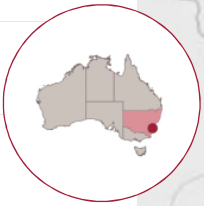
Australian Government | Infrastructure Australia

Project business case evaluation summary

M12 Motorway

Location
Western Sydney, NSW

Geography
Fast-growing cities



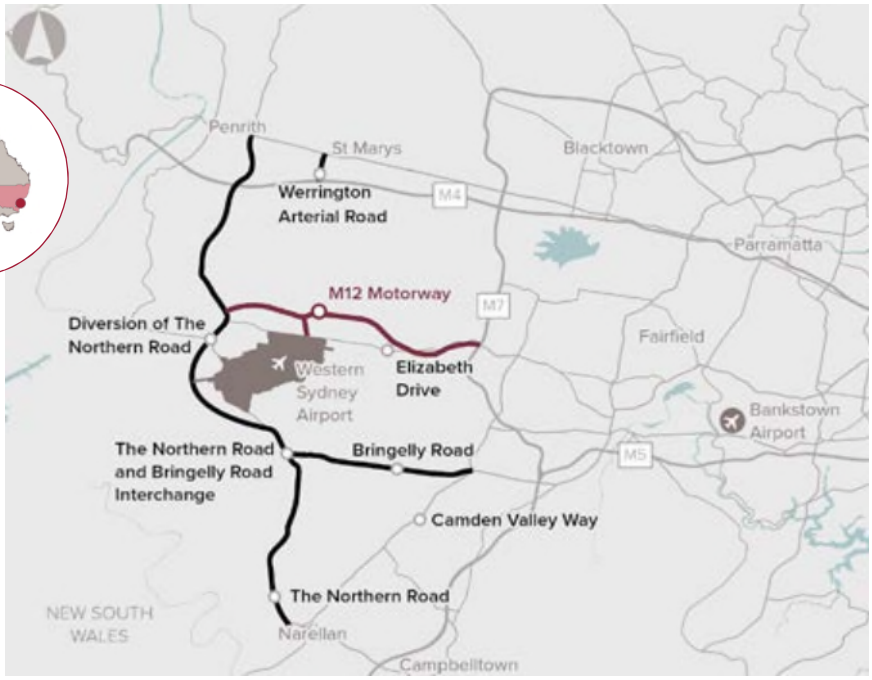
Category
Urban Congestion

Capital cost
$2,032.4 million (P90, outturn, undiscounted)

Indicative timeframe
Construction Start: Q1 2022
Project completion by: Q4 2025

Proponent
NSW Government

Evaluation date
18 June 2020



1. Evaluation Summary

The **M12 Motorway project** has been added to the Infrastructure Priority List as a **High Priority Project**.

Growing travel demand in Western Sydney, driven by transformational changes and strong population growth, is expected to put significant pressure on the existing transport network. The proposed M12 Motorway project will provide access to the new Western Sydney Airport and aims to increase road capacity and reduce congestion and travel times in the future. The M12 Motorway is a key element of the Western Sydney Infrastructure Plan, which was added to the *Infrastructure Priority List* as a Priority Initiative in 2016.

In the absence of any intervention, the business case states that proposed and ongoing development in Western Sydney will have a negative impact on traffic efficiency and road safety in the region, as well as affecting the ambitions and development plan undertakings of various levels of government, including state and federal.

The M12 Motorway is a new 16-kilometre motorway to connect the Western Sydney Airport at Badgerys Creek with Sydney's motorway network. Our evaluation found that the project demonstrates strategic alignment to relevant government policies and plans, and project objectives.

The proponent's business case states that the preferred M12 Motorway project option would have a net present value (NPV) of $1,170 million and a benefit-cost ratio (BCR) of 1.8, using a 7% real discount rate and P50 capital cost estimate.

Infrastructure Australia observed that the economic analysis has slightly overstated the net benefits. However, there were also areas where the economic appraisal was conservative, but these observations were not found to have a material impact on the economic, social and environmental value of the project.

Overall, the project demonstrates strategic fit and strong economic, social and environmental merit, as well as having appropriate deliverability planning.

2. Context

The proposed M12 Motorway is located in the Western Sydney region. Western Sydney's population is anticipated to increase from 2.1 million in 2016 to 3.0 million by 2036, which is an average of 46,000 additional residents per year.

This strong forecast growth is driven by a number of transformational changes in the region, including the Western Sydney Airport, South West Growth Area, Western Sydney Employment Area and Western Sydney Aerotropolis. These land use changes also form part of the Greater Sydney Commission's Greater Sydney Regional Plan and Western City District Plan, which provide a vision for the broader region underpinned by infrastructure, liveability, productivity and sustainability.

