Infrastructure

Business case evaluation summary

Tonkin Highway (South of Roe Highway) Project



Evaluation date August 2021

1. Evaluation Summary

Infrastructure Australia has evaluated the business case in accordance with our Statement of Expectations, which requires us to evaluate project proposals that are nationally significant or where Australian Government funding of \$250 million or more is sought. This proposal has received an Australian Government funding commitment of \$293 million. Due to the proposal's Australian Government funding status, it has not been considered for inclusion on the *Infrastructure Priority List*.

The Tonkin Highway is a major north-south route on the eastern side of Perth that links growing suburban areas with key industrial precincts, including the Perth Airport Industrial Hub. The Tonkin Highway, south of Roe Highway, is a four-lane divided road with two lanes in each direction and atgrade intersections. The proposal includes widening the Tonkin Highway from four to six lanes and grade separations at Kelvin, Welshpool and Hale roads, which are the highest priority intersections due to high levels of congestion and incidents.

This proposal responds to the existing *Perth south-east corridor capacity improvements* proposal 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 1.2 and net present value (NPV) of \$57.0 million¹. Although our evaluation found some uncertainties in the reported benefits, we agree with the proponent that the benefits of the project are likely to exceed the costs.

Following completion of the business case, and in response to community and stakeholder feedback, the proponent has incorporated additional north facing ramps at Hale Road. The proponent anticipates these to be delivered as part of the main project and funded from the project contingency allowance. We consider this to present a major risk to being able to deliver the project and this additional scope within the available funding.

¹ Using a 7% real discount rate at a P90 cost estimate over a 30-year period.

The business case identified an environmental approvals risk at the intersection of Tonkin Highway and Kelvin Road. The proponent has made changes to minimise the intersection's overall footprint and subsequent environmental impact, which is anticipated to result in timely environmental approvals being granted.

Whilst we support the proponent's proposed change from an alliance to a Design and Construct delivery model, separation into northern and southern packages presents a minor risk in terms of interfacing works, although we anticipate MRWA's ongoing risk management procedures will appropriately mitigate this risk.

2. Context

The area to the south-east of Perth is identified as a growth corridor in strategic planning documents. Population growth forecasts indicate that all Statistical Areas Level 2 (SA2s) surrounding Tonkin Highway south of Roe Highway are expected to grow at a higher rate than Perth overall. Byford and the areas surrounding Harrisdale have forecast population growth of 7.3 and 4.8 per cent per annum, respectively over the 15 years to 2031, substantially higher than Perth (1.8% per annum).

The Tonkin Highway is part of the National Land Transport Network (NLTN) and 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 Tonkin Highway is a major north-south route that lies inland of Perth's Kwinana Freeway. It stretches more than 80 kilometres and links growing suburban areas with key industrial precincts. It accommodates high volumes of vehicle traffic, with more than 45,000 vehicles per day on sections close to Perth Airport. The Tonkin Highway south of Roe Highway is one of the most used north-south corridors in Perth's southern suburbs.

Other sections of the corridor will benefit from recent investment by the Australian Government with the Gateway WA and Northlink WA projects being implemented to address increasing rates of congestion in other parts of the network. However, these have not addressed problems on the Tonkin Highway and further investment, such as the Tonkin Highway Extension - Thomas Road to South Western Highway project to the south of this section, are needed to support forecast growth.

3. Problem and opportunity descriptions

The problem area identified in the business case relates to the *Perth south-east corridor capacity improvements* early-stage proposal currently included on the *Infrastructure Priority List*.

The business case identifies that critical parts of the Tonkin Highway are currently at capacity, and without intervention, the problem is expected to worsen. Travel demand modelling in the business case demonstrates that the section of Tonkin Highway between Roe Highway and Hale Road will be operating at or above capacity in 2021 under a base case scenario. Key bottlenecks on these roads will operate at up to 107 per cent of planned capacity during peak periods. By 2031, projected increases in traffic volumes are expected to exacerbate the problem, with the same section of road operating at up to 122 per cent of capacity; additionally, the section of Welshpool Road East and Kelvin Road is also expected to be operating above capacity.

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 corridor was ranked among the ten most congested roads in Perth in the AM and PM peaks in 2016 and 2031. The proponent identified that by 2031 the Tonkin Highway is projected to have the fifth-highest delay cost of all major road corridors across WA.

