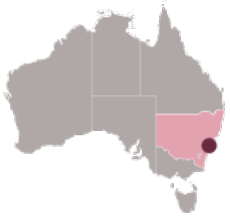
Australian Government | Infrastructure Australia

BUSINESS CASE EVALUATION SUMMARY

Mount Ousley Interchange (M1 Princes Motorway)



PURPOSE OF EVALUATION
Committed and funded project

EVALUATION OUTCOME
Funded proposal (not eligible for the Infrastructure Priority List)

ASSESSMENT FRAMEWORK STAGE

1 DEFINING PROBLEMS AND OPPORTUNITIES
2 IDENTIFYING AND ANALYSING OPTIONS
3 DEVELOPING A BUSINESS CASE
PROJECT DELIVERY
4 POST COMPLETION REVIEW

LOCATION
Wollongong, NSW
Dharawal country

GEOGRAPHY
Smaller cities and regional centres

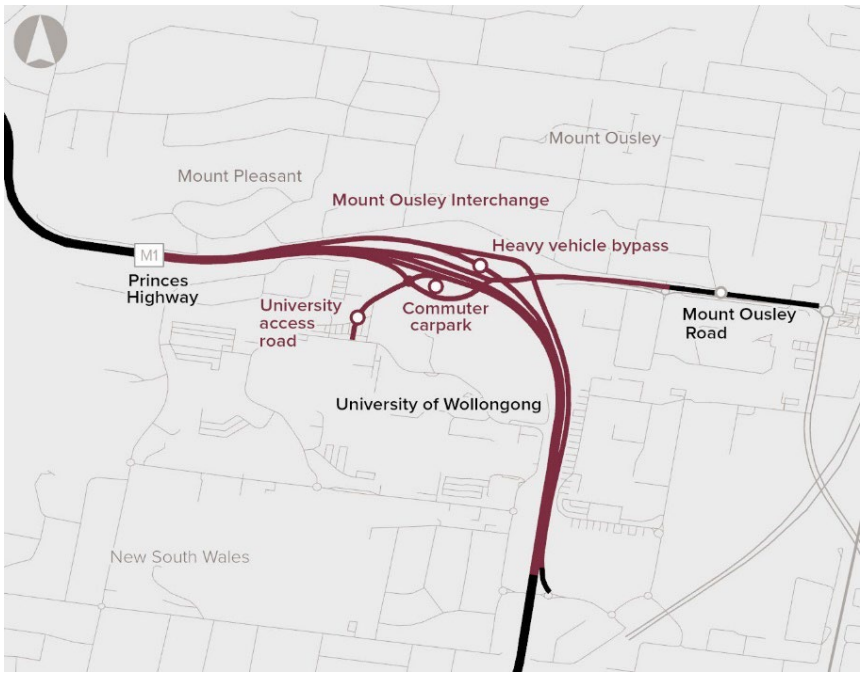
SECTOR
Transport

OUTCOME CATEGORY
Road safety

PROPONENT
NSW Government

INDICATIVE DELIVERY TIMEFRAME
Construction start: 2024
Completion by: 2028

EVALUATION DATE
16 August 2024



CAPITAL COST
$365.0 million (P50, outturn)
$390.0 million (P90, outturn)

FUNDING COMMITTED (P90)

Australian Government:
$240 million, May 2021
$72 million, May 2024

NSW Government:
$60 million, June 2021
$18 million, May 2024

Review summary

- Infrastructure Australia has evaluated the business case for **Mount Ousley Interchange** in accordance with our Statement of Expectations, which requires us to evaluate project proposals where Australian Government funding of more than $250 million is sought.
- This project will implement a grade separation for the intersection of Mount Ousley Road and the M1 Princes Motorway at the base of Mount Ousley, in Wollongong NSW. This section of the M1 Princes Motorway experiences heavy traffic congestion during peak periods, heavy and light vehicle movements conflict on the southbound approach to Mount Ousley Road, and crash rates are higher than the state average, particularly due to an at-grade right-turn to access the motorway.