Additional travel demand associated with the planned developments, including Western Sydney Airport, is expected to put significant pressure on the existing transport network, including Elizabeth Drive. Traffic modelling undertaken by Transport for NSW indicates that the existing transport network will not be able to sufficiently and efficiently service future demand. This is also expected to increase safety risks, and Elizabeth Drive already has a higher casualty crash rate compared to comparable arterial roads.

3. Problem description

The M12 Motorway project is part of the broader Western Sydney Infrastructure Plan, which is currently identified as a Priority Initiative on the *Infrastructure Priority List* in recognition of the nationally significant transport and access problems. The 2019 *Australian Infrastructure Audit* also identifies the Western Sydney Infrastructure Plan and its role in providing capacity for population growth and future developments in and around Western Sydney. These are expected to generate additional travel demand that will put pressure on the existing transport network and lead to capacity constraints over time.

The growing demand for transport in the region, driven by the transformational changes and population growth, are expected to negatively impact on:

- Traffic efficiency – the growth in travel demand and population in Western Sydney is likely to put significant pressure on the transport network over time, with traffic modelling showing examples of insufficient capacity across key sections of the network in morning and afternoon peak 1-hour periods by 2026, and worsening out to 2036
- Road safety – Elizabeth Drive has a higher road safety risk due to several environmental factors including lack of median separation, uncontrolled property access, high heavy vehicle usage and non-compliant intersection layouts. The casualty crash rate is estimated to be 46.1 per million Vehicle Kilometres Travelled (VKT) compared to 35.9 per million VKT for comparable arterial roads (or around 28% higher than comparable arterial roads)
- Risks to government – Elizabeth Drive poses risks to the NSW Government and the Australian Government (as the developer of Western Sydney Airport), including strategic risk (associated with the extensive future planned development in the region) and existing operational risks (such as additional pressure on intersections, reliability, property access, freight, public transport, as well as pedestrians and cyclists associated with the additional travel demand). Together, these are expected to present additional risks to government, such as through required upgrades to intersections to maintain a sufficient level of service.

4. Options identification and assessment

The primary objectives of the project are to:

- Provide capacity to meet traffic demand generated by Western Sydney urban development
- Provide a high standard connection to the airport with capacity to meet future freight and passenger needs
- Provide a road which supports and integrates with the broader transport network
- Support the provision of an integrated regional and local public transport system
- Preserve the access function of Elizabeth Drive for transport users
- Provide active local transport within the east–west corridor
- Make provision for connection to the future Outer Sydney Orbital.

A range of potential options to address the problems have been assessed since 2015. A longlist of 15 route options was initially developed then assessed by the proponent using quantitative multi-criteria analysis against environmental and technical constraints at a value management workshop. Specifically, the criteria included project delivery; land use; community impact; environment and heritage; and functionality.

Further work was undertaken by the proponent to identify eight shortlisted options, taking into consideration the findings from the value management workshop. These eight shortlisted options were then assessed against the same criteria and a preferred motorway route was identified in 2016.

The M12 Motorway Environmental Impact Statement considered and assessed this preferred motorway route, alongside the following options:

Option 1. Do nothing

Option 2. Do minimum (involving upgrading intersections along Elizabeth Drive)

Option 3. Alternative modes of transport (involving construction of a rail line)

Option 4. Motorway.

The proponent assessed these four options against the project objectives, along with the Western Sydney Infrastructure Plan objectives. The 'do nothing' option did not meet any of the objectives and was not considered a realistic solution. The 'do minimum' option partially met the objectives and was adopted as the base case.

Infrastructure Australia and the Australian Transport Assessment and Planning (ATAP) Guidelines recommend that the base case include only the 'do minimum' changes that would occur in the absence of the project (committed and funded projects). Therefore, it does not need to meet project objectives. Notwithstanding the treatment of the 'do minimum' scenario as an option, Infrastructure Australia has confirmed the base case for this project is appropriate.

The proponent found that the 'alternative modes of transport' option also did not fully meet the objectives. In particular, rail infrastructure on its own was not found to address the needs of customers to access highly dispersed locations and would only partially contribute to relieving congestion on arterial roads. With this in mind, the proponent has recognised that a multi-modal approach will likely be required over the longer term. The Australian and NSW Governments are jointly proposing a Metro rail link to service the airport and Aerotropolis and will ensure integrated planning of road and rail links in Western Sydney.

The motorway option was considered to meet the objectives and therefore proceeded to be assessed as part of the business case.

The business case considered the M12 Motorway (Project Option 1) and an upgrade of the existing Elizabeth Drive (Project Option 2, which was not part of the shortlist of options) against the 'do minimum' base case:

- Project Option 1: Construction of a new 16-kilometre dual-carriageway motorway between the M7 Motorway and The Northern Road with two lanes in each direction
- Project Option 2: Upgrading Elizabeth Drive to a four-lane divided carriageway between the M7 Motorway and The Northern Road.

