

Project business case evaluation summary

Nowra Bridge Project

23 August 2019



Proponent

New South Wales Government

Location

Nowra, New South Wales

Capital cost

Commercial in Confidence

Indicative timeframe

Planning: Complete

Construction: Q1 2021

Project completion by: Q4 2024

1. Evaluation Summary

The **Nowra Bridge Project** has been added to the Infrastructure Priority List as a **Priority Project**.

The Princes Highway is the main north–south link between Sydney and southern New South Wales via the Illawarra and Shoalhaven regions. It is the main connecting route for coastal communities and carries a mix of freight and passenger traffic for local, long-distance and tourism trips. At Nowra, the Princes Highway crosses the Shoalhaven River via the Nowra Bridge, which comprises a steel bridge built in 1881 for southbound traffic, and a concrete bridge built in 1981 for northbound traffic. There are no other crossings of the river on the coastal plain.

Over 51,000 vehicles use the crossing every day and this is forecast to grow by 1.4% per year between 2026 and 2036. Heavy congestion is experienced on the Nowra Bridge and nearby Princes Highway intersections during the morning and afternoon peak periods. Crash rates along this route are also worse than the NSW average for the same class of road. Recognising the costs of these problems, the Infrastructure Priority List includes the Shoalhaven River Crossing Capacity as a near-term Priority Initiative.

The Nowra Bridge Project involves the construction of a new four-lane bridge immediately to the west (upstream) of the existing bridges, which would become the new crossing for northbound traffic. The existing northbound bridge would be converted for southbound traffic, allowing the much older southbound bridge to be re-purposed for community uses. The project has strategic merit as it supports local, regional and tourist traffic, and allows for more efficient movement of freight on this important highway.

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The proponent’s reported net present value (NPV) for the project is \$268 million, with a benefit-cost ratio (BCR) of 2.2 using a 7% real discount rate and P50 cost estimate. Infrastructure Australia has independently reviewed the business case and agrees with the proponent that the project’s benefits would outweigh its costs. To inform project delivery, the proponent undertook an industry standard procurement assessment which recommended a single Design and Construct contract package. The risk identification, assessment and mitigation approach developed in the business case appears appropriate, although risk management will continue through the design and construction process.

2. Context

The Princes Highway links cities and regional centres along the south-east coast of Australia. Within NSW, the Princes Highway connects regional towns and the metropolitan centres of Sydney and Wollongong, and carries a mix of local, long-distance, freight and tourist traffic.

Some 170 kilometres south of Sydney, the Princes Highway crosses the Shoalhaven River via the Nowra Bridge. This is the only crossing of the river on the coastal plain, with the next upstream crossing approximately 70 kilometres away and only one lane in each direction. Traffic counts in November 2017 found that approximately 51,300 vehicles crossed the bridge on a weekday, with approximately 40% of those daily trips taken in the peak periods.

The population of the broader Illawarra–Shoalhaven area is estimated to grow by 0.7% per year, from around 412,000 in 2016 to over 471,000 in 2036. Within the Shoalhaven region, the population of around 100,000 people is forecast to grow by 0.5% per year to almost 110,000 people over the same period. This growth will be partly driven by the development of residential dwellings in the Nowra Bomaderry Urban Release areas. These residential release areas will generate additional traffic between these areas and the employment centre of Nowra.

The South Coast of NSW, which includes the Illawarra–Shoalhaven area, is also an important tourism destination. Between April 2017 and March 2018, there were over 3.8 million domestic overnight visitors, an increase of 7.5% from the previous 12-month period.

3. Problem description

The proponent forecasts that traffic volumes will grow by 1.4% per year between 2026 and 2036, and 1.2% per year between 2036 and 2046, which will further increase the flow of traffic across the bridge and through nearby intersections. In the event that the Nowra Bridge is unavailable, the proponent estimates significantly longer trips for users – at least an additional 100 kilometres for regional trips and up to 250 kilometres further for local trips. There also is no rail alternative, as the South Coast rail line terminates at Bomaderry on the north side of the river.

The Princes Highway crosses the Shoalhaven River on two independent bridge structures. The 1881 “Whipple” truss bridge¹ has two lanes for southbound traffic, while the 1981 concrete bridge has three northbound lanes. The key problems with the existing bridges at Nowra are:

- **Capacity and traffic congestion:** The existing southbound bridge is significantly congested in both the morning and afternoon peak periods. The proponent’s traffic model forecasts that the Princes Highway intersections with Bolong Road, Illaroo Road and Bridge Road on either side of the bridge will become severely congested by 2026. Without upgrades, the traffic modelling suggests average peak hour travel speeds will drop from 16 km/h in 2018 to 7 km/h in 2038, leading to longer trips for people and freight, and higher vehicle operating costs.
- **Freight access and productivity constraints:** The existing southbound bridge cannot carry vehicles that are more than 4.6 metres tall or Higher Mass Limit B-Double vehicles. Instead,

¹ A truss is a structure of connected elements forming triangular units. A bridge whose load-bearing superstructure is composed of a truss is a truss bridge. The main characteristic of a Whipple truss is that the tension members are elongated, usually thin, and at a shallow angle, and cross two or more bays.

