



Infrastructure Australia Project Business Case Evaluation

Project name	Forrestfield-Airport Link
Rating	Priority Project
Date of IA Board rating	7 September 2016

Location	Perth, Western Australia
Proponent	Western Australian Government
Project timeframe	<ul style="list-style-type: none">• Contract award for design and construction: April 2016• Construction: Late 2016 – 2020• Train operations commence: 2020

Evaluation Summary

The suburbs to the east of Perth Airport, and the airport itself, are relatively poorly served by public transport. This encourages car use, which leads to road congestion, and increases bus travel times. This congestion is projected to worsen as passenger journeys in the region increase. The Perth Airport operator estimates that passenger numbers at the airport will more than double from 13.7 million in 2013 to 28.5 million by 2034.

This will put pressure on landside transport connections, increasing travel times and reducing travel time reliability. Modelling undertaken as part of the *Australian Infrastructure Audit 2015* (the Audit) estimates that the time for a car trip from Perth Airport to the CBD will increase from 15 to 20 minutes in the AM peak in 2011, to 25 to 30 minutes in 2031. Based on the airport operator's forecasts, and assuming that around half of the extra passengers would be impacted by this additional travel time, the additional congestion cost could grow to around \$60 million per year by 2031.

The project consists of constructing a new 8.5 km rail spur from Bayswater, mainly tunnelled, under the airport, to Forrestfield. It will include three new railway stations (Belmont, Airport Central and Forrestfield), connecting to the existing Midland line at Bayswater. The project also includes two bus-rail interchanges at Belmont Station and Forrestfield Station. The new line will provide a fast connection between the CBD and the Airport and significantly improve accessibility to public transport in the east metropolitan region. The new rail line is expected to alleviate congestion on the road network around the airport and surrounding areas, with significant economic benefits likely to be delivered through reduced travel time savings for rail and road users.

The proponent's stated benefit-cost ratio (BCR) for the project is 1.4 using a real discount rate of 7% and contract prices, while the net present value is \$670 million (at 7% real discount rate and contract prices). The project's costs are anticipated to be lower than those used in the business case, based on the contracted cost received for a large part of the works. The benefits from the project are generated by use of the new rail link by flyers and non-flyers, with the majority of benefits from servicing the non-flyer market through the Belmont and Forrestfield Stations. Sensitivity tests undertaken by the WA Government also showed land use change as a significant driver of benefits. The

proposal is currently an Initiative on the Infrastructure Priority List (IPL), and is noted in the Perth Transport Plan *Transport @ 3.5 Million* by the WA Government as a priority for Perth as it approaches a population of 2.7 million people.

Overall, the cost benefit analysis demonstrates that the project would generate sufficient benefits to outweigh its costs. Infrastructure Australia is confident that the project will realise a BCR higher than 1.

The estimated capital cost for the project is \$1.9 billion (based on contract prices), of which the Australian Government has contributed \$490 million (nominal, 2016). The proponent awarded a Design and Construction contract for the project in April 2016.

1. Strategic Context

Perth Airport is Australia's fourth busiest airport and is a nationally significant asset. The airport operator's master plan forecasts passenger numbers will more than double from 13.7 million in 2013 to 28.5 million in 2034.

The WA Government (with support from the Australian Government) has recently completed the Gateway WA Perth Airport and Freight Access road project. This is WA's largest road project to date, designed to improve the safety and efficiency of road access to and around the airport. Analysis provided by the proponent indicates that congestion around the airport will not be satisfactorily alleviated by this road project alone, and hence the need for a rail link to the region.

The Forrestfield-Airport Link is noted by the WA Government as a priority for Perth as it approaches a population of 2.7 million people, in the Perth Transport Plan *Transport @ 3.5 Million*. The proposal is currently an Initiative on the IPL.

2. Problem Description

The proposed project seeks to address the lack of public transport availability in suburbs to the east of Perth Airport and at the airport, and road congestion in Perth's east.

Modelling undertaken as part of the Audit projects the time for a car trip from Perth Airport to the CBD will increase from 15 to 20 minutes in the AM peak 2011, to 25 to 30 minutes in 2031. Based on passenger numbers from the airport operator's master plan, and assuming that around half of this travel would be affected by the additional travel time, the additional delays for those using cars to access the airport would be around \$60 million per year by 2031. Further public transport capacity is expected to be needed to meet the significant passenger growth forecast for the airport.

