Infrastructure Australia

Project Business Case Evaluation

Project name	Bruce Highway Upgrade – Cooroy to Curra Section C: South – Traveston to Woondum
Rating	Priority Project
Date of IA Board rating	9 February 2017

Location	Wide Bay–Burnett region, Queensland
Proponent	Queensland Government
Project timeframe	Construction award date: Early 2016 Anticipated completion date: Late 2018

Evaluation Summary

The Bruce Highway is part of the National Land Transport Network, the nationally-accredited Key Freight Network and the Queensland Priority Freight Network. The highway has a key role in connecting regional centres as well as facilitating freight movement. However, a number of constraints prevent the Bruce Highway from functioning effectively as a national highway. For the section between Cooroy and Curra, in Queensland's Wide Bay/Burnett District, these include a high crash rate, variable posted speeds, unsuitable corridor alignment, restricted overtaking opportunities, a mixture of local and long distance traffic and poor flood immunity. The upgrade between Cooroy and Curra is part of a broader initiative to upgrade key parts of the Bruce Highway, which is listed on the Infrastructure Priority List.

With Queensland's freight task expected to double and population in the region to continue growing over the next 20 years, transport demand along the corridor is expected to increase. This will exacerbate the congestion, safety and flooding impacts of the current alignment.

The Cooroy to Curra package of works aims to upgrade and realign 61 kilometres of the Bruce Highway. Section C South of the upgrade would construct an 8.8 kilometre four-lane dual carriage highway and a 1.8 kilometre single carriage highway along a new alignment, with the current corridor remaining open to traffic. The completion of Section C South from Traveston to Woondum is important to realising the benefits of the corridor upgrade program, in addition to improving safety and traffic flow through the project area itself.

The proponent's economic evaluation states that the project has a net present value (NPV) of $361 million, and a benefit-cost ratio (BCR) of 2.4 using a 7% real discount rate and contract costs. While Infrastructure Australia has identified a number of risks to achieving this BCR, primarily relating to the application of traffic modelling to the cost benefit analysis, Infrastructure Australia is confident that the project's benefits will exceed its costs.

1. Strategic Context

The Bruce Highway is Queensland's major north-south corridor, connecting coastal population centres from Brisbane to Cairns. It is part of the Queensland's Priority Freight Network and forms part of the National Land Transport Network and nationally-accredited Key Freight Network, with commercial vehicles making up a large proportion of traffic along the corridor. The importance of this highway in connecting regional centres, and in facilitating freight movements, is recognised by both the Queensland and Australian Governments.

Over its length of approximately 1,700 kilometres, the Bruce Highway varies significantly in capacity, safety and flooding vulnerability. Both governments have committed to incrementally upgrade the condition of the highway to meet technical standards commensurate with its strategic importance. The upgrade of the Bruce Highway to improve connectivity between various Queensland coastal cities is listed as a Priority Initiative on the Infrastructure Priority List.

The *Bruce Highway Action Plan* 2012, developed by the Queensland Government, aims to bring about a step change in the condition of the Bruce Highway through progressive priority upgrades to the Bruce Highway over 10 years. In 2013, the Australian and Queensland Governments committed $8.5 billion (federal $6.7 billion, state $1.8 billion), over 10 years (2013-14 to 2022-23) to address safety, flood immunity and capacity deficiencies on this nationally-significant road corridor.

The Cooroy to Curra upgrade forms part of the *Bruce Highway Action Plan* 2012 and has been divided into four sections:

- Section A – Cooroy Southern Interchange to Sankey's Road (construction expected to be completed in early 2017)
- Section B – Sankey's Road to Traveston Road (completed in 2012)
- Section C – Traveston to Woondum, comprising:
    - Section C South (the subject of this assessment)
    - Section C North – early works (construction completed March 2016)
- Section D – Woondum to Curra, the Gympie Bypass (undergoing detailed design).

The Section C South project considered in this evaluation is part of the larger upgrade program and will help enable the full benefits of these related projects to be realised.

2. Problem description

There are a number of constraints which prevent the Bruce Highway between Cooroy and Curra from functioning effectively as a national highway. These include posted speeds on the highway that are not consistently 100km/h or higher, poor horizontal and vertical alignment, restricted overtaking opportunities, a mixture of local and long distance traffic and poor flood immunity. This results in three key problems which the project aims to address – congestion, safety issues and poor flood immunity.