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over-size vehicles have to use the northbound bridge with police escort, which closes access for northbound traffic.

- **High crash rates:** Congestion and stop-start traffic on the road is leading to far more crashes on this section of the highway (8.1 crashes per kilometre per year) compared with similar roads in NSW (1.6 crashes per kilometre per year). The casualty crash rate of 4.3 per kilometre per year is more than quadruple the state average of 0.9.
- **High maintenance costs:** The existing southbound bridge is almost 140 years old and is nearing the end of its useful life. The proponent estimates that there will be growing capital and recurrent maintenance costs to keep it open for the growing levels of traffic in the future.

4. Options identification and assessment

The proponent used a multi-staged process to identify and assess potential infrastructure options. The development of options and technical supporting studies was undertaken over a five-year period from 2013. The process can be broadly summarised in two phases.

Strategic route and option assessment phase

The proponent identified and considered a broad range of infrastructure and modal solutions to address the problem. The seven options included a bridge replacement, an adjacent bridge, a bypass of Nowra, and a tunnel. Non-infrastructure solutions were not considered as part of the options development, and we consider this appropriate for the nature and location of the problem.

The proponent assessed the seven options using a multi-criteria analysis (MCA), which appropriately involved management workshops, technical studies and community consultation. The results of the proponent’s MCA suggested that, to meet the project objectives, a bridge near the existing Princes Highway river crossing would be needed. The proponent next developed five route options for a new bridge crossing and assessed those routes using MCA and rapid cost-benefit analysis to select a new bridge to the west of the existing bridges as the preferred option.

Preferred option refinement and intersection analysis phase

In this phase, the proponent refined the preferred option by considering lane capacity requirements, various intersection configurations and the future use of the existing southbound bridge. A series of workshops and technical studies were undertaken on 19 different intersection options, which resulted in 39 possible network configurations. The proponent selected a preferred network configuration option using a range of criteria including travel time performance, congestion and potential environmental impacts. The preferred option was displayed for community and stakeholder feedback, refined and then taken forward to the environmental assessment and final business case. It was assessed against a base case that consists of a ‘do minimal’ approach to maintenance to ensure the bridge remains in a serviceable state.

The Assessment Framework recommends that all final business cases include at least two options (in addition to the base case) for detailed economic analysis. However, we recognise that there are fewer potential options available to address this type of problem, with limited availability for an alternative route at this location. Altogether, our evaluation found that the proponent undertook an appropriate detailed options assessment during the business case process, including both MCA and rapid cost-benefit analysis to determine the preferred option.

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5. Proposal

The business case is for the construction of a new northbound four-lane bridge on the Princes Highway over the Shoalhaven River at Nowra. This would allow the existing northbound bridge to be converted for southbound traffic and for traffic to be removed from the existing southbound 1881 “Whipple” truss bridge. The scope of the Nowra Bridge Project is as follows:

- Construction of a new four-lane concrete bridge, including a shared pedestrian/cyclist path, on the upstream (western) side, close to the existing 1981 concrete bridge
- Widening the existing concrete bridge over Bomaderry Creek on the north side of the river
- Realignment and upgrade of the Princes Highway intersections with Bolong Road and Illaroo Road to the north of the crossing
- Widening approximately 270 metres of Illaroo Road
- Realignment and upgrade of the Princes Highway intersection with Bridge Road to the south of the crossing
- Closure of the existing Pleasant Way intersection with the Princes Highway to the south of the crossing
- Construction of a new access road and intersection connecting Lyrebird Drive to the Princes Highway south of the intersection with Bridge Road
- Conversion of the 1981 bridge to three lanes for southbound traffic
- Closure of the 1881 bridge to traffic and investigation of opportunities for adaptive reuse, such as pedestrian, cyclist and other community uses following a separate environmental assessment.

6. Strategic fit

Increasing capacity and improving traffic flows across the Shoalhaven River at Nowra would reduce travel times and congestion, reduce crash rates and provide southbound access for over-height, Higher Mass Limit and High Productivity freight vehicles. It would also support future traffic growth from planned land use changes in the area and significantly reduce workers’ exposure to live traffic during necessary maintenance works on the 1881 southbound bridge.

