

## Project business case evaluation summary

# Prospect Highway Upgrade – Reservoir Road to St Martins Crescent

### Location

Sydney, New South Wales

### Geography

Fast-growing cities

### Category

Urban congestion

### Capital cost

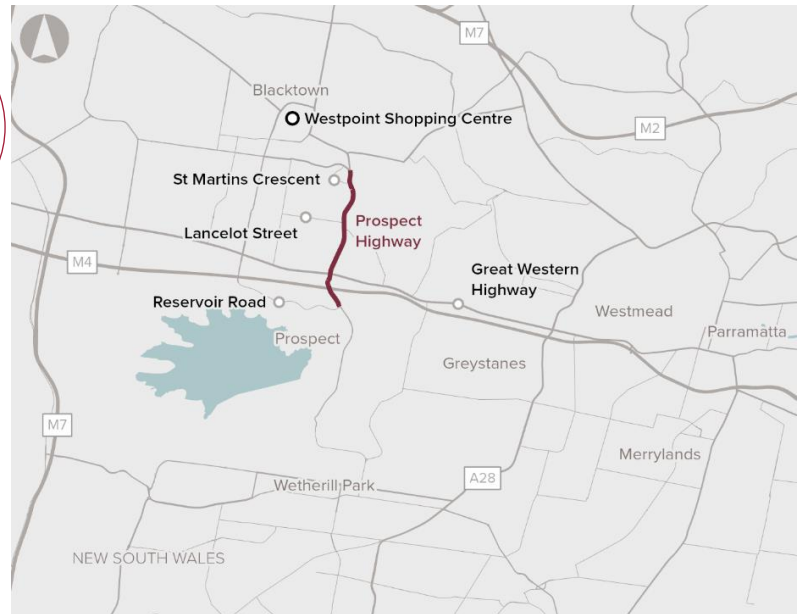
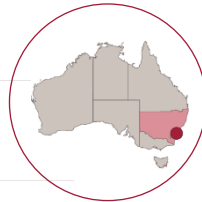
\$240 million (P50, outturn)

### Indicative timeframe

Construction start: Aug. 2021  
Project completion by: Dec. 2024

### Proponent

NSW Government



### Evaluation date

8 December 2020

## 1. Evaluation Summary

The Prospect Highway is an arterial route for freight, residential and commuter traffic in Western Sydney. The highway joins Baulkham Hills to Pemulwuy via Prospect, and provides access to the Western Motorway (M4), the Great Western Highway, the M2 and the M7. The section of the highway between Reservoir Road in Prospect and St Martins Crescent in Blacktown is currently at capacity, carrying approximately 35,000 vehicles per day with only a single lane in each direction. Together with a number of un-signalised intersections, this results in long travel times and average speeds of below 30 km/h in peak periods, which is half the speed limit. The configuration of the bridge over the Great Western Highway also limits capacity and creates a bottleneck. Congestion is expected to continue deteriorating, and the Infrastructure Priority List added Prospect Highway capacity as a near-term Priority Initiative in February 2019.

The Prospect Highway Upgrade project proposes upgrading the highway to a four-lane divided road along this 3.6 km section of the highway to reduce congestion, with an additional bus lane in both directions along parts of the corridor. The project has strategic merit as it will support continued population and employment in surrounding areas, and improve access to the M4 and the Great Western Highway.

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 6.4 and a net present value (NPV) of \$945.3 million. Infrastructure Australia considers that some of the benefits may be overstated, but we are confident that the benefits of the project would still significantly outweigh its costs.

Our review found that the proponent's preferred delivery model, a Construct Only procurement, is appropriate for this type of upgrade. It enables early resolution of complex constructability issues, stakeholder concerns, property acquisition and utility issues, and minimises project design risks.

On the balance of our assessment, the **Prospect Highway Upgrade has been added to the Infrastructure Priority List as a Priority Project.**

## 2. Context

This section of the Prospect Highway is located directly south of the North West Growth Area and north-east of the Western Sydney Employment Area. The route provides an important connection to a range of employment, residential, retail and recreational land uses including shopping centres, nature reserves, industrial and business parks, a theme park, a train station and a hospital. However, residential and industrial growth in these two areas will increase transport demand in the corridor as the Prospect Highway provides access to the M4 and the Great Western Highway.

