Australian Government | Infrastructure Australia

Project business case evaluation summary

Bruce Highway: Townsville Ring Road Stage 5

Location
Townsville, Queensland

Geography
Smaller cities and regional centres

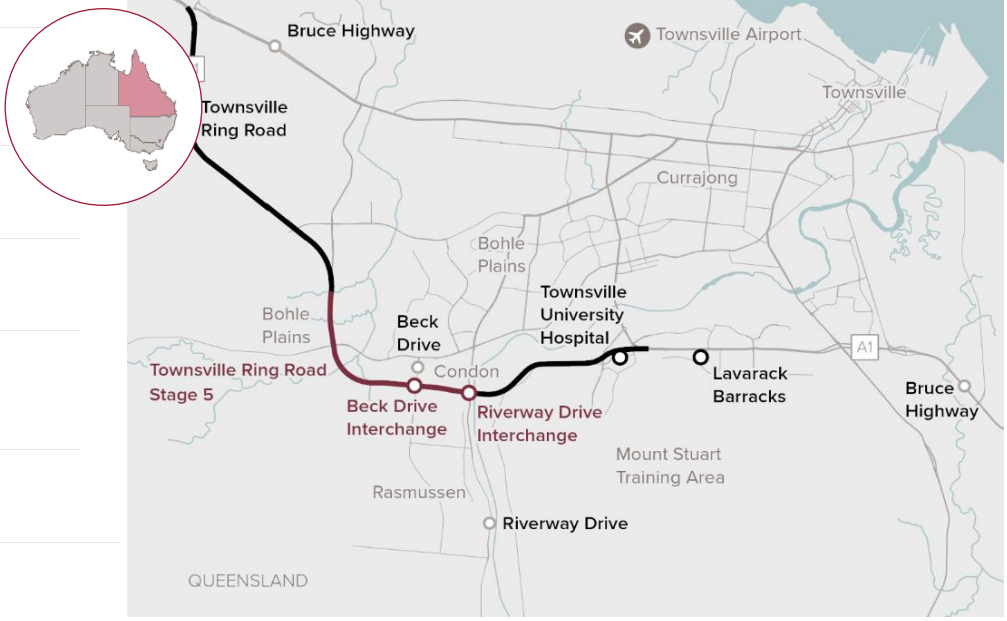
Category
National Connectivity

Capital cost
$230.0 million (P90, outturn)

Indicative timeframe
Construction Start: 2021
Project completion by: 2022

Proponent
Queensland Government

Evaluation date
7 April 2020



1. Evaluation Summary

There is a strategic case for completing the Townsville Ring Road to a four-lane standard. The proposed duplication of the remaining 6-kilometre long two-lane section is part of a nationally significant program to improve transport efficiency, reliability and safety on the Bruce Highway.

The proponent's business case shows that the full project scope may not be needed for more than 10 years, and that the project's cost outweighs its economic, social and environmental value. We would welcome a revised proposal for a more cost effective solution, which may include duplicating the ring road and enabling works for the Beck Drive interchange (to be delivered at a later date).

The **Bruce Highway (Townsville Ring Road Stage 5) proposal** as submitted to Infrastructure Australia has not been added to the Infrastructure Priority List as a project. The **Bruce Highway Upgrade**, including **Townsville Ring Road Stage 5**, remains as a Priority Initiative on the Priority List. We would welcome the opportunity to review a revised business case for this project.

Townsville is a major city in northern Queensland and a major hub for essential services. It includes a range of major defence, employment and community facilities such as Lavarack Barracks and RAAF Base Townsville, James Cook University, Townsville University Hospital, Townsville Stadium, the Port of Townsville and a range of Government agencies and public services. Townsville therefore has a key role in progressing the development of Northern Australia.

The Bruce Highway is Queensland's major north–south transport corridor, connecting coastal population centres from Brisbane to Cairns. The highway is part of Queensland's National Key Freight Route and forms part of the National Land Transport Network. The Bruce Highway Upgrade Program is a Priority Initiative on the Infrastructure Priority List, recognising the need to improve transport efficiency, reliability and safety. Townsville Ring Road Stage 5 is one of the identified initiatives under this program.

Within Townsville, the Ring Road provides an alternative to the old Bruce Highway, which runs through the city's centre. The Ring Road serves as a bypass for through traffic, a distributor for freight and commuter traffic within the city, and an alternative freight route to the port from locations north of Townsville.

The first four stages of the ring road were completed between 2005 and 2016, and this project (Stage 5) would duplicate the only remaining two-lane section of the Ring Road and also provide a major new interchange to Beck Drive.