Congestion on the Tonkin Highway is characterised by stop-start traffic that directly contributes to increased vehicle accidents. In the five years from 2015 to 2019, rear-end collisions represented over 70 per cent of crashes at the three intersections immediately south of Roe Highway –

compared to a network average of just 24 per cent. In total, these three intersections accrued 513 crashes over the period, or almost two crashes per week over the five years².

The cost of congestion on Tonkin Highway is high and growing. For the section between Roe Highway and Kelvin Road, the proponent estimated the total annual cost of congestion at \$13.0 million in 2021. Over 30 years, the cost of congestion is expected to be \$283.6 million, in present value terms, indicating the significance of not proceeding with an intervention in the corridor³.

In addition, the business case identifies the following opportunities:

- Opportunity 1: assisting the transformation of Tonkin Highway into a non-signalised, freeflowing north-south highway
- Opportunity 2: shifting heavy vehicle traffic away from rapidly growing residential areas in proximity to the Tonkin Highway corridor, by diverting traffic off roads such as the South Western Highway.

4. Options identification and assessment

The proponent applied a multi-stage options assessment process including an initial 'fatal flaw' style analysis, a qualitative multi-criteria analysis and a rapid cost-benefit analysis to identify a short list of two options for detailed analysis. The business case outlines that the long list of options was refined to a medium list via stakeholder consultations, while the shortlist was developed via a multi-criteria analysis. The multi-criteria analysis results presented in the business case were not supported by documentation detailing information such as the development of the evaluation criteria, criteria weightings justification and information used to assign scores. This would have increased transparency on the method used.

The multi-criteria analysis identified two options for progression to the rapid cost-benefit analysis. However, due to limitations in the modelling approach, only one of these options was assessed in the rapid cost-benefit analysis and shortlisted for detailed analysis.

Infrastructure Australia has identified that there could be limitations regarding the robustness of the rapid cost-benefit analysis due to the vehicle operating costs (VOC) approach adopted and the resulting differences between the rapid and detailed cost-benefit analysis presented in the business case. If our preferred VOC methodology was applied⁴, it is likely that alternative options would have been explored as the rapid cost-benefit analysis would have identified that the costs of the short-listed option are higher than the benefits. This could have warranted further consideration of options or scope changes to where the benefits outweigh the costs.

After the rapid cost-benefit analysis process, a second potential option was added and assessed through detailed cost-benefit analysis. The two short listed options analysed in the business case included:

- **Option 2A**: Major works Grade separations delivered over the long term at three intersections on Tonkin Highway: Hale Road, Welshpool Road East and Kelvin Road
- **Option 2B**: Major works Highway duplication delivered over the short term, comprising highway duplication and noise walls on South Western Highway at Byford

The evidence provided could have been clearer to determine if the two short listed options represent the best value for money in addressing the service need and meeting the project objectives. Option 2B does not address the identified problems and opportunities that Option 2A was designed to respond to. Further, Option 2B does not clearly outline how safety and access would be delivered, and could therefore be considered as not representing a true alternative option.

² Safety impacts have not been monetised in the cost of the problem estimates.

³ Vehicle operating cost impacts have not been monetised in the cost of the problem estimates.

⁴ Further information on our preferred approach can be found in Appendix B of the Guide to Economic Appraisal that supports the Assessment Framework (<u>https://www.infrastructureaustralia.gov.au/publications/assessment-framework</u>)

5. Proposal

The preferred option (Option 2A) includes grade separations delivered over the long term at three intersections on Tonkin Highway: Hale Road, Welshpool Road East and Kelvin Road. The scope of works includes:

