Australian Government | Infrastructure Australia

Project business case evaluation summary

Armadale Road Bridge

Location
Perth, WA

Geography
Fast-growing cities

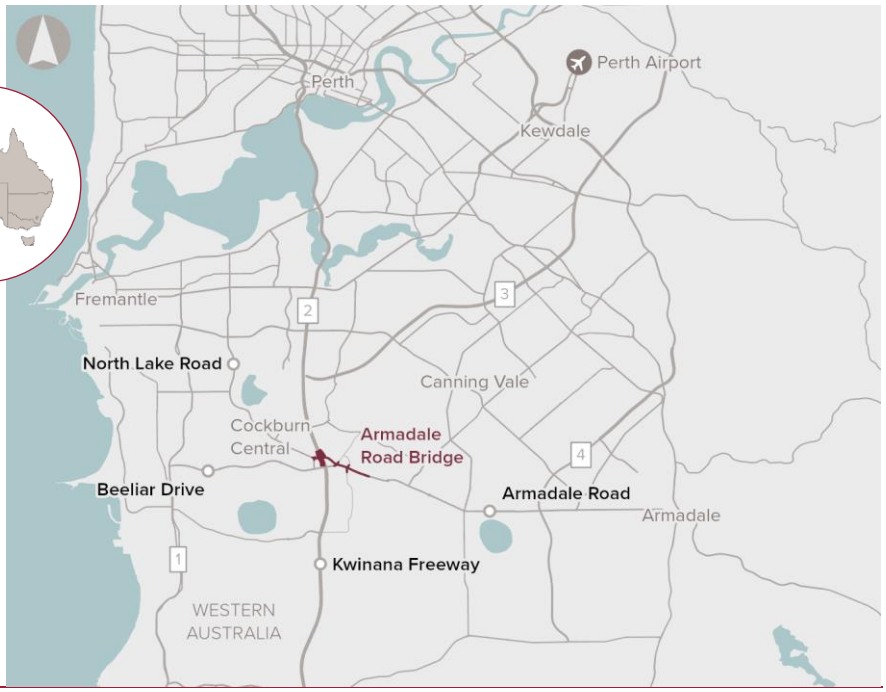
Category
Urban congestion

Capital cost
$286.1 million (P90, outturn)

Indicative timeframe
Construction Start: 2019
Project completion by: 2021

Proponent
WA Government

Evaluation date
8 December 2020



1. Evaluation Summary

Cockburn Central is a strategically important employment, activity and transport hub in south-west Perth, approximately 23 km south of the Perth CBD. Ongoing development and population growth in the City of Cockburn is significantly increasing the volume of traffic travelling to and through the area. We agree with the WA Government's assessment that this growth in traffic volumes cannot be accommodated by the existing road capacity, and Armadale Road bridge was listed as a near-term Priority Initiative on the Infrastructure Priority List in March 2018.

The proposed project is to provide a direct connection between Armadale Road and North Lake Road to increase capacity and direct regional and freight traffic away from the town centre. The project will reduce congestion and accidents, particularly on Armadale Road. In turn, the project is expected to improve amenity within Cockburn Central and help realise land use aspirations for the region. However, the business case from the WA Government states that after the project is delivered, congestion could re-emerge within 10 years. This issue can be avoided in future projects by completing a program-level assessment of different project staging or packages to identify a more comprehensive long-term solution to the identified problems.

The proponent's business case reports that the social, economic and environmental benefits of the project will exceed its costs, with a benefit cost ratio (BCR) of 3.0 and a net present value (NPV) of $413 million. Our analysis identified some uncertainties in the transport modelling and economic appraisal that are likely to overstate the benefits of the project. However, we consider that the project would still provide a positive return on investment.

The project does not present any significant environmental, social or technical issues that will impede or prevent its delivery. The WA Government has extensive experience in delivering similar projects and we are confident that the delivery model selected would be appropriate for this type of project.

On the balance of our assessment, the **Armadale Road bridge has been added to the Infrastructure Priority List as a Priority Project.**

2. Context

The key east–west route through Cockburn Central is Armadale Road and Beeliar Drive, and the major north–south route is the Kwinana Freeway. The Cockburn Central train station also provides links north to Perth and south to Mandurah for residents commuting from the area, as well as access to employment in the sub-region.

