

Infrastructure Australia

Project Business Case Evaluation

Project name	Bringelly Road Upgrade Stage 2
Rating	Priority Project
Date of IA Board rating	9 December 2016

Location	Western Sydney, New South Wales
Proponent	New South Wales Government
Project timeframe	Construction between 2016-17 and 2019-20

Evaluation Summary

Growth in south-west Sydney is being driven by employment growth associated with the Western Sydney Priority Growth Area, and population growth associated with the South West Priority Land Release Areas. Development of the Western Sydney Airport at Badgerys Creek is expected to accelerate this growth. Average daily traffic on Bringelly Road, a primary east-west route connecting the region with Sydney's motorway network, is estimated to increase by over 300% from current levels as the region develops. In the absence of additional capacity, this would lead to increased congestion, adverse safety outcomes, and poor connections between bus services and the south-west rail link at Leppington.

The proposed project complements an earlier project to upgrade Bringelly Road between Camden Valley Way and King Street (Stage 1), which was previously listed on the Infrastructure Priority List and is now under construction. The Stage 2 project would upgrade the remaining 4.3km of two-lane rural road between King Street and The Northern Road to a four-lane divided carriageway with a wide central median. This would allow for future widening to six lanes if required. The project is part of a broader program of works, the Western Sydney Infrastructure Plan, which includes significant upgrades to The Northern Road, and development of the M12 Motorway linking The Northern Road and the M7. The broader program is listed as a Priority Initiative on the Infrastructure Priority List.

The project is expected to cost \$172.1 million (P50, nominal, undiscounted), with construction to commence in 2016-17 and to conclude by 2019-20. The proponent's stated benefit-cost ratio (BCR) is 2.8 (using a 7% real discount rate and P50 cost estimates), and the net present value is \$265.1 million.

Infrastructure Australia's evaluation has identified a number of limitations in the proponent's business case. For example, it is not clear whether the proposed upgrade will integrate with the broader transport network and, in particular, buses. There are also some limitations in the economic analysis, which does not account for induced demand, and does not cap the growth of benefits beyond the final year of modelling. However, taking account of these risks, Infrastructure Australia is confident that the project BCR remains well above 1, and that the project's benefits will exceed its costs.

1. Strategic Context

Development initiatives in south-west Sydney, including the Western Sydney Priority Growth Area, and South West Priority Land Release Areas, together with the development of the Western Sydney Airport, are expected to lead to significant increases in population and employment in the western Sydney area.

The Western Sydney Priority Growth Area is forecast to support 57,000 new jobs over the next 30 years. Enhancing accessibility to the area will facilitate the successful delivery of these jobs, making it more attractive for employers to locate in the area, and minimising congestion for existing residents and workers.

The South West Priority Land Release Areas are anticipated to result in 300,000 new residents. This will necessitate new and renewed transport infrastructure to realise the growth and provide transport access for people living in the region.

Western Sydney Airport is planned to commence operations in the mid-2020s, with forecast annual passengers of 10 million by 2030. As Western Sydney Airport will act as a regional inter-modal transport hub for both passengers and freight, appropriate connections between key commuter and freight routes will be critical to link business, trade and employment centres.

The project has previously been identified in a range of NSW Government's infrastructure planning documents, including the NSW State Infrastructure Strategy, the NSW Long Term Transport Master Plan, and *A Plan for Growing Sydney*.

2. Problem Description

Levels of service along Bringelly Road are adequate to meet current demand, including in the daily peak periods. However, there is limited access for pedestrians and cyclists, and limited public transport options. Bus stops along the route are unsheltered.

Future growth of around 300,000 new residents, as well as 57,000 jobs over the next 30 years, will contribute to overall growth of the region and result in a marked increase in the level of traffic on Bringelly Road. By the time these growth precincts are complete, average daily traffic is expected to increase from its current 5,690 vehicles per day to 24,000 vehicles per day – a growth of over 300%.

The development of Western Sydney Airport is expected to generate an additional 1,254 vehicle movements per day during the construction period. Bringelly Road will be a key route for this traffic. Once operational, the airport is expected to lead to significant vehicle movements across the broader road network – for example, up to 47,000 passenger and employee trips and 42,000 freight trips per day during operation in 2031.

As a result of the anticipated growth in road users, the level of service along Bringelly Road is expected to deteriorate and reach unacceptable levels by 2026.

