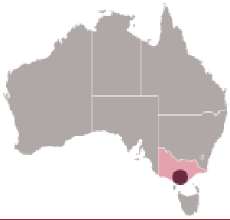
Australian Government | Infrastructure Australia

BUSINESS CASE EVALUATION SUMMARY

Monash Roads Upgrade



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
Melbourne, Victoria

GEOGRAPHY
Fast-growing cities

SECTOR
Transport

OUTCOME CATEGORY
Efficient urban transport networks

PROPONENT
Victorian Government on behalf of the Australian Government

INDICATIVE DELIVERY TIMEFRAME
Construction start: Q3 2023
Project completion by: Q4 2025

EVALUATION DATE
8 September 2022

CAPITAL COST
$232.8 million (P50, outturn)
$243.7 million (P90, outturn)

FUNDING COMMITTED (P90)

Review summary

Infrastructure Australia has evaluated the business case for the **Monash Roads Upgrade** project in accordance with our Statement of Expectations, which requires us to evaluate proposals that are nationally significant or where Australian Government funding of $250 million or more is sought. Given the project has received a full funding commitment of $250 million from the Australian Government, the proposal is not eligible for inclusion on the *Infrastructure Priority List.* [1]

Clyde Road is a primary arterial road providing north-south connectivity between the Princes Highway, Berwick and the South Gippsland Highway. It is a key access route for the proposed Berwick Health and Education Precinct (BHEP)

[1] The Infrastructure Priority List only identifies those proposals which are seeking investment.

and Berwick Railway Station, and interchange for the Monash Freeway (M1). It is also identified as a priority bus route that is expected to increase frequency of services in the future.

Population growth in the region has increased traffic along Clyde Road, resulting in demand for the Kangan Drive intersection and the Monash Freeway interchange exceeding their design capacity, leading to congestion. Long queuing delays are currently being experienced on multiple approaches during several periods of the day, causing increased risk of crashes and creating bottlenecks along the corridor.

The project demonstrates alignment with local and state government strategies and priorities and is expected to lead to reductions in vehicle travel time within the project area, while also increasing overall vehicle throughput along key intersections. Despite these improvements, the proponent's economic appraisal estimates a net present value (NPV) of -$6 million with a benefit cost ratio (BCR) of 0.96.

There are a range of uncertainties that pertain to the methodology used in the economic appraisal. There are several other projects in the adjacent area that are expected to impact on future demand that have not been accounted for in the demand modelling. In addition, insufficient information has been provided as to how transport modelling discrepancies have been reconciled in the benefit calculations.

Further analysis could provide greater confidence that the project benefits will address the identified service need.

Project description

The Monash Roads Upgrade project will deliver:

- 1.2 kilometres of road widening on Clyde Road, with three through lanes in each direction
- Signalised intersection upgrades at the Monash Freeway and Kangan Drive
- Bus priority infrastructure at these intersections
- Additional turning lanes
- Shared user paths for cyclists and pedestrians on both sides along this section of the Clyde Road corridor.

Review themes

Strategic Fit	The case for action, contribution to the achievement of stated goals, and fit with the community.
Case for change	The Clyde Road corridor is located in the City of Casey, which has been one of the fastest growing local government areas in Victoria. Over the past 20 years, population has grown on average by 3.6% per year, compared to 1.9% for Melbourne. This increase in population has resulted in higher levels of traffic along the corridor, leading to increased travel times, and reduced travel time reliability. As a result of increased traffic flows, the Kangan Drive intersection and the Monash Freeway interchange have become congested, exceeding their design capacity. This results in queuing and delay on multiple approaches during several periods of the day. In addition to increased travel times, queuing increases the risk of crashes and reduces access to the BHEP. As the BHEP and surrounding area continues to develop, these problems are expected to worsen.
Alignment	The project aligns with local, state and federal policies and strategies, including: • Victoria's Infrastructure Strategy 2021-2051, Infrastructure Victoria 2021 • Strategic Plan 2021-25, Department of Transport 2021 • Berwick Health and Education Precinct Comprehensive Development Plan, Victorian Planning Authority 2021.
Network and system integration	There are several nearby projects that interface with the Monash Roads Upgrade. In most cases these recent and planned projects will increase demand along Clyde Road, exacerbating congestion along the corridor and delays at intersections. The Monash Roads Upgrade is complementary with these projects, which include development of the BHEP, Clyde Road Level Crossing Removal, Monash Freeway Upgrade and the Berwick Station car park upgrade. Some elements of the Monash Freeway Upgrade (Stage 2), namely the O'Shea Road

