queensland Department of Transport and Main Roads

⁴ Australian Government will provide 80% project costs, capped up to a contribution of \$108 million subject to Queensland providing 20% of project costs.

http://investment.infrastructure.gov.au/files/national_partnership_agreement/NPA_Schedule_QLD_May_2017.pdf

http://investment.infrastructure.gov.au/about/resources/national_partnership_agreement.aspx



Figure 1 Kate Street to Aumuller Street (K2A) project area

3 Service need and problem identification

The K2A section of the Bruce Highway is classified as an urban arterial road and is a direct route from the south of Cairns to the central business district (CBD). The linear nature of Cairns results in the Bruce Highway being the only arterial road from the south, until it reaches a junction at the south-western end of the study area with Mulgrave Road. This means that all movements to and from the south are conveyed through the constrained corridor, rather than by the radial effect that is typical of other cities.

The K2A section of the Bruce Highway serves as the principal access to the CBD from the south of Cairns, which is a major growth area. The link is used as a direct access to the following significant land uses:

- Cairns CBD
- Port of Cairns
- Cairns sugar terminals
- high, medium and low impact industries including the marine vessel construction and maintenance industry
- HMAS Cairns Naval Base
- the Cairns rail yards and numerous associated freight handling areas
- the Cairns fuel tank farm
- the Portsmouth Transfer Station.

The primary drivers for investment in K2A are congestion, safety and freight efficiency. This section of the Bruce Highway experiences significant delays during morning and evening peaks, has a high crash rate, and carries heavy and commercial vehicles associated with the link freight task. Increasing industry diversification, densification of the CBD, and urban expansion to the south of Cairns are resulting in forecast traffic growth beyond the reliable capacity of the existing infrastructure. By 2033, the entire link will be operating at level of service F. This is demonstrated in Figure 2 and Figure 3.

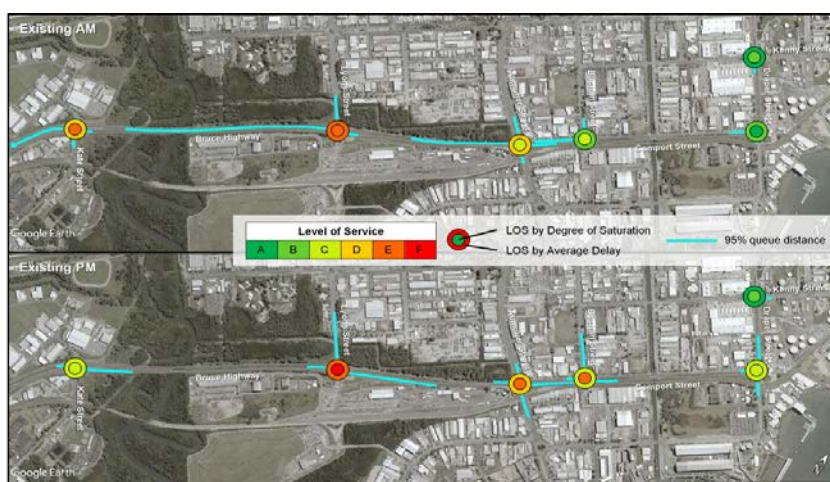


Figure 2: Current level of service

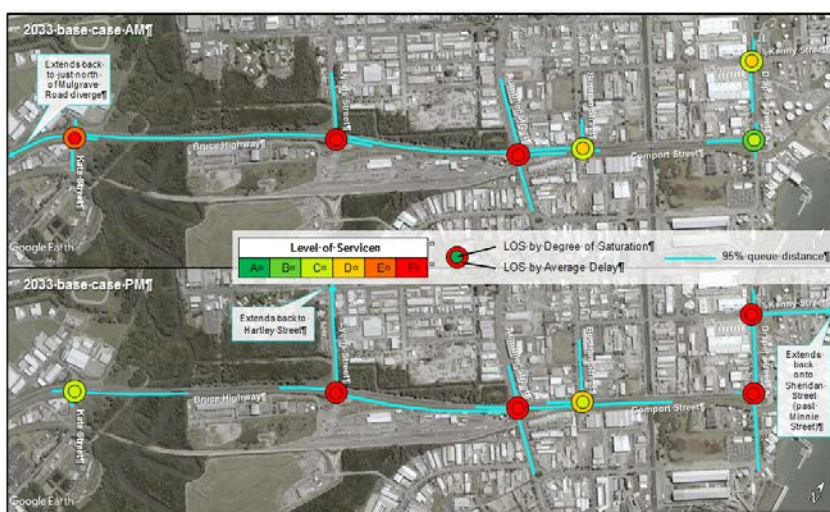


Figure 3: 2033 Level of service (without project)

