

Project business case evaluation summary

Commonwealth Avenue Bridge Upgrade

Location

Canberra,
Australian Capital Territory

Geography

Smaller cities and regional centres

Category

Asset Renewal

Capital cost

\$127.4 million (P80, outturn)

Indicative timeframe

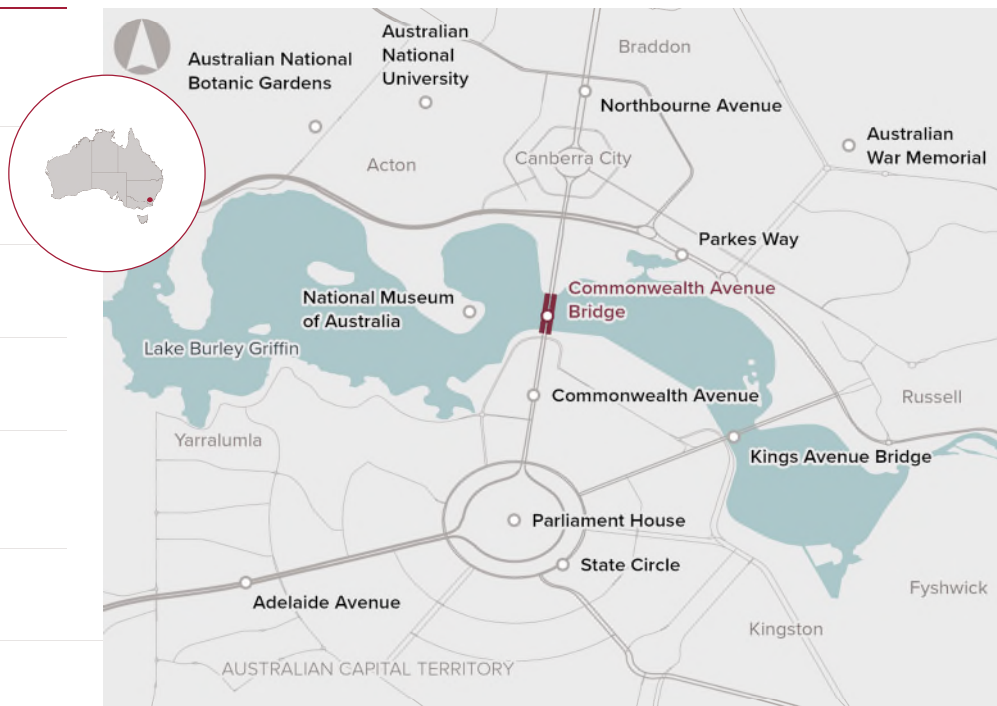
Construction Start: 2021
Project completion by: 2024

Proponent

Australian Government

Evaluation date

3 September 2020



1. Evaluation Summary

The **Commonwealth Avenue Bridge project** has been added to the Infrastructure Priority List as a **Priority Project**.

The Commonwealth Avenue Bridge (the Bridge) is one of two major bridges crossing Lake Burley Griffin and is a critical component of the transport network of Canberra and the Australian Capital Territory (ACT) overall. Located within Canberra's Parliamentary Zone, the Bridge has considerable cultural and heritage value. The Bridge was built in the mid-1960s. Since its opening, patronage on the Bridge has grown substantially, and by 2017, peak period traffic levels were effectively at capacity. Current traffic on the Bridge makes it one of the busiest transport assets in Canberra.

The Bridge is ageing and has not undergone a significant upgrade since construction. The proposed project will include structural upgrades that are required to meet relevant design standards for load capacity, traffic lane width, safety barriers, and active transport corridor width. Upgrading the Bridge will also extend the design life by 50 years. Other benefits include travel time savings, vehicle operating cost savings, emissions savings and safety benefits for pedestrians, cyclists and vehicles. The Bridge forms part of the corridor for the planned extension of the Canberra Metro light rail network, which could include a separate structure between the spans.

