

Infrastructure Australia Project Business Case Evaluation

Project name	M80 Ring Road Upgrade
Rating	High Priority Project
Date of IA Board rating	7 September 2016

Location	Melbourne, Victoria
Proponent	Victorian Government
Proposed Project timeframe	<ul style="list-style-type: none"> • Preconstruction and Tender Phase: 2016-17 – Q4 2018 • Construction Phase: Q2 2017 – Q4 2020 • Construction Complete: <ul style="list-style-type: none"> ○ Princes Freeway – Western Highway: 2019 ○ Plenty Road – Greensborough Hwy: 2020 ○ Sydney Road – Edgar Road: 2020

Evaluation Summary

The M80 Ring Road is a 38-kilometre freeway that extends from the West Gate Freeway to the Greensborough Highway, and is used by 160,000 vehicles per day. The M80 connects major population centres in Melbourne's north and west to the CBD and elsewhere, and facilitates access to Melbourne's port, airports and other major road corridors. The *Australian Infrastructure Audit 2015* (the Audit) identified capacity constraints along the corridor as a significant problem, and found that, without additional investment, the annual cost of congestion along the corridor is projected to grow from \$86 million in 2011 to \$161 million in 2031.

An earlier M80 upgrade project, covering four discrete sections, was listed on the Infrastructure Priority List (IPL) in 2013 at the *Threshold* rating, and is currently listed as a High Priority Initiative. The proponent's stated benefit-cost ratio (BCR) for the whole M80 upgrade program was 2.2 using a 7% discount rate and P50 cost estimate. The current project proposes to complete three sections of the freeway that have yet to be upgraded. These are (i) Plenty Road to Greensborough Highway (2.4 km); (ii) Princes Freeway to Western Highway (7.9 km); and (iii) Sydney Road to Edgars Road (4.0 km). The project would widen the existing road to a minimum of three through-lanes in each direction and auxiliary lanes between interchanges where required, and implement intelligent transport system infrastructure ("Managed Motorway").

Congestion on the M80 is increasing average travel times, and the variability in travel times, along the corridor, imposing significant costs on business. Congestion also produces negative social and environmental impacts as a result of increased travel time and fuel consumption, and higher vehicle crash rates. Projected population and economic growth in centres to the west and north of Melbourne are likely to amplify these problems.

The proponent's stated BCR for the current project is 2.0 using a 7% real discount rate and P50 cost estimate. The net present value of the project is estimated to be \$552.6 million (7% real discount rate, P50). While Infrastructure Australia has identified a number of risks to achieving this BCR, primarily relating to the traffic modelling approach used in developing the business case, we are confident that the project's benefits will exceed its costs.

1. Strategic Context

Capacity constraints on the M80 were identified as a significant problem in the Audit and on the IPL. Demand growth is causing the M80 corridor to operate beyond capacity, especially during peak periods. The M80 is used by 160,000 vehicles per day, connecting major population centres in Melbourne's north and west to the CBD and elsewhere, and facilitating access to Melbourne's port, airports and other major road corridors including the M1, M8, M31 and M79. The M80 is part of the National Land Transport Network.

An earlier M80 upgrade project, covering four discrete sections, was previously listed on the IPL in 2013 at the *Threshold* rating, and is currently listed as a High Priority Initiative.

2. Problem description

Congestion on the M80 is increasing average travel times, and the variability in travel times, along the corridor, imposing significant costs on business. Congestion also produces negative social and environmental impacts as a result of increased travel time and fuel consumption, and higher vehicle crash rates. Projected population and economic growth in centres to the west and north of Melbourne contribute to congestion along the corridor, amplifying these problems.

The Audit identified capacity constraints along the corridor as a significant problem, and found that, without additional investment, the cost of congestion along the corridor is projected to grow from \$86 million in 2011 to \$161 million in 2031.

Population and economic growth is increasing transport demand in Melbourne, including on the M80 corridor. Demand is exceeding supply, leading to increased congestion and delays. As demand grows over time, the delays are anticipated to increase.

The delays occurring on the M80 reflect the capacity of the M80, and its interaction with connecting roads:

- Delays on the M80 between the Western Highway and the Princes Freeway include congestion resulting from the M80 merge with the Princes Freeway
- Delays along the M80 between Plenty Road and Greensborough Highway include congestion resulting from the M80 intersection with the Greensborough Highway.