Areas to the east of the airport experience reduced accessibility to the CBD, creating inequity and potentially preventing higher value land uses. These areas are poorly served by public transport which encourages car use and increases road congestion, which in turn increases travel time on buses.

3. Project overview

The project consists of constructing a new 8.5 km rail spur from Bayswater, of which 8 km is tunnels. The link connects Forrestfield, the Airport and Belmont with the existing Perth rail system. The project will include:

- Three new railway stations (Belmont, Airport Central and Forrestfield)
- A connection with the existing Midland line at Bayswater, facilitating the operation of rail services between Perth and Forrestfield
- Two bus-rail interchanges at Belmont Station and Forrestfield Station, with Forrestfield providing for access from a large area through buses and cars.

4. Options identification and assessment

The proponent evaluated a range of potential infrastructure and non-infrastructure solutions as part of its options analysis. The options assessment was conducted in three steps:

- Qualitative scoring of the long list of options, which was used to qualitatively rank the options
- Review of technical and/or operating constraints for options which would limit their effectiveness. This was used to further inform which options made the shortlist
- Multi criteria analysis of three shortlisted options. This was used to rank the options and determine which of them would be progressed to more detailed analysis.

The options analysis initially considered a long list of 11 options, including road upgrades surrounding the airport, demand management, bus rapid transit, light rail, increased taxi availability and a number of new railway alignments. These were qualitatively assessed against evaluation criteria, given a rating and ranked from most to least preferred.

The qualitative assessment was conducted against the following criteria:

- Improves connection between Perth CBD to national capital cities and other economic regions
- Promotes development
- Maximises interconnectivity in Perth's public transport system
- Promotes development at the airport
- Improves productivity and capacity of the road network
- Improves social equity
- Promotes public transport usage.

This process identified that the three commuter rail options considered were ranked most highly. Two of these were excluded from further assessment based on technical and/or operating constraints that would limit their effectiveness.

Based on the results of the qualitative assessment and review of technical and/or operating constraints, three options were shortlisted for further analysis using a multi criteria assessment:

- The preferred rail option
- The preferred bus rapid transit option from the qualitative assessment
- An upgrade option for Orrong Road.

The same criteria applied in the qualitative assessment were used in the multi criteria assessment, which again indicated the rail option was the preferred option. The multi criteria assessment has significant weaknesses, including the absence of capital costs amongst the criteria. This biases the assessment of the options against low cost options and in favour of higher cost options. Further, the assessment of options has had limited reliance on objective quantitative evidence.

5. Economic evaluation

The proponent's stated BCR for the project is 1.4 using a real discount rate of 7% and P90 cost estimate. The project's stated net present value (NPV) of \$670 million. Overall, the proponent's cost-benefit analysis demonstrates that the project will generate net benefits, and Infrastructure Australia is confident that the BCR for the project would be greater than 1. However, a number of issues were identified with the traffic modelling used by the proponent, and the WA Government undertook sensitivity tests in support of this evaluation, which validated the results.

Demand modelling was completed separately for flyer- and non-flyer traffic. Non-flyer demand was modelled using a strategic model, which included the road and rail networks. This model allows for modal choice and trip redistribution, but not for induced demand. The inclusion of induced demand in the economic modelling may reduce project benefits

if the transport network in the project option reaches capacity before the end of the evaluation period, but this is not expected to be an issue.

The strategic transport model did not find that the project would lead to mode shifting towards public transport. Instead, it estimated substantial changes in the types of trips made (trip distribution). To verify the transport modelling results, Infrastructure Australia requested the proponent conduct an analysis to validate the strategic transport modelling results against patronage forecasts for the new train stations, which had been forecast separately from the strategic model. This process allowed benefits to be verified and better aligned with the benefits expected from this project — namely a shift towards public transport, thereby reducing road congestion.

Demand for flyer-traffic was assessed separately to the strategic model, based on forecasts of passenger demand and transport modes to, and from, the airport (disaggregated by traveller type). Forecast travel times to and from the airport, and out of pocket costs for different transport modes were based on results from the strategic model.