The project area is located in the 'Central City' Greater Sydney Commission (GSC) District, which is expected to experience rapid residential and industrial growth. The proponent forecasts that:

- Population will grow from around 1.0 million in 2016 to 1.5 million in 2036, which is an average growth rate of 2.84% – the fastest population growth rate of all GSC Districts
- Employment will grow from around 450,000 to 680,000 over the same period, which represents a growth rate of 2.53% – also the fastest growth of all GSC Districts.

Our review identified that these projections were developed four years ago, but they remain consistent with more recent population projections from the NSW Government.

The 3.6 km section of Prospect Highway identified by the business case is located between Reservoir Road and St Martins Crescent. The southern end of the section intersects with the Western Motorway (M4) and the Great Western Highway, while the northern end approaches Blacktown Station and Westpoint Shopping Centre.

## 3. Problem description

High traffic volumes and limited capacity on the Prospect Highway between Reservoir Road and St Martins Crescent is leading to congestion and safety issues. About 35,000 vehicles use the corridor on an average day, but most of this section of the highway only has one lane in each direction and there are several un-signalised intersections.

During peak periods, average traffic speeds are usually below 30 km/h, which is half the speed limit. Travel times have generally been increasing due to continued population and employment growth in Western Sydney. The proponent's traffic modelling has also projected that by 2038, the average speeds would deteriorate to 25 km/h for light vehicles, 19 km/h for heavy vehicles and 7 km/h for public buses by 2038.

The problems in the corridor affect general traffic, public transport users and freight. The proponent's traffic modelling showed that most of the trips affected by congestion are passenger and business vehicle trips. The business case also reports that the reliability of the three bus services in the corridor degrades during peak periods. Meanwhile, the proponent states that there is a need to increase the number of bus services in the region, potentially doubling over the next 25 years.

In addition to slow travel times, the route has a poor safety record with 73 reported injury crashes from July 2014 to June 2019 including 4 head on collisions. The accident rate is more than 25% higher than the average rate for equivalent classes of road on Sydney's road network.

## 4. Options identification and assessment

The NSW Government developed and progressed options to address the problems through multiple corridor investigations over an extended period of time.

A 2010 *Traffic Flow Improvement Initiatives* report by the proponent found poorly performing links, congestion and delays affecting not only general traffic, but also buses, cyclists and pedestrians. The study found that widening the route from two to four lanes would be the ideal solution and recommended more detailed technical and economic analysis. This was followed by a *Strategic Options Report* in 2011, where the proponent investigated seven preliminary options including slip lanes, improved signalling, road widening and partial duplications. The report used traffic modelling and a workshop format to identify five preferred options, all involving an upgrade of the section to a four-lane divided road, with differing timings for that upgrade.

A *Review of Environmental Factors* (REF) commissioned by the proponent in 2014 investigated design options for a Prospect Highway Upgrade. The REF stated the primary objective of such an upgrade would be to increase capacity, while other objectives would include:

- Reducing traffic congestion and improving traffic flow
- Supporting public transport
- Supporting freight movement
- Supporting growth areas
- Improving safety.

We note that establishing increased capacity as the primary objective is likely to preference physical infrastructure options over other solutions, which may otherwise include, for example, policy and demand management options.

The REF identified and reviewed nine design sub-options to arrive at the preferred design. This process took into consideration the connectivity, efficiency, clearance, minimisation of visual impact, need for land acquisition and cost-effectiveness. However, the REF does not provide extensive documentation on how the choice of preferred option was arrived at other than stating, as above, its alignment with design objectives.

The business case considers two-sub options for an upgrade, but only assesses the performance of one option against a 'Do Minimum' base case, whereas the Infrastructure Australia Assessment Framework (IAAF) recommends that business cases should consider a minimum of two options in detail (in addition to the base case) to demonstrate transparency and allow comparability. Infrastructure Australia recognises that the options development and assessment process has occurred over an extended period and multiple studies, but considers that this lack of transparency and rigour in the options development process is a significant limitation of the submission.

## 5. Proposal

The proponents preferred option is to upgrade a 3.6 km section of the Highway between Reservoir Road, Prospect, and 200 metres north of St Martins Crescent, Blacktown. The upgrade will provide a minimum four-lane divided road with a variable width central median strip.