- The business case has been updated to reflect the tender price of the construction contract awarded in December 2023. It reports that the social benefits of the project would marginally outweigh the costs, with a benefit cost ratio (BCR) of 1.3 and a Net Present Value (NPV) of $88.8 million.[1] The project's main benefits are travel time and vehicle operating cost savings for road users, although there will be significant traffic disruption impacts during construction. While road safety is a key objective of the project, quantified safety benefits are a small proportion of the total benefits. This is because of the infrequent nature of severe crash events, which results in smaller benefits relative to the incremental travel time and vehicle operating cost savings for the large number of vehicles using the M1 on a daily basis.
- The project is estimated to generate a net increase in greenhouse gas (GHG) emissions because the emissions from construction and operation would not be offset by reductions in vehicle use. However, the construction contract includes requirements to maintain an energy efficiency and GHG emission plan and investigate opportunities to reduce the lifecycle energy and carbon intensity of the project.
- The primary construction contract has been awarded and early works are underway. While there is a clear path for delivery and management of risks, a key inherent risk is the significant pipeline of major road and rail infrastructure projects in NSW planned for delivery in a similar time period. Infrastructure Australia expects there to be capacity and capability constraints that place risk on this project being delivered in line with the estimated cost and delivery period.
- Overall, we are supportive of the project and acknowledge the capacity and safety constraints it aims to address.

Recommendations

We recommend the proponent:

- Continues to engage the community to respond to opposition to the removal of the shared pedestrian and cycling bridge over Mount Ousley Road.
- Carefully monitor project delivery in response to current market capacity and materials price escalation challenges.
- Considers any changes to project scope and resulting costs related to urban design (which are currently excluded) in terms of value for money, so the merit of further investment can be appropriately considered by the NSW and Australian governments.
- Monitor road performance and safety after opening to determine if there is a need to accelerate planning and delivery of the third southbound lane for the M1 Princes Motorway or signalising intersections at University Avenue.

Project description

The project includes:

- An overpass from Mount Ousley Road, to allow northbound traffic to safely access the M1 Princes Motorway.
- A dedicated heavy vehicle bypass lane, to separate heavy vehicles from general southbound traffic on the M1 Princes Motorway, and light vehicles exiting at Mount Ousley Road.
- A dedicated southbound heavy vehicle exit ramp to Mount Ousley Road, to separate heavy and light vehicles exiting the M1 Princes Motorway to Mount Ousley Road.
- A new entry to the University of Wollongong from the M1 Princes Motorway, for northbound and southbound vehicles, via a new overpass from Mount Ousley Road and a new (northbound) motorway exit ramp.
- A new exit from the University of Wollongong to the M1 Princes Motorway northbound, and to Mount Ousley Road via the new overpass.
- A southbound access road between Mount Ousley Road and University Avenue, which would replace the existing southbound access from the M1 Princes Motorway to University Avenue.
- Two new heavy vehicle safety ramps.
- A shared path along the bridge over the M1 Princes Motorway and pedestrian and cyclist bridge over the

[1] Using a 7% real discount rate and a P50 capital cost estimate, based on the awarded construction contract.

southbound access road.

- A new commuter car park, relocated to the southern side of the M1 Princes Motorway, with additional formalised parking spaces.

The project is expected to support an average of 310 jobs during construction.

Further information about the project can be found at Mount Ousley interchange | Transport for NSW.