The project is part of a strategically important link in the national freight network between Brisbane and Cairns, carrying approximately 15,400 vehicles per day in 2010, which is expected to increase to 21,200 vehicles per day in 2020. Traffic modelling analysis provided by the proponent indicates that congestion will worsen as demand continues to increase, driven by population growth and the growing freight task. Without any improvements, in 2020, the Bruce Highway at the proposed Woondum Interchange will be operating at or near capacity, with unstable traffic flow and significant delays during peak periods and associated safety implications.

The Bruce Highway between Cooroy to Curra generally consists of a two-lane, two-way road in rolling hilly terrain. The proponent states that this section of the highway has a high accident rate. Between 2011 and 2013, there were 11 accidents along this section, comprising two head-on collisions, one of which resulted in a fatality. Similarly, the Australian Automobile Association's Australian Road Assessment Program 2016 found the Bruce Highway between Traveston Road and Gympie to have a high combined risk rating.

The highway, located at the edge of the Mary River flood plain, is also susceptible to flood events. The proponent has found that flood events occur on average once every two years, resulting in closures from a couple of hours to several days for large events (the average annual duration of road closures due to flooding is 21 hours per year). Road users are impacted by having to divert to alternative routes, wait at the flood site for waters to subside or to forego journeys. Flood disruption results in higher travel costs or the lost benefit from foregone trips.

The project is expected to alleviate these problems, allowing vehicles to travel safely and reliably at optimal speeds along the highway. The Bruce Highway is a prime freight corridor (with commercial vehicles accounting for 22% of average annual daily traffic) connecting north and south Queensland. Safer and less congested journeys for heavy vehicles will deliver substantial productivity benefits.

3. Project overview

The solution proposes a revised Bruce Highway alignment and additional capacity. It includes:

- Approximately 8.8 kilometres of a four-lane dual carriageway with a central concrete barrier from the Traveston interchange to Woondum
- Single carriageway from south of Woondum Road to connect to the existing Bruce Highway at Woondum approximately 1.8 kilometres south of Keefton Road intersection
- Integration with the existing Traveston Interchange constructed at the northern extremity of Section B of the Bruce Highway, Cooroy to Curra Project
- Connections at Woondum interchange
- Major waterway crossing structures over Traveston Creek, Kybong Creek, Cobbs Gully and Jackass Creek
- Bridges for the main alignment over Tandur Road and Woondum Road and a bridge at the Woondum ramps.

The project will provide safer and more efficient access to and from the Bruce Highway and cater for increased travel demand within the Gympie Region and for the coastal population between Brisbane and Cairns. The project will connect to the single lane early works completed in March 2016.

The objectives of the project are to:

- Provide improved capacity to reduce travel time and cost of travel for all road users
- Improve safety
- Minimise disruption and road closures due to flooding.

4. Options identification and assessment

The options analysis for upgrading the Cooroy to Curra section of the Bruce Highway began in 2004:

- A 2004 constraints and deficiencies report focused on the collection of base data, identification of deficiencies of the existing highway and mapping of constraints to guide options development
- In 2005, a number of options were identified and shortlisted. The options consisted of a range of alignments for the upgraded highway and were released for public comment
- A 2008 Recommended Corridor report identified the preferred corridor for the Cooroy to Curra upgrade.
- A 2012 options analysis study was conducted as part of the Preliminary Evaluation of the Cooroy to Curra Section C upgrade project. This evaluated a new asset option (four-lane divided carriage way) against a do-minimum option (rehabilitation of the road asset and at-grade intersection improvements) and a base case option (no additional investment in excess of routine maintenance and periodic maintenance). Options were assessed using a multi-criteria assessment against the project objectives and service requirements. This process identified the new asset option as the preferred option.

The economic evaluation detailed in the proponent's submission considers the new asset option. While the options analysis was completed for the entire Cooroy to Curry Section C upgrade, this assessment only relates to Section C South, as Section C North from Woondum to Keefton Road is complete.