The Nowra Bridge is a strategically important link in the road network, as there are no other crossings of the river on the coastal plain.

The project is part of Transport for NSW’s Princes Highway Corridor Strategy (August 2016) and is included in Future Transport Strategy 2056, which identifies transport requirements for regional population and freight growth over the next 40 years, as a committed 0–10-year project. In addition, the Australian Government’s 10-year infrastructure plan, *Strengthening Australia’s Cities and Regions*, identifies Nowra Bridge as a priority for NSW based on the value of the project in linking industry to export markets through Port Kembla.

Shoalhaven River Crossing Capacity was added as a Priority Initiative to the Infrastructure Priority List in February 2019.

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7. Economic, social and environmental value

The proponent's economic, social and environmental appraisal estimates that the NPV of the project is \$268 million, with a BCR of 2.2, using a 7% real discount rate and P50 cost estimate when evaluated over a 30-year operational period.

The major economic benefit of the project is travel time savings for passenger and freight vehicles from improved capacity and traffic flows. The project would also improve safety on the road, which accounts for some 5% of the project benefits. A small proportion of the project's benefits are offset by increased vehicle operating costs and environmental externalities due to more traffic forecast to use the upgraded crossing. Our evaluation considered these results, and the underlying assumptions and methodology used by the proponent, against Infrastructure Australia's Assessment Framework.

The proponent's traffic model had a relatively large proportion of 'unreleased trips' in the base case. These are trips which cannot 'enter' the simulated network when the demand in a traffic model exceeds the possible carrying capacity of the infrastructure (e.g. vehicles per lane per hour). This is often the result of physically constrained infrastructure, such as bridges.

The traffic modelling accounts for these trips by manually adding the trips to the simulated network outcomes, in line with Roads and Maritime Services/Transport for NSW guidance. We completed sensitivity analysis to consider alternative treatments of the unreleased trips and found that, while they had a negative impact on the project's benefits, the total benefits of the project would still exceed its costs.

Our evaluation also found that the proponent did not consider the disruption costs to road users caused during project construction. However, given that the bridge replacement would be constructed off the existing road network, we expect these impacts would only be minor and can be managed by the proponent.

Overall, our evaluation found that the proponent's appraisal aligned with the Assessment Framework, and that the economic, social and environmental benefits of the project would outweigh its costs.

The table below presents a breakdown of the proponent's stated benefits and costs.

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		\$476.6	98%
Vehicle operating cost savings		- \$17.4	- 4%
Crash reductions		\$23.1	5%
Residual value of assets		\$16.7	3%
Reduced environmental externalities		- \$9.9	- 2%
Total Benefits¹		\$489.1	(A) 100%
Capital costs (P50)		\$228.6	95%
Operating costs		- \$7.7	5%
Total Costs¹		\$220.9	(B) 100%
Core results	Net benefits - net present value (NPV)²	\$268.2	(C) n/a
	Benefit-cost ratio (BCR)³	2.2	(D) n/a

Sources: 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).

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A breakdown of the proponent’s reported capital costs and funding is presented in the table below.

Capital costs and funding	
Total capital cost	Pending (see endnote)
Proponent’s proposed Australian Government funding contribution	50% of the construction costs, as well as \$10 million committed for project development
Other funding (source / amount / cash flow)	The NSW Government is funding the balance of the project

8. Deliverability

The proponent considered and evaluated a series of procurement options for constructing the new bridge. The procurement assessment was consistent with industry practice and is appropriate for this project. The business case proposes delivery as a single Design and Construct contract package. It is proposed that restoration works on the 1881 “Whipple” truss bridge would be delivered separately following decommissioning of the bridge.

The proponent’s risk management plan was developed in line with the Roads and Maritime Services Risk Management Framework and involved a series of risk workshops and risk analysis tools. The risk assessment process included, but was not limited to, technical, construction, strategic and design considerations, as well as potential treatments. Overall, the risk assessment and mitigation approach are appropriate and consistent with this stage of business case development. Risk management will continue through the design and construction process.

A benefits realisation plan was developed for the project. The plan summarises project objectives, performance and measurement indicators, expected project benefits, and appropriate alignment with *Future Transport Strategy 2056* objectives.

If the project proceeds, Infrastructure Australia encourages the proponent to undertake and publish a Post Completion Review of the project to assess the extent to which the expected benefits and costs have been realised. This will help to inform future projects and should assess project costs and outcomes for users, against the expectations set out in the final business case.

Following Infrastructure Australia’s process of fact and sensitivity checking the summary with the proponent prior to publication, the evaluation summary was amended to exclude the capital cost (nominal, undiscounted) pending completion of the New South Wales Government’s active procurement processes.

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