Review themes

Strategic Fit	The case for action, contribution to the achievement of stated goals, and fit with the community.
Case for change	The project seeks to address several key problems: • Network performance and future capacity - heavy traffic congestion occurs during weekday peak periods and during the weekend and peak holiday periods. A key contributor to this is queueing from University Avenue onto the Motorway southbound in the AM peak. • Conflicts between heavy and light vehicles on the Princes Motorway southbound on approach to Mount Ousley Road – speed limits of 80 kilometres per hour for light vehicles and 40 kilometres per hour for heavy vehicles conflict, resulting in light vehicles cutting across slower moving heavy vehicles to access Mount Ousley Road. This impacts road safety and contributes to traffic flow breakdowns. • Road safety – There were 46 crashes, leading to 50 casualties, in the study area during the 5-year period to March 2021. Crash rates are higher than the state average, and a high proportion of fatal and serious injury crash rates indicates the potential for crashes with more serious consequences in future. Crashes were associated with queues from the University Avenue roundabout and the speed differential between light and heavy vehicles at the Mount Ousley Road exit, followed by crossing the intersection of the M1 Princes Motorway and Mount Ousley Road. The problem was added to the *Infrastructure Priority List* in 2021, recognising the high crash rate, leading to freight inefficiencies and travel unreliability. The listing also identified insufficient capacity for current and future traffic growth and freight demand. The listing was removed in 2021 following the commitment of delivery funding by the Australian and NSW governments. Broader safety and resilience challenges on the corridor are recognised through the M1 Princes Motorway (Mount Ousley) safety and resilience improvements listing. The project addresses the problems associated with the at-grade right turn from Mount Ousley Road to the M1 Princes Motorway, and the conflict between southbound light vehicles exiting at Mount Ousley Road with slower moving heavy vehicles. It also responds directly to the other identified problems of safety, travel time and efficiency on this section of the motorway.
Alignment	The project directly contributes to Australian and NSW Government objectives to improve safety, efficiency and resilience along the M1 Princes Motorway – a key route on the National Land Transport Network. This includes the objectives of the Australian Government's *Infrastructure Policy Statement*[2] and NSW policies and strategies, including the *10 Year Transport Blueprint*, *Future Transport 2056* and *Regional NSW Services and Infrastructure Plan*. The project is fully funded by the Australian and NSW governments.
Network and system integration	The project is well integrated with the existing road network, providing an interchange design that addresses the identified problems. Failure to deliver the project will result in the levels of efficiency, safety, and accessibility declining on the M1 Princes Motorway, adversely affecting personal, commuting, business and freight travel on this key road link. The project is not dependent on other projects, however, Transport for NSW (TfNSW) is

[2] See www.infrastructure.gov.au/department/media/publications/infrastructure-policy-statement

	considering emerging safety and reliability challenges on this section of the M1 through a third southbound lane on the motorway approaching the intersection and a longer-term investigation of the corridor. These investigations should consider the relative timing of this project to minimise disruption and apply any learnings.
Solution justification	The defined project scope aims to resolve a complex series of related safety and traffic efficiency issues. While only one option was investigated in detail in the business case, this option was selected as the best performing based on analysis in the strategic business case that included a cost-benefit analysis of four options. The preferred option has since been subject to a value management review, detailed analysis in the business case, and a project optimisation review by the NSW Government. Further scope refinements were proposed and agreed by TfNSW through the tender process. The design has changed following the 2021 Australian Government funding decision, to improve the safety and constructability of the project. With the exception of the removal of the pedestrian bridge over Mount Ousley Road, the proponent has provided evidence that there is a limited impact on the outcomes of the project and overall transport network performance.
Stakeholder endorsement	Stakeholder engagement for the project appears appropriate, as the proponent sought input from a wide range of stakeholders and community groups throughout project development, with feedback incorporated in the project design. Community feedback has largely supported the project, however, concerns have been raised on the impact on local traffic, impacts to the local community during construction and opposition to the removal of the pedestrian bridge over Mount Ousley Road. While these concerns are recognised through the risk management approach, they will need to be actively managed through project delivery.
Societal Impact	**The social, economic and environmental value of the proposal, as demonstrated by evidence-based analysis.**
Quality of life	The main community benefits are travel time savings, which are expected to reach around one and a half minutes for vehicles travelling southbound on the Princes Motorway, and over four minutes for southbound vehicles accessing University Avenue by 2041 (during the AM peak). Private vehicle owners will also realise vehicle operating cost savings. While road safety is a key objective of the project, quantified safety benefits are a small proportion of the total benefits. This is because of the infrequent nature of severe crash events, which results in smaller benefits relative to the incremental travel time and vehicle operating cost savings for the large number of vehicles using the M1 on a daily basis. Other quality of life benefits include increased access to active transport links to the University of Wollongong, which supports improved health outcomes.
Productivity	The main productivity benefit is reduced travel times for heavy vehicles, which make up around 14% of vehicles travelling on this section of the M1 Princes Motorway. The freight task for the corridor is also expected to increase by 59% over the next 25 years. Reducing travel time allows for freight operators to undertake either the same freight task with fewer vehicles or realise reduced vehicle operating costs. The project also includes two heavy vehicle safety ramps (replacing an existing ramp) to provide for runaway vehicles. While the benefits of these ramps were not quantified, they improve safety for heavy vehicle operators. However, there are expected to be material traffic disruption impacts during construction. While the design has considered construction staging to minimise disruption, construction activity and road possessions will impact both commercial and private travel.
Environment	The project has negative environmental impacts, primarily related to land clearing for the expanded intersection footprint. The business case reports 7.53 hectares of threatened fauna species habitat - North Coast Wet Sclerophyll Forests, will be cleared to deliver the project, and biodiversity credits have been acquired to offset impacts.