The proponent's business case demonstrates the strategic fit of the duplication component of the project. In completing the Townsville Ring Road to a consistent four-lane standard, the project would improve transport efficiency, travel-time reliability and safety on this section of the road.

However, the need for the Beck Drive interchange and related works in this timeframe was not demonstrated in the business case. The proponent's analysis indicates that the traffic network currently performs at a satisfactory level, and that the need for a new interchange is largely being driven by potential residential developments to the south of the ring road. The business case states that the interchange may not be required for another 16 years in terms of traffic capacity.

The business case reports the expected economic, social and environmental value of the project to be relatively low, with a benefit-cost ratio (BCR) of 0.59 and a net present value (NPV) of -$76.7 million at a 7% real discount rate. Our analysis found that the proponent may have underestimated some of the project benefits. However, even after accounting for these benefits, the cost of the current scope of the project outweighs its benefits.

The deliverability of the project is demonstrated in the business case. The proponent has extensive experience in delivering similar projects, including the first four Townsville Ring Road stages. We are confident that the proposed delivery model would be appropriate for this type of project.

Taking these factors into account, Infrastructure Australia recommends that the efficiency, reliability and safety issues identified on the Ring Road be addressed. However, we recommend that the proposed Beck Drive interchange be deferred until the population of the new nearby residential areas warrants upgrading the interchange. Infrastructure Australia would welcome a revised business case which captures the full benefits of the project and considers a staged delivery of the major project components.

2. Context

The Bruce Highway is Queensland's primary north–south corridor, which includes a 36 kilometre section of highway passing through Townsville. The Townsville Ring Road serves as a bypass for through traffic, a distributor for freight and commuter traffic within the city, and an alternative route to the Port of Townsville for freight to and from locations to the north of Townsville. While the route from north of Townsville to the Port through Woolcock Street is shorter, it has poor flood immunity and is experiencing disruption from increasing urban congestion and traffic incidents.

The Ring Road connects Townsville's suburbs to employment and essential services as well as playing an important role in providing access for regional and local freight trips.

Major land-use changes have occurred along the Ring Road corridor since 2001 that have generated growth in freight and commuter traffic. These include relocation of the Townsville Hospital to Douglas in 2001, the 2003 declaration of the Townsville State Development Area in the south-east, and the relocation of an army battalion from Holsworthy to Lavarack Barracks in 2012.

The existing Ring Road was delivered in four stages from 2005 to 2016:

- Stage 1 (2005) – Townsville Ring Road Section 1 (two-lane Douglas Arterial Road)
- Stage 2 (2009) – Townsville Ring Road Sections 2 and 3 (two-lane construction)
- Stage 3 (2012) – Douglas Arterial Duplication (Section 1 duplication)
- Stage 4 (2016) – Construction of Townsville Ring Road Section 4 to a four-lane standard.

Most of the Townsville Ring Road has two-lanes in each direction. However, the 6 kilometre section between Vickers Bridge and Shaw Road currently has one lane in each direction.

3. Problem description

The performance of the 6-kilometre long remaining two-lane section of the Ring Road is expected

to deteriorate between 2026 and 2036 due to existing and emerging problems, including:

- Congestion and worsening reliability impacting on freight efficiency, with the Level of Service expected to decline from Level D (operating conditions appropriate to flows near tolerable capacity) to Level E (conditions at or near actual capacity) in the morning peak by 2026, and extending to the afternoon peak by 2036.
- Safety impacts due to high-speed merges and lack of overtaking opportunities, with an annual average crash rate that is two to three times higher than adjacent sections
- No options for diversions, leading to a lack of road network resilience to disruption
- Increasing demand for access onto the Ring Road.

In the absence of the project, the proponent expects these problems to be exacerbated by:

- Increasing local and regional freight volumes linked to economic and population growth
- Constraints on connectivity between Townsville's growth areas and key employment nodes
- Limited options for people to switch to public transport
- Limited active transport use due to distance between residential areas and activity centres.

Transport modelling for the business case covers the project route in addition to the city's northern and southern growth corridors. There is potential for an additional 20,000 people to live within the study area over the next 16 years, some of whom will in future use the Ring Road.

The business case sets out the following measurable project outcomes: reduced travel times; reduced travel-time variability; reduced vehicle-operating costs; and reduced crash costs.

4. Options identification and assessment

The methodology adopted by the proponent for selecting project options was to:

- Undertake a high-level, qualitative assessment of a broad range of non-infrastructure and infrastructure options and evaluate their ability to meet the project need.
- Carry out two Multi-Criteria Analyses (MCAs) on the longlist of 14 options and then the six option shortlist, using criteria based on service requirements and stakeholder interests.
- Complete costing, public-interest and whole-of government-policy assessments, and economic and financial analyses to verify the suitability of the options for the business case.

