

# Project Evaluation Summary

## Armadale Road upgrade

**Proponent** WA Government  
**Evaluation date** 14 June 2017

### Contents

1. Summary .....	1
2. Strategic context .....	2
3. Problem description .....	2
4. Proposal .....	2
5. Options identification and assessment .....	3
6. Economic evaluation .....	3
7. Deliverability .....	5



## 1. Summary

Infrastructure Australia has added the **Armadale Road upgrade** project to the Infrastructure Priority List as a **Priority Project**.

Armadale Road is a strategic freight route in the southern Perth metropolitan area, connecting Armadale and the south-eastern metropolitan area with Fremantle Port and Kwinana. Increasing traffic volumes on the road are causing congestion and road safety issues. Planned residential, retail and commercial development in the region is expected to exacerbate these issues.

The proposed project will upgrade seven kilometres of Armadale Road between Anstey Road and Tapper Road from the existing two-lane single carriageway road to a four-lane dual carriageway, consistent with the rest of the 16 kilometre section between Armadale and the Kwinana Freeway. The project also includes intersection upgrades and provision for improved pedestrian and cycling access. The project would improve travel times for commuters and commercial vehicles, reduce vehicle operating costs and reduce the number of crashes on the road. The project will address, in part, capacity constraints on Perth's major east-west corridors, which is an identified infrastructure problem listed on the Infrastructure Priority List.

The proponent's stated net present value (NPV) for the project is \$564 million, with a benefit cost ratio (BCR) of 4.2 using a 7% real discount rate and P90 cost estimate. This is a relatively high BCR, and Infrastructure Australia is very confident the project will deliver overall benefits well in excess of its costs

## 2. Strategic context

Armadale Road serves as one of the key east-west links in the Perth road transport road network. It provides a strategic road freight link between the south-eastern metropolitan area and Fremantle Port. The port is the state's biggest general cargo port and handles almost all of the container trade for Western Australia.

The areas serviced by Armadale Road have been subject to considerable development over the past ten years, including development of the Cockburn Gateway shopping centre, eight new residential buildings (providing 466 new dwellings), and a doubling of carpark bays in the area. The adjacent areas of Banjup, Piara Waters and Forrestdale are currently being developed. A new town centre, Cockburn Central, is located on the western end of the project area with a mix of residential, retail and commercial properties. Further planned development in the corridor includes residential development in Byford and Mundijong, as well as industrial development in the growing industrial areas of Jandakot and Forrestdale. Planned development for the Cockburn area is expected to increase commercial and recreational activity in the region serviced by Armadale Road.

The Australian Infrastructure Audit 2015 found that strong population and employment growth in greater Perth is likely to lead to a significant increase in demand for transport services across the metropolitan area. The Audit estimated that Perth is set to experience the highest increase in traffic congestion in Australia if measures to improve the capacity and efficiency of the road network are not taken. Furthermore, the Audit found that Fremantle Port is likely to service strong increases in throughput in both bulk and containerised trade. Efficiently moving goods to and from the port will be crucial in facilitating this growth.

## 3. Problem description

The 7-kilometre section of Armadale Road between Anstey Road and Tapper Road remains the only two lane section of the 16-kilometre stretch between the Kwinana Freeway and Armadale. The other sections of the road are four-lane dual carriageways.

Development and population growth in the region is leading to increased congestion and poorer safety outcomes. Current traffic volumes are already delaying commuters and commercial vehicles. Additional development that is either underway or planned is expected to exacerbate these issues. The need for capacity upgrades to major Perth east-west corridors is recognised as an Initiative on the Infrastructure Priority List.

The proponent states that the recommended capacity for single lane roads is 8,000 vehicles per day. Along this section of the road, traffic volumes reach up to 27,500 vehicles per day. By 2021, this is expected to grow to up to 40,000 vehicles per day, which is a growth rate of 5% per year. As a result, travel times are forecast to increase by over 6% over the period to 2021. This will place increasing pressure on the route, reducing service standards and compounding existing delays for commuters, with corresponding increases in vehicle operating costs.

There were a total of 438 crashes on this section of the road between 2010 and 2014, of which 57% were rear end crashes. The current crash rate of 171 per 100 million vehicle kilometres travelled (MVKT) for this section of road is well above the Metropolitan average of 134 per 100 MVKT for highways and freeways.

## 4. Proposal

The proposal involves construction of a four-lane dual carriageway between Anstey Road and Tapper Road. This includes:

- Provision of dedicated left and right-turn lanes and installation of new traffic signals at two intersections
- Provision of road safety barriers and two-metre sealed shoulders
- Installation of street lighting for the full length of the project
- Provision of improved pedestrian and cycling facilities.

The Western Australian Government states that the recommended option will provide a range of benefits including:

- Improved road network connectivity and efficiency
- Supporting economic development by improving a strategic link in the freight route

- Reduced travel times
- Improved level of service at intersections
- A reduction in crash risk.

## 5. Options identification and assessment

Three options were identified to address the capacity and safety issues on Armadale Road:

- Option 1 – address the congestion issues by diverting traffic to alternative routes, providing road safety barriers, road treatments or grade separating intersections
- Option 2 – construct a six-lane dual carriageway on Armadale Road from Anstey Road to Tapper Road
- Option 3 – construct a four-lane dual carriageway on Armadale Road from Anstey Road to Tapper Road.

