Australian Government | Infrastructure Australia

Project business case evaluation summary

Tonkin Highway Extension - Thomas Road to South Western Highway

Location
Perth, Western Australia

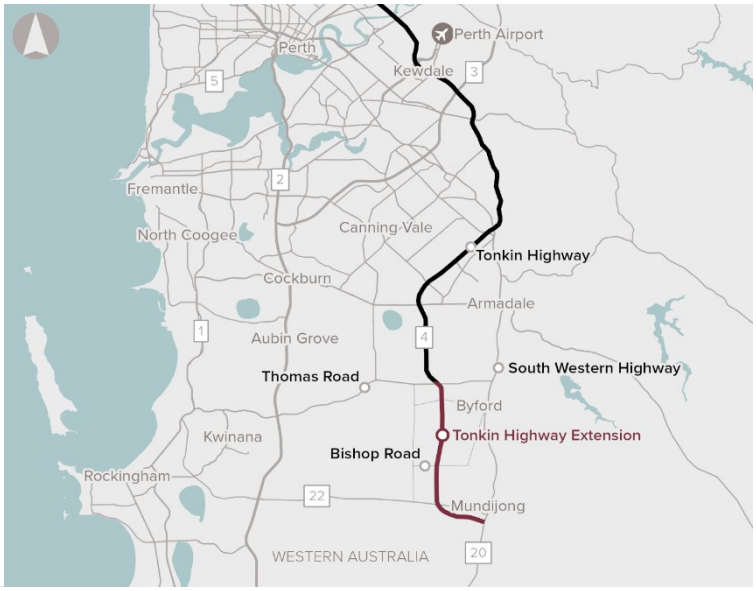
Geography
Fast-growing cities

Category
Efficient urban transport networks

Capital cost
$505 million (P90, outturn)

Indicative timeframe
Construction Start: 2022
Project completion by: 2024

Proponent
WA Government



Evaluation date
June 2021

1. Evaluation Summary

We have evaluated the business case in accordance with the revised Statement of Expectations of 20 December 2020, which requires Infrastructure Australia to evaluate project proposals that are nationally significant or where Australian Government funding of $250 million or more is sought.

The Tonkin Highway Extension – Thomas Road to South Western Highway proposal is subject to an Australian Government funding commitment of $404 million. This proposal is one of a number of infrastructure investment decisions being accelerated by the Western Australian Government as part of its COVID-19 response and economic recovery.

The population living in Greater Perth's south-east corridor is expected to grow by 120% by 2036, compared to 36% for the Greater Perth region (using pre–COVID-19 projections). The proponent identified three problems in the south-east corridor that primarily relate to congestion, safety and amenity impacts caused by passenger and freight traffic mixing through local town sites. The project responds to the *Perth south-east corridor capacity improvements* initiative on the *Infrastructure Priority List*.

The proponent's business case states that the social, economic and environmental benefits of the project are expected to exceed its costs, with a benefit cost ratio (BCR) of 1.3 and net present value (NPV) of $98.8 million using a 7% discount rate and P50 cost estimates when evaluated over a 30-year period. Our evaluation found that the benefits of the project are likely to marginally exceed the costs, noting that some of the reported benefits have been under- or over-estimated.

We support the proponent's proposed alliance delivery model, as it provides flexibility in optimising packaging that responds to market conditions and is appropriate given the requirement to accelerate the project as part of the COVID-19 response. However, this may result in a higher final project cost. The project has received environmental approval from the Western Australian Government and is seeking Australian Government approval.

The proponent has appropriately identified key project risks. Active and ongoing management of risk by the proponent will be critical to controlling project costs and realising project benefits.

2. Context

The area to the south-east of Perth is identified as a growth corridor in key planning documents. Pre-COVID-19 population forecasts predict a significantly higher forecast population growth in the Shire of Serpentine-Jarrahdale and City of Armadale compared to neighbouring Local Government Areas such as the City of Kalamunda. Population growth in the Shire of Serpentine-Jarrahdale between 2018 and 2036 is anticipated to be 120%, compared to 36% for the Greater Perth region.

The Tonkin Highway Corridor provides passenger and freight access to major industrial and commercial areas including Perth Airport, a primary intermodal facility at Kewdale, and strategic industrial areas. It is also an important connector to the Roe Highway which in turn links to regional highways including Great Eastern Highway, Leach Highway and Albany Highway.

The corridor has benefited from recent investment by the Federal Government with the Gateway WA and Northlink WA projects implemented to address increasing rates of congestion. The proposed Tonkin Highway Extension is a further upgrade to leverage the efficiency gains from these projects and address issues at the southern end of the corridor.