The six options shortlisted all included duplicating the remaining two-lane section of the Ring Road, but with different interchange options. Four options were discarded for reasons including: poor traffic performance; non-standard ramp configuration which may confuse drivers; high impacts on existing land uses; and cost.

Two options were subject to a detailed economic appraisal:

- PE03: Collector-Distributor (North/South)
- PE13: Closed Diamond

PE13 was found to produce higher net economic benefits and identified as the preferred option.

The proponent's approach to options identification and assessment broadly complies with the guidelines set out in the Infrastructure Australia Assessment Framework. While the application of quantitative MCAs for options identification and assessment is acceptable, we consider the use of a qualitative MCA to not be sufficiently rigorous. We recommend using quantitative analysis, such as rapid cost-benefit analysis, to shortlist the options which are most likely to benefit the Australian community. The options identification and selection process would have been strengthened by including options that deferred or excluded the interchange component of the proposed project.

5. Proposal

The Townsville Ring Road Stage 5 proposal as submitted consists of two major components:

- duplication of a 6-kilometre section of the Townsville Ring Road between Vickers Bridge and Shaw Road
- interchange works to provide a new connection to the Ring Road at Beck Drive, and changes to the configuration of the existing Riverway Drive interchange.

6. Strategic fit

The Infrastructure Priority List includes the Bruce Highway Upgrade as a Priority Initiative and is categorised under the strategic challenge of 'national connectivity'. The Townsville Ring Road Stage 5 project is one component of the overall Bruce Highway Upgrade Priority Initiative.

Duplication of this remaining two-lane section of the Ring Road is intended to improve freight efficiency, travel-time reliability and safety and is consistent with the following Australian Government transport and land use initiatives:

- National Freight & Supply Chain Strategy and National Action Plan (2019)
- National Road Safety Strategy (2011-2020)
- Smart Cities Plan

The proponent's business case also identifies the importance of duplicating the Ring Road to provide additional capacity for trips to key employment areas outside the CBD and help facilitate economic development and defence capability aspirations for the region, as outlined in the White Paper on Developing Northern Australia (2015) and the Defence White Paper (2016).

The duplication will support regional connectivity and freight market access. The project is consistent with the following Queensland Government transport strategies:

- Bruce Highway Action Plan
- State Infrastructure Plan
- Northern Queensland Regional Transport Plan (2020)
- Queensland Freight Strategy (2019)
- Transport Co-ordination Plan
- Department of Transport and Main Roads (TMR) Strategic Plan 2019-2023

Duplicating the Ring Road also aligns with TMR Operational Policies (Cycle Infrastructure Policy, Smart Motorways Policy, Road Safety Policy and Accessibility Compliance).

The project is intended to facilitate the development of affordable housing in the southern growth corridor by providing additional capacity through the Beck Drive interchange. However, the business case does not demonstrate the project's role in delivering these outcomes as the same land use and traffic changes are assumed to occur with, and without, the project.

Overall, the business case demonstrates the strategic merit of duplicating the remaining two-lane section of the Townsville Ring Road. However, it does not clearly demonstrate the case for improving access between the residential development areas and the Ring Road.

7. Economic, social and environmental value

The proponent reports the project BCR as 0.59, with a NPV of -$76.7m using a 7% real discount rate. The project is expected to deliver transport benefits, including $40.6 million in travel time savings and $50.3 million in vehicle operating cost savings. This is outweighed by capital costs of $187.2 million (in present value terms).

The following table presents a breakdown of the benefits and costs stated in the business case.

Benefits and costs breakdown

Proponent's stated benefits and costs	Present value ($m,2018/19) @ 7% real discount rate		% of total
Benefits			
Travel time savings	$40.6		36.1%
Vehicle operating cost savings	$50.3		44.8%
Avoided externality costs	$0.4		0.3%
Avoided Crash costs	$0.6		0.6%
Travel reliability	$14.4		12.8%
Residual value of asset	$5.9		5.3%
Total Benefits[1]	**$112.2**	(A)	**100%**
Total capital costs (P50)	$187.2		99.0%
Operating costs (P50)	$1.9		1.0%
Total Costs[1] (P50)	**$189.1**	(B)	**100%**
Net benefits - Net present value (NPV)[2] (P50)	**-$76.7**	(C)	n/a
Benefit-cost ratio (BCR)[3] (P50)	**0.59**	(D)	n/a

Source: Proponent's business case

(1) Totals may not sum due to rounding.
(2) The net present value (C) is calculated as the present value of total benefits less the present value of total costs (A − B).
(3) The benefit–cost ratio (D) is calculated as the present value of total benefits divided by the present value of total costs (A ÷ B).