Sustainability	The proponent has estimated and monetised GHG emissions from the project using the NSW Government Carbon Emissions Reporting Tool. This analysis found the project would contribute to a net increase in emissions, with the main source of emissions being from construction materials. Project emissions were monetised, but not included in the cost benefit analysis. This would marginally reduce the benefit cost ratio of the project. However, the business case identifies opportunities to reduce emissions during construction and operation. The delivery contract requires the contractor to address the following requirements to reduce emissions: • deliver a GHG emission plan, including sustainability reporting, audits and assurance reviews as required by the NSW Government • demonstrate opportunities have been investigated to reduce the life cycle energy and carbon intensity of the project • reduce construction related GHG emissions compared to a baseline GHG footprint • source a proportion of construction electricity via onsite renewable energy or accredited GreenPower. The NSW Government will be responsible for monitoring and reporting on actual emissions following completion of the project.
Resilience	The project will deliver road safety and congestion benefits to reduce disruption on the M1 Princes Motorway and surrounding road network, improving the resilience of this section of the National Land Transport Network. Opportunities to improve the resilience of the wider road network were not considered. The business case only considered direct climate risks at a high level, so opportunities to improve community resilience to climate events through the project were not investigated.
Deliverability	**The capability to deliver the proposal successfully, with risks being identified and sufficiently mitigated.**
Ease of implementation	The construction contract has been awarded and early works are underway. There is a clear path for delivery and management of risks. While there have been minor design changes as a result of the tender process, the overall scope of the project continues to meet the requirements of the business case. The increased cost, compared to the Australian Government funding commitment in 2021, appears to reflect market conditions and a more certain cost for the project based on a more developed design and revised contract model, reducing the likelihood of future cost pressures. Further, the design and construct (D&C) delivery model appears appropriate for finalising the design and enabling delivery efficiencies, while providing moderate confidence in the cost to deliver. The project has been appropriately developed to provide confidence in delivery to the identified schedule and cost, however, ongoing market capacity constraints and inherent risks (e.g. wet weather and contamination) remain.
Capability & capacity	TfNSW is well-equipped to deliver the project, with a track record of delivering similar projects. The proponent has recognised the current and projected future market capacity challenges, conducting a market interaction process to seek contractor feedback on the proposed procurement approach and the associated risks and opportunities, which align with the findings in Infrastructure Australia's *2022 Infrastructure Market Capacity report*. The contract has been awarded to Fulton Hogan, an established contractor with relevant experience delivering road infrastructure projects of this scale.
Project governance	TfNSW is the principal road delivery agency in NSW and has successfully delivered many major road upgrades across the state. No concerns have been identified through the project assurance process and we consider the governance model to be appropriate for the successful delivery and operation the project. The project has followed NSW planning processes and has completed and revised Review of Environmental Factors reports as required throughout project development.