The proponent's approach to options identification and assessment does not fully comply with the guidelines set out in the Infrastructure Australia Assessment Framework. We recommend using quantitative analysis, such as rapid cost-benefit analysis, to shortlist the options which are most likely to benefit the community. Notwithstanding this, the proponent has rigorously assessed two project options using cost-benefit analysis within the business case.

5. Proposal

The key features of the preferred option include:

- A new 16-kilometre dual-carriageway motorway between the M7 Motorway and The Northern Road, with two lanes in each direction and a central median allowing future expansion to six lanes

- Motorway access via three interchanges/intersections including an interchange with the M7 Motorway; a grade separated interchange referred to as the Western Sydney Airport interchange; and a signalised intersection at The Northern Road
- Bridge structures across Kemps Creek, South Creek, Badgerys Creek and Cosgroves Creek
- Bridge structure across the M12 Motorway into Western Sydney Parklands
- Widening an existing bridge across Ropes Creek and Villiers Road
- Bridge structures at interchanges and at Clifton Avenue, Elizabeth Drive, Luddenham Road and other local roads
- Providing active transport facilities through pedestrian/cycle bridges and an off-road shared user path including connections to existing and future shared user path networks
- Modifying the local road network to connect across and around the M12 Motorway.

6. Strategic fit

The project aligns with relevant jurisdictional plans, including the NSW Future Transport Strategy 2056, which itself is supported by several sub-plans including the Greater Sydney Services and Infrastructure Plan. The project also supports plans developed by the Greater Sydney Commission, including the Greater Sydney Regional Plan and Western City District Plan. There is also broad alignment of the project's benefits to stated project objectives.

The M12 Motorway project is also a part of the existing Western Sydney Infrastructure Plan, which is included on the 2020 *Infrastructure Priority List* as a Priority Initiative. The 2019 *Australian Infrastructure Audit* also identified the need to construct and upgrade roads around the future Western Sydney Airport as part of the proposed Western Sydney Infrastructure Plan.

The business case acknowledges the project's interdependence with other major infrastructure projects such as Western Sydney Airport, The Northern Road upgrade, Sydney Metro Western Sydney Airport, and the South West Rail Link Extension corridor.

Infrastructure Australia has identified that the land use changes assumed in planning for the M12 Motorway and other projects in this area, such as Sydney Metro Western Sydney Airport, are inconsistent. We also understand that the land use assumptions used in this project do not include the planned Aerotropolis Precinct Development around Western Sydney Airport. Infrastructure Australia recognises that the land use changes assumed in this project are likely to be conservative to the extent that these developments in the region are not captured.

7. Economic, social and environmental value

The proponent's economic appraisal of the M12 Motorway stated an NPV of $1,170 million (using a 7% real discount rate and P50 capital cost estimate) and a BCR of 1.8 over a 30-year evaluation period. This indicates that the economic, social and environmental benefits of the M12 Motorway project are expected to significantly outweigh the costs. Consistent with other major road projects, travel time savings represent the largest project benefit, at over 70% of the total project benefits.

The economic appraisal indicated that both Project Options were economically viable, with a stated NPV and BCR for the Elizabeth Drive Upgrade (Project Option 2) of $939 million (using a 7% real discount rate and P50 capital cost estimate) and 2.0 respectively. The proponent identified the M12 Motorway as the preferred option because the Elizabeth Drive Upgrade would not fully meet the stated project objectives.

Infrastructure Australia's evaluation found that some net benefits in the economic appraisal may have been slightly overstated. These include:

- The vehicle occupancy rates used as part of the economic appraisal are based on ATAP, which are considered by Infrastructure Australia to be slightly higher than observed vehicle occupancy rates, leading to higher travel time savings
- The methodological approach used to estimate the road crash cost savings resulted in a different treatment across Project Options with inconsistent Base Case crash rates, leading to slightly overstated benefits for Project Option 2 relative to Project Option 1

- The actual maintenance costs of the project are likely to be slightly higher than what was estimated in the economic appraisal, as the appraisal did not include future resurfacing costs for both Project Options, as well as somewhat conservative assumptions around the costs associated with pavement rehabilitation over the life of the project in Project Option 1.

However, we also found some areas where the economic appraisal was conservative, such as:

- The proponent included a small amount of sunk costs in the economic appraisal to maintain consistency between the cost base in the economic appraisal and the final business case. Sunk costs are typically excluded from economic appraisals.
- The traffic volume beyond the last modelled year in 2036 is extrapolated with zero growth to the end of the evaluation period. This may understate the extent that future traffic is able to grow and lead to additional benefits as a result of the project.