The options were assessed against a 'do nothing' base case using key criteria. The economic costs and benefits for each option were not quantified. Instead, a decision matrix was used to qualitatively evaluate the options against their economic (e.g. private and commercial travel time savings and transport efficiency), social (e.g. safety benefits and amenity improvements) and environmental (e.g. reductions in emissions) impacts.

Following this preliminary options evaluation, the preferred option (Option 3) is to construct a four-lane dual carriageway on Armadale Road from Anstey Road to Tapper Road. The proponent identified the following key benefits of the preferred option over alternatives:

- Improved safety and efficiency
- Reduced travel time and freight cost
- Local economic benefits
- Fit for purpose until 2031
- Lower cost than Option 2.

## 6. Economic evaluation

The proponent's revised economic evaluation of the project indicates a BCR of 4.2 and NPV of \$564 million using a 7% real discount rate and P90 cost estimate. The largest benefit of the project is travel time savings for commuters. Additionally, vehicle owners will benefit from reduced vehicle operating costs due to less stop-start traffic.

The original business case submitted by the proponent reported a BCR of 6.1. Infrastructure Australia's analysis of the economic appraisal identified a number of issues, including the methodology by which value of travel time was calculated, and the absence of a ramp-up to benefits during the early operational years of the project. In response to these issues, the proponent submitted a revised economic appraisal which addressed Infrastructure Australia's concerns.

The appraisal does not include the residual value of the project beyond the evaluation period. It assumes the upgrade has an economic life of 40 years, while project benefits and costs are evaluated over a period of 30 years. As such, the economic appraisal should include any residual economic value at the end of the appraisal period. Without this, the benefits of the project are likely to be slightly understated.

The transport modelling underpinning the Cost Benefit Analysis includes recently completed projects such as Gateway WA. It also includes Roe 8 / Perth Freight Link, as that was a committed and funded project at the time that the modelling was undertaken. The WA Government's decision not to proceed with the Roe 8 / Perth Freight Link project is not expected to have a material impact on the economic evaluation of the Armadale Road upgrade. The North Lake Road project, which is adjacent to Armadale Road, was not included in the transport modelling. This project is complementary to the Armadale Road project, and is not expected to have a material impact on the economic evaluation of the project.

Given the relatively high project BCR, Infrastructure Australia is confident that the project will deliver benefits well in excess of its costs.

### Benefits and costs breakdown

Proponent's stated benefits and costs		Present value (\$m, 2015) @ 7% real discount rate	% of total
<b>Benefits</b>			
Private travel time savings		\$372.0	50%
Commercial Travel Time Savings		\$83.8	11%
Vehicle Operating Cost Savings		\$252.9	34%
Crash Savings		\$35.3	5%
Environmental (emission) savings		\$0.1	0%
<b>Total Benefits<sup>1</sup></b>		<b>\$774.1</b>	<b>100%</b>
<b>Total Costs<sup>2</sup></b>		<b>\$179.7</b>	<b>100%</b>
<b>Core results</b>	<b>Net benefits - net present value (NPV)<sup>3</sup></b>	<b>\$564.4</b>	n/a
	<b>Benefit-cost ratio (BCR)<sup>4</sup></b>	<b>4.2</b>	n/a

Source: Proponent's Business Case

Notes:

(1) Totals may not sum due to rounding.

(2) The proponent's economic evaluation assumes a base year (Year 0) of 2019/20, the anticipated first year of operations. The proponent has inflated costs to the base year using the 7% discount rate, resulting in the present value of costs exceeding nominal (undiscounted) costs. Infrastructure Australia recommends that the base year is the current year to better inform decision-making. The impact of this change on the BCR and NPV would be minor.

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

(4) The benefit-cost ratio was calculated by the proponent as the present value of total benefits, less the present value of maintenance costs, divided by the present value of capital costs. Infrastructure Australia recommends that the BCR is calculated as total benefits divided by total costs (capital plus maintenance). This methodological difference would have a negligible impact on the BCR.

### Capital costs and funding

Total capital cost (nominal, undiscounted)	Pending
Proponent's proposed Australian Government funding contribution	\$116.3 million
Other funding (source / amount / cash flow) (nominal, undiscounted)	The Western Australian Government is funding the balance of the project

## 7. Deliverability

The Australian Government has committed to contributing \$116 million towards the project.

The project is considered to be low risk and the proponent has extensive experience in delivering projects of this type. The delivery mechanism recommended by the proponent in the original business case was a Design and Construct (D&C) contract or separate D&C contracts. The Australian and Western Australian Governments have agreed that the works will be delivered by the Metropolitan Road Improvement Alliance. The Alliance has confirmed that the procurement strategy is in accordance with Western Australia's State Supply Policies.

A benefits realisation plan has not yet been developed, but Key Performance Indicators (KPIs) will be part of the contracting strategy with the successful tenderer. Main Roads (Metropolitan Region) will be responsible for implementing and monitoring the KPIs, and Main Roads Western Australia will be the accountable agency. Infrastructure Australia recommends that the proponent conduct a post-completion review of the project to accurately understand the benefits realised.

A Preliminary Environmental Impact assessment has already been completed and the next stages of project development will further examine environmental matters associated with wetland areas at the western end of the project section. Infrastructure Australia's evaluation is subject to environmental and other regulatory approvals being secured.

While 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 for future business cases.

---

This evaluation summary was considered by the Infrastructure Australia Board in June 2017.

Following Infrastructure Australia's process of fact and sensitivity checking the summary with the proponent prior to publication, the summary was amended to exclude the capital cost (nominal, undiscounted) pending finalisation of current commercial negotiations, and to update the status of project procurement in the Deliverability section.