The following outcomes are likely to arise or be exacerbated if existing road infrastructure is not upgraded:

- A decline in local accessibility of the existing Bringelly Road over time
- A lack of adequate access to the Western Sydney Airport and throughout the Western Sydney Priority Growth Area
- A loss of opportunity to improve accessibility and efficiency for public transport
- A loss of opportunity to improve safety for pedestrians, cyclists and motorists through an off-road shared pathway
- Increased whole-of-life costs due to road deterioration and maintenance of a road not designed to carry the forecast traffic volumes and heavy vehicle loads.

The current crash rate along Bringelly Road is well above that of the state average for a road of its type, owing partly to unseparated bi-directional travel, uncontrolled intersections, heavy vehicle use, poor property access and limited infrastructure for pedestrians and cyclists. It is likely that, unless design upgrades take place, increased traffic volumes would lead to an increased accident rate for the road.

3. Project Overview

The Bringelly Road Upgrade forms part of a wider program of works, the Western Sydney Infrastructure Plan, which also includes a significant upgrade to The Northern Road, development of the M12 Motorway connecting The Northern Road with the M7 motorway.

The proposed project will upgrade the existing 4.3km two-lane rural road between King Street and The Northern Road to a four-lane divided carriageway with a wide central median, allowing for future widening to six lanes if required. The upgraded road will have a capacity in excess of 2000 vehicles per hour, a doubling of current capacity.

The upgraded road will carry a posted speed limit of 80km/h across its whole length, as well as designated turning lanes at traffic lights and indented bus bays on each side.

The upgrade will also include 2 metre wide shoulders for on-road cycling, and a 3 metre wide off-road shared pedestrian and cycle path along the southern carriageway. The upgrade also includes staggered pedestrian crossings and the installation of signals at each of four new intersections along the route.

The project follows on from the Bringelly Road Stage 1 Upgrade between Camden Valley Way and King Street, which is expected to be completed by 2018. Construction of Bringelly Road Stage 2 is proposed to commence in 2016-17, with completion in 2019-20.

The upgrade of Bringelly Road will be a key component of the broader growth of south-western Sydney over the next 30-40 years. Infrastructure Australia notes that the NSW Government's strategic transport planning for Sydney (*Sydney's Bus Future*) and structure planning for the South West Growth Centre envisage a significant role for bus transport in south-western Sydney, and a large number of bus services operating along and across Bringelly Road in particular.

It is unclear from the business case whether the proposed upgrade is scoped to provide for the level of bus services envisaged by these plans. Infrastructure Australia considers that there would benefit in the proponent updating the modelling to be confident that the project will be able to provide a high level of service for buses in the short-medium term. At a broader level, Infrastructure Australia encourages the NSW Government to continue its planning for and investment in improved bus services between the south west and major commercial centres such as Liverpool and Campbelltown. The draft district plan released recently by the Greater Sydney Commission envisages significant growth in these centres.

4. Options Identification and Assessment

In light of future capacity constraints and safety issues, various options for the upgrade of Bringelly Road were analysed as part of an options development process. This included options development workshops, value-management workshops and multi-criteria analysis.

Two options were selected from this process. These were:

- Option 1 – Re-align Bringelly Road along a parallel alignment to the north (Rossmore Avenue)
- Option 2 – Upgrade and widen the existing alignment.

These options were compared on their economic, environmental and social performance and assessed against stated project objectives.

Based on a subsequent access strategy, constructability workshops, community consultation and further design refinements, Option 2 was selected as the preferred option. Key factors in this decision included:

- Additional land acquisition costs being required for Option 1, leading to Option 2 being significantly less expensive
- Community and asset management issues associated with upgrading Rossmore Avenue to be the main arterial road, as Bringelly Road is currently recognised as the primary route. This is reflected in the business and residences established in the locality
- Fewer environmental and heritage impacts under Option 2.

5. Economic Evaluation

The proponent undertook a full economic cost-benefit analysis of Option 2, evaluating a 30-year benefit stream against the construction and operating costs of the project. All costs and benefits were discounted into present terms using a real discount rate of 7% per annum. All benefits and costs are represented as real \$2015-16.

The total discounted capital cost is \$146.1 million. The project results in a BCR of 2.8 and a net present value of \$265.1 million.