3. Problem description

The problem area identified in the business case relates to the *Perth south-east corridor capacity improvements* proposal currently included on the *Infrastructure Priority* List. It includes the existing southern Tonkin Highway terminal and the road network surrounding the intersection of Tonkin Highway and Thomas Road, near Byford and Armadale centres.

The business case identifies three main problems:

1. Growing traffic volumes are leading to an inefficient road corridor resulting in more congestion, longer travel times and higher vehicle operating costs for freight and passenger vehicles
2. Sustained growth in regional traffic and freight vehicles on a mixed-use route is adversely impacting on safety
3. Sustained growth in regional traffic and freight vehicles on a mixed-use route is adversely impacting on amenity in the town centres of Armadale and Byford.

The south-east corridor of the Perth metropolitan area is one of the fastest growing regions in Western Australia, with Byford (a township located on the South Western Highway south of Thomas Road) growing particularly rapidly. The Western Australian Government is targeting further residential development in the emerging urban areas throughout the South Metropolitan Peel Sub-Regional region including in Byford and Mundijong through Perth and Peel @3.5 million frameworks. Key links within the area including Thomas and Mundijong Roads are near capacity and are not expected to be able to sustain the residential growth in addition to the planned industrial growth in the West Mundijong Industrial Area, Kwinana and the Pinjarra refinery.

Major freight movements flow through Perth's south-east corridor to and from Perth's major industrial areas, port, and freight terminals. Tonkin Highway currently stops at Thomas Road, funnelling traffic onto Thomas Road and the South Western Highway through the Byford and future Mundijong town centres. Currently, heavy vehicles pass through populated areas such as Byford via the local road network at the southern end of Tonkin Highway to access South Western Highway. This results in a mix of local, regional, pedestrian and cyclist traffic.

The proponent identified capacity issues at the Tonkin Highway and Thomas Road intersection as a particular safety risk that may result in turning vehicle queuing and increased accidents. The proponent expects growing regional and freight traffic on these roads to result in congestion, noise and air pollution through increasingly densely populated residential estates and town centres.

The *Australian Infrastructure Audit 2019* found that daily congestion costs on the Tonkin Highway corridor exceeded $71,000 in 2016 and may exceed $221,000 by 2031. The *Australian Infrastructure Audit 2019* ranked the corridor among the ten most congested roads in Perth in the AM and PM peaks in 2016 and 2031. Congestion on the corridor is expected to produce delays of more than 10,600 hours per day by 2031 for road users.

4. Options identification and assessment

The proponent applied a qualitative multi-criteria analysis (MCA) for identifying and filtering a longlist of project options to two options. The MCA results presented by the proponent in the business case were not supported by documentation detailing information such the development of the evaluation criteria, criteria weightings justification and information used to assign scores.

The MCA short-listed three options: two highway upgrade options and one public transport improvement option. The public transport option had the lowest score of the short-listed options and was removed from consideration. The highway option that received the second highest score in the Stage 2 MCA process involved both the extension of Tonkin Highway to South West Highway, as well as the duplication of South Western Highway from Orton to Mundijong. A modified version of this option, involving the duplication of South Western Highway was re-introduced in the detailed Stage 3 cost benefit analysis in order to provide a non-overlapping viable alternative option for comparative analysis, improving the rigour of the assessment.

The proponent then performed further detailed analysis, including consideration of economic, social and strategic performance to select a preferred project option.

We recognise the use of MCA as a tool for filtering a long list of options but recommend the use of increasingly quantitative tools (such as rapid cost-benefit analysis) when shortlisting options. The appraisal would have benefited from the inclusion of more options in a shortlist being assessed using rapid cost-benefit analysis.

The business case noted that the MCA assessed all options individually, resulting in one of the options (public transport improvements) being discarded despite having the potential to be complementary to the ultimately selected preferred option.

The proponent's options analysis considered the project's role in the overall transport task. For example, the extension project responds to the movement of freight and the Byford Rail Extension project responds to the movement of people.

It is unclear from the evidence provided if the preferred project option represents the best value for money option in addressing the service need and meeting the project objectives.

5. Proposal

The Tonkin Highway Extension proposal involves a 14km four lane extension of the Tonkin Highway from Thomas Road to South Western Highway. The scope of work includes:

- Four lane road extension (two lanes in each direction) from Thomas Road to South Western Highway, with an ultimate design for a six-lane road (three lanes in each direction)
- Bridge over the freight railway over Bishop Road and Mundijong Road
- Bishop Road interchange with roundabouts at ramp intersections
- Grade roundabout at Tonkin Highway and Thomas Road intersection
- Grade roundabout at Tonkin Highway and Orton Road intersection
- Grade-separated roundabout with on and off ramps at Tonkin Highway and Bishop Road
- Grade roundabout at Tonkin Highway and Mundijong Road intersection

The scope of works is clearly described and aligned to the benefits targeted and project objectives, however the concept design work was undertaken in 2014. The project team have completed a number of project planning activities and are actioning others to de-risk the project.