The proponent's business case states that the net present value (NPV) of the preferred project option (Bridge upgrade) is \$124.9 million with a benefit-cost ratio of 2.65, using a 7 per cent real discount rate and P80 capital cost estimates in 2019 prices¹. Infrastructure Australia evaluated the business case and considers the project to have a strong strategic and economic case, but a reported economic, social and environmental value that is likely to be overstated.

In the absence of the proposed upgrade, the proponent's business case assumes that structural and safety issues will be managed by closing two of the six traffic lanes, imposing load limits on the Bridge, and widening the active transport lanes. These arrangements are assumed to be in

¹ P80 costs used in accordance with guidance issued by the Parliamentary Standing Committee on Public Works (Commonwealth).

effect throughout the appraisal period under the base case and drive the majority of the quantified project benefits.

Infrastructure Australia considers the reduction in Bridge capacity under the base case likely to be in excess of what is necessary to keep the Bridge safe and operational. As a result, the project's benefits as reported in the business case are likely to be overstated. However, after considering different base case options, and adjusting the estimated economic benefits, Infrastructure Australia considers that the project will deliver a net benefit to society.

The project has a sound delivery approach, although the proponent has limited experience of delivering complex bridge projects of this nature. The proponent has developed a mitigation strategy to address the identified risks.

2. Context

The Bridge is important to the city's cultural heritage. From the northern approach, the Bridge provides panoramic views of Parliament House. The Parliament House Vista, which is framed by the Bridge, is on the Commonwealth Heritage List. The National Library of Australia, the National Museum of Australia and Questacon are all visible from the Bridge.

Commonwealth Avenue Bridge and Kings Avenue Bridge are the two primary road crossings over Lake Burley Griffin, connecting Canberra's northern and southern suburbs. The Bridge is the most direct route connecting Canberra City to the Australian Parliament House and the Parliamentary Zone. Commonwealth Avenue Bridge is a designated area under the National Capital Plan, which sets out the policy for maintaining the significance and formality of the main avenues and approach routes to the National Capital.

The proponent has identified a need to upgrade and strengthen the Bridge, which was originally commissioned in 1963, to extend its service life. An independent engineering assessment in 2014 recommended remedial strengthening works be undertaken on the Bridge to address deficiencies relative to current design standards. Follow-on assessments resulted in the proposal of this project. An Initial Business Case was completed in August 2018, which led to the development of the Detailed Business Case submitted to Infrastructure Australia for evaluation.

The proponent has worked closely with the ACT Government to manage the interface between this project and existing and proposed ACT Government infrastructure, including the extension of the Capital Metro network south from City to Woden, known as the Light Rail Stage 2 project. Options for incorporating the light rail project into the Bridge upgrade were considered by the proponent during the development of the Detailed Business Case. While the Light Rail Stage 2 project will be considered under a separate business case, a Joint Steering Committee is being established between NCA and the ACT Government to coordinate the two projects.

3. Problem description

The age of the Bridge is the root cause of the problem. According to the proponent's business case, the Bridge needs to be strengthened within five years to reduce the risk of structural issues.

In 2017, the Bridge was servicing an average of 7,320 vehicles per morning peak hour, 6,190 vehicles per afternoon peak hour, and 3,000 active transport trips in peak periods. The maximum hourly flow in the morning peak on the eastern span was 4,109 indicating that the Bridge is effectively already operating at its maximum theoretical capacity of approximately 4,000 cars per hour on each span. Traffic demand is forecast to grow by more than 25 per cent by 2036.

The problem is worsening as population growth in Canberra results in more travel, an increasing number of heavier vehicles crossing the Bridge, and a greater number of active transport users on the Bridge. A structural issue with the Bridge is estimated to cause travel time costs of \$86 million (2019 prices) over a three-year construction/repair period relative to a fully operational Bridge.

The Bridge fails to meet minimum safety requirements in areas such as the safety barriers, the traffic lane widths, the shared pedestrian and cycle path widths, and the accessibility of existing approaches. The safety impacts of the Bridge failing to meet minimum requirements have not been monetised by the proponent.

According to the proponent's cost-benefit analysis, the project also avoids approximately \$1.6 million (2019 prices) of replacement and maintenance costs relative to the base case.