The corridor runs directly through the highest employment zone in Cairns and provides a direct connection between the Cairns Southern Growth corridor and the Cairns CBD. The proposed Mt Peter Urban Development, between Gordonvale and Cairns, is a key component in the delivery of the Far North Queensland Regional plan and will have an ultimate population capacity of up to 50,000. The southern growth corridor is forecast to grow by approximately 40,000 persons and 21,000 jobs by 2036. This would be equivalent to 45 per cent of the overall population growth in Cairns and 51 per cent of jobs growth by 2036. Based on these population and employment forecasts, by 2036, 30 per cent of all persons in the Cairns area would be living in the Southern Growth Corridor and 23 per cent of all jobs would be located there.

Currently, during the morning peak the Lyons Street and Kate Street intersections are both at capacity operating with a Degree of Saturation (DoS) between 0.95 and 1.00. The Aumuller Street intersection is operating within capacity; however, this is in part because traffic volumes to the intersection are constrained by the capacity of the Kate Street and Lyons Street intersections to cater for all eastbound traffic including the high-volume movements to the CBD and the north of the corridor. As such, it is predicted to require increased capacity following the increase in capacity of Kate Street and Lyons Street intersections.

In the evening peak, westbound movements at signalised intersections along the Bruce Highway are operating within capacity. However, the Lyons Street north, Aumuller Street south, and Buchan Street approaches are all at capacity to accommodate the westbound through traffic. The largest delays are experienced on Lyons Street, where delays can exceed three minutes.



SIDRA⁵ intersection analysis was used to assess the assumed 2033 conditions without the project, prior to the Earlvile Bypass, and also to inform and guide options development and assessment. AIMSUN⁶ modelling was then used to quantify the full benefits of the preferred option and provide inputs to economic analysis.

The analysis shows the Kate Street, Lyons Street and Aumuller Street intersections would all exceed capacity in the morning peak by 2033. Inbound traffic would form a constant queue on the Bruce Highway from the Mulgrave Road diverge to the Buchan Street intersection.

Similarly, the analysis shows during the evening peak, the Lyons Street, Aumuller Street, Draper Street, and Kenny Street intersections would all exceed capacity with a constant queue of outbound traffic forming from Lyons Street to Fearnley Street and from Draper to Sheridan Street (past Minnie Street in the Cairns CBD). Queues on the southern approaches to Bruce Highway / Aumuller Street and Comport Street / Draper Street intersections would be back to Cook Street; and queues on the northern approach to Bruce Highway / Lyons Street intersection would extend past Hartley Street. The extent of these queues would affect wider network operations across the peak period. Analysis also demonstrates that the average speed through the network would reduce by 45 per (AM peak) and by 55 per cent (PM peak) between 2016 and 2033.

The project will look to counter these service need elements, specifically with relation to reducing congestion, increasing safety and improving freight efficiency in the region.

4 Options assessment

The preliminary evaluation for the project, completed in May 2017, considered three out of 14 options assessed in the Strategic Assessment of Service Requirements stage.

Assessment of these three options during the detailed business case determined that an increase in lane capacity was the only option that fully met the project service requirements. The following sub-options around increased lane capacity were then developed:

- Option 7.1: Widen to the outside of the existing carriageways and bridges.
- Option 7.2: Widen inbound carriageway and bridge on the median side and outbound carriageway and bridge on the outside.
- Option 7.3: Widen inbound and outbound carriageways and bridges to the median side.
- Option 7.4: Provide additional carriageway for inbound traffic and reuse existing carriageways and bridges for outbound.

In addition, an intersection upgrade was proposed at Lyons Street that included a signalised option and a grade-separated right turn option from Lyons Street outbound onto Ray Jones Drive.

5 Reference project

The reference project is a new road infrastructure project with the following features:

- a new inbound carriageway and bridge
- widening of the existing outbound carriageway and bridge
- demolition of the existing inbound bridge and carriageway

⁵ SIDRA is a proprietary software package used to support transport modelling.

⁶ AIMSUN is proprietary software package used to support transport modelling.



- intersection upgrades at Lyons St, Aumuller St, and Buchan St
- appropriate ground treatments to manage differential settlements of landfill refuse and soft clays
- upgrade of the Draper Street/Comport Street and Draper Street/Kenny Street intersections⁷.

During the preliminary evaluation stage, the base case assumed that upgrades to Comport Street/Draper Street and Draper Street/Kenny Street intersections and approaches would be completed prior to K2A. It was assumed that as the Kenny/Draper Street section is a state-controlled road, and not part of the National Land Transport Network and that it would be ineligible for the funding already identified for K2A under the NPA. However, subsequent discussions with the Department of Infrastructure, Regional Development and Cities, and the identification of a precedent project in which Commonwealth funding was made available for intersection works affected by works to a State controlled road, confirmed the benefits of including the Draper Street upgrades into the proposed project scope.