3. Project overview

The project would provide additional capacity along three sections of the M80, which in total comprise 14 kilometres of the 38 kilometre M80 Freeway. The remainder of the M80 has either already been upgraded (~21 kilometres) or has approved funding for upgrade (3.7 kilometres).

The three segments addressed in the proposal are:

- Princes Freeway to Western Highway (7.9 kilometres)
- Sydney Road to Edgars Road (4 kilometres)
- Plenty Road to Greensborough Highway (2.4 kilometres).

The upgrade would widen the existing road to a minimum three through-lanes in each direction, with one or two auxiliary lanes between interchanges where required. It would also address weaving behaviour of traffic at various points. The project includes construction of an overpass for traffic exiting the Greensborough Highway southwards onto the M80, and implements Managed Motorway infrastructure along the corridor.

4. Options identification and assessment

The proponent considered a range of options for completing the M80 upgrade. The scope of the options analysis was limited to the M80 corridor. The key principles of the assessment included:

- Maintaining continuity and consistency with completed sections of the M80 Upgrade
- Considering the M80 Ring Road strategically as a corridor solution and not a series of localised solutions.

The proponent then identified a number of interventions, which were developed and packaged into six strategic options:

- Option 1 – Do nothing (base case)
- Option 2 – Truck prioritisation and separation
- Option 3 – Public transport and high occupancy vehicle prioritisation
- Option 4 – Implement Intelligent Transport Systems (managed motorways)
- Option 5 – Increase road capacity
- Option 6 – Increase road capacity and implement Intelligent Transport Systems.

Option 6 has already been implemented across the completed sections of the M80 ring road.

The proponent did not consider non asset solutions, such as road pricing, noting this was not included in the scope of full M80 upgrade. The proponent also did not consider alternative transport modes.

The proponent evaluated the options against benefits (sustained increase in commercial and industrial activity, improved road safety and improved transport network efficiency), costs, delivery period, risks and dis-benefits. The options were ranked against each benefit. The proponent chose Option 6 as its preferred alternative, followed by Option 5.

An earlier business case for the M80 was assessed by Infrastructure Australia in 2013. That assessment considered the economic viability of the M80 upgrade as a whole, whereas the current assessment considers only the economic viability of those sections of the corridor which have yet to be funded or upgraded. Infrastructure Australia's 2013 assessment noted the proponent's stated BCR of 2.2 for the whole upgrade, using a 7% discount rate and P50 cost estimate, and concluded that the project would likely have benefits in excess of costs.

5. Economic evaluation

The proponent's economic evaluation indicates the proposal has a BCR of 2 using a 7% real discount rate and P50 capital costs. The net present value of the project would be \$552.6 million (7% real discount rate, P50). The proponent has not estimated wider economic benefits (WEBs), and the parameters used in the economic evaluation are reasonable. We are confident that the BCR would be greater than 1.

Though the cost benefit analysis methodology is sound, the traffic modelling in the business case used a microsimulation model, which includes the M80 corridor and all on and off ramps.

The study area defined for the traffic model does not include the adjoining roads beyond the M80. This means that two of the three segments to be upgraded are located at the end points of the model. This is potentially problematic because the model stops counting decongestion benefits at the end points when, in fact, additional decongestion benefits could be included as the traffic moves onto the adjoining roads. The implications are different at the two ends of the M80:

- At the northern end, where the M80 meets the Greensborough Highway, a flyover ramp at the Greensborough Highway interchange would reduce congestion from traffic exiting the M80 onto the Greensborough Highway and minimise queuing, but the incremental costs of this would need to be considered
- At the southern end, where the M80 meets the West Gate Freeway, the proposed Western Distributor project will provide additional capacity beyond the M80 and more of the benefits of the M80 upgrade could be realised.

Some of the limitations above could have been addressed through the use of a strategic transport model. Despite these limitations, there is strong strategic merit in building additional road capacity on the M80, in its role as a metropolitan ring road. The M80 facilitates access to Melbourne's port, airports and other major road corridors. We are confident that the project will have benefits that are higher than its costs.

The model used does not allow for induced demand. The inclusion of induced demand in the modelling may reduce project benefits if the transport network in the project option reaches capacity before the end of the evaluation period. Demand management tools, such as road pricing and managed motorways, could play an important role in maximising benefits.

Major cost items

The major cost items are as follows (PV at 7% real discount rate):

- Capital costs - \$515.1 million (P50)
- Operating costs - \$11.9 million.