	Upgrade and the extension of O'Shea Road to join the Beaconsfield interchange, are likely to reduce traffic along Clyde Road. However, this is not expected to resolve the observed problems, as it is only expected to reduce the number of vehicles turning right from Clyde Road (south) to the Monash Freeway (east).
Solution justification	The approach used to develop and assess options appears to be appropriate for a project of this type, with the proponent undertaking options analysis in two steps. The first step was to assess high level response options, which characterised a wide range of potential actions to resolve the identified problems. These included demand management and active travel, improved efficiency and safety of intersections and increased capacity along the corridor. These were then assessed qualitatively based on expected benefits, risks, dis-benefits, interdependency with related projects, timeframe, costs and a qualitative level of service analysis. From this analysis, increased capacity along the corridor was identified as the preferred option. The second step was to assess specific options, developed based on the preferred response option. This considered three capacity improvement options in addition to the base case, which varied in terms of the scale of proposed works. Of these, one option was dropped from the cost-benefit analysis (CBA) as it provided the same outcomes as another option, but at a significantly higher cost. The preferred option was identified using the results from the CBA.
Stakeholder endorsement	The proponent has identified a range of stakeholders, which include government, transport operators, industry, stakeholder groups and the broader community. To date, consultation has not presented project options. However, information collected during engagement has informed the development of project options. There will be further consultations around the preferred design option as the project is progressed. The level of stakeholder support for the project is unclear.
Societal Impact	**The social, economic and environmental value of the project, as demonstrated by evidence-based analysis.**
Quality of life	The project will improve connectivity to the BHEP and lead to a reduction in road-based travel time through key intersections within the area. The project aims to improve road safety and marginal benefits are attributed to avoided crash costs.
Productivity	The project will result in productivity benefits for business road users, which is measured as part of travel time savings in the CBA. The project considers a relatively small and local level upgrade to the road network, which leads to improvements and time savings that do not extend beyond the project area. It is not expected that this would generate material Wider Economic Benefits (WEBs).
Environment	The project is expected to generate negligible environmental cost savings due to increased travel speeds along the corridor, but may have a longer-term impact of increasing car travel and associated impacts. The proponent has identified that delivery of the project will require the removal of 0.94 hectares of low-quality native vegetation. However, no large old trees are to be removed and the impacts on common flora are expected to be minor. In addition, the project may encounter contaminated land which has been accounted for in cost estimates. The project is not expected to affect any cultural or historical heritage places.
Sustainability	Desired sustainability outcomes, initiatives and targets have been identified. This includes aligning to Transport System Objectives of the *Transport Integration Act 2010 (Vic)* that promote forms of transport, and transport technologies that have the least impact on the natural environment and reduce transport-related greenhouse gas emissions. The economic appraisal includes benefits related to the environment, such as reduced greenhouse emissions resulting from more efficient and faster travel through the key intersections. However, they account for only 0.2% of benefits.

Resilience	The business case does not consider the resilience benefits of the project.
Deliverability	**The capability to deliver the project successfully, with risks being identified and sufficiently mitigated.**
Ease of implementation	The project is at an early stage of development, with the detailed design to be undertaken as part of project delivery. The project approval pathway has been identified. The main risks to implementation relate to delays obtaining third party approval, difficulty sourcing materials and interfacing with adjacent projects during construction. A range of mitigations have been proposed to manage these risks, which have also been reflected in cost estimates for the project.
Capability & capacity	Major Road Projects Victoria (MRPV) has experience delivering projects similar in scope and complexity to the Monash Roads Upgrade and is expected to have the required level of skill and expertise to deliver the project. The proponent has considered the capacity in the construction industry to deliver the project and has noted several market risks due to the historically high levels of construction activity. This is consistent with Infrastructure Australia's *2021 Infrastructure Market Capacity Report,* which forecasts shortages across a range of infrastructure resources critical to this project (i.e. structural engineers, finishing trades and labour, specialised machinery, materials such as concrete and steel) that are expected to persist until the end of 2024. These industry-wide capacity pressures need to be managed to mitigate impacts to the project's delivery time, scope and costs.
Project governance	Governance of the project falls under existing MRPV and Department of Transport governance structures. A project team for the Monash Roads Upgrade will be established by MRPV during procurement and construction phases. A Program Delivery Approach (PDA) is the preferred procurement option and consists of two phases. During the first phase, the PDA involves a competitive contractor tendering process, amongst pre-qualified contractors, to enter into a collaborative Project Development Phase to undertake collaborative detailed planning and design. At MRPV's discretion, and subject to the successful completion of the Project Development Phase, MRPV may enter into an Incentivised Target Cost (ITC) Delivery Contract with the contractor for a second Project Delivery Phase. The model combines the collaborative design elements of a Collaborative Design and Construct model, while allowing the State a 'gate process' to undertake a Value for Money assessment before proceeding and contracting for Delivery. Since July 2020, this procurement model has been used for all MRPV road projects. On projects in delivery under the PDA, the proponent has noted that they have been brought to market and into delivery faster than under traditional procurement processes. Speeding up delivery of projects was a key motivation for adopting this model.
Risk	A preliminary risk analysis was undertaken for the project based on MRPV's Risk Management Process. The process identifies, assesses, allocates, manages and monitors current and anticipated risks and issues. A risk register was developed as part of a risk workshop and is expected to be further developed as the project progresses. The highest residual project risks, after mitigation, relate to changes in scope between the business case concept design and reference design and again from the reference design to the detailed design. The expected cost of risks has been incorporated into the probabilistic cost estimates for the project.
Lessons learnt	MRPV has delivered a wide range of road infrastructure upgrades across Victoria. The lessons learnt from the delivery of these projects have been incorporated into the development of the Monash Roads Upgrade. This includes lessons from projects being delivered using the PDA, and benefit realisation information from a range of similar projects. A project completion review process has been outlined by the proponent, with specific KPIs identified in an investment logic map exercise.