The project also includes upgrading the section between Lancelot Street and 200 metres north of St Martins Crescent, which is approximately 1 km long, to six lanes, with the additional lanes being dedicated bus lanes. The dedicated bus lanes are expected to help improve travel times and safety, as they allow residents to access their properties without being in general traffic. The business case also states that the improvements will accommodate the planned doubling of bus services over the next 25 years. However, these bus service frequency changes are not included in the business case.

In addition to the capacity expansion, the proposal also includes upgrading or altering eleven intersections, and improvements to pedestrian and cycling paths (shared paths). The intersection works would change four intersections to 'left in left out' only (disallowing right turns), and upgrading seven others by either providing traffic signals and/or providing additional lanes for through and turning traffic. The improvements for pedestrians and cyclists include adding new shared paths and widening others.

## 6. Strategic fit

The project aligns with key state government strategies, including the *Future Transport Strategy 2056* and the *Greater Sydney Services and Infrastructure Plan*. In terms of the future transport strategy, increased capacity will improve liveability and productivity in the region, supporting the strategy's outcomes of "Successful places", "A strong economy" and "Safety and performance".

The GSC's infrastructure plan promotes infrastructure that supports the planned land use outcomes for the three cities. The upgrade is located near the union of the Western Parkland City and the Central River City, and supports the plan's focus of enabling people and goods to move safely, efficiently and reliably.

The upgrade also supports the *NSW Freight and Ports Plan 2018 – 2023*, *Sydney's Cycling Future* and *Sydney's Bus Future 2013* by supporting, respectively, the forecasted increase in freight volumes, making cycling safer, and making bus services faster and more reliable.

Our evaluation notes that by supporting planned land use and growth, the upgrade aligns strongly with state and national priorities. Importantly, the project supports one of the fastest growing regions projected in Sydney.

The main beneficiaries of the project would be private vehicle users, such as Western Sydney residents, as well as bus passengers, and to a lesser extent, commercial and freight vehicles. The make-up of these benefits aligns directly with the project objectives to improve traffic flow and safety, and support public transport. The expected benefits are also aligned, albeit to a proportionately lower degree, with the objectives relating to freight and economic growth.

The project also aligns with national, state and local priorities. Namely, the project aligns with:

- National priorities in the 2019 Infrastructure Audit relating to supporting growth through infrastructure in capital cities
- State priorities relating to supporting employment and population growth, and transport priorities relating to freight, mobility, safety, and active and public transport
- Local priorities relating to active and public transport, and freight efficiency

Infrastructure Australia included a Priority Initiative for *Prospect Highway capacity* on the Infrastructure Priority List in February 2019, and this project directly responds to the problems identified in the listing.

## 7. Economic, social and environmental value

The proponent's economic appraisal of the Prospect High upgrade stated an NPV \$945.3 million, with a BCR of 6.4, using a 7% discount rate and P50 costs. The project is expected to deliver approximately \$1.1 billion in benefits, which include travel time savings (approximately 70%), vehicle operating cost savings (approximately 30%) and other smaller benefits such as crash cost reductions.

The economic appraisal was mostly consistent with the IAAF and the Australian Transport Assessment and Planning (ATAP) guidelines. The key inconsistency of the business case with the IAAF was its limited options assessment, as noted above.

Our review also identified some limitations with the transport modelling undertaken for the project:

- Project case scope: The modelled project case includes an unfunded upgrade to the Prospect Highway directly south of the project location, whereas the IAAF recommends excluding unfunded and uncommitted projects. The unfunded upgrade is a 0.6 km widening of the Prospect Highway from two to four lanes between Reservoir Road and Reconciliation Rise. Given the location of the unfunded upgrade, it is likely to be highly complementary with the proposed project and contribute to the strong benefits estimated for the project. Correcting for this issue is likely to reduce the benefits of the project.
- Treatment of 'unreleased' trips: Transport modelling was undertaken using a microsimulation transport model. This was calibrated for the base year (2018) using observed traffic data, and demand for future years was determined by applying growth factors from a strategic city-wide model. This approach results in a large number of 'unreleased trips' in the base case – trips that cannot 'enter' the simulated network as demand exceeds the capacity of the infrastructure. The traffic modelling accounts for these trips by using a normalisation approach, which estimates a delay cost for those 'unreleased' trips. While the normalisation approach aligns with Transport for NSW guidance, best practice would be to review the model scope and strategic model outputs to reduce the number of 'unreleased' trips.