- Construction of a 6.2 kilometre six-lane dual carriageway from South of Roe Highway to 1.1 kilometres south of Kelvin Road
- Full reconstruction of Tonkin Highway to accommodate new realignment and to address the inadequate strength of the existing granular pavement
- Eggabout and roundabout interchanges at Welshpool Road and Kelvin Road respectively.
- Single span bridges for grade-separated interchanges
- Principal Shared Pathway on the eastern side of Tonkin Highway for the full length, accommodated by the road bridge at interchange intersections and underpasses at on and off-ramps
- Welshpool Road East and Kelvin Road to be reconstructed to accommodate the interchange intersections
- Hale Road layout to be modified by resurfacing and line-markings. No reconstruction of existing Hale Road.
- A concrete footpath on side roads with links to Principal Shared Pathway
- Road safety barriers for the full length of Tonkin Highway median, verge and ramps
- Street lighting along the length of works, including Principal Shared Pathway
- Foundation Intelligent Transport System for the full length of Tonkin Highway and cameras at interchange intersections
- The carriageway width has an allowance within the shoulders to convert to all lanes running to provide 4 lanes in the ultimate
- Noise walls and retaining walls
- Land costs
- Emergency stopping bays along the length of Tonkin highway works (seven in total)
- New traffic facilities and pavement marking.

The scope of works is clearly described and aligned to the benefits targeted and project objectives, however the concept design work and subsequent costing was undertaken in 2016. The project team has completed project planning activities including identifying and mitigating risks, such as environmental approval risks, which are either cost neutral or minimal cost increases. In response to community feedback and concerns, the design was updated and amended to include additional north facing ramps at Hale Road, with the proponent anticipating these to be delivered utilising a competitive tender process and project contingency allowance.

6. Strategic fit

The Tonkin Highway (South of Roe Highway) proposal demonstrates a strong alignment to the stated priorities of the Australian Government and Western Australian Government by addressing urban congestion in major cities, as well as supporting increased efficiency and productivity for freight. The proposal also responds to the *Perth south-east corridor capacity improvements* proposal currently on the *Infrastructure Priority List*.

The objectives and identified problems and opportunities are aligned with state and local government plans, strategies and policies, including:

- Perth and Peel @ 3.5m (2018)
- Keeping WA Moving

- State Planning Strategy 2050
- Western Australia Regional Freight Transport Network Plan
- Fremantle-Rockingham Industrial Area Regional Strategy
- Perth Freight Transport Plan: Transport @ 3.5 million
- Towards Zero: Getting There Together 2008 2020.

The Tonkin Highway is part of the NLTN and links Perth Airport and Airport Industrial Hub (Kewdale, Welshpool and Forrestfield) with the city's north-eastern and south-eastern suburbs. Currently, the Tonkin Highway provides a 55 kilometre free-flowing freight connection from its northern origin to the Roe Highway intersection. The proposal will grade separate three intersections around the Airport Industrial Hub which currently restrict traffic flow, creating congestion and safety issues for users, to enable more of Tonkin Highway to transform into a free-flowing north-south transport corridor.

The freight and logistics industry will be a key beneficiary of the project, with the grade separations benefitting major freight and industrial areas including the Airport Industrial Hub and the supporting centres of Hazelmere and High Wycombe.

The Tonkin Highway corridor also services eight of 24 key activity centres in Perth via their location near Tonkin Highway exits or along primary arterial roads that link to Tonkin Highway and connect Perth's rapidly growing north-eastern and south-eastern residential areas, notably Ellenbrook (in the north) and Byford (in the south) which are growing substantially faster than the wider Perth average growth. In addition to freight and logistics providers, the project will also benefit general commuters and residents of these areas and support the overall growth strategy and planning of the Western Australian Government.

7. Societal impact (economic, social and environmental value)

The proponent's business case states that the net present value (NPV) of the preferred project is estimated to be \$57 million with a benefit-cost ratio (BCR) of 1.2, using a real discount rate of 7%, P90 capital cost estimate and 30-year appraisal 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 \$250 million and BCR of 1.8
- Using a 10% discount rate results in a NPV of -\$44 million and a BCR of 0.8.

We believe the cost-benefit analysis shows a typical benefits profile for a project of this nature, with travel time savings the most significant benefit (116% of reported project benefits). The project realises minor safety and travel time reliability benefits, related to the upgrade in the quality of the road, however, results in modest environmental (-15%) and VOC (-10%) disbenefits due to the increase in vehicle kilometres travelled as a result of the project. Wider economic benefits have not been estimated, however, they would be expected to be immaterial for a project of this nature.

Whilst the benefits streams included in the economic analysis are consistent with those expected, there are a number of parameters used which may overstate the benefits of the project and therefore reduce the BCR. These include the annualisation factor, occupancy, interpolation and extrapolation, escalation of input parameter values from prior years and the reliability ratio. The precise impacts of these parameters have not been tested, however on balance, we would expect that with adjustment, we agree with the proponent that the benefits of the project are likely to exceed the costs. The business case did not incorporate any scenarios that considered potential impacts of COVID-19.