The total costs of the project are estimated to be \$527 million in present value terms using a 7% real discount rate.

The proponent has developed the business case and conducted the cost-benefit analysis using P50 capital cost estimates and has estimated the BCR and NPV accordingly. However, the proponent has provided P90 capital cost estimates as it is seeking Australian Government funding on the basis of P90 capital costs.

Total capital cost (nominal, undiscounted)	\$686.9 million (P50) \$713.7 million (P90), comprising: <ul style="list-style-type: none"> • Princes Freeway – Western Highway: \$345.1 million • Sydney Road – Edgar Road: \$233.7 million • Plenty Road – Greensborough Hwy: \$134.8 million
Proponent's proposed Australian Government funding contribution (nominal, undiscounted)	\$535.3 million (75% of the total P90 capital cost)
Other funding (source / amount / cash flow) (nominal, undiscounted)	\$178.43 million State Government

Major sources of benefits

The major sources of benefits are as follows (PV at 7% real discount rate):

- Travel time savings – light vehicles - \$861 million (80% of total benefits)
- Travel time savings – freight - \$189 million (18%)
- Vehicle operating cost savings – light vehicles - \$11 million (1%)
- Vehicle operating cost savings – freight - \$21 million (2%)
- Crash cost savings - \$43 million (4%).

The above gross benefits are offset by a disbenefit, which is measured in PV at 7% real discount rate:

- Environmental externalities - -\$45 million (-4% of total benefits)

The total benefits of the project (net of disbenefits) are estimated to be \$1,080 million in present value terms using a 7% real discount rate.

The net economic benefits of the project, as measured by the net present value at 7% real discount rate, is estimated to be \$552.6 million.

Deliverability

The preconstruction and tender phase is proposed to begin in financial year 2016-17. Detailed design for the project will be completed as part of a Design and Construction tender. Once the final design is completed, the proponent will be able to provide more detail on the deliverability of the project.

A benefits realisation plan has been developed for the project, which includes reporting and monitoring of actual benefits and performance reporting requirements. Infrastructure Australia encourages the proponent to monitor benefits arising from the project.

To ensure realisation of the benefits of the project, the proponent could consider:

- Options to manage demand through the use of road pricing - this would ensure that the M80 does not become re-congested quickly and it allocates road space to the highest value users, such as freight. User charging would be one mechanism with the potential to offset induced demand which has been observed on the previously upgraded sections of the M80
- Options to improve the connection from the M80 to the Greensborough Highway.

The three remaining sections have been designed to allow for future upgrades. For example, the upgrade on the Plenty Road to Greensborough Highway section does not preclude any future plans for the North East Link.

The proponent has evaluated a range of procurement options for the project against a number of criteria, including value for money, risk, safety, delivery time, and stakeholder and traffic management. A Design and Construct contract was found to have better value for money, lower risks, and a shorter time to award a contract and commence work, although it had a higher cost of tendering than a 'construct only' contract.

The proponent has identified a number of risks to be included in the risk management strategy, such as:

- Stakeholder relations
- Traffic disruption impacts during construction
- Project delay due to funding or regulatory constraints
- Impact of freeways not considered in traffic modelling (i.e. North-East Link, E6¹, E14², West Gate Distributor and CityLink Tullamarine Freeway Widening). At the time the M80 was planned, these projects were considered as long term proposals which would occur beyond the design horizon year 2031 and were not included in the base case for the economic analysis. Modelling by the proponent indicates that these projects are likely to affect demand along sections of the M80
- Construction industry market conditions impacting on project costs.

The proponent has indicated that risks will be proactively managed throughout the entire life of the project. For example, the risk of induced demand exceeding the increased capacity of the works over the evaluation period will be managed through the use of managed motorways technology such as ramp metering, traffic flow management onto the M80, and journey planning notices to the community.

The proponent has not investigated opportunities for user funding of the project, noting that this was not included in the scope of the original scope of the full M80 upgrade. For similar projects, Infrastructure Australia would encourage proponents to consider network-based road user charging as part of the funding options assessment.

This evaluation summary was considered by the Infrastructure Australia Board in September 2016.

Following Infrastructure Australia's process of fact checking the evaluation summary with the proponent prior to publication, the brief was amended to clarify the proposed project timeframe.

¹ A future Outer Metropolitan Ring Road.

² A future arterial road in Melbourne's north-west.