6. Strategic fit

The Tonkin Highway Extension – Thomas Road to South Western Highway proposal has a strong alignment to the stated priorities of the Australian Government and the Western Australian Government to address urban congestion in major cities. The proposal also responds to the *Perth south-east corridor capacity improvements* proposal currently on the *Infrastructure Priority List* and is strongly aligned with the Infrastructure Australia priorities of productivity, population and

connectivity, and regional development. The proposal also responds to Challenge 9 in the *Australian Infrastructure Audit 2019*, which recognises the increasing strain on legacy infrastructure in fast-growing cities such as Perth.

Without action, infrastructure constraints will add to economic, social and environmental costs, eroding the productivity of these cities and reducing quality of life for residents.

The objectives of the proposal are aligned with state and local government plans, strategies and policies, including:

- Perth and Peel@3.5million
- South Metropolitan Peel Sub-Regional Planning Framework
- Activities Centres State Planning Policy
- West Mundijong Structure Plan.

The proponent outlines that the Tonkin Highway is a critical part of the National Land Transport Network, connecting Perth Airport and the industrial hub with the Perth's north-eastern and south-eastern suburbs. The 14-kilometre extension will result in a high speed freight corridor from Muchea down to the South West Highway near Mundijong, and be nearly 90 kilometres in length. The proposal is intended to support the movement of goods by improving a key freight route and facilitating regionally important industrial development

The extension of Tonkin Highway has been a feature of the Western Australian Government's Metropolitan Regional Scheme for many decades. This means that public transport, active travel facilities, land use development has always been done in the context of the extension down to South West Highway.

While the business case does not explicitly demonstrate policy alignment with State regional freight transport strategy or policy, the freight and logistics industry will be a key beneficiary of the project. It has a strong emphasis of improving freight productivity both directly through improved travel times for freight vehicle and improved connectivity to the trade coast, as well as facilitating development of the West Mundijong Industrial Precinct.

The Tonkin Highway Extension is in the same area as the Byford Rail Extension. Since completion of the Tonkin Highway Extension business case, funding has been allocated to the Byford Rail Extension and it is progressing through design and procurement stages ahead of delivery. The inter-relationship between the Tonkin Highway Extension and the Byford Rail Extension is not clearly defined in the business case.

7. Economic, social and environmental value

The proponent's business case states that the net present value (NPV) of the project is estimated to be $98.8 million with a benefit-cost ratio (BCR) of 1.3, using a 7% real discount rate, a P50 capital cost estimate, and evaluated over a 30-year period. We have considered the sensitivity of the appraisal to the discount rate and note that:

- Using a 4% discount rate results in a NPV of $343.2 million and a BCR of 1.9.
- Using a 10% discount rate results in a NPV of -$22.1 million and a BCR of 0.9.

The cost-benefit analysis shows a typical benefits profile for highway network upgrade projects with travel time savings the most significant benefit (61%), followed by vehicle operating cost savings (25.5%) and safety enhancement (15%). Environmental benefits are slightly negative (-1.5%) reflecting a small increase in vehicle kilometres travelled as a result of the project.

There are a number of other potential benefits that have not been quantified but would be valued by the community, including travel time reliability and urban amenity improvements. The proponents qualitative assessment suggests that wider economic benefits are not expected to be material.

The 2031 transport model base case network includes unfunded and non-committed projects, which is inconsistent with approach recommended in the *Infrastructure Australia Assessment Framework*. The expected impact of these projects in the transport model will be to reduce overall

network congestion, in turn reducing the benefits that could be achieved from the Tonkin Highway Extension in the modelling results. The inclusion of unfunded and non-committed projects in the base case may understate the benefits reported for this proposal.

Other upside risks to the reported net benefits include:

- Application of a 50% ramp-up factor to the first year of benefits
- Capping benefits growth from 2031 onwards.

Our evaluation also noted downside risks to the reported project benefits. The Byford Rail Extension was not included in the base case for transport modelling as funding was not committed at the time the business case was prepared. The rail extension was also not included as a project option scenario. In subsequent analysis, the proponent has noted that the business case for Byford Rail Extension identified $39.8 million (present value, 7% real discount rate) in road user benefits, the majority of which flows from travel time savings and accident cost savings. This implies a degree of mode shift from private road vehicles to public transport. There is some potential for double counting of benefits for private road users across the two projects.