The Cockburn Central local government area is projected to experience high population growth, with the number of people living in the City of Cockburn forecast to reach 170,000 by 2031 (a 60% increase on the observed 2016 population). Land use in and around Cockburn Central is highly diverse, featuring large employment hubs, recreation facilities, and health and emergency services.

The area to the west of Cockburn Central is also growing rapidly, in line with the state planning strategy to create urban corridors and transit-oriented growth areas. To the east of the Kwinana Freeway, large zones of semi-rural and industrial land are being transformed into metropolitan centres, with brand new residential estates and suburbs under construction. This forms part of the 'Enterprise Arc' – a broader catchment connecting the Western Trade Coast, Australian Marine Complex, Bibra Lake Industrial Area, Jandakot City, Forrestdale Business Park and the Armadale Strategic Centre.

The ongoing land use changes and population growth in the City of Cockburn are leading to higher traffic volumes travelling to, or through, Cockburn Central. This has caused poor reliability, accidents and delays in this area. In response, the primary objective of the proposal is to reduce congestion throughout the Cockburn Central area by:

- allowing east–west regional traffic to bypass the regional centre, in order to improve traffic flow and remove regional traffic from local access roads
- improving access to the Kwinana Freeway through additional access points, in order to ease congestion at other freeway access points (mainly Berrigan Drive interchange)
- improving access to the Cockburn Central train station where there are limited access routes available.

3. Problem description

The existing road network does not separate traffic getting on and off the Kwinana Freeway from traffic accessing Cockburn Central. This strategically important and growing employment and activity centre is facing congestion and road safety issues, with the vast majority of trips are taken by cars. This not only slows general traffic in the area, but also freight traffic, buses accessing the heavy rail connection at Cockburn Central, and emergency response vehicles.

The Armadale Road/Beeliar Drive interchange is experiencing severe congestion and traffic volumes are growing through the Midgegooroo Avenue/Beeliar Drive intersection. Safety is also a significant challenge, with Armadale Road between Cockburn and Armadale ranked by RAC as the state's sixth riskiest road.

With limited road entry and exit points to Cockburn Central station, the congested road network results also impacts on access to rail services.

These issues have been recognised as nationally significant on the *Infrastructure Priority List* through a near-term Priority Initiative for Armadale Road Bridge. This was first included on the Priority List in 2018.

Without the project, the proponent expects that traffic volumes (including increased east-west regional traffic) will rise further in Cockburn Central, travel times for general traffic and freight will increase, vehicle operating costs will rise, safety will deteriorate. The business case states that failure to address the problem may impact on the region achieving the land use, economic and employment outcomes sought by local and state government plans and policies.

4. Options identification and assessment

The proponent identified and filtered options to address the problem by:

- developing an options long-list and assessment criteria via a workshop involving participants with divergent perspectives drawn from a range of organisations
- undertaking a qualitative Multi-Criteria Analysis (MCA) on a long-list of nine infrastructure and non-infrastructure options using criteria including service requirements, strategic alignment, deliverability and value-for-money.
- shortlisting the two options with the highest MCA score for further detailed analysis in a business case
- selecting a preferred project option on the basis of consideration of economic, social and strategic performance.

Infrastructure Australia recognises the use of MCA as a tool for filtering a long-list of options, but recommends the use of quantitative metrics when shortlisting options. Including more options (including non-infrastructure solutions such as bus priority improvements) in the short-list for rapid cost-benefit analysis would have also provided decision makers with more confidence in the assessment findings.

Our review also found that there was limited consideration of packaging options, despite many of the options potentially being complementary to one another. For example, low-cost or non-infrastructure options could have improved the performance of the higher-cost infrastructure solutions.

Two infrastructure options were shortlisted:

- Option 1: Build a new Armadale Road Bridge with Freeway Ramps
- Option 2: Widen the existing Beeliar Drive Bridge

The proponent recommended Option 1 as the preferred option.