The problems relating to the structural issues that may arise in the Bridge are expected to be

nationally significant.

4. Options identification and assessment

The proponent's Initial Business Case identified eight options for addressing the problem:

1. Do Nothing – retain existing Bridge
2. Retain Bridge and strengthen, replace barriers only
3. Retain Bridge and strengthen, replace barriers, path widened by extension (outwards)
4. Retain Bridge and strengthen, replace barriers, path widened in traffic lane (inwards)
5. Retain Bridge and strengthen, replace barriers, new cyclist bridge
6. Retain Bridge and strengthen, replace barriers, Light Rail Stage 2 in traffic lane, path widened by extension (outwards)
7. Retain Bridge and strengthen, replace barriers, new cyclist bridge (with Light Rail Stage 2 on the existing bridge)
8. Build a new bridge for traffic, light rail, pedestrians, and cyclists

The proponent used multi-criteria analysis to assess each of these options. The criteria were: retains the visual character of the Bridge; improves urban design and public domain; improves pedestrian amenity, connectivity and safety; improves cyclist amenity, connectivity and safety; improves structural integrity of the Bridge; retains existing vehicle capacity; impact on future traffic demand; and deliverability. A detailed multi-criteria analysis was also carried out across thematic areas of transport function; urban design, strategic planning and policy alignment; and engineering, environment, and deliverability. Options 1, 3 and 8 were short-listed for further analysis. The proponent's options development and assessment process aligns with the Infrastructure Australia Assessment Framework guidelines.

A rapid cost-benefit analysis of the short-listed options was then undertaken, which identified Option 3 as the preferred option. The proponent carried forward Option 3 and Option 8 to the Detailed Business Case stage. Option 8 was carried forward to the Detailed Business Case to assess and test the relative merits of a combined delivery solution with Light Rail Stage 2. The rapid cost-benefit analysis included similar costs and benefits to the Detailed Business Case. In both assessments, Option 3 generated a benefit-cost ratio greater than 1, while Option 8 did not. The economic impacts reported in the Detailed Business Case exceeded those in the rapid cost-benefit analysis as it was supported by more rigorous inputs such as a detailed traffic model.

Overall, the proponent's approach to options identification and assessment was robust and complied with Infrastructure Australia's Assessment Framework. Multi-criteria analysis supplemented with a rapid cost-benefit analysis was sufficiently rigorous for the options identification and assessment phase. However, the outcome of the process would have been improved by carrying forward a 'Retain Bridge and strengthen only' option to the Detailed Business Case to more directly address the risk of a structural issue arising.

5. Proposal

The proposed project will strengthen and widen the Bridge. The project will increase the load-bearing capacity of the current Bridge to meet current and forecast traffic load demands, and to extend the design life by at least 50 years to enable the function of the Bridge until the end of its asset life.² The vehicle and safety barriers will be upgraded, and the Bridge will be widened to accommodate slightly wider traffic lanes and wider active transport lanes. In summary, the proposed project will:

- Strengthen the Bridge to match the load rating of the feeder road network
- Widen the existing road carriageway to 10.7 metres (comprising two 3.7-metre-wide outside traffic lanes and a 3.3-metre-wide centre traffic lane)
- Widen active transport paths by 2.6 metres from 2.4 metres to 5 metres clear width, consistent with Austroads standards

² 100-year asset life following the Bridge's construction in the mid-1960s.

- Install medium performance, low transmitted force barriers, with a design that has negated the need for additional strengthening of the carriageways
- Upgrade access pathways to comply with the *Disability Discrimination Act 1992*.

The Bridge upgrade will also interact with the Light Rail Stage 2 project, which will likely be accommodated on a separate structure between the spans of the Bridge. The Light Rail Stage 2 project will be assessed under a separate business case.

6. Strategic fit

The project demonstrates strong strategic merit. Commonwealth Avenue and Kings Avenue bound the Parliamentary Zone and the Bridge is an important component of Canberra's cultural heritage. Upgrading and extending the asset life of the Bridge, which is closely associated with the Australian Parliament House and the National Capital, is of high strategic importance for the Australian Government, as set out in the National Capital Plan. Upgrading the Bridge to reduce the risk of a structural issue arising aligns with the statutory functions of the proponent, the National Capital Authority (NCA), to maintain assets to an appropriate standard befitting the National Capital.