The business case set out four measurable project outcomes: reduced travel times; travel-time variability; vehicle-operating costs; and crash costs. The first three categories make up over 90% of benefits. However, safety benefits make up only 0.6% of the expected benefits.

Safety improvements to the Stage 5 section of the Ring Road is one of four measurable project outcomes identified by the proponent. The section's crash rate in the base case is 6.74 crashes per 100 million vehicle kilometres travelled, which is two to three times the rate on adjacent sections. However, the project is expected to reduce the crash rate by 17%. This implies that the crash rate in the project area would still remain higher than on adjacent sections of the Ring Road.

The proponent's approach to quantifying transport benefits was found to be largely consistent with the Infrastructure Australia Assessment Framework. However, the business case could have been strengthened by including the following transport benefits:

- Benefits associated with the expected switching of freight movements away from the arterial network and onto the Ring Road
- Resilience benefits for the overall transport network from the project reducing the impact of disruptions have also not been captured
- The project may also make the public transport network more resilient by reducing the impact of road disruptions to the on-time running of buses.

In calculating the estimated annual benefits of the project reported in the business case, the proponent adopted an annualisation factor of 260 days in the core scenario. Sensitivity scenarios with 220 and 300 days were also completed. The use of an annualisation factor of 260 days may result in an understating of the project benefits, as 300 days is more typical of a road project.

The business case also noted that some benefits had not been captured in the economic analysis: employment opportunities; improved access to employment opportunities; improved safety outcomes; improved emergency access; and improved alignment to desired network function. Additional non-monetised negative impacts relating to land acquisition were also identified.

The proponent's reported capital costs and funding is presented in the following table.

Capital costs and funding	
Total capital cost	$217 million (P50, undiscounted) $230 million (P90, undiscounted)
Australian Government funding contribution	$184 million (80% of the P90 capital cost)
Other funding	The remaining capital costs would be funded by the Queensland Government

We commend the proponent's staged approach to delivering the Townsville Ring Road to add road network capacity as needed. This achieves a better match between delivery and demand, improving the balance of lifetime program costs and benefits. We encourage the proponent to consider an adjusted project scope that prioritises the near-term need to widen the Ring Road and plan for the provision of longer-term needs such as the interchange works at a later stage. This is likely to improve the project's expected economic, social and environmental value.

8. Deliverability

The Queensland Government's Department of Transport and Main Roads (TMR) will lead the delivery of the project. Drawing on lessons from the delivery of Stage 4, the proponent completed an assessment process that identified a Design and Construct delivery model with Early Contractor Involvement as their preferred delivery model. A Transport Infrastructure Contract (Construct Only) model was also shortlisted but considered to be less appropriate for the project. The proponent assessed a public private partnership as being unlikely to provide more value for money.

The proponent considered the preferred model to be appropriate for the following reasons:

- Provision of appropriate risk transfer
- Sufficient scope for innovation in interchange design, including potential cost savings
- Safeguards against increased impacts, with well-defined service requirements and a robust reference design layout and the project's constrains mapping
- Greater opportunities for tenderers to discuss and optimise their tender designs and construction methodologies before final submission, while working within project constraints
- Greater potential for cost savings.

Infrastructure Australia concurs with the proponent's analysis of delivery options and considers the proposed delivery model to be appropriate. The contract will be managed by TMR, which has extensive experience in delivering similar projects, including the 2012 Douglas Arterial Duplication (Ring Road Stage 3) and the 2015 Bruce Highway Upgrade (Vantassel to Cluden) project. TMR also has information from the original two-lane construction project, which was completed in 2009.

The project requires some land clearing but the business case states that the project would not have any significant environmental impacts. There is also a need to resume land for the proposed interchange as the site around Beck Drive is constrained by existing development. The proponent has sought to minimise the land resumption needed and mitigate the impact on landowners by adopting a 'constraints hierarchy' approach to guide the selection of interchange options.

The proponent's risk analysis concluded that the level of both project-wide and option-specific risks were relatively low. Following assessment and identification of proposed mitigation strategies, all residual risks were found to be within the "medium" or "low" ranges and typical of the risks for similar projects. The project's risk assessment approach was consistent with guidance in the Infrastructure Australia Assessment Framework.

The project's Benefits Realisation Plan was developed based on the program objectives, key benefits, planned outcomes and metrics set out in the Bruce Highway Upgrade Program Benefits Realisation Plan (2016). Project benefits will be reviewed, evaluated and reported in a Post-Implementation Review. Infrastructure Australia encourages the proponent to conduct and

publish a Post Completion Review to assess the extent to which the project benefits and costs set out in the business case were realised. This will help inform the development of future projects.