Economic appraisal results (preferred option)

The business case states that the NPV of the project is estimated to be -$6 million with a BCR of 0.96 (assuming a real social discount rate of 7%).

The base case for the analysis is referred to as the "do minimum" scenario, which maintains the existing condition of the road network. This assumes the existing configuration of the intersection of Clyde Road with Kangan Drive, and Clyde Road interchange with the Monash Freeway.

The economic appraisal utilises a combination of strategic demand modelling and micro simulation demand modelling, with a focus on the area of interest, to quantify and value economic benefits. There is a discrepancy, however, between the outputs of both demand models for some options (although it is less obvious as to whether this applies to the preferred option). The economic appraisal attempts to make adjustments to account for demand model inconsistencies; however, little detail has been provided as to the reasoning.

	Discount rate:	4%	7% (central)	10%
Core evaluation results[1]	**BCR:**	1.42	0.96	0.70
	NPV ($m):	$76	-$6	-$42

Key benefits measured:

The key benefits measured include:

- Travel time savings — include the change in travel times resulting from reduced levels of traffic and congestion due to upgrades and improvements to the road network
- Vehicle operating cost savings — include the reduction in the operating costs of vehicles (e.g. fuel and maintenance), due to less congestion and reduced travel times on the road network
- Avoided accidents — reduction in crash costs as a function of the number of vehicle kilometres travelled per road type. The expected shift toward higher order roads (such as freeways) results in safer conditions on the road network
- Environmental externalities — reductions in motorised travel leads to lower greenhouse and noxious emissions, as well as other environmental impacts due to faster trips and less stopping
- Other benefits — includes the residual value of the asset at the end of the appraisal period and other resource cost corrections to account for differences in the perceived and real resource cost of vehicle operating costs and tolls.

Travel time savings account for the majority of project benefits (86%). The value of externalities, such as environmental and safety benefits, are minimal (less than one percentage point) as the project itself does not displace a significant number of vehicle kilometres travelled as a proportion of the entire road network. Safety benefits are potentially understated as they are based on the issues specific to Clyde Road intersections. Applying a standard crash risk parameter which considers network wide risk could result in higher benefits.

Land use benefits and WEBs have not been measured. Land use changes, namely development of the BHEP, are expected to occur independently of the project. If the project was critical to enable continued development of the BHEP or unlocks other higher value land uses in the region, measuring a land use benefit for the project would be appropriate. Including a land use benefit would likely increase total project benefits.

Key observations and issues

There are a range of observations and issues relating to the economic appraisal and demand modelling:

- Transport demand modelling has been based on the Victorian Government's strategic transport model (VITM) and a microsimulation model (VISSIM). These models provide current and future forecasts (2026, 2036 and 2056) of vehicle hours travelled, vehicle kilometres travelled, average travel speeds, latent delays and demand, and vehicle arrivals. VITM produces forecasts for each mode of transport for a given set of demographics, road transport network and public transport service plan inputs. The VISSIM modelling has been used to check the consistency of the VITM results with local