The project aligns with Australian Government and ACT Government policies and plans, including:

- The National Capital Plan: This Plan outlines the NCA's planning priorities. The Bridge is in a Designated Area as defined under the plan.
- The Griffin Legacy - A Policy Framework (2004): This framework aims to unlock the potential of Canberra's Central National Area. The project facilitates this by enhancing the connectivity to the Central National Area.
- The Smart Cities Plan (2016): This plan aims to maximise the potential of Australian cities. The project aligns with this plan by supporting integrated active transport and improving accessibility in Canberra.
- The Transport and Infrastructure Council Strategic Work Program: The proposed project will improve safety for Bridge users, which is a key component of this Work Program.
- Moving Canberra 2019-2045: This ACT Government strategy focuses on developing a modern, sustainable transport sector. Commonwealth Avenue Bridge runs along the Central Transit Spine as defined under the strategy.
- Transport for Canberra 2012-2031: This plan is the foundation of the ACT Government's planning strategy. One principle of the plan is to facilitate greater active transport use. The project aligns with this plan by facilitating easier and faster active travel across the Bridge.
- ACT Infrastructure Plan 2011-2021: This plan is nearing its completion and aims to deliver an improved public transport system and connectivity. The project will enable quicker, easier, and safer travel for Canberra residents and visitors.
- The City Plan 2014: This ACT Government Plan sets a vision for future development in the city centre to better connect it to the lake. Some planned developments are adjacent to the Bridge and will require consideration from the NCA.
- The ACT Planning Strategy 2018: A key theme of this strategy is to use infrastructure efficiently to support the growing community. The Bridge is currently at theoretical capacity at peak times and requires upgrades to facilitate future traffic growth.

The ACT Government is supportive of the proposal to upgrade the Bridge, on the understanding that it does not inhibit the future development of the light rail network. The ACT Government has cooperated in joint investigations during the preparation of the proponent's business case.

The Light Rail Stage 2 project is likely to interact with the proposed Bridge upgrade project as the ACT Government's preferred option is understood to involve the construction of a separate structure between the Commonwealth Avenue Bridge's two spans.

The key beneficiaries of the project are road, active (pedestrians and cyclists), and public transport users who will benefit from safer, faster and more reliable travel. Further stakeholder engagement with users and other groups is planned by the proponent prior to construction.

7. Economic, social and environmental value

The proponent expects the project to deliver a range of travel time, safety, and other benefits:

- Improved travel time relative to the base case in which some traffic lanes are closed
- Reduced vehicle crash rates owing to widening of the traffic lanes
- Improved cyclist travel time owing to the ability to maintain a higher speed
- Reduced safety risks owing to wider footpaths facilitating safer cyclist and pedestrian sharing of the active transport corridor
- Increased health benefits from an increase in active users owing to the widened pedestrians/cycle pathways
- Increased consumer surplus from active transport users, who will benefit from a wider footpath
- Residual value.

The proponent was unable to quantify all of the identified impacts.

The proponent's business case estimates that the net present value of the preferred project option (Bridge upgrade) is \$124.9 million with a benefit-cost ratio of 2.65, using a 7 per cent real discount rate and P80 capital cost estimates as stated in 2019 prices. The use of P80 costs meets the minimum requirements of the Infrastructure Australia Assessment Framework as these are probabilistically derived and offer a greater level of confidence compared to a P50 cost estimate.³

The proponent's quantified benefits consist of travel time benefits, traffic vehicle operating cost savings, reduced traffic externality costs, and residual values. Infrastructure Australia's assessment found that the economic, social and environmental value is overstated as a result of the definition of the base case.

The proponent assumes a 'do-minimum' base case in which two out of six traffic lanes are closed and heavy vehicles are diverted. The proponent states that this base case is necessary to:

1. Reduce the risk of structural issues arising
2. Widen the remaining traffic lanes to meet current standards
3. Widen active transport lanes to meet current standards
4. Improve safety barriers to meet current standards.