Further, the calculation of benefits was undertaken using a bespoke analytical package called BCRatio. Infrastructure Australia has not undertaken a detailed audit of BCRatio but our high-level review found that BCRatio may produce larger user benefit estimates than conventional approaches. We recommend the proponent provide an independent peer review of BCRatio to confirm it is appropriateness for each application.

Other downside risks to the reported benefits include:

- The evaluation of Strategic Fit identified the analysis relied upon dated land use, population and employment forecasts that have been revised (in most cases downwards) in the last two years and may be further impacted by the COVID-19 pandemic.
- The risk adjustment applied to the cost estimates appears low when benchmarked to similar projects, particularly at the stage of development and design
- Residual environmental impacts are not monetised.

The project cost estimate included a comparatively low contingency range when compared to other projects at this stage of development. A sensitivity test of a more typical level of contingency found the BCR may reduce slightly.

The proponents upper and lower-bound sensitivity tests indicate a potential ‘best case’ of $340 million and BCR of 2.38 and a potential ‘worst case’ NPV of -$143 million and BCR of 0.69.

Taking into account the risks associated with the reported benefits, Infrastructure Australia expects the overall project net benefits to be marginal.

Positive social impacts are expected through reducing traffic that flows through Armadale and Byford Town centres, particularly heavy vehicles movements. However, this outcome was not discussed in detail in the submission or supported through more detailed modelling results.

The environmental impacts of the project are significant and of community concern as the alignment disturbs a Threatened Environmental Community. Approval under the *Environment Protection and Biodiversity Conservation Act 1999* is required but had not been granted as at the time of evaluation.

Benefits and costs breakdown

Proponent's stated benefits and costs	Present value ($m,2018/19) @ 7% real discount rate		% of total
Benefits			
Travel time saving	$276.3		61.0%
Vehicle operating cost saving	$115.4		25.5%
Crash reduction benefits	$68.4		15.0%
Reduced environmental externalities	-$6.8		-1.5%
Total Benefits[1]	**$453.3**	(A)	**100%**
Total capital costs (P50)	$351.4		99.2%
Operating costs	$3.0		0.8%
Total Costs[1]	**$354.4**	(B)	**100%**
Net benefits - Net present value (NPV)[2]	**$98.8**	(C)	n/a
Benefit-cost ratio (BCR)[3]	**1.3**	(D)	n/a

Source: 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).

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

Capital costs and funding	
Total capital cost	$468 million (P50, undiscounted) $505 million (P90, undiscounted)
Australian Government funding (committed)	$404 million
Other funding (WA Government)	$101 million

8. Deliverability

Main Roads Western Australia is leading the delivery of the project. The proponent has extensive demonstrated experience in delivering similar projects. With the requirement to accelerate the project as part of the COVID-19 response, the proponent has selected an Alliance approach to delivery. A delivery methodology workshop was held in January 2021 and was attended by the project delivery Agency and construction industry representatives. The workshop considered the level of design/project development and risk status and drew the conclusion that it would not be possible to procure a lump sum design and construct contract with design and technical risks allocated to the contractor. The workshop participants agreed that an Alliance form of contract was appropriate in these circumstances with any outstanding project development to be completed by the Alliance. The participants identified appropriate Prequalification level requirement that correspond with the complexity and value of the project.

The Alliance delivery model was adopted in response to the accelerated timeframes and has been structured to provide flexibility in optimising packaging that respond to market conditions and enables greater value for money. The Alliance delivery model will progress project development, design and to resolve identified risks.

The project has environmental approval under the *Environmental Protection Act (WA)* and Main Roads is currently seeking environmental approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act*. In April 2020, the project was determined to be a 'controlled action' and the Australian Department of Agriculture, Water and Environment requested further information to support the assessment process.

A risk assessment was completed and identified key risks and mitigations. A number of activities are continuing in an effort to manage and mitigate the identified risks. The project's risk assessment approach was consistent with guidance in the *Infrastructure Australia Assessment Framework*. However, the relationship between the identified risks and the contingency value incorporated into the cost estimate is unclear.

The project will be funded jointly by the Australian Government and the Western Australian Government. Tolling was rejected by the proponent as a funding source based on the lack of a precedent for tolls in Western Australia and their view that a toll would be unlikely to receive community support. The proponent also considered and dismissed value sharing mechanisms such as levies on extractive industries, and property developer contributions.

A detailed benefits realisation plan or post-completion review plan was not provided by the proponent. However, it is understood that the proponent has standard lessons learnt processes and ongoing market intelligence that is incorporated into each project. The proponent also completes post-completion reviews needed to meet National Partnership Agreement requirements. Infrastructure Australia encourages the proponent to complete a finalised benefits realisation plan at the earliest possible opportunity that includes baselines, targets, detailed timelines for achievement of benefits and assigned 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 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.