	network capacity and/or optionality that cannot be modelled in VITM. It does not appear that the forecast speeds from VISSM have been fed back into VITM to estimate changes of additional demand, due to long computing time and the expectation that the project generates a small impact relative to the main network. As the VISSIM results were used to significantly scale up the VITM benefits, it is possible that benefits may be overstated. • The approaches taken to calculate benefits over time appear to have the effect of overstating benefits from the year 2036 onwards in the preferred option. Transport outcomes are assumed to remain at their 2036 values to 2056 for a multitude of benefit categories including travel time savings. This is intended to prevent an over-estimation of benefits due to the potential for the overlap of network level benefits and local level benefits by using both strategic and microsimulation demand modelling. While this is a standard approach given the uncertainties of longer-term modelling, the proponent's economic appraisal shows a downward trend in benefits from 2036 to 2056. This means benefits would in fact be lower if the true 2056 modelling outcome were maintained in the model, although this is not expected to be significant. • If the BHEP experiences further development within the CBA evaluation period, base case demand may be underestimated, potentially understating the benefits of the proposed road upgrades. • The project places emphasis on improving road safety outcomes. A Safe System Assessment along Clyde Road found a score of 186/448 equating to a level of service C rating, with 29 crashes recorded between 2014 and 2019. The project is likely to result in a reduction in the crash rate, which is not reflected in the CBA as it applies a constant crash rate to the vehicle km travelled across the network. As a result, the avoided crash cost benefit is likely understated. • The business case states that the COVID-19 pandemic has disrupted planning related to the preparation of the business case, leading to a degree of uncertainty linked to the data inputs. Specifically, no new traffic data collection was possible during 2020, and any data collected during the pandemic period would be skewed due to changed travel behaviour during travel restrictions in Victoria. The business case therefore relies on previous studies and collected data (such as data from 2017). This may incorrectly reflect new patterns, specifically those that have emerged since and as a result of COVID-19.

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

Project development

Project options were developed and assessed in two stages:

- Stage 1: Response options analysis. This process involved identifying a list of potential interventions, which were then combined into a shortlist of response options, which characterises the range of potential interventions. These were:
  - demand management and active travel, which included interventions to encourage alternative modes, changes in trip time and restrictions on car use (such as reduced parking at the nearby Berwick train station)
  - improved efficiency and safety of intersections, which included interventions to improved traffic light sequencing, targeted bus priority, safety improvements and intersection efficiency improvements
  - increased capacity along the corridor, which included targeted safety interventions, capacity improvement, active transport infrastructure improvements and bus priority infrastructure.
  - These were then assessed qualitatively based on expected benefits, risks, dis-benefits, interdependency with related projects, timeframe, costs and a qualitative level of service analysis. From this analysis, increased capacity along the corridor was identified as the preferred option, and was taken forward for further analysis.
- Stage 2: Project options analysis. Building on the previous analysis, project options were developed to increase capacity along the corridor. Apart from the base case (Project Option 1), three options were considered:
  - Project Option 2 – Intersection upgrades at Kangan Drive and Monash Freeway

- Project Option 3 – Intersection and corridor upgrades between Kangan Drive and Monash Freeway
- Project Option 4 – Single point interchange, intersection and corridor upgrades between Kangan Drive and Monash Freeway

Project Option 4 was removed due to the similar operational performance to Project Option 3 at a significantly higher cost.

The project options considered represent different scales of corridor capacity improvements. This approach is appropriate given a wider range of options were considered as part of the response options analysis. The options were assessed using a CBA and based on this analysis, Project Option 3 was identified as the preferred option.

The approach used to develop and assess options appears to be appropriate for a project of this type. It has considered a wide range of interventions in the response options analysis, and has focused on considering the appropriate scale of capital investment.

Project engagement history

Not submitted for Priority List consideration at Stage 1

Not submitted for Priority List consideration at Stage 2

Submitted to Infrastructure Australia as a funded project

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,2021/22)			% of total for 7% results
Discount rate (real)	**4%**	**7%**	**10%**	
Costs				
Total capital costs (P50)	176.9	156.8	139.6	99.2%
Operating costs	2.1	1.2	0.7	0.8%
Total costs[1,2]	**179.0**	**158.0**	**140.3**	**100.0%**
Benefits				
Travel time savings	216.5	130.2	83.5	85.6%
Vehicle operating cost savings	18.3	14.0	10.9	9.2%
Environmental externalities	0.3	0.2	0.2	0.2%
Avoided crash costs	0.5	0.4	0.3	0.3%
Residual value	20.4	7.3	2.7	4.8%
Total Benefits[1]	**255.9**	**152.2**	**97.6**	**100.0%**
Net present value (NPV)[3]	**77.0**	**-5.8**	**-42.7**	**n/a**
Benefit-cost ratio (BCR)[4]	**1.43**	**0.96**	**0.70**	**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.