5. Economic evaluation

The proponent's economic evaluation of the project states an NPV of $361 million and a BCR of 2.4 using a 7% real discount rate and contract costs. Wider economic benefits (WEBs) were not measured; however, they are not expected to be significant as the project relates to a regional road corridor.

Traffic modelling was conducted using the Gympie Region Strategic Transport Model, which covers the entire Gympie Regional Council area and a proportion of the Noosa Shire Council, including 80 kilometres of the Bruce Highway. The model uses a fixed trip matrix and does not allow for induced demand, but does allow for trip redistribution. The inclusion of induced demand may reduce project benefits if the transport network in the project option reaches capacity before the end of the evaluation period. However, this is not expected to occur during the evaluation period.

Demand was modelled for 2020, 2031 and 2036 and extrapolated to 2048 using half of the traffic growth rate between 2031 and 2036. The modelling results suggest that base case travel speeds would fall gradually until 2036 then sharply decrease from 2036 onwards. While forecasting into the future is inherently difficult, it would be more realistic to expect speeds to continue falling at the rate that was observed for the modelled years. This approach would have resulted in a slightly lower benefit.

The completion of the project is important to realising the benefits of the corridor upgrade program. While the economic case for the project would have benefited from a program business case with an NPV and a BCR for the whole program of works at the outset, the proponent has undertaken substantial detailed planning for the Cooroy to Curra corridor. Furthermore, the cost estimates include the contract prices for the construction of the project, improving the reliability of the cost estimate, and adding to confidence that the project's benefits will outweigh its costs.

Whilst the proponent's stated BCR is likely to be overstated, Infrastructure Australia is confident that the project's benefits will be greater than its costs, and that the project will generate a net benefit to the Australian economy.

Capital cost and funding

Total capital cost (nominal, undiscounted)	$273 million (contract prices)
Proponent's proposed Australian Government funding contribution (nominal, undiscounted)	$218 million
Other funding (source / amount / cash flow) (nominal, undiscounted)	$55 million from the Queensland Government

Benefits and Costs breakdown

Proponent's Stated Benefits and Costs	Present Value ($m, 2016) @ 7% real discount rate		% of total
Benefits			
Passenger travel time savings	$347		56%
Freight travel time savings	$69		11%
Vehicle operating cost savings	$138		22%
Safety improvements	$6		1%
Externalities (e.g. air pollution, greenhouse gas emissions, noise, water etc.)	$39		6%
Flood immunity improvements	$20		3%
Total Benefits[3]	**$619**	(A)	**100%**
Costs			
Capital costs	$255		99%
Operating costs	$3		1%
Total Costs[3]	**$258**	(B)	**100%**
Net Benefits - Net Present Value (NPV)[1] without WEBs	**$361**	(C)	n/a
Benefit-Cost Ratio (BCR)[2] without WEBs	**2.4**	(D)	n/a

Source: Proponent's Business Case

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

6. Deliverability

The project is under construction at the time of this assessment. The project's capital costs have fallen significantly as its design has progressed. The scope has been refined and some deliverability risks have been resolved. Costs have also fallen significantly due to recent favourable market conditions for procurement in the construction industry in Queensland.

A number of procurement options were evaluated for the project, against a range of criteria, including the scope of the project, project time frame, risk, constructability, political, environmental and cultural heritage sensitivities and budget. The proponent determined a Construction Only contract was the preferred delivery method due to the low risk profile of the project.

The proponent has conducted a risk assessment identifying a number of risks. The key project risks have been identified as follows:

- Specific project delays around funding, project approvals and permits and early works
- Site specific risks, such as soil quality
- Design risks, including for erosion and sedimentation, water quality and incorporating fish friendly guidelines in the detailed design
- Market risks, such as availability of contractors and materials
- Not meeting community expectations.

The proponent's risk analysis includes mitigation strategies to minimise the impact of these risks on the project and realisation of the project benefits.

The proponent has outlined a benefits management and realisation plan that is consistent with the Queensland Government's project assessment framework guidelines. Benefits management for the project focuses on monitoring traffic and accident data and travel time variation. Infrastructure Australia supports the proponent undertaking a post-completion review after the project has commenced operation, to assess whether the project benefits have been realised.

The proponent has not investigated opportunities for direct user funding of the project. Infrastructure Australia would encourage the proponent to consider network-based road user charging as part of its funding options assessment.