	The project is being delivered under a D&C contract. The tender process included a market interaction process, and interactive sessions through the Registration of Interest and Request for Tender phases. The packaging strategy is one main works package, with delivery of critical utilities as early works. The market engagement supported this delivery model and noted key risks to be traffic management, staging and road occupancies. While the design is relatively complex for an interchange, a collaborative D&C contract is normal for this type of project, and we consider it to be appropriate in this case due to the clear scope definition of the project and the model being able to balance optimising the design through consideration of constructability with providing cost certainty compared to more collaborative contract forms. We consider this packaging strategy to be appropriate, as the single main works package under a D&C contract will provide cost certainty while enabling the contractor to innovate through the detailed design.
Risk	We agree with the risks identified by the proponent, but also consider key risks for the project to be materials price escalation, project delays, and ongoing community opposition to the removal of the pedestrian bridge over Mount Ousley Road. While design and cost maturity are well developed due to the advanced stage of the project, risks will need to continue to be managed carefully as the project progresses. The proponent has identified the following key risks, which remain significant following mitigation measures: • runaway heavy vehicles impacting construction • unexpected contamination or utilities • additional noise treatment requirements • additional conditions for road occupancy • requests for additional urban design scope.
Lessons learnt	The business case includes a benefits realisation approach, which sets out the objectives, expected benefits, performance indicators for measuring project success, and the benefits realisation plan. We recommend actively capturing the lessons learned from design and delivery and sharing these with relevant projects currently in planning, in particular the Mount Ousley Safety and Reliability project and other upgrades connecting to the M1 Princes Motorway, for example, on Appin Road.

Economic appraisal results

The proponent's business case reports that the societal benefits of the project would outweigh the costs, with a BCR of 1.3 and a NPV of $88.8 million.

	Discount rate:	4%	7% (central)	10%
Core evaluation results[1]	**BCR:**	2.1	1.3	0.8
	NPV ($m):	$354.5	$88.8	-$46.3

Key benefits measured:	Key benefits quantified in the economic appraisal include:
	• Travel time savings (68% of total benefits) – these are based on reduced congestion and removal of the conflict between slow moving heavy vehicles and faster moving light vehicles accessing Mount Ousley Road, which results in an overall reduction in vehicle hours travelled (particularly during weekday peak periods as well as during the weekend and peak holiday periods).
	• Vehicle operating cost savings (38% of total benefits) – these are a result of the improved network performance.
	• Crash cost savings (2% of total benefits) – these are a result of addressing:
	  ○ The at-grade right turn from Mount Ousley Road to the M1 Princes Motorway.
	  ○ The conflict between southbound light vehicles exiting at Mount Ousley Road			

	with slower moving heavy vehicles. ○ Queuing on the motorway caused by congestion at University Avenue. • Construction impacts are a material disbenefit of the project (-12% of total benefits) – these are a result of construction activities during the delivery phase impacting traffic. While the approach to measure these benefits was high level, it recognises the real impacts of construction activity and road possessions on road users. Non-monetised benefits identified in the business case include active transport accessibility provided by the new pedestrian and cyclist bridge over the M1 Motorway, safety benefits of the additional heavy vehicle safety ramps, additional parking and improved access to the commuter car park, and reduced noise and vibration due to the provision of noise walls.
Key observations and issues	Although the CBA approach reflects accepted methodologies, the assumptions applied, in particular the cost expansion factors, are likely to overstate the project's benefits. Only one option has been analysed in detail. Although four design options were considered and analysed during the strategic business case, inclusion of an additional option or options in the detailed business case would allow for a relative assessment of alternative options with differing scopes. Maturity of the capital costs is higher than is usually available at the business case stage, due to the cost being committed in the executed D&C contract. However, incremental operating costs estimated are low compared to the capital cost of the project, therefore the estimate may be low, which would very slightly overstate the BCR. Forecast demand growth is modest and in line with expectations. Any population growth above expectations in the Wollongong and Shoalhaven region, such as due to increasing regionalisation, would improve the case for the project. However, the weekday peak-to-day volume and annual cost expansion factors chosen are likely to materially overstate the BCR. Reduced GHG emissions related to vehicle emissions has been included in the CBA, however emissions related to land clearing and construction materials were estimated but not incorporated into the CBA. This is likely to overstate the benefits by up to 5%. Taking all of these observations into account, it is likely that the BCR is overstated and the project may have marginal net benefits. Sensitivity analysis for the impacts of COVID-19 considered population projection adjustments for Wollongong and a high-level adjustment to travel demand forecasts to account for the impacts of increased working from home. This sensitivity analysis found the project benefits would increase if population increases in the Wollongong area.