Despite the limitations of the business case identified, Infrastructure Australia is still confident that the proposed benefits would outweigh its costs. Our sensitivity testing found that the project would still provide economic merit 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) @ 7% real discount rate	% of total	
<b>Benefits</b>			
<b>Savings in Travel Time</b>	<b>\$754.0</b>		<b>67.3%</b>
Passenger vehicles	\$443.0		39.5%
Business vehicles	\$249.2		22.2%
Freight vehicles	\$61.8		5.5%
<b>Vehicle Operating Costs</b>	<b>\$363.4</b>		<b>32.4%</b>
Passenger vehicles	\$219.9		19.6%
Business vehicles	\$123.7		11.0%
Freight vehicles	\$19.9		1.8%
<b>Savings in Crash Costs</b>	<b>\$6.4</b>		<b>0.6%</b>
<b>Residual Value</b>	<b>\$5.1</b>		<b>0.5%</b>
<b>Environmental externalities</b>	<b>-\$8.8</b>		<b>-0.8%</b>
<b>Total Benefits<sup>1</sup></b>	<b>\$1,120.1</b>	(A)	<b>100%</b>
Total capital costs (P50)	\$173.5		99.3%
Operating costs	\$1.3		0.7%
<b>Total Costs<sup>1</sup></b>	<b>\$174.8</b>	(B)	<b>100%</b>
<b>Net benefits - Net present value (NPV)<sup>2</sup></b>	<b>\$945.3</b>	(C)	n/a
<b>Benefit-cost ratio (BCR)<sup>3</sup></b>	<b>6.4</b>	(D)	n/a

Source: Proponent's business case

(1) Totals may not sum due to rounding.

(1) 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 business case discusses a range of potential environmental impacts and proposed mitigation measures. The key potential impacts include biodiversity, property disruption and noise. The proponent's cost-benefit analysis also indicates a small increase in environmental externalities, as shown in the table above. This is due to the traffic modelling forecasting an increase in vehicles using the route, with faster but slightly longer trips. However, this has been estimated based on the distance travelled by vehicles, without considering their speed improvements.

Overall, our review of information provided by the proponent in relation to environmental impacts suggests that the upgrade is likely to have limited environmental and social impacts, particularly after the application of proposed mitigation measures.

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

Capital costs and funding	
Total capital cost	\$240 million (P50, undiscounted) \$252 million (P90, undiscounted)
Australian Government funding committed	\$120 million (50% of the P50 capital cost)
Other funding	The NSW Government would fund the remaining project costs



## 8. Deliverability

The cost estimate was prepared by North Projects, based on a detailed design produced by SMEC. While the costs have undergone internal review by Transport for NSW, an independent cost review was not included in the business case. Infrastructure Australia recommends the completion of an independent peer review of project costs to improve the quality of business cases for decision makers.

The proponent has selected a Construct Only procurement strategy for this project based on several risk and constructability workshops. We consider the procurement approach appropriate for this type of project, as it enables early resolution of complex constructability issues, stakeholder concerns, property acquisition and utility issues, and minimises project design risks. However, there is limited transparency on the structure, analysis and findings of the workshops to demonstrate that the procurement model has been selected using a robust process.

The business case did not explore a user pays model. However, this is reasonable as the project is an upgrade, not a new build, to a short segment of an existing arterial road.

The Risk Management Plan and risk processes for the project comply with the TfNSW Risk Management Framework. The risk registers have been created and updated through risk workshops from 2014 until 2019, and have been incorporated into the probabilistic capital cost estimates using Monte Carlo simulation. Key risks identified by the plan include insufficient designs for the delivery method, unknown utilities infrastructure, and short-term disruptions during construction including increased traffic and access issues for property owners.

The proponent plans to undertake a post completion review in accordance with the RMS User Guide for Road Project Post Completion Reviews, which focuses on cost and core quantified benefits only. The benefits realisation plan includes targets for improving traffic efficiency, road safety, freight and business travel productivity, public transport network operation, and active travel amenity. Infrastructure Australia encourages the proponent to conduct and publish a full 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.