The majority of benefits from the project are derived from improved travel time for public transport users, reduced vehicle operating costs and reduced road congestion. The benefit of road decongestion was measured by applying a congestion cost parameter to the reduction in vehicle kilometres travelled. This approach does not take into account the nature of congestion specific to the Perth road network impacted by airport and surrounding suburban traffic, and the travel times for airport and surrounding suburban traffic. However, the project would still generate net benefits if more conservative congestion estimates are used. The analysis does not include the benefit from improved travel time reliability which could have resulted in a higher BCR.

Infrastructure Australia also requested the inclusion of benefits from likely land use changes around Belmont and Forrestfield Stations. The benefit of densification of these areas is expected to be substantial, and reinforces the need to ensure planning outcomes are aligned to the provision of the new rail infrastructure. The planning work underpinning analysis of these benefits had not been available for inclusion in the original business case.

Taking into account the further work undertaken by the proponent, Infrastructure Australia is confident that the project would realise a BCR higher than 1.

Major cost items

The major cost items are as follows (PV at 7% real discount rate):

- Capital costs (including rolling stock) - \$1,355 million
- Rail operating and maintenance costs - \$244 million
- Bus operating and maintenance costs - \$102 million.

The total costs of the project are estimated to be \$1,702 million in present value terms at 7% real discount rate.

Total capital cost (nominal, undiscounted)	\$1.9 billion (contracted costs for construction and budgeted cost for other activities)
Australian Government funding contribution (nominal, undiscounted)	\$490 million (26% of total capital cost)
Other funding (source / amount / cash flow) (nominal, undiscounted)	Not specified

Major sources of benefit

The major sources of benefit based on the original business case are as follows (PV at 7% real discount rate):

- Transport user time and resource savings – flyer demand - \$852 million (36% of total benefits)
- Transport user time and resource savings – non-flyer demand - \$1,124 million (47%)

- Rail de-crowding benefits - \$10 million (0% rounded)
- Road crash savings - \$59 million (2%)
- External cost savings (including greenhouse gas reductions and local air pollution) - \$194 million (8%)
- Option and non-use value - \$77 million (3%)
- Residual capital value - \$56 million (2%).

The total benefits of the project are estimated to be \$2,372 million in present value terms at 7% discount rate.

Net economic benefits for the project, as measured by the NPV at 7%, are estimated to be \$670 million.

Sensitivity analysis requested by Infrastructure Australia confirms land use changes around the stations as being an important driver of benefits.

Deliverability

The Design and Construction contract for the project was awarded in April 2016. Detailed design for the project is scheduled to be completed by early 2017.

A number of procurement options were evaluated for the project, against a range of criteria, including asset reliability, risk, efficient whole-of-life costs, affordability, timing and market appetite and capacity to develop the project. The proponent determined that a Design and Construction contract was the preferred delivery method, as it allows scope for innovation and was relatively less complicated than other models considered.

The proponent identified a number of risks to be included in the risk management strategy. These risks relate to governance (e.g. impact on stakeholders and gaining approval for works), the scoping and design meeting requirement and construction (risk of higher costs or disruption to surrounding transport assets).

As part of best practice project development, Infrastructure Australia recommends that a post-completion review of the project be conducted to gauge accurately whether works have delivered high levels of service, and discover any lessons learnt that could be used to inform future projects.

The project also requires recurrent funding over the life of the asset, as the average level of cost recovery via all revenue sources (farebox revenues, car park revenue and advertising revenue) covers only a proportion of annual operating costs. The proponent has identified a number of alternative funding mechanisms and conducted a preliminary high level assessment of them. For similar projects, Infrastructure Australia would encourage proponents to consider network-based road user charging, alongside more cost-reflective public transport user charging, as part of the funding options assessment. This will help to improve the financial sustainability of transport investment. This would be consistent with the WA Government's indicated willingness to engage in a national enquiry into road user charging reforms, as noted in the Perth Transport Plan *Transport @3.5 Million*.

Infrastructure Australia welcomes the land use planning changes that are being considered in conjunction with the project, including proposed precinct zoning and street network changes, and an ultimate intensification estimate across the Belmont Station and Forrestfield Station precincts of 22,000 jobs and 22,500 residents. Infrastructure Australia also welcomes the proposed integration of bus services with the rail network, particularly at Forrestfield, to make the best use of the new rail infrastructure.

This evaluation summary was considered by the Infrastructure Australia Board in September 2016. During this consideration the Board noted that the capital cost estimate had been updated to take account of contract prices. The evaluation summary was subsequently updated to reflect this change.