The proponent's analysis shows that both options increase road capacity and reduce congestion. Unlike Option 2, Option 1 directs regional and freight traffic away from the town centre, which helps improve amenity in the Cockburn Central area and freight and business efficiency by allowing these road users to bypass the Cockburn Central area. The analysis shows that Option 1 relieves more congestion along Armadale Road/Beeliar Drive and improves access to the Cockburn Central train station.

We recognise that Option 1 better aligns with project objectives and achieves significantly greater benefits. However, this option does have capital costs that are higher than the alternative option. This results in Option 1 having a higher stated NPV ($413m vs $257m), but a lower BCR (3.01 vs 10.29).

The business case notes that Option 1 may need to be followed by a second project (Option 2), within a decade in order to maintain an acceptable level of service. The business case could have benefited by considering potential staging or packaging of these options to better address the problem, achieve higher value for money and more strongly align with strategic planning and project objectives.

5. Proposal

The Armadale Road bridge proposal includes:

- Construction of a bridge over the Kwinana Freeway.
- Grade separated intersections between Armadale Road, and Solomon and Tapper Roads.
- North-facing on/off ramps and two lane collector distributor roads on both sides of the Kwinana Freeway from Berrigan Drive to Armadale Road.
- Modifications to the existing Armadale Road / Ghostgum Avenue signalised intersection.
- Modifications to the existing North Lake Road / Midgegooroo Avenue signalised intersection.

- Two lanes in each direction for free flowing regional traffic from west of the Armadale Road / Solomon Road intersection to east of the Armadale Road / Tapper Road intersection.
- Two lane collector distributor roads adjacent to the regional traffic lanes between Armadale Road / Solomon Road intersection and the Armadale Road / Tapper Road intersection.

6. Strategic fit

The project aligns well with local and state plans, strategies and policies, including sub-regional plans, state planning policies and public and integrated transport plans. The WA Government's State Planning Strategy and Perth and Peel @ 3.5m identifies the need to limit urban sprawl and its associated costs, and this project helps facilitate higher-density development. The opportunity to catalyse a more efficient and sustainable land use form is a key theme in the business case, but the proponent did not measure any of these benefits in the economic appraisal.

The City of Cockburn's Integrated Transport Plan identifies congestion problems, particularly around Cockburn Central, which this project helps address. The project is likely to improve bus travel times and access to rail for existing public transport users, but the business case does not provide evidence that the project helps achieve the strategic objective of reducing car dependency and increasing public transport uptake.

The Infrastructure Priority List includes Armadale Road Bridge as a Priority Initiative, and this project responds directly to the urban congestion problems identified in this nationally significant Initiative. The business case found that most of the benefits of the project are for road users saving time on their journeys (63% of total benefits. Beneficiaries include private road users accessing the Cockburn Central area and those travelling east–west by removing the need to travel directly through the Cockburn Central area. The project will would also improve access and amenity for the local community and businesses.

The WA Government Department of Main Roads' strategic direction "Keeping WA moving" includes a focus area on safety and the RACWA 2017 road safety survey ranked Armadale Road between Cockburn and Armadale as the state's sixth riskiest road. However, the crash cost savings from the project are less than 1% of benefits.

Overall, the business case demonstrates the strategic merit of delivering a new Armadale road bridge to address congestion and divert regional and freight traffic away from Cockburn Central.

7. Economic, social and environmental value

The proponent reports the project BCR as 3.0, with a NPV of $413 million using a 7% real discount rate and P50 capital cost estimate. The proponent estimates that the project would deliver $620 million in transport benefits, including $388 million in travel time savings (63%) and $228 million in vehicle operating cost savings (37%).

Our analysis of the business case identified limitations and areas of uncertainty in the transport modelling and economic appraisal that are likely to overstate the benefits of the project.

The proponent's transport modelling includes very high demand growth, but no additional transport network capacity in the base case between 2021 and 2031. This results in significant congestion that could be unrealistic, such as average speeds of 17 km/h on the Kwinana Freeway. The Infrastructure Australia Assessment Framework recommends the use of a 'do minimum' base case, but also recognises that in some circumstances, where high levels of growth are expected, incremental capacity enhancements may be needed to produce realistic transport modelling results.