Infrastructure Australia agrees with the need to reduce the risk of a structural issue arising and the need to divert heavy vehicles to limit load until the Bridge can be strengthened. However, the supporting engineering appendix of the proponent's business case indicates that the lane closures do not change the structural risk rating.

The proponent advised that the base case also addresses other safety issues, which had not been monetised in the analysis. These were the need to:

- widen the traffic lanes (currently 3.2 to 3.5 metres wide each)
- widen the active transport lanes (currently 2.6 metres wide each)
- improve the safety barriers.

Infrastructure Australia acknowledges these non-structural issues, but considers the removal of 33 per cent of current Bridge capacity from one of two major lake crossings not to be an appropriate base case assumption. Overall, Infrastructure Australia considers the reduction in Bridge capacity under the base case likely to be in excess of what is necessary to keep the Bridge safe and operational. As a result, the project's benefits as reported in the business case are likely to be overstated. However, after considering different base case options, Infrastructure Australia considers the project will deliver a net benefit to the economy.

The proponent has also included traffic disruptions during construction as part of their analysis, which is good practice.

³ The Infrastructure Australia Assessment Framework states that P50 and P90 costs are acceptable for the Detailed Business Case central scenario. We note that the proponent used P80 costs in order to comply with guidance on capital works projects that are applicable to Australian Government agencies. This guidance is set out by the Parliamentary Standing Committee on Public Works of the Parliament of Australia in the April 2019 edition of the Procedure Manual.

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			
Vehicle travel time impact ¹	\$194.7		97.0%
Residual values	\$6.7		3.3%
Cyclist travel time benefit	-\$0.7		-0.3%
Total Benefits²	\$200.7	(A)	100%
Costs			
Total capital costs (P80)	\$76.2		100.5%
Operating costs	\$0.2		0.3%
Avoided maintenance and replacement costs	-\$0.6		-0.8%
Total Costs²	\$75.8	(B)	100%
Net benefits - Net present value (NPV)³	\$124.9	(C)	n/a
Benefit-cost ratio (BCR)⁴	2.65	(D)	n/a

Source: Proponent's business case

(1) Includes travel time savings, vehicle operating costs, externalities.

(2) Totals may not sum due to rounding.

(3) The net present value (C) is calculated as the present value of total benefits less the present value of total costs (A – B).

(4) 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 project is also expected to deliver additional non-monetised benefits such as:

- increased health benefits from increasing active transport infrastructure capacity
- welfare improvements and increased liveability from an improved active transport corridor, making trips more enjoyable
- heritage and cultural value improvements as the project affects the Parliament House Vista, a heritage listed location.

The proponent has assessed the environmental impacts, risks, and mitigation measures in detail. These risks will be mitigated by using construction methodologies that minimise environmental harm. The only environmental impacts that were monetised within the business case were the externality costs associated with vehicle traffic.

The proponent indicates that the Bridge has no statutory heritage status and is not currently on any heritage lists. However, the Parliament House Vista is on the Commonwealth Heritage List. The vista is bordered by the bridges crossing Lake Burley Griffin, including the Commonwealth Avenue Bridge. The proposed upgrades may have a moderate impact on this value given the substantial extensions to the Bridge on either side. The designs have sought to minimise these impacts.

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

Capital costs and funding	
Total capital cost	\$127.4 million (P80, undiscounted)
Australian Government funding contribution (sought)	\$127.4 million
Other funding	n/a

8. Deliverability

Planning and management of the Parliamentary Zone is the responsibility of the NCA, an Australian Government agency that administers National Land on behalf of the Commonwealth. The ACT Government administers the rest of the ACT, with responsibilities for long-term land use planning, roads and public transport infrastructure. The NCA is responsible for the Commonwealth Avenue Bridge, and so will be delivering the proposed upgrade project.

The proponent used a multi-criteria analysis to assess various contracting models for delivering the project, including construct only, design and construct, managing contractor, construction management, financed models, and alliance models.