The transport model base case network presented in the business case only includes funded and committed projects which is consistent with the approach recommended in the *Infrastructure Australia Assessment Framework*. Following the development of the business case, funding has been committed to major projects in the study area, including the Byford Rail Line and Tonkin Highway Extension projects. The business case did not outline the implications of these projects on the demand modelling and economic analysis outputs, such as potential double counting or

overstating of benefits. The proponent considers that if the Tonkin Highway Extension project were to be included in the base case, the impact would be a net increase in the BCR of the preferred option as the transport impact of that project would increase light and heavy vehicle traffic on the Tonkin Highway. For future business cases, we recommend modelling scenarios be undertaken that include any major interrelated or interdependent initiatives.

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,2019/20) @ 7% real discount rate		% of total
Benefits			
Travel time saving	\$399		115.7%
Vehicle operating cost savings	-\$35		-10.1%
Crash savings	\$31		9.0%
Environmental externalities	-\$50		-14.5%
Total Benefits ¹	\$355	(A)	100%
Total capital costs (P90)	\$291		97.7%
Operating costs	\$7		2.3%
Total Costs ¹	\$298	(B)	100%
Net benefits - Net present value (NPV) ²	\$57		n/a
Benefit-cost ratio (BCR) ³	1.2		n/a

Source: Proponent's business case

(1) Totals may not sum due to rounding.

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

(3) The benefit-cost ratio is calculated as the present value of total benefits divided by the present value of total costs ($A \div B$).

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

Capital costs and funding	
Total capital cost	\$319.3 million (P50, undiscounted) \$365.7 million (P90, undiscounted) ⁵
Australian Government funding contribution	\$293 million
Other funding	\$73 million

8. Deliverability

Main Roads Western Australia (MRWA) is leading the delivery of the project. The proponent has extensive demonstrated experience in delivering similar projects. The proponent has developed an initial consideration of the packaging and procurement options consistent with the requirements of MRWA. However, there was no detailed consideration of packaging options, including whether value would be delivered by separately delivering each grade separation. An Alliance model was originally recommended by the proponent as the preferred delivery model for the project in the business case. This was partly driven by the requirement to accelerate the project as part of the COVID-19 response, with the Alliance model being able to be brought to the market faster than other delivery models. There was, however, limited discussion on the process underlying the selection of this delivery model.

⁵ iQ Pty Ltd Project Estimate Summary Report

Since submission of the business case, the proponent further refined the delivery approach, drawing on market feedback from other active procurements. The proponent has advised that the project will now be delivered via a Design and Construct delivery model, with two separate packages. The proponent considers that this will allow for greater participation by industry across contractor levels as well as provide more time to resolve environmental approvals required for one of the packages. Given a detailed delivery model assessment and justification was not included in the submission by the proponent, it is not possible to confirm whether this is the most appropriate delivery model for this project, however, it is noted that desktop market sounding undertaken by the proponent indicated that a Design and Construct model was the most common procurement model for this type of project. We recommend that the proponent undertake a detailed quantitative delivery model assessment in future submissions to ensure the robustness of the assessment and to provide detail on the relative advantages and disadvantages of delivery models for the specific project.

The business case outlined that a risk assessment has been undertaken for the project, sufficient to develop a P90 probabilistic cost estimate. Five risks were still considered to have a residual rating of 'High' or above. Sections of the project are located within the environmentally sensitive Swan Coastal Plain and Perth Subregion. In response to this, the proponent has undertaken refinements post the business case to further minimise and manage this risk. This includes changes to the design of the project to minimise its footprint, as well as creating two separate construction packages to allow for more time to progress through the required approvals process. We recommend the proponent consider implications of any design changes on the ability to realise the anticipated benefits of the project.

The proponent identified that a Benefits Realisation Plan has been developed for the project, along with a detailed set of Key Performance Indicators for each benefit to measure and assess whether the project benefits will be delivered and realised. A full Post Completion Review Plan has not been submitted to Infrastructure Australia. We encourage 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 are realised.

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 undertaking this evaluation, 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.