(1) Costs reported in this table are based on P50 cost estimates.

Project development

The Strategic Business Case and Preferred Option Report (2016) investigated 4 options in detail. All four options included grade separation of the right turn from Mount Ousley Road to the motorway, a new access to the university, pedestrian and cyclist access over Mount Ousley Road and the Princes Motorway, and provision for a future third southbound lane. Two additional 'low cost' options were considered but rejected due to worsening the road network performance of the study area.

While these options were all major interventions that were primarily design alternatives to provide similar intersection upgrades, it is welcome that a CBA was conducted on all four options, and the preferred option was selected because it delivered the greatest net benefits and road network performance.

The preferred option was developed further in the Final Business Case and concept design. A *Project Optimisation Review* was completed in July 2017, to identify opportunities to improve value for money outcomes. The project has addressed recommendations from the review, as well as stakeholder feedback from public consultation on the preferred option and Review of Environmental Factors.

The design has been further refined as part of the tender process, with some material changes. These changes focus on improving safety in construction by reducing interfaces with live traffic, and reducing whole of life costs by simplifying the design and reducing the built area and size of structures. Key scope changes include:

- Separation of bridge structures over the heavy vehicle bypass and the motorway, moving the overpass alignment

west.

- Replacing the eastern roundabout with two connected signalised intersections servicing the new entrance to the University of Wollongong and for vehicles exiting the motorway at Mount Ousley Road.
- Removing the service road, instead providing access to University Avenue from the new Mount Ousley intersections.
- Removing the pedestrian and cyclist bridge over Mount Ousley Road, instead providing access via existing shared paths.
- Relocating the Traffic Incident Response Facility

The project considered the effects of COVID-19 by validating that observed traffic demand had returned to pre-COVID levels and by conducting a sensitivity test on the CBA, as described above.

Project engagement history

Positively assessed and added to the Priority List in February 2021 and removed in July 2021 following commitment of funding.

Not submitted

Submitted to Infrastructure Australia as a funded proposal

Detailed economic appraisal results

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,2023/24)			% of total for 7% results
Discount rate (real)	**4%**	**7%**	**10%**	
Costs				
Total capital costs (P50)	$303.3	$288.9	$275.9	97.8%
Net operating and maintenance costs	$11.5	$6.5	$4.0	2.2%
Total costs[1,2]	**$314.8**	**$295.4**	**$279.9**	**100%**
Benefits				
Travel time savings	$425.3	$259.9	$169.2	67.6%
Vehicle operating cost savings	$238.9	$145.6	$94.5	37.9%
Externality cost savings	$6.7	$4.2	$2.8	1.1%
Crash cost savings	$12.0	$7.6	$5.1	2.0%
Residual value	$38.0	$14.5	$5.6	3.8%
Construction Impacts	-$51.6	-$47.4	-$43.7	-12.3%
Total benefits[1]	**$669.3**	**$384.2**	**$233.5**	**100%**
Net present value (NPV)[3]	**$354.5**	**$88.8**	**-$46.3**	**n/a**
Benefit-cost ratio (BCR)[4]	**2.1**	**1.3**	**0.8**	**n/a**

Source: Proponent's business case

(1) Totals may not sum due to rounding.

(2) Costs reported in this table are based on P50 cost estimates.

(3) The net present value is calculated as the present value of total benefits less the present value of total costs.

(4) The benefit–cost ratio is calculated as the present value of total benefits divided by the present value of total costs.