6 Project costs

The costs presented in this section represent a point in time estimate of capital costs of the reference project. Table 1⁸ sets out a breakdown of the risk adjusted capital costs.

Table 1 Summary project costs

PROJECT COSTS	REAL (\$M 2017)	NOMINAL (\$M)	NPC (\$M)
Raw capital costs	70.4	76.5	72.4
Risk adjustment (P90)	27.5	27.5	26.2
Risk-adjusted capital costs (P90)	97.9	104.0	98.6
Net ongoing costs (not risk adjusted)	.9	1.4	.7
TOTAL COSTS	71.3	77.9	80.3
TOTAL RISK ADJUSTMENT	27.5	27.5	26.2
TOTAL RISK ADJUSTED COSTS (P90)	98.8	105.4	99.4⁹

7 Project benefits

The benefits that have been monetised as part of the cost benefit analysis for the K2A project are summarised in Table 2.

Table 2 Quantified project benefits

BENEFITS ANALYSIS RESULTS (P50)			
DISCOUNT RATE	4%	7%	10%
Passenger Travel Time	\$ 169.79 m	\$ 114.02 m	\$ 80.61 m
Freight Travel Time	\$ 8.22 m	\$ 5.31 m	\$ 3.65 m

⁷ For the purpose of the financial analysis, the reference project includes the cost of upgrades to these intersections which will be brought forward as part of the delivery of the Reference Project. In the economic analysis, the costs and benefits of these upgrades have been excluded as they form part of the base case.

⁸ Includes costs associated with the additional Comport Street / Draper Street and Draper Street / Kenny Street intersection upgrades.

⁹ Due to rounding, numbers presented throughout this document may not add up precisely to the totals provided and percentages may not precisely reflect the absolute figures.



Vehicle Operating Costs (VOC)	\$ 74.73 m	\$ 49.99 m	\$ 35.25 m
Safety (Crash)	\$ 10.46 m	\$ 6.71 m	\$ 4.59 m
Externalities	-\$ 0.04 m	-\$ 0.04 m	-\$ 0.03 m
Total benefits (PV)	\$ 263.16 m	\$ 175.99 m	\$ 124.07 m

A number of additional qualitative benefits were identified in the social impact evaluation, including:

- increased reliable access to services and facilities
- an opportunity to raise awareness of and enhance the environmental significance of this area through signage, planting and maintenance of the natural edge of the road and mountain views
- improved access to employment opportunities for a potential workforce by improving connectivity to the Cairns CBD and the Port
- facilitating business opportunities coincident with highway exposure providing an opportunity for land use diversity and the development of a mix of service uses
- improved accessibility and legibility for tourists and visitors accessing Cairns from the south by road.

8 Environmental and sustainability impacts

An assessment of environmental factors was undertaken to identify potential impacts, mitigation and management measures, and approval requirements for the project.

The assessment concluded that the K2A project is not likely to have a significant impact on matters of national environmental significance within or adjacent to the project area and there is no requirement to refer the Project to the Commonwealth Environment Minister under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

A number of potential issues concerning land were identified along with mitigation strategies. Some of the key risks to be managed include land acquisition, native title, and aboriginal cultural heritage. The sustainability assessment demonstrates that the project will contribute to positive economic, environmental and social outcomes.

9 Project implementation and delivery

A value-for-money assessment was undertaken at the preliminary evaluation stage that leveraged market sounding conducted for other projects of this scale. The assessment concluded that a Public Private Partnership (PPP) would not be appropriate for this project.

The delivery model assessment for the project considered three forms of delivery contract:

- Transport Infrastructure—Construct Only (TIC-CO)
- Early Contractor Involvement (ECI)—form of Design and Construct (D&C) contract
- Alliance Contracting.

Analysis (including a multi-criteria analysis (MCA) process) concluded that superior outcomes would be achieved through a TIC-CO delivery model. The TIC-CO contract stipulates that performance and quality requirement specifications are developed before procurement, and the procuring entity is required to manage the design and construction under two separate contracts. The detailed design is developed before procurement of construction.

The TIC-CO model was determined to be the best suited to this project, as:



- the project characteristics left limited scope for innovation
- timeframes are compressed
- project risks, issues and sensitivities are manageable by the Department of Transport and Main Roads
- risk transfer inherent in interactive models are unlikely to generate sufficient benefit to outweigh the costs of the model.