The economic evaluation was prepared using an analytical module, which deviates from commonly applied approaches and is likely to overstate user benefits. The analysis also measures vehicle operating costs with a 'capital and interest costs' component for all vehicles. Our Assessment Framework recommends excluding this component, as it overstates benefits for most users. Notwithstanding these issues, our internal sensitivity testing found that the benefits of the project would still exceed its costs under a wide range of scenarios.

We support the steps taken by the proponent develop an analytical module, but recommend it be refined to improve the consistency and efficiency of business cases.

The proponent has assumed benefits would be 'capped' beyond 2031. This is typically a conservative assumption, apart from scenarios where significant congestion is likely to occur again in the later years of the appraisal period. As previously noted, the business case states that this project is unlikely to provide sufficient capacity for the next 30 years, so there is a risk that the ongoing benefits of the project could fall, rather than remain constant.

Our review identified that some project benefits were not included in the social cost-benefit analysis, including:

- Public transport benefits
- Residual value of assets
- Improved amenity and operations of the shopping centre (through removal of heavy vehicle freight movements from Cockburn Central)
- Improved response times (and associated community welfare benefits) of emergency response vehicles
- Improved productivity of existing businesses and business expansion (with associated land use change and employment) due to improved accessibility

Taking all the above factors into account, we consider that the benefits of the project are likely to be overstated. However, our extensive sensitivity testing found that the project benefits remain well above its costs under a wide range of scenarios.

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	$388		62.6%
Road vehicle operating cost savings	$228		36.8%
Accident cost savings	$5		0.8%
Reduced environmental externalities	-$1		-0.2%
Total Benefits[1]	**$620**	(A)	**100%**
Total capital costs (P50)	$205	(C)	99.0%
Maintenance costs	$2	(B)	1.0%
Total Costs[1]	**$207**		**100%**
Net benefits - Net present value (NPV)[2]	**$413**	(D)	n/a
Benefit-cost ratio (BCR)[3]	**3.0**	(E)	n/a

Source: Proponent's business case

(1) Totals may not sum due to rounding.
(2) The net present value (D) is calculated as the present value of total benefits less the present value of maintenance costs less the present value of capital costs (A – B - C).
(3) The benefit–cost ratio (E) has been calculated by the proponent as the present value of total benefits less the present value of maintenance costs, divided by the present value of total costs ((A-B) ÷ B). Deducting maintenance costs in the numerator is not consistent with the Infrastructure Australian Assessment Framework, however the impact on the calculated BCR would be immaterial.

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

Capital costs and funding	
Total capital cost	$237.5 million (P50, undiscounted) $286.1 million (P90, undiscounted)
Australian Government funding contribution (committed)	$207.2 million
Other funding	The remaining capital costs will be funded by the WA Government

Maintenance cost estimates are included in the analysis. However, we consider they are unlikely to be adequately accounting for periodic maintenance and refurbishment over the evaluation period.

8. Deliverability

Main Roads Western Australia is leading the delivery of the project. The proponent completed an assessment process that identified an Alliance approach as the preferred delivery model. Infrastructure Australia concurs with the proponent's analysis of delivery options and considers the proposed delivery model to be appropriate. Main Roads Western Australia has extensive experience in delivering similar projects using an alliance approach.

The proponent's risk analysis concluded that the level of risk was relatively low. Following assessment and identification of proposed mitigation strategies, the quantified value of residual risks was found to be within the low range and typical of the risks for similar projects. We consider the risk assessment appropriate.

The project does not present significant environmental, social or technical issues that impede or prevent the delivery of the preferred solution. Documentation provided demonstrates that there are no significant environmental constraints or impacts (the project site is a brownfield site within the existing designated road and rail reserve). There are controls in place to mitigate any potential social impacts during construction.

The proponent provided a preliminary Benefits Realisation Plan which provides information on the proposed type of benefits as well as key metrics, baselines to be collected, and timelines for the benefits to be realised. Infrastructure Australia encourages the proponent to advance this plan further to develop baselines, targets, detailed timelines for achievement of benefits and assign responsibilities.

Infrastructure Australia also 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 Commonwealth 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.