These options were shortlisted qualitatively using the following criteria: operational flexibility, risk management, control of design, NCA's capacity and capability, time to deliver project, market interest, value for money, budget certainty, flexibility, and stakeholder management. The proponent's preferred delivery strategy is a Managing Contractor model.

This delivery model is preferred by the proponent for the following reasons:

- Enables the commencement of early works whilst the detailed design stages continue
- Allows for the management of scope uncertainty around enabling works and services relocation
- Provides flexibility in dealing with interfaces such as a potential Light Rail Stage 2 and other services
- Allows a coordinated approach to the project components such as the structural works, early works, and architectural works
- Allows for external, technical input during the design phase which may translate to cost savings
- Ability to manage construction disruptions by using best design solutions and staging approaches during the planning phase.

The following risks associated with the preferred delivery model were identified:

1. The proponent generally does not deal with large scale complex infrastructure projects, and does not commonly use the Managing Contractor model
2. A risk of lack of market response due to the size of the project and its specialist nature.

The risk mitigation strategies for risk 1 include the use of project officers with experience in using the Managing Contractor model, and the employment of external experts. The proponent will undertake early market-sounding activities to address risk 2. Overall, Infrastructure Australia is broadly satisfied with the approach used to identify the preferred delivery option. However, the delivery risk remains. Infrastructure Australia encourages the proponent to initiate the identified mitigation strategies as early as possible and closely manage, monitor, evaluate and adapt the delivery strategy.

Another potential delivery risk relates to the interaction of the Bridge upgrade with the Light Rail Stage 2 project, which will be delivered in the same corridor by a different proponent. The proponent intends to complete the project prior to the commencement of the light rail project in order to avoid site conflicts. The proponent's mitigation strategy for this risk is ongoing consultation with the ACT Government. With mitigation, this delivery risk is rated as medium by the proponent.

The ACT Government has indicated that, based on guidance provided by the proponent, it proposes to construct Light Rail Stage 2 on a new bridge between the existing Commonwealth Avenue Bridge spans. This will minimise any interaction with the Commonwealth Avenue Bridge Upgrade. Infrastructure Australia acknowledges the drivers for delivering the two projects under separate business cases. We strongly recommend that the proponents continue to work together and integrate the planning and delivery of both projects.

The proponent has used P80 capital cost estimates in the economic analysis in the Detailed Business Case. The Infrastructure Australia Assessment Framework sets out a requirement for the reporting of P50 or P90 cost estimates, which are respectively based on the 50 per cent and 90 per cent probability that the cost estimate will not be exceeded. A P80 cost estimate is based on the 80 per cent probability that it will not be exceeded, and so meets the minimum standard of a P50

estimate. The proponent had reported P80 cost estimates to comply with guidance applicable to Australian Government capital works proposals. This guidance is set out in the April 2019 edition of the Procedure Manual of the Parliamentary Standing Committee on Public Works of the Parliament of Australia.

The proponent did not include a Post Completion Review plan in their submission. They have advised Infrastructure Australia that a Benefit Realisation Review is part of the Australian Government's Gateway Review Process and that an independent Post Completion Review would be commissioned if the Benefit Realisation Review is not initiated. 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.

Consideration of COVID-19

The COVID-19 pandemic has significantly affected the use of infrastructure. Infrastructure Australia has been working collaboratively with the Australian Government to provide advice on a staged response for managing, and recovering from, the impacts of the COVID-19 pandemic.

One critical element of our advice is to maintain a pipeline of nationally significant infrastructure investments. Nationally significant infrastructure projects are long-term investments, typically considering a 30-year view of the project's social, environmental and economic impacts. In making this recommendation, Infrastructure Australia continues to take a long-term view and has also considered the sensitivity of key planning assumptions using the best data available to us.

As noted in the 2019 Australian Infrastructure Audit, we must continue to evolve the way we plan for Australia's infrastructure to embrace uncertainty. There are still many uncertainties regarding the long-term impact of the COVID-19 pandemic on infrastructure use.

We will continue to collaborate with industry, the community and governments at all levels to understand the impacts of the COVID-19 pandemic on infrastructure decisions in Australia.