Overall, we consider that the proponent's analysis generally aligned with the requirements of the Infrastructure Australia Assessment Framework, and that the issues identified above are unlikely to materially impact the results of the economic appraisal.

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			
Value of travel time savings	$1,877.3		71.9%
Value of travel time variability savings	$22.7		0.9%
Vehicle operating cost savings	$612.7		23.5%
Road crash cost savings	$52.4		2.0%
Road externality cost savings[1]	-$40.5		-1.6%
Residual value of asset	$86.9		3.3%
Total Benefits[2]	**$2,611.4**	(A)	**100%**
Total capital costs (P50)	$1,387.4		96.3%
Maintenance costs	$53.4		3.7%
Total Costs[2]	**$1,440.8**	(B)	**100%**
Net benefits - Net present value (NPV)[3]	**$1,170.7**		n/a
Benefit-cost ratio (BCR)[4]	**1.8**		n/a

Source: Proponent's business case

(1) Road externality costs (including air pollution; Greenhouse Gas emissions; noise; water pollution; nature and landscape; urban separation; and upstream and downstream costs) represent a disbenefit, driven by higher vehicle kilometres travelled.
(2) Totals may not sum due to rounding.
(3) The net present value is calculated as the present value of total benefits less the present value of total costs (A – B).
(4) The benefit–cost ratio 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	$1,887.5 million (P50, out-turn, undiscounted) $2,032.4 million (P90, out-turn, undiscounted)
Proposed Australian Government funding contribution	$1,638 million
Other funding	$394 million (NSW Government)

At the time of the evaluation, the approved funding for this project totalled $1,750 million, with the Commonwealth contributing $1,400 million, and the NSW Government contributing $350 million. This indicates that there is a gap of $138 million between the total approved funding and the business case cost estimate of $1,888 million (at P50), and a gap of $282 million between the total approved funding and the business case cost estimate of $2,032 million (at P90). The proponent has subsequently advised that the NSW Government commitment will increase to $394 million and that they will be seeking an increase in the Australian Government contribution of $238 million to $1,638 million.

8. Deliverability

The business case targets construction to commence in 2022, with the M12 Motorway opening to traffic by the end of 2025 and ahead of the opening of the Western Sydney Airport scheduled for 2026. This project would be delivered by the NSW Government, through the Transport for NSW Western Sydney Project Office. We note that Transport for NSW has delivered a number of road projects of this type in the past.

The procurement strategy for the M12 Motorway project considered a range of packaging strategies. The proponent identified the most viable strategy as three separate work packages, including a West, Airport (Central) and East package. In particular, the proponent found that this packaging provides the opportunity to use specialist resources in greenfield areas (such as the Western package) while encouraging innovation along more complex sections of the road, reduces complex works along less risky sections and provides opportunities to a wider range of industry participants to alleviate current market constraints.

Various contracting strategies were considered for the three work packages as part of the procurement strategy, including public-private partnerships. The contracting models were assessed against a range of criteria, including market capacity, budget, time, resourcing, scope flexibility, innovation and operational flexibility. This process was considered to be appropriate and the proponent identified the following preferred contracting models for each of the work packages:

- Construct only for the West package
- Construct only for the Central package
- Design and construct for the East package.

The proponent has considered a range of funding approaches, including road user charges and the potential for private financing. However, road user charges were excluded from the analysis following the announcement by the NSW Premier that the M12 Motorway would be a 'toll free' motorway. The project is funded by the Australian Government and NSW Government on an 80:20 basis.

The development of the cost estimates was overseen by the Transport for NSW Project Services Branch, Engineering Estimating Management. Cost planning for the project has also considered the Transport for NSW Investment Cost and Risk Management Guidelines. Infrastructure Australia understands that these costs were reviewed by the Transport for NSW Project Management Office, which is independent of the M12 team. Overall, we consider the cost estimates appropriate.

The risk assessment framework provided by the proponent appears to be robust for a project at this stage of design development and aligns with the Transport for NSW Risk Management Framework. A Risk Management plan has been prepared for the project and a project risk register has been developed through multiple risk workshops (attended by internal and external stakeholders) throughout the development of the project. The key risks identified include:

- Property acquisition costs exceeding current estimates
- Constructability, coordination, interface issues with adjoining project and stakeholders
- Project scope and utility scope increases to meet requirement from stakeholders.

While the business case included a benefits realisation plan, it did not include a full Post Completion Review plan. Infrastructure Australia recommends a Post Completion Review of the project be conducted to accurately evaluate whether it delivered the expected benefits, and to identify any lessons that could be used to inform 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.