Infrastructure Australia has identified a number of potential limitations in the analysis which could present risks to achieving the estimated economic benefits. The traffic model used by the proponent assumes a fixed number of trips across the network, and therefore does not allow for induced demand. The inclusion of induced demand in the modelling may reduce project benefits if the transport network in the project option reaches capacity before the end of the evaluation period.

The proponent forecasts that a four lane alignment will be able to meet demand until at least 2041, at which time widening to six lanes may be required. Depending on induced demand, widening could be required sooner than forecast. In addition, the growth of benefits beyond the final year of traffic modelling runs counter to standard practice in cost-benefit analysis which is to cap the growth of benefits at that point.

To understand the impact of these issues, a scenario test combining a reduction in benefits due to induced demand and capped growth in benefits after 2041 was undertaken. While this showed a material decrease in the BCR, it remained well above 1.

Infrastructure Australia notes that a number of potential benefits have not been quantified as part of the economic evaluation. These include:

- Reliability benefits – the upgrade of Bringelly Road will provide journey time reliability benefits through the reduction of accidents and delays. Given that Bringelly Road forms a key link between a number of origins and destinations, reliability benefits across the network could be sizeable. However, these reliability benefits are likely to reduce over time as traffic volumes in the corridor increase.
- Wider Economic Benefits (WEBs) – given the strong forecast growth in population and employment, as well as development of the Western Sydney Airport and the adjoining Business Park, improvements in connectivity may lead to increased effective density, and therefore WEBs.

Overall, Infrastructure Australia is very confident that the benefits of the project would exceed its costs.

Proponent's Stated Benefits and Costs	Present Value (\$m, 2015-16) @ 7% real discount rate	% of total
Benefits		
Travel time savings	\$286.7	69.6%
Vehicle operating cost savings	\$56.5	13.7%
Avoided crash costs	\$11.9	2.9%
Savings in externalities	\$47.7	11.6%
Residual value	\$9.0	2.2%
Total Benefits³	\$411.8 (A)	100%
Costs		
Capital costs (P50)	\$146.1	99.6%
Operating and maintenance costs	\$0.594	0.4%
Total Costs³	\$146.7 (B)	100%
Net Benefits - Net Present Value (NPV)¹ without WEBs	\$265.1 (C)	n/a
Benefit-Cost Ratio (BCR)² without WEBs	2.8 (D)	n/a

Source: NSW Roads and Maritime Services (2016), Bringelly Road Upgrade Stage 2 Economic Summary Report

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.

Capital costs and funding

Total capital cost (nominal, undiscounted)	\$180 million (P90) \$172.1 million (P50)
Proponent's proposed Australian Government funding contribution	\$150.5 million of approved funding sought
Other funding (source / amount / cash flow) (nominal, undiscounted)	\$21.6 million NSW Government contribution

6. Deliverability

The proponent considered alternative procurement methods to mitigate construction and delivery risks. The following methods were considered as options for procuring The Northern Road (Mersey Road to Peter Brock Drive) and Bringelly Road Stage 2:

- Construct Only – Schedule of Rates (roadworks) and Lump Sum (bridgeworks), based on a NSW standard conditions of construction contract
- Construct Only – Lump Sum, based on a modified NSW standard conditions of construction contract
- Construct Only – Lump Sum, based on a modified Design & Construct Deed
- Document (Design Verification) and Construct – Lump Sum, using a Design & Construct Deed.

For the roadwork component, the proponent selected a construct-only option using a Schedule of Rates contract model, on the basis that the shorter project timeline and project scale would result in an overall lower risk profile. The bridgeworks component would be procured under a Lump Sum model.

As part of best practice project development, Infrastructure Australia encourages, in the first instance, the development of program business cases in line with integrated land use and transport planning, followed or accompanied by project-specific business cases.

In addition, Infrastructure Australia recommends that a post-completion review of the project be conducted to accurately gauge whether works have delivered high levels of service, and identify any lessons that could be used to inform future projects. The proponent has prepared a benefits realisation plan which specifies the performance criteria through which the project objectives can be measured. This plan focuses on the realisation of travel time savings, a reduction in crash frequency and the level of service standards.

The proponent is of the view that private financing and user charging is unsuited to a road project of this nature. This is due to the scope and cost, the associated risk and the lack of an effective charging mechanism available to fund the project. Infrastructure Australia encourages proponents to consider network-based road user charging as part of the funding options assessment.